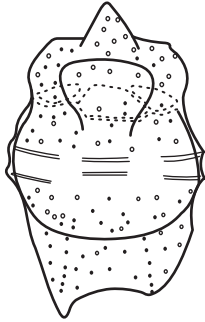
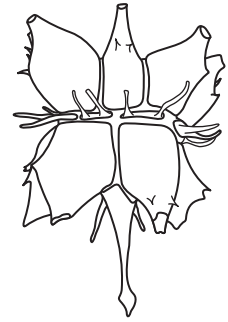


THE LENTIN AND WILLIAMS INDEX OF FOSSIL DINOFLAGELLATES 2017 EDITION



Graham L. Williams¹
Robert A. Fensome^{1*}
and
R. Andrew MacRae²



¹Geological Survey of Canada (Atlantic), Bedford Institute of Oceanography,
P.O.Box 1006, Dartmouth, Nova Scotia, Canada, B3Y 4A2

²Saint Mary's University, Geology Department, 923 Robie Street, Halifax,
Nova Scotia, Canada B3H 3C3

*corresponding author: rob.fensome@canada.ca



AASP Contributions Series Number 48

AMERICAN ASSOCIATION OF STRATIGRAPHIC PALYNOLOGISTS
FOUNDATION

January 2017

ISSN 0160-8843

TABLE OF CONTENTS

Abstract.....	2
Introduction.....	3
Important note regarding ages	5
Dinoflagellates	5
Rules of nomenclature	7
General remarks	7
Ranks of taxa.....	7
Status, typification and priority.....	8
Nomenclature of taxa according to their rank.....	14
Effective publication.....	16
Valid publication.....	13
Citations	23
Rejection of names.....	25
Orthography and gender	26
Key dates.....	28
Format.....	29
Entries	29
Note on citations	32
Glossary	33
Acknowledgements.....	40
Main Index	42
Appendix A.....	859
Appendix B.....	948
References.....	972

The effective date of publication for AASP Contributions Series No 48 is January 5, 2017

ABSTRACT

Included in this 2017 edition of the Lentin and Williams Index are all fossil dinoflagellate taxa at and below generic rank known to the authors as of 31st July 2016. The Index now has 667 generic and 4,464 specific "correct" names, and includes in total 9,910 taxonomic entries in its main part (exclusive of appendices), as well as over 2,400 references. There are 728 entirely new taxonomic entries and 1,471 modified entries. Validly published and legitimate names are listed, as well as those that are effectively published, but are not valid or are illegitimate. Information on synonymies, nomenclatural types, nomenclatural status, history, and geologic age is also provided. The age cited for each taxon of species or infraspecific rank is, unless otherwise specified, that attributed to it in the protologue. It is not intended to be a full or up-to-date statement of the range of the species, and users are advised to consult the literature for potentially more detailed and precise information. Proposals include 5 new names (*Bohaidina arenula*, *Bohaidina enodis*, *Parabohaidina arenata*, *Parabohaidina bulla* and *Parabohaidina runcinatus*), all necessary because of the inadvertent creation of homonyms in the literature. Also proposed are two new combinations (*Danea spinosa* and *Nyktericysta spinosa*), made necessary by generic synonymys. Taxa at some time included in non-dinoflagellate or extant dinoflagellate genera are listed in two appendices. Appendix A lists all non-dinoflagellate genera that at some time have included species or infraspecific taxa now or previously considered dinoflagellates; it also includes genera listed in the main text of previous editions of the Index but not (now) considered dinoflagellates. Appendix B includes extant dinoflagellate genera based on motile types to which cyst taxa have been assigned. This edition of the Index is a digital publication and is released in parallel with a new version of the DINOFLAJ database, DINOFLAJ3 (<http://dinoflaj.smu.ca/dinoflaj3/>).

INTRODUCTION

This 2017 edition of the Lentin and Williams Index (hereafter “the Index”) is being released in tandem with a new version of the DINOFLAJ database — DINOFLAJ3. In fact, it has been generated from the database, though the entries for the latter were formulated in the same way as entries for previous editions of the Index, the most recent of which was Fensome and Williams (2004). The main difference between the 2017 edition of the Index and previous editions is the exclusive use of digital publication, both to follow the modern preference for digital material and for practical reasons, given that it is over 1100 pages long when formatted as a document.

The merit of having both a web version of DINOFLAJ3 and a digital formal publication is that the former offers a modern, flexible, easily accessible database that can be adapted for use in conjunction with other databases, while the latter enables formal nomenclatural changes to be proposed (see the sections dealing with nomenclature below) and a more conventional format for those who prefer that style. Throughout, as in previous editions of the Index, we follow the formal rules of nomenclature, as now contained in the International Code of Nomenclature for Algae, Fungi and Plants (ICN), previously known as the International Code of Botanical Nomenclature (ICBN) (see below).

As with previous editions of the Index and versions of DINOFLAJ, the main objective of this edition of the Index is to list all dinoflagellate taxa of generic and lower rank cited in formal publications and based on fossil or fossilizable types. In both the 2017 Index and DINOFLAJ3, we have included information from publications available to us as of 31 July 2016. Where life-cycle relationships are known, we indicate the name of the motile equivalent.

The Index has three sections: Main Index, Appendix A and Appendix B. The Main Index contains all genera based on fossilizable dinoflagellates, mainly organic-walled, calcareous and siliceous cysts. Appendix A contains non-dinoflagellate genera (fossil and modern) as well as forms that have at one time or other been considered to be, or have been associated with, dinoflagellates. Appendix B contains dinoflagellate genera that are not based on fossil or fossilizable types. Taxa included in the appendices are those necessary to complete the histories of taxa in the main section.

Besides citing organic-walled, calcareous and siliceous cysts, the Main Index includes genera based on mineralized skeletal elements (e.g. *Actiniscus*); and genera based on extant fossilizable

cysts (e.g. *Brigantedinium*). Another unusual taxon included in this section is *Succiniperidinium inopinatum*, a species based on a motile form preserved in Cretaceous amber.

The line between fossil and living dinoflagellates is becoming increasingly blurred with the growing number of studies of cyst-forming modern species, promoted in large part by the paleoecological significance of these forms. Most researchers agree that a dual nomenclature of fossil and living dinoflagellates (effectively cysts and motile stages) needs to be maintained, even if some may prefer to use just one. Such a dual approach is permissible under the ICN (see below and Head et al. 2016). However, a quandary arises in terms of what to include in the Main Index when a cyst name is based on a living type, as we consider living dinoflagellates to be beyond our scope other than to identify equivalence with fossil taxa. For clarity, in the Main Index we include all genera typified by fossils, as well as genera based on preservable living cysts. We do not include modern cyst-based species assigned to extant, motile-based genera unless they are subsequently transferred to a fossilizable-cyst-based or fossil genus.

Unless there is a compelling reason not to do so, we have generally accepted the latest systematic treatment of a particular taxon in the literature, provided that the latest author indicates that previous taxonomic treatments and nomenclatural proposals have been considered and are in accord with the rules of the ICN.

The number of genera and species in the Main Index has increased remarkably since the first edition of the Index (Lentin and Williams, 1973). The 2017 Index (and DINOFLAJ3) now has 667 generic and 4,464 specific "correct" names, and includes in total 9,910 taxonomic entries in its main part (exclusive of appendices), as well as over 2,400 references. In this edition, 728 taxonomic entries are entirely new, and 1,471 entries have been modified.

A major effort in this edition has been the re-evaluation of 21 references by C. G. Ehrenberg, dating from the 1800s. Many of his papers were initially read, then printed and distributed as separates, then published in journals, these events commonly taking place in different years. Given the convoluted nature of establishing actual effective publication dates, the years assigned to some of Ehrenberg's references have varied from publication to publication (by us and others). Thanks to access to digital reproductions of Ehrenberg's original papers and our re-assessment of information they record, we hope that many of the problems surrounding Ehrenberg's papers have been resolved herein. However, users should be aware that the dates

we now assign to many of Ehrenberg's publications have changed from those given in previous editions of the Index.

Important note regarding ages.

The age cited for each taxon of species or infraspecific rank is, unless otherwise specified, that attributed to it in the protologue. **Ages cited in the Index are thus not intended to be full or up-to-date statements of species ranges**; users are advised to consult the literature for potentially more detailed and precise information.

DINOFLAGELLATES

Dinoflagellates are primarily single-celled, eukaryotic organisms (protists) with at least one life-cycle stage bearing two distinctive flagella: a ribbon-like, wavy transverse flagellum that almost encircles the cell and a longitudinal flagellum that trails posteriorly. The combined motion of the two flagella causes the cell to move forward in a spirally rotating manner. The term "dinoflagellate", originated from the Greek "dinos" (= a whirl or eddy) and the Latin "flagellum" (= a small whip). Most dinoflagellates at some stage in their life cycle have a dinokaryon, a nucleus characterized by the absence of histones and by chromosomes that remain condensed between cell divisions. Mitosis is said to be closed, meaning that the nuclear membrane does not break down and the mitotic spindle remains outside the nucleus. The presence of characteristic dinoflagellate flagella and/or a dinokaryon are diagnostic for the division (or phylum) Dinoflagellata.

Dinoflagellates typically possess vesicles in the motile cell's peripheral region. The latter is termed the amphiesma and the vesicles are, accordingly, termed amphiesmal vesicles. These vesicles may be empty, or they may contain thin to thick, usually cellulosic, thecal plates, the overall assembly of thecal plates being termed the theca. The number and arrangement of the thecal plates is referred to as tabulation. Tabulation is an important criterion in the classification of several major groups, including the Peridiniphyceae, which includes the vast majority of fossil dinoflagellates. Other genera recognized as fossils are included in the Gymnodiniphyceae and Dinophysiphyceae (Fensome et al., 1993b).

Many dinoflagellates are known to have complex life cycles, which usually include one or more, non-motile or cyst stages. The main types of cyst are resting cysts, temporary cysts and vegetative cysts. Most fossil dinoflagellates are thought to be hypnozygotes, resting cysts resulting from sexual fusion (Dale, 1983), although this is unproven except for a few Holocene examples. That they are representative of a cyst stage is confirmed by their possession of an excystment opening, termed an "archoepyle". Several fossil dinoflagellate genera, however, appear to represent other stages in the life cycle. For example, *Dinogymnium* and its allies appear to represent the remains of discarded pellicles (Fensome et al., 1993b). The pellicle is a continuous layer that in some dinoflagellates occurs beneath the theca or amphiesmal vesicles of motile cells; it may be homologous with the cyst wall.

Dinoflagellates include both autotrophs and heterotrophs, and thus the group as a whole is properly referred to as protists rather than algae or protozoa. These organisms have been treated under both the International Code of Zoological Nomenclature (ICZN) and the International Code of Botanical Nomenclature (ICBN; now the ICN). To bring a degree of stability to the nomenclature, Downie et al. (1961) proposed that all dinoflagellates be treated under the ICBN. This proposal has been adopted widely (completely for fossils) and in this, as in previous editions of the Index, we follow the rules of "botanical" nomenclature as now found in the ICN. The latest version of the ICN is the "Melbourne Code" (McNeill et al., 2012; <http://www.iapt-taxon.org/nomen/main.php>), and it is this version that we refer to unless otherwise stated. The rules expressed in the ICBN/ICN do change: for example the requirement for an English or Latin diagnosis or description for fossils was instituted in 1995; however, these are not usually retroactive, as that would cause great nomenclatural instability. In the following section we review the ICN, especially as it relates to fossil dinoflagellates. But we can't over-emphasize that this review should not be used in place of direct reference to the ICN; note that we have generally omitted reference to measures and complications that we consider not relevant to the nomenclature of fossil dinoflagellates. At the end of the section on nomenclature we provide a list of critical dates from the Code for quick reference.

RULES OF NOMENCLATURE

General Remarks

The ICN (also referred to herein as "the Code") assumes a hierarchical classification, the basic unit being the species. However, other than this basic exception, the Code is concerned with nomenclature, not taxonomy (Fensome and Skog, 1997). Provisions of the ICN can be suspended through a formal process of conservation or rejection of names; names so affected are listed in an appendix to the Code. Below we highlight key sections of the Code, with examples mainly from this edition of the Index to illustrate the discussion. The Code is divided into chapters and these are divided into sections and articles. Here, for expediency, we focus on articles, which are numbered from 1 to 62 cumulatively across sections and chapters. Related topics are dealt with in paragraphs within an Article, which are generally referred to with numbers subordinate to the appropriate article number: thus the first paragraph in Article 1 is Article 1.1. Most terms are explained at first mention, but further elucidation for many terms can be found in the Glossary below. At the end of the section on Rules of Nomenclature we have compiled a list of key dates at which particular rules took effect.

Ranks of Taxa

Articles 1 to 5 of the ICN are concerned with the ranks of taxa. **Article 1.2** clarifies that a fossil-taxon is one based on a fossil type: it specifies that “A fossil-taxon comprises the remains of one or more parts of the parent organism, one or more of their life history stages, in one or more preservational states” Thus fossil dinoflagellate cysts clearly fall into the “life history stage category”, and as such are well entrenched in the Code. The concept of fossil-taxa replaces earlier concepts of form-, organ- and morphotaxa. **Articles 3.1, 4.1 and 4.2** list the ranks to which an organism can be assigned. The ranks referred to in the Index are, in descending scale: genus, subgenus, section, species, subspecies, variety and form

In the first edition of the Index, Lentin and Williams (1973, p.3–5) discussed the infraspecific classification then used for fossil dinoflagellates, and recommended that the ranks subspecies, variety and form not be used indiscriminately, which was a tendency at the time. Consequently, Lentin and Williams (1973, 1975, 1977b, 1981, 1985, 1989, 1993) consistently raised varieties and forms to subspecific rank. An example is *Amphorosphaeridium fenestratum* var. *dividum*

Davey, 1969c, which Lentin and Williams (1973) raised to the subspecific rank. In the 1998 and 2004 editions (Williams et al., 1998 and Fensome and Williams, 2004), the latest taxonomic treatments in the literature were generally followed with regard to infraspecific rank. However, we still have misgivings about the value of uneven treatment and recommend that, if infraspecific taxa must be used, they be designated as subspecies, nuanced definitions of infraspecific ranks in our view being meaningless in our field. Although we list infrageneric taxa (subgenus and section) after the genus and all of its species, we similarly consider that use of these ranks adds unnecessary complication in the classification of fossil dinoflagellates.

Status, Typification and Priority

Articles 6 to 15 deal with general provisions for the status, typification and priority of names. **Article 6** states that a name must be effectively published and validly published in order to be a legitimate name — i.e. one that satisfies the rules. It does not follow that names not in accordance with the rules are illegitimate, as discussed below (as are the definitions of effectively and validly published). **Article 6.6** states that "At the rank of family or below, the correct name of a taxon with a particular circumscription, position, and rank is the legitimate name which must be adopted for it under the rules" This implies that the correct name is the senior (earliest) legitimate name of a group of legitimate names that are considered to be taxonomic synonyms. The species name *Xanthidium* (now *Spiniferites*) *ramosum* is legitimate, as are the names *Xanthidium furcatum*, *Galea koryka*, *Hystrichosphaeridium echinoides*, *Areoligera birama*, *Geodia? tripunctata* and *Homotryblium distinctum*. All seven names, as well as being legitimate, are correct as long as they are considered to represent separate species. However, the last six species have been considered taxonomic junior synonyms of *Xanthidium* (now *Spiniferites*) *ramosum*. Since we accept all these names to be synonyms, the correct name for the species is *Spiniferites ramosus*, as this name, being the earliest (or earliest-selected in cases where names are of the same vintage), has priority over the other six names. Note that the word "correct" thus has a specific meaning in this context. Article 6 also has paragraphs dealing with autonyms, new combinations and new (replacement) names.

Typification is the subject of **Articles 7 to 10**. According to **Article 7.1**, all names of taxa at the rank of family or below (and of names above family when based on a generic name) must have a nomenclatural type. A nomenclatural type, as defined in **Article 7.2**, is "... that element

to which the name of a taxon is permanently attached, whether as a correct name or as a synonym" (see also the discussion under Article 10.1 below).

Article 7.4 states that: "A replacement name ... is typified by the type of the replaced synonym ...". Thus, *Hystrichokolpoma wilsonii*, proposed as a substitute name, has the same type as the illegitimate homonym, *Hystrichokolpoma truncatum* Wilson, which it replaced.

Article 7.6 stipulates that the type of an autonym is the same specimen as the type of the (specific) name from which it is derived. Thus, the autonym *Circulodinium distinctum* subsp. *distinctum* has the same holotype as *Circulodinium distinctum*. Interspersed among its Articles, the ICN has Recommendations that ought to be followed but are not binding. **Recommendation 7A** urges that material on which the name of a taxon is based, especially the holotype, be deposited in a public herbarium or other public collection with a policy of giving bona fide researchers access to deposited material, and that it be scrupulously conserved. Fortunately, this seems to happen more often than not for fossil dinoflagellates, with a very positive impact on the taxonomic stability of the group.

Holotypes, lectotypes, and neotypes of species and infraspecific taxa (e.g. subspecies) are defined in **Articles 8 and 9**. **Articles 8.1** stipulates that the type is a single specimen or illustration, and **Article 8.5** restricts this to only specimens (except for epitypes — see below) for fossils. **Article 9.1** defines a holotype of a name as the specimen designated by an author as the nomenclatural type. As long as a holotype exists, it fixes the application of a name. When the holotype is missing or destroyed, or when the original author did not designate a holotype (prior to 1958), a lectotype can be designated from the original material (**Articles 9.2**). Note that the Code specifically uses the word "missing", so there is no need to demonstrate that a holotype has been destroyed in order for a lectotype to be designated. An example of a lectotype is that designated by Jan du Chêne and Londeix (1988) for *Achomosphaera andalousiensis*, this designation being necessary because the holotype is lost. Under **Article 9.3**, "original material" can include any specimens seen by the original author, whether or not cited in the original publication. Where no original material remains, a neotype is designated (**Articles 9.7**) from material not used by the original author. The first author to designate a lectotype or neotype for a particular name must be followed (Article 9.19) unless such a specimen is shown to be in conflict with the protologue (everything associated with the name at its valid publication); in that case the lectotype or neotype may be superseded (**Articles 9.18, 9.19**). Thus, Sarjeant (1984a)

designated a lectotype for *Gonyaulax* (now *Cribroperidinium*) *granulatum* because the holotype had disintegrated. Brenner (1988) argued that the lectotype designated by Sarjeant was not conspecific with the holotype, and so designated as lectotype the specimen illustrated in Brenner (1988, pl.1, figs.3a–c). Inevitably, such debates involve subjective taxonomy. Authors who agree with Brenner must adhere to Brenner's lectotype; authors considering the holotype and both lectotypes to be conspecific are obliged to adhere to Sarjeant's lectotype.

Other sorts of type are accommodated in **Article 9**. **Article 9.6** allows for paratypes, which are specimens cited in the protologue other than the holotype: the article does not specify that such a specimen needs to have been cited as a paratype in order to be considered one. Paratypes have no definitive nomenclatural role, although they are potential lectotypes if the holotype is lost. The term "isotype" has been used by some palynologists (e.g., Drugg, 1978). According to **Article 9.4**, an isotype is "any duplicate of the holotype". As with the broad definition of the word "specimen" in **Article 8.3**, the word "duplicate" in Article 9.4 is tacitly underpinned by genetic identity in a modern botanical context. Hence, the term isotype should be avoided in a fossil context. A syntype is any specimen cited in the protologue when no holotype has been designated (**Article 9.5**); hence this term is applicable only for names validated prior to 1958, when designation of holotypes became mandatory (see below).

An epitype is a specimen selected to serve as an interpretative type when the holotype, lectotype or neotype is "demonstrably ambiguous" (**Article 9.8**). **Article 9.20** specifies that the author who first designates an epitype must be followed, and a new epitype may be designated only if the original epitype is lost or destroyed. As with other kinds of type, an epitype is not validly published unless its repository is specified (**Article 9.19**). As far as we are aware, no epitypes have yet been designated for fossil dinoflagellates. However, this device may prove a useful addition to the "tool box" in helping to solve some difficult taxonomic issues related to fossil dinoflagellates.

Fensome et al. (1990) and Fensome et al. (1998a) identified examples among acritarchs where an author listed a holotype in the text but did not specify which of the illustrations represented that specimen. The name *Moyeria uticaensis* Thusu, 1973 is an example. Fensome et al. (1990) faced a quandary as to whether such a name was validly published: they decided that it was not, since in effect no useful holotype had been designated. To resolve this issue, Fensome et al. (1998a) proposed new articles, incorporated in the St. Louis Code (Greuter et al.,

2000) and now **Articles 9.15** and **43.3**. **Article 9.15** effectively states that such a name, if published before 2001, should be considered as validly published, but one of the illustrated specimens should be designated as a lectotype until the identity of the holotype (if represented among the illustrations in the protologue) is confirmed. Hence, the name *Moyeria uticaensis* was validly published in 1973. **Article 43.3** indicates that, after 2000, at least one illustration must be identified as the holotype: hence, if published now with the same material, *Moyeria uticaensis* would not be validly published.

Article 10.1 states that: "The type of a name of a genus or any subdivision of a genus is the type of the name of a species" This article, in conjunction with **Article 7.2** on the permanence of types, implies that the type of a generic name remains the holotype of the name of the "type species" as designated by the author of the generic name. For example, Duxbury (1983, p.58) designated *Cepadinium variabile* as the "type species" of *Cepadinium*. Lister and Batten (1988b, p.43) considered *Cepadinium ventriosum* to be a taxonomic synonym of *Cepadinium variabile*. Since *Cepadinium ventriosum* is the senior name, it becomes the correct name for the "type species" of the genus *Cepadinium*. However, the nomenclatural type of the generic name *Cepadinium* remains the holotype of *Cepadinium variabile* (Duxbury, 1983, pl.9, fig.8; text-fig.27A–E). Article 10.1 also notes that "For purposes of designation or citation of a type [of a genus], the species name alone suffices" However, because the identity of the generic type has sometimes been misconstrued in the fossil dinoflagellate literature, we suggest that citing the type specimen of a genus rather than the correct name for the "type species" avoids confusion and misunderstanding. **Article 10.6** indicates that the type of a name of a family or any subdivision of a family is the same as that of the genus on which its name is based. The same is true for taxa above the rank of family that are based on generic names (**Article 10.7**).

Articles 11 to 12 deal with priority. Each taxon of family or lower rank can bear only one correct name (**Article 11.1**). Of importance for fossil dinoflagellates is the second sentence in Article 11.1, which states: "However, the use of separate names is allowed for fossil-taxa that represent different parts, life-history stages, or preservational states of what may have been a single organismal taxon or even a single individual." In the past such variants were covered under provisions for form-, organ- and morphotaxa, but these terms have now been dropped in favour of a general reference to fossil-taxa. What this means is that a single biological taxon

(however that may be defined) may have separate “extant” and “fossil” names (if the latter is based on a fossil specimen representing, say, a particular life-cycle stage such as a cyst). An example involves the species names *Pyrophacus steinii* and *Tuberculodinium vancampoae*: the former is typified by a living dinoflagellate, and the latter is based on a fossil cyst. The provision of Article 11.1 allows for an individual author to decide whether to treat the two generic names as taxonomic synonyms or to retain both separately. In the Index we retain all fossil-cyst based names separately from any known motile equivalents, following the generally accepted practice of dual nomenclature for dinoflagellates (Head et al., 2016). This is an excellent example of the flexibility in well-considered nomenclatural rules allowing for freedom in taxonomic decision-making. Not all nomenclatural rules are so well-considered!

At family to generic rank, the correct name is the earliest legitimate name at that rank (**Article 11.3**). For each species, subspecies, variety and form, the correct name is the combination of the final epithet of the earliest legitimate name at that rank (except for autonyms — **Article 11.6** — and a few other specified cases) combined with the correct name of the genus or species to which it is assigned (**Article 11.4**). In cases of equal priority, the first effectively published choice establishes priority (**Article 11.5**). The order in which names appear in an individual publication has no bearing on priority. The name *Hystrichosphaeridium recurvatum* subsp. *polypes* was proposed by Cookson and Eisenack (1962b) and was later raised to specific rank, as *Polysphaeridium? polypes*, by Davey and Williams (1966b). Two years earlier, Tasch in Tasch et al. (1964) had proposed the species name *Hystrichosphaeridium unituberculatum*, which is now considered synonymous with *Polysphaeridium? polypes*. Unfortunately, since “*unituberculatum*” was proposed at species rank in 1964 and “*polypes*” was not raised to species rank until 1966 (although proposed at subspecific rank in 1962), the more cumbersome epithet has to have priority over the more elegant one at species rank, as *Kiokansium unituberculatum*.

Article 11.7 states that “... names of fossil-taxa (diatom taxa excepted), compete only with names based on a fossil type.” This is followed by **Article 11.8**, which states “Names of organisms (diatoms excepted) based on a non-fossil type are treated as having priority over names of the same rank based on a fossil type”. As pointed out by Head et al. (2016), Article 11.8

"... is meant to address the priority of names based on a non-fossil type that are considered to be synonyms of those based on a fossil type when these names are applied to a non-fossil taxon. However, it could be interpreted to mean that a name based on a non-fossil type must also be applied to a fossil-taxon if both non-fossil and fossil-taxa are considered equivalent, such as when they represent different parts of the same life cycle. This would then be at odds with dual nomenclature and potentially contradict Art. 11.7."

Hence, Head et al. (2016) proposed an amendment of Article 11.8, as follows: "Names of organisms (diatoms excepted) based on a non-fossil type are treated as having priority over names of the same rank based on a fossil type *where these names are treated as synonyms for a non-fossil taxon*" (italics added here to indicate the additional phrase). If this amendment is accepted (ultimately at the 2017 International Botanical Congress), it will clarify and confirm the use of dual cyst (fossil) and motile nomenclature for dinoflagellates. For the purposes of this edition of the Index, we interpret Article 11.8 in the sense of the new proposed amendment, as we did in previous editions of the Index. Head et al. (2016) propose a new example to be added under Article 11.8. This example involves *Votadinium calvum*, which was proposed by Reid (1977) as a new fossil-species, acknowledging that it is the cyst of the extant species *Peridinium oblongum*. *Votadinium calvum* can be used as the correct name for the cyst because it has a fossil type and does not compete for priority with *Peridinium oblongum*.

Article 13.3 states that "For nomenclatural purposes, a name is treated as pertaining to a non-fossil taxon unless its type is fossil in origin. Fossil material is distinguished from non-fossil material by stratigraphic relations at the site of original occurrence." Thus, to paraphrase interpretively, a specimen is a fossil for nomenclatural purposes if it is found in strata. For example, based on this definition, and following Head et al. (2001) and Head (2003a), we consider the name *Echinidinium granulatum* to have been not validly published in its original proposal by Zonneveld (1997). The holotype is from a sediment trap and does not have a stratigraphic context; hence it must be treated as extant, its name (at the time of its proposal) requiring a Latin diagnosis. However, *Echinidinium bispiniformum* has a holotype from ocean floor sediment and has a stratigraphic context; hence it may be treated as a fossil, its name not requiring a Latin diagnosis for validation (Head, 2003a, p.171–172).

Article 12.1 states that: "A name of a taxon has no status under this Code unless it is validly published" Thus, only validly published names can be considered legitimate, illegitimate, correct, or for priority. Limitation of priority is covered in **Articles 13 to 15**. According to **Article 13.1f**, only names of fossil plants published after 1820 can be considered as validly published. Fortunately, this includes all names of fossil dinoflagellate taxa.

Conservation of names against others that would otherwise have priority is dealt with in **Article 14**. Names can only be conserved through submission to the General Committee (normally via a proposal in the journal *Taxon*), which refers the proposal to the appropriate subcommittee: in the case of fossil dinoflagellates this is the Committee for Fossil Plants. If recommended at the committee stages, proposals for conservation of names must be subjected to a decision of an International Botanical Congress (**Article 14.14**). Conservation cannot be achieved by individual taxonomists in general publications. Davey (1978) proposed in the general literature that the dinoflagellate generic name *Tenua* be "conserved" with a different type to that proposed by Eisenack (1958a), who first used the generic name *Tenua*. However, Davey's proposal is not in accordance with **Article 14**, and *Tenua* Davey (with the holotype of *Tenua rioultii* as type) must be considered an illegitimate junior homonym of *Tenua* Eisenack (with the holotype of *Tenua hystrix* as type). Similar situations surround the generic names *Aiora* and *Compositosphaeridium*. Among dinoflagellates, the family name Rhaetogonyaulaceae (Fensome et al., 1998c) and the generic name *Diphyes* (Harris and Fensome, 2000) have been formally conserved and are listed in the Code. **Article 15** deals with sanctioned names, a concept that does not (yet) affect fossil dinoflagellates.

Nomenclature of Taxa According to their Rank

Articles 16 to 28 deal with the nomenclature of taxa in relation to their rank. **Articles 16 to 19** are concerned with taxa above generic rank. **Articles 20 to 22** cover names of genera and their subdivisions above the rank of species. **Article 20.1** specifies that the name of a genus is a noun or a word treated as such; it must not coincide with an active Latin morphological term (**Article 20.2**). A generic name must not consist of two unhyphenated words (**Article 20.3**). Thus, *Ovum hispidum* is not an acceptable generic name; unhyphenated multiple word generic names apparently are not to be considered valid in their initial publication, though they may subsequently be made acceptable by the addition of a hyphen. Recommendation 20A

encourages authors of generic names to use Latin terminations, to avoid names that are not adaptable to Latin, that are long, that are of mixed language, that are similar to a contained species name, and that are dedicated to individuals outside natural science.

Article 21.1 indicates that the name of a subdivision of a genus is a combination of a generic name and a subdivisional epithet, with a connecting term (e.g. "subgenus") to denote rank. Hence *Protopteridinium* subgenus *Archaopteridinium* is a proper rendition of the subgeneric name. When a specific epithet is added and the subdivisional epithet is deemed necessary, the subdivisional epithet should be placed in parentheses: for example, *Protopteridinium* (*Archaopteridinium*) *minutum* or *Protopteridinium* (subgenus *Archaopteridinium*) *minutum* are both acceptable (**Recommendation 21A**).

Under the provisions of **Article 22.1**, the name of any subdivision of a genus that includes the type of the genus is an autonym and repeats the generic name as its epithet; it is not followed by an author citation. An example is *Protopteridinium* subgenus *Protopteridinium*.

Article 23 deals with the names of species. **Article 23.1** states that the name of a species is a binary combination consisting of the name of the genus followed by a single specific epithet. (Note that the term epithet refers to part of a name: thus, for *Oligosphaeridium complex*, *Oligosphaeridium* is the generic name, *Oligosphaeridium complex* is the specific name, and *complex* is the specific epithet. An epithet cannot stand alone.) The specific epithet can be in the form of an adjective (e.g. *Kallosphaeridium granulatum*) or a noun in the genitive (e.g. *Cribropteridinium wilsonii*) or in apposition (e.g. *Trichodinium castanea*). If an adjective and not a noun, a specific or infraspecific epithet must agree grammatically with the generic name, as in *Riculacysta perforata* (**Article 23.5**; see also Orthography and Gender below). Epithets not conforming with this rule are to be corrected; in the Index we treat such corrections as typographic errors and ordinarily make the changes without comment unless there are complications regarding the etymology or past understandings of it. If an epithet is a noun in apposition (N.I.A.), its ending is not changed to agree with the gender of the generic name, as for example with *Cordosphaeridium cantharellus* (the epithet referring to a specific type of mushroom). If the specific epithet is not of a single word, it can be considered valid in the initial publication (in contrast to the situation for generic names) but the words must be united or hyphenated in subsequent use if they were not originally thus proposed. An example of a name with a hyphenated epithet is *Subtilisphaera pontis-mariae*.

Article 23.4 states that a specific epithet may not be a tautonym — i.e. repeat exactly the generic name. Thus, the specific name *Galea galea* is not validly published, even if the generic name *Galea* were not a homonym. (This contrasts with the International Code of Zoological Nomenclature where such tautonyms are acceptable: e.g. *Bison bison*.) **Recommendation 23A** involves similar exhortations to those listed under Recommendation 20A above.

Names of taxa below the rank of species (infraspecific taxa) are covered in **Articles 24 to 27**. **Article 24.1** states that the name of an infraspecific taxon is a combination of the name of a species and an infraspecific epithet, these being connected by a term denoting the rank (e.g. subspecies, varietas, forma). **Article 24.2** notes that infraspecific epithets are formed in the same way as specific epithets: for example, where adjectival, they must agree grammatically with the generic name (e.g. *Impagidinium paradoxum* subsp. *granulatum*).

Article 26.1 stipulates that the name of any infraspecific taxon which includes the type of the species is an autonym and must repeat the specific epithet, but is not followed by an author's name. **Article 26.3** notes that the first valid publication of a name of an infraspecific taxon that does not include the type of the species automatically establishes the corresponding autonym. Thus, when Yun Hyesu (1981) published the name *Xenascus ceratioides* subsp. *procerus*, which was the first subspecies proposed in this species, *Xenascus ceratioides* subsp. *ceratioides* was automatically established. Autonyms are indicated throughout the Index for species in which at any given time there has been a validly published infraspecific taxon. Thus, the entry for *Apectodinium homomorphum* includes an entry for the autonym *Apectodinium homomorphum* subsp. *homomorphum*, even though no other infraspecific taxa are now included in *Apectodinium homomorphum*. In such a situation, the autonym becomes (perhaps temporarily) redundant. A new infraspecific taxon is appropriately compared only with other infraspecific taxa (even if there is only the autonym), rather than with the species.

Effective Publication

Articles 29 to 31 deal with effective publication. **Article 29.1** states that publication is effected by distribution of printed matter to the general public "or at least to scientific institutions with generally accessible libraries." However, **Articles 30.4 and 30.5** permit "indelible autograph" prior to 1953. **Article 30.1** stipulates that publication is not effected by communication of new

names at a public meeting, by the placing of names in public collections, by the issue of microfilm, or via electronic material other than that specified in Article 29.1.

New in the Melbourne Code is an addition to **Article 29.1** that states: “Publication is also effected by distribution on or after 1 January 2012 of electronic material in Portable Document Format (PDF ...) in an online publication with an International Standard Serial Number (ISSN) or an International Standard Book Number (ISBN). **Article 30.2** specifies that an electronic publication is not effectively published if it is a preliminary version of something finalized later. The content of an electronic publication must not be altered after it is effectively published (**Article 30.3**). In preparing new entries for DINOFLAJ3, and hence this version of the Index, we encountered issues that illustrate the potential pitfalls of interpreting new rules such as those concerning electronic publishing in the Melbourne Code. The new genus *Bianchina* is proposed in the journal *Palynology* and first came to our attention in a PDF sent to us by the author, Poul Schiøler. The PDF appears essentially final, and the author has fulfilled all the conventional requirements for valid publication. However, the PDF bears the date 2015 and the pagination 1–6 (with the new genus proposed on pages 3 and 5). A little research involving “insider” connections confirmed that this pagination is not final and that the paper would be included as pages 406–412 in an issue of *Palynology* to appear in later 2016. Initially we considered *Bianchina* (and its single contained species *Bianchina hieroglyphica*) to be not effectively published because it was proposed in a non-final PDF — the pagination not being final. However, in discussion with Patrick Herendeen, a co-author of the Melbourne Code, we learned that during deliberations for the compilation of the Melbourne Code, final pagination was not considered a requirement for effective publication and was in fact regarded as “aesthetic and not substantive”. While we go along with this decision apparently accepted among the nomenclatural hierarchy, and recognize the value of prompt publication of scientific data, we think it unfortunate that the article is not clearer (apparently “final” does not mean “final”) and we are concerned about the confusion that will ensue. Thus, *Bianchina* was effectively published on pages 3,5 of a PDF of a paper that was posted online in 2015. The article will be part of an issue of *Palynology* to appear in its entirety and printed as a hard copy in later 2016, the article by Schiøler and containing *Bianchina* bearing the pagination 406–412. In future, the latter pagination will be the one referred to in the literature, but it will not be the formal pagination for effective (and valid) publication.

Another innovation in the Melbourne Code of potential importance (and confusion) to fossil dinoflagellate nomenclature is **Article 30.8**. This states: Publication on or after 1 January 1953 of an independent non-serial work stated to be a dissertation submitted to a university or other institute of education for the purpose of obtaining a degree does not constitute effective publication unless the work includes an explicit statement (referring to the requirements of the *Code* for effective publication) or other internal evidence that it is regarded as an effective publication by its author or publisher.” Presumably, “dissertation” can be taken to be a synonym of “thesis” in this context. This new ruling may affect some names in this version of the Index that have been considered until now effectively published and consequently legitimate. For example, those introduced in the dissertation by Agelopoulos (1967), which has been considered effectively published supposedly in consideration of its broad distribution. **Note 4** following **Article 30.8** indicates that the presence of an ISBN number or a statement of the name of the printer, publisher, or distributor in the original printed version is regarded as internal evidence that the work was intended to be effectively published. In our view, Note 4 will cause confusion, especially regarding the statement of a printer’s or related name. Moreover, the question arises as to whether theses that contain such indications should be considered effectively published; presumably, Article 29.1 would need to be considered in this context. Recommendation 30A notes that when publications exist only as printed matter, they should be deposited in “at least ten, but preferably more” generally accessible libraries”. We have not made any changes in reaction to the present version of Article 30.8.

The date of effective publication is the date of availability as defined in Article 29 and that, in the absence of other proof, the date on the publication must be accepted (**Article 31.1**). When a publication is issued as both electronic material and printed matter, they must be treated as effectively published on the same date unless the dates of the versions are different (**Article 31.2**). Commonly, the electronic version is available at an earlier date than the printed version, as is the case with Schiøler (2015), as discussed above. In such cases, the date of effective publication will be that of the electronic publication. **Article 31.3** clarifies that the date of effective publication can be that the distribution of separates (reprints) if earlier than the containing issue of the journal (echoing the case of *Bianchina* above and presumably with final pagination unnecessary). An example involves the fossil dinoflagellate taxa *Quinquecuspis* and *Trinovantedinium concretum*. Head (1993) contended that *Quinquecuspis* was not validly

published by Harland (1977b) because he designated as its type *Trinovantedinium concretum*, which Head thought was not effectively published until 1978. However, although the journal in which Reid's paper appeared did indeed not come out until 1978, preprints of Reid's paper did appear in 1977 (P.C. Reid, personal communication, 1997).

Valid publication

Articles 32 to 45 deal with general provisions for valid publication. While the conditions for valid publication remain closely similar to those in previous versions of the ICBN, the order and arrangement of Articles in the Melbourne Code (ICN) is significantly different. According to **Article 32.1**, in order to be validly published, a name of a new taxon (other than an autonym) must be effectively published and have an acceptable form (for example, it must be in the Latin alphabet). **Article 32.2** stipulates that use of incorrect Latin endings to epithets does not affect validity or authorship, but the endings should be corrected. The date of a name is that of its valid publication (**Article 33.1**). Prior to 1973, when conditions for fulfilment for valid publication are met in stages, the date of valid publication is the date when the final condition is met; after 1972, for a name to be validly published full and direct reference needs to be made in the validating publication to all places where the various elements have been fulfilled. The generic name *Brigantedinium* is a good example. It was not validly published in Reid (1977) since the type species, *Chytroeisphaeridia simplicia* Wall 1965b, was not validly published; Wall (1965b) had not provided a Latin diagnosis for *Chytroeisphaeridia simplicia*, a requirement since, although a cyst species, it was based on living material. Harland and Reid in Harland et al. (1980) provided a Latin diagnosis for the species, but did not validate the generic name *Brigantedinium* since they did not directly cite the Latin diagnosis provided for it by Reid (1977). It was not until Lentin and Williams (1993) brought all the pieces of the puzzle together that the names *Brigantedinium* and *Brigantedinium simplex* became validly published. (Although Wall, 1965b, had proposed the epithet originally as "*simplicia*", when eventually Lentin and Williams, 1993, validly published the name, they rendered the epithet as "*simplex*", which is thus correct.)

Article 35.1 specifies that the name of a taxon below the rank of genus is not validly published unless the name of the genus is also validly published. Thus, the name *Palaeoperidinium muriciforme* Conrad, 1941 was not validly published since the generic name

Palaeoperidinium Deflandre, 1934 ex Sarjeant, 1967b, was not validly published until 1967. Note that species names attributed to validly published but illegitimate generic names (for example *Albertia recticornis* Vozzhennikova 1967) are validly published (*Albertia* in the example being a validly published name but an illegitimate junior homonym).

A combination is not validly published unless the final epithet is definitely associated with the genus or species to which it belongs (**Article 35.2**). Thus, in the Fensome and Williams (2004) Index, where we listed names within a genus by final epithet, for new combinations and other nomenclatural novelties, we deliberately used the full name of the taxon somewhere in the entry. Generic abbreviations are allowed in this context (but not recommended by us). **Article 36.1** specifies that a name is not validly published when it is: not accepted by the author; proposed provisionally in anticipation of future acceptance; cited merely as a synonym; or merely mentioned as a subordinate taxon within a discussion of another taxon. Thus, the name *Deflandrea eocenica* was not validly published in Balteş (1969), since he considered it a provisional name. The correct citation is *Deflandrea eocenica* Balteş, 1969 ex Lentin and Williams, 1973. Bujak (1994, p. 119) stated that "Stover and Williams (in press) erected the genus *Enneadocysta* to accommodate ... species ... which have a partiform hypocystal configuration, with processes on paraplates 6", 2" and 1ps. They designated *Enneadocysta pectiniformis* (Gerlach) Stover and Williams as the type species." Bujak's paper represents the first published mention of the generic name *Enneadocysta*, since the paper by Stover and Williams did not appear until 1995. In most respects, Bujak fulfilled the requirements for validating the name *Enneadocysta*, providing a description, albeit brief, and indicating a type. However, since he was clearly mentioning the generic name in anticipation of Stover and Williams' paper, following Article 34.1b the name *Enneadocysta* was not validly published in Bujak (1994) and is correctly cited as *Enneadocysta* Stover and Williams, 1995. Similar situations surround the original publication of the names *Tehamadinium* and *Chiropteridium lobospinosum*. **Article 36.1** also makes clear that names published with an indication of taxonomic doubt, such as a question mark, but otherwise in accordance with the Code, are validly published.

After 1952, the rank of a new name must be clear (**Article 37.1**). The name of a new taxon must also be accompanied by a description (any morphological statement) or diagnosis (a statement of the morphological features that distinguished the taxon from other taxa — **Article**

38.2) or a reference to such (**Article 38.1**). **Article 38.5** specifies that the names of a genus and species can be validated simultaneously provided that the genus is monotypic at the time of validation. Thus, *Palynodinium* and its "type species" *Palynodinium grallator* were both validly published by Gocht (1970a), since *Palynodinium* was monospecific, even though Gocht gave only a diagnosis for *Palynodinium grallator* and did not separately describe the genus. Prior to 1908, an annotated illustration is acceptable in place of a written description or diagnosis (**Article 38.7**).

Article 39.1 deals with language of descriptions, but defers the language to be used for fossils and algae to later articles. Any name for a new taxon published after 2011 must have an English or Latin description or diagnosis or reference to such (**Article 39.2**) — prior to 2012, most groups governed by the Code had to have Latin descriptions, but not fossils (see below). After 1957, designation of the type of a new name of generic rank or lower is a requirement (**Article 40.1**). For the name of a genus, this can be reference to a species name, or the holotype of a species name (**Article 40.3**). After 1989, indication of a type must include the word "typus" or equivalent (**Article 40.6**). The generic name *Kisselovia* was proposed by Vozzhennikova (1963), who indicated a "type species" (*Kisselovia ornata*) but did not provide a description for that species. Hence, effectively, no type was designated in 1963 for *Kisselovia*. Vozzhennikova (1967) fulfilled the requirements for valid publication of the name of the proposed "type species", including the provision of a description and the designation of a type, thus also validating the generic name (with the spelling *Kisselevia*).

After 1989, the repository of the type must be specified (**Article 40.7**). Thus, the specific name *Fibrocysta prolixa* Harker and Sarjeant in Harker et al., 1990 was not validly published since those authors did not indicate where the holotype is lodged. This oversight was corrected in Harker and Sarjeant (1991). Therefore, the correct citation for the name of this species is *Fibrocysta prolixa* Harker and Sarjeant in Harker et al., 1990 ex Harker and Sarjeant, 1991, or more simply but less informatively *Fibrocysta prolixa* Harker and Sarjeant, 1991. Fensome et al. (1998b) noted, in correspondence with J. Jansonius, that the Chair of the then Code Editorial Committee, W. Greuter, considered that "the intent of [Article 40.7] is not to make deposition of types in a public herbarium mandatory, but to force authors to make the whereabouts of their types publically known." Greuter remarked also that the Article does not specify "public" herbarium, and he implied that reference to a private herbarium (i.e. collection) would fulfil this

requirement of the Code. Fensome et al. (1998b) also suggested that if an author does not directly (i.e. fully) cite a repository but does give specimen numbers including abbreviations that clearly refer to a particular institute or collection (e.g. BS or BSIP for Birbal Sahni Institute of Palaeobotany), this is acceptable under Article [40.7]. This agrees with the spirit of **Article 40.7, Note 4**, which states that "Specification of the herbarium or institution may be made in an abbreviated form"

An additional requirement for valid publication of a new combination or replacement name is a citation to the basionym (the original version of the name of a taxon) (**Article 41.1**). After 1952, this citation must be a full and direct reference to its author and place of valid publication, with page or plate reference and date (**Article 41.5**). We interpret this to mean also that a full reference to the relevant publication must appear in the reference list of the paper in which the proposal is made, not a blanket reference to an earlier compendium, such as Fensome and Williams (2004) (cf. **Article 41.7**). Thus, the combination *Stiphrosphaeridium dictyophorum* (Cookson and Eisenack, 1958) Davey, 1982b, was not validly published in Davey (1982b), since although he provided page and plate references and a date, he did not provide a reference for Cookson and Eisenack (1958) in his reference list. The correct citation is *Stiphrosphaeridium dictyophorum* (Cookson and Eisenack, 1958) Lentin and Williams, 1985, since a complete reference to the protologue was given by the latter authors. However, errors in citation do not invalidate such nomenclatural proposals (**Article 41.6**).

After 1995, in order to be validly published, the name of a new fossil-taxon must be accompanied by a Latin or English description or diagnosis (**Article 43.1**). Thus the name *Pervosphaeridium septatum*, proposed in Slimani (1996), was not validly published since that author did not provide a description or diagnosis in Latin or English. Fossil taxa named prior to 1996 can be accompanied by a description or diagnosis in any language (**Note 1**). **Article 43.2** stipulates that after 1911 the name of a new fossil-taxon of generic or lower rank must be accompanied by an illustration or reference to such. And as already noted, according to **Article 43.3**, after 2000 the name of a new fossil-species or infraspecific fossil-taxon is not validly published unless at least one of the validating illustrations is identified as the type.

As dinoflagellates are algae, aspects of the Code relating to that group as well as to fossils are of significance here. To be valid, the name of a non-fossil alga published between 1958 and 2011 inclusive must have a Latin diagnosis (**Article 44.1**), and from 1958 must be accompanied

by an illustration (**Article 44.2**). There has been some confusion over what constitutes a fossil. Harland and Reid in Harland et al. (1980, p.223) considered that the name of a "Recent" species, *Omanodinium alticinctum*, was not validly published since its author (Bradford, 1975) did not provide a Latin diagnosis. However, the type is from not-avowedly living material and derived from sediments (i.e. having a stratigraphic context — see comments related to Article 11.7 above), and hence can appropriately be considered as a fossil. Thus, as noted by Lentin and Williams (1981), no Latin diagnosis or description of that name was required for valid publication.

Article 45.1 deals with names originally established under other codes, primarily the ICZN. It states that such a name need satisfy only requirements of the other code to be validly published under the ICN. Thus, many early names for fossil dinoflagellates were established under the ICZN. An example is the extant dinoflagellate genus *Scrippsiella* Balech 1959, which was "validly published" under the ICZN; when this genus is treated under the ICN its name does not require further validation, regardless of the absence of a Latin diagnosis. The reverse situation also applies and this caused some notable re-interpretations in the 1998 edition of the Index. Thus the generic name *Hystrichosphaera* was "not validly published" in Wetzel (1932; 1933b), because no type was designated — a necessity since Wetzel was treating his fossils as protozoa and was using zoological nomenclature (ICZN Article 69). The name *Hystrichosphaera* was unwittingly validated by Deflandre (1937b) who designated a type. This re-interpretation changed the date of valid publication of several specific names: for example, *Hystrichosphaera cornigera* Wetzel, 1933b ex Deflandre, 1937b was cited in Lentin and Williams, 1993 as *Hystrichosphaera cornigera* Wetzel, 1933b.

Citations

Articles 46 to 50 deal with citations. **Article 46.1** states that in some publications "... it may be desirable, even when no bibliographic reference to the protologue is made, to cite the author of the name" It is important to emphasize here the use of the word "may" in Article 46.1 — it is not a rule that authorship must be cited. Although useful, authorship citations can make text more difficult to read, and hence authors are increasingly including nomenclatural authorships in an Appendix (e.g. Schiøler et al., 1997) — a practice that we encourage.

Article 47.1 indicates that a change of a taxon's diagnostic characters (or, by implication, description) or circumscription "... does not warrant a change of the author citation."

Recommendation 47A1 continues this theme by noting that, when such an alteration "... has been considerable, the nature of the change *may* be indicated by adding such words as ... "emendavit" (emend.) followed by the name of the author responsible for the change ..." (italics added here). Hence, an "emendation" is not a formal nomenclatural device (actually, it is not nomenclatural at all, but a taxonomic device), and an emending authorship is at no time part of the formal name of the taxon. An emendation should be cited for information purposes only — and generally only if the author making the citation agrees with the intent of the emendation. Long strings of cited emendations incorporated as part of a taxon's name should generally be avoided. In the Index, we list only those emendations avowedly acknowledged by the author at the time of the revision, and cite them separately from the formal nomenclatural authorship. We include as emendations cases where an author has used an equivalent term such as "revised description". We recommend that if authors feel they have something significant to say about the concept of a taxon, they should flag it as an emendation; otherwise important insights might be missed by later authors.

Article 48.1 stipulates that when an author adopts an existing name but explicitly excludes its original type, he has in effect created a later homonym of which he is sole author. Several examples, including *Tenua* Davey, 1978, were given above under the discussion of Article 14. For the citation of names at generic and lower rank, **Article 49.1** requires the use of parentheses around the name of the author of an earlier, epithet-bringing legitimate name in cases of change of taxonomic rank or generic assignment. The name in parentheses is then followed, outside parentheses, by that of the author who effected the alteration in rank or assignment. For example, the species *Cyclonephelium vitilare* Cookson, 1965b was transferred to the genus *Renidinium* by Stover and Evitt (1978): the correct citation is *Renidinium vitilare* (Cookson, 1965b) Stover and Evitt, 1978. *Hystrichosphaera ramosa* var. *granosa* Davey and Williams, 1966a was transferred by Corradini (1973) to *Spiniferites* as *Spiniferites ramosus* var. *granosus* (Davey and Williams, 1966a) Corradini, 1973. Lentin and Williams (1973) raised this taxon to subspecific rank but retained it in *Spiniferites*. Thus, the correct citation is *Spiniferites ramosus* subsp. *granosus* (Davey and Williams, 1966a) Lentin and Williams, 1973. We emphasize that the protologue is the key reference for any taxon and should be fully referenced in taxonomic

works; thus in our view the aforementioned species should not be cited as *Renidinium vitilare* (Cookson) Stover and Evitt, 1978; the key diagnostic information for this species is in Cookson (1965b).

Rejection of Names

Articles 51 to 58 deal with rejection of names. **Article 52.1** states that a name is illegitimate if it was nomenclaturally superfluous when published — i.e. if the taxon to which the name was applied definitely included the type of another name, which ought to have been given priority. Thus, *Agerasphaera* Harland, 1979a is illegitimate since it is a nomenclatural junior synonym of *Alisocysta* Stover and Evitt, 1978, which has the same type.

However, **Article 52.2** specifies that definite inclusion of the type of a name is effected, in part, by citation of the name itself "... unless the type is at the same time excluded either explicitly or by implication." In Fensome and Williams (2004) (and thus DINOFLAJ2), we invoked Article 52.2 to justify retention of the species name *Votadinium calvum* (and in consequence the generic name *Votadinium*), in future we may use a revised Article 11.8 (if ratified) to justify its acceptance (see discussion above). Lentin and Williams (1993) considered the name *Votadinium calvum* to be an illegitimate superfluous name (in the sense of Article 52.1), since in proposing the species as new, Reid (1977) considered it to represent the encysted stage of *Protoperidinium oblongum*; strict application of Article 52.1 thus prescribes that *Votadinium calvum* is a nomenclatural junior synonym of *Protoperidinium oblongum*, the two names referring to the same biological species according to Reid. However, as discussed above and by Head et al. (2016) duality of nomenclature is accepted practice for dinoflagellates. Since Reid (1977) clearly viewed the two names *Votadinium calvum* and *Protoperidinium oblongum* as representing distinct entities, one based on cysts, the other on the motile stage, and since he clearly did not propose the name *Votadinium calvum* to replace *Protoperidinium oblongum*, Fensome and Williams (2004) invoke Article 52.2 to retain the former name. Most names based on cysts are fossil and can be clearly retained under the ICN as fossil-taxa, regardless of whether their motile equivalent is known.

Article 53.1 states that "A name of a family, genus or species ... is illegitimate if it is a later homonym, that is, if it is spelled exactly like a name based on a different type that was previously and validly published for a taxon of the same rank." An example is *Albertia*

Vozzhennikova, 1967, a junior homonym of *Albertia* Schimper, 1837 and therefore an illegitimate name. Lentin and Williams (1976) thus proposed to replace it with the new name *Alterbia*, but while doing so inadvertently included the "type species" of the earlier generic names *Senegalinium* and *Andalusiella*. Following Article 52.1, therefore, *Alterbia* was a superfluous, and hence illegitimate, name. Consequently, Lentin and Williams (1985) proposed a second new name for *Albertia* Vozzhennikova, *Alterbidinium*, this time excluding the "type species" of *Andalusiella* and *Senegalinium*. Fensome et al. (1993b) considered the name *Danea* Morgenroth, 1968 to be a junior homonym of *Danaea* Smith 1793, an extant fern genus, and proposed the generic name *Damassadinium* as a replacement for *Danea* Morgenroth. However, we agree with the entry in the *Index Nominum Algarum* (<http://ucjeps.berkeley.edu/cgi-bin/porp.cgi.pl?105660>) that *Damassadinium* is an illegitimate superfluous name, as *Danea* Morgenroth is not an exact homonym of *Danaea* Smith; we have thus made the appropriate adjustments in in this version of the Index and DINOFLAJ3.

According to **Article 55.1**, a name of a species or subdivision of a genus may be legitimate even if its name/epithet was originally combined with an illegitimate generic name. Thus, *Albertia curvicornis* is a validly published name, even though the generic name *Albertia* Vozzhennikova is illegitimate.

Orthography and Gender

Articles 60 to 61 deal with the orthography of names and epithets. Some of the rules and recommendations are very hard to follow, especially for those of us without classical training. **Article 60.1** specifies that the original spelling of a name or epithet is to be retained, except for, firstly, the correction of typographic or orthographic errors and, secondly, modifications indicated by standardizations specified in **Articles 60.5 to 60.12**. **Article 60.2** states that the "original spelling" is the spelling of a name at its valid publication. Hence, the name *Kisselevia* is the correct version of the name as it was spelled at it the time of its validation by Vozzhennikova (1967), rather than *Kisseljovia* in Vozzhennikova (1961) and *Kisselovia* in Vozzhennikova (1963). **Article 60.3** notes that the liberty of correcting a name is to be used with reserve, especially if it affects the first letter or syllable. According to **Article 60.6**, diacritical signs are not used in Latin plant names. In names "... drawn from words in which such signs appear, the signs are to be suppressed with the necessary transcription of the letters so

modified" Thus, the specific name introduced by Morgenroth (1966a) as *Impletosphaeridium krömmelbeinii* is correctly cited as *Impletosphaeridium kroemmelbeinii*.

The use of hyphens is treated differently depending on taxonomic rank. **Article 60.9** specifies that use of a hyphen in a compound epithet is treated as an error to be corrected by deletion of the hyphen. "A hyphen is permitted only when the epithet is formed of words that usually stand independently, or when the letters before and after the hyphen are the same." Use of the word "epithet" implies that this article is dealing with names at species (or maybe subgenus) and lower rank. Applying this article to the species name *Bonetocardiella ponce-de-leoni*, we tentatively retain the hyphens as the three words would have presumably stood independently. Although not relating to dinoflagellates, but of interest as a palynological example, it has recently come to light that some well-used spore-based generic names were originally spelled with a hyphen — for example *Cicatricosi-sporites*. Although no palynologist as far as we know has used this spelling for decades, technically it is still the correct spelling. A proposal has been published to revise the Code so that hyphens in such generic names follow the same rule as specific epithets — that is that the hyphen be dropped in such cases (Anderson et al., 2016).

Article 60.12 states that "The use of an incorrect termination (for example -i, -ii, -ae, -iae, -anus, or -ianus ... is treated as an error to be corrected". Thus the name originally proposed as *Canningia ringnesii* Manum and Cookson, 1964, named after the Ringnes brothers, is correctly written as *Canningia ringnesiorum* Manum and Cookson, 1964. The species name *Chatangiella bondarenkii* (Vozzhennikova, 1967) Lentin and Williams, 1976, named after N.M. Bondarenko, is correctly cited as *Chatangiella bondarenkoi* (Vozzhennikova, 1967) Lentin and Williams, 1976. And we have changed the epithet proposed as *Senoniasphaera whitenessii* to *Senoniasphaera whitenessensis* because it is named after a place (White Ness) rather than a person.

Recommendations 60A through 60I provide further guidance on correct orthography. For example, **Recommendation 60C.2** notes that personal names already in Greek or Latin, or possessing a well-established latinized form, should be given their appropriate Latin genitive, such as *alexandri* from Alexander, *augusti* from Augustus, *martini* from Martinus or Martin or *linnaei* from Linnaeus. To the present authors (and perhaps others lacking classical training), the limits of this recommendation are not clear, but we have tried to adhere to it in obvious

situations, such as *Achomosphaera neptuni*, based in large part on advice from the late Jan Jansonius. According to **Recommendation 60C.5a**, "The Scottish patronymic prefix 'Mac', 'Mc' or 'M', meaning 'son of', should be spelled 'mac' and united with the rest of the name. However, this is a recommendation, not an Article, and the original spelling of the epithet must be followed. For example, with regard to the name *Chatangiella mcintyreii*, the preferred spelling of the epithet following Recommendation 60C.5a would be "*macintyreii*", but since the author, Nøhr-Hansen (1996), gave the epithet as "*mcintyreii*", the latter spelling is correct.

It is relevant to note again that specific epithets, if adjectival, must agree grammatically with the generic name (Article 23.5). However, when the specific epithet is a noun in apposition (N.I.A.), it is not to be changed as if it were an adjective, but stays in the nominative, as in *Discorsia nannus* (the epithet meaning dwarf). **Recommendation 60G** deals with the formation of compound epithets — i.e. those epithets that are derived from two or more words, for example *perforoconum* (as in *Sentusidinium perforoconum*). In this compound epithet, the first part is related to the Latin adjective "perforatus" (perforate) and the second part is derived from the Latin noun "conus" (cone). The recommendation is rather obtuse, but we follow Nicolson (1986, p.324), who averred that unless the original author indicates otherwise, it is general botanical practice to treat such compound epithets as adjectives, even though the last part (in this case "conus") may be a noun. Hence, "*Sentusidinium perforoconum*" is the correct orthography, rather than "*Sentusidinium perforoconus*"

Article 62 is concerned with gender. A generic name retains the gender assigned by botanical tradition. A generic name without a botanical tradition retains the gender assigned by its author. Thus, *Hystrichokolpoma* is regarded as neuter. For a further discussion of orthography in botanical taxonomic names, see Jansonius (1997a, b).

Key dates

Here are some key dates associated with the ICN:

1820 onward — names for fossils can be considered (Article 13.1f)

1908 onward — an annotated illustration in place of written description or diagnosis not allowed (Article 38.7)

1912 onward — illustration required for new fossil-taxa of genus or lower rank (Article 43.2)

- 1953 onward — rank must be clear (Article 37.1)
- 1953 onward — for new combinations, etc., a full and direct reference to the basionym is required (Article 41.5)
- 1958 onward — designation of holotype necessary for valid publication (Article 40.1)
- 1958 onward — new taxa of living algae require an illustration (Article 44.2)
- 1973 onward — conditions for valid publication must be all met in one place (Article 33.1)
- 1990 onward — indication of a type must include the word *typus* or equivalent (Article 40.6)
- 1990 onward — the repository of the type must be specified (Article 40.7) in full or as abbreviation
- 1996 onward — each new fossil-taxon must be accompanied by a Latin or English description or diagnosis (Article 43.1)
- 2001 onward — for fossils, at least one illustration must be identified as the holotype (Article 43.3)
- 2012 onward — electronically published names considered for effective publication (Article 29.1)
- 2012 onward — all new taxa must have Latin or English description or diagnosis (as was already the case for fossils) (Article 39.1)

FORMAT

Entries

In each genus entry, the generic name is immediately followed by the authorship citation and, in a separate sentence, any emendations. Where the genus represents calcareous or siliceous fossils, there is a statement to that effect. Thus:

ORTHOCARINELLUM Keupp, 1987, p.41. Emendation: Kienel, 1994, p.37. Calcareous dinoflagellate genus.

This information is sequentially followed by information in the following categories, as appropriate: validity and legitimacy (including senior homonym), substitute name, nomenclatural

history, senior synonym(s), junior synonym(s), junior homonym(s), other comments, and type. Subgenera and sections are treated in a similar way to genera, but species attributed to these are listed as formal entries under the genus, not under the subgenus or section. Beneath each genus entry is a list of all species names that have at some time or other been included in the genus, the currently correct ones in bold.

For each species entry, the specific epithets is in bold, followed by citations for original and, where appropriate, validating or combining authors. There then follows information, where appropriate, on emendation(s), holotype, lectotype, neotype, validity and legitimacy (including senior homonym), substitute name, nomenclatural history (including retention and questionable assignment statements), senior synonym(s), junior synonym(s), junior homonym(s), motile equivalent, other comments, and age. The age cited for each species, unless otherwise specified, is that attributed to it in the protologue. It is not intended to be a full or up-to-date statement of the range of the species; users are advised to consult the literature for potentially more detailed and precise information. The letters "N.I.A." immediately before the age indicate that a particular epithet is a noun in apposition (see above and Glossary).

Entries for infraspecific taxa are inset and preceded by the name of the rank ("subsp.", "var.", "forma"). Except where a definite hierarchy of infraspecific taxa is clearly involved (e.g. *Gonyaulacysta jurassica* subsp. *longicornis* var. *longicornuta*), we treat all infraspecific taxa as being of equivalent rank. The format adopted for the infraspecific ranks is essentially the same as that for the specific entries, except in the case of autonyms. For each autonym, we give the word "autonym", emendation(s), holotype, lectotype, neotype, and nomenclatural history. If no other infraspecific taxa within a particular species are currently accepted, the phrase "**Now redundant**" will appear as part of the nomenclatural history. There is a tendency in the literature for autonyms and the taxa that they represent to be ignored or neglected. However, they are real entities — the subspecies, varieties and forms containing the type of the species — and should be referred to as such in descriptions and comparisons.

Names not enclosed by quotation marks are validly published, legitimate, and correct (in the sense of the ICN). All other names are enclosed by quotation marks. For all names in quotation marks, one or more statements in bold type will explain the current status. Thus, under *Pseudoceratium*, there is:

“eopelliferum” Herngreen et al., 1994, p.386. **Name not validly published:** no description or illustration.

The statement of nomenclatural history of a particular taxon may include: a "NOW" statement, which indicates current assignment; a "sequencing" statement that provides the nomenclatural history in full; a "retention" statement if the taxon has been retained under a combination that was not the latest to be proposed; and a "questionable assignment" statement, discussed below. Thus the statement of nomenclatural history in the entry for *Hystrichosphaeridium capitatum* is:

NOW *Prolixosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Prolixosphaeridium*, thirdly *Tenua* Eisenack, fourthly *Batiacasphaera*.

And under *Prolixosphaeridium capitatum*:

Originally *Hystrichosphaeridium*, subsequently (and now) *Prolixosphaeridium*, thirdly *Tenua* Eisenack, fourthly *Batiacasphaera*. Lentin and Williams (1981, p.233) retained this species in *Prolixosphaeridium*.

The citation "*Tenua* Eisenack" includes the name's author to distinguish it from the homonym, "*Tenua* Davey".

The sequencing statement for *Achilleodinium biformoides* is as follows:

Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Achilleodinium*, fifthly *Florentinia*. Lentin and Williams (1981, p.2) retained this species in *Achilleodinium*.

The parenthetic statement after "subsequently *Baltisphaeridium*" indicates that the entry for *Baltisphaeridium biformoides* can be found in Appendix A.

Names or combinations that are not validly published or illegitimate are similarly indicated. Where a species has been questionably assigned to a genus, this is indicated in the "sequencing"

statement and in a "questionable assignment" statement. For example, the entry for *Canningia? granulata* in part reads as follows:

Originally *Canningia*, subsequently (and now) *Canningia?*. Questionable assignment: Stover and Evitt (1978, p.25), as a problematic species.

Where taxa have changed rank, this is reflected in the "sequencing" statement. For example, the statement for *Sophismatia crassiramosa* is:

Originally *Wetzeliella tenuivirgula* var. *crassiramosa*, subsequently *Wetzeliella tenuivirgula* subsp. *crassiramosa*, thirdly *Kisselevia tenuivirgula* subsp. *crassiramosa*, fourthly *Kisselevia crassiramosa*, fifthly *Charlesdownia crassiramosa*, sixthly (and now) *Sophismatia crassiramosa*.

In such cases, the full taxon names, rather than just generic names, are included for clarity.

In cases where a motile equivalent for a cyst can be identified, we have provided this information. For example, under the entry for *Tuberculodinium vancampoae*, we include the statement:

Motile equivalent: *Pyrophacus steinii* (Schiller, 1935) Wall and Dale, 1971, according to Matsuoka et al. (1989, p.94).

Note on Citations

With regard to reference citations, following Xu Zhaoran and Nicolson (1992), we give names of Chinese and Korean authors in full: i.e. "Mao Shaozhi" rather than just "Mao". We thus also cite Chinese names with family name first and personal name second ("Mao Shaozhi") as they themselves would cite the name, hence avoiding the nowadays common (but in our view discourteous) temptation to westernize the name ("Shaozhi Mao").

Throughout the Index, author citations are given as they appeared at publication. An example is Jiabo (1978). The word Jiabo, used on the publication, was given as a collective

name for the authors. We were asked by He Chengquan, prior to publication of the 1981 Index, to list the individual contributors: thus, *Bohaidina* Jiabo would be cited as *Bohaidina* Sung Zhichen, He Chengquan, Qian Zeshu, Pan Zhaorin, Zheng Guoguang and Zheng Yuefang. Unfortunately, we could not accede to this request since, in accordance with ICN (then ICBN) Article 46.2, we should maintain the integrity of the protologue, which cites the authorship as "Jiabo".

GLOSSARY

autonym: According to ICN Article 26.1: "The name of any infraspecific taxon that includes the type of the ... legitimate name of the species to which it is assigned is to repeat the specific epithet unaltered as its final epithet, not followed by an author citation. Such names are termed autonyms" An autonym may be a subspecies, variety or form; and the taxon that an autonym represents may be referred to as the "type subspecies", "type variety" or "type form" of the species. Subspecific taxa not including the type species are most appropriately compared with the type infraspecific taxon, not with the species.

basionym: The first validly published, legitimate name of a taxon.

Code: An abbreviation for the International Code of Nomenclature for Algae, Fungi, and Plants (McNeill et al., 2012; the Melbourne Code). Previous editions of the Code were published as the International Code for Botanical Nomenclature (see Williams and Fensome 2016 for further discussion).

combination not validly published: statement used when a species or infraspecific taxon with a validly published basionym is assigned to another genus or species and the combination is not validly published.

comb. nov., combinatio nova: Latin, new combination: "... a combination ... validly published ... for the first time, and based on a previously ... validly published combination (basionym

...), from which the word peculiar to the taxon (epithet ...) is transferred ..." (Jeffrey, 1977, p.57).

compound name/epithet: A compound name or epithet is one that combines elements from two or more words, e.g. "*conispiniferum*" in *Hystrichosphaeridium conispiniferum*. Compound epithets for species and infraspecific taxa, regardless of whether their components are nouns or adjectives, are generally made to agree with the gender of the generic name. See further discussion under Orthography and Gender above.

correct name: "... the correct name of a taxon with a particular circumscription, position and rank is the legitimate name which must be adopted for it under the rules" (ICN Article 6.6.) The one senior, validly published and legitimate name among a group of names, legitimate and validly published or otherwise, that are considered to be taxonomic synonyms.

description: "... a statement of the attributes of a specimen or taxon" (Jeffrey, 1977, p.58).

diagnosis: "... a statement of that which in the opinion of its author distinguishes the taxon from others" (ICN Article 37.2). A statement, terse by comparison to a description, that is restricted to answering the question "How is this taxon different from other described taxa?"

emend., emendatus, emendavit, emendavunt: Latin: "... altered (by); "indicates a change in circumscription of a taxon without exclusion of the type of its name: the abbreviation emend. follows the authority [i.e. original author of the taxon] and precedes the name of the author who effected the change." (Jeffrey, 1977, p.59.) We prefer to use the English word "emendation". Especially in palynology, emendations have been cited as if they were part of the name of the taxon. However, emendations have no formal status under the ICN (see discussion above relating to ICN Article 47.1).

emendation: see "emend."

epithet: "... a word, other than a generic name or a term indicative of rank, forming part of a combination" (Jeffrey, 1977, p.59.) For example, in the name *Gonyaulacysta jurassica* subsp. *desmos*, the words "*jurassica*" and "*desmos*" are the specific and subspecific epithets respectively.

epitype: "... a specimen ... selected to serve as an interpretative type when the holotype, lectotype or ... neotype ..." or any protologue material are "... demonstrably ambiguous ..." (Article 9.8). Article 9.20 specifies that the author who first designates an epitype must be followed, and a new epitype may be designated only if the original epitype is lost, destroyed, or in conflict with the protologue.

ex: Latin: "... from, according to ... used to connect two author citations, the second of which validly published a name proposed but not validly published by the first." (Jeffrey, 1977, p.59.) For example, the authorship of the species *Areoligera medusettiformis* is "Wetzel, 1933b ex Lejeune-Carpentier, 1938[a]". The name *Hystriosphera penicillata* forma *medusettiformis* was not validly published in Wetzel (1933b); it was subsequently validated by Lejeune-Carpentier (1938a). It is technically correct, but less informative (and courteous), to give the citation as *Areoligera medusettiformis* Lejeune-Carpentier, 1938a.

form, forma: The rank of infraspecific taxa immediately below variety.

holotype: "... the one specimen ... used by the author, or designated by the author as the nomenclatural type" of a species or infraspecific taxon (ICN Article 9.1).

homonym: "... a name identical in orthography with another (or treated as such ...) and based on a different type" (Jeffrey, 1977, p.61). For example, the dinoflagellate generic name *Speetonia* Duxbury, 1977 is a junior homonym of the coccolith generic name *Speetonia* Black, 1971. Names with similar pronunciation but different spellings are generally not considered to be homonyms; for example *Danea* Morgenroth, 1968 is not considered a homonym of *Danaea* Smith 1793.

ICBN.: Previous editions of the ICN (see below) were called the International Code of Botanical Nomenclature.

ICN: The International Code of Nomenclature for Algae, Fungi, and Plants (Melbourne Code) (McNeill et al., 2012). See also ICBN. Changes to a Code must be proposed to the General Committee, generally via publication in the journal *Taxon*. Proposals concerning fossils and (modern) algae are referred to special committees for the respective groups for consideration and recommendations. Changes to the Code, based on this process, must be validated at an International Botanical Congress, these being held usually every six years.

ICZN: International Code of Zoological Nomenclature (Ride et al., 2012).

illegitimate name: "... a validly published name that is not in accordance with the rules in such a way that it must not be taken into consideration for the purposes of priority (except for the purposes of homonymy ...) when the correct name of a taxon is being decided." (Jeffrey, 1977, p.65.) Note that names that are not validly published can be referred to as "not legitimate" but not "illegitimate". Illegitimate names cannot be re-used, since a homonym would be created; if a name is simply "not legitimate", it may be validated and thus rendered legitimate as long as it is neither a homonym nor includes the type of an earlier name.

junior homonym: "... the later [validly] published of two homonyms" (Jeffrey, 1977, p.61).

junior synonym, junior taxonomic synonym: see "nomenclatural synonym" and "taxonomic synonym".

lectotype: "... a specimen ... designated from the original material as the nomenclatural type ... when no holotype was indicated at the time of publication [or] when it is missing..." (ICN Article 9.2).

legitimate name: a name "... that is in accordance with the rules ..." (ICN Article 6.5). Note that legitimate in the sense of the ICN is not the converse of illegitimate (which see).

misspelling: an unintentional, incorrect spelling of a taxon name.

name not validly published: a name that is not in accordance with Articles 32 to 45 of the ICN.

neotype: "... a specimen ... selected to serve as nomenclatural type as long as all of the material on which the name of the taxon was based is missing" (ICN Article 9.7).

new combination: see comb. nov.

new name: "A new name published as a replacement name (... nomen novum) for an older name is typified by the type of the older name ..." (ICN Article 7.4).

new species: a species name validly published for the first time.

N.I.A.: noun in apposition; refers to the use of the substantive as a specific or infraspecific epithet of a species name. The nominative orthography ("original correct spelling") of such an epithet is retained, regardless of the gender of the generic name — e.g. "*Cordosphaeridium cantharellus*" not "*Cordosphaeridium cantharellum*". ("*Cantharellus*" is a genus of mushroom — all generic names are nouns.)

nomenclatural synonym: a synonym of the same rank and based on the same type; in the ICZN the equivalent term is objective synonym. An earlier, validly published nomenclatural synonym is a "nomenclatural senior synonym" relative to a later, validly published nomenclatural synonym, which is thus a "nomenclatural junior synonym". (See also the discussion above under ICN Article 52.)

nomenclatural type: "A nomenclatural type ... is that element to which the name of a taxon is permanently attached, whether as a correct name or as a synonym. The nomenclatural type is not necessarily the most typical or representative element of a taxon" (ICN Article 7.2). See also "holotype" and "type".

nom. nov. subst. pro: Latin, a new name in substitution for. This Latin phrase is used in the publication in which the new name is proposed; subsequent publications should use the term "nom. subst. pro".

nom. nud., nomen nudum: Latin for “naked name”; a name that is not validly published. In the Index we prefer the clearer equivalent "name not validly published".

nom. subst. pro: Latin, a name in substitution for. This Latin phrase is used to signify replacement names proposed in earlier publications. We prefer to use the term "substitute name" in this Index.

Now redundant: indicates an autonym that has been required in the past but is no longer needed because the species currently contains no other correct (“active”) infraspecific taxa .

objective synonym: the ICZN term for a nomenclatural synonym. Also termed obligate synonym.

obligate synonym: see objective synonym.

original material: "... those specimens and illustrations ... upon which it can be shown that the description or diagnosis validating the name was based ..." (ICN Article 9.3).

orthographic variant: an incorrect, but intentional spelling of a name, as opposed to an unintentional misspelling.

protologue: "... everything associated with a name at its valid publication, i.e. description or diagnosis, illustrations, references, synonymy, geographical data, citation of specimens, discussion, and comments" (ICN, footnote to Recommendation 8A.4.)

senior homonym: "... the earlier published of two homonyms" (Jeffrey, 1977, p.61).

senior synonym; senior taxonomic synonym: see nomenclatural synonym and taxonomic synonym.

sp. nov., species nova: Latin, new species; indicates a species name validly published for the first time.

stat. nov., status novus: Latin, new status; "... used in citation to indicate that a taxon has been altered in rank but retains in its name the epithet from its name in the former rank" (Jeffrey, 1977, p.69).

subjective synonym: the ICZN term for taxonomic synonym.

subsp.: subspecies: the rank of infraspecific taxa immediately below species.

substitute name: A replacement name substituting for an illegitimate name.

synonym: "One of two or more names applied to the same taxon" (Jeffrey, 1977, p.70). In the Index, without further qualifiers, "synonym" refers to a taxonomic synonym.

tautonym: a name of a species in which the specific epithet exactly repeats the generic name.

taxonomic synonym: a synonym based on a different type; in the ICZN the equivalent term is subjective synonym. An earlier taxonomic synonym is a "taxonomic senior synonym" relative to a later, validly published taxonomic synonym, which is thus a "taxonomic junior synonym". (The terms junior taxonomic synonym and senior taxonomic synonym are also used.)

type (of a genus): "The type of a name of a genus ... is the type of the name of a species" (ICN Article 10.1.) See holotype.

type species: the now informal designation of the correct name of the species that includes the type of the generic name. See explanation of the symbols "*" and "+" below.

validly published: In order to be validly published, a name of a taxon (autonyms excepted) must be in accordance with ICN articles 32 to 45. Requirements for the valid publication of a name include effective publication (Articles 29–31), the provision of a description or diagnosis or by a reference to a previously and effectively published description or diagnosis, and the designation of a type. For a more comprehensive summary of articles relating to valid publication, see above.

var., varietas: Latin, variety. The rank of infraspecific taxa immediately below subspecies.

*: species containing the type of the genus, as designated at the valid publication of the generic name.

+: the taxonomic senior synonym of the species name containing the nomenclatural type of the genus. Thus, correct (in the sense of the ICN), but not the originally designated name of the "type species".

ACKNOWLEDGEMENTS

Updating the Index after a lapse of twelve years was a massive task that would have been impossible without the unstinted support of numerous colleagues. These include: Peter Bijl, Henk Brinkhuis, Chris Clowes, Erica Crouch, Stijn De Schepper, Karen Dybkjær, Lucy Edwards, Malte Elbrachter, Susanne Feist-Burkhardt, Rahul Garg, Marc Gottschling, Raquel Guerstein, Rex Harland, Claus Heilmann-Clausen, Martin Head, Alina Iakovleva, Laurent Londeix, Stephan Louwye, Daniel Mantle, Fabienne Marret-Davies, Edwige Masure, Francine McCarthy, Kenneth Mertens, Peta Mudie, Dirk Munsterman, Henrik Nøhr-Hansen, Martin Pearce, Daniel Peyrot, Michael Prauss, Joe Prebble, Jim Riding, André Rochon, Francesca Sangiorgi, Paul Schioler, Hamid Slimani, Appy Sluijs, Ali Soliman, Michael Streng, Gerard

Versteegh, Karin Zonneveld. We apologize to anyone we inadvertently omitted. Susanne Feist-Burkhardt pointed out some errors in our references to the papers by C.G. Ehrenberg in previous versions of the Index and assisted us in correcting these mistakes; however, any errors that remain are fully our responsibility. Malte Elbrächter, Marc Gottschling and Michael Streng were towers of strength in helping us to update the entries for the calcareous dinoflagellate cysts and in providing us with several, otherwise inaccessible reprints. We owe an especial debt of gratitude to Michael for responding to our numerous queries promptly and expertly. We are grateful to Jennifer Galloway, Raquel Guerstein and Martin Head for reviewing all or parts of the manuscript. We are indebted to Bill MacMillan and Nelly Koziel for technical support. And we thank Judi Lentin, Jim Riding and Bob Clarke for managing the publication aspects of both the Index and DINOFLAJ. Finally, we are grateful to the Geological Survey of Canada (GSC) and Saint Mary's University for providing the facilities for production of this edition of the Index. Indeed there would not be an Index, without the continuing support of the GSC since 1973. This is ESS Contribution no. 20160153.

MAIN INDEX

"**ABANTOSPHAERIDIUM**" Banerjee and Rawat, 1991, p.42. **Name not validly published**: no description.

ABRATOPDINIUM Mao Shaozhi and Mohr, 1992, p.317–318. Type: Mao Shaozhi and Mohr, 1992, pl.1, fig.1, as *Abratopdinium kerguelense*.

cardioforme Mao Shaozhi and Mohr, 1992, p.318, pl.1, figs.3–4. Holotype: Mao Shaozhi and Mohr, 1992, pl.1, fig.4. Age: late Campanian–early Maastrichtian.

***kerguelense** Mao Shaozhi and Mohr, 1992, p.318, pl.1, figs.1–2,6. Holotype: Mao Shaozhi and Mohr, 1992, pl.1, fig.1. Age: late Campanian–early Maastrichtian.

"**ACANTHAULAX**" Sarjeant, 1968, p.227. Emendations: Sarjeant, 1982b, p.46; Brenner, 1988, p.33. Substitute name for *Acanthogonyaulax* Sarjeant, 1966b, p.132 (an illegitimate name). **Taxonomic senior synonym**: *Cribroperidinium*, according to Poulsen (1996, p.71). Taxonomic junior synonym: *Meristaulax* Sarjeant, by implication in Brenner (1988, p.35), who included the type of *Meristaulax* Sarjeant in *Acanthaulax*. Type: Klement, 1960, pl.5, figs.10–11, as *Gonyaulax venusta*.

"**acanthosphaera**" (Sarjeant, 1961a, p.94–95, pl.13, fig.14; text-fig.4) Sarjeant, 1968, p.227. Emendation: Sarjeant, 1976c, p.12, as *Meiourogonyaulax? acanthosphaera*. Holotype: Sarjeant, 1961a, pl.13, fig.14; text-fig.4; Sarjeant, 1976c, pl.5, figs.2,4. **NOW** *Meiourogonyaulax?*. Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Meiourogonyaulax*, fifthly (and now) *Meiourogonyaulax?*, sixthly *Lithodinia*, seventhly *Lithodinia?*. Age: early Oxfordian.

"**aceras**" (Eisenack, 1958a, p.391, pl.21, figs.1–2) Stover and Evitt, 1978, p.137. Emendation: Sarjeant, 1985a, p.57,59, as *Cribroperidinium aceras*. Holotype: Eisenack, 1958a, pl.21, fig.1; Sarjeant, 1985a, pl.4, figs.1–2; Jan du Chêne et al., 1986a, pl.2, figs.6–7. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Leptodinium*, fourthly *Acanthaulax?*, fifthly (and now) *Cribroperidinium*. Questionable assignment: Stover and Evitt (1978, p.137). Age: Aptian.

"**aculeata**" (Klement, 1960, p.42, pl.5, figs.6–9; text-fig.21) Stover and Evitt, 1978, p.137. Holotype: Klement, 1960, pl.5, figs.6–7. **NOW** *Tehamadinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Acanthaulax*, fourthly *Occisucysta*, fifthly (and now) *Tehamadinium*. Age: early Kimmeridgian.

"**angulosa**" (Gitmez, 1970, p.252, pl.2, figs.4–5; text-figs.7A–B) Stover and Evitt, 1978, p.137. Holotype: Gitmez, 1970, pl.2, figs.4–5; text-figs.7A–B; Jan du Chêne et al., 1986a, pl.2, figs.11–15. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Acanthaulax*, thirdly *Meristaulax* Sarjeant, fourthly *Acanthaulax?*, fifthly *Rhynchodiniopsis*, sixthly (and now) *Cribroperidinium*. Questionable assignment: Jan du Chêne et al. (1986a, p.26). Taxonomic senior synonym: *Gonyaulax* (now *Cribroperidinium*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Acanthaulax?* (as *Meristaulax*, now *Cribroperidinium*) *angulosa*. Age: early Kimmeridgian.

"**areolata**" (Sarjeant, 1961a, p.95–96, pl.13, fig.13; text-fig.5) Riley and Fenton, 1982, p.199. Holotype: Sarjeant, 1961a, pl.13, fig.13; text-fig.5; Jan du Chêne et al., 1986a, pl.3, figs.1–2. **Combination illegitimate** — **nomenclatural senior synonym**: *Gonyaulacysta scarburghensis*. **NOW** *Trichodinium scarburghense*. Originally *Gonyaulax areolata* (name illegitimate; Appendix B), subsequently *Gonyaulacysta scarburghensis*, thirdly *Gonyaulacysta areolata* (combination illegitimate), fourthly *Acanthaulax areolata* (combination illegitimate), fifthly *Acanthaulax scarburghensis*, sixthly *Liesbergia scarburghensis*, seventhly (and now) *Trichodinium scarburghense*. Taxonomic junior synonym: *Acanthaulax senta*, according to Berger (1986, p.343). This combination was not validly published in Riley and Fenton (1980, p.340), since these authors did not reference the basionym. Age: late Callovian–early Oxfordian.

"*compta*" (Duxbury, 1980, p.122–123, pl.2, figs.1–2,4) Sarjeant, 1982b, p.47. Holotype: Duxbury, 1980, pl.2, figs.1–2,4; Jan du Chêne et al., 1986a, pl.10, figs.9–10. Originally *Gonyaulacysta*, subsequently *Cribroperidinium*, thirdly *Acanthaulax*, fourthly *Apteodinium*. **Taxonomic senior synonym:** *Millioudodinium* (now *Cribroperidinium*) *spinoreticulatum*, according to Lucas-Clark (1987, p.178). Age: middle-late Barremian.

"*crispa*" (Wetzel, 1967a, p.870, pl.15, figs.4a–b) Woollam and Riding, 1983, p.3. Emendations: Sarjeant, 1980b, p.119–120, as *Hystrichogonyaulax crispa*; Fenton, 1981, p.255,257, as *Cribroperidinium crispum*. Holotype: Wetzel, 1967a, pl.15, figs.4a–b; Dietz et al., 1999, text-fig.5a. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Hystrichogonyaulax*, fifthly (and now) *Cribroperidinium*, sixthly *Acanthaulax*. Age: Middle Jurassic.

"?*downiei*" (Sarjeant, 1960a, p.138–139) Sarjeant, 1976c, p.6. Holotype: Downie, 1957, pl.20, fig.10, as *Hystrichosphaeridium pattei*; Jan du Chêne et al., 1986a, pl.3, figs.7–9. **NOW** *Cribroperidinium*?. Originally *Baltisphaeridium* (Appendix A), subsequently *Acanthaulax*, thirdly *Acanthaulax*?, fourthly *Cyclonephelium*, fifthly (and now) *Cribroperidinium*? Questionable assignment: Stover and Evitt (1978, p.137) — however, Sarjeant (1982b, p.47) retained the species in *Acanthaulax* without question. Age: Kimmeridgian.

"*granulata*" (Klement, 1960, p.39–41, pl.4, figs.10–13; text-figs.18–20) Brenner, 1988, p.35. Emendation: Sarjeant, 1984a, p.161–162, as *Meristaulax granulata*. Holotype: Klement, 1960, pl.4, figs.10–11; text-figs.18–20; Fensome et al., 1995, figs.1–2 — p.1525; disintegrated according to Sarjeant (1984a, p.162). Lectotype (designated by Sarjeant, 1984a, p.162): Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2a–b; Fensome et al., 1995, figs.5–6 — p.1525 — however, Brenner (1988, p.35) argued that this specimen is not conspecific with the holotype. Lectotype (designated by Brenner, 1988, p.35): Brenner, 1988, pl.1, figs.3a–c; Fensome et al., 1995, figs.7–9 — p.1525. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Meristaulax* Sarjeant, sixthly *Acanthaulax*. Poulsen (1996, p.73) retained this species in *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *venusta*, according to Schrank (2005, p.56); *Gonyaulax* (now *Cribroperidinium*) *granuligera*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156–158) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*; *Gonyaulacysta* (as *Acanthaulax*?, now *Cribroperidinium*) *angulosa*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*) *angulosa*. For further discussion, see *Cribroperidinium granulatum*. Age: middle Oxfordian–early Kimmeridgian.

"*granuligera*" (Klement, 1960, p.41–42, pl.5, figs.4–5) Brenner, 1988, p.35–36. Emendation: Sarjeant, 1984a, p.156, as *Cryptarchaeodinium granuligerum*. Holotype: Klement, 1960, pl.5, figs.4–5; Sarjeant, 1984a, pl.1, figs.3–4; text-fig.1; Jan du Chêne et al., 1986a, pl.27, figs.11–14. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Cryptarchaeodinium*, sixthly *Acanthaulax*. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156) retained *Acanthaulax* (as *Cryptarchaeodinium*) *granuligera*. Age: middle Oxfordian–early Kimmeridgian.

"*magna*" (Jain, 1977b, p.175–176, pl.4, figs.40–42) Khowaja-Ateequzaman, 1993, p.131. Holotype: Jain, 1977b, pl.4, figs.41–42; Jan du Chêne et al., 1986a, pl.122, fig.8. **NOW** *Cribroperidinium*. Originally *Trichodinium*, subsequently *Acanthaulax*, thirdly (and now) *Cribroperidinium*. Age: early Albian.

"*miocenica*" Zevenboom and Santarelli in Zevenboom, 1995, p.149, pl.1, figs.1–6. Holotype: Zevenboom, 1995, pl.1, figs.1–3. **Name not validly published:** considered a manuscript name by the authors. Age: Tortonian–Messinian.

"?*paliuros*" (Sarjeant, 1962a, p.260, pl.1, fig.7; text-fig.5) Sarjeant, 1968, p.227–228. Holotype: Sarjeant, 1962a, pl.1, fig.7. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Acanthaulax*?, fifthly (and now) *Cribroperidinium*?. Questionable assignment: Stover and Evitt (1978, p.137). Age: Oxfordian.

"*saetosa*" Wilson in Masure, 1985, p.205. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Acanthaulax* (now *Cribroperidinium*) *wilsonii*, according to Slimani (2001a, p.192).

"*scarburghensis*" (Sarjeant, 1964b, p.472–473) Lentin and Williams, 1985, p.2. Holotype: Sarjeant, 1961a, pl.13, fig.13; text-fig.5; Jan du Chêne et al., 1986a, pl.3, figs.1–2. **NOW** *Trichodinium scarburghense*. Originally *Gonyaulax areolata* (name illegitimate; Appendix B), subsequently *Gonyaulacysta scarburghensis*, thirdly *Gonyaulacysta areolata* (combination illegitimate), fourthly *Acanthaulax areolata* (combination illegitimate), fifthly *Acanthaulax scarburghensis*, sixthly *Liesbergia scarburghensis*, seventhly (and now) *Trichodinium scarburghense*. *Gonyaulacysta scarburghensis* is the substitute name for *Gonyaulax areolata* Sarjeant, 1961a, p.95–96, pl.13, fig.13; text-fig.5. Taxonomic junior synonym: *Acanthaulax senta*, according to Berger (1986, p.343) and Kunz (1990, p.14). Age: late Callovian–early Oxfordian.

"*senta*" Drugg, 1978, p.62, pl.3, fig.13; pl.4, figs.1–3. Holotype: Drugg, 1978, pl.4, fig.2; Jan du Chêne et al., 1986a, pl.4, figs.1–2. **Taxonomic senior synonym:** *Gonyaulacysta* (now *Trichodinium*) *scarburghensis*, according to Berger (1986, p.343) and Kunz (1990, p.14). Age: Oxfordian.

"*septata*" Hultberg, 1985c, p.104–105, pl.1, fig.C. Holotype: Hultberg, 1985c, pl.1, fig.C. **NOW** *Cribroperidinium*. Originally *Acanthaulax*, subsequently (and now) *Cribroperidinium*. Age: late Maastrichtian–Danian.

"?*spinossissima*" (Deflandre, 1939a, p.179, pl.9, fig.11 ex Deflandre and Cookson, 1955, p.258) Sarjeant, 1972, p.22. Holotype: Deflandre, 1939a, pl.9, fig.11. **NOW** *Pareodinia*?. Originally *Palaeoperidinium* (name not validly published), subsequently *Palaeohystrichophora*, thirdly *Acanthaulax*?, fourthly *Pareodinia*, fifthly (and now) *Pareodinia*?. Questionable assignment: Sarjeant (1972, p.22). Age: Late Jurassic.

"*systemmatus*" (Gitmez and Sarjeant, 1972, p.204–205, pl.5, figs.7–8) Brenner, 1988, p.36. Holotype: Gitmez and Sarjeant, 1972, pl.5, figs.7–8; Jan du Chêne et al., 1986a, pl.29, figs.4–7. Originally *Gonyaulacysta*, subsequently *Cribroperidinium*, thirdly *Millioudodinium*, fourthly *Cribroperidinium*?, fifthly *Acanthaulax*. **Taxonomic senior synonym:** *Gonyaulacysta* (as and now *Cribroperidinium*) *globata*, according to Poulsen (1996, p.72). Age: early Kimmeridgian.

"?*tenuiceras*" (Eisenack, 1958a, p.389–391, pl.21, figs.14–15; pl.22, figs.1–3; pl.24, fig.2; text-figs.4a–c,5) Sarjeant, 1985a, p.63. Emendations: Sarjeant, 1985a, p.63,65, as *Acanthaulax tenuiceras*; Jan du Chêne et al., 1986b, p.29–30, as *Tehamadinium tenuiceras*. Holotype: Eisenack, 1958a, pl.21, fig.15; Sarjeant, 1985a, pl.6, figs.1–2; text-fig.3; Jan du Chêne et al., 1986a, pl.118, fig.1; Jan du Chêne et al., 1986b, pl.24, fig.5. **NOW** *Cribroperidinium*?. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*?, thirdly *Diacanthum*, fourthly *Occisucysta*, fifthly *Acanthaulax*?, sixthly *Tehamadinium*, seventhly (and now) *Cribroperidinium*?. Questionable assignment: Sarjeant (1985a, p.63). Taxonomic junior synonym: *Occisucysta victorii*, according to Pöthe de Baldis and Ramos (1988, p.33). Age: late Barremian–Aptian.

"*venusta*" (Klement, 1960, p.44–45, pl.5, figs.10–13; text-fig.22) Sarjeant, 1968, p.227. Holotype: Klement, 1960, pl.5, figs.10–11. **Taxonomic senior synonym:** *Gonyaulax* (as *Cribroperidinium*) *granulata*, according to Schrank (2005, p.56). Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Gonyaulacysta*, fifthly *Cribroperidinium*. Age: middle Oxfordian–Kimmeridgian.

"*wilsonii*" Yun Hyesu, 1981, p.7–8, pl.1, figs.2–3,6–7a–b. Holotype: Yun Hyesu, 1981, pl.1, fig.6; Jan du Chêne et al., 1986a, pl.2, fig.18; Fensome et al., 1991, fig.3 — p.773. **NOW** *Cribroperidinium*. Originally *Acanthaulax*, subsequently (and now) *Cribroperidinium*. Taxonomic junior synonym: *Acanthaulax saetosa* (name not validly published), according to Slimani (2001a, p.192). Age: late Campanian.

"**ACANTHOGONYAULAX**" Sarjeant, 1966b, p.132. **Name illegitimate** — **senior homonym:** *Acanthogonyaulax* Kofoid, 1911. **Substitute name:** *Acanthaulax*. Type: Klement, 1960, pl.5, figs.10–11, as *Gonyaulax venusta*.

"*acanthosphaera*" (Sarjeant, 1961a, p.94–95, pl.13, fig.14; text-fig.4) Sarjeant, 1966b, p.132. Emendation: Sarjeant, 1976c, p.12, as *Meiourogonyaulax? acanthosphaera*. Holotype: Sarjeant, 1961a, pl.13, fig.14; text-fig.4; Sarjeant, 1976c, pl.5, figs.2,4. **Combination not validly published:** basionym not fully referenced. **NOW** *Meiourogonyaulax*?. Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not

validly published), thirdly *Acanthaulax*, fourthly *Meiourogonyaulax*, fifthly (and now) *Meiourogonyaulax?*, sixthly *Lithodinia*, seventhly *Lithodinia?*. Age: early Oxfordian.

"*paliuros*" (Sarjeant, 1962a, p.260, pl.1, fig.7; text-fig.5) Sarjeant, 1966b, p.132. Holotype: Sarjeant, 1962a, pl.1, fig.7. **Combination not validly published:** basionym not fully referenced. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Acanthaulax?*, fifthly (and now) *Cribroperidinium?*. Age: Oxfordian.

"*venusta*" (Klement, 1960, p.44–45, pl.5, figs.10–13; text-fig.22) Sarjeant, 1966b, p.132. Holotype: Klement, 1960, pl.5, figs.10–11. **Taxonomic senior synonym:** *Gonyaulax* (as *Cribroperidinium*) *granulata*, according to Schrank (2005, p.56). Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Gonyaulacysta*, fifthly *Cribroperidinium*. Age: middle Oxfordian–Kimmeridgian.

ACHILLEODINIUM Eaton, 1976, p.234. Taxonomic senior synonym: *Florentinia*, according to Duxbury (1980, p.119), Below (1982c, p.7) and Duxbury (1983, p.46) — however, Lentin and Williams (1981, p.1) and Lentin and Williams (1985, p.2) retained *Achilleodinium*. Type: Eisenack, 1954b, pl.11, fig.18, as *Hystrichosphaeridium biformoides*.

?*arboriforme* Marheinecke, 1992, p.55–56, pl.9, figs.7–8,10–11. Holotype: Marheinecke, 1992, pl.9, figs.7–8,10. Questionable assignment: Marheinecke (1992, p.55). Contrary to the opinion of Lentin and Williams (1993, p.4), this name was considered validly published by Williams et al. (1998, p.21). Age: early–late Maastrichtian.

bianii Hultberg, 1985c, p.105, pl.6, figs.F–H. Holotype: Hultberg, 1985c, pl.6, fig.F. Schiøler et al. (1997, p.83) considered this species to be a possible taxonomic junior synonym of *Kleithriasphaeridium truncatum*. Age: late Maastrichtian.

**biformoides* (Eisenack, 1954b, p.68, pl.11, figs.16–20) Eaton, 1976, p.234. Holotype: Eisenack, 1954b, pl.11, fig.18. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Achilleodinium*, fifthly *Florentinia*. Lentin and Williams (1981, p.2) retained this species in *Achilleodinium*. Age: late Eocene–early Oligocene.

fibrapendiculum Islam, 1983b, p.335, pl.1, figs.1–3; text-fig.5. Holotype: Islam, 1983b pl.1, figs.1–2; text-fig.5. Age: middle Eocene.

latispinosum (Davey and Williams, 1966b, p.88–89, pl.5, fig.8) Bujak et al., 1980, p.26. Holotype: Davey and Williams, 1966b, pl.5, fig.8; Bujak et al., 1980, pl.8, figs.7–9. Originally *Cordosphaeridium*, subsequently (and now) *Achilleodinium*, thirdly *Tityrosphaeridium?*. Lentin and Williams (1985, p.3) retained this species in *Achilleodinium*. Age: early Eocene.

palaeoeocenicum Khanna and Singh, 1981b, p.400,402, fig.3, no.1; text-fig.13. Holotype: Khanna and Singh, 1981b, fig.3, no.1. This name was a not validly published in Singh et al. (1979, p.35–36) and Khanna (1979, p.218), since in neither publication was a description provided. Age: early Eocene.

ACHOMOSPHAERA Evitt, 1963, p.163. Taxonomic senior synonym: *Spiniferites*, according to Duxbury (1983, p.54–55) — however, Lentin and Williams (1989, p.3) retained *Achomosphaera*. Taxonomic junior synonym: *Hystrichostrogylon*, by implication in Eaton (1976, p.237), who included the "type species", *Hystrichostrogylon membraniphorum*, in *Achomosphaera* — however, Stover and Evitt (1978, p.165) retained *Hystrichostrogylon*. Type: Deflandre, 1937b, pl.14 (al. pl.11), fig.5, as *Hystrichosphaeridium ramuliferum*.

alcicornu (Eisenack, 1954b, p.65, pl.10, figs.1–2; text-fig.5) Davey and Williams, 1966a, p.50. Holotype: Eisenack, 1954b, pl.10, fig.2. Originally *Hystrichosphaeridium*, subsequently (and now) *Achomosphaera*. Taxonomic junior synonyms: *Galea lychnea* and *Hystrichosphaeridium leptodermum*, both according to Sarjeant (1983, p.100–101).

May (1980, p.64) considered *Hystrichosphaera* (as *Spiniferites*) *pseudofurcatus* to be the possible taxonomic senior synonym of this species. Age: Oligocene.

"forma *alcicornu*". Autonym. Holotype: Eisenack, 1954b, pl.10, fig.2. **Now redundant.**

subsp. *alcicornu*. Autonym. Holotype: Eisenack, 1954b, pl.10, fig.2.

"forma *columnaeformis*" Aristova, 1971, p.117–118, pl.1, fig.2. Holotype: Aristova, 1971, pl.1, fig.2. **NOW** *Achomosphaera alcicornu* subsp. *columnaeformis*. Originally *Achomosphaera alcicornu* forma *columnaeformis*, subsequently (and now) *Achomosphaera alcicornu* subsp. *columnaeformis*. Age: Eocene.

subsp. *columnaeformis* (Aristova, 1971, p.117–118, pl.1, fig.2) Lentin and Williams, 1989, p.3. Holotype: Aristova, 1971, pl.1, fig.2. Originally *Achomosphaera alcicornu* forma *columnaeformis*, subsequently (and now) *Achomosphaera alcicornu* subsp. *columnaeformis*. Age: Eocene.

andalousiensis Jan du Chêne, 1977, p.112, pl.1, figs.1–4. Emendation: Jan du Chêne and Londeix, 1988, p.239, as *Achomosphaera andalousiensis*. Holotype: Jan du Chêne, 1977, pl.1, fig.1, lost according to Jan du Chêne and Londeix (1988, p.237). Lectotype: Jan du Chêne and Londeix, 1988, pl.1, figs.1–3, designated by Jan du Chêne and Londeix (1988, p.244). Originally (and now) *Achomosphaera*, subsequently *Spiniferites*. Head (1997, p.169) retained this species in *Achomosphaera*. Taxonomic junior synonyms: *Spiniferites septentrionalis*, according to Harland (1983, p.103–104) — however, Londeix et al. (2009, p.67–68) retained *Spiniferites septentrionalis*; *Spiniferites aquilonius*, according to Strauss in Strauss and Lund (1992, p.169). The synonymy of *Achomosphaera andalousiensis* and *Spiniferites septentrionalis* was questioned in Head and Wrenn (1992, p.2). Age: Miocene (Andalusian).

subsp. *andalousiensis*. Autonym. Holotype: Jan du Chêne, 1977, pl.1, fig.1, lost according to Jan du Chêne and Londeix (1988, p.237). Lectotype: Jan du Chêne and Londeix, 1988, pl.1, figs.1–3, designated by Jan du Chêne and Londeix (1988, p.244).

subsp. *suttonensis* Head, 1997, p.169,171, fig.4, nos.3–11; fig.15, nos.2–9. Holotype: Head, 1997, fig.4, nos.3–8. Age: middle Pliocene.

antleriformis Schiøler, 1993, p.102,104, pl.3, figs.1–6; text-figs.2a–c. Holotype: Schiøler, 1993, pl.3, fig.2; text-figs.2a–b. Age: Maastrichtian.

argesensis Demetrescu, 1989, p.51–54, pl.1, figs.1–6; pl.2, figs.1–4; text-fig.2; text-figs.3A–E. Holotype: Demetrescu, 1989, pl.1, figs.1–5; text-fig.2; text-figs.3A,C. Age: early Pliocene.

bullae Cookson and Eisenack, 1974, p.55, pl.23, fig.13. Holotype: Cookson and Eisenack, 1974, pl.23, fig.13. N.I.A. Age: Paleocene.

callosa Matsuoka, 1983b, p.128–129, pl.11, figs.6a–c,7a–b,8; text-figs.15A–B. Holotype: Matsuoka, 1983b, pl.11, figs.6a–c. Age: Pliocene.

"*cambræ*" Sah et al., 1970, p.144, pl.1, fig.3. Holotype: Sah et al., 1970, pl.1, fig.3. Originally *Achomosphaera*, subsequently *Spiniferites*. **Taxonomic senior synonym:** *Galea* (now *Spiniferites*) *twistingiensis*, by implication in Jain (1982, p.51), who considered *Achomosphaera cambræ* to be a taxonomic junior synonym (at subspecific rank) of *Hystrichosphaera ramosa* var. *multibrevis* (as *Spiniferites ramosus* var. *multibrevis*), which is now considered a taxonomic junior synonym (at specific rank) of *Galea* (now *Spiniferites*) *twistingiensis*. Age: Late Cretaceous.

"*communis*" (Corradini, 1973, p.151, pl.22, figs.1a–b; pl.33, figs.1,3) Sarjeant, 1981, p.122. Holotype: Corradini, 1973, pl.22, figs.1a–b. **NOW** *Cordosphaeridium*. Originally (and now) *Cordosphaeridium*, subsequently *Achomosphaera*. Lentin and Williams (1985, p.3) retained this species in *Cordosphaeridium*. Age: Late Cretaceous.

?*convexa* Sah et al., 1970, p.145–146, pl.1, figs.12–13. Holotype: Sah et al., 1970, pl.1, fig.12. Originally *Achomosphaera*, subsequently (and now) *Achomosphaera*?. Questionable assignment: Stover and Evitt (1978, p.139). Age: Late Cretaceous.

"?*cracenospinosa*" (Davey and Williams, 1966b, p.87, pl.3, fig.3) Sarjeant, 1981, p.123. Holotype: Davey and Williams, 1966b, pl.3, fig.3; Bujak et al., 1980, pl.7, fig.9. **NOW** *Cordosphaeridium*?. Originally *Cordosphaeridium*, subsequently (and now) *Cordosphaeridium*?, thirdly *Achomosphaera*?. Questionable assignment: Sarjeant (1981, p.123). Age: early Eocene.

crassipellis (Deflandre and Cookson, 1955, p.265, pl.6, figs.2–3; text-fig.20) Stover and Evitt, 1978, p.138. Holotype: Deflandre and Cookson, 1955, pl.6, figs.2–3. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Achomosphaera*. Taxonomic junior synonyms: *Achomosphaera recurvata* and *Hystrichosphaera* (subsequently *Spiniferites*) *membranosa*, according to Quattrocchio and Sarjeant (1996, p.116). May (1980, p.64) considered *Achomosphaera sagena* to be a possible taxonomic junior synonym of this species. Age: early Eocene.

danica (Wetzel, 1952, p.396–397, pl.A, figs.5–6; text-fig.8) Sarjeant, 1984c, p.129, pl.1, fig.4. Emendation: Sarjeant, 1984c, p.129–130, as *Achomosphaera danica*. Holotype: Wetzel, 1952, pl.A, fig.6; Dietz et al., 1999, text-fig.6b. Originally *Areoligera*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium*, fourthly *Cleistosphaeridium*?, fifthly (and now) *Achomosphaera*. Taxonomic senior synonym: *Areoligera senonensis*, according to Lejeune-Carpentier and Sarjeant (1981, p.15) — however, Sarjeant (1984c, p.129) retained *Achomosphaera danica*. Age: Paleocene.

?*delicata* Sah et al., 1970, p.144–145, pl.1, figs.4–5. Holotype: Sah et al., 1970, pl.1, fig.4. Originally *Achomosphaera*, subsequently (and now) *Achomosphaera*?. Questionable assignment: Stover and Evitt (1978, p.139). Age: Late Cretaceous.

expansa Stover and Hardenbol, 1994, p.33–34, pl.5, figs.30a–b, 31a–c; pl.6, figs.32a–b. Holotype: Stover and Hardenbol, 1994, pl.5, figs.30a–b. Age: Rupelian.

fenestra Kirsch, 1991, p.54–55, pl.2, figs.4, 6–12; text-figs.35a–b, 36a–j. Holotype: Kirsch, 1991, pl.2, figs.7–9. N.I.A. Age: early-middle Campanian.

?*globata* Sah et al., 1970, p.145, pl.1, figs.10–11. Holotype: Sah et al., 1970, pl.1, fig.10. Originally *Achomosphaera*, subsequently (and now) *Achomosphaera*?. Questionable assignment: Stover and Evitt (1978, p.139). Age: Late Cretaceous.

grallaeformis (Brosius, 1963, p.42, pl.5, fig.3; text-fig.2) Davey and Williams, 1969, p.4. Holotype: Brosius, 1963, pl.5, fig.3. Originally *Hystrichosphaeridium*, subsequently (and now) *Achomosphaera*, thirdly *Spiniferites* (combination not validly published). Taxonomic junior synonym: *Spiniferites solidago*, according to Strauss et al. (2001, p.412). This combination was not validly published in Davey and Williams (1966b, p.104), since these authors did not fully reference the basionym. Age: Oligocene.

granulata Mao Shaozhi, 1989, p.139, pl.28, figs.9–10. Holotype: Mao Shaozhi, 1989, pl.28, fig.10. Mao Shaozhi (1989, p.139) gave the citation "*Achomosphaera granurata* sp.nov.". Age: Quaternary.

heterostyla (Heisecke, 1970, p.238, 240, pl.5, figs.1–4; pl.6, figs.4–5) Stover and Evitt, 1978, p.138. Holotype: Heisecke, 1970, pl.5, figs.3–4; pl.6, fig.4. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Achomosphaera*. Age: Danian.

"*hirundo*" (Eisenack, 1958a, p.404–405, pl.24, fig.12) Davey and Williams, 1969, p.4. Emendation: Sarjeant, 1985a, p.76–77, as *Achomosphaera hirundo*. Holotype: Eisenack, 1958a, pl.24, fig.12. **NOW** *Cordosphaeridium*?. Originally *Hystrichosphaeridium*, subsequently *Achomosphaera*, thirdly *Lanternosphaeridium*, fourthly (and now) *Cordosphaeridium*?, fifthly *Spiniferites*. This combination was not validly published in Davey and Williams (1966b, p.104), since these authors did not fully reference the basionym. N.I.A. Age: Early Cretaceous.

"hyperacantha" (Deflandre and Cookson, 1955, p.264–265, pl.6, fig.7) Davey and Williams, 1969, p.4. Holotype: Deflandre and Cookson, 1955, pl.6, fig.7. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently *Achomosphaera*, thirdly (and now) *Spiniferites*. Taxonomic junior synonym (at specific rank): *Hystrichosphaera furcata* var. *multiplicata*, according to Matsuoka (1985a, p.35) — however, Londeix et al. (2009, p.66) retained both taxa. Motile equivalent: *Gonyaulax spinifera* complex, according to Matsuoka et al. (1989, p.94). Age: Miocene.

improcera Islam, 1983c, p.80–81, pl.1, figs.1–2. Holotype: Islam, 1983c, pl.1, fig.1. Age: early-middle Eocene.

linifera (Cookson and Eisenack, 1967b, p.253, pl.40, fig.9; pl.41, figs.7–8) Stover and Evitt, 1978, p.138–139. Holotype: Cookson and Eisenack, 1967b, pl.41, fig.8. Originally *Baltisphaeridium* (Appendix A), subsequently *Taeniophora*, thirdly (and now) *Achomosphaera*. Age: late Paleocene.

?**longispinosa** He Chengquan, 1991, p.148, pl.23, fig.16. Holotype: He Chengquan, 1991, pl.23, fig.16. Questionable assignment: He Chengquan (1991, p.148). Age: Paleocene–early Eocene.

?**malleofera** (White, 1842, p.37, pl.4, div.3, fig.7) Sarjeant, 1991, p.88. Holotype: White, 1842, pl.4, div.3, fig.7; Sarjeant, 1991, fig.4.6. Originally *Xanthidium* (Appendix A), subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Achomosphaera*?, fourthly *Hystrichosphaeridium* (combination not validly published). Questionable assignment: Sarjeant (1991, p.88). Age: Late Cretaceous.

marianneae (Philippot, 1949, p.56–57; text-fig.2) Stover and Evitt, 1978, p.139. Holotype: Philippot, 1949, text-fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Achomosphaera*. Age: Late Cretaceous.

subsp. **marianneae**. Autonym. Holotype: Philippot, 1949, text-fig.2.

subsp. **philippotii** Marheinecke, 1992, p.35, pl.4, fig.10. Holotype: Marheinecke, 1986, pl.2, fig.4, as *Achomosphaera* sp.; Marheinecke, 1992, pl.4, fig.10. Contrary to the opinion of Lentin and Williams (1993, p.7), Williams et al. (1998, p.24) considered this name to be validly published. Age: early–early late Maastrichtian.

"membraniphora" (Agelopoulos, 1964, p.674; text-figs.1–2) Eaton, 1976, p.237. Emendation: Eaton, 1976, p.237, as *Achomosphaera membraniphora*. Holotype: Agelopoulos, 1964, text-fig.1. **NOW** *Hystrichostrogylon*. Originally (and now) *Hystrichostrogylon*, subsequently *Achomosphaera*. Age: late Eocene.

microreticulata Salujha and Kindra, 1981, p.51, pl.2, fig.47. Holotype: Salujha and Kindra, 1981, pl.2, fig.47. Jain and Garg (1982, p.69) stated that this species is based on two incomplete specimens and that the name should be restricted to the holotype. Age: early Paleocene.

"microtriaina" (Klumpp, 1953, p.390, pl.17, figs.6–7) Sarjeant, 1981, p.110–112. Emendation: Sarjeant, 1981, p.110–112, as *Achomosphaera microtriaina*. Holotype: Klumpp, 1953, pl.17, figs.6–7; Sarjeant, 1981, pl.2, figs.1–2; text-fig.2. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly *Cordosphaeridium*?, fourthly *Polysphaeridium*, fifthly *Achomosphaera*, sixthly (and now) *Operculodinium*. Age: late Eocene.

minor He Chengquan, 1991, p.148, pl.23, fig.6; text-fig.31. Holotype: He Chengquan, 1991, pl.23, fig.6; text-fig.31. Age: Paleocene.

minuta He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.37, pl.20, fig.7. Holotype: He Chengquan et al., 1989, pl.20, fig.7. Age: Early Tertiary.

multifurcata Jain and Tandon, 1981, p.7, pl.1, fig.10. Holotype: Jain and Tandon, 1981, pl.1, fig.10. Age: middle Eocene.

neptuni (Eisenack, 1958a, p.399, pl.26, figs.7–8; text-fig.8) Davey and Williams, 1966a, p.51–52. Emendations: Duxbury, 1983, p.55, as *Spiniferites neptuni*; Sarjeant, 1985a, p.89–90, 92, as *Florentinia? neptuni*. Holotype:

Eisenack, 1958a, pl.26, fig.7. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Achomosphaera*, thirdly *Achomosphaera?*, fourthly *Spiniferites*, fifthly *Florentinia?*. Questionable assignment: Stover and Evitt (1978, p.139) — however, Lister and Batten (1988b, p.31–32) retained this species in *Achomosphaera* without question. Since the epithet is based on a familiar name with an existing Latin genitive, it ends in "i" rather than "ii" (I.C.N. Recommendation 60C.2). Age: Early Cretaceous.

"*operculata*" Sah et al., 1970, p.144, pl.1, figs.1–2. Holotype: Sah et al., 1970, pl.1, fig.1. **NOW** *Operculodinium*. Originally *Achomosphaera*, subsequently *Achomosphaera?*, thirdly (and now) *Operculodinium*. Questionable assignment: Stover and Evitt (1978, p.139). Age: Late Cretaceous.

pachyderma Heilmann-Clausen in Heilmann-Clausen and Thomsen, 1995, p.287–288, pl.10, figs.5–10. Holotype: Heilmann-Clausen and Thomsen, 1995, pl.10, figs.5–6. Age: early Aptian.

quadrata Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.54–55, pl.1, fig.6. Holotype: Antolinez-Delgado and Oboh-Ikuenobe, 2007, pl.1, fig.6. Age: Paleocene–?earliest Eocene.

ramosasimilis (Yun Hyesu, 1981, p.14–15, pl.1, figs.1,8; text-fig.3b) Londeix et al., 1999, p.86. Holotype: Yun Hyesu, 1981, pl.1, fig.1; text-fig.3b; Fensome et al., 1991, figs.1–2 — p.719; fig.4 — p.721. Originally *Achomosphaera ramulifera* subsp. *ramosasimilis*, subsequently (and now) *Achomosphaera ramosasimilis*. Age: early Santonian.

ramosissima He Chengquan, 1991, p.149, pl.23, figs.10–11. Holotype: He Chengquan, 1991, pl.23, fig.10. Age: Paleocene.

**ramulifera* (Deflandre, 1937b, p.74, pl.14 [al. pl.11], figs.5–6; pl.17 [al. pl.14], fig.10) Evitt, 1963, p.163. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), fig.5; Fensome et al., 1991, fig.1 — p.721; fig.1 — p.725. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published, Appendix A), thirdly (and now) *Achomosphaera*, fourthly *Spiniferites*. Lentin and Williams (1981, p.3) retained this species in *Achomosphaera*. Taxonomic junior synonym: *Hystrichosphaeridium rehdense*, according to Sarjeant (1983, p.97–99). Age: Late Cretaceous.

subsp. *gabonensis* (Boltenhagen, 1977, p.36–37, pl.3, figs.7a–b,8–9) Lentin and Williams, 1981, p.3. Holotype: Boltenhagen, 1977, pl.3, figs.7a–b; Fensome et al., 1993a, figs.1–2 — p.1209. Originally *Achomosphaera ramulifera* var. *gabonensis*, subsequently (and now) *Achomosphaera ramulifera* subsp. *gabonensis*. Age: Campanian–Maastrichtian.

"var. *gabonensis*" Boltenhagen, 1977, p.36–37, pl.3, figs.7a–b,8–9. Holotype: Boltenhagen, 1977, pl.3, figs.7a–b; Fensome et al., 1993a, figs.1–2 — p.1209. **NOW** *Achomosphaera ramulifera* subsp. *gabonensis*. Originally *Achomosphaera ramulifera* var. *gabonensis*, subsequently (and now) *Achomosphaera ramulifera* subsp. *gabonensis*. Age: Campanian–Maastrichtian.

subsp. *perforata* (Davey and Williams, 1966a, p.50, pl.5, figs.1,4) Lentin and Williams, 1973, p.10. Holotype: Davey and Williams, 1966a, pl.5, fig.4; Bujak et al., 1980, pl.5, fig.1; Fensome et al., 1991, fig.2 — p.705; fig.3 — p.721. Originally *Achomosphaera ramulifera* var. *perforata*, subsequently (and now) *Achomosphaera ramulifera* subsp. *perforata*. Age: early Eocene.

"var. *perforata*" Davey and Williams, 1966a, p.50, pl.5, figs.1,4. Holotype: Davey and Williams, 1966a, pl.5, fig.4; Bujak et al., 1980, pl.5, fig.1; Fensome et al., 1991, fig.2 — p.705; fig.3 — p.721. **NOW** *Achomosphaera ramulifera* subsp. *perforata*. Originally *Achomosphaera ramulifera* var. *perforata*, subsequently (and now) *Achomosphaera ramulifera* subsp. *perforata*. Age: early Eocene.

"subsp. *ramosasimilis*" Yun Hyesu, 1981, p.14–15, pl.1, figs.1,8; text-fig.3b. Holotype: Yun Hyesu, 1981, pl.1, fig.1; text-fig.3b; Fensome et al., 1991, figs.1–2 — p.719; fig.4 — p.721. **NOW** *Achomosphaera ramosasimilis*. Originally *Achomosphaera ramulifera* subsp. *ramosasimilis*, subsequently (and now) *Achomosphaera ramosasimilis*. Age: early Santonian.

subsp. *ramulifera*. Autonym. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), fig.5; Fensome et al., 1991, fig.1 — p.721; fig.1 — p.725.

"var. *ramulifera*". Autonym. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), fig.5; Fensome et al., 1991, fig.1 — p.721; fig.1 — p.725. **Now redundant.**

"*recurvata*" Jain et al., 1975, p.8, pl.3, figs.36–37,39. Holotype: Jain et al., 1975, pl.3, fig.36. **Taxonomic senior synonym:** *Hystrichosphaera* (as and now *Achomosphaera*) *crassipellis*, according to Quattrocchio and Sarjeant (1996, p.116). Age: Maastrichtian.

regiensis Corradini, 1973, p.171, pl.27, fig.2; text-fig.8. Holotype: Corradini, 1973, pl.27, fig.2. Age: Senonian.

"*reticulata*" Clarke and Verdier, 1967, p.41–42, pl.8, figs.2–3; text-fig.16. Holotype: Clarke and Verdier, 1967, pl.8, fig.2. **Taxonomic senior synonym:** *Achomosphaera sagena*, according to Fechner (1985, p.115). Age: Cenomanian–Santonian.

?*robusta* Sah et al., 1970, p.145, pl.1, figs.6–7. Holotype: Sah et al., 1970, pl.1, fig.6. Originally *Achomosphaera*, subsequently (and now) *Achomosphaera*?. Questionable assignment: Stover and Evitt (1978, p.139). Age: Late Cretaceous.

sagena Davey and Williams, 1966a, p.51, pl.2, figs.1–2. Holotype: Davey and Williams, 1966a, pl.2, figs.1–2. Taxonomic junior synonym: *Achomosphaera reticulata*, according to Fechner (1985, p.115). May (1980, p.64) considered *Hystrichosphaera* (now *Spiniferites*) *crassipellis* to be the possible taxonomic senior synonym of this species. N.I.A. Age: Cenomanian.

"*septata*" (Cookson and Eisenack, 1967b, p.253–254, pl.42, figs.6–10; text-fig.1) Stover and Evitt, 1978, p.139. Emendation: McLean, 1971, p.730, as *Spiniferites septatus*. Holotype: Cookson and Eisenack, 1967b, pl.42, fig.6; Eisenack and Kjellström, 1975b, uppermost figure — p.984w; Fensome et al., 1996, fig.1 — p.2356. **NOW** *Hafniasphaera*. Originally *Baltisphaeridium* (Appendix A), subsequently *Spiniferites*, thirdly (and now) *Hafniasphaera*, fourthly *Achomosphaera*, fifthly *Rivernookia*. Age: late Paleocene.

spongiosa Matsuoka and Bujak, 1988, p.37–38, pl.1, figs.5–7; pl.2, figs.1–3. Holotype: Matsuoka and Bujak, 1988, pl.2, fig.2. Age: late Oligocene–early Miocene.

taiwaniana Shaw Chenglong, 1999b, p.176, figs.52–53. Holotype: Shaw Chenglong, 1999b, figs.52–53. Age: Eocene.

transculenta (Sah et al., 1970, p.147, pl.2, figs.18–19) Jain, 1982, p.52. Holotype: Sah et al., 1970, pl.2, fig.18. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium*?, thirdly (and now) *Achomosphaera*. Jain (1982, p.52) considered the specimen illustrated by Sah et al. (1970, pl.2, fig.19) to be *Cordosphaeridium inodes*. Age: Late Cretaceous.

triangulata (Gerlach, 1961, p.194–195, pl.29, fig.1) Davey and Williams, 1969, p.4. Emendation: Sarjeant, 1984b, p.82–83, as *Achomosphaera triangulata*. Holotype: Gerlach, 1961, pl.29, fig.1; Sarjeant, 1984b, pl.1, figs.4–5. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Achomosphaera*. Age: middle Oligocene–mid Miocene.

"*tridactylites*" (Valensi, 1955a, p.37–38, fig.1D) Deflandre and Sarjeant, 1970, p.1. Holotype: Valensi, 1955a, fig.1D. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma* (combination not validly published), fourthly *Achomosphaera*, fifthly *Silicisphaera*, sixthly (and now) *Florentinia*. Age: Cretaceous.

"*valianta*" Sah et al., 1970, p.145, pl.1, figs.8–9. Holotype: Sah et al., 1970, pl.1, fig.8. Originally *Achomosphaera*, subsequently *Cordosphaeridium*. **Taxonomic senior synonym:** *Cordosphaeridium fibrospinosum*, according to Fensome et al. (2009, p.23). Taxonomic senior synonym: *Cordosphaeridium exilimurum*, according to Jain (1982, p.52). Age: Late Cretaceous.

verdierei Below, 1982c, p.3, pl.8, figs.10a–b,11a–c; text-figs.1a–d. Emendation: Lister and Batten, 1988b, p.32. Holotype: Below, 1982c, pl.8, figs.11a–c. Age: Hauterivian–Albian.

ACTINISCUS (Ehrenberg, 1841, p.149–150) Ehrenberg, 1843a, p.103. Siliceous dinoflagellate genus. Originally *Dictyocha* subgenus *Actiniscus*, subsequently (and now) *Actiniscus*. Taxonomic junior synonyms: *Lutetianella* (name not validly published) and *Microdistephanus* (name not validly published), both according to Dumitrică (1973, p.820); *Gymnaster*, according to Dumitrică (1973, p.820). The designation of *Actiniscus pentasterius* as "type species" by Downie and Sarjeant (January, 1965, p.81–82) has precedence over the designation of *Actiniscus elegans* as "type species" by Norris and Sarjeant (March, 1965, p.9). Dumitrică (1973, p.820) considered the extant genus *Diaster* Meunier, 1909 to be a possible taxonomic junior synonym of *Actiniscus*. The name *Actiniscus* was first used in Ehrenberg (1841), who cited the name twice as as sub-entity of *Dictyocha* — "*Dictyocha (Actiniscus) Pentasterias*" (p.149) and "*Dictyocha (Actiniscus) Sirius*" (p.150). It was next mentioned by Ehrenberg (1843a, p.103) as "*Actiniscus Sol und septenarius*" within non-descriptive text. It is not clear to us that the generic name *Actiniscus* should be considered validly published by Ehrenberg (1841, 1843a) as it lacks a description in those publications. But for now we follow the general consensus in accepting the name as valid as of 1841 as a subgenus, raised to generic rank in Ehrenberg (1843a). Type: not designated; "type species" is *Actiniscus pentasterias*, designated by Downie and Sarjeant (January, 1965, p.81–82).

?*discus* Ehrenberg, 1844a, p.62,75. Holotype: Ehrenberg, 1854, pl.21, fig.49. Originally *Actiniscus*, subsequently (and now) *Actiniscus*? Questionable assignment: Ehrenberg 1854, caption to pl. 21, fig. 49. Contrary to the statement in Fensome and Williams (2004, p.30), Ehrenberg (1844a, p. 75) provided a Latin description for this species. N.I.A. Age: Pliocene.

elegans (Ehrenberg, 1844a, p.79) Ehrenberg, 1854, pl.22, fig.51. Holotype: Ehrenberg, 1854, pl.22, fig.51. Originally *Dictyocha* (Appendix A), subsequently (and now) *Actiniscus*. Dumitrică (1973, p.822) considered *Dictyocha* (now *Actiniscus*) *pentasterias* to be the questionable taxonomic senior synonym of this species. Age: Pliocene.

elongatus Dumitrică, 1968, p.240, pl.4, figs.22,26. Holotype: Dumitrică, 1968, pl.4, fig.22. Age: Tortonian.

?*heptagonus* (Ehrenberg, 1843c, p.417, pl.1, section 3, fig.26) Ehrenberg, 1854, caption to pl.20, section 1, fig.49. Holotype: Ehrenberg, 1843c, p.417, pl.1, section 3, fig.26. Originally *Mesocena*? (Appendix A), subsequently (and now) *Actiniscus*? Questionable assignment: Ehrenberg 1854, caption to pl.20, section 1, fig.49. Age: Pliocene.

**pentasterias* (Ehrenberg, 1841, p.111,149) Ehrenberg, 1844a, p.68. Holotype: not designated. Originally *Dictyocha* subgenus *Actiniscus* (Appendix A), subsequently (and now) *Actiniscus*, thirdly *Gymnaster*. Downie and Sarjeant (1965, p.82) retained this species in *Actiniscus*. Illustrations of this species were provided by Ehrenberg (1854, pl.18, fig.61; pl.19, fig.45; pl.20, fig.48; pl.33 (XVII), fig.1 and pl.33 (XVIII), fig.1. Dumitrică (1973, p.822) considered *Dictyocha* (now *Actiniscus*) *elegans* and *Dictyocha* (now *Actiniscus*) *sirius* to be questionable taxonomic junior synonyms of this species. Age: Pliocene.

quinarius Ehrenberg, 1844a, p.76. Holotype: not designated. Age: unknown.

"*radicula*" Dumitrică, 1973, p.822, pl.2, figs.15–17; pl.3, figs.1–5; pl.5, fig.4. **Name not validly published:** holotype not designated. N.I.A. Age: late Miocene–early Pliocene.

?*rota* Ehrenberg, 1844a, p.62,76. Holotype: Ehrenberg, 1854, caption to pl.21, fig.50. Originally *Actiniscus*, subsequently (and now) *Actiniscus*? Questionable assignment: Ehrenberg 1854, caption to pl. 21, fig. 50. Contrary to the statement in Fensome and Williams (2004), Ehrenberg (1844a, p.76) provided a Latin description for this species. N.I.A. Age: Pliocene.

sexfurcatus Ehrenberg, 1854, pl.35B, section 4, fig.15. Holotype: Ehrenberg, 1854, pl.35B, section 4, fig.15. Age: extant.

sirius (Ehrenberg, 1841, p.150) Ehrenberg 1844a, p.68. Holotype: not designated Originally *Dictyochoa* subgenus *Actiniscus*, subsequently (and now) *Actiniscus*, thirdly *Distephanus* (name not validly published; Appendix A), fourthly *Gymnaster*. Illustrations of this species were provided by Ehrenberg (1854, pl.18, figs.59–60; and pl.33–XV, fig.1). For an explanation of earlier treatments of this species in the Lentin and Williams Index, see Fensome and Williams (2004, p.31). In his synonymy list for this species, Schütt (1891) indicated that the name *Distephanus sirius* was cited by Haeckel (date not specified). Dumitrică (1973, p.822) considered *Dictyochoa* (now *Actiniscus*) *pentasterius* to be the questionable taxonomic senior synonym of this species. N.I.A. Age: Miocene.

?*stella* (Ehrenberg, 1839a, p.129, pl.4, fig.11p) Ehrenberg, 1844a, p.62. Holotype: Ehrenberg, 1839a, pl.4, fig.11p. Originally *Dictyochoa*?, subsequently *Dictyochoa* subgenus *Actiniscus*, thirdly *Actiniscus*, fourthly (and now) *Actiniscus*? Questionable assignment: Ehrenberg, 1854, captions to pl.20, fig.47, pl.21, fig.48, pl.22, fig.52. Ehrenberg (1839a, p.129) provided the plate citation indicated here, but location of a pertinent specimen is not obvious in the plate. N.I.A. Age: Pliocene.

talmadgei Parke, 1974, p.81–82, pl.1, figs.1–9. Holotype: Parke, 1974, pl.1, fig.3. Age: late Miocene.

tetrasterias Ehrenberg, 1844a, p.68,76. Holotype: Ehrenberg, 1854, pl.18, fig.62. Originally (and now) *Actiniscus*, subsequently *Gymnaster*. Age: Miocene.

ACTINOTHECA Cookson and Eisenack, 1960a, p.9. Type: Cookson and Eisenack, 1960a, pl.2, fig.20, as *Actinotheca aphroditae*.

**aphroditae* Cookson and Eisenack, 1960a, p.9, pl.2, figs.19–20. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.20; Helby et al., 1987, fig.39H. Age: Turonian.

ornata Cookson and Eisenack, 1970a, p.147, pl.13, figs.1–2. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.1. Age: Senonian.

?*rara* Corradini, 1973, p.183, pl.30, fig.1. Holotype: Corradini, 1973, pl.30, fig.1. Originally *Actinotheca*, subsequently (and now) *Actinotheca*?. Questionable assignment: Stover and Evitt (1978, p.200). Age: Late Cretaceous–?Paleocene.

ADELIESPHAERA Bijl and Brinkhuis, 2015, p.92. Type: Bijl and Brinkhuis, 2015 pl.2A–B, as *Adeliesphaera ohanlonii*.

**ohanlonii* Bijl and Brinkhuis, 2015, p.90–92, pl.1G–R, pl.2A–L, N, O, pl.3A–F, pl.4, figs.A–G. Holotype: Bijl and Brinkhuis, 2015, pl.2A–B. Age: Ypresian.

ADNATOSPHAERIDIUM Williams and Downie, 1966c, p.215. Emendation: Stancliffe and Sarjeant, 1990, p.199–200. Type: Williams and Downie, 1966c, pl.24, fig.7; text-fig.56, as *Adnatosphaeridium vittatum*.

"*aemulum*" (Deflandre, 1939a, p.187–189, pl.9, fig.12; pl.10, figs.5–8; pl.11, figs.1,7) Williams and Downie, 1969, p.17. Emendation: Below, 1982b, p.139–140, as *Rigaudella aemula*. Holotype: Deflandre, 1939a, pl.11, fig.1; Eisenack and Kjellström, 1972, figure to left on p.43; Fensome et al., 1995, fig.1 — p.1473, fig.2 — p.1477. **NOW** *Rigaudella*. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly *Adnatosphaeridium*, fourthly (and now) *Rigaudella*. Taxonomic junior synonym: *Cannosphaeropsis paucispina*, according to Below (1982b, p.139). This combination was not validly published in Williams and Downie (1966c, p.218), since these authors did not fully reference the basionym. Age: Oxfordian.

"subsp. *aemulum*". Autonym. Holotype: Deflandre, 1939a, pl.11, fig.1; Eisenack and Kjellström, 1972, figure to left on p.43; Fensome et al., 1995, fig.1 — p.1473, fig.2 — p.1477. **NOW** *Rigaudella aemula* subsp. *aemula*. Originally *Cannosphaeropsis aemula* subsp. *aemula*, subsequently *Adnatosphaeridium aemulum* subsp. *aemulum*, thirdly (and now) *Rigaudella aemula* subsp. *aemula*.

"subsp. **integrum**" (Cookson and Eisenack, 1958, p.47, pl.7, figs.6–7) Eisenack and Kjellström, 1972, p.45. Holotype: Cookson and Eisenack, 1958, pl.7, fig.6; Fensome et al., 1995, fig.1 — p.1565; Fauconnier and Masure, 2004, pl.68, figs.8–9. **NOW** *Rigaudella aemula* subsp. *integra*. Originally *Cannosphaeropsis aemula* subsp. *integra*, subsequently *Adnatosphaeridium aemulum* subsp. *integrum*, thirdly (and now) *Rigaudella aemula* subsp. *integra*. Age: Late Jurassic.

"**apenninicum**" Corradini, 1973, p.163–164, pl.25, figs.4a–b; pl.36, figs.1a–b. Holotype: Corradini, 1973, pl.25, figs.4a–b; Fauconnier and Masure, 2004, pl.68, figs.10–12. **NOW** *Rigaudella*. Originally *Adnatosphaeridium*, subsequently (and now) *Rigaudella*. Age: Campanian–?Paleocene.

"**apiculatum**" (Cookson and Eisenack, 1960b, p.254, pl.39, fig.15) Lentin and Williams, 1973, p.11. Emendation: Davey, 1988, p.42–43, as *Papuadinium apiculatum*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.15; Fensome et al., 1993a, fig.1 — p.927. **NOW** *Papuadinium*. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly *Rigaudella*, fourthly (and now) *Papuadinium*. Age: Tithonian.

buccinum Hultberg, 1985c, p.106, pl.1, figs.A–B. Holotype: Hultberg, 1985c, pl.1, fig.A. Age: late Maastrichtian.

"?**capilatum**" de Coninck, 1969, p.39, pl.11, figs.9–14, 21–24. Holotype: de Coninck, 1969, pl.11, figs.12–13. Questionable assignment: de Coninck (1969, p.39). **Taxonomic senior synonym:** *Impletosphaeridium implicatum*, according to Eaton (1976, p.306). Age: early Eocene.

caulleryi (Deflandre, 1939a, p.189, pl.11, figs.2–3) Williams and Downie, 1969, p.17. Emendation: Stancliffe and Sarjeant, 1990, p.200, as *Adnatosphaeridium caulleryi*. Holotype: Deflandre, 1939a, pl.11, fig.2; Stancliffe and Sarjeant, 1990, pl.1, figs.3,5; Fauconnier and Masure, 2004, pl.1, figs.7–8. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly (and now) *Adnatosphaeridium*, fourthly *Polystephanephorus*. Stancliffe and Sarjeant (1990, p.200) retained this species in *Adnatosphaeridium*. This combination was not validly published in Williams and Downie (1966c, p.218), since these authors did not fully reference the basionym. Age: early Oxfordian.

?**chonetum** (Cookson and Eisenack, 1962b, p.493, pl.4, figs.8–10) Davey, 1969a, p.171. Holotype: Cookson and Eisenack, 1962b, pl.4, fig.8. Originally *Cannosphaeropsis?*, subsequently *Adnatosphaeridium*, thirdly (and now) *Adnatosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.15). Age: ?Cenomanian.

"?**delicatum**" (Horowitz, 1975, p.24, pl.1, fig.2) Stover and Evitt, 1978, p.15. Holotype: Horowitz, 1975, pl.1, fig.2. **Combination not validly published:** basionym not fully referenced. **NOW** *Areoligera?*. Originally *Areoligera*, subsequently *Adnatosphaeridium?* (combination not validly published), thirdly (and now) *Areoligera?*. Questionable assignment: Stover and Evitt (1978, p.15), as a problematic species. Age: Late Triassic (probably not in place).

densifilum (Cookson and Eisenack, 1974, p.70, pl.24, fig.13) Stancliffe and Sarjeant, 1990, p.201. Holotype: Cookson and Eisenack, 1974, pl.24, fig.13; Stancliffe and Sarjeant, 1990, pl.4, fig.1; Fauconnier and Masure, 2004, pl.1, fig.4. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Adnatosphaeridium*. Age: Late Jurassic.

"**filamentosum**" (Cookson and Eisenack, 1958, p.47–48, pl.7, figs.8–9; pl.8, figs.1–2) Williams and Downie, 1969, p.17. Holotype: Cookson and Eisenack, 1958, pl.7, fig.9. **NOW** *Rigaudella*. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly (and now) *Rigaudella*. Taxonomic junior synonym: *Cannosphaeropsis perforata*, according to Stancliffe and Sarjeant (1990, p.206). This combination was not validly published in Williams and Downie (1966c, p.218), since these authors did not fully reference the basionym. Age: Middle-Late Jurassic.

filiferum (Cookson and Eisenack, 1958, p.46, pl.7, fig.4) Williams and Downie, 1969, p.17. Holotype: Cookson and Eisenack, 1958, pl.7, fig.4; Fauconnier and Masure, 2004, pl.1, figs.1–2. Originally *Cannosphaeropsis utinensis* subsp. *filifera*, subsequently *Cannosphaeropsis filifera*, thirdly (and now) *Adnatosphaeridium filiferum*.

This combination was not validly published in Williams and Downie (1966c, p.218), since these authors did not fully reference the basionym. Age: Campanian–early Maastrichtian.

?huenickenii Archangelsky, 1969b, p.201,203, pl.5, figs.5–7. Holotype: Archangelsky, 1969b, pl.5, figs.5–6. Originally *Adnatosphaeridium*, subsequently (and now) *Adnatosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.15), as a problematic species. Age: Eocene.

?membraniphorum Jan du Chêne and Adedirán, 1985, p.10, pl.20, figs.1–6; pl.21, figs.1–10; pl.22, figs.1–4. Holotype: Jan du Chêne and Adedirán, 1985, pl.20, figs.1–3. Originally *Adnatosphaeridium*, subsequently (and now) *Adnatosphaeridium?*. Questionable assignment: Stancliffe and Sarjeant (1990, p.200). Age: late Paleocene–early Eocene.

"multispinosum" Williams and Downie, 1966c, p.216–217, pl.24, fig.5; text-fig.57. Holotype: Williams and Downie, 1966c, text-fig.57. **Taxonomic senior synonym:** *Adnatosphaeridium vittatum*, according to Fensome et al. (2009, p.13). Age: early Eocene.

"?patulum" Williams and Downie, 1966c, p.217–218, pl.24, figs.1–2; text-fig.58. Holotype: Williams and Downie, 1966c, pl.24, fig.2; text-fig.58. **NOW** *Thalassiphora*. Originally *Adnatosphaeridium?*, subsequently (and now) *Thalassiphora*. Questionable assignment: Williams and Downie (1966c, p.217). Taxonomic senior synonym: *Thalassiphora pelagica*, according to Benedek and Gocht (1981, p.59) — however, Lentin and Williams (1985, p.354) retained *Thalassiphora patula*. Taxonomic junior synonym: *Subathua sahnii*, according to Stover and Williams (1987, p.207) and Lentin and Williams (1989, p.354). Age: early Eocene.

"paucispinum" (Klement, 1960, p.72, pl.10, figs.9–10) Gitmez and Sarjeant, 1972, p.234. Holotype: Klement, 1960, pl.10, fig.9; Sarjeant, 1984a, pl.3, figs.5–6. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Rigaudella*) *aemulum*, according to Below (1982b, p.139). Age: late Oxfordian.

"perforatum" (Alberti, 1961, p.37, pl.9, fig.14) Riley and Sarjeant, 1972, p.3. Holotype: Alberti, 1961, pl.9, fig.14. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly *Rigaudella*. **Taxonomic senior synonym:** *Cannosphaeropsis* (now *Rigaudella*) *filamentosa*, according to Stancliffe and Sarjeant (1990, p.206). Age: ?Callovian.

regulatum Willumsen, 2012, p.55,57–58, pl.1, figs.1–6. Holotype: Willumsen, 2012, pl.1, figs.1–2. Age: latest Maastrichtian–earliest Paleocene.

"reticulense" (Patiels, 1948, p.49, pl.5, figs.7–10) de Coninck, 1969, p.40. Emendation: Sarjeant, 1986, p.9,11, as *Nematosphaeropsis reticulensis*. Holotype: Patiels, 1948, pl.5, fig.10; unrecognizable, according to Sarjeant (1986, p.11). Lectotype: Patiels, 1948, pl.5, fig.7; Sarjeant, 1986, pl.3, fig.6; designated by Sarjeant (1986, p.11). **NOW** *Nematosphaeropsis*. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly (and now) *Nematosphaeropsis*. Age: early Eocene.

robustum (Morgenroth, 1966a, p.19, pl.4, fig.1) de Coninck, 1975, p.47–48. Holotype: Morgenroth, 1966a, pl.4, fig.1. Originally *Cannosphaeropsis*, subsequently (and now) *Adnatosphaeridium*. Eaton (1976, p.239) also proposed this combination. Age: early Eocene.

?speciosum (Alberti, 1961, p.37, pl.9, fig.13) Stancliffe and Sarjeant, 1990, p.202. Holotype: Alberti, 1961, pl.9, fig.13; Stancliffe and Sarjeant, 1990, pl.5, fig.6. Originally *Cannosphaeropsis*, subsequently *Polystephanephorus*, thirdly *Cannosphaeropsis?*, fourthly (and now) *Adnatosphaeridium?*. Questionable assignment: Stancliffe and Sarjeant (1990, p.202). Age: Bathonian–Callovian.

tutulosum (Cookson and Eisenack, 1960a, p.8, pl.2, figs.12–13) Morgan, 1980, p.14. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.13; Fauconnier and Masure, 2004, pl.1, fig.3. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Adnatosphaeridium*. Age: Cenomanian.

"*uncinatum*" Norvick, 1976, p.74–75, pl.8, figs.11–12. Holotype: Norvick, 1976, pl.8, fig.11; Fauconnier and Masure, 2004, pl.17, figs.10–11. **NOW** *Cyclonephelium*. Originally *Adnatosphaeridium*, subsequently (and now) *Cyclonephelium*. Age: Cenomanian.

"*vetusculum*" Davey, 1974, p.45, pl.1, figs.1–2. Holotype: Davey, 1974, pl.1, fig.2. **NOW** *Nexosispinum*. Originally *Adnatosphaeridium*, subsequently *Systematophora*, thirdly (and now) *Nexosispinum*, fourthly *Kiokansium*. Age: early Barremian.

**vittatum* Williams and Downie, 1966c, p.215, pl.24, figs.3,7; text-fig.56. Holotype: Williams and Downie, 1966c, pl.24, fig.7; text-fig.56. Taxonomic junior synonym: *Adnatosphaeridium multispinosum*, according to Fensome et al. (2009, p.13). Age: early Eocene.

williamsii Islam, 1983c, p.81–82, pl.4, figs.9–10. Holotype: Islam, 1983c, pl.4, fig.9. Age: early-middle Eocene.

?*williereae* de Coninck, 1975, p.49, pl.2, figs.9–11. Holotype: de Coninck, 1975, pl.2, figs.10–11; Fauconnier and Masure, 2004, pl.1, fig.5. Questionable assignment: de Coninck (1975, p.49). Age: Ypresian.

"**AGERASPHERA**" Harland, 1979a, p.28–29. **Name illegitimate — nomenclatural senior synonym:** *Alisocysta*, which has the same type. Taxonomic senior synonym: *Eisenackia*, according to Quattrocchio and Sarjeant (2003, p.144) — however, Fensome et al. (in press) retained *Alisocysta*, with *Agerasphaera* as its nomenclatural junior synonym. Type: Drugg, 1967, pl.1, fig.12, as *Eisenackia circumtabulata*.

"**circumtabulata*" (Drugg, 1967, p.15, pl.1, figs.12–13) Harland, 1979a, p.29. Holotype: Drugg, 1967, pl.1, fig.12; Damassa, 1979b, pl.3, figs.14–16; Fensome et al., 1993a, fig.1 — p.1061. **Combination illegitimate:** the generic name *Agerasphaera* is illegitimate. **NOW** *Alisocysta*. Originally *Eisenackia*, subsequently *Hystrichokolpoma*, thirdly (and now) *Alisocysta*, fourthly *Agerasphaera* (generic name illegitimate). Taxonomic junior synonym: *Hystrichokolpoma mentitum*, according to Schumacker-Lambry (1978, p.42) — however, Lentin and Williams (1981, p.135) retained *Hystrichokolpoma mentitum*. Age: Danian.

"*margarita*" Harland, 1979a, p.29,31,33, pl.1, figs.1–12; pl.2, figs.1–10. Holotype: Harland, 1979a, pl.1, figs.5–6; pl.2, figs.5–6; Fauconnier and Masure, 2004, pl.2, fig.1. **NOW** *Alisocysta*. Originally *Agerasphaera* (generic name illegitimate), subsequently (and now) *Alisocysta*, thirdly *Eisenackia*. Taxonomic junior synonym: *Alisocysta rugolirata*, according to Damassa and Harland in Lentin and Williams (1989, p.10). Following I.C.N. Article 55.1, the species name *Agerasphaera margarita* is validly published even though the generic name *Agerasphaera* is illegitimate. Age: late Paleocene.

AIDELOCYSTA Riding, Helby and Stevens in Riding and Helby, 2001g, p.178–179. Taxonomic junior synonym: *Vespadinia* (name not validly published), by implication in Riding and Helby (2001g, p.179,181), who included the only species name, *Vespadinia clavata* (name not validly published), in synonymy with *Aidelocysta clavata*. Type: Riding and Helby, 2001g, figs.11–L, as *Aidelocysta clavata*.

**clavata* Riding, Helby and Stevens in Riding and Helby, 2001g, p.179,181, figs.1A–P. Holotype: Riding and Helby, 2001g, figs.11–L. Taxonomic junior synonym: *Vespadinia clavata* (name not validly published), according to Riding and Helby (2001g, p.179,181). Age: Tithonian–Berriasian.

AIORA Cookson and Eisenack, 1960a, p.9. Junior homonym: *Aiora* Davey, 1978. Stover and Evitt (1978, p.225) indicated that they were emending the diagnosis of this genus; however, no emendation was provided. Type: Deflandre and Cookson, 1955, pl.3, fig.2, as *Cannosphaeropsis fenestrata*.

**fenestrata* (Deflandre and Cookson, 1955, p.283, pl.3, fig.2; text-fig.43) Cookson and Eisenack, 1960a, p.9. Holotype: Deflandre and Cookson, 1955, pl.3, fig.2. Originally *Cannosphaeropsis*, subsequently (and now) *Aiora*. Wilson and Clowes (1980, p.10) retained this species in *Aiora* Cookson and Eisenack. Age: Turonian–Santonian.

"**AIORA**" Davey, 1978, p.892. **Name illegitimate** — **senior homonym**: *Aiora* Cookson and Eisenack, 1960a. **Nomenclatural senior synonym**: *Balteocysta*, which has the same type. Type: Cookson and Eisenack, 1960a, pl.2, fig.17, as *Aiora fenestrata*.

"***perforata**" Davey, 1978, p.892. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.17 (as *Aiora fenestrata*); Fensome et al., 1996, fig.1 — p.2267; designated by Davey (1978, p.892). **NOW** *Balteocysta*. Originally *Aiora*, subsequently (and now) *Balteocysta*. Nomenclatural junior synonym: *Balteocysta rotula*, which has the same holotype. Following I.C.N. Article 55.1, the species name *Aiora perforata* is validly published even though the generic name *Aiora* Davey is illegitimate. Age: Turonian.

AIREIANA Cookson and Eisenack, 1965a, p.127. Type: Cookson and Eisenack, 1965a, pl.14, figs.11–12, as *Aireiana verrucosa*.

salicta Damassa, 1979a, p.817–818, pl.1, figs.4–9; text-fig.2. Holotype: Damassa, 1979a, pl.1, fig.4. Age: early-middle Eocene.

taiwaniana Shaw Chenglong, 1999b, p.165, figs.4–6. Holotype: Shaw Chenglong, 1999b, figs.4–6. Age: Eocene.

***verrucosa** Cookson and Eisenack, 1965a, p.127, pl.14, figs.11–13. Emendation: Stover, 1975, p.43–44. Holotype: Cookson and Eisenack, 1965a, pl.14, figs.11–12. Age: late Eocene.

"**ALASKADINIUM**" Duxbury, 1977, p.37. **Taxonomic senior synonym**: *Nelchinopsis*, according to Stover and Williams (1987, p.11). Type: Wiggins, 1972, pl.1, fig.A, as *Nelchinopsis kostromiensis*.

"***wigginsii**" Duxbury, 1977, p.37. Holotype: Wiggins, 1972, pl.1, fig.A (as *Nelchinopsis kostromiensis*); Fensome et al., 1995, fig.1 — p.1915. **Taxonomic senior synonym**: *Gonyaulax* (now *Nelchinopsis*) *kostromiensis*, according to Stover and Williams (1987, p.11). Age: Neocomian (?Valanginian or early Hauterivian).

ALASPHAERA Keupp, 1979b, p.285. Calcareous dinoflagellate genus (see Streng et al. 2004, p.481 and Elbrächter et al., 2008, p.1298). Type: Keupp, 1979b, text-figs.2–3, as *Alasphaera caudata*.

"***caudata**" Keupp, 1979b, p.285–287,289, text-figs.1–7. Holotype: Keupp, 1979b, text-figs.2–3. **Taxonomic senior synonym**: *Pithonella* (now *Alasphaera*) *tuberculata*, according to Monnet (1993, p.41), who considered *Alasphaera caudata* to be the senior name. The nomenclatural type of the genus *Alasphaera* remains the holotype of *Alasphaera caudata*. Age: Hauterivian.

+**tuberculata** (Pflaumann and Krasheninnikov, 1978, p.820–821, pl.1, figs.7a–c,8) Keupp, 1981, p.55. Holotype: Pflaumann and Krasheninnikov, 1978, pl.1, figs.7a–c. Originally *Pithonella*, subsequently (and now) *Alasphaera*. Taxonomic junior synonyms: *Alasphaera verrucosa*, according to Keupp (1981, p.55); *Alasphaera caudata*, according to Monnet (1993, p.41), who considered *Alasphaera caudata* to be the senior name. The nomenclatural type of the genus *Alasphaera* remains the holotype of *Alasphaera caudata*. Age: late Valanginian–early Hauterivian.

"**verrucosa**" Keupp, 1979c, p.656,658, pl.6, figs.1–5. Holotype: Keupp, 1979c, pl.6, fig.1. **Taxonomic senior synonym**: *Pithonella* (now *Alasphaera*) *tuberculata*, according to Keupp (1981, p.55). Age: early Hauterivian.

"**ALBERTIA**" Vozzhennikova, 1967, p.150–151. **Name illegitimate** — **senior homonym**: *Albertia* Schimper, 1837. **Substitute name**: *Alterbidinium*. Substitute name: *Alterbia* (name illegitimate). Type: Vozzhennikova, 1967, pl.77, fig.2, as *Albertia recticornis* (see discussion under *Alterbidinium recticorne*).

"*curvicornis*" Vozzhennikova, 1967, p.151, pl.76, figs.1–4. Holotype: Vozzhennikova, 1967, pl.76, fig.2. Originally *Albertia* (generic name illegitimate), subsequently *Alterbia* (combination illegitimate). **Taxonomic senior synonym:** *Deflandrea* (now *Alterbidinium*) *acutula*, according to Whitney (1979, p.125). Following I.C.N. Article 55.1, the species name *Albertia curvicornis* is validly published even though the generic name *Albertia* is illegitimate. Age: Campanian.

"**recticornis*" Vozzhennikova, 1967, p.151–152, pl.77, figs.1–4; pl.78, figs.1–3; pl.79, figs.1–2. Holotype: Vozzhennikova, 1967, pl.77, fig.2; Lentin and Vozzhennikova, 1990, pl.3, fig.10; text-fig.13B (see discussion under *Alterbidinium recticorne*). Lectotype: Vozzhennikova, 1967, pl.77, fig.1, designated by Stover and Evitt (1978, p.93); however, see discussion under *Alterbidinium recticorne*. Originally *Albertia* (generic name illegitimate), subsequently *Alterbia* (combination illegitimate), thirdly *Alterbidinium*. **Taxonomic senior synonym:** *Deflandrea* (now *Alterbidinium*) *acutula*, according to Whitney (1979, p.125) and Lentin and Williams (1993, p.14). Following I.C.N. Article 55.1, the species name *Albertia recticornis* is validly published even though the generic name *Albertia* is illegitimate. Age: Turonian.

ALDORFIA Stover and Evitt, 1978, p.140. Riding and Fensome (2003, p.19) considered that *Aldorfia* may be a taxonomic junior synonym of *Apteodinium*. Type: Gocht, 1970b, pl.31, figs.10a–c, as *Gonyaulacysta aldorfensis*.

**aldorfensis* (Gocht, 1970b, p.136–138, pl.30, figs.1–2,3a–d; pl.31, figs.9a–b,10a–c,11; pl.32, figs.1–2,3a–b; text-figs.5,9a–b) Stover and Evitt, 1978, p.140. Holotype: Gocht, 1970b, pl.31, figs.10a–c; Jan du Chêne et al., 1986a, pl.6, figs.1–3; Fensome et al., 1993a, figs.1–3 — p.897. Originally *Gonyaulacysta*, subsequently (and now) *Aldorfia*. Jan du Chêne et al. (1986a, p.35) considered *Scriniodinium galeritum* subsp. *reticulatum* to be a possible taxonomic synonym of this species. Age: early Bathonian.

"*corticata*" Norris and Jux, 1984, p.162–163, pl.2, figs.5–16; pl.3, figs.6–7; pl.6, figs.1–5. Holotype: Norris and Jux, 1984, pl.2, figs.7–8. **NOW** *Apteodinium*. Originally *Aldorfia*, subsequently (and now) *Apteodinium*. Age: late Kimmeridgian–Portlandian.

"*deflandrei*" (Clarke and Verdier, 1967, p.26–28, pl.3, figs.10–12; text-fig.10) Stover and Evitt, 1978, p.140. Emendation: Lucas-Clark, 1987, p.172–173, as *Apteodinium deflandrei*. Holotype: Clarke and Verdier, 1967, pl.3, fig.10; Jan du Chêne et al., 1986a, pl.8, figs.10–11. **NOW** *Apteodinium*. Originally *Gardodinium*, subsequently *Aldorfia*, thirdly (and now) *Apteodinium*. Age: Cenomanian–Santonian.

"*dictyophora*" (Deflandre, 1939a, p.178, pl.8, figs.1–3 ex Sarjeant, 1967b, p.249–250) Stover and Evitt, 1978, p.140. Holotype: Deflandre, 1939a, pl.8, fig.1; Jan du Chêne et al., 1986a, pl.7, figs.1–5. **NOW** *Scriniodinium*?. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Aldorfia*, fourthly *Scriniodinium*, fifthly (and now) *Scriniodinium*?. Age: Oxfordian.

"*dictyota*" (Cookson and Eisenack, 1960b, p.248–249, pl.37, figs.8–9) Davey, 1982b, p.25. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.9; Jan du Chêne et al., 1986a, pl.5, fig.1; pl.7, fig.6. **NOW** *Scriniodinium*. Originally (and now) *Scriniodinium*, subsequently *Scriniocassis*, thirdly *Aldorfia*. Age: Oxfordian–Tithonian.

"subsp. *dictyota*". Autonym. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.9; Jan du Chêne et al., 1986a, pl.5, fig.1; pl.7, fig.6. **NOW** *Scriniodinium dictyotum* subsp. *dictyotum*. Originally (and now) *Scriniodinium dictyotum* subsp. *dictyotum*, subsequently *Scriniocassis dictyota* subsp. *dictyota*, thirdly *Aldorfia dictyota* subsp. *dictyota*.

"subsp. *osmingtonensis*" (Gitmez, 1970, p.310–311, pl.1, fig.3; pl.8, fig.12) Jan du Chêne et al., 1986a, p.35. Holotype: Gitmez, 1970, pl.8, fig.12; Jan du Chêne et al., 1986a, pl.7, figs.10–11. **NOW** *Scriniodinium dictyotum* subsp. *osmingtonense*. Originally (and now) *Scriniodinium dictyotum* subsp. *osmingtonense*, subsequently *Scriniocassis dictyotus* subsp. *osmingtonensis*, thirdly *Aldorfia dictyota* subsp. *osmingtonensis*. Taxonomic senior synonym: *Scriniocassis weberi*, according to Davies (1983, p.24) — however, Jan du Chêne et al. (1986a, p.35) retained *Aldorfia dictyota* subsp. *osmingtonensis*. Age: early Kimmeridgian.

"subsp. *papillata*" (Gitmez, 1970, p.311, pl.9, fig.11) Jan du Chêne et al., 1986a, p.35. Holotype: Gitmez, 1970, pl.9, fig.11. **NOW** *Scriniodinium dictyotum* subsp. *papillatum*. Originally (and now) *Scriniodinium dictyotum* subsp. *papillatum*, subsequently *Scriniocassis dictyotus* subsp. *papillatus*, thirdly *Scriniocassis papillatus*, fourthly *Aldorfia dictyota* subsp. *papillata*. Age: early Kimmeridgian.

"subsp. *pyrum*" (Gitmez, 1970, p.311,313, pl.10, fig.1; pl.13, figs.1–2; text-figs.33a–b) Jan du Chêne et al., 1986a, p.36. Holotype: Gitmez, 1970, pl.13, figs.1–2; text-fig.33a; Jan du Chêne et al., 1986a, pl.7, figs.7–8. **NOW** *Scriniodinium dictyotum* subsp. *pyrum*. Originally (and now) *Scriniodinium dictyotum* subsp. *pyrum*, subsequently *Scriniocassis dictyota* subsp. *pyrum*, thirdly *Scriniocassis pyrum*, fourthly *Aldorfia dictyota* subsp. *pyrum*. N.I.A. Age: early Kimmeridgian.

sibirica Pestchevitskaya, 2009, p.108–110, pl.1, figs.1a–c,2a–b; text-fig.2B. Holotype: Pestchevitskaya, 2009, pl.1, figs.1a–c. Age: early Valanginian.

"*spongiosa*" (McIntyre and Brideaux, 1980, p.12, pl.2, figs.8–12) Davey, 1982b, p.25. Holotype: McIntyre and Brideaux, 1980, pl.2, figs.11–12; Jan du Chêne et al., 1986a, pl.8, figs.4–5. **NOW** *Apteodinium*. Originally (and now) *Apteodinium*, subsequently *Aldorfia*. Age: Valanginian.

"*vectensis*" Duxbury, 1983, p.39, pl.4, figs.3,7,10. Holotype: Duxbury, 1983, pl.4, figs.3,7,10; Jan du Chêne et al., 1986a, pl.8, figs.6–9. **NOW** *Apteodinium*. Originally *Aldorfia*, subsequently (and now) *Apteodinium*. Age: late Aptian.

"*warringtonii*" Poulsen, 1996, p.69–70, pl.11, figs.1–4; pl.12, figs.1–4. Holotype: Poulsen, 1996, pl.11, figs.1–3. **NOW** *Apteodinium*. Originally *Aldorfia*, subsequently (and now) *Apteodinium*. Age: late Oxfordian?–earliest Volgian.

ALGIDASPHERIDIUM Matsuoka and Bujak, 1988, p.35–36. See Rochon et al. (1999, p.52) regarding dinoflagellate affinity of this genus. Type: Matsuoka and Bujak, 1988, pl.2, fig.5, as *Algidasphaeridium capillatum*.

**capillatum* Matsuoka and Bujak, 1988, p.36–37, pl.2, figs.4a–b,5–6. Holotype: Matsuoka and Bujak, 1988, pl.2, fig.5; Head, 1994b, pl.1, figs.1–3. Age: late Miocene.

"*euaxum*" Head, 1993, p.24,26, fig.16, nos.1–8,11; fig.26, no.4. Holotype: Head, 1993, fig.16, no.11. **NOW** *Echinidinium*. Originally *Algidasphaeridium?*, subsequently (and now) *Echinidinium*. Questionable assignment: Head (1993, p.24). Age: latest Pliocene.

"*minutum*" (Harland and Reid in Harland et al., 1980, p.216,218, figs.2M–O) Matsuoka and Bujak, 1988, p.36. Holotype: Harland et al., 1980, fig.2O. **NOW** *Islandinium*. Originally *Multispinula*, subsequently *Multispinula?*, thirdly *Algidasphaeridium?*, fourthly (and now) *Islandinium*. Questionable assignment: Matsuoka and Bujak (1988, p.36). Taxonomic junior synonym: *Cantiacidinium conicum* (name not validly published), according to Head et al. (2001, p.629). Age: Holocene.

"var. *cezare*" de Vernal et al., 1989, p.2463, pl.2, figs.5,10 ex de Vernal in Rochon et al., 1999, p.53. Emendation: Head et al., 2001, p.631, as *Islandinium cezare*. Holotype: de Vernal et al., 1989, pl.2, fig. 10, designated by Rochon et al., 1999, p.53. **NOW** *Islandinium? cezare*. Originally *Algidasphaeridium? minutum* var. *cezare*, subsequently (and now) *Islandinium? cezare*. This name was not validly published in de Vernal et al. (1989) since no holotype was designated. Age: late Pleistocene.

"var. *minutum*". Autonym. Holotype: Harland et al., 1980, fig.2O. **Now redundant**.

"*spongium*" Zonneveld, 1997, p.322–323,325, pl.1, figs.1–6; text-figs.3A–B. Emendation: Zonneveld and Jurkschat, 1999, p.158, as *Bitectatodinium spongium*. Holotype: Zonneveld, 1997, pl.1, figs.1,3,5; Zonneveld and Jurkschat, 1999, pl.1, figs.2–4 (not 1). **NOW** *Bitectatodinium*. Originally *Algidasphaeridium?*, subsequently (and now) *Bitectatodinium*. Questionable assignment: Zonneveld (1997, p.322–323). Age: Holocene.

ALISOCYSTA Stover and Evitt, 1978, p.15–16. Taxonomic senior synonym: *Eisenackia*, according to Quattrocchio and Sarjeant (2003, p.144) — however, Fensome et al. (in press) retained *Alisocysta*. Nomenclatural junior synonym: *Agerasphaera*, which has the same type. Type: Drugg, 1967, pl.1, fig.12, as *Eisenackia circumtabulata*.

"**brevivallata**" Harker and Sarjeant in Harker et al., 1990, p.97–98, pl.5, figs.5,9–17; text-figs.20a–b ex Harker and Sarjeant, 1991, p.708. Holotype: Harker et al., 1990, pl.5, figs.11–12; text-figs.20a–b. **NOW** *Eisenackia*. Originally *Alisocysta*, subsequently (and now) *Eisenackia*. This name was not validly published in Harker et al. (1990), since the lodgement of the holotype was not cited (I.C.N. Article 40.7). Age: late Campanian.

***circumtabulata** (Drugg, 1967, p.15, pl.1, figs.12–13) Stover and Evitt, 1978, p.16. Holotype: Drugg, 1967, pl.1, fig.12; Damassa, 1979b, pl.3, figs.14–16; Fensome et al., 1993a, fig.1 — p.1061. Originally *Eisenackia*, subsequently *Hystrichokolpoma*, thirdly (and now) *Alisocysta*, fourthly *Agerasphaera* (generic name illegitimate). Taxonomic junior synonym: *Hystrichokolpoma mentitum*, according to Schumacker-Lambry (1978, p.42) — however, Lentin and Williams (1981, p.135) retained *Hystrichokolpoma mentitum*. Fensome et al. (in press) retained this species in *Alisocysta*. Age: Danian.

margarita (Harland, 1979a, p.29,31,33, pl.1, figs.1–12; pl.2, figs.1–10) Harland, 1979a, p.35. Holotype: Harland, 1979a, pl.1, figs.5–6; pl.2, figs.5–6; Fauconnier and Masure, 2004, pl.2, fig.1. Originally *Agerasphaera* (generic name illegitimate), subsequently (and now) *Alisocysta*, thirdly *Eisenackia*. Taxonomic junior synonym: *Alisocysta rugolirata*, according to Damassa and Harland in Lentin and Williams (1989, p.10). Fensome et al. (in press) retained this species in *Alisocysta*. Age: late Paleocene.

"**ornata**" (Cookson and Eisenack, 1965a, p.124, pl.13, figs.1–8) Stover and Evitt, 1978, p.16. Holotype: Cookson and Eisenack, 1965a, pl.13, figs.1–2. **NOW** *Stoveracysta*. Originally *Eisenackia*, subsequently *Alisocysta*, thirdly (and now) *Stoveracysta*. Age: late Eocene.

"**reticulata**" Damassa, 1979b, p.196,198,200, pl.3, figs.1–6; pl.4, figs.4–5; text-fig.3. Holotype: Damassa, 1979b, pl.4, figs.4–5; text-fig.3. **NOW** *Eisenackia*. Originally *Alisocysta*, subsequently (and now) *Eisenackia*. Age: early Paleocene.

"**rugolirata**" Damassa, 1979b, p.193–194,196, pl.3, figs.7–13,21,23,27; text-fig.2. Holotype: Damassa, 1979b, pl.3, figs.7–11; Fauconnier and Masure, 2004, pl.2, figs.7–11. Originally *Alisocysta*, subsequently *Eisenackia*. **Taxonomic senior synonym:** *Agerasphaera* (now *Eisenackia*) *margarita*, according to Damassa and Harland in Lentin and Williams (1989, p.10). Age: early Paleocene.

ALISOGYMNIIUM Lentin and Vozzhennikova, 1990, p.24–25. Type: Vozzhennikova, 1967, pl.3, fig.1, as *Gymnodinium sphaerocephalum*.

assamicum (Jain et al., 1975, p.4, pl.2, figs.28–29) Lentin and Vozzhennikova, 1990, p.28. Holotype: Jain et al., 1975, pl.2, fig.28; Lentin and Vozzhennikova, 1990, Appendix A, fig.37. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Taxonomic senior synonym: *Gymnodinium* (now *Dinogymnium*) *sphaerocephalum*, according to Jain (1977a, p.133–134) — however, Lentin and Vozzhennikova (1990, p.28) retained *Alisogymnium assamicum*. Age: Maastrichtian.

cerviculum (Cookson and Eisenack, 1970a, p.138, pl.10, fig.6) Lentin and Vozzhennikova, 1990, p.28. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.6; Lentin and Vozzhennikova, 1990, Appendix A, fig.34. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Senonian.

deflandrei (Boltenhagen, 1977, p.67–68, pl.9, figs.1b–c,2a–b,3a–b,4a–b) Lentin and Vozzhennikova, 1990, p.28. Holotype: Boltenhagen, 1977, pl.9, figs.1b–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.31. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: late Senonian.

downiei (Boltenhagen, 1977, p.77–78, pl.11, figs.8a–c,9a–b,10) Lentin and Vozzhennikova, 1990, p.28. Holotype: Boltenhagen, 1977, pl.11, figs.8a–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.36. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Campanian–Maastrichtian.

euclaense (Cookson and Eisenack, 1970a, p.139, pl.10, figs.9–12) Lentin and Vozzhennikova, 1990, p.28. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.12; Lentin and Vozzhennikova, 1990, Appendix A, fig.35. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Senonian.

evittii (Boltenhagen, 1977, p.66–67, pl.8, figs.9a–c,10–11) Lentin and Vozzhennikova, 1990, p.28. Holotype: Boltenhagen, 1977, pl.8, figs.9a–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.33. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Senonian.

laeve (Vozzhennikova, 1967, p.48, pl.1, fig.4; pl.2, fig.5) Lentin and Vozzhennikova, 1990, p.26. Emendation: Lentin and Vozzhennikova, 1990, p.26–27, as *Alisogymnium laeve*. Holotype: Vozzhennikova, 1967, pl.2, fig.5; Lentin and Vozzhennikova, 1990, pl.2, fig.7a; lost according to Lentin and Vozzhennikova (1990, p.26). Neotype: Harland, 1973, pl.85, figs.2–3 (as *Dinogymnium longicornis*); Lentin and Vozzhennikova, 1990, pl.2, fig.7b; designated by Lentin and Vozzhennikova (1990, p.27). Originally *Gymnodinium sphaerocephalum* var. *laeve* (Appendix B), subsequently *Dinogymnium sphaerocephalum* subsp. *laeve*, thirdly (and now) *Alisogymnium laeve*. Age: Senonian.

**sphaerocephalum* (Vozzhennikova, 1967, p.48, pl.2, fig.7; pl.3, fig.1) Lentin and Vozzhennikova, 1990, p.25. Emendation: Lentin and Vozzhennikova, 1990, p.25–26, as *Alisogymnium sphaerocephalum*. Holotype: Vozzhennikova, 1967, pl.3, fig.1; Lentin and Vozzhennikova, 1990, pl.2, figs.6,11–12; text-fig.10; Appendix A, fig.30. Originally *Gymnodinium* (Appendix B), subsequently *Dinogymnium*, thirdly (and now) *Alisogymnium*. Taxonomic junior synonym: *Dinogymnium* (now *Alisogymnium*) *assamicum*, according to Jain (1977a, p.133–134) — however, Lentin and Vozzhennikova (1990, p.28) retained *Dinogymnium* (as *Alisogymnium*) *assamicum*. Age: Senonian.

"**ALTERBIA**" Lentin and Williams, 1976, p.47–48. **Name illegitimate**: in proposing the generic name *Alterbia*, Lentin and Williams (1976) included the type of the senior names *Andalusiella* and *Senegalinium*. **Substitute name**: *Alterbidinium*. Substitute name for *Albertia* Vozzhennikova, 1967, p.151. Type: Vozzhennikova, 1967, pl.77, fig.2, as *Albertia recticornis* (see discussion under *Alterbidinium recticorne*).

"*acribes*" (Davey and Verdier, 1971, p.38–39, pl.2, figs.10,12) Lentin and Williams, 1976, p.48. Emendation: Goodman and Evitt, 1981, p.48,50,52–53, as *Angustidinium acribes*. Holotype: Davey and Verdier, 1971, pl.2, fig.10; Fensome et al., 1993a, fig.1 — p.875. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Angustidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Alterbia?* (combination illegitimate), fourthly (and now) *Angustidinium*, fifthly *Moesiodinium*. Questionable assignment: Stover and Evitt (1978, p.93) as a problematic species. Age: early Albian.

"*acuminata*" (Cookson and Eisenack, 1958, p.27, pl.4, figs.5–8) Lentin and Williams, 1976, p.48. Holotype: Cookson and Eisenack, 1958, pl.4, fig.5. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*, fourthly (and now) *Isabelidinium*. Age: Cenomanian–early Turonian.

"*acutula*" (Wilson, 1967b, p.225–226, figs.11–12) Lentin and Williams, 1976, p.48. Emendation: Khowaja-Ateequzaman et al., 1991, p.41–42, as *Alterbidinium acutululum*. Holotype: Wilson, 1967b, fig.12. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Taxonomic junior synonyms: *Albertia curvicornis* and *Albertia* (subsequently *Alterbia*) *recticornis*, both according to Whitney (1979, p.125). The nomenclatural type of the genus *Alterbia* remains the holotype of *Alterbia recticornis*. Age: ?Maastrichtian (see Wilson, 1972).

"*ambigua*" He Chengquan, 1991, p.72–73, pl.29, figs.1–6. Holotype: He Chengquan, 1991, pl.29, fig.3. **NOW** *Alterbidinium*. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Following

I.C.N. Article 55.1, the species name *Alterbia ambigua* is validly published even though the generic name *Alterbia* is illegitimate. Age: Cenomanian–middle Eocene.

"*amphiata*" (McIntyre, 1975, p.65–66, pl.2, figs.5–8) Yun Hyesu, 1981, p.64. Holotype: McIntyre, 1975, pl.2, figs.5–6. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Isabelidinium?*. Originally *Deflandrea*, subsequently *Isabelia?* (combination illegitimate), thirdly *Alterbia* (combination illegitimate), fourthly (and now) *Isabelidinium?*. Age: Paleocene–early Eocene.

"*asymmetrica*" (Wilson, 1967a, p.62–63, figs.17–21) Lentin and Williams, 1976, p.48. Holotype: Wilson, 1967a, figs.19–21. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium?*, fourthly (and now) *Alterbidinium*, fifthly *Magallanesium*. Age: ?Eocene (erratic).

"*bakeri*" (Deflandre and Cookson, 1955, p.251, pl.4, figs.1–4) Yun Hyesu, 1981, p.65. Emendation: Stover, 1974, p.169–170, as a "revised description" for *Deflandrea bakeri*. Holotype: Deflandre and Cookson, 1955, pl.4, fig.1. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*, fourthly *Alterbia* (combination illegitimate). Age: Paleocene–early Eocene.

"*balmei*" (Cookson and Eisenack, 1962b, p.486) Lentin and Williams, 1976, p.48. Emendation: Morgan, 1977, p.130, as *Alterbia minor*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.1; Morgan, 1977, text-fig.2. **NOW** *Spinidinium balmei*. Originally *Deflandrea minor* (name illegitimate), subsequently *Deflandrea balmei*, thirdly *Alterbia balmei* (combination illegitimate), fourthly *Isabelidinium balmei*, fifthly (and now) *Spinidinium balmei*, sixthly *Magallanesium balmei*. Taxonomic senior synonym: *Palaeohystrichophora* (as *Diconodinium*) *minuta*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea* (as *Isabelidinium*, now *Spinidinium*) *balmei*. Age: Late Cretaceous.

"*bellula*" He Chengquan, 1991, p.73, pl.29, fig.12. Holotype: He Chengquan, 1991, pl.29, fig.12. **NOW** *Alterbidinium*. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Following I.C.N. Article 55.1, the species name *Alterbia bellula* is validly published even though the generic name *Alterbia* is illegitimate. This name was not validly published in Xu Jinli (1987, p.150), who cited it as "*Alterbia bellula* He (MS)" — as a provisional manuscript name. Age: middle Eocene.

"*bicavata*" (Jain and Millepied, 1973, p.23, pl.1, figs.1–4; text-fig.1B) Lentin and Williams, 1976, p.49. Holotype: Jain and Millepied, 1973, pl.1, figs.1–3; Fensome et al., 1993a, figs.1–2 — p.975. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Senegalinium*. Originally (and now) *Senegalinium*, subsequently *Deflandrea*, thirdly *Alterbia* (combination illegitimate). Age: Campanian–Maastrichtian.

"*bicellula*" Islam, 1983b, p.335–336, pl.1, figs.6–7. Holotype: Islam, 1983b, pl.1, fig.6. **NOW** *Alterbidinium?*. Originally *Alterbia?* (generic name illegitimate), subsequently (and now) *Alterbidinium?*. Questionable assignment: Islam (1983b, p.335). Following I.C.N. Article 55.1, the species name *Alterbia? bicellula* is validly published even though the generic name *Alterbia* is illegitimate. Age: middle Eocene.

"*circula*" Heilmann-Clausen, 1985, p.16–17, pl.1, figs.1–8; text-fig.5. Holotype: Heilmann-Clausen, 1985, pl.1, figs.1–2. **NOW** *Alterbidinium*. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Following I.C.N. Article 55.1, the species name *Alterbia circula* is validly published even though the generic name *Alterbia* is illegitimate. Age: early Paleocene.

"*curvicornis*" (Vozzhennikova, 1967, p.151, pl.76, figs.1–4) Lentin and Williams, 1976, p.49. Holotype: Vozzhennikova, 1967, pl.76, fig.2; Lentin and Vozzhennikova, 1990, pl.3, fig.9; text-fig.13a. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. Originally *Albertia* (generic name illegitimate), subsequently *Alterbia* (combination illegitimate). **Taxonomic senior synonym**: *Deflandrea* (now *Alterbidinium*) *acutula*, according to Whitney (1979, p.125). Age: Campanian.

"*daveyi*" Stover and Evitt, 1978, p.93. **Name not validly published**: holotype not designated. Originally *Alterbia* (name not validly published), subsequently *Alterbidinium* (name not validly published). Age: Albian–Cenomanian.

"*dilwynensis*" (Cookson and Eisenack, 1965c, p.141, pl.18, figs.6–9) Lentin and Williams, 1976, p.49. Holotype: Cookson and Eisenack, 1965c, pl.18, figs.7–8. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Senegalinium*?. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*?. Age: Paleocene.

"*distincta*" (Wilson, 1967a, p.63–64, figs.9–10) Lentin and Williams, 1976, p.49. Holotype: Wilson, 1967a, fig.9. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium*?. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Alterbia*? (combination illegitimate), fourthly (and now) *Alterbidinium*?. Questionable assignment: Stover and Evitt (1978, p.93). Age: Early Tertiary (erratic).

"*earnleyensis*" Islam, 1983b, p.336, pl.1, figs.10–11. Holotype: Islam, 1983b, pl.1, fig.10. **NOW** *Alterbidinium*?. Originally *Alterbia*? (generic name illegitimate), subsequently (and now) *Alterbidinium*?. Questionable assignment: Islam (1983b, p.336). Following I.C.N. Article 55.1, the species name *Alterbia earnleyensis* is validly published even though the generic name *Alterbia* is illegitimate. Age: middle Eocene.

"*ectorugosa*" (Archangelsky, 1969b, p.192, pl.1, figs.5–7) Lentin and Williams, 1976, p.49. Holotype: Archangelsky, 1969b, pl.1, figs.5–6. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Eocene.

"*eyrensis*" (Cookson and Eisenack, 1971, p.217–218, pl.7, figs.2–3) Lentin and Williams, 1976, p.49. Holotype: Cookson and Eisenack, 1971, pl.7, fig.3. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Alterbia*? (combination illegitimate), thirdly (and now) *Eurydinium*. Questionable assignment: Lentin and Williams (1976, p.49). Age: Albian–Cenomanian.

"*foliacea*" (Eisenack and Cookson, 1960, p.2, pl.1, fig.3) Lentin and Williams, 1976, p.49. Holotype: Eisenack and Cookson, 1960, pl.1, fig.3. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Subtilisphaera*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Subtilisphaera*. Age: Turonian–middle Senonian.

"*ingramii*" (Cookson and Eisenack, 1970a, p.143, pl.12, figs.7–9) Lentin and Williams, 1976, p.49. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.9; Eisenack and Kjellström, 1975a, figure to left — p.190a; Fensome et al., 1996, fig.3 — p.2167. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*, fourthly (and now) *Eurydinium*. Age: Albian–Cenomanian.

"*macrocysta*" (Cookson and Eisenack, 1960a, p.3, pl.1, figs.7–8) Lentin and Williams, 1976, p.49. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.7. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Campanian.

"*mauthei*" (Riegel, 1974, p.357–360, pl.2, figs.1–7; text-figs.5–6) Lentin and Williams, 1976, p.149. Emendation: Riegel and Sarjeant, 1982, p.289, as *Andalusiella mauthei*. Holotype: Riegel, 1974, pl.2, fig.4; Riegel and Sarjeant, 1982, figs.1A–C,4A,5A; Fensome et al., 1995, figs.2,5–6 — p.1613. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Andalusiella*. Originally (and now) *Andalusiella*, subsequently *Alterbia* (combination illegitimate). Taxonomic senior synonym: *Svalbardella* (now *Andalusiella*) *polymorpha*, according to Lentin and Williams (1976, p.149) — however, Lentin and Williams (1977b, p.8) retained *Andalusiella mauthei*. Age: ?Senonian.

"*microgranulata*" (Stanley, 1965, p.219, pl.19, figs.4–6) Lentin and Williams, 1976, p.49. Holotype: Stanley, 1965, pl.19, figs.4–5. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Paleocene.

"*minor*" (Alberti, 1959b, p.98, pl.9, figs.9–11) Lentin and Williams, 1976, p.49. Emendation: Khowaja-Atequzzaman et al., 1991, p.44, as *Alterbidinium minus*. Holotype: Alberti, 1959b, pl.9, fig.10. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Age: late Senonian.

"*montanaensis*" (Harland, 1977a, p.184–185, pl.25, figs.4,6–7,10–12) Lentin and Williams, 1981, p.10. Holotype: Harland, 1977a, pl.25, fig.4. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Alterbia* (combination illegitimate), fourthly (and now) *Alterbidinium*. Age: late Campanian–Maastrichtian.

"*obscura*" (Drugg, 1967, p.17, pl.2, figs.8–9; pl.9, fig.5) Lentin and Williams, 1976, p.49. Holotype: Drugg, 1967, pl.2, fig.8. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Maastrichtian–Danian.

"*ovalis*" He Chengquan, 1991, p.73, pl.29, figs.7–10. Holotype: He Chengquan, 1991, pl.29, fig.7. **NOW** *Alterbidinium*. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Following I.C.N. Article 55.1, the species name *Alterbia ovalis* is validly published even though the generic name *Alterbia* is illegitimate. Age: Turonian–middle Eocene.

"*pellucida*" (Deflandre and Cookson, 1955, p.251, pl.4, fig.3) Yun Hyesu, 1981, p.64. Holotype: Deflandre and Cookson, 1955, pl.4, fig.3; Cookson and Eisenack, 1958, pl.4, fig.9; Stover, 1974, pl.1, figs.7a–b. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Isabelidinium pellucidum*. Originally *Deflandrea bakeri* forma *pellucida*, subsequently *Deflandrea pellucida*, thirdly *Isabelia pellucida* (combination illegitimate), fourthly (and now) *Isabelidinium pellucidum*, fifthly *Alterbia pellucida* (combination illegitimate). Age: Paleocene–early Eocene.

"?*pentaradiata*" (Cookson and Eisenack, 1965c, p.139–140, pl.18, figs.1–2) Lentin and Williams, 1976, p.49. Holotype: Cookson and Eisenack, 1965c, pl.18, fig.1; Stover, 1974, pl.2, figs.6a–b. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium?*. Originally *Deflandrea*, subsequently *Alterbia?* (combination illegitimate), thirdly (and now) *Alterbidinium?*. Questionable assignment: Lentin and Williams (1976, p.49). Age: Paleocene.

"subsp. *pentaradiata*". Autonym. Holotype: Cookson and Eisenack, 1965c, pl.18, fig.1; Stover, 1974, pl.2, figs.6a–b. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium?* *pentaradiatum* subsp. *pentaradiatum*. Originally *Deflandrea pentaradiata* subsp. *pentaradiata*, subsequently *Alterbia?* *pentaradiata* subsp. *pentaradiata* (combination illegitimate), thirdly (and now) *Alterbidinium?* *pentaradiatum* subsp. *pentaradiatum*.

"subsp. *preceda*" (Cookson and Eisenack, 1974, p.49, pl.20, figs.1–2) Lentin and Williams, 1976, p.50. Holotype: Cookson and Eisenack, 1974, pl.20, fig.1. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium?* *pentaradiatum* subsp. *precedum*. Originally *Deflandrea pentaradiata* subsp. *preceda*, subsequently *Alterbia?* *pentaradiata* subsp. *preceda* (combination illegitimate), thirdly (and now) *Alterbidinium?* *pentaradiatum* subsp. *precedum*. Age: Paleocene.

"*pilosa*" (Davey, 1969b, p.9, pl.3, figs.2–5) Lentin and Williams, 1976, p.50. Holotype: Davey, 1969b, pl.3, figs.2,5. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Age: Campanian–Maastrichtian.

"*polymorpha*" (Malloy, 1972, p.63–64, pl.1, figs.8–16,21) Lentin and Williams, 1976, p.50. Holotype: Malloy, 1972, pl.1, fig.15. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Andalusiella*. Originally *Svalbardella*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Andalusiella*. Taxonomic junior synonyms: *Palaeocystodinium microgranulatum*, according to Lentin and Williams (1976, p.89); *Senegalinium trisinum*, according to Lentin and Williams (1976, p.164); *Palaeocystodinium punctatum*, according to Lentin and Williams (1976, p.89) — however, Schrank (1987, p.265) retained that taxon as the subspecies

Andalusiella polymorpha subsp. *punctata*; *Andalusiella mauthei*, according to Lentin and Williams (1976, p.149) — however, Lentin and Williams (1977b, p.8) retained *Andalusiella mauthei*. Age: Maastrichtian.

"*puyangensis*" Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.37–38, pl.3, fig.7; text-fig.1. Holotype: He Chengquan et al., 1989, pl.3, fig.7; text-fig.1. **NOW** *Subtilisphaera*. Originally *Alterbia* (generic name illegitimate), subsequently *Alterbidinium*, thirdly (and now) *Subtilisphaera*. Following I.C.N. Article 55.1, the species name *Alterbia puyangensis* is validly published even though the generic name *Alterbia* is illegitimate. Age: Early Tertiary.

"*raijae*" (Kjellström, 1973, p.20–22, fig.16) Lentin and Williams, 1976, p.50. Holotype: Kjellström, 1973, fig.16. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Eurydinium*, fourthly (and now) *Manumiella*. Age: middle-late Maastrichtian.

"**recticornis*" (Vozzhennikova, 1967, p.151–152, pl.77, figs.1–4; pl.78, figs.1–3; pl.79, figs.1–2) Lentin and Williams, 1976, p.47. Holotype: Vozzhennikova, 1967, pl.77, fig.2; Lentin and Vozzhennikova, 1990, pl.3, fig.10; text-fig.13B (see discussion under *Alterbidinium recticorne*). Lectotype: Vozzhennikova, 1967, pl.77, fig.1, designated by Stover and Evitt (1978, p.93); however, see discussion under *Alterbidinium recticorne*. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. Originally *Albertia* (generic name illegitimate), subsequently *Alterbia* (combination illegitimate), thirdly *Alterbidinium*. **Taxonomic senior synonym**: *Deflandrea* (now *Alterbidinium*) *acutula*, according to Whitney (1979, p.125) and Lentin and Williams (1993, p.14). The nomenclatural type of the genus *Alterbia* remains the holotype of *Alterbia recticornis*. Age: Turonian.

"*rhombohedra*" (Benson, 1976, p.195, pl.9, figs.10–12) Lentin and Williams, 1977b, p.7. Holotype: Benson, 1976, pl.9, figs.10–12. **Combination illegitimate**: the generic name *Alterbia* is illegitimate. **NOW** *Andalusiella*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Andalusiella*. Age: early Paleocene.

"*subtilis*" He Chengquan in Zheng Yahui and He Chengquan, 1984, p.90–91, pl.6, figs.1–6; pl.10, figs.1–2. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.3. **NOW** *Alterbidinium*. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Following I.C.N. Article 55.1, the species name *Alterbia subtilis* is validly published even though the generic name *Alterbia* is illegitimate. Age: Campanian.

"*xinjiangensis*" He Chengquan, 1991, p.73–74, pl.28, figs.1–6. Holotype: He Chengquan, 1991, pl.28, fig.3. **NOW** *Alterbidinium*. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Following I.C.N. Article 55.1, the species name *Alterbia xinjiangensis* is validly published even though the generic name *Alterbia* is illegitimate. Age: Paleocene.

ALTERBIDINIUM Lentin and Williams, 1985, p.14. Substitute name for *Albertia* Vozzhennikova, 1967, p.150–151 (an illegitimate name) and *Alterbia* Lentin and Williams, 1976, p.47–48 (an illegitimate name). Emendation: Khowaja-Ateequzzaman et al., 1991, p.38. Originally *Albertia* (name illegitimate), subsequently *Alterbia* (name illegitimate), thirdly (and now) *Alterbidinium*. Type: Vozzhennikova, 1967, pl.77, fig.2, as *Albertia recticornis* (see discussion under *Alterbidinium recticorne*).

+*acutulum* (Wilson, 1967b, p.225–226, figs.11–12) Lentin and Williams, 1985, p.14. Emendation: Khowaja-Ateequzzaman et al., 1991, p.41–42, as *Alterbidinium acutulum*. Holotype: Wilson, 1967b, fig.12. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Taxonomic junior synonyms: *Albertia recticornis*, according to Whitney (1979, p.125) and Lentin and Williams (1993, p.14); *Albertia curvicornis*, according to Whitney (1979, p.125). The nomenclatural type of the genus *Alterbidinium* remains the holotype of *Alterbidinium recticorne*. Age: ?Maastrichtian (see Wilson, 1972, p.184).

ambiguum (He Chengquan, 1991, p.72–73, pl.29, figs.1–6) Lentin and Williams, 1993, p.21. Holotype: He Chengquan, 1991, pl.29, fig.3. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Age: Cenomanian–middle Eocene.

asymmetricum (Wilson, 1967a, p.62–63, figs.17–21) Levy and Harwood, 2000, p.202. Holotype: Wilson, 1967a, figs.19–21. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*?, fourthly (and now) *Alterbidinium*, fifthly *Magallanesium*. Sluijs et al. (2009, p.50) also proposed the transfer of this species to *Alterbidinium*, thereby retaining it in the genus. Age: ?Eocene (erratic).

austrinum Roncaglia and Schiøler, 1999, p.124–125,127–128, pl.1, figs.1–9; pl.2, figs.1–6; text-figs.3A–F. Holotype: Roncaglia and Schiøler, 1999, pl.1, figs.1–2; text-fig.3A. Age: middle-late Campanian.

bellulum (He Chengquan, 1991, p.73, pl.29, fig.12) Lentin and Williams, 1993, p.22. Holotype: He Chengquan, 1991, pl.29, fig.12. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. This species was not validly published in Xu Jinli (1987, p.150), who gave the citation, "*Alterbia bellula* He (MS)". Age: middle Eocene.

?*bicellulum* (Islam, 1983b, p.335–336, pl.1, figs.6–7) Lentin and Williams, 1985, p.14. Holotype: Islam, 1983b, pl.1, fig.6. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*?. Questionable assignment: Lentin and Williams (1985, p.14). Age: middle Eocene.

circulum (Heilmann-Clausen, 1985, p.16–17, pl.1, figs.1–8; text-fig.5) Lentin and Williams, 1989, p.13. Holotype: Heilmann-Clausen, 1985, pl.1, figs.1–2. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Age: early Paleocene.

compactum Vasilyeva in Andreeva-Grigorovich et al., 2011, p.40–42, pl.11, figs. 1–4; text-fig. 18a ex Williams and Fensome, 2016, p.138. Holotype: Andreeva-Grigorovich et al., 2011, text-fig.18a, pl.11, fig.1, designated by Williams and Fensome (2016, p.138). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.41) since the holotype citation (pl.11, figs.1–4 and text-fig.18a) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium compactum*. Age: Selandian.

"*daveyi*" (Stover and Evitt, 1978, p.93) Lentin and Williams, 1985, p.14. **Name not validly published:** holotype not designated. Originally *Alterbia* (name not validly published), subsequently *Alterbidinium* (name not validly published). Age: Albian–Cenomanian.

dictyotum Harker and Sarjeant in Harker et al., 1990, p.105–106, pl.8, figs.1–5; text-fig.21 ex Harker and Sarjeant, 1991, p.709. Holotype: Harker et al., 1990, pl.8, fig.1; text-fig.21. This name was not validly published in Harker et al. (1990) since the lodgement of the holotype was not cited (I.C.N. Article 40.7). Age: early Campanian.

?*distinctum* (Wilson, 1967a, p.63–64, figs.9–10) Lentin and Williams, 1985, p.14. Holotype: Wilson, 1967a, fig.9. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Alterbia*? (combination illegitimate), fourthly (and now) *Alterbidinium*?. Questionable assignment: Lentin and Williams (1985, p.14). Age: Early Tertiary (erratic).

?*earnleyense* (Islam, 1983b, p.336, pl.1, figs.10–11) Lentin and Williams, 1985, p.14. Holotype: Islam, 1983b, pl.1, fig.10. Originally *Alterbia*? (generic name illegitimate), subsequently (and now) *Alterbidinium*?. Questionable assignment: Lentin and Williams (1985, p.14). Age: middle Eocene.

ellentonense Lucas-Clark, 2006, p.189–190, pl.1, figs.3–6. Holotype: Lucas-Clark, 2006, pl.1, figs.3–4. Age: Paleocene.

emulatum Mao Shaozhi and Norris, 1988, p.41–42, pl.9, figs.1–2; text-fig.12. Holotype: Mao Shaozhi and Norris, 1988, pl.9, fig.1. Age: Late Cretaceous.

ioannidesii Pearce, 2010, p.66–67, pl.1, figs.1–6. Holotype: Pearce, 2010, pl.1, figs.1–6. Age: early Campanian.

kirschii Slimani, 1994, p.89–90, pl.14, figs.1–4. Holotype: Slimani, 1994, pl.14, figs.1–3. Age: late early Maastrichtian.

longicornutum Roncaglia et al., 1999, p.297,299, fig.15, nos.1–5. Holotype: Roncaglia et al., 1999, fig.15, no.5. Age: Maastrichtian.

mcmillanii Willumsen, 2012, p.58–59, pl.1, figs.12,16–18; pl.2, figs.7–12. Holotype: Willumsen, 2012, pl.2, figs.7–12. Age: latest Maastrichtian–earliest Paleocene.

microverrusum (Yu Jingxian and Zhang Wangping, 1980, p.109, pl.3, figs.1–2) He Chengquan et al., 2009, p.416. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.3, fig.2. Originally *Deflandrea*, subsequently *Isabelidinium?*, thirdly (and now) *Alterbidinium*. Yu Jingxian and Zhang Wangping (1980, p.109) spelled the epithet as "*microverrusum*" in their text, but as "*microverrucosa*" in their plate caption. Previous editions of the "Lentin and Williams Index" and DINOFLAJ2 have cited the epithet as "*microverrucosa* / *microverrucosum*", but He Chengquan et al. (2009, p.416) used "*microverrusum*", which we follow here. Age: Campanian–early Maastrichtian.

minus (Alberti, 1959b, p.98, pl.9, figs.9–11) Lentin and Williams, 1985, p.14. Emendation: Khowaja-Ateequzzaman et al., 1991, p.44, as *Alterbidinium minus*. Holotype: Alberti, 1959b, pl.9, fig.10. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Age: late Senonian.

montanaense (Harland, 1977a, p.184–185, pl.25, figs.4,6–7,10–12) Lentin and Williams, 1985, p.14. Holotype: Harland, 1977a, pl.25, fig.4. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Alterbia* (combination illegitimate), fourthly (and now) *Alterbidinium*. Age: late Campanian–Maastrichtian.

?novozealandicum Schiøler et al., 2001, p.146,148–150, figs.4A–F,5A–G. Holotype: Schiøler et al., 2001, fig.4A. Questionable assignment: Schiøler et al. (2001, p.146). Age: middle-late Campanian.

nuculum Vasilyeva in Andreeva-Grigorovich et al., 2011, p.42–43, pl.11, figs.5–8,11–14; text-fig.18b ex Williams and Fensome, 2016, p.138. Holotype: Andreeva-Grigorovich et al., 2011, pl.11, figs.5–6; text-fig.18b, designated by Williams and Fensome (2016, p.138). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.42–43) since the holotype citation (pl.11, figs.5–8,11–14 and text-fig.18b) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium nuculum*. Age: Thanetian–Ypresian.

nummuliforme Vasilyeva in Andreeva-Grigorovich et al., 2011, p. 43, pl.11, figs.15–17; text-fig.18c ex Williams et al., herein. Holotype: Andreeva-Grigorovich et al., 2011, pl.11, fig.15; text-fig.18c, designated by Williams and Fensome (2016, p.138). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.43) since the holotype citation (pl.11, figs.15–17 and text-fig.18c) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium nummuliforme*. Age: Thanetian–Ypresian.

ovale (He Chengquan, 1991, p.73, pl.29, figs.7–10) Lentin and Williams, 1993, p.22. Holotype: He Chengquan, 1991, pl.29, fig.7. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Age: Turonian–middle Eocene.

papillatum Khowaja-Ateequzzaman et al., 1991, p.38,40–41, pl.1, figs.1–7; pl.2, figs.5–6; text-figs.1A–B,2A–B,3A–B. Holotype: Khowaja-Ateequzzaman et al., 1991, pl.1, figs.4–7; text-figs.1A–B. Age: Turonian–Santonian.

pentangulare Vasilyeva in Andreeva-Grigorovich et al., 2011, p.44, pl.11, figs.9–10; text-fig.18d ex Williams and Fensome, 2016, p.138. Holotype: Andreeva-Grigorovich et al., 2011, pl.11, figs.10; text-fig. 18d, designated by Williams and Fensome (2016, p.138). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.44) since the holotype citation (pl.11, figs.9–10 and text-fig.18d) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium pentangulare*. Age:Ypresian.

?pentaradiatum (Cookson and Eisenack, 1965c, p.139–140, pl.18, figs.1–2) Lentin and Williams, 1985, p.15. Holotype: Cookson and Eisenack, 1965c, pl.18, fig.1; Stover, 1974, pl.2, figs.6a–b. Originally *Deflandrea*,

subsequently *Alterbia*? (combination illegitimate), thirdly (and now) *Alterbidinium*? Questionable assignment: Lentin and Williams (1985, p.15). Age: Paleocene.

subsp. *pentaradiatum*. Autonym. Holotype: Cookson and Eisenack, 1965c, pl.18, fig.1; Stover, 1974, pl.2, figs.6a–b. Originally *Deflandrea pentaradiata* subsp. *pentaradiata*, subsequently *Alterbia*? *pentaradiata* subsp. *pentaradiata* (combination illegitimate), thirdly (and now) *Alterbidinium*? *pentaradiatum* subsp. *pentaradiatum*.

subsp. *precedum* (Cookson and Eisenack, 1974, p.49, pl.20, figs.1–2) Lentin and Williams, 1985, p.15. Holotype: Cookson and Eisenack, 1974, pl.20, fig.1. Originally *Deflandrea pentaradiata* subsp. *preceda*, subsequently *Alterbia*? *pentaradiata* subsp. *preceda* (combination illegitimate), thirdly (and now) *Alterbidinium*? *pentaradiatum* subsp. *precedum*. Age: Paleocene.

pilosum (Davey, 1969b, p.9, pl.3, figs.2–5) Lentin and Williams, 1985, p.15. Holotype: Davey, 1969b, pl.3, figs.2,5. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Age: Campanian–Maastrichtian.

prominense Vasilyeva in Andreeva-Grigorovich et al., 2011, p.44–45, pl.12, figs.5–6,9–11; text-fig.18e ex Williams and Fensome, 2016, p.139. Holotype: Andreeva-Grigorovich et al., 2011, pl.12, figs.10–11; text-fig.18e, designated by Williams and Fensome (2016, p.139). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.44–45) since the holotype citation (pl.12, figs.5–6, 9–11 and text-fig.18e) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium prominense*. Age: Danian–Selandian.

pseudocirculum Vasilyeva in Andreeva-Grigorovich et al., 2011, p.45–46, pl.11, figs.20–24; text-fig.18f ex Williams and Fensome, 2016, p.139. Holotype: Andreeva-Grigorovich et al., 2011, pl.11, figs.23–24; text-fig.18f, designated by Williams and Fensome (2016, p.139). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.45–46) since the holotype citation (pl.11, figs.20–24 and text-fig.18f) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium pseudocirculum*. In the caption to text-fig.18, the species is referred to as *Alterbidinium pseudocingulum*. Age: Danian–Selandian.

"*puyangense*" (Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.37–38, pl.3, fig.7; text-fig.1) Lentin and Williams, 1993, p.23. Holotype: He Chengquan et al., 1989, pl.3, fig.7; text-fig.1. **NOW** *Subtilisphaera*. Originally *Alterbia* (generic name illegitimate), subsequently *Alterbidinium*, thirdly (and now) *Subtilisphaera*. Age: Early Tertiary.

"*recticorne*" (Vozzhennikova, 1967, p.151–152, pl.77, figs.1–4; pl.78, figs.1–3; pl.79, figs.1–2) Harker and Sarjeant in Harker et al., 1990, p.104. Holotype: Vozzhennikova, 1967, pl.77, fig.2; Lentin and Vozzhennikova, 1990, pl.3, fig.10; text-fig.13B. Lectotype: Vozzhennikova, 1967, pl.77, fig.1, designated by Stover and Evitt (1978, p.93); however, see discussion below. Originally *Albertia* (generic name illegitimate), subsequently *Alterbia* (combination illegitimate), thirdly *Alterbidinium*. **Taxonomic senior synonym:** *Deflandrea* (now *Alterbidinium*) *acutula*, according to Whitney (1979, p.125) and Lentin and Williams (1993, p.14). The nomenclatural type of the genus *Alterbidinium* remains the holotype of *Alterbidinium recticorne*. Vozzhennikova (1967, p.151) designated the holotype by means of a "preparation" number and reference to her pl.77, figs.1–2. However, these two illustrations are of different specimens. I.C.N. Article 43.3 indicates that for fossils prior to 2001, holotype designation does not need to be tied directly to a particular figure and hence this species name was validly published by Vozzhennikova (1967). Stover and Evitt (1978, p.93) designated the specimen illustrated in Vozzhennikova (1967, pl.77, fig.1) as lectotype. However, Lentin and Vozzhennikova (1990, p.32) implied that the originally intended holotype is the specimen illustrated in Vozzhennikova (1967, pl.77, fig.2); so the latter must supersede Stover and Evitt's lectotype designation. Age: Turonian.

rugulum Iakovleva and Kulkova, 2001, p.16, pl.8, figs.8,12–14; text-fig.10. Holotype: Iakovleva and Kulkova, 2001, pl.8, figs.8,12–14. Age: early Eocene (Ypresian).

saltanovae Vasilyeva in Andreeva-Grigorovich et al., 2011, p.46–47, pl.11, figs.25–28; text-fig.18g ex Williams and Fensome, 2016, p.139. Holotype: Andreeva-Grigorovich et al., 2011, pl.11, figs.25–26; text-fig. 18g, designated by Williams and Fensome (2016, p.139). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.46–47) since the holotype citation (pl.11, figs.25–28 and text-fig.18g) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium saltanovae*. Age: Danian–Selandian.

simplex Vasilyeva in Andreeva-Grigorovich et al., 2011, p.47–48, pl.12, figs.1–4; text-fig.18h ex Williams and Fensome, 2016, p.139. Holotype: Andreeva-Grigorovich et al., 2011, pl.12, figs.1–2; text-fig. 18h, designated by Williams and Fensome (2016, p.139). This name was not validly published by Vasilyeva in Andreeva-Grigorovich et al. (2011, p.47–48) since the holotype citation (pl.12, figs.1–4 and text-fig.18h) includes more than one specimen. The holotype was clearly designated in Williams and Fensome (2016), thus validating the name *Alterbidinium simplex*. Age: Thanetian–Ypresian.

subtile (He Chengquan in Zheng Yahui and He Chengquan, 1984, p.90–91, pl.6, figs.1–6; pl.10, figs.1–2) Lentin and Williams, 1989, p.14. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.3. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Age: Campanian.

?*ulloriaq* Nøhr-Hansen, 1996, p.28–29, pl.14, figs.4–12. Holotype: Nøhr-Hansen, 1996, pl.14, fig.4. Questionable assignment: Nøhr-Hansen (1996, p.28). Age: earliest Paleocene.

varium Kirsch, 1991, p.98–99, pl.19, figs.1–10; text-figs.46a–h,47a–b. Holotype: Kirsch, 1991, pl.19, figs.1–2; text-fig.46a. Age: early Maastrichtian.

xinjiangense (He Chengquan, 1991, p.73–74, pl.28, figs.1–6) Lentin and Williams, 1993, p.23. Holotype: He Chengquan, 1991, pl.28, fig.3. Originally *Alterbia* (generic name illegitimate), subsequently (and now) *Alterbidinium*. Age: Paleocene.

AMBONOSPHAERA Fensome, 1979, p.50–51. Emendation: Prauss, 1989, p.31. Taxonomic senior synonym: *Polygonifera*, according to Brenner (1988, p.68) — however, Prauss (1989, p.31) retained *Ambonosphaera*. Type: Fensome, 1979, pl.7, figs.3,6,9; text-figs.16B–C, as *Ambonosphaera calloviana*.

"*bavarica*" Lund and Ecke, 1988, p.348,351, pl.1, figs.2a–b,4; text-figs.3a–b. Holotype: Lund and Ecke, 1988, pl.1, figs.2a–b; text-fig.3a. **NOW** *Polygonifera*. Originally *Ambonosphaera*, subsequently (and now) *Polygonifera*. Age: ?late middle Oxfordian.

**calloviana* Fensome, 1979, p.51–54, pl.7, figs.3,5–6,8–9; text-figs.16A–D,17A–B. Holotype: Fensome, 1979, pl.7, figs.3,6,9; text-figs.16B–C; Fensome et al., 1993a, figs.1–3,7–8 — p.1007. Originally (and now) *Ambonosphaera*, subsequently *Polygonifera*. Prauss (1989, p.31) retained this species in *Ambonosphaera*. Age: early Callovian.

delicata Lebedeva in Lebedeva and Nikitenko, 1998, p.810–811, pl.1, figs.5–7; text-figs.7a–b. Holotype: Lebedeva and Nikitenko, 1998, pl.1, fig.5. Age: Berriasian–Valanginian.

hemicavata Prauss, 1989, p.31–32, pl.10, figs.8–15; text-fig.9. Holotype: Prauss, 1989, pl.10, figs.8,12; text-fig.9. Age: late Bajocian–early Callovian.

"*jurassica*" (Gitmez and Sarjeant, 1972, p.240–241, pl.14, figs.5,8) Fensome, 1979, p.51. Emendation: Poulsen and Riding, 1992, p.28, as *Senoniasphaera jurassica*. Holotype: Gitmez and Sarjeant, 1972, pl.14, fig.5; Poulsen and Riding, 1992, text-figs.3C–D. **NOW** *Senoniasphaera*. Originally *Hexagonifera*, subsequently (and now) *Senoniasphaera*, thirdly *Ambonosphaera*. Taxonomic senior synonym: *Meiourogonya* (now *Lithodinia*?) *staffinensis*, according to Williams et al. (1993, p.32) — however, in the same publication, Williams et al. (1993, p.56) retained *Hexagonifera* (now *Senoniasphaera*) *jurassica*. Age: Kimmeridgian.

?*staffinensis* (Gitmez, 1970, p.276–278, pl.3, fig.1; text-figs.20A–B) Poulsen and Riding, 1992, p.26. Emendation: Poulsen and Riding, 1992, p.26, as *Ambonosphaera*? *staffinensis*. Holotype: Gitmez, 1970, pl.3, fig.1; text-

figs.20A–B; Poulsen and Riding, 1992, pl.1, fig.6; text-figs.1A–B. Originally *Meiourogonya*, subsequently *Lithodinia*, thirdly *Polygonifera*, fourthly (and now) *Ambonosphaera*?, fifthly *Lithodinia*?. Williams et al. (1998, p.39) retained this species in *Ambonosphaera*?. Questionable assignment: Poulsen and Riding (1992, p.26). Taxonomic junior synonym: *Senoniasphaera*? *frisia*, according to Poulsen and Riding (1992, p.26); *Hexagonifera* (now *Senoniasphaera*) *jurassica*, according to Williams et al. (1993, p.32) — however, elsewhere in the same publication, Williams et al. (1993, p.56) retained *Hexagonifera* (now *Senoniasphaera*) *jurassica*. Age: early Kimmeridgian.

AMICULOSPHERA Harland, 1979b, p.535. Type: Harland, 1979b, pl.2, figs.1–3, as *Amiculosphaera umbraculum*.

***umbraculum** Harland, 1979b, p.535, pl.1, figs.11–14,22–23; pl.2, figs.1–3. Holotype: Harland, 1979b, pl.2, figs.1–3; Fensome et al., 1995, figs.1–3 — p.1857. N.I.A. Age: middle Miocene–Pleistocene.

AMPHIDIADEMA Cookson and Eisenack, 1960a, p.4. Emendation: Lentin and Williams, 1976, p.60–61. Type: Cookson and Eisenack, 1960a, pl.1, fig.11, as *Amphidiadema denticulata*.

***denticulata** Cookson and Eisenack, 1960a, p.4, pl.1, fig.11. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.11. Age: Senonian.

nucula (Cookson and Eisenack, 1962b, p.486, pl.1, fig.13) Lentin and Williams, 1976, p.61. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.13. Originally *Deflandrea*, subsequently (and now) *Amphidiadema*. N.I.A. Age: Senonian.

rectangularis (Cookson and Eisenack, 1962b, p.486, pl.1, figs.14–15) Lentin and Williams, 1976, p.61. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.14; Jan du Chêne et al., 1986a, pl.48, figs.14–15. Originally *Deflandrea*, subsequently (and now) *Amphidiadema*. Contrary to the belief of Stover and Evitt (1978, p.94), Gocht (1976, p.322) did not consider this species to be a taxonomic junior synonym of *Triblastula* (now *Hystrichosphaeropsis*) *quasicribrata*. Age: late Turonian–mid Senonian.

"subsp. **rectangularis**". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.14; Jan du Chêne et al., 1986a, pl.48, figs.14–15. **Now redundant**. Originally *Deflandrea rectangularis* subsp. *rectangularis*, subsequently *Amphidiadema rectangularis* subsp. *rectangularis*.

"subsp. **samuelsonii**" (Kjellström, 1973, p.22, fig.18) Lentin and Williams, 1976, p.61. Holotype: Kjellström, 1973, fig.18. Originally *Deflandrea rectangularis* var. *samuelsonii*, subsequently *Deflandrea rectangularis* subsp. *samuelsonii*, thirdly *Amphidiadema rectangularis* subsp. *samuelsonii*. **Taxonomic senior synonym**: *Triblastula* (now *Hystrichosphaeropsis*) *quasicribrata*, according to Gocht (1976, p.322). Age: early–late Maastrichtian.

?**similis** Marheinecke, 1992, p.80–81, pl.16, figs.5–7; text-fig.14. Holotype: Marheinecke, 1992, pl.16, fig.7. Questionable assignment: Marheinecke (1992, p.80). Contrary to the opinion of Lentin and Williams (1993, p.24), Williams et al. (1998, p.39) considered this name to be validly published. Age: early–late Maastrichtian.

AMPHIGYMNium Lentin and Vozzhennikova, 1990, p.28–29. Type: Vozzhennikova, 1967, pl.1, fig.2, as *Amphidinium mitratum*.

cooksoniae (Boltenhagen, 1977, p.75–76, pl.11, figs.5a–c,6–7) Lentin and Vozzhennikova, 1990, p.30. Holotype: Boltenhagen, 1977, pl.11, figs.5a–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.40. Originally *Dinogymnium*, subsequently (and now) *Amphigymnium*. Age: Campanian.

***mitratum** (Vozzhennikova, 1967, p.40, pl.1, figs.2–3; pl.5, figs.1–2,4) Lentin and Vozzhennikova, 1990, p.29. Emendation: Lentin and Vozzhennikova, 1990, p.29–30, as *Amphigymnium mitratum*. Holotype: Vozzhennikova,

1967, pl.1, fig.2; Lentin and Vozzhennikova, 1990, pl.1, figs.10–11; text-fig.12; Appendix A, fig.38. Originally *Amphidinium* (Appendix B), subsequently *Dinogymnium*, thirdly (and now) *Amphigymnium*. Age: Turonian–Senonian.

rigaudiae (Boltenhagen, 1977, p.73, pl.11, figs.1a–b,2–4) Lentin and Vozzhennikova, 1990, p.30. Holotype: Boltenhagen, 1977, pl.11, figs.1a–b; Lentin and Vozzhennikova, 1990, Appendix A, fig.39. Originally *Dinogymnium*, subsequently (and now) *Amphigymnium*. Age: Campanian–Maastrichtian.

"**AMPHORA**" Willems, 1995a, p.66–67. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298, who noted that the cyst wall is pithonelloid and so dinoflagellate affinity is questionable). **Name illegitimate** — **senior homonym**: *Amphora* Ehrenberg ex Kützing, 1844. **Substitute name**: *Coronadinium*. Type: Willems, 1995a, pl.3, figs.1–3, as *Amphora coronata*.

"**coronata*" Willems, 1995a, p.67,69, pl.3, figs.1–6; pl.4, figs.1–4. Holotype: Willems, 1995a, pl.3, figs.1–3. **NOW** *Coronadinium*. Originally *Amphora* (generic name illegitimate), subsequently (and now) *Coronadinium*. Age: early Campanian.

AMPHOROSPHAERIDIUM Davey, 1969c, p.30. Taxonomic senior synonym: *Lanternosphaeridium*, according to Norvick (1976, p.50) — however, Stover and Evitt (1978, p.140–141) retained *Amphorosphaeridium*. Type: Davey, 1969c, pl.3, figs.1–2, as *Amphorosphaeridium fenestratum*.

?*almae* Schiøler, 2005, p.28–29, pl.12, figs.11–13; text-figs.5a–h. Holotype: Schiøler, 2005, pl.12, fig.11. Questionable assignment: Schiøler (2005, p.28). Age: middle to late Rupelian.

"*axiale*" (Eisenack, 1965b, p.150, pl.15, figs.1–4) Davey, 1969c, p.35. Holotype: Eisenack, 1965b, pl.15, fig.2. **NOW** *Fibrocysta*. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocysta*. Age: late Eocene–early Oligocene.

"*bipolare*" (Cookson and Eisenack, 1965b, p.135, pl.16, figs.7–8) Davey, 1969c, p.35. Holotype: Cookson and Eisenack, 1965b, pl.16, fig.8. **NOW** *Fibrocysta*. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocysta*. Age: early Eocene.

**fenestratum* Davey, 1969c, p.30–33, pl.1, fig.6; pl.2, figs.2,4–6; pl.3, figs.1–3; text-fig.1, nos.2a–e; text-fig.2. Holotype: Davey, 1969c, pl.3, figs.1–2; Fensome et al., 1993a, fig.1 — p.1181; figs.1–2 — p.1183. Age: Campanian–Maastrichtian.

subsp. *dividum* (Davey, 1969c, p.32–33, pl.2, figs.5–6; text-fig.2) Lentin and Williams, 1973, p.13. Holotype: Davey, 1969c, pl.2, fig.5; Fensome et al., 1993a, fig.1 — p.1135; fig.2 — p.1181. Originally *Amphorosphaeridium fenestratum* var. *dividum*, subsequently (and now) *Amphorosphaeridium fenestratum* subsp. *dividum*. Age: Campanian–Maastrichtian.

"var. *dividum*" Davey, 1969c, p.32–33, pl.2, figs.5–6; text-fig.2. Holotype: Davey, 1969c, pl.2, fig.5; Fensome et al., 1993a, fig.1 — p.1135; fig.2 — p.1181. **NOW** *Amphorosphaeridium fenestratum* subsp. *dividum*. Originally *Amphorosphaeridium fenestratum* var. *dividum*, subsequently (and now) *Amphorosphaeridium fenestratum* subsp. *dividum*. Age: Campanian–Maastrichtian.

subsp. *fenestratum*. Autonym. Holotype: Davey, 1969c, pl.3, figs.1–2; Fensome et al., 1993a, fig.1 — p.1187; figs.1–2 — p.1183.

"var. *fenestratum*". Autonym. Holotype: Davey, 1969c, pl.3, figs.1–2; Fensome et al., 1993a, fig.1 — p.1187; figs.1–2 — p.1183. **Now redundant**.

latitubulum Davey, 1969c, p.34–35, pl.4, figs.2,7; text-fig.1, no.4. Holotype: Davey, 1969c, pl.4, fig.2. Age: Campanian–Maastrichtian.

"*majus*" (Lejeune-Carpentier, 1940, p.B220–B221; text-fig.13) Lejeune-Carpentier and Sarjeant, 1981, p.12. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.12, as *Amphorosphaeridium majus*. Holotype: Lejeune-Carpentier, 1940, text-fig.13; Strel et al., 1977, pl.1, fig.7; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.6–7; text-fig.7. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Cordosphaeridium*, fourthly *Dapsilidinium*? (combination not validly published), fifthly *Amphorosphaeridium*, sixthly (and now) *Exochosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (as *Exochosphaeridium bifidum*) and *Exochosphaeridium bifidum* var. *involutum* (as *Exochosphaeridium bifidum* subsp. *involutum*), both according to Peyrot (2011, p.284). Age: Late Cretaceous.

multibrevum Davey, 1969c, p.33–34, pl.3, figs.5–6; pl.4, fig.1; text-fig.1, no.3. Holotype: Davey, 1969c, pl.3, fig.5. Age: Campanian–Maastrichtian.

?*multispinosum* (Davey and Williams, 1966b, p.89–90, pl.3, fig.6) Sarjeant, 1981, p.123. Holotype: Davey and Williams, 1966b, pl.3, fig.6; Bujak et al., 1980, pl.7, figs.1–2. Originally *Cordosphaeridium*, subsequently (and now) *Amphorosphaeridium*?. Questionable assignment: Sarjeant (1981, p.123). Age: early Eocene.

?*robustum* (Salujha and Kindra, 1981, p.52, pl.3, figs.55–56) Jain and Garg, 1982, p.69. Holotype: Salujha and Kindra, 1981, pl.3, fig.55. Originally *Hystrichokolpoma*, subsequently (and now) *Amphorosphaeridium*?. Questionable assignment: Jain and Garg (1982, p.69). Jain and Garg (1982, p.69) indicated that one of the two specimens illustrated by Salujha and Kindra (1981, pl.3, fig.56) is assignable to a species of *Achomosphaera*. Age: early Paleocene.

"**AMPHORULA**" Dodekova, 1969, p.19. Emendations: Zotto et al., 1987, p.203; Monteil, 1990, p.602. **Name illegitimate — senior homonym:** *Amphorula* Grove 1922. **Substitute name:** *Amphorulacysta* Chen, 2013, p.295. Type: Dodekova, 1969, pl.4, figs.1–3, as *Amphorula metaelliptica*.

"*delicata*" van Helden, 1986, p.188, pl.4, figs.4–7. Holotype: van Helden, 1986, pl.4, fig.4. **NOW** *Amphorulacysta*. Originally *Amphorula* (generic name illegitimate), subsequently (and now) *Amphorulacysta*. Age: Portlandian–early Berriasian.

"*dodekovae*" Zotto et al., 1987, p.203–204, pl.2, fig.1; pl.3, fig.4; text-fig.7. Emendation: Monteil, 1990, p.604. Holotype: Zotto et al., 1987, pl.2, fig.1. **NOW** *Amphorulacysta*? Originally *Amphorula* (generic name illegitimate), subsequently (and now) *Amphorulacysta*? Age: Kimmeridgian.

"*expirata*" (Davey, 1982b, p.28–29, pl.8, figs.13–16) Courtinat, 1989, p.174. Holotype: Davey, 1982b, pl.8, figs.13–14. **NOW** *Amphorulacysta*? Originally *Egmontodinium*, subsequently *Amphorula* (generic name illegitimate), thirdly (and now) *Amphorulacysta*? Age: early Portlandian–earliest Ryazanian.

"**metaelliptica*" Dodekova, 1969, p.20, pl.4, figs.1–6; text-figs.E–F. Emendation: Monteil, 1990, p.603, as *Amphorula metaelliptica*. Holotype: Dodekova, 1969, pl.4, figs.1–3. **NOW** *Amphorulacysta*. Originally *Amphorula*, (generic name illegitimate), subsequently (and now) *Amphorulacysta*. Age: Tithonian.

"?monteilii" Dodekova, 1994, p.18–19, pl.1, figs.6–11,13–14; pl.2, figs.6–10; text-figs.4a–b. Holotype: Dodekova, 1994, pl.1, figs.13–14. **NOW** *Amphorulacysta*? Originally *Amphorula*? (generic name illegitimate), subsequently (and now) *Amphorulacysta*? Questionable assignment: Dodekova (1994, p.18). Age: late Tithonian–Berriasian.

AMPHORULACYSTA Chen, 2013, p.293. Substitute name for *Amphorula* Dodekova, 1969 (an illegitimate name). Emendations: Zotto et al., 1987, p.203 and Monteil, 1990, p.602, both for *Amphorula*. Chen (2013, p.295) used the term "emendation" but was clearly referring to the change of name and did not intend to provide a revised description or diagnosis. Type: Dodekova, 1969, pl.4, figs.1–3, as *Amphorula metaelliptica*.

delicata (van Helden, 1986, p.188, pl.4, figs.4–7) Williams and Fensome 2016, p.139. Holotype: van Helden, 1986, pl.4, fig.4. Originally *Amphorula* (generic name illegitimate), subsequently (and now) *Amphorulacysta*. This

combination was not validly published in Chen (2013, p.295), since that author did not fully reference the basionym. Age: Portlandian–early Berriasian.

?*dodekova* (Zotto et al., 1987, p.203–204, pl.2, fig.1; pl.3, fig.4; text-fig.7) Williams and Fensome 2016, p.139. Holotype: Zotto et al., 1987, pl.2, fig.1. Originally *Amphorula* (generic name illegitimate), subsequently (and now) *Amphorulacysta*? Questionable assignment: Williams and Fensome (2016, p.139). Age: Kimmeridgian.

?*expirata* (Davey, 1982b, p.28–29, pl.8, figs.13–16) Williams and Fensome 2016, p.139. Holotype: Davey, 1982b, pl.8, figs.13–14. Originally *Egmontodinium*, subsequently *Amphorula* (generic name illegitimate), thirdly (and now) *Amphorulacysta*? Questionable assignment: Williams and Fensome (2016, p.139). Age: early Portlandian–earliest Ryazanian.

**metaelliptica* (Dodekova, 1969, p.20, pl.4, figs.1–6; text-figs.E–F) Williams and Fensome 2016, p.139. Emendation: Monteil, 1990, p.603, as *Amphorula metaelliptica*. Holotype: Dodekova, 1969, pl.4, figs.1–3. Originally *Amphorula*, (generic name illegitimate), subsequently (and now) *Amphorulacysta*. The combination was not validly published in Chen (2013, p.295), since that author did not fully reference the basionym. Age: Tithonian.

?*monteilii* (Dodekova, 1994, p.18–19, pl.1, figs.6–11,13–14; pl.2, figs.6–10; text-figs.4a–b) Williams and Fensome 2016, p.139. Holotype: Dodekova, 1994, pl.1, figs.13–14. Originally *Amphorula*? (generic name illegitimate), subsequently (and now) *Amphorulacysta*? Questionable assignment: Williams and Fensome (2016, p.139). Age: late Tithonian–Berriasian.

AMPULLADINIUM Riding, Helby and Parker in Riding and Helby, 2001g, p.181,183. Type: Riding and Helby, 2001g, figs.2I–L, as *Ampulladinium variabile*.

aiax Mantle, 2009b, p.113–114, pl.5, figs.8–11; text-figs.5A–B. Holotype: Mantle, 2009b, pl.5, fig.8. Age: Callovian.

"*minutispinosum*" Parker in Riding and Helby, 2001g, p.183. **Name not validly published:** no description. **Taxonomic senior synonym:** *Ampulladinium variabile*, according to Riding and Helby (2001g, p.183).

"*robustum*" Parker in Riding and Helby, 2001g, p.200. **Name not validly published:** no description. **Taxonomic senior synonym:** *Dissimulidinium purattense*, according to Riding and Helby (2001g, p.200).

**variabile* Riding, Helby and Parker in Riding and Helby, 2001g, p.183–184, figs.2A–P. Holotype: Riding and Helby, 2001g, figs.2I–L. Taxonomic junior synonym: *Ampulladinium minutispinosum* (name not validly published), according to Riding and Helby (2001g, p.183). Age: Tithonian.

ANDALUSIELLA Riegel, 1974, p.357. Emendations: Riegel and Sarjeant, 1982, p.287,289; Masure et al., 1996, p.172–173,177. Nomenclatural junior synonym: *Alterbia*, by implication in Lentin and Williams (1976, p.149), who illegitimately included the "type species" of the senior generic name *Andalusiella*, *Andalusiella mauthei*, in *Alterbia*. See discussion under *Alterbia*. Type: Riegel, 1974, pl.2, fig.4, as *Andalusiella mauthei*.

acicornuta Srivastava, 1995, p.264–265,268, pl.3, figs.1–6. Holotype: Srivastava, 1995, pl.3, figs.1–2. Age: Maastrichtian.

basita Slimani et al., 2012, p.349–350, fig.6G–K. Holotype: Slimani et al., 2012, fig.6G–I. Age: late Maastrichtian–early Danian.

dubia (Jain and Millepied, 1973, p.25, pl.2, figs.12–13) Lentin and Williams, 1980, p.41. Emendation: Masure et al., 1996, p.180, as *Andalusiella dubia*. Holotype: Jain and Millepied, 1973, pl.2, fig.13. Originally *Senegalinium*, subsequently *Deflandrea*, thirdly *Deflandrea*?, fourthly *Andalusiella*?, fifthly (and now) *Andalusiella*. Questionable assignment: Lentin and Williams (1980, p.41) — however, Masure et al. (1996, p.180) included the species in *Andalusiella* without question. Age: Maastrichtian.

gabonensis (Stover and Evitt, 1978, p.115) Wrenn and Hart, 1988, p.362. Holotype: Malloy, 1972, pl.1, fig.17, as *Svalbardella australina*. Originally *Palaeocystodinium*, subsequently (and now) *Andalusiella*. This species is based on material described by Malloy (1972, p.63, pl.1, fig.17 not pl.1, fig.20). Age: Maastrichtian.

inflata (Rauscher and Doubinger, 1982, p.104–105, pl.1, figs.13–17) Lentin and Williams, 1985, p.17. Holotype: Rauscher and Doubinger, 1982, pl.1, figs.13–15. Originally *Svalbardella*, subsequently (and now) *Andalusiella*. Age: Maastrichtian.

ivoirensis Masure et al., 1996, p.177,179–180, pl.1, figs.1–10; pl.2, figs.1–5; text-figs.3–4. Holotype: Masure et al., 1996, pl.1, figs.1–2; text-fig.3. Age: Maastrichtian.

"*laevigata*" (Malloy, 1972, p.64, pl.1, figs.1–7) Lentin and Williams, 1977b, p.8. Holotype: Malloy, 1972, pl.1, fig.5. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Andalusiella*, fourthly *Lejeunecysta*, fifthly (and now) *Senegalinium*. Taxonomic junior synonym: *Senegalinium psilatum*, according to Herngreen (1975, p.61). Age: Senonian.

**mauthei* Riegel, 1974, p.357–360, pl.2, figs.1–7; text-figs.5A–B,6A–B. Emendation: Riegel and Sarjeant, 1982, p.289, as *Andalusiella mauthei*. Holotype: Riegel, 1974, pl.2, fig.4; Riegel and Sarjeant, 1982, figs.1A–C,4A,5A; Fensome et al., 1995, figs.2,5–6 — p.1613. Originally (and now) *Andalusiella*, subsequently *Alterbia* (combination illegitimate). Taxonomic senior synonym: *Svalbardella* (now *Andalusiella*) *polymorpha*, according to Lentin and Williams (1976, p.50) — however, Lentin and Williams (1977b, p.8) retained *Andalusiella mauthei*. Although Masure et al. (1996, p.180) indicated that they were emending this species, no emendation was provided. Age: ?Senonian.

subsp. *aegyptiaca* (Schrank, 1988, p.131–132, pl.1, figs.1–6) Masure et al., 1996, p.180. Holotype: Schrank, 1988, pl.1, fig.1. Originally *Andalusiella polymorpha* subsp. *aegyptiaca*, subsequently (and now) *Andalusiella mauthei* subsp. *aegyptiaca*. Age: late Campanian.

subsp. *mauthei*. Autonym. Holotype: Riegel, 1974, pl.2, fig.4; Riegel and Sarjeant, 1982, figs.1A–C,4A,5A.

subsp. *punctata* (Jain and Millepied, 1973, p.29, pl.2, fig.24; pl.3, figs.26–28) Masure et al., 1996, p.180. Emendation: Masure et al., 1996, p.180–181, as *Andalusiella mauthei* subsp. *punctata*. Holotype: Jain and Millepied, 1973, pl.3, fig.27. Originally *Palaeocystodinium punctatum*, subsequently *Andalusiella polymorpha* subsp. *punctata*, thirdly (and now) *Andalusiella mauthei* subsp. *punctata*. Taxonomic senior synonym: *Svalbardella* (now *Andalusiella*) *polymorpha*, according to Lentin and Williams (1976, p.89) — however, Schrank (1987, p.265) retained this taxon as the subspecies *Andalusiella polymorpha* subsp. *punctata*. Jain and Millepied (1973, p.32 — figure caption) mislabelled the specimen illustrated in their pl.2, fig.24 as *Palaeocystodinium microgranulatum*. Age: Maastrichtian.

polymorpha (Malloy, 1972, p.63–64, pl.1, figs.8–16,21) Lentin and Williams, 1977b, p.8. Holotype: Malloy, 1972, pl.1, fig.15. Originally *Svalbardella*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Andalusiella*. Taxonomic junior synonyms: *Palaeocystodinium microgranulatum*, according to Lentin and Williams (1976, p.89); *Senegalinium trisinum*, according to Lentin and Williams (1976, p.164); *Palaeocystodinium punctatum*, according to Lentin and Williams (1976, p.89) — however, Schrank (1987, p.265) retained that taxon as the subspecies *Andalusiella polymorpha* subsp. *punctata*; *Andalusiella mauthei*, according to Lentin and Williams (1976, p.149) — however, Lentin and Williams (1977b, p.8) retained *Andalusiella mauthei*. Age: Maastrichtian.

"subsp. *aegyptiaca*" Schrank, 1988, p.131–132, pl.1, figs.1–6. Holotype: Schrank, 1988, pl.1, fig.1. **NOW** *Andalusiella mauthei* subsp. *aegyptiaca*. Originally *Andalusiella polymorpha* subsp. *aegyptiaca*, subsequently (and now) *Andalusiella mauthei* subsp. *aegyptiaca*. Age: late Campanian.

"subsp. *polymorpha*". Autonym. Holotype: Malloy, 1972, pl.1, fig.15. **Now redundant.**

"subsp. *punctata*" (Jain and Millepied, 1973, p.29, pl.2, fig.24; pl.3, figs.26–28) Schrank, 1987, p.265. Emendation: Masure et al., 1996, p.180–181, as *Andalusiella mauthei* subsp. *punctata*. Holotype: Jain and Millepied, 1973, pl.3, fig.27. **NOW** *Andalusiella mauthei* subsp. *punctata*. Originally *Palaeocystodinium punctatum*, subsequently *Andalusiella polymorpha* subsp. *punctata*, thirdly (and now) *Andalusiella mauthei* subsp. *punctata*. Taxonomic senior synonym: *Svalbardella* (now *Andalusiella*) *polymorpha*, according to Lentin and Williams (1976, p.89) — however, Schrank (1987, p.265) retained this taxon as the subspecies *Andalusiella polymorpha* subsp. *punctata*. Age: Maastrichtian.

rhombohedra (Benson, 1976, p.195, pl.9, figs.10–12) Stover and Evitt, 1978, p.95. Holotype: Benson, 1976, pl.9, figs.10–12. Originally *Deflandrea*, subsequently *Alterbia* (generic name illegitimate), thirdly (and now) *Andalusiella*. Age: early Paleocene.

rhomboides (Boltenhagen, 1977, p.106–107, pl.20, figs.1a–b,2a–b,3) Lentin and Williams, 1980, p.41. Emendation: Masure et al., 1996, p.182, as *Andalusiella rhomboides*. Holotype: Boltenhagen, 1977, pl.20, figs.1a–b. Originally *Svalbardella*, subsequently (and now) *Andalusiella*. Age: Campanian.

spicata (May, 1980, p.79, pl.9, figs.18–20) Lentin and Williams, 1981, p.13. Holotype: May, 1980, pl.9, fig.19. Originally *Deflandrea*, subsequently (and now) *Andalusiella*. Age: Campanian–Maastrichtian.

spinosa Guler et al., 2005, p.420–421, figs.4A–O. Holotype: Guler et al., 2005, figs.4I–J. Age: late Maastrichtian.

vozhennikovae (Boltenhagen, 1977, p.108, pl.19, figs.5a–c,6–7) Lentin and Williams, 1980, p.41. Emendation: Masure et al., 1996, p.182, as *Trithyrodinium vozhennikovae*. Holotype: Boltenhagen, 1977, pl.19, figs.5a–c. **NOW** *Trithyrodinium*. Originally *Svalbardella*, subsequently *Andalusiella*, thirdly (and now) *Trithyrodinium*. Age: Campanian.

"ANDREEDINIUM" Below, 1987a, p.112. **Taxonomic senior synonym:** *Phallocysta*, according to Riding (1994, p.13). Type: Below, 1987a, pl.22, figs.1–3,6,8, as *Andreedinium arcticum*.

"*arcticum" Below, 1987a, p.112–113, pl.22, figs.1–8; text-fig.64. Holotype: Below, 1987a, pl.22, figs.1–3,6,8; Fensome et al., 1993a, figs.1–3,5 — p.929. **NOW** *Phallocysta*. Originally *Andreedinium*, subsequently (and now) *Phallocysta*. Age: Toarcian.

elongatum (Beju, 1971, p.289–290, pl.3, figs.7–10; text-figs.6A–E) Feist-Burkhardt and Monteil in Feist-Burkhardt, 1990, p.615. Emendations: Feist-Burkhardt and Monteil, 1994, p.9, as *Andreedinium elongatum*; Riding, 1994, p.16, as *Phallocysta elongata*. Holotype: Beju, 1971, pl.3, fig.7; text-fig.6A. **NOW** *Phallocysta*. Originally *Fromea* (Appendix A), subsequently *Fromea?* (Appendix A), thirdly *Walloodinium*, fourthly *Palaeostomocystis* (Appendix A), fifthly *Andreedinium*, sixthly (and now) *Phallocysta*. Nomenclatural junior synonym: *Phallocysta minuta*; refer to that species for details. Taxonomic senior synonym: *Prismatocystis* (now *Walloodinium*) *cylindricum*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Andreedinium elongatum*. Taxonomic junior synonym: *Phallocysta subconica*, according to Riding (1994, p.16). Age: Bajocian–Oxfordian.

erregulense (Filatoff, 1975, p.90, pl.29, figs.12–14) Below, 1987a, p.112. Emendation: Stover and Helby, 1987a, p.111, as *Phallocysta erregulensis*, as a revised description. Holotype: Filatoff, 1975, pl.29, fig.14; Stover and Helby, 1987a, figs.11L–M. **NOW** *Phallocysta?*. Originally *Evansia*, subsequently *Evansia?*, thirdly *Phallocysta*, fourthly *Andreedinium*, fifthly (and now) *Phallocysta?*. Age: Bajocian.

"ANDRIELLA" Bolli 1974, p.845. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298). **Taxonomic senior synonym:** *Pithonella*, according to Wendler et al. (2013, p.1098). This name was casually introduced in running text and its validity might be in question under the I.C.N.; however, Elbrächter et al. (2008, p.1298) implied that it can be accepted as valid since it was proposed under the I.C.Z.N. Type: *Pithonella trejoi*.

"**trejoi*" (Bonet, 1956, p.459–461, pl.27, figs.1–part,2) Bolli 1974, p.845. Holotype: not designated. **NOW** *Pithonella*. Originally (and now) *Pithonella*, subsequently *Andriella*. Although no holotype was designated, Elbrächter et al. (2008, p.1298) implied that this name can be accepted as valid since it was proposed under the I.C.Z.N. Similarly, the combination *Andriella trejoi* was not accompanied by a basionym citation, but again Elbrächter et al. (2008, p.1298) implied that it can be accepted as valid since it was proposed under the I.C.Z.N. Age: late Albian–Turonian.

ANGUSTIDINIUM Goodman and Evitt, 1981, p.47–48. Taxonomic senior synonym: *Moesiodinium*, according to Below (1987a, p.129) — however, Lentin and Williams (1989, p.17) retained *Angustidinium*. Type: Davey and Verdier, 1971, pl.2, fig.10, as *Deflandrea acribes*.

**acribes* (Davey and Verdier, 1971, p.38–39, pl.2, figs.10,12) Goodman and Evitt, 1981, p.48. Emendation: Goodman and Evitt, 1981, p.48,50,52–53, as *Angustidinium acribes*. Holotype: Davey and Verdier, 1971, pl.2, fig.10; Fensome et al., 1993a, fig.1 — p.875. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Alterbia?* (combination illegitimate), fourthly (and now) *Angustidinium*, fifthly *Moesiodinium*. Lentin and Williams (1989, p.17) retained this species in *Angustidinium*. Age: early Albian.

vozhennikovae (Below, 1987a, p.130–131, pl.19, figs.1–10; text-figs.69a–f) Lentin and Williams, 1989, p.17. Holotype: Below, 1987a, pl.19, figs.1,4–6,8; Fensome et al., 1993a, figs.1,3–6 — p.1381. Originally *Moesiodinium*, subsequently (and now) *Angustidinium*. Age: late Volgian.

"**ANHYSTRICHOSPHERA**" Deflandre in West, 1961, p.452. **Name not validly published**: no description or validly published species. Williams et al. (1998, p.43, 654) incorrectly cited this name as "*Anhystrichosphaeridium*".

"**multiplex**" Deflandre in West, 1961, p.452. **Name not validly published**: no description or illustration. **NOW** *Impagidinium*. Originally *Anhystrichosphaera* (name not validly published), subsequently *Leptodinium*, thirdly (and now) *Impagidinium*. Age: early Pleistocene.

ANTHOSPHAERIDIUM Cookson and Eisenack, 1968, p.115. Fensome and Williams (2004) were incorrect in listing this as an acritarch genus. It's dinoflagellate affinity was confirmed by Schiøler and Wilson (1998, p323), who described an archeopyle for the type. Type: Cookson and Eisenack, 1968, fig.4A, as *Anthosphaeridium convolvuloides*.

**convolvuloides* Cookson and Eisenack, 1968, p.115, figs.4A–D. Holotype: Cookson and Eisenack, 1968, fig.4A. Age: Santonian–early Campanian.

APECTODINIUM (Costa and Downie, 1976, p.608) Lentin and Williams, 1977b, p.8. Emendation: Williams, Damassa, Fensome and Guerstein in Fensome et al., 2009, p.13–14, as *Apectodinium*. Originally *Wetzeliiella* subgenus *Apectodinium*, subsequently (and now) *Apectodinium*. Costa and Downie (1979, p.36) also proposed the elevation of this name to generic rank. Type: Deflandre and Cookson, 1955, pl.5, fig.7, as *Wetzeliiella homomorpha*.

africaense (Jan du Chêne and Adediran, 1985, p.30–31, pl.6, figs.5–6) Williams et al., 2015, p.300. Holotype: Jan du Chêne and Adediran, 1985, pl.6, fig.5. Originally *Wetzeliiella*, subsequently (and now) *Apectodinium*. Age: late Paleocene–early Eocene.

"*augustum*" (Harland, 1979c, p.63, pl.2, figs.13–15) Lentin and Williams, 1981, p.14. Holotype: Harland, 1979c, pl.2, fig.13. **NOW** *Axiodinium*. Originally *Wetzeliiella* subgenus *Apectodinium*, subsequently *Apectodinium*, thirdly (and now) *Axiodinium*. Age: latest Paleocene.

"*caiobense*" (Regali et al., 1974, p.290, pl.24, fig.4) Lentin and Williams, 1981, p.14. Holotype: Regali et al., 1974, pl.24, fig.4. Originally *Hystrichosphaeridium*, subsequently *Apectodinium*. **Taxonomic senior synonym:** *Wetziella* (now *Apectodinium*) *homomorpha*, according to Williams et al. (1993, p.57). Age: Paleocene.

capitulatum He Chengquan, 1991, p.89, pl.27, fig.15. Holotype: He Chengquan, 1991, pl.27, fig.15. Age: Paleocene.

cornufruticosum Islam, 1983c, p.82, pl.1, figs.5,8. Holotype: Islam, 1983c, pl.1, fig.5. Age: middle Eocene.

"*folliculum*" Islam, 1983b, p.336–337, pl.1, figs.8–9. Holotype: Islam, 1983b, pl.1, fig.8. **Taxonomic senior synonym:** *Wetziella* (now *Apectodinium*) *homomorpha*, according to Williams et al. (1993, p.57). Age: early-middle Eocene.

geometricum (Pastiels, 1948, p.41, pl.4, figs.1–11 ex Downie and Sarjeant, 1965, p.90) Fensome et al., 1990, p.617. Holotype: Pastiels, 1948, pl.4, fig.4. Originally *Hystrichosphaeridium geometricum* (name illegitimate), subsequently *Baltisphaeridium geometricum* (Appendix A), thirdly *Apectodinium pastielsii* (name illegitimate), fourthly *Apectodinium geometricum*. Nomenclatural junior synonym: *Apectodinium pastielsii*, which has the same type. Taxonomic junior synonym (at specific rank): *Wetziella homomorpha* var. *quinquelata* (as *Wetziella quinquelata*, now *Apectodinium quinquelatum*), by implication in Harland (1979c, p.67), who considered the latter to be the senior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. The name *Hystrichosphaeridium geometricum* Pastiels is an illegitimate junior homonym of *Hystrichosphaeridium geometricum* Deflandre, 1945a. By "transferring" Pastiels' species to *Baltisphaeridium*, Downie and Sarjeant (1965, p.90) created the valid and legitimate name *Baltisphaeridium geometricum* Pastiels, 1948 ex Downie and Sarjeant, 1965. The name *Apectodinium pastielsii* Lentin and Williams, 1989, is thus superfluous. Deflandre and Cookson (1955, p.254) identified the specimen illustrated in Pastiels (1948, pl.4, fig.8) as *Wetziella* (now *Apectodinium*) *homomorpha*. Age: Ypresian.

**homomorphum* (Deflandre and Cookson, 1955, p.254, pl.5, fig.7; text-fig.19, not text-figs.17–18 as indicated by Deflandre and Cookson, 1955, p.254) Lentin and Williams, 1977b, p.8. Emendation: Harland, 1979c, p.64, as *Apectodinium* *homomorphum*. Holotype: Deflandre and Cookson, 1955, pl.5, fig.7; text-fig.19; Eisenack and Klement, 1964, p.829; Fensome et al., 1995, figs.1–2 — p.1553. Originally *Wetziella*, subsequently *Wetziella* subgenus *Apectodinium*, thirdly (and now) *Apectodinium*. Taxonomic junior synonyms: *Hystrichosphaeridium* (as *Apectodinium*) *caiobense* and *Apectodinium* *folliculum*, both according to Williams et al. (1993, p.57). Costa and Downie (1976, p.608) designated this species as the type of *Wetziella* subgenus *Apectodinium*. See *Apectodinium pastielsii*. Age: early Eocene.

"subsp. *homomorphum*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.5, fig.7; text-fig.19; Eisenack and Klement, 1964, p.829; Fensome et al., 1995, figs.1–2 — p.1553. **Now redundant.** Originally *Wetziella homomorpha* subsp. *homomorpha*, subsequently *Apectodinium homomorphum* subsp. *homomorphum*.

"subsp. *quinquelatum*" (Williams and Downie, 1966b, p.191–192, pl.18, fig.7) Lentin and Williams, 1977b, p.8. Holotype: Williams and Downie, 1966b, pl.18, fig.7. **NOW** *Apectodinium quinquelatum*. Originally *Wetziella homomorpha* var. *quinquelata*, subsequently *Wetziella homomorpha* subsp. *quinquelata*, thirdly *Apectodinium homomorphum* subsp. *quinquelatum*, fourthly *Wetziella quinquelata*, fifthly (and now) *Apectodinium quinquelatum*. Taxonomic senior synonym (at specific rank): *Hystrichosphaeridium* (now *Apectodinium*) *geometricum*, by implication in Harland (1979c, p.67), who considered the latter to be the junior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. Age: early Eocene.

"subsp. *tesselatum*" Châteauneuf and Gruas-Cavagnetto, 1978, p.65–66, pl.1, figs.1–2. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.1, figs.1–2. **NOW** *Axiodinium tessellatum*. Originally *Apectodinium homomorphum* subsp. *tesselatum*, subsequently *Wilsonidium tessellatum*, thirdly (and now) *Axiodinium tessellatum*. Age: early Eocene.

hyperacanthum (Cookson and Eisenack, 1965b, p.134–135, pl.16, figs.3–6) Lentin and Williams, 1977b, p.8. Holotype: Cookson and Eisenack, 1965b, pl.16, fig.5. Originally *Wetzeliella*, subsequently *Wetzeliella* subgenus *Apectodinium*, thirdly (and now) *Apectodinium*. Costa and Downie (1976, p.609) assigned this species to *Wetzeliella* subgenus *Apectodinium*. Age: Paleocene.

longispinosum (Wilson, 1968, p.59–60, figs.1–10) Bujak and Davies, 1983, p.162. Holotype: Wilson, 1968, fig.4. Originally *Deflandrea*, subsequently *Wetzeliella*, thirdly (and now) *Apectodinium*. Age: Paleocene or early Eocene.

paniculatum (Costa and Downie, 1976, p.608–609, pl.92, fig.1) Lentin and Williams, 1977b, p.9. Holotype: Costa and Downie, 1976, pl.92, fig.1. Originally *Wetzeliella*, subsequently (and now) *Apectodinium*. Taxonomic junior synonym: *Fibrocyta variabilis*, according to Garg et al. (1995, p.364). Age: early Eocene.

paradoxum He Chengquan, 1991, p.90, pl.27, figs.13–14; text-fig.10. Holotype: He Chengquan, 1991, pl.27, fig.14. Age: Paleocene.

parvum (Alberti, 1961, p.8–9, pl.1, figs.14–18; pl.12, figs.10–12) Lentin and Williams, 1977b, p.9. Emendation: Harland, 1979c, p.65–66, as *Apectodinium parvum*. Holotype: Alberti, 1961, pl.1, fig.14. Originally *Wetzeliella*, subsequently *Wetzeliella* subgenus *Apectodinium*, thirdly (and now) *Apectodinium*. Costa and Downie (1976, p.609) assigned this species to *Wetzeliella* subgenus *Apectodinium*. Age: late Paleocene–early Eocene.

"pastsielsii" Lentin and Williams, 1989, p.18. Holotype: Pastsiels, 1948, pl.4, fig.4. **Name illegitimate — nomenclatural senior synonym:** *Baltisphaeridium* (now *Apectodinium*) *geometricum* Pastsiels, 1948 ex Downie and Sarjeant, 1965, which has the same holotype. This was proposed as a substitute name for *Hystrichosphaeridium geometricum* Pastsiels, 1948, p.41, pl.4, figs.1–11. Originally *Hystrichosphaeridium geometricum* (name illegitimate), subsequently *Baltisphaeridium geometricum* (Appendix A), thirdly *Apectodinium pastielsii* (name illegitimate), fourthly *Apectodinium geometricum*. According to Lentin and Williams (1989, p.18): "When Deflandre and Cookson (1955) created the species *Wetzeliella homomorpha* they placed *Hystrichosphaeridium geometricum* Pastsiels in the synonymy and referred to 'Pastsiels, 1945 pars.' but did not expressly include the holotype (Pastsiels, 1948, pl.4, fig.4). By selecting a holotype for *Wetzeliella homomorpha* from their own material they created a new species, not a new name, as was assumed in previous issues of this index." Hence, Lentin and Williams (1989, p.18) proposed *Apectodinium pastielsii* as a new name. However, Fensome et al. (1990, p.617) noted that "... *Hystrichosphaeridium geometricum* Pastsiels, is an illegitimate junior homonym of *Hystrichosphaeridium geometricum* Deflandre, 1945[a]. By 'transferring' Pastsiels' species to *Baltisphaeridium*, Downie and Sarjeant (1965, [p.40]) created the valid and legitimate name *Baltisphaeridium geometricum* Pastsiels ex Downie and Sarjeant. The name *Apectodinium pastielsii* is thus superfluous." Age: Eocene.

quinquelatum (Williams and Downie, 1966b, p.191–192, pl.18, fig.7) Costa and Downie, 1979, p.43. Holotype: Williams and Downie, 1966b, pl.18, fig.7. Originally *Wetzeliella homomorpha* var. *quinquelata*, subsequently *Wetzeliella homomorpha* subsp. *quinquelata*, thirdly *Apectodinium homomorphum* subsp. *quinquelatum*, fourthly *Wetzeliella quinquelata*, fifthly (and now) *Apectodinium quinquelatum*. Taxonomic senior synonym (at specific rank): *Hystrichosphaeridium* (now *Apectodinium*) *geometricum*, by implication in Harland (1979c, p.67), who considered the latter to be the junior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. Age: early Eocene.

rarityformium Shaw Chenglong, 1999a, p.36, figs.11–13. Holotype: Shaw Chenglong, 1999a, figs.11–13. Age: Eocene.

summissum (Harland, 1979c, p.66–67, pl.1, fig.12) Lentin and Williams, 1981, p.14. Holotype: Harland, 1979c, pl.1, fig.12. Originally *Wetzeliella* subgenus *Apectodinium*, subsequently (and now) *Apectodinium*, thirdly *Krutzschidinium* (combination not validly published). Strauss (1991a, p.57) considered this species to be the possible senior synonym of *Krutzschidinium spinosum*. Age: late Paleocene.

"verrucosum" (Oleinik, 1976, p.85, pl.1, figs.1–3) Lentin and Williams, 1981, p.14. Holotype: Oleinik, 1976, pl.1, fig.1. **NOW** *Apteodinium*. Originally (and now) *Apteodinium*, subsequently *Apectodinium*. This name was erroneously listed in *Apectodinium* by Lentin and Williams (1981, p.14); in the same publication, Lentin and Williams (1981, p.17) correctly listed it as a species of *Apteodinium*. Age: late Eocene.

?*williereae* (Boltenhagen, 1977, p.42–43, pl.3, figs.3a–b,4–6) Lentin and Williams, 1981, p.14. Holotype: Boltenhagen, 1977, pl.3, figs.3a–b. Originally *Polysphaeridium*, subsequently (and now) *Apectodinium*?. Questionable assignment: Lentin and Williams (1981, p.14). Age: Paleocene.

"*APICULADINIUM*" Yu Jingxian et al., 1981, p.261–262. **Taxonomic senior synonym:** *Laciniadinium*, according to He Chengquan et al. (2009, p.386). Chen et al. (1988, p.6) considered *Bellatudinium* to be a possible taxonomic synonym of this genus. Type: Yu Jingxian et al., 1981, pl.1, fig.36, as *Apiculadinium ovatum*.

"**ovatum*" Yu Jingxian et al., 1981, p.262, pl.1, figs.19,28,32,35–37; text-fig.3. Holotype: Yu Jingxian et al., 1981, pl.1, fig.36. **NOW** *Laciniadinium*. Originally *Apiculadinium*, subsequently (and now) *Laciniadinium*. Age: Late Cretaceous.

APROBOLOCYSTA Duxbury, 1977, p.52. Emendations: Duxbury, 1980, p.112; Mehrotra and Sarjeant, 1986, p.721; Pourtoy, 1988, p.386,388; Pestchevitskaya, 2006, p.S639,641. Taxonomic senior synonym: *Necrobroomea*, according to Below (1990, p.52) — however, Lentin and Williams (1993, p.31) retained *Aprobolocysta*. Stover and Williams (1987, p.19) considered Davey's (1982b, p.21) treatment of *Aprobolocysta* to be an emendation. Type: Duxbury, 1977, pl.14, figs.4–5; text-fig.19B, as *Aprobolocysta eilema*.

alata Backhouse, 1987, p.211–212, figs.5A–D,9A–D. Holotype: Backhouse, 1987, figs.5A–B,9A–B; Fensome et al., 1996, figs.1–2,5–6 — p.2019. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Lentin and Williams (1993, p.31) retained this species in *Aprobolocysta*. Age: middle Hauterivian–early Barremian.

?*arguta* Yu Jingxian, 1982, p.238, pl.1, fig.4. Holotype: Yu Jingxian, 1982, pl.1, fig.4. Originally *Aprobolocysta*, subsequently (and now) *Aprobolocysta*?. Questionable assignment: Stover and Williams (1987, p.19). Age: Late Jurassic–Early Cretaceous.

bipartita Backhouse, 1987, p.212, figs.9E–H. Holotype: Backhouse, 1987, figs.9E–F; Fensome et al., 1996, figs.1–2 — p.2067. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Lentin and Williams (1993, p.31) retained this species in *Aprobolocysta*. Age: middle Hauterivian.

cornuta Pestchevitskaya, 2006, p.S642, pl. 7, fig.16; text-fig.3D. Holotype: Pestchevitskaya, 2006, pl.7, fig.16. Age: late Hauterivian–early Barremian.

**eilema* Duxbury, 1977, p.52–53, pl.14, figs.4–5,8; text-figs.19A–B. Holotype: Duxbury, 1977, pl.14, figs.4–5; text-fig.19B; Pourtoy, 1988, pl.3, figs.1–3,5–6; Fensome et al., 1993a, figs.1–2,5 — p.1139. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Lentin and Williams (1993, p.31) retained this species in *Aprobolocysta*. N.I.A. Age: late Hauterivian.

extrema Duxbury, 2001, p.99, fig.2, nos.1–4. Holotype: Duxbury, 2001, fig.2, no.1. Age: early Valanginian.

galeata Backhouse, 1987, p.212, figs.9I–L. Holotype: Backhouse, 1987, figs.9I–J; Fensome et al., 1996, figs.1–2 — p.2135. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Lentin and Williams (1993, p.31) retained this species in *Aprobolocysta*. Age: Valanginian–earliest Hauterivian.

neista Duxbury, 1980, p.112–113, pl.2, figs.8–9; text-fig.5. Holotype: Duxbury, 1980, pl.2, figs.8–9; text-fig.5; Pourtoy, 1988, pl.4, figs.4–5,7–9. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Lentin and Williams (1993, p.31) retained this species in *Aprobolocysta*. Duxbury (1980) cited the epithet as "*neistosa*" but indicated that it was based on the Greek adjective "*neistos*". According to the I.C.N., taxon names are to be treated as Latin; thus under Article 60.12, this epithet should be rendered as "*neista*", in agreement with the feminine gender of the generic name. The neuter form would be "*neistum*" and the masculine form "*neistus*". Age: Barremian.

pustulosa Smith and Harding, 2004, p.359,361,363, pl.1, figs.1,2,9–11. Holotype: Smith and Harding, 2004, pl.1, figs.1–2. Age: earliest Valanginian.

trycheria Pourtoy, 1988, p.388–389, pl.1, figs.1–6,8; pl.5, figs.1–2,5,9. Holotype: Pourtoy, 1988, pl.1, figs.1–3. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Lentin and Williams (1993, p.31) retained this species in *Aprobolocysta*. Age: late Valanginian.

"?*varigranosa*" Duxbury, 1977, p.53–54, pl.14, figs.6–7; text-figs.20a–b. Holotype: Duxbury, 1977, pl.14, fig.6; text-fig.20b; Pourtoy, 1988, pl.2, figs.1–2. Originally *Aprobolocysta*, subsequently *Batioladinium*, thirdly *Aprobolocysta*?. Questionable assignment: Lentin and Vozzhennikova (1990, p.82). **Taxonomic senior synonym:** *Batioladinium*? (as *Necrobroomea*) *gochtii*, according to Below (1990, p.53). Age: early Valanginian–early Hauterivian.

APTEA Eisenack, 1958a, p.393. Emendations: Davey and Verdier, 1974, p.640–641; Dörhöfer and Davies, 1980, p.33. Taxonomic senior synonym: *Pseudoceratium*, according to Bint (1986, p.144) — however, Quattrocchio and Sarjeant (1992, p.2–234) retained *Aptea*. Taxonomic junior synonym: *Doidyx*, according to Sarjeant and Stover (1978, p.51). Type: Eisenack, 1958a, pl.22, fig.5, as *Aptea polymorpha*.

"*almohadensis*" Below, 1984, p.635, pl.1, figs.5A–B,6–7. Holotype: Below, 1984, pl.1, figs.5A–B. **NOW** *Pseudoceratium*. Originally *Aptea*, subsequently (and now) *Pseudoceratium*. Age: middle-late Aptian.

"*anaphrissa*" (Sarjeant, 1966c, p.206, pl.22, fig.8; pl.23, fig.6; text-fig.55) Sarjeant and Stover, 1978, p.51. Emendation: Harding, 1990b, p.17–18, as *Pseudoceratium anaphrissum*. Holotype: Sarjeant, 1966c, pl.22, fig.8; text-fig.55. **NOW** *Pseudoceratium*. Originally *Doidyx*, subsequently *Tenua* Eisenack, thirdly *Aptea*, fourthly (and now) *Pseudoceratium*. Age: early Barremian.

"*attadalica*" (Cookson and Eisenack, 1962b, p.495, pl.5, figs.12–15) Davey and Verdier, 1974, p.643. Holotype: Cookson and Eisenack, 1962b, pl.5, fig.13. **NOW** *Circulodinium*. Originally *Cyclonephelium*?, subsequently *Aptea*, thirdly *Canningia*, fourthly (and now) *Circulodinium*. Age: Aptian–Albian.

"*eisenackii*" (Davey, 1969a, p.170–171, pl.8, figs.3–4; pl.9, fig.4; text-figs.16a–b) Davey and Verdier, 1974, p.643. Holotype: Davey, 1969a, pl.8, fig.4. **NOW** *Pseudoceratium*. Originally *Cyclonephelium*, subsequently *Aptea*, thirdly (and now) *Pseudoceratium*. Taxonomic senior synonym: *Aptea polymorpha*, according to Cookson and Eisenack (1974, p.74) — however, Below (1981a, p.7) retained *Aptea eisenackii*. Age: late Albian.

notialis Quattrocchio and Sarjeant, 1992, p.83 (al. 2–235), pl.5, figs.1–4; pl.7, figs.7–8. Holotype: Quattrocchio and Sarjeant, 1992, pl.5, fig.1. Age: middle-late Tithonian.

"*plera*" Duxbury, 1983, p.22,25, pl.1, figs.7–8,11; pl.10, fig.3; text-figs.5–6. Holotype: Duxbury, 1983, pl.1, fig.7. **NOW** *Pseudoceratium*. Originally *Aptea*, subsequently (and now) *Pseudoceratium*. Age: early Aptian.

**polymorpha* Eisenack, 1958a, p.394, pl.22, figs.5–12; pl.24, fig.5. Emendation: Dörhöfer and Davies, 1980, p.34–36, as *Aptea polymorpha*. Holotype: Eisenack, 1958a, pl.22, fig.5; Sarjeant, 1985a, pl.7, fig.4. Originally (and now) *Aptea*, subsequently *Pseudoceratium*. By retaining *Aptea*, Quattrocchio and Sarjeant (1992, p.2–234) effectively retained *Aptea polymorpha*, the "type species", as a species of *Aptea*. Taxonomic junior synonym: *Aptea* (now *Pseudoceratium*) *eisenackii*, according to Cookson and Eisenack (1974, p.74) — however, Below (1981a, p.7) retained *Aptea eisenackii*. Age: Aptian.

"*rugulosa*" Clarke and Verdier, 1967, p.57–58, pl.12, figs.5–6; text-fig.23. Holotype: Clarke and Verdier, 1967, pl.12, fig.6. **NOW** *Canningia*. Originally *Aptea*, subsequently (and now) *Canningia*. Age: Santonian.

"*securigera*" Davey and Verdier, 1974, p.642–643, pl.91, figs.2–3; text-fig.5(vii). Holotype: Davey and Verdier, 1974, pl.91, fig.3. **NOW** *Pseudoceratium*. Originally *Aptea*, subsequently (and now) *Pseudoceratium*. Age: early Aptian.

APTEODINIUM Eisenack, 1958a, p.385. Emendations: Sarjeant, 1985a, p.78; Lucas-Clark, 1987, p.168,170. Taxonomic junior synonyms: *Archeotectatum*, *Coniferatum*, *Dodekovia* and *Emslandia*, all according to Stover and Evitt (1978, p.141–142) — however, Prauss (1989, p.18) retained *Dodekovia* and Lentin and Williams (1981, p.18; 1989, p.24) retained *Archeotectatum*. Riding and Fensome (2003, p.19) considered that *Aldorfia* may be a junior synonym of *Apteodinium*. Type: Eisenack, 1958a, pl.23, fig.9, as *Apteodinium granulatum*.

?*albertii* Lentin and Williams, 1981, p.15. Holotype: Alberti, 1961, pl.4, fig.16. Originally *Pareodinia spinosa*, subsequently *Apteodinium? spinosum* (combination illegitimate), thirdly (and now) *Apteodinium? albertii*. Questionable assignment: Stover and Evitt (1978, p.142). Substitute name for *Apteodinium spinosum* (Alberti, 1961, p.24, pl.4, fig.16) Stover and Evitt, 1978, p.142 (an illegitimate name). Age: late Barremian.

apiatum McIntyre and Brideaux, 1980, p.11–12, pl.2, figs.1–7. Holotype: McIntyre and Brideaux, 1980, pl.2, figs.1–2; Jan du Chêne et al., 1986a, pl.13, figs.7–8. Age: early-middle Valanginian.

australiense (Deflandre and Cookson, 1955, p.248, pl.5, fig.1) Williams, 1978, p.794. Holotype: Deflandre and Cookson, 1955, pl.5, fig.1. Originally *Gymnodinium* (Appendix B), subsequently *Emslandia* (combination not validly published), thirdly *Scrinioidinium*, fourthly (and now) *Apteodinium*. Taxonomic junior synonym: *Emslandia crassimurata*, according to Lucas-Clark (1987, p.174). Age: middle Miocene.

blandum Yu Jingxian, 1982, p.244, pl.1, fig.15. Holotype: Yu Jingxian, 1982, pl.1, fig.15. Age: Late Jurassic–Early Cretaceous.

bucculiatum Davies, 1983, p.20, pl.4, figs.13–18; text-fig.15. Holotype: Davies, 1983, pl.4, figs.13–14; Jan du Chêne et al., 1986a, pl.150, fig.19. Age: Callovian–Oxfordian.

"*ciliatum*" Gocht, 1959, p.65, pl.8, figs.5–6. Holotype: Gocht, 1959, pl.8, fig.5. **NOW** *Trichodinium*. Originally *Apteodinium*, subsequently (and now) *Trichodinium*. Taxonomic junior synonym: *Trichodinium castanea*, by implication in Clarke and Verdier (1967, p.19), who believed *Trichodinium castanea* to be the senior name — however, Harding (1990b, p.38) retained the two species. Age: late Hauterivian.

cingulatum He Chengquan, 1991, p.110–111, pl.3, figs.17–20; text-figs.15a–b. Holotype: He Chengquan, 1991, pl.3, fig.19. Age: Cenomanian.

"*comptum*" (Duxbury, 1980, p.122–123, pl.2, figs.1–2,4) Helenes, 1984, p.132. Holotype: Duxbury, 1980, pl.2, figs.1–2,4; Jan du Chêne et al., 1986a, pl.10, figs.9–10. Originally *Gonyaulacysta*, subsequently *Cribroperidinium*, thirdly *Acanthaulax*, fourthly *Apteodinium*. **Taxonomic senior synonym:** *Millioudodinium* (now *Cribroperidinium spinoreticulatum*, according to Lucas-Clark (1987, p.178). Age: middle-late Barremian.

confusum (Vozzhennikova, 1967, p.80, pl.17, figs.1a–b; pl.25, figs.4–5; pl.27, figs.3–4) Helenes, 1984, p.132. Holotype: Vozzhennikova, 1967, pl.25, fig.5, lost according to Lentin and Vozzhennikova (1990, p.93). Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Apteodinium*. Lentin and Vozzhennikova (1990, p.93–94) retained this species in *Apteodinium*. According to Lentin and Vozzhennikova (1990, p.93), no potential lectotype is available. Lentin and Williams (1989, p.20) recommended that this name be restricted to the holotype. Age: Late Jurassic.

conicum He Chengquan, 1991, p.111, pl.4, figs.1–6. Holotype: He Chengquan, 1991, pl.4, fig.6. Age: Cenomanian–Turonian.

"*conjunctum*" Eisenack and Cookson, 1960, p.5, pl.1, figs.7–8. Holotype: Eisenack and Cookson, 1960, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.33, figs.7–9. Originally *Apteodinium*, subsequently *Cribroperidinium*. **Taxonomic senior synonym:** *Apteodinium maculatum*, according to Backhouse (1988, p.74). Age: Aptian.

cornutum Cookson and Eisenack, 1974, p.51, pl.24, fig.9. Holotype: Cookson and Eisenack, 1974, pl.24, fig.9; Jan du Chêne et al., 1986a, pl.14, figs.1–4. Age: Paleocene.

corticatum (Norris and Jux, 1984, p.162–163, pl.2, figs.5–16; pl.3, figs.6–7; pl.6, figs.1–5) Lucas-Clark, 1987, p.176. Holotype: Norris and Jux, 1984, pl.2, figs.7–8. Originally *Aldorfia*, subsequently (and now) *Apteodinium*. Age: late Kimmeridgian–Portlandian.

crassum Slimani and Louwye, 2013, p.13, pl.1, figs.1–16. Holotype: Slimani and Louwye, 2013, pl.1, figs.1–4. Age: late Campanian.

?*cribrosum* Cookson and Eisenack, 1968, p.112, fig.1L. Holotype: Cookson and Eisenack, 1968, fig.1L; Jan du Chêne et al., 1986a, pl.14, fig.5. Originally *Apteodinium*, subsequently (and now) *Apteodinium*?. Questionable assignment: Stover and Evitt (1978, p.142). Age: Santonian or early Campanian.

daveyi Poulsen, 1996, p.70–71, pl.13, figs.1–4. Holotype: Poulsen, 1996, pl.13, figs.1–3. Age: latest Jurassic–earliest Cretaceous.

deflandrei (Clarke and Verdier, 1967, p.26–28, pl.3, figs.10–12; text-fig.10) Lucas-Clark, 1987, p.172. Emendation: Lucas-Clark, 1987, p.172–173, as *Apteodinium deflandrei*. Holotype: Clarke and Verdier, 1967, pl.3, fig.10; Jan du Chêne et al., 1986a, pl.8, figs.10–11. Originally *Gardodinium*, subsequently *Aldorfia*, thirdly (and now) *Apteodinium*. Age: Cenomanian–Santonian.

delicatum (Davey, 1975, p.156–157, pl.2, figs.8–9,11–12) Schrank, 1987, p.262. Holotype: Davey, 1975, pl.2, fig.8. Originally *Trichodinium*, subsequently (and now) *Apteodinium*. Age: Senonian (?Campanian).

donghaiense He Chengquan and Wang Kede, 1990, p.409–410,422–423, pl.1, figs.17–19. Holotype: He Chengquan and Wang Kede, 1990, pl.1, fig.18. Age: early Eocene.

ellipticum He Chengquan et al. 2005a, p.246–247; pl.19, figs.1–7. Holotype: He Chengquan et al. 2005a, pl.19, fig.2. Age: Late Jurassic.

emslandense (Gerlach, 1961, p.172–173, pl.26, figs.13–14) Stover and Evitt, 1978, p.141. Emendation: Benedek and Sarjeant, 1981, p.316–318, as *Apteodinium emslandense*. Holotype: Gerlach, 1961, pl.26, fig.13; Benedek and Sarjeant, 1981, fig.1, no.1; Jan du Chêne et al., 1986a, pl.10, figs.17–19. Originally *Emslandia*, subsequently (and now) *Apteodinium*. Age: middle Oligocene–middle Miocene.

fallax (Morgenroth, 1968, p.535–536, pl.41, figs.4–6) Stover and Evitt, 1978, p.142. Holotype: Morgenroth, 1968, pl.41, figs.4–5. Originally *Gonyaulacysta*, subsequently (and now) *Apteodinium*. Age: Danian.

?*foveolatum* (Sütő-Szentai, 1982a, p.211–212,219, pl.2, figs.1–5) Lentin and Williams, 1989, p.21. Holotype: Sütő-Szentai, 1982a, pl.2, fig.1. Originally *Millioudodinium*, subsequently (and now) *Apteodinium*?. Questionable assignment: Lentin and Williams (1989, p.21). Age: late Miocene.

frontierense (Burgess, 1971, p.81, pl.1, figs.6,9; text-fig.13) Stover and Evitt, 1978, p.142. Holotype: Burgess, 1971, pl.1, fig.9; Jan du Chêne et al., 1986a, pl.15, figs.1–6. Originally *Coniferatium*, subsequently (and now) *Apteodinium*. Age: Albian–early Cenomanian.

gerasimovii Iosifova, 1996, p.207,209, pl.3, figs.4a–b,6. Holotype: Iosifova, 1996, pl.3, figs.4a–b. Age: Ryazanian.

"*gottisii*" (Dupin, 1968, p.4, pl.1, figs.7–12) Helenes, 1984, p.134. Holotype: Dupin, 1968, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.12, fig.11 and pl.94, figs.9–10. Originally *Gonyaulacysta*, subsequently *Millioudodinium*?, thirdly *Apteodinium*. **Taxonomic senior synonym:** *Gonyaulax* (now *Rhynchodiniopsis*) *cladophora*, according to Jan du Chêne et al. (1986a, p.48) and Jan du Chêne and Fauconnier (1986, p.55). Age: Late Jurassic.

"*grande*" Cookson and Hughes, 1964, p.52, pl.6, figs.8–9. Holotype: Cookson and Hughes, 1964, pl.6, fig.9; Jan du Chêne et al., 1986a, pl.13, fig.5. **NOW** *Apteodinium maculatum* subsp. *grande*. Originally *Apteodinium grande*, subsequently (and now) *Apteodinium maculatum* subsp. *grande*. Age: late Albian–early Cenomanian.

granorugosum He Chengquan, 1991, p.111, pl.5, figs.34–35. Holotype: He Chengquan, 1991, pl.5, fig.34. Age: middle-late Eocene.

***granulatum** Eisenack, 1958a, p.386–387, pl.23, figs.8–14. Emendations: Sarjeant, 1985a, p.79–81,83; Lucas-Clark, 1987, p.170,172. Holotype: Eisenack, 1958a, pl.23, fig.9; Jan du Chêne et al., 1986a, pl.10, figs.1–2. Taxonomic junior synonym: *Apteodinium thelium*, according to Jan du Chêne et al. (1986a, p.46) — however, Sarjeant in Lentin and Williams (1989, p.21) retained *Apteodinium thelium*. Age: Aptian.

granuliferum Iosifova, 1996, p.209,211, pl.13, figs.3a–b; pl.15, figs.6a–c; pl.18, figs.2a–c. Holotype: Iosifova, 1996, pl.18, figs.2a–c. Age: Ryazanian–?Hauterivian.

helicoides He Chengquan, 1991, p.111–112, pl.3, figs.21–25. Holotype: He Chengquan, 1991, pl.3, fig.22. Age: middle-late Eocene.

?**indicosum** (Brideaux, 1971, p.83) Stover and Evitt, 1978, p.142. Holotype: Singh, 1964, pl.18, figs.2–3. Originally *Palaeoperidinium granulatum* Singh (name not validly published), subsequently *Gonyaulacysta indicosa*, thirdly (and now) *Apteodinium? indicosum*. Questionable assignment: Stover and Evitt (1978, p.142). *Gonyaulacysta indicosa* is the substitute name for *Palaeoperidinium granulatum* Singh, 1964, p.135, pl.18, figs.2–3 (name not validly published); the name *Apteodinium granulatum* is preoccupied. The name *Palaeoperidinium granulatum* Singh 1964 was not validly published since the generic name *Palaeoperidinium* was not validly published until 1967. Age: middle-late Albian.

maculatum Eisenack and Cookson, 1960, p.4–5 pl.2, figs.1–3. Holotype: Eisenack and Cookson, 1960, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.14, figs.6–7. Taxonomic junior synonym: *Cribooperidinium conjunctum*, according to Backhouse (1988, p.74). Age: Aptian–Albian.

subsp. **grande** (Cookson and Hughes, 1964, p.52, pl.6, figs.8–9) Below, 1981a, p.25. Holotype: Cookson and Hughes, 1964, pl.6, fig.9; Jan du Chêne et al., 1986a, pl.13, fig.5. Originally *Apteodinium grande*, subsequently (and now) *Apteodinium maculatum* subsp. *grande*. Lentin and Williams (1989, p.21) retained this taxon as a subspecies of *Apteodinium maculatum*. Age: late Albian–early Cenomanian.

subsp. **maculatum**. Autonym. Holotype: Eisenack and Cookson, 1960, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.14, figs.6–7.

mecsekense (Nagy, 1969, p.292, pl.1, figs.6,8) Helenes, 1984, p.132. Holotype: Nagy, 1969, pl.1, figs.6,8; Jan du Chêne et al., 1986a, pl.11, figs.10–12. Originally *Palaeoperidinium*, subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly (and now) *Apteodinium*. Age: late Miocene.

?**micracanthum** Cookson and Eisenack, 1974, p.51–52, pl.25, figs.2–3. Holotype: Cookson and Eisenack, 1974, pl.25, fig.3. Originally *Apteodinium*, subsequently (and now) *Apteodinium?*. Questionable assignment: Stover and Evitt (1978, p.142), as a problematic species. Age: Albian–Senonian.

microceratum Cookson and Eisenack, 1982, p.26, pl.1, fig.2. Holotype: Cookson and Eisenack, 1982, pl.1, fig.2. Age: latest Turonian–Coniacian.

minimum Yu Jingxian, 1989, p.125, pl.59, figs.5–6. Holotype: Yu Jingxian, 1989, pl.59, fig.6. Age: late Eocene.

minus He Chengquan, 1991, p.112, pl.4, figs.7–10. Holotype: He Chengquan, 1991, pl.4, fig.10. Age: late Eocene.

?**monacanthum** (Deflandre, 1936b, p.176–177, pl.5, fig.10 ex Sarjeant, 1967b, p.252) Helenes, 1984, p.134. Holotype: Deflandre, 1935, pl.6, fig.1; Deflandre, 1936b, pl.5, fig.10; lost according to Jan du Chêne et al. (1986a, p.48). Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Apteodinium*, fifthly (and now) *Apteodinium?*. Questionable assignment: Jan du Chêne et al. (1986a, p.48), as a problematic species. Jan du Chêne et al. (1986a, p.48) recommended that the name be restricted to the holotype. The name *Palaeoperidinium monacanthum* was not validly published in Deflandre (1935) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.49)

accepted Sarjeant's (1967b) indirect reference to Deflandre (1935) as indication of a type (I.C.N. Article 40.1). Age: Late Cretaceous.

nanhaicum He Chengquan and Li Peng, 1981, p.61–62, pl.31, figs.10–12. Holotype: He Chengquan and Li Peng, 1981, pl.31, fig.10. Age: late Oligocene.

"nuciforme" (Deflandre, 1939a, p.180, pl.8, figs.4–6 ex Sarjeant, 1962a, p.482–483, pl.69, fig.6; text-fig.4) Stover and Evitt, 1978, p.142. Holotype: Deflandre, 1939a, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.11, figs.1–3. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulax* (Appendix B), thirdly *Gonyaulacysta*, fourthly *Apteodinium*, fifthly *Millioudodinium*, sixthly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Palaeoperidinium nuciformoides*, according to Sarjeant (1968, p.227). Age: Oxfordian.

palliatum Stevens, 1987, p.185–186, figs.3A–G. Holotype: Stevens, 1987, figs.3A–B; Fensome et al., 1996, figs.1–2 — p.2261. Age: early Berriasian.

reticulatum Singh, 1971, p.312, pl.47, figs.1–4. Holotype: Singh, 1971, pl.47, figs.1–2; Jan du Chêne et al., 1986a, pl.13, figs.3–4. Junior homonym: *Apteodinium reticulatum* Yu Jingxian, 1982. Age: late Albian.

"reticulatum" Yu Jingxian, 1982, p.244, pl.1, figs.13–14. Holotype: Yu Jingxian, 1982, pl.1, fig.14. **Name illegitimate** — **senior homonym:** *Apteodinium reticulatum* Singh, 1971. **Substitute name:** *Apteodinium suibinense*. Originally *Apteodinium reticulatum* (name illegitimate), subsequently (and now) *Apteodinium suibinense*. Age: Late Jurassic–Early Cretaceous.

rhombiforme He Chengquan, 1991, p.112, pl.3, figs.1–2. Holotype: He Chengquan, 1991, pl.3, fig.1. This name was not validly published in He Chengquan and Wang Kede (1990, p.410), who gave the citation "*Apteodinium rhombiforme* He". Age: Paleocene–Eocene.

"sarjeantii" (Habib, 1972, p.376, pl.5, figs.3–4) Stover and Evitt, 1978, p.142. Holotype: Habib, 1972, pl.5, fig.3; Fensome et al., 1995, fig.1 — p.1763. **NOW** *Archeotectatum*. Originally (and now) *Archeotectatum*, subsequently *Apteodinium*. Age: Oxfordian–Kimmeridgian.

"senegalense" Stover and Evitt, 1978, p.142. Holotype: Jain and Millepied, 1975, pl.2, fig.27; Jan du Chêne et al., 1986a, pl.12, figs.8–10. **Name illegitimate** — **nomenclatural senior synonym:** *Apteodinium spinosum* Jain and Millepied, 1975, which has the same holotype. Age: Aptian–Albian.

sparsum He Chengquan, 1991, p.112–113; pl.5, fig.36; text-fig.16. Holotype: He Chengquan, 1991, pl.5, fig.36; text-fig.16. Age: Cenomanian.

"spinoreticulatum" (McIntyre and Brideaux, 1980, p.15–16, pl.3, figs.4,8–12) Helenes, 1984, p.134. Holotype: McIntyre and Brideaux, 1980, pl.3, figs.4,9,12; Jan du Chêne et al., 1986a, pl.13, figs.9–11. **NOW** *Cribroperidinium*. Originally *Millioudodinium*, subsequently *Apteodinium*, thirdly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Gonyaulacysta compta*, according to Lucas-Clark (1987, p.178). Age: Valanginian.

"?spinosum" (Alberti, 1961, p.24, pl.4, fig.16) Stover and Evitt, 1978, p.142. Holotype: Alberti, 1961, pl.4, fig.16. **Combination illegitimate** — **senior homonym:** *Apteodinium spinosum* Jain and Millepied, 1975. **Substitute name:** *Apteodinium albertii*. Originally *Pareodinia spinosa*, subsequently *Apteodinium? spinosum* (combination illegitimate), thirdly (and now) *Apteodinium albertii*. Questionable assignment: Stover and Evitt (1978, p.142). Age: late Barremian.

spinosum Jain and Millepied, 1975, p.139–140, pl.2, fig.27. Holotype: Jain and Millepied, 1975, pl.2, fig.27; Jan du Chêne et al., 1986a, pl.12, figs.8–10. Junior homonym: *Apteodinium? spinosum* (Alberti, 1961) Stover and Evitt, 1978. Nomenclatural junior synonym: *Apteodinium senegalense* Stover and Evitt, 1978, which has the same holotype. Age: Aptian–Albian.

spiridoides Benedek, 1972, p.5, pl.2, figs.1a–b; pl.15, figs.1–6. Emendation: Benedek and Sarjeant, 1981, p.318–320, as *Emslandia spiridoides*. Holotype: Benedek, 1972, pl.2, figs.1a–b; Benedek and Sarjeant, 1981, fig.2, nos.1–

3; Jan du Chêne et al., 1986a, pl.11, figs.6–9. Originally (and now) *Apteodinium*, subsequently *Emslandia*. Jan du Chêne et al. (1986a, p.48) retained this species in *Apteodinium*. Taxonomic junior synonym: *Apteodinium tectatum*, according to Lucas-Clark (1987, p.178) — however, Jan du Chêne in Head and Wrenn (1992, p.3) retained *Apteodinium tectatum*. Age: middle Oligocene.

spongiosum McIntyre and Brideaux, 1980, p.12, pl.2, figs.8–12. Holotype: McIntyre and Brideaux, 1980, pl.2, figs.11–12; Jan du Chêne et al., 1986a, pl.8, figs.4–5. Originally (and now) *Apteodinium*, subsequently *Aldorfia*. Lucas-Clark (1987, p.178) retained this species in *Apteodinium*. Age: Valanginian.

subtile He Chengquan, 1991, p.113, pl.3, figs.4–10. Holotype: He Chengquan, 1991, pl.3, fig.8. Age: middle Eocene.

suibinense Lentin and Williams, 1985, p.23. Holotype: Yu Jingxian, 1982, pl.1, fig.14. Originally *Apteodinium reticulatum* Yu Jingxian (name illegitimate), subsequently (and now) *Apteodinium suibinense*. Substitute name for: *Apteodinium reticulatum* Yu Jingxian, 1982, p.244, pl.1, figs.13–14 (an illegitimate name). Age: Late Jurassic–Early Cretaceous.

"*syzygium*" (Dörhöfer and Davies, 1980, p.26, figs.11,23B,E,H,26A–D,F–G) Stover and Williams, 1987, p.87. Emendation: Below, 1987a, p.121–122, as *Dodekovia syzygia*. Holotype: Dörhöfer and Davies, 1980, figs.26A–D; Fensome et al., 1995, figs.1–4 — p.1827. **NOW** *Dodekovia*. Originally (and now) *Dodekovia*, subsequently *Apteodinium*. Prauss (1989, p.19) retained this species in *Dodekovia*. Taxonomic junior synonym: *Ovalicysta hiata*, according to Below (1987a, p.121) — however, Lentin and Williams (1989, p.269) retained *Ovalicysta hiata*. Age: Toarcian–Bathonian.

"*tamboviense*" Vozzhennikova, 1967, p.61, pl.41, fig.1. Holotype: Vozzhennikova, 1967, pl.41, fig.1; Lentin and Vozzhennikova, 1990, pl.14, fig.9; text-fig.49. **NOW** *Pareodinia*. Originally *Apteodinium*, subsequently *Apteodinium?*, thirdly (and now) *Pareodinia*. Questionable assignment: Stover and Evitt (1978, p.142). Age: Barremian.

tectatum Piasecki, 1980, p.63,66, pl.2, figs.1–6. Holotype: Piasecki, 1980, pl.2, figs.4–6; Jan du Chêne et al., 1986a, pl.10, figs.5–8. Taxonomic senior synonym: *Apteodinium spiridoides*, according to Lucas-Clark (1987, p.178) — however, Jan du Chêne in Head and Wrenn (1992, p.3) retained *Apteodinium tectatum*. Age: middle Miocene.

tenuicinctum He Chengquan, 1991, p.113, pl.5, fig.33; text-fig.17. Holotype: He Chengquan, 1991, pl.5, fig.33; text-fig.17. Age: middle-late Eocene.

thelium Sarjeant, 1985a, p.83, pl.3, figs.2–3; pl.8, figs.3–4. Holotype: Sarjeant, 1985a, pl.8, figs.3–4. Taxonomic senior synonym: *Apteodinium granulatum*, according to Jan du Chêne et al. (1986a, p.46) — however, Sarjeant in Lentin and Williams (1989, p.21) retained *Apteodinium thelium*. Age: late Barremian–late Aptian.

tuberculatum Cookson and Eisenack, 1970a, p.146–147, pl.12, fig.14. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.14; Jan du Chêne et al., 1986a, pl.14, figs.9–11. Age: Senonian.

unicornum (Kar, 1985, p.206, pl.49, fig.8) Jain and Garg, 1991, p.72. Emendation: Jain and Garg, 1991, p.72–73, as *Apteodinium unicornum*. Holotype: Kar, 1985, pl.49, fig.8. Originally *Millioudinium*, subsequently (and now) *Apteodinium*. Age: Miocene.

variabile He Chengquan, 1991, p.113–114, pl.3, figs.11–16. Holotype: He Chengquan, 1991, pl.3, fig.11. Age: Cenomanian–Eocene.

vectense (Duxbury, 1983, p.39, pl.4, figs.3,7,10) Lucas-Clark, 1987, p.179. Holotype: Duxbury, 1983, pl.4, figs.3,7,10; Jan du Chêne et al., 1986a, pl.8, figs.6–9. Originally *Aldorfia*, subsequently (and now) *Apteodinium*. Age: late Aptian.

verrucosum Oleinik, 1976, p.85, pl.1, figs.1–3. Holotype: Oleinik, 1976, pl.1, fig.1. Originally (and now) *Apteodinium*, subsequently *Apectodinium*. This name was erroneously listed in *Apectodinium* (Costa and Downie, 1976) Lentin and Williams, 1977b in Lentin and Williams (1981, p.14); in the same publication, Lentin and Williams (1981, p.17) correctly listed it as a species of *Apteodinium*. Age: late Eocene.

?**vescum** Matsuoka, 1983b, p.139, pl.5, figs.7–8. Holotype: Matsuoka, 1983b, pl.5, fig.7; Jan du Chêne et al., 1986a, pl.12, fig.7. Originally *Apteodinium*, subsequently (and now) *Apteodinium*?. Questionable assignment: Lucas-Clark (1987, p.180). Age: early-middle Miocene.

warringtonii (Poulsen, 1996, p.69–70, pl.11, figs.1–4; pl.12, figs.1–4) Riding and Fensome, 2003, p.19. Holotype: Poulsen, 1996, pl.11, figs.1–3. Originally *Aldorfia*, subsequently (and now) *Apteodinium*. Age: late Oxfordian?–earliest Volgian.

"**wilsonii**" Slimani, 1994, p.90–91, pl.14, figs.5–11. Holotype: Slimani, 1994, pl.14, figs.5–9. **NOW** *Cribroperidinium graemei*. Originally *Apteodinium wilsonii*, subsequently *Cribroperidinium wilsonii* (name illegitimate), thirdly (and now) *Cribroperidinium graemei*. Taxonomic junior synonym: *Gonyaulacysta filosa* (name not validly published), according to Slimani (2001a, p.192). Age: early Campanian–late Maastrichtian.

ARACHNODINIUM Wilson and Clowes, 1982, p.97–98. Type: Wilson, 1967a, fig.37, as *Aiora fenestrata*.

***antarcticum** Wilson and Clowes, 1982, p.98,100,102, pl.1, figs.1–12; pl.2, figs.1–10; text-figs.2A–B. Holotype: Wilson, 1967a, fig.37 (as *Aiora fenestrata*); Wilson and Clowes, 1982, pl.1, figs.1–3; Fensome et al., 1993a, figs.1–3 — p.917; Fauconnier and Masure, 2004, pl.2, figs.18–20. Age: Eocene–Oligocene.

ARANEOSPHAERA Eaton, 1976, p.239–240. Type: Eaton, 1976, pl.2, fig.6; text-fig.6A, as *Araneosphaera araneosa*.

***araneosa** Eaton, 1976, p.240,242, pl.2, figs.5–8; text-figs.6A–D. Holotype: Eaton, 1976, pl.2, fig.6; text-figs.6A–B; Bujak et al., 1980, pl.6, figs.4–5. Age: middle-late Eocene.

consociata Jain and Tandon, 1981, p.7–8, pl.2, figs.36–37; pl.3, fig.47. Holotype: Jain and Tandon, 1981, pl.3, fig.47. Age: middle Eocene.

minuta Khanna and Singh, 1981b, p.399–400, fig.3, no.2; text-fig.10. Holotype: Khanna and Singh, 1981b, fig.3, no.2. This name was not validly published in Khanna (1979, p.217), since that author gave no description or illustration. Age: early Eocene.

stephanophora (Benedek, 1972, p.30–31, pl.9, fig.6; text-fig.10) Benedek and Sarjeant, 1981, p.349–350. Emendation: Benedek and Sarjeant, 1981, p.349–350, as *Araneosphaera stephanophora*. Holotype: Benedek, 1972, pl.9, fig.6. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium*?, thirdly (and now) *Araneosphaera*. Age: middle-late Oligocene.

ARCHEOTECTATUM Habib, 1972, p.375–376. Taxonomic senior synonym: *Apteodinium*, according to Stover and Evitt (1978, p.142) — however, Lentin and Williams (1989, p.24) retained *Archeotectatum*. Type: Habib, 1972, pl.5, fig.3, as *Archeotectatum sarjeantii*.

reticulatum Khowaja-Atequzaman and Jain, 1992, p.142, pl.4, fig.5; pl.6, fig.8. Holotype: Khowaja-Atequzaman and Jain, 1992, pl.4, fig.5. Age: Hauterivian–Barremian.

***sarjeantii** Habib, 1972, p.376, pl.5, figs.3–4. Holotype: Habib, 1972, pl.5, fig.3; Fensome et al., 1995, fig.1 — p.1763. Originally (and now) *Archeotectatum*, subsequently *Apteodinium*. Lentin and Williams (1981, p.16) retained this species in *Archeotectatum*. Age: Oxfordian–Kimmeridgian.

ARCTICACYSTA Sangiorgi et al., 2009, p.251–252,254. Type: Sangiorgi et al., 2009, pl.1, figs.1–3, as *Arcticacysta backmanii*.

**backmanii* Sangiorgi et al., 2009, p.254–255, pl.1, figs.1–12, pl.2, figs.1–9, pl.3, figs.1–2. Holotype: Sangiorgi et al., 2009, pl.1, figs.1–3. Age: ?early Miocene.

moraniae Sangiorgi et al., 2009, p.255–256, pl.3, figs.3–6, pl.4, figs.1–12. Holotype: Sangiorgi et al., 2009, pl.4, figs.1–4. Age: ?early Miocene.

AREOLIGERA Lejeune-Carpentier, 1938a, p.B164. Emendation: Williams and Downie, 1966c, p.227–228. Type: Lejeune-Carpentier, 1938a, text-fig.2, as *Areoligera senonensis*.

"*birama*" Maier, 1959, p.304, pl.29, fig.2. Holotype: Maier, 1959, pl.29, fig.2. **Taxonomic senior synonym:** *Xanthidium* (now *Spiniferites*) *ramosum*, according to Morgenroth (1968, p.550). Age: middle Oligocene.

campoensis Caro, 1973, p.344,347–348, pl.1, figs.1–2. Holotype: Caro, 1973, pl.1, figs.1–2; Fauconnier and Masure, 2004, pl.3, fig.1. Age: middle Paleocene.

"*cassiculus*" Drugg, 1970b, p.811, figs.2B,3A–B. Holotype: Drugg, 1970b, fig.3A. **NOW** *Gerdiocysta*. Originally *Areoligera*, subsequently (and now) *Gerdiocysta*. N.I.A. Age: early Eocene.

coronata (Wetzel, 1933b, p.41, caption to pl.4, fig.17 ex Deflandre, 1937b, p.75) Lejeune-Carpentier, 1938a, p.B170. Holotype: Wetzel, 1933b, pl.4, fig.17; Lejeune-Carpentier, 1938a, fig.6. Originally *Hystrichosphaera penicillata* forma *coronata* (name not validly published), subsequently *Hystrichosphaeridium penicillatum* forma *coronatum*, thirdly (and now) *Areoligera coronata*. Taxonomic junior synonyms (at specific rank): *Hystrichosphaera penicillata* subsp. *medusettiformis* (now *Areoligera medusettiformis*), according to Morgenroth (1968, p.551) — however, Eaton (1976, p.245) retained *Hystrichosphaera penicillata* subsp. *medusettiformis* (as *Areoligera medusettiformis*); *Hystrichosphaera penicillata* subsp. *rhizopodiphora* (subsequently *Areoligera rhizopodiphora*), according to Lentin and Williams (1981, p.19). Age: Senonian.

crenatis Damassa, 1979b, p.192–193, pl.1, figs.1–13. Holotype: Damassa, 1979b, pl.1, figs.9–11; Fauconnier and Masure, 2004, pl.3, figs.4–5. Age: early Paleocene.

"*danica*" Wetzel, 1952, p.396–397, pl.A, figs.5–6; text-fig.8. Emendation: Sarjeant, 1984c, p.129–130, as *Achomosphaera danica*. Holotype: Wetzel, 1952, pl.A, fig.6; Dietz et al., 1999, text-fig.6b. **NOW** *Achomosphaera*. Originally *Areoligera*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Achomosphaera*. Taxonomic senior synonym: *Areoligera senonensis*, according to Lejeune-Carpentier and Sarjeant (1981, p.15) — however, Sarjeant (1984c, p.130) retained *Areoligera* (as *Achomosphaera*) *danica*. Age: Paleocene.

?*delicata* Horowitz, 1975, p.24, pl.1, fig.2. Holotype: Horowitz, 1975, pl.1, fig.2. Originally *Areoligera*, subsequently *Adnatosphaeridium?* (combination not validly published), thirdly (and now) *Areoligera?*. Questionable assignment: Stover and Evitt (1978, p.19). Age: Late Triassic (probably not in place).

"*dermatica*" Maier, 1959, p.305, pl.29, fig.3. Holotype: Maier, 1959, pl.29, fig.3. **Taxonomic senior synonym:** *Xanthidium* (now *Spiniferites*) *ramosum*, according to Morgenroth (1968, p.550). Age: middle Oligocene.

"*digitata*" Kar, 1985, p.180–181, pl.40, fig.3; pl.41, figs.2–3. Holotype: Kar, 1985, pl.41, fig.2. **Taxonomic senior synonym:** *Homotryblium plectilum*, according to Jain and Garg (1991, p.77). Age: early Eocene.

"*espiritasantensis*" (Regali et al., 1974, p.290, pl.24, fig.3) Lentin and Williams, 1981, p.18. Holotype: Regali et al., 1974, pl.24, fig.3; irretrievably damaged according to Arai in Fauconnier and Masure (2004, p.246). Lectotype: Fauconnier and Masure, 2004, pl.31, figs.1–3, designated by Arai in Fauconnier and Masure (2004, p.246). **NOW**

Glaphyrocysta. Originally *Hystrichosphaeridium*, subsequently *Areoligera*, thirdly (and now) *Glaphyrocysta*. Age: Maastrichtian.

fimbriata He Chengquan, 1991, p.134, pl.28, fig.10; pl.59, fig.1. Holotype: He Chengquan, 1991, pl.28, fig.10. Age: Paleocene–middle Eocene.

flandriensis Slimani, 1994, p.92–93, pl.15, figs.10–12; pl.16, figs.15–16. Holotype: Slimani, 1994, pl.15, figs.10–12; Fauconnier and Masure, 2004, pl.3, figs.8–10. Age: late Campanian–early Maastrichtian.

"***galea***" (Maier, 1959, p.306–307, pl.29, fig.4) Davey et al., 1969, p.15. Emendation: Sarjeant, 1983, p.10, as *Chiropteridium galea*. Holotype: Maier, 1959, pl.29, fig.4; Eisenack and Kjellström, 1975b, p.88a; Fensome et al., 1995, fig.1 — p.1495. **NOW** *Chiropteridium*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*, fourthly *Areoligera?*, fifthly (and now) *Chiropteridium*. Questionable assignment: Stover and Evitt (1978, p.19). Taxonomic junior synonyms: *Chiropteridium dispersum*, *Galea* (al. *Baltisphaeridium*) *mespilatum* and *Galea* (al. *Baltisphaeridium*) *levis*, all according to Sarjeant (1983, p.108–109); *Membranophoridium multispinatum*, according to Brosius (1963, p.48) and Gocht (1969, p.63), who considered *Membranophoridium multispinatum* to be a taxonomic junior synonym of *Galea* (as *Chiropteridium*) *dispersa*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium*) *galea*; *Membranophoridium* (subsequently *Chiropteridium*) *partispinatum*, by implication in Matsuoka and Bujak (1988, p.40), who considered *Membranophoridium partispinatum* to be a taxonomic junior synonym of *Galea* (as *Chiropteridium*) *mespilana*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium*) *galea*. N.I.A. Age: Oligocene.

gippingensis Jolley, 1992, p.26,28,30–31, pl.1, figs.1–6; pl.2, figs.1–6; text-figs.2a–d,3. Holotype: Jolley, 1992, pl.1, figs.1–2; text-fig.2a. Age: Thanetian.

guembelii Kirsch, 1991, p.89, pl.15, figs.1–3. Holotype: Kirsch, 1991, pl.15, figs.1–3. Age: middle Maastrichtian.

"***incerta***" Klumpp, 1953, p.389–390, pl.17, figs.1–2. Emendations: Morgenroth, 1966a, p.15, as *Hystrichosphaera incerta*; Sarjeant, 1981, p.109–110, as *Spiniferites incertus*. Holotype: Klumpp, 1953, pl.17, figs.1–2. **NOW** *Spiniferites*. Originally *Areoligera*, subsequently *Hystrichosphaera*, thirdly (and now) *Spiniferites*. Taxonomic junior synonym: *Hystrichokibotium* (now *Spiniferites*) *pseudofurcatum*, according to Morgenroth (1966a, p.15) — however, Sarjeant (1981, p.108–109) retained *Hystrichokibotium* (as and now *Spiniferites*) *pseudofurcatum*. Age: late Eocene.

lemniscata (Stanley, 1965, p.229–230, pl.24, figs.1–6) Stover and Evitt, 1978, p.18. Holotype: Stanley, 1965, pl.24, figs.1–2. Originally *Cyclonephelium*, subsequently (and now) *Areoligera*. Age: Paleocene.

longispinata Xu Jinli et al., 1997, p.88, pl.25, figs.1–2; pl.27, figs.1,4 ex He Chengquan et al., 2009, p.648. Holotype: Xu Jinli et al., 1997, pl.27, fig.1. The name was not validly published in Xu Jinli et al., (1997), since no English or Latin description was provided. He Chengquan et al. (2009, p.648) validated the name by publishing a diagnosis in English. Age: middle-late Eocene.

"***lychnea***" (Maier, 1959, p.310, pl.30, fig.6) Davey et al., 1969, p.15. Holotype: Maier, 1959, pl.30, fig.6. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Achomosphaera*) *alcicornu*, according to Sarjeant (1983, p.100–101). Age: Miocene.

medusettiformis Wetzel, 1933b, caption to pl.4, fig.19 — p.41 ex Lejeune-Carpentier, 1938a, p.B170. Holotype: Wetzel, 1933b, pl.4, fig.19; Lejeune-Carpentier, 1938a, fig.7. Originally *Hystrichosphaera penicillata* forma *medusettiformis* (name not validly published), subsequently (and now) *Areoligera medusettiformis*. Taxonomic senior synonym (at specific rank): *Hystrichosphaera penicillata* forma *coronata* (now *Areoligera coronata*), according to Morgenroth (1968, p.551) — however, Eaton (1976, p.245) retained *Areoligera medusettiformis*. The name *Hystrichosphaera penicillata* forma *medusettiformis* was not validly published in Wetzel (1933b), since the specific combination *Hystrichosphaera penicillata* was not validly published. Age: Senonian.

microreticulata Slimani, 1994, p.93–94, pl.15, figs.13–15; pl.16, figs.9–12. Holotype: Slimani, 1994, pl.15, figs.13–15; Fauconnier and Masure, 2004, pl.4, figs.1–3. Taxonomic junior synonym: *Areoligera reticulata* (name not validly published), according to Slimani (2001a, p.192). Age: late Campanian.

"*reticulata*" Wilson in Slimani, 1994, p.93. **Name not validly published**: no description or illustration.

Taxonomic senior synonym: *Areoligera microreticulata*, according to Slimani (2001a, p.192).

"*rhizopodiphora*" Wetzel, 1933b, p.41, caption to pl.4, fig.18 ex Lejeune-Carpentier, 1938a, p.B170. Holotype: Wetzel, 1933b, pl.4, fig.18. Originally *Hystrichosphaera penicillata* subsp. *rhizopodiphora* (name not validly published), subsequently *Areoligera rhizopodiphora*. **Taxonomic senior synonym** (at specific rank): *Hystrichosphaera penicillata* forma *coronata* (now *Areoligera coronata*), according to Lentin and Williams (1981, p.19). Lejeune-Carpentier (1938a, p.B170) considered *Hystrichosphaera penicillata* forma *medusettiformis* (now *Areoligera medusettiformis*) to be a possible taxonomic senior synonym of this taxon. The name *Hystrichosphaera penicillata* forma *rhizopodiphora* was not validly published in Wetzel (1933b), since the specific combination *Hystrichosphaera penicillata* was not validly published. Age: Senonian.

"*semicirculata*" (Morgenroth, 1966b, p.9–10, pl.2, figs.3–4) Stover and Evitt, 1978, p.18. Holotype: Morgenroth, 1966b, pl.2, fig.3. **NOW** *Licracysta*? Originally *Cyclonephelium*, subsequently *Areoligera*, thirdly (and now) *Licracysta*? Age: middle Oligocene.

**senonensis* Lejeune-Carpentier, 1938a, p.B164–B166, text-figs.1–3. Holotype: Lejeune-Carpentier, 1938a, text-fig.2; Streel et al., 1977, pl.1, fig.2; Lejeune-Carpentier and Sarjeant, 1981, pl.3, figs.5–6. Taxonomic junior synonym: *Areoligera* (now *Achomosphaera*) *danica*, according to Lejeune-Carpentier and Sarjeant (1981, p.15) — however, Sarjeant (1984c, p.130) retained *Achomosphaera danica*. Age: Late Cretaceous.

sentosa Eaton, 1976, p.246, pl.4, figs.1–2; pl.5, figs.1,3; text-fig.8A. Holotype: Eaton, 1976, pl.4, figs.1–2; Bujak et al., 1980, pl.9, figs.4–5. Age: middle Eocene (see Aubry, 1986).

taiwaniana Shaw Chenglong, 1999b, p.180, figs.70–71. Holotype: Shaw Chenglong, 1999b, figs.70–71. Age: Eocene.

tauloma Eaton, 1976, p.247, pl.4, figs.3,5; pl.5, figs.5–6; text-fig.8B. Holotype: Eaton, 1976, pl.4, figs.3,5; Bujak et al., 1980, pl.9, figs.1–2; Fauconnier and Masure, 2004, pl.4, figs.7–8. Age: middle Eocene (see Aubry, 1986).

tenuicapillata (Wetzel, 1933b, p.42, pl.4, figs.20–22 ex Deflandre, 1937b, p.78) Lejeune-Carpentier, 1938a, p.B170. Holotype: Wetzel, 1933b, pl.4, fig.20. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly (and now) *Areoligera*. The name *Hystrichosphaera tenuicapillata* was not validly published in Wetzel (1933b), since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Senonian.

"subsp. *irregularis*" Wetzel, 1933b, p.42–43, pl.4, fig.20 ex Lentin and Williams, 1973, p.16. Holotype: Wetzel, 1933b, pl.4, fig.20. **Combination illegitimate** — **nomenclatural senior synonym**: *Areoligera tenuicapillata* subsp. *tenuicapillata*, which has the same holotype. Originally *Hystrichosphaera tenuicapillata* forma *irregularis* (name not validly published), subsequently *Areoligera tenuicapillata* subsp. *irregularis* (name illegitimate). The name *Hystrichosphaera tenuicapillata* forma *irregularis* was not validly published in Wetzel (1933b), since the species name was not validly published until 1937. Age: Senonian.

"forma *pinopollina*" Wetzel, 1933b, p.42–43, pl.4, fig.22 ex Downie and Sarjeant, 1965, p.86. Holotype: Wetzel, 1933b, pl.4, fig.22. **NOW** *Areoligera tenuicapillata* subsp. *pinopollina*. Originally *Hystrichosphaera tenuicapillata* forma *pinopollina* (name not validly published), subsequently *Areoligera tenuicapillata* forma *pinopollina*, thirdly (and now) *Areoligera tenuicapillata* subsp. *pinopollina*. The name *Hystrichosphaera tenuicapillata* forma *pinopollina* was not validly published in Wetzel (1933b), since the species name was not validly published until 1937. Age: Senonian.

subsp. *pinopollina* (Wetzel, 1933b, p.42–43, pl.4, fig.22 ex Downie and Sarjeant, 1965, p.86) Lentin and Williams, 1973, p.16. Holotype: Wetzel, 1933b, pl.4, fig.22. Originally *Hystrichosphaera tenuicapillata* forma *pinopollina* (name not validly published), subsequently *Areoligera tenuicapillata* forma *pinopollina*, thirdly (and now) *Areoligera tenuicapillata* subsp. *pinopollina*. Lejeune-Carpentier (1938a, p.B167) speculated that this taxon might be based on coniferous pollen. Lentin and Williams (1989, p.26) believed it may be a damaged specimen of *Hystrichosphaeridium* (now *Florentinia?*) *flosculus*. The name *Hystrichosphaera tenuicapillata* forma *pinopollina* was not validly published in Wetzel (1933b), since the species name was not validly published until 1937. Age: Senonian.

"forma *tenuicapillata*". Autonym. Holotype: Wetzel, 1933b, pl.4, fig.20. **Now redundant.** Nomenclatural junior synonym: *Hystrichosphaera* (subsequently *Areoligera*) *tenuicapillata* forma *irregularis*, which has the same holotype.

subsp. *tenuicapillata*. Autonym. Holotype: Wetzel, 1933b, pl.4, fig.20. Nomenclatural junior synonym: *Hystrichosphaera* (subsequently *Areoligera*) *tenuicapillata* subsp. *irregularis*, which has the same holotype.

subsp. *turbilineata* (Wetzel, 1933b, p.42, pl.4, fig.21 ex Downie and Sarjeant, 1965, p.86) Lentin and Williams, 1981, p.20. Holotype: Wetzel, 1933b, pl.4, fig.21; Sarjeant, 1985b, pl.4, fig.2. Originally *Hystrichosphaera tenuicapillata* forma *turbilineata* (name not validly published), subsequently *Areoligera turbilineata*, thirdly (and now) *Areoligera tenuicapillata* subsp. *turbilineata*. Sarjeant (1985b, p.153–154) provided a detailed discussion of this taxon. Age: Senonian.

"*turbilineata*" Wetzel, 1933b, p.42, pl.4, fig.21 ex Downie and Sarjeant, 1965, p.86. Holotype: Wetzel, 1933b, pl.4, fig.21; Sarjeant, 1985b, pl.4, fig.2. **NOW** *Areoligera tenuicapillata* subsp. *turbilineata*. Originally *Hystrichosphaera tenuicapillata* forma *turbilineata* (name not validly published), subsequently *Areoligera turbilineata*, thirdly (and now) *Areoligera tenuicapillata* subsp. *turbilineata*. The name *Hystrichosphaera tenuicapillata* forma *turbilineata* was not validly published in Wetzel (1933b), since the specific name *Hystrichosphaera tenuicapillata* was not validly published until 1937. Age: Senonian.

"*twistringiensis*" (Maier, 1959, p.308–309, pl.30, figs.3–4) Davey et al., 1969, p.15. Holotype: Maier, 1959, pl.30, fig.3; Sarjeant, 1983, pl.5, fig.3. **NOW** *Spiniferites*. Originally *Galea* (combination illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*, fourthly (and now) *Spiniferites*. Taxonomic junior synonyms (at specific rank): *Hystrichosphaera ramosa* var. *multibrevis* (as *Spiniferites multibrevis*), according to Sarjeant (1983, p.94–95) and *Achomosphaera* (al. *Spiniferites*) *cambra*, by implication in Jain (1982, p.51), who considered this species to be taxonomic junior synonym of *Hystrichosphaera ramosa* var. *multibrevis* (as *Spiniferites ramosus* subsp. *multibrevis*). Age: middle Miocene.

undulata Eaton, 1976, p.248, pl.4, figs.4,6; pl.5, figs.2,4; text-figs.8c,9. Holotype: Eaton, 1976, pl.4, figs.4,6; text-fig.9; Bujak et al., 1980, pl.9, figs.7–8; Fauconnier and Masure, 2004, pl.5, figs.1–3. Originally (and now) *Areoligera*, subsequently *Glaphyrocysta?*. Jain and Garg (1986a, p.111) retained this species in *Areoligera*. Age: middle Eocene (see Aubry, 1986).

vermiculata Corradini, 1973, p.159–160, pl.24, figs.6–7; pl.34, fig.5. Holotype: Corradini, 1973, pl.24, fig.7; Fauconnier and Masure, 2004, pl.5, figs.4–7. Age: Maastrichtian.

volata Drugg, 1967, p.21, pl.3, figs.11–13; pl.9, fig.4. Holotype: Drugg, 1967, pl.3, fig.11. Age: Danian.

AREOSPHERIDIUM Eaton, 1971, p.357–358. Emendation: Stover and Williams, 1995, p.100. Type: Klumpp, 1953, pl.18, figs.3–4, as *Hystrichosphaeridium diktyoplokum*.

"*actinocoronatum*" (Benedek, 1972, p.34, pl.12, fig.13; text-fig.13) Stover and Evitt, 1978, p.20. Emendation: Bujak and Matsuoka, 1986, p.238–239, as *Reticulosphaera actinocoronata*. Holotype: Benedek, 1972, pl.12, fig.13; Benedek and Sarjeant, 1981, fig.10, no.5; text-fig.11; Sarjeant et al., 1987, pl.2, fig.4; Fensome et al., 1993a, fig.1 — p.879. **NOW** *Reticulosphaera*. Originally *Cleistosphaeridium*, subsequently *Areosphaeridium?*, thirdly

(and now) *Reticulosphaera*. Questionable assignment: Stover and Evitt (1978, p.20). Taxonomic junior synonym: *Reticulosphaera stellata*, according to Bujak and Matsuoka (1986, p.238). Age: middle-late Oligocene.

"**arcuatum**" Eaton, 1971, p.360–363, pl.3, figs.1–9; text-figs.4–5. Emendation: Stover and Williams, 1995, p.109, as *Enneadocysta arcuata*. Holotype: Eaton, 1971, pl.3, fig.1; text-fig.4; Bujak et al., 1980, pl.2, fig.6. **NOW** *Enneadocysta*. Originally *Areosphaeridium*, subsequently (and now) *Enneadocysta*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Enneadocysta?*) *dictyostilum*, according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Enneadocysta*) *arcuatum*. Age: middle Eocene.

"**argentinense**" Pöthe de Baldis, 1986, p.172, pl.1, figs.1–2. Holotype: Pöthe de Baldis, 1986, pl.1, fig.1. **NOW** *Surculosphaeridium?*. Originally *Areosphaeridium*, subsequently (and now) *Surculosphaeridium?*. Age: Santonian–Campanian.

asteriphorum He Chengquan et al., 1999, p.188, 198–199, pl.3, fig.7; text-fig.2. Holotype: He Chengquan et al., 1999, pl.3, fig.7; text-fig.2. Age: late Hauterivian–Barremian.

calicigerum de Coninck, 1986b, p.10, pl.1, figs.8–13. Emendation: Michoux and Masure in Fauconnier and Masure, 2004, p.63. Holotype: de Coninck, 1986b, pl.1, figs.11–13; Fauconnier and Masure, 2004, pl.7, figs.1–3. Originally *Areosphaeridium?*, subsequently *Surculosphaeridium?*, thirdly (and now) *Areosphaeridium*. Questionable assignment: de Coninck (1986b, p.10) — however, Michoux and Masure in Fauconnier and Masure (2004, p.63) retained this species in *Areosphaeridium* without question (but did not acknowledge the earlier transfer to *Surculosphaeridium*). Age: late Eocene (Tongrian).

"**capricornum**" (Cookson and Eisenack, 1965a, p.128–129, pl.15, figs.1–9) Stover and Evitt, 1978, p.20. Emendation: Stover and Williams, 1995, p.107, as *Cooksonidium capricornum*. Holotype: Cookson and Eisenack, 1965a, pl.15, fig.7; Fauconnier and Masure, 2004, pl.7, figs.7–10. **NOW** *Cooksonidium*. Originally *Cordosphaeridium*, subsequently *Systematophora?*, thirdly *Areosphaeridium*, fourthly (and now) *Cooksonidium*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Enneadocysta?*) *dictyostilum*, according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Cooksonidium*) *capricornum*. Age: late Eocene.

"**coniunctum**" Prössl, 1992b, p.106–108, pl.2, figs.1–2, 4–5, 7, 9, 12–14; pl.3, figs.1, 4, 7, 12–14. Holotype: Prössl, 1992b, pl.3, figs.1, 4, 7; Fauconnier and Masure, 2004, pl.8, figs.1–3. **NOW** *Cooksonidium*. Originally *Areosphaeridium*, subsequently (and now) *Cooksonidium*. Age: middle Eocene.

"**dictyostilum**" (Menéndez, 1965, p.11–12, pl.2, fig.6; pl.3, figs.18–22) Sarjeant, 1981, p.115. Emendation: Sarjeant, 1981, p.115, as *Areosphaeridium dictyostilum*. Holotype: Menéndez, 1965, pl.2, fig.6; pl.3, figs.18–20. **NOW** *Enneadocysta?*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium?*, thirdly *Areosphaeridium*, fourthly (and now) *Enneadocysta?*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Areosphaeridium*) *diktyoplokum*, according to Eaton (1971, p.359) — however, Sarjeant (1981, p.115) retained *Areosphaeridium* (now *Enneadocysta?*) *dictyostilum*. Taxonomic junior synonyms: *Areosphaeridium* (now *Enneadocysta*) *arcuatum* and *Cordosphaeridium* (now *Cooksonidium*) *capricornum*, both according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Enneadocysta*) *arcuatum* and *Cordosphaeridium* (now *Cooksonidium*) *capricornum*. Age: Tertiary.

***diktyoplokum** (Klumpp, 1953, p.392, pl.18, figs.3–7 [not pl.18, figs.8–10, which are now *Cordosphaeridium latum*]) Eaton, 1971, p.358–359. Emendations: Eaton, 1971, p.359 and Stover and Williams, 1995, p.102, both as *Areosphaeridium diktyoplokum*. Holotype: Klumpp, 1953, pl.18, figs.3–4. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Areosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (now *Enneadocysta?*) *dictyostilum*, according to Eaton (1971, p.359) — however, Sarjeant (1981, p.115) retained *Hystrichosphaeridium* (as *Areosphaeridium*, now *Enneadocysta?*) *dictyostilum*. Age: middle-late Eocene.

"subsp. **diktyoplokum**". Autonym. Holotype: Klumpp, 1953, pl.18, figs.3–4. **Now redundant**. Originally *Hystrichosphaeridium diktyoplokum* subsp. *diktyoplokum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *diktyoplokum*, thirdly *Areosphaeridium diktyoplokum* subsp. *diktyoplokum*.

"subsp. *latum*" (Klumpp, 1953, p.392, pl.18, figs.8–10) Lentin and Williams, 1973, p.16. Emendation: Sarjeant, 1981, p.106–107, as *Plethysyrinx lata* — however, see Lentin and Williams (1985, p.72). Holotype: Klumpp, 1953, pl.18, figs.8–9. **NOW** *Cordosphaeridium latum*. Originally *Hystrichosphaeridium diktyoplokum* subsp. *latum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *latum*, thirdly *Areosphaeridium diktyoplokum* subsp. *latum*, fourthly *Plethysyrinx? lata*, fifthly (and now) *Cordosphaeridium latum*. Age: Eocene.

ebdonii Bujak, 1994, p.119–121, pl.2, figs.8–9. Holotype: Bujak, 1994, pl.2, figs.8–9. Age: late Ypresian–Lutetian.

"*fenestratum*" Bujak, 1976, p.107,109–110, pl.2, figs.9–12; pl.3, figs.1–4; text-figs.3D–F. Emendation: Stover and Williams, 1995, p.110, as *Enneadocysta fenestrata*. Holotype: Bujak, 1976, pl.3, fig.2. **NOW** *Enneadocysta*. Originally *Areosphaeridium*, subsequently (and now) *Enneadocysta*. Age: middle Eocene (see Aubry, 1986).

michoudii Bujak, 1994, p.121, pl.1, figs.1–3. Holotype: Bujak, 1994, pl.1, figs.1–2; Fauconnier and Masure, 2004, pl.7, fig.11. Age: Ypresian–Priabonian.

"*multicornutum*" Eaton, 1971, p.363–364, pl.4, figs.1–7; text-fig.6. Emendation: Stover and Williams, 1995, p.112–113, as *Enneadocysta multicornuta*. Holotype: Eaton, 1971, pl.4, fig.1; text-fig.6. **NOW** *Enneadocysta*. Originally *Areosphaeridium*, subsequently (and now) *Enneadocysta*. Taxonomic senior synonym: *Baltisphaeridium* (now *Enneadocysta*) *pectiniforme*, according to Sarjeant (1984b, p.83–84,86) — however, Stover and Williams (1995, p.112) retained *Areosphaeridium* (as *Enneadocysta*) *multicornutum*. Age: Eocene.

"*pectiniforme*" (Gerlach, 1961, p.195–196, pl.28, fig.14; text-fig.18) Stover and Evitt, 1978, p.20. Emendations: Sarjeant, 1984b, p.83–84,86, as *Areosphaeridium pectiniforme*; Stover and Williams, 1995, p.114, as *Enneadocysta pectiniformis*. Holotype: Gerlach, 1961, pl.28, fig.14; Sarjeant, 1984b, pl.1, fig.2; pl.4, fig.2; Fauconnier and Masure, 2004, pl.7, figs.4–5. **NOW** *Enneadocysta*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Areosphaeridium*, fourthly *Areosphaeridium?*, fifthly (and now) *Enneadocysta*. Taxonomic junior synonym: *Areosphaeridium* (now *Enneadocysta*) *multicornutum*, according to Sarjeant (1984b, p.83–84,86) — however, Stover and Williams (1995, p.112) retained *Areosphaeridium* (as *Enneadocysta*) *multicornutum*. Questionable assignment: Stover and Evitt (1978, p.20) — however, Sarjeant (1984b, p.83) included this species in *Areosphaeridium* without question. Age: middle Oligocene.

"*polypetellum*" Islam, 1983c, p.82,84, pl.2, figs.1–6. Holotype: Islam, 1983c, pl.2, fig.1. **NOW** *Cleistosphaeridium*. Originally *Areosphaeridium*, subsequently (and now) *Cleistosphaeridium*. Taxonomic senior synonym: *Cleistosphaeridium* (as *Systematophora*) *diversispinosum*, according to Islam (1993, p.88) — however, Eaton et al. (2001, p.194) retained *Cleistosphaeridium polypetellum*. Age: early-middle Eocene.

"*suggestium*" McMinn, 1988, p.146–148, figs.3A–F,4. Holotype: McMinn, 1988, figs.3A,C; Fensome et al., 1996, figs.1–2 — p.2389. **NOW** *Surculosphaeridium*. Originally *Areosphaeridium*, subsequently (and now) *Surculosphaeridium*. Age: Santonian–mid Campanian.

ARKELLEA Below, 1990, p.42. Type: Sarjeant, 1961a, pl.15, fig.9; text-figs.9a–b, as *Cymatiosphaera teichophera*.

**teichophera* (Sarjeant, 1961a, p.107–108, pl.15, fig.9; text-figs.9a–b) Below, 1990, p.42–43. Emendation: Below, 1990, p.42–43, as *Arkellea teichophera*. Holotype: Sarjeant, 1961a, pl.15, fig.9; text-figs.9a–b; Sarjeant, 1976c, pl.6, fig.3. Originally *Cymatiosphaera* (Appendix A), subsequently *Heslertonia*, thirdly (and now) *Arkellea*. Age: early Oxfordian.

"**ARKELLIDINIUM**" Beju, 1979, p.1,4. **Taxonomic senior synonym:** *Sirmiodiniopsis*, according to Beju in Lentin and Williams (1981, p.21). Type: Beju, 1979, fig.1, no.1; figs.2A–A', as *Arkellidium triapertum*.

"*apiapertum*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

"**triapertum*" Beju, 1979, p.4–5, fig.1, nos.1–6; figs.2A–A',B–E. Holotype: Beju, 1979, fig.1, no.1; figs.2A–A'; Fensome et al., 1995, figs.1,7–8 — p.1847. Originally *Arkellidium*, subsequently *Sirmiodiniopsis*. **Taxonomic senior synonym:** *Sirmiodiniopsis orbis*, according to Riley and Fenton (1982, p.199). Age: late Callovian.

ARVALIDINIUM Lentin and Vozzhennikova, 1990, p.33–34. Type: Marshall, 1988, figs.17M–R, as *Chatangiella arvensis*.

**arvense* (Marshall, 1988, p.201,203, figs.7,17M–X) Lentin and Vozzhennikova, 1990, p.33. Holotype: Marshall, 1988, figs.7,17M–R; Fensome et al., 1996, figs.1–4,8–10 — p.2037. Originally *Chatangiella*, subsequently (and now) *Arvalidinium*. Age: Santonian.

cristatum Lucas-Clark, 2006, p.192, pl.1. figs.7–15; text-figs.4A–B. Holotype: Lucas-Clark, 2006, pl.1, figs.7–10. Age: early Paleocene.

scheii (Manum, 1963, p.56–58, pl.1, figs.1–16; text-fig.1) Lentin and Vozzhennikova, 1990, p.34. Holotype: Manum, 1963, pl.1, figs.1–4; text-fig.1. Originally *Deflandrea*, subsequently *Cooksoniella*, thirdly *Chatangiella?*, fourthly (and now) *Arvalidinium*. Age: Middle Cretaceous (early Late Cretaceous, according to Manum and Cookson, 1964).

ASCODINIUM Cookson and Eisenack, 1960a, p.5. Emendation: Helenes, 1983, p.258–260. Taxonomic junior synonyms: *Pocockia* and *Ovoidinium*, both according to Helenes (1983, p.258), and by implication *Evittia* Pocock (an illegitimate name for which *Pocockia* is the substitute) — however, Lentin and Williams (1989, p.269) retained *Ovoidinium* (including by implication *Pocockia* and *Evittia*). Type: Cookson and Eisenack, 1960a, pl.1, fig.19, as *Ascodinium acrophorum*.

**acrophorum* Cookson and Eisenack, 1960a, p.5, pl.1, figs.19–20. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.19. Age: late Albian–Cenomanian.

"*cinctum*" (Cookson and Eisenack, 1958, p.26, pl.4, figs.1–3) Helenes, 1983, p.260. Holotype: Cookson and Eisenack, 1958, pl.4, fig.3. **NOW** *Ovoidinium*. Originally *Deflandrea*, subsequently *Evittia* (combination illegitimate), thirdly *Pocockia*, fourthly (and now) *Ovoidinium*, fifthly *Ascodinium*. Age: late Neocomian–early Aptian.

"*diversum*" (Davey, 1979b, p.558, pl.6, figs.6–16) Helenes, 1983, p.260. Holotype: Davey, 1979b, pl.6, fig.9. **NOW** *Ovoidinium*. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Age: late Aptian–early Albian.

fissilum Harding, 1990b, p.16–17; pl.2, figs.1–8 ex Harding in Williams et al., 1998, p.57. Holotype: Harding, 1990b, pl.2, fig.6. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: early Barremian.

"?*fragile*" (Norvick, 1976, p.88, pl.13, figs.1,8; pl.17, fig.7) Lentin and Williams, 1985, p.28. Holotype: Norvick, 1976, pl.13, fig.1. **NOW** *Ovoidinium?*. Originally (and now) *Ovoidinium?*, subsequently *Ascodinium?*. Questionable assignment: Lentin and Williams (1985, p.28). Age: Cenomanian.

"*hialinum*" Balteş, 1963, p.585, pl.8, figs.1–3. **Name not validly published:** holotype not designated. Age: Senonian.

"*implanum*" (Davey, 1979b, p.558–559, pl.5, figs.7–9,11–12) Helenes, 1983, p.260. Holotype: Davey, 1979b, pl.5, figs.7,11. **NOW** *Ovoidinium*. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Age: late Albian.

"*incomptum*" (Duxbury, 1983, p.64, pl.10, figs.4–5,9; text-figs.30A–C) Lentin and Williams, 1985, p.28. Holotype: Duxbury, 1983, pl.10, figs.5,9; text-fig.30C. **NOW** *Ovoidinium*. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Age: late Aptian.

"incorporeum" (Duxbury, 1983, p.65, pl.10, fig.14; text-figs.31A–B) Lentin and Williams, 1985, p.28. Holotype: Duxbury, 1983, pl.10, fig.14; text-figs.31A–B. **NOW** *Ovoidinium*. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Age: late Aptian–early Albian.

"?kansanum" (Tasch in Tasch et al., 1964, p.196, pl.1, fig.1) Lentin and Williams, 1985, p.28. Holotype: Tasch et al., 1964, pl.1, fig.1. **NOW** *Ovoidinium*?. Originally *Peridinium* (Appendix B), subsequently *Deflandrea*?, thirdly (and now) *Ovoidinium*?, fourthly *Ascodinium*?. Questionable assignment: Lentin and Williams (1985, p.28). Age: Albian.

"lingfengense" Yu Jingxian, 1989, p.158, pl.38, figs.9–10. Holotype: Yu Jingxian, 1989, pl.38, fig.10. **NOW** *Leberidocysta*. Originally *Ascodinium*, subsequently (and now) *Leberidocysta*. Age: Paleocene.

longangularium Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.51–52, pl.15, fig.1. Holotype: Liu Zhili et al., 1992, pl.15, fig.1. Age: Early Tertiary.

"lordii" Cookson and Eisenack, 1968, p.112, figs.11–K. Holotype: Cookson and Eisenack, 1968, fig.11J. **NOW** *Senoniasphaera*. Originally *Ascodinium*, subsequently (and now) *Senoniasphaera*. Age: Santonian–early Campanian.

"?microreticulatum" Jiabo, 1978, p.90, pl.6, fig.13. Holotype: Jiabo, 1978, pl.6, fig.13. **NOW** *Pareodinia*?. Originally *Ascodinium*?, subsequently (and now) *Pareodinia*?. Questionable assignment: Jiabo (1978, p.90). Age: Early Tertiary.

orbiculatum Yu Jingxian, 1989, p.158, pl.38, figs.12–13. Holotype: Yu Jingxian, 1989, pl.38, fig.12. Age: Paleocene.

"ovale" Cookson and Eisenack, 1970a, p.145, pl.13, fig.8. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.8. **NOW** *Ovoidinium*. Originally *Ascodinium*, subsequently (and now) *Ovoidinium*. Age: Albian–Cenomanian.

ovatum Prössl, 1990, p.106–107, pl.15, figs.5–7 ex Prössl, 1992b, p.113. Holotype: Prössl, 1990, pl.15, figs.6–7. This name was not validly published in Prössl (1990, p.106–107), since that author did not specify the lodgment of the holotype. Age: late Cenomanian.

parvum (Cookson and Eisenack, 1958, p.28, pl.4, figs.12–13) Cookson and Eisenack, 1960a, p.5. Holotype: Cookson and Eisenack, 1958, pl.4, fig.12; lost according to Cookson and Eisenack (1960a, p.5). Neotype: Cookson and Eisenack, 1960a, pl.1, fig.23, designated by Cookson and Eisenack (1960a, p.5). Originally *Deflandrea*, subsequently (and now) *Ascodinium*. Age: late Albian–Cenomanian.

"pontis-mariae" (Deflandre, 1936b, p.167, pl.2, figs.7–9) Deflandre, 1966, p.3. Holotype: Deflandre, 1936b, pl.2, fig.7. **NOW** *Subtilisphaera*. Originally *Gymnodinium* (Appendix B), subsequently *Deflandrea*, thirdly *Ascodinium*, fourthly (and now) *Subtilisphaera*. Age: ?Senonian.

"scabrosum" Cookson and Hughes, 1964, p.40–41, pl.5, figs.1–3. Holotype: Cookson and Hughes, 1964, p.40, pl.5, fig.1. **NOW** *Ovoidinium*. Originally *Ascodinium*, subsequently (and now) *Ovoidinium*. Age: late Albian–early Cenomanian.

serratum Cookson and Eisenack, 1960a, p.5, pl.1, figs.21–22. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.22. Age: Albian–Cenomanian.

"stagonoides" Benedek, 1972, p.10, pl.2, fig.12; text-fig.5. Emendation: Benedek and Sarjeant, 1981, p.324, as *Ascodinium stagonoides*. Holotype: Benedek, 1972, pl.2, fig.12; and Benedek and Sarjeant, 1981, fig.3, nos.1,3. **NOW** *Senoniasphaera*. Originally *Ascodinium*, subsequently *Deflandrea*, thirdly (and now) *Senoniasphaera*. Age: late Oligocene.

"*trendallii*" Cookson and Eisenack, 1970a, p.145–146, pl.12, figs.5–6. Emendation: Pavlishina, 1995, p.138–139, as *Trithyrodinium trendallii*. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.5. **NOW** *Trithyrodinium*. Originally *Ascodinium*?, subsequently *Subtilisphaera*?, thirdly (and now) *Trithyrodinium*. Questionable assignment: Cookson and Eisenack (1970a, p.145). Age: Albian–Cenomanian.

"*verrucosum*" Cookson and Hughes, 1964, p.41, pl.5, figs.4–7. Holotype: Cookson and Hughes, 1964, pl.5, fig.4. **NOW** *Ovoidinium*. Originally *Ascodinium*, subsequently (and now) *Ovoidinium*. Age: late Albian–early Cenomanian.

"subsp. *ostium*" (Davey, 1970, p.353, pl.4, figs.5–6; text-fig.1B) Lentin and Williams, 1985, p.29. Holotype: Davey, 1970, pl.4, fig.5. **NOW** *Ovoidinium verrucosum* subsp. *ostium*. Originally *Ovoidinium ostium*, subsequently *Ovoidinium verrucosum* var. *ostium*, thirdly (and now) *Ovoidinium verrucosum* subsp. *ostium*, fourthly *Ascodinium verrucosum* subsp. *ostium*. Age: Albian–early Cenomanian.

"subsp. *verrucosum*". Autonym. Holotype: Cookson and Hughes, 1964, pl.5, fig.4. **NOW** *Ovoidinium verrucosum* subsp. *verrucosum*. Originally (and now) *Ovoidinium verrucosum* subsp. *verrucosum*, subsequently *Ascodinium verrucosum* subsp. *verrucosum*.

"*waltonii*" (Pocock, 1972, p.93, pl.22, figs.13–14) Helenes, 1983, p.261. Holotype: Pocock, 1972, pl.22, fig.14. **NOW** *Ovoidinium*. Originally *Evittia* (generic name illegitimate), subsequently *Pocockia*, thirdly (and now) *Ovoidinium*, fourthly *Ascodinium*. Age: ?Toarcian–?Bajocian.

"**ASTROCYSTA**" Davey, 1970, p.359. **Taxonomic senior synonym:** *Palaeoperidinium*, according to Lentin and Williams (1976, p.150). This name was not validly published in Sarjeant (1967b, p.243), since no description was given. Type: Pocock, 1962, pl.14, fig.219, as *Palaeoperidinium cretaceum*.

"*ampla*" (Harland, 1973, p.673–674, pl.84, figs.1,7; text-fig.8) Harker and Sarjeant, 1975, p.264. Holotype: Harland, 1973, pl.84, fig.1. **Combination not validly published:** basionym not fully referenced. Originally *Lejeunia* (generic name illegitimate), subsequently *Astrocysta* (combination not validly published), thirdly *Palaeoperidinium*. **Taxonomic senior synonym:** *Palaeoperidinium cretaceum*, according to Harker and Sarjeant in Harker et al. (1990, p.128). Age: late Campanian.

"**cretacea*" Pocock, 1962, p.80, pl.14, figs.219–221 ex Davey, 1970, p.359. Emendation: Harding, 1990a, p.44, as *Palaeoperidinium cretaceum*. Holotype: Pocock, 1962, pl.14, fig.219. **NOW** *Palaeoperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Astrocysta*, thirdly *Lejeunia*? (combination illegitimate), fourthly *Subtilisphaera*, fifthly (and now) *Palaeoperidinium*. Taxonomic junior synonyms: *Lejeunia* (as *Palaeoperidinium*) *ampla*, according to Harker and Sarjeant in Harker et al. (1990, p.128); and *Astrocysta* (subsequently *Palaeoperidinium*) *manumcooksonii*, according to Lentin and Williams (1976, p.110). The name *Palaeoperidinium cretaceum* was not validly published in Pocock (1962) since the generic name *Palaeoperidinium* was not validly published until 1967. The name *Astrocysta cretacea* was not validly published in Sarjeant (1967b, p.243) since the generic name *Astrocysta* was not validly published until 1970. Davey (1970, p.359), while validating this name, proposed an "emended diagnosis". Age: Albian–Aptian.

"*kozłowskii*" (Górka, 1963, p.41, pl.5, fig.4) Davey, 1970, p.360. Holotype: Górka, 1963, pl.5, fig.4. **NOW** *Phelodinium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Astrocysta*, thirdly *Senegalinium*, fourthly (and now) *Phelodinium*. Taxonomic senior synonym: *Lejeunia* (now *Phelodinium*) *tricuspis*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Lejeunia* (as *Phelodinium*) *kozłowskii*. Age: late Maastrichtian.

"*manumcooksonii*" Corradini, 1973, p.176–177, pl.28, figs.4,6. Holotype: Corradini, 1973, pl.28, fig.4. Originally *Astrocysta*, subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Palaeoperidinium cretaceum*, according to Lentin and Williams (1976, p.110). Age: Late Cretaceous–Paleocene.

"*tricuspis*" (Wetzel, 1933a, p.166, pl.2, fig.14) Davey, 1970, p.360. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.20, as *Lejeunecysta tricuspis*. Holotype: Wetzel, 1933a, pl.2, fig.14; Lejeune-Carpentier, 1942, fig.21; and

Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.5. **NOW** *Phelodinium*. Originally *Peridinium* (Appendix B), subsequently *Lejeunia* (combination illegitimate), thirdly *Astrocysta*, fourthly *Senegalinium*, fifthly *Lejeunecysta*, sixthly (and now) *Phelodinium*. Taxonomic junior synonym: *Lejeunia* (now *Phelodinium*) *kozłowskii*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Phelodinium kozłowskii*. Age: Senonian.

ASYMMETROPECYSTA He Chengquan et al., 2009, p.509–510,643. Type: Mao Shaozhi, 1989, pl.30, fig 6, as a cyst of *Protoperidinium* (*Protoperidinium* section *Asymmetropedinium*) *punctulatum*.

**scabrata* He Chengquan et al., 2009, p.510,643–644, pl.13, figs.13,15–16. Holotype: Mao Shaozhi, 1989, pl.30, fig 6. Age: middle-late Pleistocene.

ATAXIODINIUM Reid, 1974, p.588. Taxonomic senior synonym: *Planinosphaeridium*, by implication in Wall et al. (1977, p.149), who transferred the "type species" of *Ataxiodinium*, *Ataxiodinium choane*, to *Planinosphaeridium* — however, Edwards and Andrlé (1992, p.265) retained *Ataxiodinium*. Type: Reid, 1974, pl.1, figs.1–2, as *Ataxiodinium choane*.

**choane* Reid, 1974, p.588–589, pl.1, figs.1–2. Holotype: Reid, 1974, pl.1, figs.1–2; and Fensome et al., 1993a, figs.1–2 — p.1053. Originally (and now) *Ataxiodinium*, subsequently *Planinosphaeridium*. Edwards and Andrlé (1992, p.265) retained this species in *Ataxiodinium*. Taxonomic senior synonym: *Planinosphaeridium membranaceum*, according to Dale (1976, p.45; footnote to table II) — however, Wall et al. (1977, p.149) retained *Ataxiodinium* (as *Planinosphaeridium*) *choane*. N.I.A. Age: Holocene.

confusum Versteegh and Zevenboom in Versteegh, 1995, p.87–88, pl.1, figs.1–9; pl.3, fig.9. Holotype: Versteegh, 1995, pl.1, figs.1,4,7; Versteegh and Zevenboom, 1995, pl.1, figs.1,4,7. Versteegh and Zevenboom (1995, p.217) also proposed this name. Age: early–late Pliocene (early Zanclean–mid Piacenzian).

"*elongatum*" Zevenboom and Santarelli in Zevenboom, 1995, p.141–142, pl.1, figs.7–12. Holotype: Zevenboom, 1995, pl.1, figs.7–9. **Name not validly published**: considered a manuscript name by the authors. **Taxonomic senior synonym**: *Ataxiodinium zevenboomii*, according to Head (1997, p.171–172). Age: ?late Miocene–early Pliocene.

scaldemense Louwye, 2001, p.123, fig.3, nos.1–12. Holotype: Louwye, 2001, fig.3, nos.1–4. Age: early-middle Miocene.

zevenboomii Head, 1997, p.171–172, fig.5; fig.6, nos.4–6,16; fig.18, nos.5–6. Holotype: Head, 1997, fig.6, nos.4–9. Taxonomic junior synonym: *Ataxiodinium elongatum* (name not validly published), according to Head (1997, p.171–172). Age: middle Pliocene.

ATHIGMATOCYSTA Duxbury, 1977, p.23–24. Taxonomic senior synonyms: *Endoscrinium*, according to Below (1981a, p.48); and *Scriniodinium*, according to Stover and Williams (1987, p.27) — however, Harding (1990b, p.28) and Riding and Fensome (2003, p.23–24) retained *Athigmatocysta*. Type: Duxbury, 1977, pl.11, figs.1,6; text-fig.3, as *Athigmatocysta glabra*.

**glabra* Duxbury, 1977, p.24, pl.11, figs.1,6; text-fig.3. Holotype: Duxbury, 1977, pl.11, figs.1,6; text-fig.3; Jan du Chêne et al., 1986a, pl.111, figs.9–10; and Fensome et al., 1995, figs.1–2 — p.1511. Originally (and now) *Athigmatocysta*, subsequently *Endoscrinium*, thirdly *Scriniodinium*. Harding (1990b, p.28) retained this species in *Athigmatocysta*. Age: late Berriasian–mid Barremian.

"*granulata*" Raynaud, 1978, p.391–392, pl.2, figs.6,12. Holotype: Raynaud, 1978, pl.2, fig.6; and Jan du Chêne et al., 1986a, pl.111, figs.13–14. **NOW** *Endoscrinium*. Originally *Athigmatocysta*, subsequently (and now) *Endoscrinium*, thirdly *Scriniodinium*. Age: late Kimmeridgian–Portlandian.

ATLANTODINIUM Zotto et al., 1987, p.202. Type: Zotto et al., 1987, pl.4, figs.6a–b, as *Atlantodinium jurassicum*.

**jurassicum* Zotto et al., 1987, p.202–203, pl.4, figs.6a–b; text-figs.6a–b. Holotype: Zotto et al., 1987, pl.4, figs.6a–b; and Fensome et al., 1995, figs.1–2 — p.1581. Age: Kimmeridgian.

ATOPODINIUM Drugg, 1978, p.62. Emendations: Masure, 1991, p.64–65; Slimani, 2004, p.182. Taxonomic junior synonyms: *Maghrebinia*, *Bejuia*, and *Burtonia* Beju (illegitimate name) all according to Masure (1991, p.64) and Masure in Fauconnier and Masure (2004, p.88). Type: Drugg, 1978, pl.1, fig.1, as *Atopodinium prostatum*.

"*chleuh*" (Below, 1981a, p.22–23, pl.1, figs.5a–b; pl.12, fig.5; text-figs.13a–b) Masure, 1991, p.65. Emendation: Masure, 1988a, p.365–366, as *Maghrebinia chleuh*. Holotype: Below, 1981a, pl.1, figs.5a–b; text-figs.13a–b; and Masure, 1988a, pl.2, figs.1–8; text-figs.3a–b; Fensome et al., 1991, figs.1–4 — p.619; Fauconnier and Masure, 2004, pl.9, figs.1–3. **NOW** *Montanarocysta*. Originally *Maghrebinia*, subsequently *Atopodinium*, thirdly (and now) *Montanarocysta*. N.I.A. Age: Vraconian–Cenomanian.

"*cretaceum*" Prössl, 1990, p.107–108, pl.5, figs.4–5; pl.6, fig.9 ex Prössl, 1992b, p.113. Holotype: Prössl, 1990, pl.5, figs.4–5; Fauconnier and Masure, 2004, pl.9, fig.10. **Taxonomic senior synonym:** *Atopodinium haromense*, according to Masure in Fauconnier and Masure (2004, p.74). This name was not validly published in Prössl (1990, p.107–108), since that author did not specify the lodgment of the holotype. Age: early Hauterivian–early Barremian.

haromense Thomas and Cox, 1988, p.319–321,323, pl.1, figs.1–6; text-fig.4. Holotype: Thomas and Cox, 1988, pl.1, figs.1–2; text-fig.4; Masure, 1991, pl.1, figs.1–3; text-figs.1a–b; Fauconnier and Masure, 2004, pl.9, fig.4. Taxonomic junior synonyms: *Maghrebinia breviornata*, according to Masure (1991, p.65); and *Atopodinium cretaceum*, according to Masure in Fauconnier and Masure (2004, p.74). Age: late Oxfordian–early Kimmeridgian.

iuvene Prössl, 1990, p.108, pl.17, figs.2,5,8,10 ex Prössl, 1992b, p.113. Holotype: Prössl, 1990, pl.17, figs.2,5; Fauconnier and Masure, 2004, pl.9, fig.11. This name was not validly published in Prössl (1990, p.108), since that author did not specify the lodgment of the holotype. Age: late Turonian.

"*mirabile*" (Below, 1984, p.635–636, pl.6, fig.2) Masure, 1991, p.68. Emendation: Masure, 1988a, p.366–368, as *Maghrebinia mirabilis*. Holotype: Below, 1981a, pl.1, figs.1a–c, as *Maghrebinia perforata*; Masure, 1988a, pl.3, figs.1–11; text-figs.4a–c; Fauconnier and Masure, 2004, pl.10, figs.1–4. **NOW** *Montanarocysta mirabilis*. Originally *Maghrebinia perforata* subsp. *mirabilis*, subsequently *Maghrebinia mirabilis*, thirdly *Atopodinium mirabile*, fourthly (and now) *Montanarocysta mirabilis*. Age: late Albian–early Cenomanian.

perforatum (Clarke and Verdier, 1967, p.36–37, pl.6, figs.1–3; text-fig.15) Masure, 1991, p.68. Emendations: Davey and Verdier, 1971, p.30, as *Pterodinium perforatum*; Below, 1981a, p.23–24 and Masure, 1988a, p.363–364, both as *Maghrebinia perforata*. Holotype: Clarke and Verdier, 1967, pl.6, figs.1–2; Masure, 1988a, pl.1, figs.1–9; text-figs.1a–b; Fensome et al., 1995, figs.1–2 — p.1653; Fauconnier and Masure, 2004, pl.10, figs.5–6. Originally *Dinopterygium*, subsequently *Pterodinium*, thirdly *Pterodinium?*, fourthly *Maghrebinia*, fifthly (and now) *Atopodinium*. Age: early Cenomanian.

polygonale (Beju, 1983, p.107,109,111; text-figs.3A–F,4A–F,5A–D) Masure, 1991, p.68. Emendation: Masure, 1991, p.68,70–71, as *Atopodinium polygonale*. Holotype: Beju, 1983, text-figs.4A–B; Masure, 1991, pl.2, figs.1,4; text-figs.3a–b; Fensome et al., 1995, figs.1–4 — p.1675; Fauconnier and Masure, 2004, pl.10, figs.8–11. Originally *Burtonia* (generic name illegitimate), subsequently *Bejuia*, thirdly (and now) *Atopodinium*. Age: early Bathonian.

**prostatum* Drugg, 1978, p.63, pl.1, figs.1–7; text-figs.1A–D. Emendation: Masure, 1991, p.71–72,74,76. Holotype: Drugg, 1978, pl.1, fig.1; Masure, 1991, pl.3, figs.1–2; Fensome et al., 1995, fig.1 — p.1701; Fauconnier and Masure, 2004, pl.10, fig.12. Age: late Callovian–early Oxfordian.

"**AUSTRALIELLA**" Vozzhennikova, 1967, p.129–130. **Taxonomic senior synonym:** *Chatangiella*, according to Lentin and Williams (1976, p.151–152). Type: Cookson and Eisenack, 1960a, pl.1, fig.10, as *Deflandrea tripartita*.

"**bondarenkoi**" Vozzhennikova, 1967, p.130–131, pl.59, figs.1a–b; pl.60, fig.2. Emendations: Lentin and Vozzhennikova, 1990, p.41 and Lebedeva in Ilyina et al., 1994, p.68–69, both as *Chatangiella bondarenkoi*. Holotype: Vozzhennikova, 1967, pl.59, fig.1b; pl.60, fig.2; Lentin and Vozzhennikova, 1990, pl.4, figs.6–7; text-fig.17. **NOW** *Chatangiella*. Originally *Australiella*, subsequently (and now) *Chatangiella*. Taxonomic junior synonyms: *Australiella* (now *Chatangiella*) *chetiensis* and *Chatangiella obtusa*, both according to Lentin and Vozzhennikova (1990, p.41) — however, Lebedeva in Ilyina et al. (1994, p.67) retained *Australiella* (as and now *Chatangiella*) *chetiensis* and *Chatangiella obtusa* is now considered a taxonomic junior synonym of *Australiella* (as and now *Chatangiella*) *chetiensis*. Age: Santonian.

"**chetiensis**" Vozzhennikova, 1967, p.131, pl.60, figs.1a–b. Emendation: Lebedeva in Ilyina et al., 1994, p.67–68, as *Chatangiella chetiensis*. Holotype: Vozzhennikova, 1967, pl.60, fig.1. **NOW** *Chatangiella*. Originally *Australiella*, subsequently (and now) *Chatangiella*. Taxonomic senior synonym: *Australiella* (now *Chatangiella*) *bondarenkoi*, according to Lentin and Vozzhennikova (1990, p.41) — however, Lebedeva in Ilyina et al. (1994, p.67) retained *Australiella* (as *Chatangiella*) *chetiensis*. Taxonomic junior synonym: *Chatangiella obtusa*, according to Lebedeva in Ilyina et al. (1994, p.67). Age: Santonian.

"**cooksoniae**" (Alberti, 1959b, p.97, pl.9, figs.1–6) Vozzhennikova, 1967, p.132. Holotype: Alberti, 1959b, pl.9, fig.2. **NOW** *Isabelidium*. Originally *Deflandrea*, subsequently *Australiella*, thirdly *Isabelia* (combination illegitimate), fourthly (and now) *Isabelidium*. Taxonomic junior synonyms: *Deflandrea* (as *Isabelidium*) *belfastensis* and *Isabelidium bujakii*, according to Fensome et al. (2009, p.39). Age: Late Cretaceous.

"**granulifera**" (Manum, 1963, p.61, pl.3, figs.5–9) Vozzhennikova, 1967, p.132–133. Holotype: Manum, 1963, pl.3, figs.5–6. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Taxonomic junior synonym: *Cooksoniella* (as and now *Chatangiella*) *vnigrii*, according to Lentin and Vozzhennikova (1990, p.47) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (as and now *Chatangiella*) *vnigrii*. Age: Senonian.

"subsp. **granulifera**". Autonym. Holotype: Manum, 1963, pl.3, figs.5–6. **NOW** *Chatangiella granulifera* subsp. *granulifera*. Originally *Australiella granulifera* subsp. *granulifera*, subsequently (and now) *Chatangiella granulifera* subsp. *granulifera*.

"subsp. **tenuis**" (Davey, 1970, p.340–341, pl.2, fig.1) Lentin and Williams, 1973, p.18. Holotype: Davey, 1970, pl.2, fig.1. **NOW** *Chatangiella granulifera* subsp. *tenuis*. Originally *Deflandrea granulifera* var. *tenuis*, subsequently *Australiella granulifera* subsp. *tenuis*, thirdly (and now) *Chatangiella granulifera* subsp. *tenuis*. Age: Albian.

"**micracantha**" (Cookson and Eisenack, 1960a, p.3, pl.1, fig.9) Lentin and Williams, 1973, p.18. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.9; Cookson and Manum, 1964, pl.76, figs.9–11. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Campanian.

"**spasica**" Grigorovich, 1969b, p.67–68, pl.1, fig.1. Holotype: Grigorovich, 1969b, pl.1, fig.1. **NOW** *Isabelidium*. Originally *Australiella*, subsequently (and now) *Isabelidium*. Age: Late Cretaceous.

"**spectabilis**" (Alberti, 1959b, p.99, pl.9, fig.78) Lentin and Williams, 1973, p.18. Emendation: Lebedeva in Ilyina et al., 1994, p.66, as *Chatangiella spectabilis*. Holotype: Alberti, 1959b, pl.9, fig.78. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: late Senonian.

"***tripartita**" (Cookson and Eisenack, 1960a, p.2–3, pl.1, fig.10) Vozzhennikova, 1967, p.134–135. Emendation: Cookson and Manum, 1964, p.521–522, as *Deflandrea tripartita*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.10; Cookson and Manum, 1964, pl.76, figs.1–2. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Senonian.

"**verrucosa**" (Manum, 1963, p.60–61, pl.3, figs.1–4) Lentin and Williams, 1973, p.18. Holotype: Manum, 1963, pl.3, figs.1–2. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Trithyrodinium*, thirdly *Australiella*, fourthly (and now) *Chatangiella*. Taxonomic junior synonym: *Cooksoniella* (now *Chatangiella*) *vnigrii*, according to Yun Hyesu (1981, p.66) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (now *Chatangiella*) *vnigrii*. Age: Middle Cretaceous.

"**victoriensis**" (Cookson and Manum, 1964, p.522, pl.76, figs.3–8) Lentin and Williams, 1973, p.19. Emendation: Lebedeva in Ilyina et al., 1994, p.67, as *Chatangiella victoriensis*. Holotype: Cookson and Manum, 1964, pl.76, figs.3–4; Helby et al., 1987, fig.41A. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Senonian.

AUSTRALISPHAERA Davey, 1978, p.892. Emendations: Duxbury, 1983, p.25; Harding, 1986a, p.100 — however, see Harding (1990b, p.21). Type: Davey, 1978, pl.2, fig.1, as *Australisphaera verrucosa*.

"**cruciata**" Qiao Xiuyun et al., 1992, p.31,35–36, pl.1, figs.13–15. Holotype: Qiao Xiuyun et al., 1992, pl.1, fig.13; Gao Ruiqi et al., 1992b, pl.6, fig.10. **Taxonomic senior synonym:** *Vesperopsis glabra*, according to Mao Shaozhi et al. (1999, p.150). Age: Berriasian–Barremian.

"**digitata**" (Duxbury, 1983, p.35–36, pl.3, fig.15; text-fig.15) Jain and Khowaja-Ateequzzaman, 1984, p.39. Holotype: Duxbury, 1983, pl.3, fig.15; text-fig.15. **NOW** *Vesperopsis*. Originally *Muderongia*?, subsequently *Australisphaera*, thirdly (and now) *Vesperopsis*, fourthly *Vesperopsis*?. Age: late Aptian.

"**dolabella**" Duxbury, 1983, p.25–26, pl.3, fig.11; text-fig.7. Holotype: Duxbury, 1983, pl.3, fig.11; text-fig.7. **NOW** *Vesperopsis*. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*, thirdly *Vesperopsis*?. Age: early Albian.

"**fragilis**" Harding, 1986a, p.100–101, pl.16, figs.6–9; pl.17, fig.9; text-fig.2. Holotype: Harding, 1986a, pl.16, fig.6. **NOW** *Vesperopsis*. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*. Age: late Hauterivian.

"**longicornis**" Batten and Lister, 1988, p.340–341, figs.1b–e.g. Emendation: Harding, 1990b, p.21–22, as *Vesperopsis longicornis*. Holotype: Batten and Lister, 1988, figs.1b–c. **NOW** *Vesperopsis*. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*. Age: Barremian.

"**pannosa**" (Duxbury, 1980, p.129–130, pl.10, figs.3,6; text-figs.12A–B) Duxbury, 1983, p.27. Holotype: Duxbury, 1980, pl.10, fig.3; text-fig.12B. **NOW** *Nyktericysta*?. Originally *Muderongia*, subsequently *Australisphaera*, thirdly (and now) *Nyktericysta*?. Age: middle Barremian.

"**pseudovitrea**" Lister and Batten, 1988b, p.25–27, pl.3, figs.2–3; text-fig.6B, nos.1–4. Holotype: Lister and Batten, 1988b, pl.3, fig.3; text-fig.6B, no.1. **NOW** *Vesperopsis*. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*. Age: latest Barremian–early Aptian.

***verrucosa** Davey, 1978, p.893, pl.2, figs.1–5. Holotype: Davey, 1978, pl.2, fig.1; Fensome et al., 1995, fig.1 — p.1901. Age: Campanian–Maastrichtian.

"**vitrea**" Duxbury, 1983, p.26–27, pl.2, fig.11; pl.3, fig.5; text-fig.8. Holotype: Duxbury, 1983, pl.2, fig.11; text-fig.8. **NOW** *Nyktericysta*?. Originally *Australisphaera*, subsequently (and now) *Nyktericysta*?. Age: early Aptian.

AVELLODINIUM Duxbury, 1977, p.24. Emendation: Backhouse, 1988, p.75. Taxonomic senior synonyms: *Callaiosphaeridium*, according to Below (1981a, p.27) — however, Lentin and Williams (1981, p.23) retained *Avellodinium*; *Dichadogonyaulax*, by implication in Davey (1982b, p.26), who transferred the "type species" of *Dichadogonyaulax*, *Dichadogonyaulax culmula*, to *Avellodinium* — however, Lentin and Williams (1985, p.31) retained *Avellodinium*. Type: Duxbury, 1977, pl.5, figs.1–2, as *Avellodinium falsificum*.

"culmula" (Norris, 1965, p.793–795, figs.1–2,6–9) Davey, 1982b, p.26. Holotype: Norris, 1965, figs.8–9. **NOW** *Dichadogonyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Avellodinium*. N.I.A. Age: Portlandian.

***falsificum** Duxbury, 1977, p.24–26, pl.5, figs.1–3; text-fig.4. Holotype: Duxbury, 1977, pl.5, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1171. Originally (and now) *Avellodinium*, subsequently *Callaiosphaeridium*. Lentin and Williams (1981, p.23) retained this species in *Avellodinium*. Taxonomic junior synonym (at specific rank): *Hystrichosphaera furcata* forma *aulosphaeropsis* (subsequently *Spiniferites ramosus?* subsp. *aulosphaeropsis*), according to Sarjeant (1985b, p.156–157). Age: late Berriasian–early Barremian.

flagellatum Davey, 1988, p.34–35, pl.1, figs.1–5. Holotype: Davey, 1988, pl.1, figs.1–2; Fensome et al., 1996, figs.1–2 — p.2127. Age: Valanginian.

?hauteriviense Prössl, 1990, p.99–100, pl.1, figs.3,7,14–15 ex Prössl, 1992b, p.113. Holotype: Prössl, 1990, pl.1, figs.3,7. This name was not validly published in Prössl (1990, p.99–100), since that author did not specify the lodgment of the holotype. Questionable assignment: Prössl (1990, p.99). Age: early–late Hauterivian.

lepidum Backhouse, 1988, p.75, pl.19, figs.3a–b,4–5,6a–b,7; pl.47, fig.1. Holotype: Backhouse, 1988, pl.19, figs.6a–b; Fensome et al., 1996, figs.5–6 — p.2191. Age: late Valanginian–early Aptian.

AXIODINIUM Williams, Damassa, Fensome and Guerstein in Fensome et al., 2009, p.16. Type: Williams and Downie, 1966b, pl.18, fig.1, as *Wetzeliella articulata*.

abortivum (Yu Jingxian, 1989, p.154–155, pl.56, fig.4; pl.57, fig.4) Williams et al., 2015, p.301. Holotype: Yu Jingxian, 1989, pl.56, fig.4. Originally *Wetzeliella*, subsequently (and now) *Axiodinium*. Age: Eocene.

augustum (Harland, 1979c, p.63, pl.2, figs.13–15) Williams et al., 2015, p.301. Holotype: Harland, 1979c, pl.2, fig.13. Originally *Wetzeliella* subgenus *Apectodinium*, subsequently *Apectodinium*, thirdly (and now) *Axiodinium*. Age: latest Paleocene.

degeneratum (Yu Jingxian, 1989, p.152, pl.54, figs.2–3) Williams et al., 2015, p.301. Holotype: Yu Jingxian, 1989, pl.54, fig.2. Originally *Wetzeliella*, subsequently (and now) *Axiodinium*. Age: Paleocene.

lunare (Gocht, 1969, p.13–15, pl.10, figs.1–3; text-fig.6) Williams et al. 2015, p.301. Holotype: Gocht, 1969, pl.10, fig.3. Originally *Wetzeliella*, subsequently (and now) *Axiodinium*. Age: early–?late Eocene.

***prearticulatum** Williams, Damassa, Fensome and Guerstein in Fensome et al., 2009, p.16–17, pl.3, figs.g,r. Holotype: Williams and Downie, 1966b, pl.18, fig.1, as *Wetzeliella articulata*. Age: Ypresian.

sparnacium Iakovleva, 2016, p.4 (on PDF initially published online), pl.1, figs.6,9–11; text-fig.4b (part). Holotype: Iakovleva, 2016, pl.1, figs.10–11. Age: earliest Eocene.

tesselatum (Châteauneuf and Gruas-Cavagnetto, 1978, p.65–66, pl.1, figs.1–2) Williams et al., 2015, p.301. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.1, figs.1–2. Originally *Apectodinium homomorphum* subsp. *tesselatum*, subsequently *Wilsonidium tesselatum*, thirdly (and now) *Axiodinium tesselatum*. Age: early Eocene.

"BACCHIDINIUM" Davey, 1979b, p.555. **Taxonomic senior synonym:** *Kiokansium*, according to Below (1982c, p.13–15) and Davey (1982a, p.377). Type: Cookson and Eisenack, 1962b, pl.4, figs.11–13, as *Hystrichosphaeridium recurvatum* subsp. *polypes*.

***"polypes"** (Cookson and Eisenack, 1962b, p.491–492, pl.4, figs.11–13) Davey, 1979b, p.555. Emendation: Duxbury, 1983, p.49, as *Kiokansium polypes*. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. Originally *Hystrichosphaeridium recurvatum* subsp. *polypes*, subsequently *Polysphaeridium?* *polypes* (combination not validly published), thirdly *Cleistosphaeridium polypes*, fourthly

Bacchidinium polypes, fifthly *Impletosphaeridium polypes*, sixthly *Kiokansium polypes*. **Taxonomic senior synonym** (at specific rank): *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, by implication in Duxbury (1983, p.49), who considered *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*) to be the senior name. Taxonomic junior synonym: *Cleistosphaeridium?* *solidum*, according to Below (1982c, p.16). Age: Albian–Cenomanian.

"subsp. *clavulum*" (Davey, 1969a, p.154–155, pl.6, figs.9–10) Lentin and Williams, 1981, p.24. Holotype: Davey, 1969a, pl.6, fig.9; Fauconnier and Masure, 2004, pl.50, fig.1. **NOW** *Impletosphaeridium?* *clavulum*. Originally *Cleistosphaeridium polypes* var. *clavulum*, subsequently *Cleistosphaeridium polypes* subsp. *clavulum*, thirdly *Impletosphaeridium polypes* subsp. *clavulum*, fourthly *Bacchidinium polypes* subsp. *clavulum*, fifthly *Cleistosphaeridium clavulum*, sixthly *Impletosphaeridium clavulum*, seventhly (and now) *Impletosphaeridium?* *clavulum*. This combination was not validly published in Davey (1979b, p.553), since that author did not fully reference the basionym. Age: Cenomanian.

"subsp. *polypes*". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. **Now redundant**. Originally *Cleistosphaeridium polypes* subsp. *polypes*, subsequently *Bacchidinium polypes* subsp. *polypes*, thirdly *Impletosphaeridium polypes* subsp. *polypes*, fourthly *Kiokansium polypes* subsp. *polypes*.

"*sarmentum*" Davey, 1979b, p.555, pl.1, figs.8–12. Holotype: Davey, 1979b, pl.1, figs.8–9,12. **NOW** *Kleithriasphaeridium?*. Originally *Bacchidinium*, subsequently *Kiokansium*, thirdly (and now) *Kleithriasphaeridium?*. N.I.A. Age: late Aptian–middle Albian.

"**BAILEYELLA**" Özdikmen, 2009, p.234. **Name illegitimate** — **nomenclatural senior synonym**: *Durotrigia*. Özdikmen (2009) considered *Durotrigia* Bailey to be illegitimate because it is a junior homonym of *Durotrigia* Hoffstetter, 1967; however, *Durotrigia* Hoffstetter is an animal and under the I.C.N. it does not pre-empt *Durotrigia* Bailey. Type: Bailey, 1987, pl.2, figs.1,4,9, as *Durotrigia daveyi*.

"**daveyi*" (Bailey, 1987, p.89,91,94, pl.1, figs.1–5; pl.2, figs.1–11; text-figs.2A–D) Özdikmen, 2009, p.234. Holotype: Bailey, 1987, pl.2, figs.1,4,9; Fensome et al., 1993a, figs.1–2 — p.1095. **NOW** *Durotrigia*. Originally (and now) *Durotrigia*, subsequently *Baileyella* (generic name illegitimate). Although Özdikmen (2009) did not fully reference the basionym when proposing the transfer of this species to *Baileyella*, he did so under the aegis of the I.C.Z.N., so the combination can be considered validly published. Age: early Bajocian.

BALCATTIA Cookson and Eisenack, 1974, p.78. Emendation: Riding, Helby and Stevens in Riding and Helby, 2001g, p.184. Type: Cookson and Eisenack, 1974, pl.24, fig.8, as *Balcattia cirrifera*.

cheleusis Riding, Helby and Stevens in Riding and Helby, 2001g, p.184,186, figs.3A–P. Holotype: Riding and Helby, 2001g, figs.3E–F. Taxonomic junior synonyms: *Emmetrocyta cheleusis* and *Rigaudella separata* (both names not validly published), both according to Riding and Helby (2001g, p.184). Age: Tithonian.

cirribarbata Cookson and Eisenack, 1982, p.48, pl.8, fig.15. Holotype: Cookson and Eisenack, 1982, pl.8, fig.15. Age: late Albian–Cenomanian.

**cirrifera* Cookson and Eisenack, 1974, p.78, pl.24, fig.8; pl.28, fig.16. Holotype: Cookson and Eisenack, 1974, pl.24, fig.8. Age: Albian–Cenomanian.

"**BALMULA**" Bint, 1986, p.158. **Taxonomic senior synonym**: *Nyktericysta*, according to Fensome et al. (2009, p.46). Type: Bint, 1986, pl.6, figs.10,14–16, as *Balmula tripenta*.

"*granorugosa*" Qiao Xiuyun et al., 1992, p.31,36, pl.2, fig.10. Holotype: Qiao Xiuyun et al., 1992, pl.2, fig.10; Gao Ruiqi et al., 1992b, pl.2, fig.5; Gao Ruiqi et al., 1992c, pl.1, fig.11. **NOW** *Nyktericysta*. Originally *Balmula*, subsequently (and now) *Nyktericysta*. Age: Berriasian–Barremian.

"*granulata*" Gao Ruiqi et al., 1992a, p.17–18,23–24, pl.1, fig.19. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.19; Gao Ruiqi et al., 1992b, pl.8, fig.9. **NOW** *Nyktericysta*. Originally *Balmula*, subsequently (and now) *Nyktericysta*. Age: Campanian.

"*pentaradiata*" (Singh, 1983, p.127, pl.43, fig.5) Bint, 1986, p.158. Holotype: Singh, 1983, pl.43, fig.5. **NOW** *Nyktericysta*. Originally *Muderongia*, subsequently *Balmula*, thirdly (and now) *Nyktericysta*. Age: early Cenomanian.

"*spinosa*" Gao Ruiqi et al., 1992a, p.18,24, pl.1, figs.17–18. Emendation: Mao Shaozhi et al., 1999, p.157, as *Quantouendinium spinosum*. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.17; Gao Ruiqi et al., 1992b, pl.8, fig.1; Mao Shaozhi et al., 1999, pl.4, fig.2. **NOW** *Nyktericysta*. Originally *Balmula*, subsequently *Quantouendinium*, thirdly (and now) *Nyktericysta*. He Chengquan et al. (2009, p.294) retained this species in *Balmula*. Age: Campanian.

"**tripenta*" Bint, 1986, p.158,160, pl.6, figs.9–17; pl.7, fig.8; text-figs.6A–B. Holotype: Bint, 1986, pl.6, figs.10,14–16; text-fig.6B; Fensome et al., 1995, figs.1,4,7 — p.1851. **NOW** *Nyktericysta*. Originally *Balmula*, subsequently (and now) *Nyktericysta*. Age: late Albian.

BALTEOCYSTA Stover and Evitt, 1978, p.226. Nomenclatural junior synonym: *Aiora* Davey (name illegitimate), which has the same type. Type: Cookson and Eisenack, 1960a, pl.2, fig.17, as *Aiora fenestrata*.

**perforata* (Davey, 1978, p.892) Wilson and Clowes, 1980, p.19. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.17 (as *Aiora fenestrata*); Fensome et al., 1996, fig.1 — p.2267; designated by Davey (1978, p.892). Originally *Aiora*, subsequently (and now) *Balteocysta*. Nomenclatural junior synonym: *Balteocysta rotula*, which has the same type. Lentin and Williams (1981, p.7) assumed that Davey named this species for the perforations it possesses: since it was perforate, he used the Latin "perforare", which is equivalent to the English infinitive "to perforate"; the Latin for the past participle is "perforatus". Age: Turonian.

"*rotula*" Stover and Evitt, 1978, p.226. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.17, as *Aiora fenestrata*; Fensome et al., 1996, fig.1 — p.2267, as *Balteocysta perforata*. **Name illegitimate** — **nomenclatural senior synonym**: *Balteocysta perforata*, which has the same type. N.I.A. Age: Turonian.

BARBATACYSTA Courtinat, 1989, p.185. Type: Erkmen and Sarjeant, 1980, text-fig.2, as *Sentusidinium creberbarbatum*.

baculata (Dodekova, 1975, p.28–29, pl.6, figs.1–3; text-fig.7) Courtinat, 1989, p.185. Holotype: Dodekova, 1975, pl.6, figs.1–3. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Barbatacysta*. Age: late Bathonian.

brevispinosa (Courtinat in Courtinat and Gaillard, 1980, p.60, pl.9, figs.4,7,11; text-fig.10e) Courtinat, 1989, p.185. Holotype: Courtinat and Gaillard, 1980, p.60, pl.9, fig.7; Fauconnier and Masure, 2004, pl.11, fig.1. Originally *Sentusidinium*, subsequently (and now) *Barbatacysta*. Taxonomic junior synonym: *Barbatacysta lemoignei*, according to Courtinat in Fauconnier and Masure (2004, p.83). Age: late Oxfordian.

capitata (Cookson and Eisenack, 1960b, p.252, pl.39, fig.9) Schrank, 2005, p.548. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.9; Fauconnier and Masure, 2004, pl.66, fig.1. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium*, thirdly *Tenua* Eisenack, fourthly *Batiacasphaera*, fifthly (and now) *Barbatacysta*. Age: Oxfordian–Kimmeridgian.

**creberbarbata* (Erkmen and Sarjeant, 1980, p.52–54, text-fig.2.) Courtinat, 1989, p.186. Holotype: Erkmen and Sarjeant, 1980, text-fig.2. Originally *Sentusidinium*, subsequently (and now) *Barbatacysta*. Taxonomic junior synonym: *Sentusidinium parvum*, according to Courtinat in Fauconnier and Masure (2004, p.83–84). Age: Oxfordian–Kimmeridgian.

"lemoinei" Courtinat, 1989, p.186–187, pl.18, figs.4–6,8; pl.21, fig.17; text-fig.80B. Holotype: Courtinat, 1989, pl.21, fig.17; Fauconnier and Masure, 2004, pl.11, fig.5. **Taxonomic senior synonym:** *Sentusidinium* (now *Barbatocysta*) *brevispinosum*, according to Courtinat in Fauconnier and Masure (2004, p.83). Age: Oxfordian.

"parva" (Kunz, 1990, p.33–34, pl.8, figs.14a–c,15a–c,16a–b; text-fig.11) Courtinat in Fauconnier and Masure, 2004, p.84. **Combination not validly published:** not accepted by its author. Holotype: Kunz, 1990, pl.8, figs.14a–c; text-fig.11. Originally *Sentusidinium*, subsequently *Barbatocysta* (name not validly published). **Taxonomic senior synonym:** *Sentusidinium* (now *Barbatocysta*) *creberbarbatum*, according to Courtinat in Fauconnier and Masure (2004, p.83–84). Courtinat in Fauconnier and Masure (2004) proposed this transfer while simultaneously and clearly proposing the species to be a junior synonym: he thus clearly did not accept *Barbatocysta parva* as a correct name. Age: late Oxfordian.

pelionensis (Fensome, 1979, p.13–15, pl.1, figs.5–9; text-fig.5B) Courtinat, 1989, p.187. Holotype: Fensome, 1979, pl.1, figs.5,7; text-fig.5B; Fauconnier and Masure, 2004, pl.11, fig.4. Originally *Sentusidinium*, subsequently (and now) *Barbatocysta*. Age: Bajocian–Bathonian.

pilosa (Ehrenberg, 1854, pl.37, section 8, fig.4) Courtinat, 1989, p.187. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatocysta pilosa*. This species may not have been validly published in Ehrenberg (1854) as no description has subsequently been referenced (or found by the present authors in the Ehrenberg's huge tome). In transferring this species to *Hystrichosphaeridium*, Deflandre (1937b, p.79) noted that Ehrenberg's figure appeared insufficient for meaningful identification. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1854) did not provide a description. Age: Oxfordian.

verrucosa (Sarjeant, 1968, p.232, pl.1, fig.17; pl.2, figs.3,6) Courtinat, 1989, p.187. Holotype: Sarjeant, 1968, pl.1, fig.17; pl.2, figs.3,6; Fauconnier and Masure, 2004, pl.11, figs.2–3. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly *Sentusidinium*, fourthly (and now) *Barbatocysta*. Age: late Callovian.

BARSSIDINIUM Lentin et al., 1994, p.575,577. Emendation: De Schepper et al., 2004, p.634. Type: Lentin et al., 1994, pl.2, figs.2,5, as *Barssidinium wrennii*.

evangelinae Lentin et al., 1994, p.578–579, pl.2, figs.3,7–8; pl.3, figs.1–6; text-fig.3H. Holotype: Lentin et al., 1994, pl.2, fig.8. Age: Tortonian–Pleistocene.

graminosum Lentin et al., 1994, p.579, pl.2, figs.9,11,12; text-fig.3C. Holotype: Lentin et al., 1994, pl.2, fig.11. Age: latest middle-late Miocene.

olymposum Warny and Wrenn, 1997, p.299,301, pl.9, figs.1–6. Holotype: Warny and Wrenn, 1997, pl.9, figs.3–5. Age: late Miocene.

pliocenicum (Head, 1993, p.40–41, fig.22, nos.5–14; fig.23) Head, 1994a, p.296. Emendation: De Schepper et al., 2004, p.634,636, as *Barssidinium pliocenicum*. Holotype: Head, 1993, fig.22, no.11; De Schepper et al., 2004, fig.10.7–9. Originally *Sumatradinium*, subsequently (and now) *Barssidinium*. Taxonomic junior synonym: *Barssidinium wrennii*, according to De Schepper et al. (2004, p.634). Age: latest Pliocene.

taxandrianum Louwye, 1999, p.119–121, pl.4, figs.1–6; pl.5, figs.1–2. Holotype: Louwye, 1999, pl.4, figs.4–6. Age: late Miocene.

"**wrenni*" Lentin et al., 1994, p.578, pl.1, fig.8; pl.2, figs.2,4–6,10; text-fig.3G. Holotype: Lentin et al., 1994, pl.2, figs.2,5. **Taxonomic senior synonym:** *Barssidinium pliocenicum*, according to De Schepper et al. (2004, p.634). Age: Serravallian?–Pliocene.

"**BASERUS**" Özdikmen, 2009, p.237. **Name illegitimate — nomenclatural senior synonym:** *Suessia*, which has the same type. In proposing the name *Baserus*, Özdikmen (2009, p.237) considered *Suessia* Morbey to be illegitimate because it is a junior homonym of *Suessia* Deslongchamps 1855; however, *Suessia* Deslongchamps is an animal and under the I.C.N. it does not pre-empt *Suessia* Morbey. Type: Morbey, 1975, pl.14, fig.5; pl.17, fig.4; text-figs.12a–c, as *Suessia swabiana*.

"**swabiana*" (Morbey, 1975, p.39–40, pl.14, figs.5–11; pl.17, figs.4–9; text-figs.12a–c,13a–c,14a–b,15) Özdikmen, 2009, p.237. Emendation: Below, 1987a, p.94–96 (as *Suessia swabiana*). **NOW** *Suessia*. Originally (and now) *Suessia*, subsequently *Baserus* (generic name illegitimate). Holotype: Morbey, 1975, pl.14, fig.5; pl.17, fig.4; text-figs.12a–c; Fensome et al., 1995, figs.1,7–9 — p.1819. Below (1987a, p.94) considered *Rhombodella* (now *Heibergella*) *kendelbachia* to be a questionable junior synonym of this species. Age: Rhaetian.

BATIACASPHAERA Drugg, 1970b, p.813. Emendations: Morgan, 1975, p.161; Dörhöfer and Davies, 1980, p.40. Taxonomic junior synonyms: *Sentusidinium*, according to Dörhöfer and Davies (1980, p.40) — however, Lentin and Williams (1981, p.253) retained *Sentusidinium*; *Pseudobohaidina*, according to He Chengquan et al. (2009, p.326). Type: Drugg, 1970b, figs.6A–B, as *Batiacasphaera compta*.

agglutinata (McIntyre and Brideaux, 1980, p.25, pl.12, figs.5–12) Jan du Chêne et al., 1985a, p.15. Holotype: McIntyre and Brideaux, 1980, pl.12, figs.7–9. Originally *Kallosphaeridium?*, subsequently (and now) *Batiacasphaera*. Age: early-middle Valanginian.

angularis Stevens and Helby, 1987, p.165–166, figs.2A–I,3A–B. Holotype: Stevens and Helby, 1987, figs.2A–B; Fensome et al., 1996, figs.1–2 — p.2027. Age: early Berriasian.

"**aptiensis**" (Burger, 1980a, p.76, pl.23, figs.1,5; pl.24, fig.1) Kumar, 1986a, p.32. Holotype: Burger, 1980a, pl.23, fig.1; Fauconnier and Masure, 2004, pl.63, figs.11–12. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Taxonomic junior synonym: *Tenua* (as *Sentusidinium*) *microrobusta*, according to Backhouse (1988, p.107). Age: Aptian.

asperata Backhouse, 1987, p.215, figs.10A–C,14E. Holotype: Backhouse, 1987, figs.10A–B; Fensome et al., 1996, figs.1–2 — p.2045. Age: Valanginian–early Hauterivian.

baculata Drugg, 1970b, p.814, fig.6F. Holotype: Drugg, 1970b, fig.6F. Age: late Eocene.

?**bellula** (Jiabo, 1978, p.51, pl.23, figs.14–16) Jan du Chêne et al., 1985a, p.15. Holotype: Jiabo, 1978, pl.23, fig.15. Originally *Tenua* Eisenack, subsequently *Kallosphaeridium?*, thirdly *Batiacasphaera*, fourthly (and now) *Batiacasphaera?*, fifthly *Sentusidinium*. Questionable assignment: Marheinecke (1992, p.76). In transferring this species to *Sentusidinium*, Xu Jinli et al. (1997, p.46) did not discuss the full history of this taxon; we therefore prefer to retain it questionably in *Batiacasphaera*. Age: Early Tertiary.

bergenensis Schreck and Matthiessen, 2014, p.102–103, pl.1, figs.1–16. Holotype: Schreck and Matthiessen, 2014, pl.1, figs.1–9. Age: latest Langhian–early Tortonian.

"**biornata**" (Jiabo, 1978, p.52, pl.22, figs.21–29; pl.23, figs.1–4) Jan du Chêne et al., 1985a, p.15. Holotype: Jiabo, 1978, pl.22, fig.24. **NOW** *Sentusidinium*. Originally *Tenua biornata*, subsequently *Kallosphaeridium biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum*, fourthly *Batiacasphaera biornata*, fifthly (and now) *Sentusidinium biornatum*. Lentin and Williams (1993, p.53) retained this species in *Batiacasphaera*, but He Chengquan et al. (2009, p.249) retained it in *Sentusidinium*. Age: Early Tertiary.

"subsp. *biornata*". Autonym. Holotype: Jiabo, 1978, pl.22, fig.24. **NOW** *Sentusidinium biornatum* subsp. *biornatum*. Originally *Tenua biornata* subsp. *biornata*, subsequently *Kallosphaeridium biornatum* subsp. *biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *biparatum*, fourthly *Batiacasphaera biornata* subsp. *biornata*, fifthly (and now) *Sentusidinium biornatum* subsp. *biornatum*.

"subsp. *conspicula*" (Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.84–85, pl.9, figs.10–11) Fensome and Williams, 2004, p.74. Holotype: Liu Zhili et al., 1992, pl.9, fig.11. **NOW** *Batiacasphaera conspicula*. Originally *Sentusidinium biornatum* subsp. *conspiculum*, subsequently *Batiacasphaera biornata* subsp. *conspicula*, thirdly (and now) *Batiacasphaera conspicula*. Age: Early Tertiary.

"subsp. *crassa*" (Jiabo, 1978, p.52, pl.23, figs.1–4) Lentin and Williams, 1989, p.34. Holotype: Jiabo, 1978, pl.23, fig.3. **NOW** *Sentusidinium biornatum* subsp. *crassum*. Originally *Tenua biornata* subsp. *crassa*, subsequently *Kallosphaeridium biornatum* subsp. *crassum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *crassum*, fourthly *Batiacasphaera biornata* subsp. *crassa*, fifthly (and now) *Sentusidinium biornatum* subsp. *crassum*. Age: Early Tertiary.

brachyspinosa (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.85, pl.18, figs.12–17) He Chengquan et al., 2009, p.327. Holotype: Liu Zhili et al., 1992, pl.18, fig.16. Originally *Sentusidinium*, subsequently (and now) *Batiacasphaera*. Age: Early Tertiary.

"*capitata*" (Cookson and Eisenack, 1960b, p.252, pl.39, fig.9) Dörhöfer and Davies, 1980, p.40. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.9; Fauconnier and Masure, 2004, pl.66, fig.1. **NOW** *Barbatacysta*. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium*, thirdly *Tenua* Eisenack, fourthly *Batiacasphaera*, fifthly (and now) *Barbatacysta*. Age: Oxfordian–Kimmeridgian.

cassiculus Wilson, 1988, p.14; pl.2, figs.5–6. Holotype: Wilson, 1988, pl.2, fig.5; Fensome et al., 1996, fig.1 — p.2083. N.I.A. Age: middle Eocene.

"?*cephalum*" (Kar, 1979, p.34, pl.4, figs.66a–b,67) Lentin and Williams, 1981, p.25. Holotype: Kar, 1979, pl.4, figs.66a–b. Originally *Polysphaeridium*, subsequently *Sumatradinium*, thirdly *Batiacasphaera*?. Lentin and Williams (1985, p.33) questionably retained this species in *Batiacasphaera*. Questionable assignment: Lentin and Williams (1981, p.25). **Taxonomic senior synonym:** *Operculodinium placitum*, according to Jain and Garg (1991, p.81). N.I.A. Age: Oligocene.

"*circularis*" (Cookson and Eisenack, 1971, p.219, pl.8, fig.6) Dörhöfer and Davies, 1980, p.40. Holotype: Cookson and Eisenack, 1971, pl.8, fig.6. **NOW** *Kallosphaeridium*?. Originally *Canningia*, subsequently *Canningia*?, thirdly *Batiacasphaera*, fourthly (and now) *Kallosphaeridium*?. Age: Albian–Cenomanian.

**compta* Drugg, 1970b, p.813–814, figs.6A–E,7A–B. Holotype: Drugg, 1970b, figs.6A–B. Age: late Eocene.

conspicula (Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.84–85, pl.9, figs.10–11) He Chengquan et al., 2009, p.328. Holotype: Liu Zhili et al., 1992, pl.9, fig.11. Originally *Sentusidinium biornatum* subsp. *conspiculum*, subsequently *Batiacasphaera biornata* subsp. *conspicula*, thirdly (and now) *Batiacasphaera conspicula*. Age: Early Tertiary.

consolida Pan Zhaoren in Xu Jinli et al., 1997, p.72, pl.37, fig.12; pl.38, figs.11,16 ex He Chengquan et al., 2009, p.328,648. Holotype: Xu Jinli et al., 1997, pl.37, fig.12. Originally *Pyxidinospis* (name not validly published), subsequently (and now) *Batiacasphaera*. The name *Pyxidinospis consolida* was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.648) validated the name by publishing an English diagnosis on proposing the transfer to *Batiacasphaera*. Age: Oligocene.

?*cooperi* Hannah et al., 1998, p.534–535, figs.4j–k. Holotype: Hannah et al., 1998, figs.4j–k (not figs.5a–b, as indicated in Hannah et al., 1998, p.534). Questionable assignment: Clowes et al., 2016, p.80. Clowes et al. (2016, p.80) implied that this species might be a taxonomic synonym of *Brigantedinium pynei*. Age: Miocene.

"crassicingulata" (Burger, 1980b, p.268, figs.4C,D1–2) Kumar, 1986a, p.32. Holotype: Burger, 1980b, fig.4D1–2; Fensome et al., 1993a, figs.2–3 — p.1081. **NOW** *Levisphaera*. Originally *Canningia*, subsequently *Batiacasphaera*, thirdly (and now) *Levisphaera*. Helby (1987, p.324–325) also proposed this combination. Age: Berriasian–Valanginian.

curiosa (Bujak, 1984, p.188, pl.2, figs.17–20) Jan du Chêne et al., 1985a, p.15. Holotype: Bujak, 1984, pl.2, fig.19. Originally *Kallosphaeridium*, subsequently (and now) *Batiacasphaera*. Age: middle-late Eocene.

deheinzelinii Louwye, 1999, p.117, pl.2, figs.10–13; pl.3, figs.1–7. Holotype: Louwye, 1999, pl.2, figs.10–12. Age: late Miocene.

"dictydia" (Sarjeant, 1972, p.41, pl.3, fig.3; pl.6, fig.6) Davey, 1979d, p.217. Holotype: Sarjeant, 1972, pl.6, fig.6. **NOW** *Valensiella*. Originally *Chytroeisphaeridia*, subsequently *Batiacasphaera*, thirdly *Escharisphaeridia*, fourthly *Cassiculosphaeridia*, fifthly (and now) *Valensiella*. Age: Bathonian–Callovian.

dictyophora Gao Ruiqi et al., 1992b, p.40–41,61, pl.11, fig.4. Holotype: Gao Ruiqi et al., 1992b, pl.11, fig.4. Age: Late Cretaceous.

"echinata" (Gitmez and Sarjeant, 1972, p.190, pl.1, figs.1,9) Dörhöfer and Davies, 1980, p.40. Holotype: Gitmez and Sarjeant, 1972, pl.1, fig.1; Fauconnier and Masure, 2004, pl.63, fig.14. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Age: early–late Kimmeridgian.

edwardsiae Louwye et al., 2008, p.134,136, pl.1, figs.1–9. Holotype: Louwye et al., 2008, pl.1, figs.1–7. Age: middle Miocene.

euteiches (Davey, 1969a, p.141, pl.3, figs.8–9) Davey, 1979d, p.217. Holotype: Davey, 1969a, pl.3, fig.8. Originally *Chytroeisphaeridia*, subsequently (and now) *Batiacasphaera*. Age: Cenomanian.

explanata (Bujak in Bujak et al., 1980, p.44, pl.13, figs.13–14) Islam, 1983a, p.235. Holotype: Bujak et al., 1980, pl.13, figs.13–14. Originally *Chytroeisphaeridia*, subsequently (and now) *Batiacasphaera*. Matsuoka (1984a, p.376) also proposed this combination. Age: middle Eocene (see Aubry, 1986).

extravermiculata Shaw Chenglong, 1999b, p.183–185, figs.87–95. Holotype: Shaw Chenglong, 1999b, figs.87–89. Age: Eocene.

floralis He Chengquan et al., 2005a, p.67–68,247–248; pl.16, figs.8–12. Holotype: He Chengquan et al., 2005a, pl.16, fig.9. Age: Middle to Late Jurassic.

gemmata Head et al., 1989c, p.488, pl.9, figs.1–4. Holotype: Head et al., 1989c, pl.9, figs.1–3. Age: early Miocene.

grandis Roncaglia et al., 1999, p.299,301, fig.18, nos.1–6. Holotype: Roncaglia et al., 1999, fig.18, no.1. Age: late Campanian–early Maastrichtian.

granofoveolata Pan Zhaoren in Xu Jinli et al., 1997, p.43, pl.39, fig.1 ex He Chengquan et al., 2009, p.649. Holotype: Xu Jinli et al., 1997, pl.39, fig.1. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.649) validated it by publishing a diagnosis in English. Age: Oligocene.

granospina He Chengquan, 1991, p.53, pl.6, figs.22–23. Holotype: He Chengquan, 1991, pl.6, fig.23. Age: Paleocene.

granulata Shaw Chenglong, 1999b, p.186, figs.78–81. Holotype: Shaw Chenglong, 1999b, figs.78–79. Age: Eocene.

granulosa (Cookson and Eisenack, 1974, p.79, pl.28, fig.10) Jansonius, 1989, p.67. Holotype: Cookson and Eisenack, 1974, pl.28, fig.10. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea* (Appendix A), thirdly (and now) *Batiacasphaera*. Junior homonym: *Batiacasphaera granulosa* He Chengquan, 1991. Age: Albian–Cenomanian.

"**granulosa**" He Chengquan, 1991, p.53, pl.6, fig.7. Holotype: He Chengquan, 1991, pl.6, fig.7. **Name illegitimate** — **senior homonym**: *Batiacasphaera granulosa* (Cookson and Eisenack, 1974) Jansonius, 1989. **Substitute name**: *Batiacasphaera xinjiangensis*. Originally *Batiacasphaera granulosa* (name illegitimate), subsequently (and now) *Batiacasphaera xinjiangensis*. Age: Paleocene.

henanensis He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.38, pl.7, fig.10. Holotype: He Chengquan et al., 1989, pl.7, fig.10. Taxonomic junior synonym: *Batiacasphaera vermiculata* (name not validly published), according to He Chengquan et al. (2009, p.330). Age: Early Tertiary.

hirsuta Stover, 1977, p.72–73, pl.1, figs.1–3. Holotype: Stover, 1977, pl.1, figs.1–2. Age: middle Oligocene–early Miocene.

hystricosa Mao Shaozhi and Norris, 1988, p.40, pl.8, figs.17–20. Holotype: Mao Shaozhi and Norris, 1988, pl.8, fig.18. The epithet was spelled "*hystricosa*" in the protologue, but the authors state that it is derived from the classical word meaning "thorny" — i.e. "*hystricosus*". Age: late Eocene.

imperfecta Stover and Helby, 1987d, p.261–262, figs.2A–O. Holotype: Stover and Helby, 1987d, figs.2A–B; Fensome et al., 1996, figs.1–2 — p.2155. Age: Barremian–early Aptian.

"**jiaboi**" Lentin and Williams, 1989, p.35. Name not validly published: incorrect citation for the substitute name for *Batiacasphaera minor* (Jiabo). **NOW** *Sentusidinium minus*. Originally *Tenua hystrix* subsp. *minor*, subsequently *Kallosphaeridium?* *minus*, thirdly *Batiacasphaera minor* (combination illegitimate), fourthly *Batiacasphaera sinensis*, fifthly *Batiacasphaera jiaboi* (name not validly published), sixthly (and now) *Sentusidinium minus*. Age: Early Tertiary.

kekerengensis Schiøler and Wilson, 1998, p.323–324, pl.7, figs.1–8. Holotype: Schiøler and Wilson, 1998, pl.7, fig.2. Age: late Coniacian–early Campanian.

?**kutharensis** (Khanna and Singh, 1981b, p.389–390, fig.1, nos.3,5; text-fig.1) Lentin and Williams, 1993, p.55. Holotype: Khanna and Singh, 1981b, fig.1, no.3. Originally *Tenua* Eisenack, subsequently (and now) *Batiacasphaera?*. Questionable assignment: Lentin and Williams (1993, p.55). This was not validly published in Khanna (1979, p.216) and Singh et al. (1979, p.35–36), since in neither publication was a description provided. Age: late Paleocene.

laevigata (Smelror, 1988b, p.152–153, figs.10G–H) Feist-Burkhardt and Monteil, 1997, p.40. Holotype: Smelror, 1988b, fig.10G. Originally *Escharisphaeridia*, subsequently (and now) *Batiacasphaera*. Taxonomic senior synonym: *Escharisphaeridia psilata*, according to Poulsen (1996, p.80) — however, Feist-Burkhardt and Monteil (1997, p.40) retained *Batiacasphaera laevigata*. Taxonomic junior synonym: *Escharisphaeridia nuda*, according to Prauss in Lentin and Williams (1993, p.213). Age: late Bathonian–early Oxfordian.

macbethiae Mantle, 2009b, p.100–101, pl.8; figs.1,3–5. Holotype: Mantle, 2009b, pl.8, fig.1. Age: Bathonian–Callovian.

macrogranulata Morgan, 1975, p.162, pl.2, figs.3a–d. Holotype: Morgan, 1975, pl.2, figs.3a–d. Taxonomic junior synonym: *Parabohaidina granulata*, according to He Chengquan et al. (2009, p.331). Age: Neocomian.

macropyla He Chengquan et al., 2009, p.331–332,644, pl.56, fig.6. Holotype: He Chengquan et al., 2009, pl.56, fig.6. Age: Cenomanian.

mica Harding, 1990b, p.48, pl.25, figs.10–19 ex Harding in Williams et al., 1998, p.67. Holotype: Harding, 1990b, pl.25, fig.10. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). N.I.A. Age: early Barremian.

micropapillata Stover, 1977, p.73, pl.1, figs.7–8. Holotype: Stover, 1977, pl.1, fig.7. Head in Head and Wrenn (1992, p.3) and Schreck and Matthiessen (2013, p.295) considered this species to be the possible taxonomic senior synonym of *Tectatodinium* (now *Batiacasphaera*) *minutum*. Age: middle Oligocene–early Miocene.

microreticulata Shaw Chenglong, 1999b, p.180–182, figs.66–69,82–83. Holotype: Shaw Chenglong, 1999b, figs.66–67. Age: Eocene.

var. *microreticulata*. Autonym. Holotype: Shaw Chenglong, 1999b, figs.66–67.

var. *minima* Shaw Chenglong, 1999b, p.182, figs.82–83. Holotype: Shaw Chenglong, 1999b, figs.82–83. Age: Eocene.

"*minor*" (Cookson and Hughes, 1964, p.43, pl.8, figs.1–3,5) Dörhöfer and Davies, 1980, p.40. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. **NOW** *Kallosphaeridium?* *helbyi*. Originally *Canningia minor*, subsequently *Canningia?* *minor*, thirdly *Batiacasphaera minor*, fourthly *Chytroeisphaeridia minor*, fifthly *Kallosphaeridium?* *minus* (combination illegitimate), sixthly (and now) *Kallosphaeridium?* *helbyi*. Age: late Albian–early Cenomanian.

"*minor*" (Jiabo, 1978, p.52–53, pl.23, figs.5–7) Jan du Chêne et al., 1985a, p.15. Holotype: Jiabo, 1978, pl.23, fig.5. **Combination illegitimate** — **senior homonym:** *Batiacasphaera minor* (Cookson and Hughes, 1964) Dörhöfer and Davies, 1980. Substitute name: *Batiacasphaera sinensis*. **NOW** *Sentusidinium minus*. Originally *Tenua hystrix* subsp. *minor*, subsequently *Kallosphaeridium?* *minus*, thirdly *Batiacasphaera minor* (combination illegitimate), fourthly *Batiacasphaera sinensis*, fifthly *Batiacasphaera jiaboi* (name not validly published), sixthly (and now) *Sentusidinium minus*. Age: Early Tertiary.

minuta (Matsuoka, 1983b, p.127, pl.5, fig.6; pl.6, fig.7) Matsuoka and Head, 1992, p.167. Emendation: Matsuoka and Head, 1992, p.167, as *Batiacasphaera minuta*. Holotype: Matsuoka, 1983b, pl.6, fig.7; Matsuoka and Head, 1992, pl.1, figs.1–11; text-figs.1A–C. Originally *Tectatodinium*, subsequently (and now) *Batiacasphaera*. Head in Head and Wrenn (1992, p.3) and Schreck and Matthiessen (2013, p.295) considered this species to be a possible taxonomic junior synonym of *Batiacasphaera micropapillata*. Age: late early–early middle Miocene.

norvickii (Burger, 1980a, p.73–74, pl.26, figs.7–8) Lentin and Williams, 1989, p.35. Holotype: Burger, 1980a, pl.26, fig.7. Originally *Membranosphaera*, subsequently *Kallosphaeridium*, thirdly (and now) *Batiacasphaera*. This combination was not validly published in Burger (1980b, p.267–268), since that author did not clearly use the name *Batiacasphaera norvickii*; the combination was not validly published in Jan du Chêne et al. (1985a, p.15), since those authors did not fully reference the basionym. Age: Albian.

oblongata Xu Jinli et al., 1997, p.49, pl.42, fig.6 ex He Chengquan et al., 2009, p.332,649. Holotype: Xu Jinli et al., 1997, pl.42, fig.6. Originally *Pseudobohaidina* (name not validly published), subsequently (and now) *Batiacasphaera*. The name *Pseudobohaidina oblongata* was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.649) validated the name by publishing an English diagnosis on proposing the transfer to *Batiacasphaera*. Age: middle-late Eocene.

oligacantha He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.39, pl.7, fig.13. Holotype: He Chengquan et al., 1989, pl.7, fig.13. Mao Shaozhi et al. (1995, p.99) indicated that this name should be restricted to the holotype. Age: Early Tertiary.

ovata Backhouse, 1987, p.215, figs.10D–F. Holotype: Backhouse, 1987, fig.10D; Fensome et al., 1996, fig.1 — p.2255. Age: middle Hauterivian.

"*pilosa*" (Ehrenberg, 1854, pl.37, section 8, fig.4) Dörhöfer and Davies, 1980, p.40. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa*

(combination not validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Baticasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. Age: Oxfordian.

?reticulata (Davey, 1969b, p.14, pl.4, figs.3–4,6) Davey, 1979d, p.217. Holotype: Davey, 1969b, pl.4, fig.3. Originally *Chytroeisphaeridia*, subsequently *Fromea* (Appendix A), thirdly *Baticasphaera*, fourthly (and now) *Baticasphaera?*. Questionable assignment: Mohr and Mao Shaozhi (1997, p.58). Age: Campanian–Maastrichtian.

retirugosa Xu Jinli et al., 1997, p.48–49, pl.42, fig.3 ex He Chengquan et al., 2009, p.649. Holotype: Xu Jinli et al., 1997, pl.42, fig.3. Originally *Pseudobohaidina* (name not validly published), subsequently (and now) *Baticasphaera*. The name *Pseudobohaidina retirugosa* was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.649) validated the name by publishing an English diagnosis on proposing the transfer to *Baticasphaera*. Age: middle-late Eocene.

rifensis Slimani et al., 2008, p.338,340, figs.9A–F. Holotype: Slimani et al., 2008, figs.9D–E. Age: early Danian.

"ringnesiorum" (Manum and Cookson, 1964, p.15, pl.2, fig.10) Dörrhöfer and Davies, 1980, p.40. Holotype: Manum and Cookson, 1964, pl.2, fig.10. **NOW** *Kallosphaeridium?*. Originally *Canningia*, subsequently *Canningia?*, thirdly *Baticasphaera*, fourthly *Chytroeisphaeridia*, fifthly (and now) *Kallosphaeridium?*. Age: Campanian–Maastrichtian.

"rioultii" (Sarjeant, 1968, p.231, pl.1, figs.12,22; pl.2, figs.1–2,4) Dörrhöfer and Davies, 1980, p.41. Emendation: Courtinat, 1989, p.192, as *Sentusidinium rioultii*. Holotype: Sarjeant, 1968, pl.1, fig.22; pl.2, fig.1; Eisenack and Kjellström, 1972, p.1043, figure to left; Fensome et al., 1995, fig.1 — p.1743; Fauconnier and Masure, 2004, pl.70, fig.4. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently *Baticasphaera*, thirdly (and now) *Sentusidinium*; fourthly *Tenua* Davey (combination illegitimate). Age: late Callovian.

"rotundata" (Cookson and Eisenack, 1961a, p.72, pl.12, figs.1–5) Dörrhöfer and Davies, 1980, p.41. Holotype: Cookson and Eisenack, 1961a, pl.12, fig.1. **NOW** *Canningia?*. Originally *Canningia*, subsequently (and now) *Canningia?*, thirdly *Baticasphaera*. Age: Senonian.

rugulata Schiøler and Wilson, 1998, p.324, pl.6, figs.11–14. Holotype: Schiøler and Wilson, 1998, pl.6, fig.11. Age: late Coniacian–early Santonian.

?sahii (Khanna and Singh, 1981b, p.391,393, fig.2, nos.1–3; fig.4, no.4; text-figs.4–5) Lentin and Williams, 1993, p.56. Holotype: Khanna and Singh, 1981b, fig.2, no.2. Originally *Hexagonifera*, subsequently (and now) *Baticasphaera?*. Questionable assignment: Lentin and Williams (1993, p.56). This name was not validly published in Singh et al. (1979, p.35–36), Khanna (1979, p.216) and Khanna et al. (1981, p.261) since no description was provided. Age: early-middle Eocene.

saidensis Below, 1981a, p.26, pl.10, figs.1,2a–b; text-fig.15. Holotype: Below, 1981a, pl.10, figs.2a–b; text-fig.15; Fensome et al., 1991, figs.2–4 — p.729. Age: Hauterivian–early Aptian (Bedoulian).

"scrobiculata" (Deflandre and Cookson, 1955, p.291, pl.3, fig.3; text-fig.57) Burger, 1980b, p.268. Holotype: Deflandre and Cookson, 1955, pl.3, fig.3. **NOW** *Pyxidiella?*. Originally *Leiosphaera* (Appendix A), subsequently *Pyxidiella*, thirdly *Leiosphaeridia* (Appendix A), fourthly *Palaeostomocystis* (Appendix A), fifthly (and now) *Pyxidiella?*, sixthly *Baticasphaera*. Age: Santonian–Eocene.

setulosa Shaw Chenglong, 1999b, p.182, figs.72–77,84–86. Holotype: Shaw Chenglong, 1999b, figs.72–73. Age: Eocene.

var. *minima* Shaw Chenglong, 1999b, p.182, figs.84–86. Holotype: Shaw Chenglong, 1999b, figs.84–86. Age: Eocene.

var. *setulosa*. Autonym. Holotype: Shaw Chenglong, 1999b, figs.72–73.

?simlaensis (Khanna and Singh, 1981b, p.389–390, fig.1, nos.8–9; text-fig.2) Lentin and Williams, 1993, p.56. Holotype: Khanna and Singh, 1981b, fig.1, no.8. Originally *Tenua* Eisenack, subsequently (and now) *Baticasphaera*?. Questionable assignment: Lentin and Williams (1993, p.56). This name was not validly published in Khanna (1979, p.216) and Singh et al. (1979, p.35–36) since no description was provided. Age: early Eocene.

"*sinensis*" Lentin and Williams, 1989, p.36. Holotype: Jiabo, 1978, pl.23, fig.5. **NOW** *Sentusidinium minus*. Originally *Tenua hystrix* subsp. *minor*, subsequently *Kallosphaeridium? minus*, thirdly *Baticasphaera minor* (combination illegitimate), fourthly (and now) *Baticasphaera sinensis*, fifthly *Baticasphaera jiaboi* (name not validly published), sixthly (and now) *Sentusidinium minus*. Lentin and Williams (1993, p.56) retained this species in *Baticasphaera*, but He Chengquan et al. (2009, p.251) retained it in *Sentusidinium*. Substitute name for *Baticasphaera minor* (Jiabo, 1978) Jan du Chêne et al., 1985a (an illegitimate name). Age: Early Tertiary.

solida Slimani, 2003, p.268–269,271,273, pl.1, figs.1–7. Holotype: Slimani, 2003, pl.1, fig.1. Taxonomic junior synonym: *Chytroeisphaeridia solida* (name not validly published) according to Slimani (2003, p.268–269). Age: Campanian.

sparsa He Chengquan, 1991, p.53–54, pl.6, fig.4. Holotype: He Chengquan, 1991, pl.6, fig.4. Age: late Eocene.

sphaerica Stover, 1977, p.73, pl.1, figs.4–6. Holotype: Stover, 1977, pl.1, fig.4. Age: early Miocene.

spumosa (Brideaux, 1977, p.12, pl.3, figs.9–14) Below, 1981a, p.26. Holotype: Brideaux, 1977, pl.3, figs.9,14. Originally *Canningia*, subsequently *Baticasphaera*?, thirdly (and now) *Baticasphaera*. Questionable assignment: Below (1981a, p.26) — however, Kumar (1986a, p.32) retained this species in *Baticasphaera* without question. Helby (1987, p.324–325) also proposed this combination without question. Age: Aptian.

subtilis Stover and Helby, 1987c, p.228–230, figs.2A–F,3A–L. Holotype: Stover and Helby, 1987c, figs.2A–B; Fensome et al., 1996, figs.1–2 — p.2385. Age: Hauterivian–Barremian.

"*taugourdeau*" (Varma and Dangwal, 1964, p.68, pl.2, fig.9) Dörhöfer and Davies, 1980, p.41. Holotype: Varma and Dangwal, 1964, pl.2, fig.9. Originally *Tenua* Eisenack, subsequently *Hemicystodinium?*, thirdly *Baticasphaera*. **Taxonomic senior synonym:** *Polysphaeridium subtile*, according to Lentin and Williams (1993, p.275). Taxonomic senior synonym: *Hystrichosphaeridium* (now *Polysphaeridium*) *zoharyi*, according to Lentin and Williams (1981, p.26,127) — however, *Tenua taugourdeau* is now considered a taxonomic junior synonym of *Polysphaeridium subtile*. Age: Eocene–Oligocene.

"*tenulla*" Xu Jinli et al., 1997, p.44, pl.59, figs.4,5a–b,6. Holotype: not designated. **Name not validly published:** no English or Latin description or type. **Taxonomic senior synonym:** *Bosedinia granulata*, according to He Chengquan et al. (2009, p.457). Age: Oligocene.

"*torulosa*" (Davey and Verdier, 1973, p.180,183, pl.1, figs.2,5,8) Dörhöfer and Davies, 1980, p.41. Holotype: Davey and Verdier, 1973, pl.1, fig.2. **NOW** *Canningia*. Originally (and now) *Canningia*, subsequently *Baticasphaera*, thirdly *Ovoidinium*. Age: late Albian–early Cenomanian.

tuberculata He Chengquan, 1991, p.54, pl.6, fig.2. Holotype: He Chengquan, 1991, pl.6, fig.2. Age: middle Eocene.

"*vermiculata*" Xu Jinli et al., 1997, pl.36, fig.20. Holotype: Xu Jinli et al., 1997, pl.36, fig.20. **Name not validly published:** no English or Latin description. **Taxonomic senior synonym:** *Baticasphaera henanensis*, according to He Chengquan et al. (2009, p.330). Age: Oligocene.

verrucatum Xu Jinli et al., 1997, p.47, pl.35, figs.12a–b,13a–b,15a–b,16a–b,17–20,21a–b ex He Chengquan et al., 2009, p.334, 650. Holotype: Xu Jinli et al., 1997, pl.35, figs.15a–b. Originally *Sentusidinium?* (name not validly published), subsequently (and now) *Baticasphaera*. The name *Sentusidinium? verrucatum* was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009,

p.649) validated the name by publishing an English diagnosis on proposing the transfer to *Batiacasphaera*. Age: Oligocene.

"**verrucosa**" (Sarjeant, 1968, p.232, pl.1, fig.17; pl.2, figs.3,6) Dörhöfer and Davies, 1980, p.41. Holotype: Sarjeant, 1968, pl.1, fig.17; pl.2, figs.3,6; Fauconnier and Masure, 2004, pl.11, figs.2–3. **NOW** *Barbatacysta*. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly *Sentusidinium*, fourthly (and now) *Barbatacysta*. Age: late Callovian.

"**villersensis**" (Sarjeant, 1968, p.231–232, pl.1, fig.16; pl.2, figs.5–10) Dörhöfer and Davies, 1980, p.41. Holotype: Sarjeant, 1968, pl.1, fig.16; Fauconnier and Masure, 2004, pl.70, fig.5. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly (and now) *Sentusidinium*. Age: early Callovian–early Oxfordian.

xinjiangensis Lentin and Williams, 1993. Holotype: He Chengquan, 1991, pl.6, fig.7. Originally *Batiacasphaera granulosa* He Chengquan, subsequently (and now) *Batiacasphaera xinjiangensis*. Substitute name for *Batiacasphaera granulosa* He Chengquan, 1991, p.53, pl.6, fig.7 (an illegitimate name). Age: Paleocene.

BATIOLADINIUM Brideaux, 1975, p.1241. Emendation: Pourtoy, 1988, p.390 — however, see Lentin and Vozzhennikova (1990, p.82) and Riding and Helby (2001g, p.187). Taxonomic senior synonym: *Imbatodinium*, according to Dörhöfer and Davies (1980, p.36) — however, Lentin and Williams (1985, p.35) retained *Batioladinium*. Taxonomic junior synonym: *Necrobroomea*, according to Brideaux (1977, p.10). With respect to the synonymy of *Necrobroomea* and *Batioladinium*, Below (1990, p.52) considered *Necrobroomea* to be the senior name. However, Fensome et al. (1993b, p.78) gave the following statement: "Below (1990, p.52) listed *Batioladinium* Brideaux 1975 as a taxonomic junior synonym of *Necrobroomea* Wiggins 1975 rather than the reverse, as is customarily the case. Below stated that '... the genus *Necrobroomea* Wiggins (publication date 25 April 1975 in *Geoscience and Man*, volume 11) has priority over *Batioladinium* Brideaux 1975 (publication date 15 June 1975 in the *Canadian Journal of Botany*, volume 53(12))' [translation]. However, Below was clearly unaware that Brideaux (1977, p.10) stated that '*Necrobroomea* Wiggins, 1975 appeared in *Geoscience and Man*, v.11, the date of publication being given as April 25th, 1975. However, in a letter to the writer, acting editor, Ruth B. Hubert, established that no copies of this volume were available to the public before July 23rd, 1975, and that there was no prior distribution of the volume.' On the basis of this evidence and the observation that the *Canadian Journal of Botany* v.53, no.12 did appear in June 1975 (W.W. Brideaux, personal communication to R.A.F.), *Necrobroomea* must be considered junior to *Batioladinium* if these two taxa are considered congeneric." Type: Alberti, 1961, pl.5, fig.2, as *Broomea jaegeri*.

daviesii Lentin and Vozzhennikova, 1990, p.82–83; text-fig.45. Holotype: Dörhöfer and Davies, 1980, fig.30D, as *Imbatodinium kondratjevii* Vozzhennikova, 1967; Lentin and Vozzhennikova, 1990, text-fig.45. Age: late Valanginian.

?**exiguum** (Alberti, 1961, p.26–27, pl.5, fig.14) Brideaux, 1975, p.1240. Holotype: Alberti, 1961, pl.5, fig.14. Originally *Broomea*, subsequently (and now) *Batioladinium*?, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Questionable assignment: Brideaux (1975, p.1240). Lentin and Williams (1993, p.58) retained this species in *Batioladinium*. Below (1990, p.53) suggested that this species may be a taxonomic synonym of *Batioladinium*? (as *Necrobroomea*) *pelliferum*. Age: early Hauterivian–?late Barremian.

"**fractum**" (Mehrotra and Sarjeant, 1984a, p.217–218, pl.1, figs.1–7; pl.2, figs.1–7; text-figs.1a–e) Lentin and Williams, 1985, p.35. Holotype: Mehrotra and Sarjeant, 1984a, pl.1, fig.1; pl.2, fig.7; text-figs.1a–e. Originally *Imbatodinium*, subsequently *Batioladinium*. **Taxonomic senior synonym:** *Broomea* (as *Necrobroomea*) *mipodum*, according to Below (1990, p.56). Age: Aptian.

?**gochtii** (Alberti, 1961, p.27, pl.5, figs.8–10,?16) Lentin and Williams, 1977b, p.14. Holotype: Alberti, 1961, pl.5, fig.8. Originally *Broomea*, subsequently (and now) *Batioladinium*?, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Lentin and Williams (1993, p.58) retained this species in *Batioladinium*. Questionable assignment: Lentin and Williams (1977b, p.14). Taxonomic junior synonyms: *Batioladinium pomum* and *Batioladinium varigranosum*, both according to Below (1990, p.53). Below (1990, p.53) considered *Batioladinium?* *gochtii* to be a possible taxonomic synonym of *Broomea* (now *Batioladinium*) *jaegeri*. Age: Valanginian–?Hauterivian.

subsp. *gochtii*. Autonym. Holotype: Alberti, 1961, pl.5, fig.8.

subsp. *rude* (Iosifova, 1992, p.59, pl.10, figs.4a–b,5) Iosifova, 1996, p.211. Holotype: Iosifova, 1992, pl.10, figs.4a–b; Iosifova, 1996, pl.14, fig.5. Originally *Batioladinium pomum* subsp. *rude*, subsequently (and now) *Batioladinium gochtii* subsp. *rude*. Age: Ryazanian.

"*imbatodinense*" (Vozzhennikova, 1967, p.55, pl.12, figs.4a–c) Lentin and Williams, 1985, p.35. Emendation: Lentin and Vozzhennikova, 1990, p.91–92, as *Protobatioladinium imbatodinense*. Holotype: Vozzhennikova, 1967, pl.12, fig.4a. **NOW** *Protobatioladinium*. Originally *Imbatodinium*, subsequently *Necrobroomea*?, thirdly *Pareodinia*, fourthly *Pareodinia*?, fifthly *Batioladinium*, sixthly (and now) *Protobatioladinium*, seventhly *Gochteodinia*. Age: Late Jurassic.

**jaegeri* (Alberti, 1961, p.26, pl.5, figs.1–7) Brideaux, 1975, p.1240. Emendation: Below, 1990, p.53–54, as *Necrobroomea jaegeri*. Holotype: Alberti, 1961, pl.5, fig.2; Eisenack and Klement, 1964, p.67; Fensome et al., 1995, fig.2 — p.1571. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Lentin and Williams (1993, p.58) retained this species in *Batioladinium*. Taxonomic junior synonym: *Pseudoceratium gochtii* Pocock (subsequently *Pseudoceratium hansgochtii*), according to Singh (1971, p.320). Brideaux (1977, p.10) and Below (1990, p.53) indicated that Davey (1974, p.64) had considered *Broomea* (as *Necrobroomea*; now *Batioladinium*) *micropoda* to be the taxonomic senior synonym of *Broomea* (now *Batioladinium*) *jaegeri*; however, Davey did not include the holotype of *Broomea* (now *Batioladinium*) *jaegeri* in his synonymy for *Broomea* (now *Batioladinium*) *micropoda*. Below (1990, p.53) considered *Broomea* (as *Necrobroomea*; now *Batioladinium*) *gochtii* to be a possible taxonomic synonym of this species. Age: late Barremian.

longicornutum (Alberti, 1961, p.27–28, pl.5, figs.18–21; pl.6, figs.1–2) Brideaux, 1975, p.1240. Emendation: Below, 1990, p.56, as *Necrobroomea longicornuta*. Holotype: Alberti, 1961, pl.5, fig.19; Eisenack and Klement, 1964, p.69; Fensome et al., 1996, fig.1 — p.2205. Originally *Broomea*?, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Lentin and Williams (1993, p.58) retained this species in *Batioladinium*. Taxonomic junior synonym: *Batioladinium radiculatum*, according to Below (1990, p.53). Age: late Hauterivian–late Barremian.

matyjae Poulsen, 1996, p.60, pl.3, fig.7. Holotype: Poulsen, 1996, pl.3, fig.7. Age: Volgian–early Valanginian.

micropodum (Eisenack and Cookson, 1960, p.7–8, pl.2, figs.8–9) Brideaux, 1975, p.1240. Emendation: Below, 1990, p.56, as *Necrobroomea micropoda*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.9. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Lentin and Williams (1993, p.59) retained this species in *Batioladinium*. Taxonomic junior synonyms: *Imbatodinium fractum*, according to Below (1990, p.56); *Broomea* (now *Batioladinium*?) *pellifera*, according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Broomea* (as *Batioladinium*?) *pellifera*. Brideaux (1977, p.10) and Below (1990, p.53) indicated that Davey (1974, p.64) considered *Broomea* (now *Batioladinium*) *micropoda* to be a taxonomic senior synonym of *Broomea* (as *Necrobroomea*, now *Batioladinium*) *jaegeri*; however, Davey (1974, p.64) did not include the holotype of *Broomea* (now *Batioladinium*) *jaegeri* in his synonymy for *Broomea* (now *Batioladinium*) *micropoda*. Age: Aptian–Albian.

"?*mulingense*" Zhao Chuanben and Qiao Xiuyun, 1993, p.454,456, pl.2, figs.1–6. **Name not validly published**: holotype not designated. Questionable assignment: Zhao Chuanben and Qiao Xiuyun, 1993, p.454. Age: Aptian–Albian.

paeminosum Riding and Helby, 2001g, p.187,189, figs.4A–P. Holotype: Riding and Helby, 2001g, figs.4N–P. Taxonomic junior synonym: *Batioladinium protojaegeri* (name not validly published), according to Riding and Helby (2001g, p.187). Age: Tithonian.

?*pelliferum* (Alberti, 1961, p.26, pl.5, figs.11–13) Brideaux, 1975, p.1240. Holotype: Alberti, 1961, pl.5, fig.11. Originally *Broomea*, subsequently (and now) *Batioladinium*?, thirdly *Imbatodinium*, fourthly *Necrobroomea*. Lentin and Williams (1993, p.59) questionably retained this species in *Batioladinium*. Questionable assignment:

Brideaux (1975, p.1240). Taxonomic senior synonym: *Broomea* (now *Batioladinium*) *micropoda*, according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Broomea* (as *Batioladinium*?) *pellifera*. Below (1990, p.53) considered *Broomea* (as *Necrobroomea*, now *Batioladinium*) *exigua* to be a possible taxonomic synonym of this species. Age: late Barremian–early Aptian.

"*pomum*" Davey, 1982b, p.21, pl.5, figs.2–4. Holotype: Davey, 1982b, pl.5, fig.3. Originally *Batioladinium*, subsequently *Imbatodinium*. Lentin and Williams (1985, p.36) retained this species in *Batioladinium*. **Taxonomic senior synonym:** *Broomea* (as *Necrobroomea*, now *Batioladinium*?) *gochtii*, according to Below (1990, p.53). N.I.A. Age: Ryazanian–early Valanginian.

"subsp. *pomum*". Autonym. Holotype: Davey, 1982b, pl.5, fig.3. **Now redundant.**

"subsp. *rude*" Iosifova, 1992, p.59, pl.10 (not pl.9), figs.4a–b,5. Holotype: Iosifova, 1992, pl.10 (not pl.9), figs.4a–b; Iosifova, 1996, pl.14, fig.5. **NOW** *Batioladinium*? *gochtii* subsp. *rude*. Originally *Batioladinium pomum* subsp. *rude*, subsequently (and now) *Batioladinium*? *gochtii* subsp. *rude*. Age: Ryazanian.

"*protojaegeri*" Helby in Riding and Helby, 2001g, p.187. **Name not validly published:** no description. **Taxonomic senior synonym:** *Batioladinium paeminosum*, according to Riding and Helby (2001g, p.187).

"*radiculatum*" Davey, 1982b, p.21–22, pl.5, figs.1,7–9. Holotype: Davey, 1982b, pl.5, fig.8. Originally *Batioladinium*, subsequently *Imbatodinium*. Lentin and Williams (1985, p.36) retained this species in *Batioladinium*. **Taxonomic senior synonym:** *Broomea* (as *Necrobroomea*, now *Batioladinium*) *longicornutum*, according to Below (1990, p.53). Age: early–late Ryazanian.

reticulatum Stover and Helby, 1987a, p.101–103, figs.1A–N. Holotype: Stover and Helby, 1987a, figs.1E–G; Helby et al., 1987, fig.25I; Fensome et al., 1996, figs.1–3 — p.2325. Originally (and now) *Batioladinium*, subsequently *Necrobroomea*. Lentin and Williams (1993, p.59) retained this species in *Batioladinium*. Age: Berriasian.

"*rossicum*" Iosifova, 1992, p.59–61, pl.9, figs.2a–b; pl.10, figs.1a–b. Emendation: Iosifova, 1996, p.227,229, as *Protobatioladinium rossicum*. Holotype: Iosifova, 1992, pl.10, figs.1a–b; Iosifova, 1996, pl.7, figs.4a–c; text-figs.10A–B. **NOW** *Protobatioladinium*. Originally *Batioladinium*, subsequently (and now) *Protobatioladinium*. Age: Ryazanian.

shaftesburiense Nøhr-Hansen, 1993, p.46–47, pl.2, figs.5,12–13. Holotype: Nøhr-Hansen, 1993, pl.2, fig.5. Age: middle Albian.

simplex (Yun Hyesu, 1981, p.56–57, pl.13, figs.10,15) Jansonius, 1989, p.68. Holotype: Yun Hyesu, 1981, pl.13, fig.15. Originally *Fromea* (Appendix A), subsequently (and now) *Batioladinium*. Age: early Santonian.

?*tricornoides* (Alberti, 1961, p.28, pl.5, fig.17) Lentin and Williams, 1977b, p.14. Holotype: Alberti, 1961, pl.5, fig.17. Originally *Broomea*?, subsequently (and now) *Batioladinium*?, thirdly *Necrobroomea*?, fourthly *Imbatodinium*?. Questionable assignment: Lentin and Williams (1977b, p.14). Age: late Hauterivian.

"*varigranosum*" (Duxbury, 1977, p.53–54, pl.14, figs.6–7; text-figs.20a–b) Davey, 1982b, p.22. Holotype: Duxbury, 1977, pl.14, fig.6; text-fig.20b; Pourtoy, 1988, pl.2, figs.1–2. Originally *Aprobolocysta*, subsequently *Batioladinium*, thirdly *Aprobolocysta*?. **Taxonomic senior synonym:** *Broomea* (as *Necrobroomea*) *gochtii*, according to Below (1990, p.53). Age: early Valanginian–early Hauterivian.

BEAUMONTELLA Below, 1987a, p.69–70. Type: Wall, 1965a, pl.6, fig.9; pl.9, fig.9, as *Hystrichosphaeridium langii*.

?*caminuspina* (Wall, 1965a, p.165, pl.9, fig.4) Below, 1987a, p.70. Holotype: Wall, 1965a, pl.9, fig.4. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?, fourthly (and now) *Beaumontella*?

Questionable assignment: Below (1987a, p.70). Taxonomic junior synonym: *Cleistosphaeridium mojsisovicsii*, according to Below (1987a, p.70). Age: early Sinemurian.

?*delicata* (Wall, 1965a, p.156, pl.1, figs.11–13; pl.7, fig.6) Below, 1987a, p.70. Holotype: Wall, 1965a, pl.1, fig.11. Originally *Baltisphaeridium* (Appendix A), subsequently *Solisphaeridium* (combination not validly published, Appendix A), thirdly (and now) *Beaumontella*?. Questionable assignment: Below (1987a, p.70). Age: Hettangian–early Sinemurian.

**langii* (Wall, 1965a, p.165, pl.6, figs.9–11; pl.9, fig.9) Below, 1987a, p.70–71. Emendations: Morbey, 1975, p.41–42, as *Hystrichosphaeridium langii*; Below, 1987a, p.70–71, as *Beaumontella langii*. Holotype: Wall, 1965a, pl.6, fig.9; pl.9, fig.9; Fensome et al., 1995, figs.1–2 — p.1595. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?, fourthly (and now) *Beaumontella*. Age: Hettangian–early Sinemurian.

"**BEJUIA**" Stover and Williams, 1987, p.37. Substitute name for *Burtonia* Beju, 1983, p.106 (an illegitimate name). **Taxonomic senior synonym:** *Atopodinium*, according to Masure (1991, p.64) and Masure in Fauconnier and Masure (2004, p.88). Type: Beju, 1983, text-figs.3A–B,4A–B, as *Burtonia polygonalis*.

"**polygonalis*" (Beju, 1983, p.107,109,111; text-figs.3A–F,4A–F,5A–D) Stover and Williams, 1987, p.38. Emendation: Masure, 1991, p.68,70–71, as *Atopodinium polygonale*. Holotype: Beju, 1983, text-figs.3A–B,4A–B; Masure, 1991, pl.2, figs.1,4; text-figs.3a–b,4a–b; Fensome et al., 1995, figs.1–4 — p.1675; Fauconnier and Masure, 2004, pl.10, figs.8–11. **NOW** *Atopodinium*. Originally *Burtonia* (generic name illegitimate), subsequently *Bejuia*, thirdly (and now) *Atopodinium*. Age: early Bathonian.

"**BELLATUDINIUM**" Yu Jingxian et al., 1981, p.261. **Taxonomic senior synonym:** *Laciniadinium*, according to He Chengquan et al. (2009, p.386). Chen et al. (1988, p.6) considered *Apiculadinium* to be a possible taxonomic synonym of this genus. Type: Yu Jingxian et al., 1981, pl.1, fig.20, as *Bellatudinium conspicuum*.

"**conspicuum*" Yu Jingxian et al., 1981, p.261, pl.1, figs.20–22,24; text-fig.2. Holotype: Yu Jingxian et al., 1981, pl.1, fig.20. **NOW** *Laciniadinium*. Originally *Bellatudinium*, subsequently (and now) *Laciniadinium*. Age: Late Cretaceous.

"*fusum*" Yu Jingxian et al., 1981, p.261, pl.1, figs.25–27,29–31. Holotype: Yu Jingxian et al., 1981, pl.1, fig.27. **NOW** *Laciniadinium*. Originally *Bellatudinium*, subsequently (and now) *Laciniadinium*. Age: Late Cretaceous.

"*hokkaidoanum*" Kurita and Matsuoka, 1995, p.146–147, pl.1, figs.1–7. Holotype: Kurita and Matsuoka, 1995, pl.1, fig.1. **NOW** *Laciniadinium*. Originally *Bellatudinium* subsequently (and now) *Laciniadinium*. Age: late middle to late Eocene.

BELODINIUM Cookson and Eisenack, 1960b, p.249. Emendations: Dodekova, 1975, p.23; Stover and Helby, 1987d, p.275, as a revised description. Type: Cookson and Eisenack, 1960b, pl.37, fig.14, as *Belodinium dysculum*.

"*asaphum*" Drugg, 1978, p.63–64, pl.2, figs.8–10. Holotype: Drugg, 1978, pl.2, fig.8. **NOW** *Clathroctenocystis*. Originally *Belodinium*, subsequently (and now) *Clathroctenocystis*. Age: early Oxfordian.

**dysculum* Cookson and Eisenack, 1960b, p.250, pl.37, fig.14; pl.39, fig.10. Emendation: Stover and Helby, 1987d, p.275,277, as a revised description. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.14. Age: ?Tithonian.

neridis Stevens and Helby, 1987, p.166–168,170, figs.4A–C,5A–O. Holotype: Stevens and Helby, 1987, figs.5A–B; Fensome et al., 1996, figs.1–2 — p.2243. N.I.A. Age: early Berriasian.

obsoletum Dodekova, 1975, p.23–24, pl.4, figs.1–12; text-fig.5. Holotype: Dodekova, 1975, pl.4, figs.1–4. Originally (and now) *Belodinium*, subsequently *Clathroctenocystis*. Dodekova (1990, p.7) retained this species in *Belodinium*. Age: late Bathonian.

"**BELOWIA**" Riding and Helby, 2001g, p.189,191,193. **Name illegitimate** — **senior homonym**: *Belowia* Moquin-Tandon, 1849. **Substitute name**: *Belowicysta* Riding and Zijlstra, 2006. Type: Riding and Helby, 2001g, figs.6A–C, as *Belowia balteus*. N.I.A. Age: Tithonian.

"***balteus**" Riding and Helby, 2001g, p.191,193,195, figs.5A–L,6A–F,7A–L. Holotype: Riding and Helby, 2001g, figs.6A–C. **NOW** *Belowicysta*. Originally *Belowia* (generic name illegitimate), subsequently (and now) *Belowicysta*. N.I.A. Age: Tithonian.

BELOWICYSTA Riding and Zijlstra, 2006, p.313–314. Substitute name for *Belowia* Moquin-Tandon, 1849. Type: Riding and Helby, 2001g, figs.6A–C, as *Belowia balteus*.

***balteus** (Riding and Helby, 2001g, p.191,193,195, figs.5A–L,6A–F,7A–L) Riding and Zijlstra, 2006, p.314. Holotype: Riding and Helby, 2001g, figs.6A–C. Originally *Belowia balteus* (generic name illegitimate), subsequently (and now) *Belowicysta*. N.I.A. Age: Tithonian.

"**BELOWIUS**" Özdikmen, 2009, p.237. **Name illegitimate** — **nomenclatural senior synonym**: *Wanneria*, which has the same type. Özdikmen (2009) considered *Wanneria* Below to be illegitimate because it is a junior homonym of *Wanneria* Walcott 1908; however, *Wanneria* Walcott is an animal and under the I.C.N. it does not pre-empt *Wanneria* Below. Type: Below, 1987a, pl.2, figs.2–10, as *Wanneria misolensis*.

"***misolensis**" (Below, 1987a, p.80,86, pl.1, figs.15–18; pl.2, figs.1–10,14–15; pl.3, figs.2–10,12–13,15; text-figs.36a–g,37a–h,39–47; table 2) Özdikmen, 2009, p.238. Holotype: Below, 1987a, pl.2, figs.2–10; Fensome et al., 1993a, figs.2–3 — p.1257. **NOW** *Wanneria*. Originally (and now) *Wanneria*, subsequently *Belowius* (generic name illegitimate). Although Özdikmen (2009) did not fully reference the basionym when proposing the transfer of this species to *Belowius*, he did so under the aegis of the I.C.Z.N., so the combination can be considered validly published. Age: Norian.

BEYRICHODINIUM Below, 1990, p.69–70. Contrary to the opinion of Lentin and Williams (1993, p.60), this name is validly published since the name of the "type species" is validly published. Type: Below, 1990, pl.17, figs.6–10, as *Beyrichodinium radiatum*.

hystrix Below, 1990, p.70–71, pl.17, figs.1–5. Holotype: Below, 1990, pl.17, figs.1–5. Contrary to the opinion of Lentin and Williams (1993, p.61), we consider this name to be validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: early Hauterivian.

***radiatum** Below, 1990, p.71, pl.17, figs.6–15; text-fig.20. Holotype: Below, 1990, pl.17, figs.6–10. Contrary to the opinion of Lentin and Williams (1993, p.61), we consider this name to be validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: early Hauterivian.

BIANCHINA Schiøler, 2015, p.408,410 (p.3,5 on PDF initially published online). Type: Schiøler, 2015, pl.1, figs.6–7, as *Bianchina hieroglyphica*.

***hieroglyphica** Schiøler, 2015, p.410–411 (p.5–6 in PDF initially published online), pl.1, figs.1–12; text-fig.3. Holotype: Schiøler, 2015, pl.1, figs.6–7. Age: late Albian–middle Cenomanian

BICARINELLUM Deflandre, 1948, p.212. Emendation: Keupp, 1984, p.17–18, as a revised diagnosis. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1298). Taxonomic junior synonyms: *Biechelerella*, according to Keupp (1984, p.20); *Calcisphaerellum*, by implication in Keupp (1984, p.20), who considered the "type species" of *Calcisphaerellum*, *Calcisphaerellum flosculus*, to be a taxonomic junior synonym of *Bicarinellum jurassicum*. Type: Deflandre, 1948, figs.28–29, as *Bicarinellum castaninium*.

calvum Keupp, 1979a, p.38–39, pl.10, figs.1–10. Holotype: Keupp, 1979a, pl.10, figs.1–2. Age: early Barremian.

***castaninium** Deflandre, 1948, p.212–215, figs.28–31,34. Holotype: Deflandre, 1948, figs.28–29. Age: middle Eocene.

?**cristatum** Keupp, 1981, p.49–50, pl.43, figs.1–8. Holotype: Keupp, 1981, pl.43, figs.1–4; Keupp, 1982, pl.6.2–9, figs.7–9,12. Questionable assignment: Keupp (1993, p.32). Keupp (1982, p.335) also cited this species as new. Age: late Aptian–early Albian.

eulineatum Keupp, 1987, p.47, pl.10, figs.1–5; text-fig.7. Holotype: Keupp, 1987, pl.10, figs.1–3. Age: middle Albian–early Cenomanian.

jurassicum (Deflandre, 1948, p.210–211, figs.26–27) Keupp, 1984, p.20. Holotype: Deflandre, 1948, figs.26–27. Originally *Biechelerella*, subsequently (and now) *Bicarinellum*. Taxonomic junior synonym: *Calcisphaerellum flosculus*, according to Keupp (1984, p.20). Age: Late Jurassic.

pulchrum Keupp and Kowalski, 1992, p.221, pl.5, fig.13; pl.6, figs.1–2,4. Holotype: Keupp and Kowalski, 1992, pl.6, fig.1. Keupp and Kowalski (1992, p.221) placed the generic name in quotes. The Latin adjective "pulcher" (masculine) is declined as "pulchra" (feminine) and "pulchrum" (neuter). Age: middle to late Albian.

"**tricarinelloides**" Versteegh, 1993, p.357,359,360, pl.1, figs.1–12; text-figs.4A–D. Holotype: Versteegh, 1993, pl.1, figs.4–5. **NOW** *Posoniella*. Originally *Bicarinellum*, subsequently (and now) *Posoniella*. Age: late Pliocene–late Pleistocene.

tumulosum Willems, 1988, p.458–461, pl.6, figs.28–29. Holotype: Willems, 1988, pl.6, fig.28. Age: early Campanian.

BICONIDINIUM Islam, 1983c, p.84. Type: Islam, 1983c, pl.1, fig.3, as *Biconidinium longissimum*.

***longissimum** Islam, 1983c, p.84–85, pl.1, figs.3–4; text-fig.10. Holotype: Islam, 1983c, pl.1, fig.3; Fensome et al., 1995, fig.1 — p.1607. Age: early Eocene.

"**parvum**" Wilson in Slimani, 2001a, p.192. **Name not validly published**: no description. **Taxonomic senior synonym**: *Diconodinium wilsonii*, according to Slimani (2001a, p.192).

reductum (May, 1980, p.84–85, pl.21, fig.20) Kirsch, 1991, p.120. Emendation: Kirsch, 1991, p.120, as *Biconidinium reductum*. Holotype: May, 1980, pl.12, fig.20. Originally *Palaeocystodinium*, subsequently (and now) *Biconidinium*. Taxonomic junior synonym: *Svalbardella parva* (name not validly published), according to Slimani (2001a, p.192). Age: late Campanian–early Maastrichtian.

"**BIECHELERELLA**" Deflandre, 1948, p.209–210. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298). **Taxonomic senior synonym**: *Bicarinellum*, according to Keupp (1984, p.20). Type: Deflandre, 1948, figs.26–27, as *Biechelerella jurassica*.

"**jurassica*" Deflandre, 1948, p.210–211, figs.26–27. Holotype: Deflandre, 1948, figs.26–27. **NOW** *Bicarinellum*. Originally *Biechelerella*, subsequently (and now) *Bicarinellum*. Taxonomic junior synonym: *Calcisphaerellum flosculus*, according to Keupp (1984, p.20). Age: Late Jurassic.

BINZHOUDINIUM Xu Jinli et al., 1997, p.52,146–147. Type: Xu Jinli et al., 1997, pl.7, fig.1, as *Binzhoudinium longispinosum*.

"*branospinosum*" Xu Jinli et al., 1997, p.53, pl.6, figs.6–7. Holotype: Xu Jinli et al., 1997, pl.6, fig.6. **Name not validly published**: no English or Latin description. Age: middle-late Eocene.

**longispinosum* Xu Jinli et al., 1997, p.52–53,147, pl.5, fig.13; pl.7, figs.1–3; text-fig.2. Holotype: Xu Jinli et al., 1997, pl.7, fig.1. Taxonomic junior synonym: *Binzhoudinium recedens*, according to He Chengquan et al. (2009, p.335). Age: middle-late Eocene.

membranospinosum Xu Jinli et al., 1997, p.53, pl.6, figs.6–7 ex He Chengquan et al. 2009, p.335–336,650. Holotype: Xu Jinli et al., 1997, pl.6, fig.6. This name (with the epithet misspelled as "*branospinosum*") was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.651) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

multispinosum Xu Jinli et al., 1997, p.54, pl.5, figs.15–16; pl.6, figs.9–10; pl.7, figs.4–9 ex He Chengquan et al., 2009, p.336,651. Holotype: Xu Jinli et al., 1997, pl.5, fig.16. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.651) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

"*recedens*" Xu Jinli et al., 1997, p.54, pl.5, fig.14; pl.7, figs.10–11. Holotype: Xu Jinli et al., 1997, pl.7, fig.10. **Name not validly published**: no English or Latin description. **Taxonomic senior synonym**: *Binzhoudinium longispinosum*, according to He Chengquan et al. (2009, p.335). Age: middle-late Eocene.

BIORBIFERA Habib, 1972, p.377. Emendations: Below, 1987b, p.63; Riding and Helby, 2001g, p.195,197. Type: Habib, 1972, pl.10, fig.3, as *Biorbifera johnewingii*.

"*aggressiva*" Helby in Riding and Helby, 2001g, p.197. **Name not validly published**: no description. **Taxonomic senior synonym**: *Biorbifera ferox*, according to Riding and Helby (2001g, p.197).

ferox Riding and Helby, 2001g, p.197,199, figs.9A–T. Holotype: Riding and Helby, 2001g, figs.9I–L. Taxonomic junior synonym: *Biobifera aggressiva* (name not validly published), according to Riding and Helby (2001g, p.197). Age: Tithonian.

**johnewingii* Habib, 1972, p.377–378, pl.10, figs.2–3. Emendation: Below, 1987b, p.63–64. Holotype: Habib, 1972, pl.10, fig.3; Fensome et al., 1995, fig.2 — p.1577. Age: Early Cretaceous.

"BIPOLARIBUCINA" Jiabo, 1978, p.57. Although the "type species" was not validly transferred by Jiabo (1978), the generic name *Bipolaribucina* was validly published by these authors, since it is based on a previously validly published species name (I.C.N. Article 40.3). **Taxonomic senior synonym**: *Distatodinium*, according to Chen et al. (1988, p.6–7). Type: Brosius, 1963, pl.4, fig.6, as *Hystrichosphaeridium paradoxum*.

"?*biornata*" He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.39, pl.22, figs.18–19. Holotype: He Chengquan et al., 1989, pl.22, fig.18. **NOW** *Songiella*. Originally *Bipolaribucina*?, subsequently *Distatodinium*, thirdly (and now) *Songiella*. Questionable assignment: He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al. (1989, p.39). Taxonomic senior synonym: *Membranilarnacia paucitubata*, according to Mao Shaozhi et al. (1995, p.44) — however, He Chengquan et al. (2009, p.366) retained this species as *Songiella biornata*. Age: Early Tertiary.

"*conicosa*" Jiabo, 1978, p.57, pl.29, figs.4–5. Holotype: Jiabo, 1978, pl.29, fig.4. **NOW** *Palaeohystrichodinium*. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Palaeohystrichodinium*. Age: Early Tertiary.

"*huanghuaensis*" Jiabo, 1978, p.57, pl.29, figs.9–10. Holotype: Jiabo, 1978, pl.29, fig.9. **NOW** *Songiella*. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Songiella*. Age: Early Tertiary.

"*liaoningensis*" Jiabo, 1978, p.58, pl.29, figs.6–8. Holotype: Jiabo, 1978, pl.29, fig.7. **NOW** *Peltiphoridium*. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Peltiphoridium*. Age: Early Tertiary.

"*oblongata*" Jiabo, 1978, p.58, pl.29, figs.1–3. Holotype: Jiabo, 1978, pl.29, fig.2. **NOW** *Peltiphoridium oblongatum*. Originally *Bipolaribucina oblongata*, subsequently *Impletosphaeridium oblongatum* (combination illegitimate), thirdly *Impletosphaeridium elongatum*, fourthly (and now) *Peltiphoridium oblongatum*. Age: Early Tertiary.

"*paradoxa*" (Brosius, 1963, p.41–42, pl.4, figs.1,6; text-fig.2, nos.1a–c) Lentin and Williams, 1981, p.28. Holotype: Brosius, 1963, pl.4, fig.6; Fensome et al., 1995, fig.2 — p.1639. **NOW** *Distatodinium*. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly *Oligosphaeridium?*, fourthly (and now) *Distatodinium*, fifthly *Bipolaribucina*. Taxonomic junior synonym: *Distatodinium craterum*, according to Fensome et al. (2009, p.31). Age: late Oligocene.

"*pusilla*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.53–54, pl.12, figs.1–6. Holotype: Liu Zhili et al., 1992, pl.12, fig.2. Originally *Bipolaribucina*, subsequently *Distatodinium*. **Taxonomic senior synonym:** *Oligosphaeridium minus*, according to He Chengquan et al. (2009, p.116). Age: Early Tertiary.

"*tianjinensis*" Jiabo, 1978, p.59, pl.29, figs.13–14. Holotype: Jiabo, 1978, pl.29, fig.13. **NOW** *Impletosphaeridium*. Originally *Bipolaribucina*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

"?*tuberculata*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.54, pl.12, fig.13. Holotype: Liu Zhili et al., 1992, pl.12, fig.13. **NOW** *Gagiella*. Originally *Bipolaribucina?*, subsequently *Distatodinium*, thirdly (and now) *Gagiella*. Questionable assignment: Zheng Yuefang and Liu Xuexian in Liu Zhili et al. (1992, p.54). Age: Early Tertiary.

BITECTATODINIUM Wilson, 1973, p.351. Taxonomic junior synonym: *Caledonidinium*, by implication in Harland (1977b, p.93), who considered the "type species" of *Caledonidinium*, *Caledonidinium vermiculatum*, to be a taxonomic junior synonym of *Bitectatodinium tepikiense*. Type: Wilson, 1973, fig.2, nos.1–4, as *Bitectatodinium tepikiense*.

?*arborichiarum* Louwye, 1999, p.112,115, pl.1, figs.1–8. Holotype: Louwye, 1999, pl.1, figs.1–3. Questionable assignment: Louwye, 1999, p.112. Age: late Miocene.

heistense Louwye, 2001, p.127,129, fig.5, nos.1–7; text-fig.6. Holotype: Louwye, 2001, fig.5, nos.1–4; text-fig.6. Age: early-middle Miocene.

raedwaldii Head, 1997, p.175, fig.7, nos.7–20; fig.15, nos.15–17; fig.16, nos.1–3. Holotype: Head, 1997, fig.7, nos.7–11. Age: middle Pliocene.

?*serratum* (Head et al., 1989b, p.457, pl.3, figs.14–16) Lentin and Williams, 1993, p.62. Holotype: Head et al., 1989b, pl.3, figs.14–16. Originally *Gongylocladus*, subsequently (and now) *Bitectatodinium?*. Questionable assignment: Lentin and Williams (1993, p.62). Age: late Miocene.

spongium (Zonneveld, 1997, p.322–323,325, pl.1, figs.1–6; text-figs.3A–B) Zonneveld and Jurkschat, 1999, p.158. Emendation: Zonneveld and Jurkschat, 1999, p.158, as *Bitectatodinium spongium*. Holotype: Zonneveld, 1997, pl.1,

figs.1,3,5; Zonneveld and Jurkschat, 1999, pl.1, figs.2–4 (not 1). Originally *Algidasphaeridium*?, subsequently (and now) *Bitectatodinium*. Age: Holocene.

**tepikiense* Wilson, 1973, p.351,353, fig.2, nos.1–12. Holotype: Wilson, 1973, fig.2, nos.1–4. Taxonomic junior synonym: *Caledonidinium vermiculatum*, according to Harland (1977b, p.93). Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45), and *Gonyaulax digitale* (Pouchet) Kofoid according to Lewis et al. (2001). Age: middle Pleistocene.

BITORUS Keupp, 1992a, p.500. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1298). Type: Keupp, 1992a, pl.4, figs.1–2, as *Bitorus turbiformis*.

bulbjergensis Kienel, 1994, p.39–40, pl.6, figs.1–6. Holotype: Kienel, 1994, pl.6, figs.1–2. Age: Danian.

truncus Hildebrand-Habel and Willems, 1999, p.90,93, pl.1, figs.1–7. Holotype: Hildebrand-Habel and Willems, 1999, pl.1, figs.2–6. N.I.A. Age: late Eocene.

**turbiformis* Keupp, 1992a, p.500, pl.4, figs.1–9; pl.5, figs.1–7; text-figs.2a–b. Holotype: Keupp, 1992a, pl.4, figs.1–2. Age: ?late Berriasian–Valanginian.

BITUBERICYSTA Soncini, 1992, p.326. Type: Soncini, 1992, pl.1, figs.1–3, as *Bitubericysta boroujiana*.

**boroujiana* Soncini, 1992, p.326–327,329, pl.1, figs.1–11; pl.2, fig.1; text-figs.4a–b. Holotype: Soncini, 1992, pl.1, figs.1–3. Age: Ypresian.

BLYSMATODINIUM McMinn, 1992, p.434. Type: McMinn, 1992, pl.3, figs.1–3, as *Blysmatodinium argoi*.

**argoi* McMinn, 1992, p.434, pl.3, figs.1–4. Holotype: McMinn, 1992, pl.3, figs.1–3. Age: late Miocene–Pliocene.

BOHAIDINA Jiabo, 1978, p.37. Emendations: Xu Jinli and Mao Shaozhi, 1989, p.215–216; Sun Xuekun, 1994, p.70–71. Taxonomic junior synonym: *Prominangularia*, according to Sun Xuekun (1994, p.70); see *Bohaidina* subgenus *Prominangularia*. Type: Jiabo, 1978, pl.13, fig.1, as *Bohaidina laevigata*.

alveolae Xu Jinli and Mao Shaozhi, 1989, p.216–217,222, pl.1, figs.1–6,7a–b,8–11; pl.3, figs.2–5. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.1, fig.1. Age: Early Tertiary.

apiciporata Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.40, pl.12, figs.9–14. Holotype: He Chengquan et al., 1989, pl.12, fig.14. Age: Early Tertiary.

apicornicula Jiabo, 1978, p.39, pl.8, fig.7. Holotype: Jiabo, 1978, pl.8, fig.7. Age: Early Tertiary.

"*arcteverrucosa*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.55, pl.3, figs.7–10. Holotype: Liu Zhili et al., 1992, pl.3, fig.7. **NOW** *Parabohaidina*. Originally *Bohaidina*, subsequently (and now) *Parabohaidina*. Age: Early Tertiary.

arenula nom. nov. subst. pro *Bohaidina granulata* (Jiabo, 1978) He Chengquan et al. 2009 non *Bohaidina granulata* Jiabo 1978.

Prominangularia granulata Jiabo, 1978, p.47–48, pl.19, figs.7–12; pl.46, figs.1a–b; text-fig.8.

Emendation: Xu Jinli and Mao Shaozhi, 1989, p.303, as *Prominangularia granulata*. Holotype: Jiabo, 1978, pl.19, fig.7. Originally *Prominangularia granulata*, subsequently *Bohaidina granulata* (Jiabo) He Chengquan et al. (combination illegitimate, non *Bohaidina granulata* Jiabo), thirdly (and now) *Bohaidina arenula*. Taxonomic senior synonym: *Bohaidina granulata* Jiabo, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained this species separately. The name *Bohaidina arenula* is proposed here as a substitute name for

the illegitimate combination *Bohaidina granulata* (Jiabo) He Chengquan et al. The epithet derives from the Latin arenula, grain of sand. N.I.A. Age: Early Tertiary.

"*aspera*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.55, pl.4, figs.10–12. Holotype: Liu Zhili et al., 1992, pl.4, fig.12. **Taxonomic senior synonym:** *Bohaidina granulata* according to He Chengquan et al. (2009, p. 446). He Chengquan et al. (2009, p. 446) also listed this species as a taxonomic junior synonym of the subspecies *Bohaidina granulata* subsp. *biconica*. Age: Early Tertiary.

asymmetrosa Jiabo, 1978, p.39, pl.9, fig.2. Holotype: Jiabo, 1978, pl.9, fig.2. Age: Early Tertiary.

dongyingensis (Jiabo, 1978, p.48, pl.19, figs.13–17) He Chengquan et al., 2009, p.453. Holotype: Jiabo, 1978, pl.19, fig.14. Originally *Prominangularia*, subsequently (and now) *Bohaidina*. Taxonomic senior synonym: *Bohaidina granulata*, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.453) retained the species separately as *Bohaidina dongyingensis*. Age: Early Tertiary.

dorsiprominentis Jiabo, 1978, p.39, pl.15, figs.1a–e,2a–b,3a–c. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.219. Holotype: Jiabo, 1978, pl.15, figs.1a–e. Originally (and now) *Bohaidina*, subsequently *Bohaidina*?. Questionable assignment: Chen et al. (1988, p.11) — however, Xu Jinli and Mao Shaozhi (1989, p.219) included the species in *Bohaidina* without question. Age: Early Tertiary.

enodis nom. nov. subst. pro *Bohaidina laevigata* (Jiabo, 1978) He Chengquan et al. 2009 non *Bohaidina laevigata* Jiabo 1978.

Prominangularia laevigata Jiabo, 1978, p.48, pl.19, figs.5–6. Holotype: Jiabo, 1978, pl.19, fig.6. Originally *Prominangularia laevigata*, subsequently *Bohaidina laevigata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Bohaidina laevigata* Jiabo), thirdly (and now) *Bohaidina enodis*. Taxonomic senior synonym: *Bohaidina laevigata* Jiabo, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained this species separately. The name *Bohaidina enodis* is proposed here as a substitute name for the illegitimate combination *Bohaidina laevigata* (Jiabo) He Chengquan et al. The epithet derives from the Latin enodis, without knots, smooth. Age: Early Tertiary.

fusiforma Jiabo, 1978, p.39–40, pl.8, fig.6. Holotype: Jiabo, 1978, pl.8, fig.6. Age: Early Tertiary.

"*granulata*" (Jiabo, 1978, p.47–48, pl.19, figs.7–12; pl.46, figs.1a–b; text-fig.8) He Chengquan et al., 2009, p.454. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.303. Holotype: Jiabo, 1978, pl.19, fig.7. **Combination illegitimate — senior homonym:** *Bohaidina granulata* Jiabo 1978. **NOW** *Bohaidina arenula*. Originally *Prominangularia granulata*, subsequently *Bohaidina granulata* (Jiabo) He Chengquan et al. (combination illegitimate, non *Bohaidina granulata* Jiabo), thirdly (and now) *Bohaidina arenula*. Taxonomic senior synonym: *Bohaidina granulata* Jiabo, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Early Tertiary.

granulata Jiabo, 1978, p.40–41, pl.8, fig.8; pl.11, figs.1–3,5; pl.12, figs.1–8; pl.13, figs.4–9. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.219. Holotype: Jiabo, 1978, pl.12, fig.8. Taxonomic junior synonyms: *Prominangularia granulata* and *Prominangularia dongyingensis*, both according to Sun Xuekun (1994, p.71) — however He Chengquan et al. (2009, p.453–454) retained both species separately; and *Bohaidina aspera* and *Bohaidina microgranulosa*, both according to He Chengquan et al. (2009, p. 446). Junior homonym: *Bohaidina granulata* (Jiabo) He Chengquan et al. 2009. Age: Early Tertiary.

subsp. *biconica* Jiabo, 1978, p.40, pl.12, figs.1,4; pl.13, figs.4–9. Holotype: Jiabo, 1978, pl.13, fig.7. He Chengquan et al. (2009, p. 446) listed *Bohaidina aspera* as a taxonomic synonym of this subspecies as well as of the species *Bohaidina granulata*. Age: Early Tertiary.

subsp. *granulata*. Autonym. Holotype: Jiabo, 1978, pl.12, fig.8.

subsp. *minor* Jiabo, 1978, p.40–41, pl.11, figs.1–3. Holotype: Jiabo, 1978, pl.11, fig.2. Age: Early Tertiary.

"laevigata" (Jiabo, 1978, p.48, pl.19, figs.5–6) He Chengquan et al., 2009, p.454. Holotype: Jiabo, 1978, pl.19, fig.6. **Combination illegitimate — senior homonym:** *Bohaidina laevigata* Jiabo 1978. **NOW** *Bohaidina enodis*. Originally *Prominangularia laevigata*, subsequently *Bohaidina laevigata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Bohaidina laevigata* Jiabo), thirdly (and now) *Bohaidina enodis*. Taxonomic senior synonym: *Bohaidina laevigata* Jiabo, according to Sun Xuekun (1994, p.71)) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Early Tertiary.

**laevigata* Jiabo, 1978, p.38–39, pl.13, figs.1–3; pl.14, figs.1–10. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.219–220. Holotype: Jiabo, 1978, pl.13, fig.1. Taxonomic junior synonym: *Prominangularia laevigata*, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p. 454) retained that species separately. Junior homonym: *Bohaidina granulata* (Jiabo) He Chengquan et al., 2009. Age: Early Tertiary.

subsp. *biconica* Jiabo, 1978, p.38, pl.13, fig.3. Holotype: Jiabo, 1978, pl.13, fig.3. Age: Early Tertiary.

"forma *laevigata*". Autonym. Holotype: Jiabo, 1978, pl.13, fig.1. **Now redundant.** Xu Jinli and Mao Shaozhi (1989, p.220) gave the citation "*Bohaidina laevigata* forma *laevigata* Jiabo, 1978, stat. et emend. nov."

subsp. *laevigata*. Autonym. Holotype: Jiabo, 1978, pl.13, fig.1. Lentin and Williams (1993, p.63) retained this taxon at subspecific rank.

"forma *minor*" (Jiabo, 1978, p.38–39, pl.14, figs.1–6) Xu Jinli and Mao Shaozhi, 1989, p.220. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.220, as *Bohaidina laevigata* forma *minor*. Holotype: Jiabo, 1978, pl.14, fig.2. **NOW** *Bohaidina laevigata* subsp. *minor*. Originally (and now) *Bohaidina laevigata* subsp. *minor*, subsequently *Bohaidina laevigata* forma *minor*. Age: Early Tertiary.

subsp. *minor* Jiabo, 1978, p.38–39, pl.14, figs.1–6. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.220, as *Bohaidina laevigata* forma *minor*. Holotype: Jiabo, 1978, pl.14, fig.2. Originally (and now) *Bohaidina laevigata* subsp. *minor*, subsequently *Bohaidina laevigata* forma *minor*. Lentin and Williams (1993, p.63) retained this taxon at subspecific rank. Age: Early Tertiary.

"laxituberculata" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.57, pl.3, fig.13. Holotype: Liu Zhili et al., 1992, pl.3, fig.13. **Taxonomic senior synonym:** *Parabohaidina tuberculata* He Chengquan, according to He Chengquan et al. (2009, p.471). Age: Early Tertiary.

micirugosa (He Chengquan, 1984b, p.158, pl.2, figs.12–17) He Chengquan et al., 2009, p.454. Holotype: He Chengquan, 1984b, pl.2, fig.14. Originally *Prominangularia*, subsequently (and now) *Bohaidina*. Taxonomic senior synonym: *Bohaidina rugosa*, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Tertiary.

"microgranulosa" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.57, pl.4, figs.5–8. Holotype: Liu Zhili et al., 1992, pl.4, fig.6. **Taxonomic senior synonym:** *Bohaidina granulata*, according to He Chengquan et al. (2009, p. 446). Age: Early Tertiary.

microreticulata Jiabo, 1978, p.41, pl.10, figs.1–8b. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.220–221. Holotype: Jiabo, 1978, pl.10, fig.2. Age: Early Tertiary.

minuta Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.58–59, pl.1, figs.15–18 ex He Chengquan et al., 2009, p.449. Holotype: Liu Zhili et al., 1992, pl.1, fig.17, designated by He Chengquan et al. (2009, p.449). This name was not validly published in Liu Zhili et al. (1992) as the type was not designated; the authors apparently cited both illustrated specimens as type (Mao Shaozhi, personal communication). Age: Early Tertiary.

primitiva Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.58, pl.5, figs.12–13. Holotype: Liu Zhili et al., 1992, pl.5, fig.13. Age: Early Tertiary.

prolata Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.42, pl.13, figs.1–2. Holotype: He Chengquan et al., 1989, pl.13, fig.2. Age: Early Tertiary.

reticulata (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.79–80, pl.5, figs.14–17; text-fig.7) Fensome and Williams, 2004, p.86. Holotype: Liu Zhili et al., 1992, pl.5, fig.17. Originally *Prominangularia*, subsequently (and now) *Bohaidina*. He Chengquan et al. (2009, p.455) also proposed this combination. Age: Early Tertiary.

retirugosa Jiabo, 1978, p.41, pl.7, figs.7–11; pl.8, figs.1–5; pl.9, figs.3–9; pl.10, figs.9–10; pl.11, figs.7–12. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.221. Holotype: Jiabo, 1978, pl.9, fig.8. Age: Early Tertiary.

subsp. *brachorhombica* Jiabo, 1978, p.41–42, pl.10, figs.9–10. Holotype: Jiabo, 1978, pl.10, fig.9. Age: Early Tertiary.

subsp. *minor* Jiabo, 1978, p.42, pl.11, figs.7–12. Holotype: Jiabo, 1978, pl.11, fig.9. Age: Early Tertiary.

subsp. *retirugosa*. Autonym. Holotype: Jiabo, 1978, pl.9, fig.8.

rivularisa Jiabo, 1978, p.42, pl.11, fig.4. Holotype: Jiabo, 1978, pl.11, fig.4. Age: Early Tertiary.

rugosa Jiabo, 1978, p.42, pl.9, fig.1. Holotype: Jiabo, 1978, pl.9, fig.1. Taxonomic junior synonym: *Prominangularia micirugosa*, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained that species separately. Age: Early Tertiary.

spinosa Xu Jinli and Mao Shaozhi, 1989, p.217–218,222, pl.1, figs.12–16; pl.2, figs.1–2; pl.3, fig.1; text-figs.2–4. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.1, fig.12. Age: Early Tertiary.

"forma *fusiforma*" Xu Jinli and Mao Shaozhi, 1989, p.218, pl.1, figs.14–15; text-fig.3. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.1, fig.14. **NOW** *Bohaidina spinosa* subsp. *fusiforma*. Originally *Bohaidina spinosa* forma *fusiforma*, subsequently (and now) *Bohaidina spinosa* subsp. *fusiforma*. Age: Early Tertiary.

subsp. *fusiforma* (Xu Jinli and Mao Shaozhi, 1989, p.218, pl.1, figs.14–15; text-fig.3) Lentin and Williams, 1993, p.64. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.1, fig.14. Originally *Bohaidina spinosa* forma *fusiforma*, subsequently (and now) *Bohaidina spinosa* subsp. *fusiforma*. Age: Early Tertiary.

"forma *quadrata*" Xu Jinli and Mao Shaozhi, 1989, p.218, pl.1, fig.16; pl.2, figs.1–2; text-fig.4. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.2, fig.2. **NOW** *Bohaidina spinosa* subsp. *quadrata*. Originally *Bohaidina spinosa* forma *quadrata*, subsequently (and now) *Bohaidina spinosa* subsp. *quadrata*. Age: Early Tertiary.

subsp. *quadrata* (Xu Jinli and Mao Shaozhi, 1989, p.218, pl.1, fig.16; pl.2, figs.1–2; text-fig.4) Lentin and Williams, 1993, p.64. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.2, fig.2. Originally *Bohaidina spinosa* forma *quadrata*, subsequently (and now) *Bohaidina spinosa* subsp. *quadrata*. Age: Early Tertiary.

"forma *spinosa*". Autonym. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.1, fig.12. **Now redundant**.

subsp. *spinosa*. Autonym. Holotype: Xu Jinli and Mao Shaozhi, 1989, pl.1, fig.12.

tuberculata Sun Xuekun, 1994, p.71, pl.4, figs.6–8. Holotype: Sun Xuekun, 1994, pl.4, fig.6. He Chengquan et al. (2009, p.455) incorrectly considered *Bohaidina tuberculata* to be a new combination. Age: late Eocene.

verrugosa (Jiabo, 1978, p.45, pl.17, fig.10) Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.58. Holotype: Jiabo, 1978, pl.17, fig.10. Originally *Parabohaidina*, subsequently (and now) *Bohaidina*. Age: Early Tertiary.

"**BOHAIDINA** subgenus **BOHAIDINA**". Autonym. **Name redundant**. He Chengquan et al. (2009, p.444–453) included the following species in this subgenus: *Bohaidina alveolae*, *Bohaidina apiciporata*, *Bohaidina apicornicula*, *Bohaidina asymmetrosa*, *Bohaidina dorsiprominentis*, *Bohaidina fusiformis*, *Bohaidina granulata*, *Bohaidina laevigata*, *Bohaidina microreticulata*, *Bohaidina minuta*, *Bohaidina primitiva*, *Bohaidina prolata*, *Bohaidina retirugosa*, *Bohaidina rivularisa*, *Bohaidina rugosa* and *Bohaidina spinosa*. Type: Jiabo, 1978, pl.13, fig.1, as *Bohaidina laevigata*.

"**BOHAIDINA** subgenus **PROMINANGULARIA**" (Jiabo, 1978, p.47) He Chengquan et al., 2009, p.453. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.303, as *Prominangularia*. **Combination not validly published**: no clear indication of rank. We assume that the rank of subgenus was implied by He Chengquan et al. (2009) and so treat it as such here; but in doing so do not intend to validate the name. Chen et al. (1988, p.23) included this taxon (as *Prominangularia*) in the acritarchs; however, Lentin in Lentin and Williams (1989, p.304) considered it to be a freshwater ceratioid dinoflagellate cyst. He Chengquan et al. (2009, p.453–455) included the following species in this subgenus: *Bohaidina dongyingensis*, *Bohaidina granulata*, *Bohaidina laevigata*, *Bohaidina micirugosa*, *Bohaidina reticulata* and *Bohaidina tuberculata*. Type: Jiabo, 1978, pl.19, fig.7, as *Prominangularia granulata*.

BONBONADINIUM Helby and Partridge, 2001, p.221. Type: Helby and Partridge, 2001, figs.1K–L, as *Bonbonadinium granulatum*.

***granulatum** Helby and Partridge, 2001, p.221,223–224, figs.1A–N. Holotype: Helby and Partridge, 2001, figs.1K–L. Helby and Partridge (2001, p.223) attributed this name to an unpublished thesis by F.M. Parker. Age: Tithonian.

"**BONETIELLA**" Trejo, 1983, p.6. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298, who noted that the cyst wall is pithonelloid and so dinoflagellate affinity is questionable). **Name illegitimate — senior homonym**: *Bonetiella* Rzedowski, 1957, an anacardiacean. **Taxonomic senior synonym**: *Bonetocardiella*, provisionally, according to Elbrächter et al., 2008, p.1298). If considered a separate genus, a new name would be required. Type: Trejo, 1983, pl.36, fig.1, as *Bonetiella peregrinaensis*.

"***peregrinaensis**" Trejo, 1983, p.6, pl.36, figs.1–6; pl.44, figs.5,7,9. Holotype: Trejo, 1983, pl.36, fig.1. **NOW** *Bonetocardiella*. Originally *Bonetiella* (generic name illegitimate), subsequently (and now) *Bonetocardiella*. Following I.C.N. Article 55.1, the species name *Bonetiella prergrinaensis* is validly published even though the generic name *Bonetiella* is illegitimate. Age: Albian.

BONETOCARDIELLA Dufour, 1968, p.1948. Emendations: Villain, 1975, p.196; Masters and Scott, 1978, p.215. Calcareous dinoflagellate genus (see Kienel, 1994, p.53 and Elbrächter et al., 2008, p.1298, the latter noting that the cyst wall is pithonelloid and so dinoflagellate affinity is questionable). Taxonomic junior synonym: *Bonetiella* (name illegitimate), provisionally according to Elbrächter et al. (2008, p.1289). Nomenclatural junior synonym: *Conejoconus*, which has the same proposed type (see also Villain, 1975, p.196). Fensome and Williams (2004) considered this generic name to be not validly published because it lacked a type. However, as it was published under the I.C.Z.N., Elbrächter et al. (2008, p.1289) implied that it can be considered validly published. Type: not designated; "type species" — *Stomiosphaera conoidea*.

betica (Azéma, 1966, p.838–840, pl.1, figs.7–8; pl.2, fig.9) Dufour, 1968, p.1948. Holotype: information not available. Originally *Stomiosphaera*, subsequently (and now) *Bonetocardiella*. Fensome and Williams (2004) considered this name to be not validly published on the incorrect basis that the generic name is not validly published. Villain (1977, p.155) indicated that this species is attributable to *Conorbina* or some other genus of benthic foraminifer. Age: information not available.

"**cardiiformis**" (Ayala Castañares and Seigle, 1962, p.16–17, pl.1, figs.1–5,7–9) Dufour, 1968, p.1948. Holotype: information not available. Originally *Stomiosphaera*, subsequently *Bonetocardiella*, thirdly *Conejoconus* (generic name illegitimate). **Taxonomic senior synonym**: *Leptodermella maestrichtiensis* (Appendix A), according to

Villain (1975, p.198). Taxonomic junior synonym: *Bonetocardiella conoidea*, according to Andri (1972, p.15) — however, the latter species has generally been retained as the type of *Bonetocardiella*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Fensome and Williams (2004) considered this name to be not validly published on the incorrect basis that the generic name is not validly published. Age: information not available.

**conoidea* (Bonet, 1956, p.454–456, pl.22, figs.1[part]–2; pl.27, fig.1[part]) Dufour, 1968, p.1948. Holotype: not designated. Originally *Stomiosphaera*, subsequently (and now) *Bonetocardiella*, thirdly *Conejoconus* (generic name illegitimate). Taxonomic junior synonym: *Stomiosphaera cardiiformis*, according to Andri (1972, p.15) — however that species was later considered to be a taxonomic junior synonym of *Leptodermella* (now *Bonetocardiella*) *maastrichtiensis*. Fensome and Williams (2004) indicated that designation of a holotype was a requirement under the I.C.Z.N. at the time that Bonet (1956) proposed this name; however, Elbrächter et al. (2008, p.1289) implied that it can be considered validly published as the name was proposed under the I.C.Z.N. Elbrächter et al. (2008, p.1289) cited "fig. 4" as the type of *Bonetocardiella*, but it is not clear to which reference this pertained to. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Middle Cretaceous.

"var. *extraflexa*" Andri, 1972, p.16, pl.1, fig.12; pl.2, figs.4–5; text-fig.2, nos.12,16–17,30,34–35,42,49,51.
Name not validly published: holotype not designated. Age: Albian–Cenomanian.

"*maastrichtiensis*" (Visser, 1951, p.211, pl.7, fig.13) Villain, 1975, p.198. Holotype: Visser, 1951, pl.7, fig.13. **NOW** *Inocardion*. Originally *Leptodermella* (Appendix A), subsequently *Bonetocardiella*, thirdly (and now) *Inocardion*. Taxonomic junior synonym: *Stomiosphaera cardiiformis*, according to Villain (1975, p.198). Fensome and Williams (2004) considered this combination to be not validly published on the incorrect basis that the generic name is not validly published. Age: Maastrichtian.

"*neumanniae*" Villain, 1975, p.199–200, pl.2, figs.7–8; pl.6, figs.1–17, pl.1, figs.1d–e; tableau 2, figs.1–12; tableau 15, fig.2. Holotype: Villain, 1975, pl.6, fig.4. **NOW** *Inocardion*. Originally *Bonetocardiella*, subsequently (and now) *Inocardion*. Fensome and Williams (2004) considered this name to be not validly published on the incorrect basis that the generic name is not validly published. Age: Late Cretaceous.

"*paulaworstelliae*" Bolli, 1978b, p.912, pl.1, figs.1–12. Holotype: Bolli, 1978b, pl.1, figs.7–9. **NOW** *Heptasphaera*. Originally *Bonetocardiella*, subsequently (and now) *Heptasphaera*. Fensome and Williams (2004) considered this combination to be not validly published on the incorrect basis that the generic name is not validly published. Age: Oxfordian–Kimmeridgian.

peregrinaensis (Trejo, 1983, p.6, pl.36, figs.1–6; pl.44, figs.5,7,9) Williams and Fensome, 2016, p.140. Holotype: Trejo, 1983, pl.36, fig.1. Originally *Bonetiella* (generic name illegitimate), subsequently (and now) *Bonetocardiella*. Age: Albian.

ponce-de-leoni Trejo, 1983, p.6–7, pl.36, figs.7–9; pl.37, figs.1–2. Holotype: Trejo, 1983, pl.37, fig.1.
 Age: Albian–Cenomanian.

vachardii Villain, 1977, p.155–156, pl.5, figs.1–3,5–7. Holotype: Villain, 1977, pl.5, figs.5–6. Fensome and Williams (2004) considered this name to be not validly published on the incorrect basis that the generic name is not validly published. Age: Maastrichtian–?Danian.

"*williamsonii*" Bolli, 1978b, p.912–913, pl.2, figs.1–12; pl.3, figs.1–12. Holotype: Bolli, 1978b, pl.2, figs.1–3. **NOW** *Pirumella*. Originally *Bonetocardiella*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly *Orthopithonella*, fifthly (and now) *Pirumella*. Fensome and Williams (2004) considered this name to be not validly published on the incorrect basis that the generic name is not validly published. Age: Oxfordian–Kimmeridgian.

BOREOCYSTA Stover and Evitt, 1978, p.22–23. Emendation: Århus, 1992, p.306. Type: Wiggins, 1969, pl.2, figs.1–2, as *Omatia butticula*.

**butticula* (Wiggins, 1969, p.150, pl.2, figs.1–5) Stover and Evitt, 1978, p.23. Holotype: Wiggins, 1969, pl.2, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1005. Originally *Omatia*, subsequently (and now) *Boreocysta*. Age: Neocomian, ?late Valanginian or early Hauterivian.

isfjordica Århus, 1992, p.310, figs.4A–I. Holotype: Århus, 1992, fig.4E. Age: Valanginian.

"**BOSEA**" He Chengquan and Qian Zeshu, 1979, p.177–178. Name illegitimate — senior homonym: *Bosea* Srivastava, 1975, p.19. Substitute name: *Bosedinia*. Type: He Chengquan and Qian Zeshu, 1979, pl.1, fig.2, as *Bosea granulata*.

"*granorugosa*" He Chengquan and Qian Zeshu, 1979, p.178–179, pl.1, figs.12–13. Holotype: He Chengquan and Qian Zeshu, 1979, pl.1, fig.2. **NOW** *Bosedinia*. Originally *Bosea* (generic name illegitimate), subsequently (and now) *Bosedinia*. Age: late Eocene–Oligocene.

"**granulata*" He Chengquan and Qian Zeshu, 1979, p.178, pl.1, figs.1–5. Holotype: He Chengquan and Qian Zeshu, 1979, pl.1, fig.2. **NOW** *Bosedinia*. Originally *Bosea* (generic name illegitimate), subsequently (and now) *Bosedinia*. Age: late Eocene–Oligocene.

"*laevigata*" Jiabo, 1978, p.126–127, pl.32, fig.23 ex He Chengquan and Qian Zeshu, 1979, p.179. Holotype: Jiabo, 1978, pl.32, fig.23. **NOW** *Bosedinia laevigata*. Originally *Palaeostomocystis laevigata* (name illegitimate; Appendix A), subsequently *Bosea laevigata* (generic name illegitimate), thirdly *Fromea laevigata* (combination illegitimate; Appendix A), fourthly *Fromea psilata* (Appendix A), fifthly (and now) *Bosedinia laevigata*. The name *Palaeostomocystis laevigata* was illegitimate in Jiabo (1978) since this name is preoccupied. By "transferring" the species to *Bosea*, He Chengquan and Qian Zeshu (1979) effectively created a "new name". Following I.C.N. Article 55.1, the species name *Bosea laevigata* is validly published even though the generic name *Bosea* is illegitimate. Age: Early Tertiary.

"*operculata*" (Jiabo, 1978, p.107, pl.40, figs.17–20; pl.48, figs.3a–b) He Chengquan and Qian Zeshu, 1979, p.179. Holotype: Jiabo, 1978, pl.40, fig.19. **Combination not validly published:** basionym not fully referenced. **NOW** *Bosedinia*. Originally *Rugasphaera* (Appendix A), subsequently *Bosea* (generic name illegitimate), thirdly (and now) *Bosedinia*. Age: late Eocene–Oligocene.

BOSEDINIA He Chengquan, 1984b, p.172–173. Emendations: Chen et al., 1988, p.12–13; Prauss, 2012, p.286,289. Substitute name for *Bosea* He Chengquan and Qian Zeshu, 1979, p.177–178 (an illegitimate name). Type: He Chengquan and Qian Zeshu, 1979, pl.1, fig.2, as *Bosea granulata*.

alveolata Prauss, 2012, p.289, figs.2A–F,M,3A–H,N–O. Holotype: Prauss, 2012, fig.2A. Age: late Turonian–late Coniacian.

elegans He Chengquan, 1991, p.172–173, pl.6, fig.3. Holotype: He Chengquan, 1991, pl.6, fig.3. Age: early Eocene.

"subsp. *minor*" Tang in Cai Zhiguo et al., 1998, p.253, pl.85, figs.9–10 Holotype: Cai Zhiguo et al., 1998, pl.85, fig.9. **Name not validly published: no Latin or English description or diagnosis.** Age: early Oligocene.

granorugosa (He Chengquan and Qian Zeshu, 1979, p.178–179, pl.1, figs.12–13) He Chengquan, 1984b, p.173. Holotype: He Chengquan and Qian Zeshu, 1979, pl.1, fig.13. Originally *Bosea* (generic name illegitimate), subsequently (and now) *Bosedinia*. Age: late Eocene–Oligocene.

**granulata* (He Chengquan and Qian Zeshu, 1979, p.178, pl.1, figs.1–5) He Chengquan, 1984b, p.172. Holotype: He Chengquan and Qian Zeshu, 1979, pl.1, fig.2. Originally *Bosea* (generic name illegitimate), subsequently (and now) *Bosedinia*. Taxonomic junior synonym: *Batiacasphaera tenulla*, according to He Chengquan et al. (2009, p.457). Age: late Eocene–Oligocene.

hepuensis He Chengquan, 1984b, p.173–174, pl.8, figs.9–11. Holotype: He Chengquan, 1984b, pl.8, fig.10. Age: late Oligocene–early Miocene.

infragranulata He Chengquan, 1984b, p.174, pl.6, figs.17–23. Holotype: He Chengquan, 1984b, pl.6, fig.17. Age: late Oligocene–early Miocene.

kuantanensis Cole, 1992, p.188, pl.2, fig.4; pl.3, figs.1–2; text-figs.3I,4A–B. Holotype: Cole, 1992, pl.3, fig.1. Age: late Oligocene–middle Miocene.

laevigata (Jiabo, 1978, p.126–127, pl.32, fig.23 ex He Chengquan and Qian Zeshu, 1979, p.179) He Chengquan, 1984b, p.174. Holotype: Jiabo, 1978, pl.32, fig.23. Originally *Palaeostomocystis laevigata* (name illegitimate; Appendix A), subsequently *Bosea laevigata* (generic name illegitimate), thirdly *Fromea laevigata* (combination illegitimate; Appendix A), fourthly *Fromea psilata* (Appendix A), fifthly (and now) *Bosedinia laevigata*. The name *Palaeostomocystis laevigata* was illegitimate in Jiabo (1978), since that name is preoccupied. See *Bosea laevigata* for further discussion. Age: Early Tertiary.

subsp. *laevigata*. Autonym. Holotype: Jiabo, 1978, pl.32, fig.23.

"var. *laevigata*". Autonym. Holotype: Jiabo, 1978, pl.32, fig.23. **Now redundant.**

subsp. *minor* (He Chengquan, 1991, p.173, pl.6, fig.19) He Chengquan et al., 2009, p.459. Holotype: He Chengquan, 1991, pl.6, fig.19. Originally *Bosedinia minor*, subsequently (and now) *Bosedinia laevigata* subsp. *minor*. Taxonomic junior synonym: *Bosedinia laevigata* var. *minuta*, according to He Chengquan et al. (2009, p.459). Although *Bosedinia laevigata* var. *minuta* was the first infraspecific taxon in *Bosedinia laevigata*, it was at variety rather than subspecific rank. At subspecific rank, the epithet *minor* has priority. Age: early Eocene.

"var. *minuta*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.59, pl.15, figs.14–17. Holotype: Liu Zhili et al., 1992, pl.15, fig.14. **Taxonomic senior synonym:** *Bosedinia laevigata* subsp. *minor*, according to He Chengquan et al. (2009, p.459). Although *Bosedinia laevigata* var. *minuta* was the first infraspecific taxon in *Bosedinia laevigata*, it was at variety rather than subspecific rank. At subspecific rank, the epithet *minor* has priority. Age: Early Tertiary.

liuzhuangensis Qian Zeshu et al., 1986, p.22, pl.1, fig.36. Holotype: Qian Zeshu et al., 1986, pl.1, fig.36. Age: Paleocene–Eocene.

micirugosa He Chengquan, 1984b, p.174–175, pl.7, figs.16–20; pl.8, figs.6–8. Holotype: He Chengquan, 1984b, pl.7, fig.16. Age: latest Eocene–early Miocene.

subsp. *micirugosa*. Autonym. Holotype: He Chengquan, 1984b, pl.7, fig.16.

subsp. *minor* He Chengquan, 1984b, p.175, pl.8, figs.6–8. Holotype: He Chengquan, 1984b, pl.8, fig.8. Age: middle Oligocene–early Miocene.

microgranulosa (Jain, 1977b, p.176, pl.6, fig.74) Jansonius, 1989, p.67. Holotype: Jain, 1977b, pl.6, fig.74. Originally *Fromea* (Appendix A), subsequently (and now) *Bosedinia*. Age: early Albian.

"*minor*" He Chengquan, 1991, p.173, pl.6, fig.19. Holotype: He Chengquan, 1991, pl.6, fig.19. **NOW** *Bosedinia laevigata* subsp. *minor*. Originally *Bosedinia minor*, subsequently (and now) *Bosedinia laevigata* subsp. *minor*. Taxonomic junior synonym: *Bosedinia laevigata* var. *minuta*, according to He Chengquan et al. (2009, p.459). Age: early Eocene.

obovata (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.74, pl.16, figs.7–12; text-fig.5) He Chengquan et al., 2009, p.460. Holotype: Liu Zhili et al., 1992, pl.16, fig.10; text-fig.5. Originally *Liaohedina*, subsequently (and now) *Bosedinia*. Age: Early Tertiary.

operculata (Jiabo, 1978, p.107, pl.40, figs.17–20; pl.48, figs.3a–b) He Chengquan, 1984b, p.175. Holotype: Jiabo, 1978, pl.40, fig.19. Originally *Rugasphaera* Jiabo (Appendix A), subsequently *Bosea* (combination illegitimate), thirdly (and now) *Bosedinia*. Age: late Eocene–Oligocene.

radiata He Chengquan, 1984b, p.176, pl.8, fig.23. Holotype: He Chengquan, 1984b, pl.8, fig.23. Age: Oligocene.

reticulata Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.60, pl.15, figs.18–20,22; pl.16, figs.1–3,5–6. Holotype: Liu Zhili et al., 1992, pl.16, fig.1. Age: Early Tertiary.

retirugosa He Chengquan, 1984b, p.175, pl.8, figs.1–4. Holotype: He Chengquan, 1984b, pl.8, fig.4. Age: Oligocene.

scabrata (Jiabo, 1978, p.127, pl.32, figs.24–25; pl.46, figs.3a–b) Song Zhichen et al., 1985, p.46. Holotype: Jiabo, 1978, pl.32, fig.25. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea* (Appendix A), thirdly (and now) *Bosedinia*. Jansonius (1989, p.67–68) also proposed this combination. Age: Early Tertiary.

sinensis He Chengquan, 1984b, p.176, pl.7, figs.9–13. Holotype: He Chengquan, 1984b, pl.7, fig.12. Age: late Oligocene–early Miocene.

spinosa Prauss, 2012, p.289–290, figs.2J–K,N,3I–J. Holotype: Prauss, 2012, fig.2K. Age: late Turonian.

tarfayensis Prauss, 2012, p.290, figs.2H–I,3K–L. Holotype: Prauss, 2012, fig.2I. Age: late Turonian.

tuberculata He Chengquan, 1984b, p.176, pl.6, fig.24. Holotype: He Chengquan, 1984b, pl.6, fig.24. Age: middle-late Oligocene.

verrurugosa He Chengquan, 1984b, p.176–177, pl.8, fig.5. Holotype: He Chengquan, 1984b, pl.8, fig.5. Age: middle-late Oligocene.

whelkaris Cole, 1992, p.188,190, pl.3, figs.3–5; text-figs.4C–D. Holotype: Cole, 1992, pl.3, fig.4; text-fig.4D. Age: late Oligocene–middle Miocene.

BOURKIDINIUM Morgan, 1975, p.160. Emendation: Nøhr-Hansen, 1993, p.47–48. Type: Morgan, 1975, pl.2, figs.2a–c, as *Bourkidinium granulatum*.

?*cylindricum* Dolding, 1992, p.313,315, figs.3c–e,4a–d,h. Holotype: Dolding, 1992, figs.3c,4a–c. Questionable assignment: Dolding (1992, p.313). Contrary to the statement of Lentin and Williams (1993, p.66), the repository for the holotype of this species was cited in Dolding (1992, p.313). Age: late Campanian.

elegans Torricelli, 1997, p.343,345, pl.2, figs.1–9. Holotype: Torricelli, 1997, pl.2, fig.4. Age: early Hauterivian.

**granulatum* Morgan, 1975, p.160–161, pl.2, figs.2a–c. Emendations: Nøhr-Hansen, 1993, p.48,50; Torricelli, 2000, p.261. Holotype: Morgan, 1975, pl.2, figs.2a–c; Fensome et al., 1996, figs.1–3 — p.2141; Fauconnier and Masure, 2004, pl.11, fig.7. Age: late Aptian–early Albian.

psilatam Singh, 1983, p.125, pl.42, figs.8–9; pl.43, fig.1. Holotype: Singh, 1983, pl.42, fig.8; Fauconnier and Masure, 2004, pl.11, fig.6. Age: early Cenomanian.

BRADLEYELLA Woollam, 1983, p.194. Type: Fenton et al., 1980, pl.14, fig.3; text-figs.3A–B, as *Dichadogonyaulax adela*.

**adela* (Fenton et al., 1980, p.155–156, pl.14, figs.1–4; text-figs.3A–B) Woollam, 1983, p.194. Holotype: Fenton et al., 1980, pl.14, fig.3; text-figs.3A–B; Fensome et al., 1993a, fig.1 — p.883. Originally *Dichadogonyaulax*,

subsequently *Ctenidodinium*, thirdly (and now) *Bradleyella*. Fenton et al. (1980) cited the epithet as "*adelos*", the Greek adjective for "obscure". Since taxon names are to be treated as Latin under the I.C.N., the epithet should be rendered as "*adela*", in agreement with the feminine gender of the generic name; "*adelum*" would be the neuter form, and "*adelus*" the masculine form. Age: late Bajocian.

"**BREEDOXELLA**" Norris, 1978, p.12. **Taxonomic senior synonym:** *Mendicodinium*, according to Stover and Williams (1987, p.45). Type: Brideaux, 1977, pl.7, figs.8–9, as *Mendicodinium caperatum*.

"**caperata*" (Brideaux, 1977, p.19–20, pl.7, figs.7–11) Norris, 1978, p.12. Holotype: Brideaux, 1977, pl.7, figs.8–9; Fensome et al., 1993a, figs.1–2 — p.1025. **NOW** *Mendicodinium*. Originally (and now) *Mendicodinium*, subsequently *Breedoxella*. Age: Aptian–early Albian.

BRIGANTEDINIUM Reid, 1977, p.432 ex Lentin and Williams, 1993, p.67. Originally *Brigantedinium* (name not validly published), subsequently *Protoperidinium* subgenus *Protoperidinium* section *Brigantedinium* (name not validly published), thirdly (and now) *Brigantedinium*. The generic name *Brigantedinium* was not validly published in Reid (1977) since the name of the "type species", *Brigantedinium simplex* (which see), was not validly published, there being no accompanying Latin diagnosis, a requirement prior to 2012 since this species is based on living material (I.C.N. Article 39). The name *Brigantedinium* was not validly published in Harland et al. (1980, p.22), since these authors did not provide a direct reference to the diagnosis for the genus (I.C.N. Article 33.1). By providing complete citations for the names *Brigantedinium* and *Brigantedinium simplex*, including Latin diagnoses, Lentin and Williams (1993, p.67) validated both names. Reid (1977, p.432) provided a Latin diagnosis. Type: Wall, 1965b, text-figs.7,20, as *Chytroeisphaeridia simplex*.

asymmetricum Matsuoka, 1987, p.56, pl.5, figs.10–12; text-fig.4B ex Head, 1996b, p.1231. Holotype: Matsuoka, 1987, pl.5, figs.10–11. This name was not validly published in Matsuoka (1987, p.56) since the generic name *Brigantedinium* was not validly published at that time. Age: Holocene.

auranteum Reid, 1977, p.432–433, pl.1, fig.1 ex Lentin and Williams, 1993, p.67. Holotype: Reid, 1977, pl.1, fig.1. This species name was not validly published in Reid (1977), since the generic name *Brigantedinium* was not validly published at that time. Age: Holocene.

cariacoense (Wall, 1967, p.113, pl.16, figs.13–14) Lentin and Williams, 1993, p.67. Emendation: Matsuoka, 1987, p.53, as *Brigantedinium cariacense*. Holotype: Wall, 1967, pl.16, fig.14. Originally *Chytroeisphaeridia*, subsequently (and now) *Brigantedinium*. Motile equivalent: *Protoperidinium avellana* (Meunier, 1919) Balech, 1974, according to Wall and Dale (1967, p.350) and Harland (1981, p.68). This combination was not validly published in Reid (1977, p.434) since the generic name *Brigantedinium* was not validly published at that time. Age: Quaternary.

grande Matsuoka, 1987, p.55–56, pl.5, figs.1–2; text-fig.4D ex Head, 1996b, p.1231. Holotype: Matsuoka, 1987, pl.5, figs.1–2. This name was not validly published in Matsuoka (1987, p.55–56) since the generic name *Brigantedinium* was not validly published at that time. Age: Holocene.

irregulare Matsuoka, 1987, p.56–57, pl.5, figs.13–16; text-fig.4C ex Head, 1996b, p.1231. Holotype: Matsuoka, 1987, pl.5, figs.15–16. Motile equivalent: *Protoperidinium denticulatum* (Gran and Braarud 1935) Balech, 1974, according to Matsuoka (1987, p.57). This name was not validly published in Matsuoka (1987, p.56–57) since the generic name *Brigantedinium* was not validly published at that time. Age: Holocene.

majusculum Reid, 1977, p.434–435, pl.1, fig.5 ex Lentin and Williams, 1993, p.67. Holotype: Reid, 1977, pl.1, fig.5. This species name was not validly published in Reid (1977) since the generic name *Brigantedinium* was not validly published at that time. Motile equivalent: *Protoperidinium shanghaiense* Gu Haifeng et al., 2015, according to Gu Haifeng et al. (2015, p. p.49). Age: Holocene.

pynei Hannah et al., 1998, p.535, figs.5a–b. Holotype: Hannah et al., 1998, figs.5a–b (not figs.5c–d, as indicated in Hannah et al., 1998, p.535) (lost according to Clowes et al. (2016, p.80). Clowes et al. (2016, p.80) implied that this species might be a taxonomic synonym of *Batiacasphaera cooperi*. Age: Miocene.

**simplex* Wall, 1965b, p.308; text-figs.7,20 ex Lentin and Williams, 1993, p.67. Holotype: Wall, 1965b, text-figs.7,20; Eisenack and Kjellström, 1972, p.187; Fensome et al., 1995, fig.1 — p.1785. Originally *Chytroeisphaeridia* (name not validly published), subsequently (and now) *Brigantedinium*. Motile equivalent: *Protopteridinium conicoides* (Paulsen, 1905) Balech, 1974, according to Harland (1981, p.68). The species name *Chytroeisphaeridia simplicia* was not validly published in Wall (1965b, p.308), since that author did not provide a Latin diagnosis, a requirement since this species is based on living material (I.C.N. Article 39). For the same reason, the combination *Brigantedinium simplex* (Wall, 1965b) Reid, 1977, p.435 was also not validly published. Harland and Reid in Harland et al. (1980, p.222–223) provided a Latin diagnosis, but the name *Brigantedinium simplex* was still not validly published since the generic name *Brigantedinium* was not validly published at that time. Lentin and Williams (1993, p.67) validly published the generic name *Brigantedinium* and the species name *Brigantedinium simplex* by providing a complete citation to both the protologue and a Latin diagnosis. Farr et al. (1986, p.18) considered "*B. [Brigantedinium] simplex* P.C. Reid" to be an illegitimate name since "... cysts of the type species were referred by the author [implying Reid] to an extant species [*Protopteridinium conicoides*]." As noted by Fensome et al. (1995, p.1787), this would only be a possible interpretation if Reid were the validating author. Lentin and Williams (1993, p.67), when validating this name, followed Reid (1977, p.435) in rendering the epithet as "*simplex*". Age: extant.

BROOMEA Cookson and Eisenack, 1958, p.41. Emendations: Lentin and Williams, 1976, p.143–144; Mantle, 2009a, p.43–44. Taxonomic senior synonym: *Pareodinia*, according to Wiggins (1975, p.102) — however, Lentin and Williams (1976, p.144) retained *Broomea*. Type: Cookson and Eisenack, 1958, pl.6, fig.7, as *Broomea ramosa*.

"*exigua*" Alberti, 1961, p.26–27, pl.5, fig.14. Holotype: Alberti, 1961, pl.5, fig.14. **NOW** *Batioladinium?*. Originally *Broomea*, subsequently (and now) *Batioladinium?*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Age: early Hauterivian–?late Barremian.

fusiforma Oлару, 1978a, p.81–82, pl.13, fig.12. Holotype: Oлару, 1978a, pl.13, fig.12. Age: late Eocene–early Oligocene.

fusticula Mantle, 2009a, p.44–46, pl.6, figs.1–8; text-fig.9. Holotype: Mantle, 2009a, pl.6, fig.1. Age: Callovian.

"*gochtii*" Alberti, 1961, p.27, pl.5, figs.8–10,?16. Holotype: Alberti, 1961, pl.5, fig.8. **NOW** *Batioladinium?*. Originally *Broomea*, subsequently (and now) *Batioladinium?*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonyms: *Batioladinium pomum* and *Batioladinium varigranosum*, both according to Below (1990, p.53). Age: Valanginian–?Hauterivian.

"*jaegeri*" Alberti, 1961, p.26, pl.5, figs.1–7. Emendation: Below, 1990, p.53–54, as *Necrobroomea jaegeri*. Holotype: Alberti, 1961, pl.5, fig.2; Eisenack and Klement, 1964, p.67; Fensome et al., 1995, fig.2 — p.1571. **NOW** *Batioladinium*. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonym: *Pseudoceratium gochtii* Pocock (subsequently *Pseudoceratium hansgochtii*), according to Singh (1971, p.320). Age: late Barremian.

"?*longicornuta*" Alberti, 1961, p.27–28, pl.5, figs.18–21; pl.6, figs.1–2. Emendation: Below, 1990, p.56, as *Necrobroomea longicornuta*. Holotype: Alberti, 1961, pl.5, fig.19; Eisenack and Klement, 1964, p.69; Fensome et al., 1996, fig.1 — p.2205. **NOW** *Batioladinium*. Originally *Broomea?*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Questionable assignment: Alberti (1961, p.27). Taxonomic junior synonym: *Batioladinium radiculatum*, according to Below (1990, p.53). Age: late Hauterivian–late Barremian.

"*micropoda*" Eisenack and Cookson, 1960, p.7–8, pl.2, figs.8–9. Emendation: Below, 1990, p.56, as *Necrobroomea micropoda*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.9. **NOW** *Batioladinium*. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonyms: *Imbatodinium fractum*, according to Below (1990, p.56); *Broomea* (as *Batioladinium?*) *pellifera*,

according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Broomea* (as *Batioladinium?*) *pellifera*. Age: Aptian–Albian.

"*pellifera*" Alberti, 1961, p.26, pl.5, figs.11–13. Holotype: Alberti, 1961, pl.5, fig.11. **NOW** *Batioladinium?*. Originally *Broomea*, subsequently (and now) *Batioladinium?*, thirdly *Imbatodinium*, fourthly *Necrobroomea*. Taxonomic senior synonym: *Broomea* (as and now *Batioladinium*) *micropoda*, according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Batioladinium?* *pelliferum*. Age: late Barremian–early Aptian.

**ramosa* Cookson and Eisenack, 1958, p.41–42, pl.6, figs.6–8. Holotype: Cookson and Eisenack, 1958, pl.6, fig.7. Originally (and now) *Broomea*, subsequently *Pareodinia*. Lentin and Williams (1976, p.144) retained this species in *Broomea*. Age: Middle-Late Jurassic.

"*seelandica*" Lange, 1969, p.113–114, pl.2, fig.10; pl.3, fig.3. Emendation: Firth, 1987, p.213–214, as *Manumiella seelandica*. Holotype: Lange, 1969, pl.3, fig.3; Fensome et al., 1995, fig.2 — p.1773. **NOW** *Manumiella*. Originally *Broomea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Taxonomic junior synonym: *Deflandrea* (as *Manumiella*) *druggii*, according to Firth (1987, p.213) — however Thorn et al. (2009, p.443) retained *Deflandrea* (as *Manumiella*) *druggii*. Age: Danian

simplex Cookson and Eisenack, 1958, p.42, pl.6, fig.9. Holotype: Cookson and Eisenack, 1958, pl.6, fig.9. Originally (and now) *Broomea*, subsequently *Necrobroomea*. Lentin and Williams (1976, p.144) retained this species in *Broomea*. Age: Late Jurassic.

"*tabulata*" Ott in Riding and Helby, 2001d, p.95. **Name not validly published**: no description. **Taxonomic senior synonym**: *Voodooia tabulata*, according to Riding and Helby (2001d, p.95).

"?*tricornoides*" Alberti, 1961, p.28, pl.5, fig.17. Holotype: Alberti, 1961, pl.5, fig.17. **NOW** *Batioladinium?*. Originally *Broomea?*, subsequently (and now) *Batioladinium?*, thirdly *Necrobroomea?*, fourthly *Imbatodinium?*. Questionable assignment: Alberti (1961, p.28). Age: late Hauterivian.

"**BROTZENIA**" Horowitz, 1975, p.25. **Taxonomic senior synonym**: *Dichadogonyaulax*, by implication in Fensome and Sarjeant (1982, p.56), who transferred the "type species" of *Brotzenia*, *Brotzenia cristata*, to *Dichadogonyaulax*. Taxonomic senior synonym: *Ctenidodinium*, according to Stover and Evitt (1978, p.203) — however, *Brotzenia* is now considered a taxonomic junior synonym of *Dichadogonyaulax*. Type: Horowitz, 1975, pl.1, fig.8, as *Brotzenia cristata*.

*"*cristata*" Horowitz, 1975, p.25, pl.1, fig.8. Emendation: Wheeler and Sarjeant, 1990, p.306–307, as *Dichadogonyaulax cristata*. Holotype: Horowitz, 1975, pl.1, fig.8; Fensome et al., 1995, fig.1 — p.1479; lost according to Sarjeant (1988, p.177). Neotype: Wheeler and Sarjeant, 1990, pl.8, fig.4; text-figs.10a–b; Fensome et al., 1995, fig.2 — p.1479; designated by Wheeler and Sarjeant (1992, p.382). **NOW** *Dichadogonyaulax*. Originally *Brotzenia*, subsequently *Ctenidodinium?*, thirdly (and now) *Dichadogonyaulax*. Taxonomic senior synonym: *Ctenidodinium ornatum*, according to Woollam (1983, p.190) — however, Sarjeant (1988, p.180) retained this species as *Dichadogonyaulax cristata*. Age: Late Triassic (probably not in place).

BULBODINIUM Wetzel, 1960, p.82. Lentin and Williams (1976, p.93–94) considered *Chatangiella* to be a possible taxonomic junior synonym of this genus. Type: Wetzel, 1960, pl.1, fig.1, as *Bulbodinium seitzi*.

altipetax Wetzel, 1960, p.83, pl.1, figs.3,5,9. Holotype: Wetzel, 1960, pl.1, fig.5. Klement (1961, p.489–492) suggested that this species is assignable to *Deflandrea*, but did not effect a formal transfer. Age: Senonian.

oistoides Wetzel, 1960, p.83–84, pl.1, figs.6–7. Holotype: Wetzel, 1960, pl.1, fig.6. Klement (1961, p.489–492) suggested that this species is possibly a species of *Scriniodinium*, but did not effect a formal transfer. Age: Senonian.

**seitzii* Wetzel, 1960, p.82–83, pl.1, figs.1–2,4,8,10–13. Holotype: Wetzel, 1960, pl.1, fig.1. Klement (1961, p.489–492) suggested that this species is assignable to *Deflandrea*, but did not effect a formal transfer. Age: Senonian.

"**BULBOSIA**" Ott in Riding and Helby, 2001e, p.128. **Name not validly published**: no description. **Taxonomic senior synonym**: *Tringadinium*, by implication in Riding and Helby (2001e, p.128), who included the only species name, *Bulbosia tithonica* (name not validly published), in synonymy with *Tringadinium bjaerkei*.

"*tithonica*" Ott in Riding and Helby, 2001e, p.128. **Name not validly published**: no description. **Taxonomic senior synonym**: *Tringadinium bjaerkei*, according to Riding and Helby (2001e, p.128).

BUROCRATUS Trejo, 1983, p.8. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298, who noted that the cyst wall is pithonelloid and so dinoflagellate affinity is questionable). Type: Trejo, 1983, pl.10, fig.7, as *Burocratus perniciosus*.

**perniciosus* Trejo, 1983, p.8, pl.10, figs.6–8; pl.11, fig.9; pl.39, fig.9; pl.43, figs.2–4; pl.44, figs.1–4,8. Holotype: Trejo, 1983, pl.10, fig.7. Age: Late Cretaceous.

"**BURTONIA**" Beju, 1983, p.106. **Name illegitimate** — **senior homonym**: *Burtonia* Brown, 1811. Substitute name: *Bejuia*. **Taxonomic senior synonym**: *Atopodinium*, according to Masure, 1991, p.64. Type: Beju, 1983, text-figs.3A–B,4A–B, as *Burtonia polygonalis*.

polygonalis* Beju, 1983, p.107,109,111; text-figs.3A–F,4A–F,5A–D. Emendation: Masure, 1991, p.68,70–71, as *Atopodinium polygonale*. Holotype: Beju, 1983, text-figs.3A–B,4A–B; Masure, 1991, pl.2, figs.1,4; text-figs.3a–b,4a–b; Fensome et al., 1995, figs.1–4 — p.1675; Fauconnier and Masure, 2004, pl.10, figs.8–11. **NOW *Atopodinium*. Originally *Burtonia*, subsequently *Bejuia*, thirdly (and now) *Atopodinium*. Age: early Bathonian.

"**CADDASPHAERA**" Fenton et al., 1980, p.164. **Taxonomic senior synonym**: *Pareodinia*, by implication in Prauss (1989, p.42), who transferred the "type species" of *Caddasphaera*, *Caddasphaera halosa*, to *Pareodinia*. **Taxonomic senior synonym**: *Pterocystidiopsis*, by implication by Courtinat in Courtinat and Gaillard (1980, p.80), who transferred the "type species" of the genus *Caddasphaera*, *Caddasphaera halosa*, to *Pterocystidiopsis* — however, Lentin and Williams (1981, p.31,237) retained *Caddasphaera*. Type: Filatoff, 1975, pl.29, fig.10, as *Kalyptea halosa*.

halosa* (Filatoff, 1975, p.91, pl.29, figs.10–11) Lentin and Williams, 1981, p.31. Emendation: Prauss, 1989, p.42, as *Pareodinia halosa*. Holotype: Filatoff, 1975, pl.29, fig.10. **NOW *Pareodinia*. Originally *Kalyptea*, subsequently *Kalyptea?*, thirdly *Caddasphaera*, fourthly *Pterocystidiopsis* (Appendix A), fifthly (and now) *Pareodinia*. This combination was not validly published in Fenton et al. (1980, p.164,169), since these authors did not fully reference the basionym. Age: Bajocian.

"*treptensis*" (Courtinat in Courtinat and Gaillard, 1980, p.81–82. pl.6, figs.4,6) Courtinat, 1989, p.225. Holotype: Courtinat and Gaillard, 1980, pl.6, fig.4. **NOW** *Pterocystidiopsis* (Appendix A). Originally (and now) *Pterocystidiopsis* (Appendix A), subsequently *Caddasphaera*. Age: late Oxfordian.

CADOSINA Wanner, 1940, p.79. Calcareous dinoflagellate genus, originally described as a foraminifer (see Elbrächter et al., 2008, p.1298). Emendation: Masters and Scott, 1978, p.220. **Taxonomic senior synonym**: *Stomiosphaera*, according to Bonet (1956, p.447–448 — however, I. Nagy (1966, p.87) proposed the retention of *Cadosina*. **Taxonomic junior synonyms**: *Hemistomiosphaera*, according to Řehánek and Cecca (1993, p.155); *Obliquipithonella*, according to Řeháková and Michalík (1996, p.93) — however, *Obliquipithonella* is now considered a taxonomic junior synonym of *Pirumella*. Fensome and Williams (2004) considered this genus to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1298) implied that this

generic name can be considered validly published as it was proposed under the I.C.Z.N. Thus, we have revised the status of the contained species as appropriate, as well as reconsidered the generic synonymies. According to Řehánek and Cecca (1993, p.155), Řehánek (1985a) provided an emendation; however, the latter author did not indicate that he was emending *Cadosina*. Type: not designated; "type species" — *Cadosina fusca*.

"*borzae*" I. Nagy, 1966, p.92,99–100, pl.5, figs.15–16. Holotype: I. Nagy, 1966, pl.5, fig.15. **NOW** *Carpistomiosphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Carpistomiosphaera*. Age: Kimmeridgian.

"*fibrata*" I. Nagy, 1966, p.92–93,100, pl.5, figs.14,22. Holotype: I. Nagy, 1966, pl.5, fig.14. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Oxfordian.

**fusca* Wanner, 1940, p.79–81, pl.1, figs.1–2 (parts); pl.2, figs.3–5; text-figs.19–30. Holotype: not designated. Originally (and now) *Cadosina*, subsequently *Stomiosphaera* (name not validly published). Fensome and Williams (2004) considered this name to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1298) implied that this generic name can be considered validly published as it was proposed under the I.C.Z.N. Age: Late Jurassic?

subsp. *fusca*. Autonym. Holotype: not designated.

subsp. *misolensis* Vogler, 1941, p.281, pl.20, fig.7. Holotype: Vogler, 1941, pl.20, fig.7. Originally (and now) *Cadosina fusca* subsp. *misolensis*, subsequently *Stomiosphaera fusca* subsp. *misolensis* (name not validly published). Vogler (1941) gave the citation "*Cadosina fusca misolensis* n.sp.". For convenience of treatment we have arbitrarily listed it as a subspecies. Age: Late Jurassic?–Neocomian?

gracillima (Seguenza in de Lapparent, 1918, p.19, pl.3, fig.1–part) Vogler, 1941, p.282. Holotype: not designated: although the caption to de Lapparent's pl.3, fig.1 suggests a single specimen ("g"), there is no indication as to which specimen this refers. Originally *Lagena* (Appendix A), subsequently *Cadosina*. Age: Cretaceous.

"*heliosphaera*" Vogler, 1941, p.281, pl.20, fig.6. Holotype: Vogler, 1941, pl.20, fig.6. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Neocomian? (Oxfordian–Berriasian according to I. Nagy, 1966, p.88).

ingens Vogler, 1941, p.281–282, pl.21, fig.59. Holotype: Vogler, 1941, pl.21, fig.59. Age: Cretaceous.

"*lapidosa*" Vogler, 1941, p.281, pl.21, fig.58. Holotype: Vogler, 1941, pl.21, fig.58. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Neocomian? (Oxfordian to Berriasian according to I. Nagy, 1966, p.87).

"*malmica*" (Borza, 1964, p.192, pl.1, figs.5–6) I. Nagy, 1966, p.93,101. Holotype: Borza, 1964, pl.1, fig.5. **NOW** *Parastomiosphaera*. Originally *Stomiosphaera*, subsequently *Cadosina*, thirdly (and now) *Parastomiosphaera*. Age: Kimmeridgian.

"*misolensis*" Vogler, 1941, p.281, pl.20, figs.1b [indicated as 1a in plate caption],8. Holotype: not designated. **NOW** *Stomiosphaera*. Originally *Cadosina*, subsequently (and now) *Stomiosphaera*. Age: Late Jurassic?–Neocomian?

parvula I. Nagy, 1966, p.93,101, pl.5, fig.17. Holotype: I. Nagy, 1966, pl.5, fig.17. Originally (and now) *Cadosina*, subsequently *Hemistomiosphaera*. This species is retained in *Cadosina* since *Hemistomiosphaera* is now considered a taxonomic junior synonym of that genus. Age: Kimmeridgian.

"*pulla*" (Borza, 1964, p.192–193, pl.2, figs.1–2) I. Nagy, 1966, p.93,101. Holotype: Borza, 1964, pl.2, fig.1. **NOW** *Colomisphaera*. Originally *Stomiosphaera*, subsequently *Cadosina*, thirdly (and now) *Colomisphaera*. Age: Kimmeridgian.

"*radiata*" Vogler, 1941, p.281, pl.20, fig.1. Holotype: Vogler, 1941, pl.20, fig.1. **NOW** *Stomiosphaera*. Originally *Cadosina*, subsequently (and now) *Stomiosphaera*. Age: Neocomian? (Kimmeridgian according to I. Nagy, 1966, p.88).

salebrosa Řehánek, 1985a, p.370, pl.2, figs.1–4. Holotype: Řehánek, 1985a, pl.2, figs.1–2. Age: middle Kimmeridgian.

"*semiradiata*" Wanner, 1940, p.81, text-figs.36–37. **NOW** *Crustocadosina*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Crustocadosina*. Age: Late Jurassic?

spinosa Borza, 1972, p.142, text-figs.7–12. Holotype: Borza, 1972, text-fig.7. Age: Late Cretaceous.

"*sublapidosa*" Vogler, 1941, p.280–281, pl.20, fig.5. Holotype: Vogler, 1941, pl.20, fig.5. **NOW** *Committosphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Committosphaera*. Age: Neocomian?

"*tenuis*" I. Nagy, 1966, p.93,100–101, pl.5, fig.18. Holotype: I. Nagy, 1966, pl.5, fig.18. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Oxfordian.

undosa Borza, 1972, p.139,141–142, text-figs.1–6. Holotype: Borza, 1972, text-fig.2. Age: Late Cretaceous.

CADOSINELLA Vogler, 1941, p.282. A calcareous dinoflagellate genus according to Elbrächter et al. (2008, p.1298). Wendler et al. (2013, p.1098) considered *Cadosinella* to be a taxonomic senior synonym of *Pithonella*, but did not propose any species transfers. This genus was previously considered to encompass nannofossils. Type: Vogler, 1941, pl.21, fig.63, as *Cadosinella gracillimoides*.

**gracillimoides* Vogler, 1941, p.282, pl.21, fig.63. Holotype: Vogler, 1941, pl.21, fig.63. Andri (1972, p.22) considered this species to be a possible taxonomic synonym of *Pithonella perlonga* (name not validly published). Age: Cenomanian–Maastrichtian.

CALCICARPINUM Deflandre, 1948, p.216. Emendations: Keupp, 1984, p.22; Versteegh, 1993, p.361. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1298). Type: Deflandre, 1948, text-figs.36–37, as *Calcicarpinum tetraedricum*.

bivalvum Versteegh, 1993, p.361,363, pl.3, figs.1–8; text-figs.5A–D. Holotype: Versteegh, 1993, pl.3, figs.1–2. Motile equivalent: *Pentapharsodinium tyrrhenicum* (Balech, 1990) Montresor et al., 1993 ex Head, 1996b, according to Montresor et al. (1995, p.51). Age: late Pliocene–late Pleistocene.

?*fallax* Taugourdeau-Lantz and Rosset, 1966, p.190, pl.1, figs.1–4,7–13. Holotype: Taugourdeau-Lantz and Rosset, 1966, pl.1, figs.1–3. Questionable assignment: Taugourdeau-Lantz and Rosset, (1966, p.190). Streng et al. (2004, p.481) noted that this species is too large to be a dinoflagellate cyst and is more likely a calcified megaspore. Age: Oligocene.

macrogranulum Hildebrand-Habel and Willems, 1997, p.183, pl.2, figs.8–10 ex Hildebrand-Habel and Willems, 2004, p.183. Holotype: Hildebrand-Habel and Willems, 1997, pl.2, fig.8 and Hildebrand-Habel and Willems, 2004, pl.1, figs.7–9. The name was not validly published in Hildebrand-Habel and Willems (1997), since these authors did not designate a holotype. Age: middle Coniacian–late Santonian.

"*mutterlosei*" Keupp, 1979a, p.41, pl.10, figs.11–12; pl.11, figs.1–5. Holotype: Keupp, 1979a, pl.11, figs.1–3. **NOW** *Praecalcionellum*. Originally *Calcicarpinum*, subsequently *Calcigonellum*, thirdly (and now) *Praecalcionellum*. Age: early Barremian.

perfectum Versteegh, 1993, p.363,365,367, pl.4, figs.1–11; text-figs.6A–D. Holotype: Versteegh, 1993, pl.4, figs.6–7,10. Age: late Pliocene.

var. *perfectum*. Autonym. Holotype: Versteegh, 1993, pl.4, figs.6–7,10.

var. *poratum* Banasová et al., 2007, p.113, pl.2. figs.15–16 ex Streng et al., 2009, p.229. Holotype: Streng et al., 2009, p.229, pl.1, fig.13. This name was not validly published in Banasová et al., (2007), since it was used in anticipation of future acceptance of the name (I.C.N. Article 36.1). Age: middle Miocene.

primum Keupp, 1995, p.159–160, pl.3, figs.10–12; pl.4, figs.1–3. Holotype: Keupp, 1995, pl.3, figs.10–12. Age: late Albian.

**tetraedricum* Deflandre, 1948, p.216,218; text-figs.35–37. Holotype: Deflandre, 1948, text-figs.36–37. Age: Eocene.

tetramurum Kienel, 1994, p.51, pl.10, figs.12–15; pl.11, figs.1–3. Holotype: Kienel, 1994, pl.10, figs.12–15. Age: Danian.

CALCICONUS Streng et al., 2009, p.229–230. Calcareous dinoflagellate genus (see Gottschling and Soehner, 2013, p.127). Taxonomic synonym: *Trigonus* (name not validly published) according to Streng et al. (2009, p.229). Type: Streng et al., 2009, pl.2, fig.1, as *Calciconus irregularis*.

**irregularis* Streng et al., 2009, p.230, pl.2, figs.1–10. Holotype: Streng et al., 2009, pl.2, fig.1. Taxonomic synonym: *Trigonus conicus* (name not validly published), according to Streng et al. (2009, p.230). Age: middle Miocene.

CALCIGONELLUM Deflandre, 1948, p.206. Emendations: Keupp, 1984, p.14; Keupp and Versteegh, 1989, p.211. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1298). Taxonomic junior synonym: *Calciogranellum*, according to Keupp (1984, p.15–16). Type: Deflandre, 1948, figs.13–14, as *Calcigonellum infula*.

"*ansatum*" (Hildebrand-Habel and Willems, 1999, p.93, pl.1, figs.8–12; pl.2, figs.1–6; text-fig.2) Streng et al., 2009, p.237. Holotype: Hildebrand-Habel and Willems, 1999, pl.1, figs.8–10. **NOW** *Juergenella*. Originally *Calcigonellum*, subsequently ?*Calcigonellum*, thirdly (and now) *Juergenella*. Questionable assignment: Streng et al. (2004, p.481). Age: late Eocene.

"*dolium*" Keupp, 1979a, p.39–40, pl.9, figs.7–9. Holotype: Keupp, 1979a, pl.9, figs.7–9. **NOW** *Praealcigonellum*. Originally *Calcigonellum*, subsequently (and now) *Praealcigonellum*. Age: early Barremian.

"*granulatum*" Kohring, 1993a, p.55–57, pl.32, figs.g–m; text-fig.9. Holotype: Kohring, 1993a, pl.32, fig.k. **NOW** *Juergenella*. Originally *Calcigonellum*, subsequently ?*Calcigonellum*, thirdly (and now) *Juergenella*. Questionable assignment: Streng et al. (2004, p.481). Age: middle Oligocene.

**infula* Deflandre, 1948, p.206–207, figs.13–18. Emendation: Keupp, 1984, p.14–15. Holotype: Deflandre, 1948, figs.13–14. N.I.A. Age: late Miocene.

"*limbatum*" (Deflandre, 1948, p.204–206, figs.10–12) Keupp, 1984, p.15. Holotype: Deflandre, 1948, figs.10–12. **NOW** *Calciodinellum*. Originally *Calciogranellum*, subsequently *Calcigonellum*, thirdly (and now) *Calciodinellum*. Age: late Miocene.

?*minutum* Keupp, 1987, p.40–41, pl.6, figs.1–7; text-fig.2a. Holotype: Keupp, 1987, pl.6, figs.5–6. Originally *Calcigonellum*, subsequently *Keuppisphaera* (combination not validly published), thirdly (and now) ?*Calcigonellum*. Questionable assignment: Streng et al. (2004, p.481). Age: middle Albian–early Cenomanian.

"*mutterlosei*" (Keupp, 1979a, p.41, pl.10, figs.11–12; pl.11, figs.1–5) Keupp, 1980a, p.127. Holotype: Keupp, 1979a, pl.11, figs.1–3. **NOW** *Praecalcionellum*. Originally *Calcicarpinum*, subsequently *Calcigonellum*, thirdly (and now) *Praecalcionellum*. Age: early Barremian.

"*polymorphum*" Keupp, 1980a, p.128, p.130–131, pl.15, figs.7–15; pl.16, figs.1–6. Holotype: Keupp, 1980a, pl.15, figs.7–8. **NOW** *Praecalcionellum*. Originally *Calcigonellum*, subsequently (and now) *Praecalcionellum*. Age: late Aptian–early Albian.

"subsp. *dentatum*" Keupp, 1980a, p.131, pl.15, figs.13–15; pl.16, fig.1. Holotype: Keupp, 1980a, pl.15, fig.13. **NOW** *Praecalcionellum polymorphum* subsp. *dentatum*. Originally *Calcigonellum polymorphum* subsp. *dentatum*, subsequently (and now) *Praecalcionellum polymorphum* subsp. *dentatum*. Age: Aptian (late Gargasian).

"subsp. *polymorphum*". Autonym. Holotype: Keupp, 1980a, pl.15, figs.7–8. **NOW** *Praecalcionellum polymorphum* subsp. *polymorphum*. Originally *Calcigonellum polymorphum* subsp. *polymorphum*, subsequently (and now) *Praecalcionellum polymorphum* subsp. *polymorphum*.

"subsp. *tenuis*" Keupp, 1980a, p.131–132, pl.16, figs.2–6. Holotype: Keupp, 1980a, pl.16, figs.2–3. **NOW** *Praecalcionellum polymorphum* subsp. *tenuis*. Originally *Calcigonellum polymorphum* subsp. *tenuis*, subsequently (and now) *Praecalcionellum polymorphum* subsp. *tenuis*. Age: Aptian (late Clansayesian).

"*sulcatum*" Keupp, 1979c, p.658, pl.6, figs.16–21. Holotype: Keupp, 1979c, pl.2, figure labelled as "*C. sulcatum*". **NOW** *Praecalcionellum*. Originally *Calcigonellum*, subsequently (and now) *Praecalcionellum*. Age: early Hauterivian.

CALCIODINELLUM Deflandre, 1947b, p.1781–1782. Emendation: Janofske and Karwath, 2000, p.100. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1298). Taxonomic junior synonym: *Sphaerodinella*, by implication in Janofske and Karwath (2000, p.100), who transferred the type, *Sphaerodinella albatrosiana*, to *Calciodinellum*. Type: Deflandre, 1947b, figs.1–2, as *Calciodinellum operosum*.

albatrosianum (Kamptner, 1963, p.177–178, pl.5, fig.30) Janofske and Karwath, 2000, p.100. Emendation: Janofske and Karwath, 2000, p.100–101. Holotype: Kamptner, 1963, pl.5, fig.30. Originally *Thoracosphaera*, subsequently *Orthopithonella*, thirdly *Sphaerodinella*, fourthly (and now) *Calciodinellum*. Taxonomic junior synonyms: *Thoracosphaera ricaseta*, according to Fütterer (1976, p.134); and *Thoracosphaera rela* according to Fütterer (1978, p.716). Age: Pleistocene.

var. *albatrosianum*. Autonym. Holotype: Kamptner, 1963, pl.5, fig.30. Originally *Sphaerodinella albatrosiana* var. *albatrosiana*, subsequently (and now) *Calciodinellum albatrosianum* var. *albatrosianum*.

var. *spinulosum* (Versteegh, 1993, p.377–378, pl.4, figs.12–16) Fensome and Williams, 2004, p.96. Holotype: Versteegh, 1993, pl.4, figs.12–13,16. Originally *Sphaerodinella albatrosiana* var. *spinulosa*, subsequently (and now) *Calciodinellum albatrosianum* var. *spinulosum*. Age: late Pliocene.

clamosum Streng et al., 2004, p.464–465, fig.3, nos.7–14; fig.8, nos.2–3. Holotype: Streng et al., 2004, fig.3, nos.11,14. Age: Paleocene

subsp. *clamosum*. Autonym. Holotype: Streng et al., 2004, p.465–466, fig.3, nos.11,14.

subsp. *latum* Streng et al., 2004, p.465–466, fig.3, nos.7,9–10,12; fig.8, no.3. Holotype: Streng et al., 2004, fig.3, nos.10,12. Age: late Paleocene.

elongatum (Hildebrand-Habel et al., 1999, p.83, pl.5, figs.5–7; text-fig.6A–B) Streng et al., 2006, p.191. Holotype: Hildebrand-Habel et al., 1999, pl.5, figs.5–6. Originally *Sphaerodinella? tuberosa* forma *elongata*, subsequently *Calciodinellum elongatum* (combination not validly published), thirdly *Pernambugia tuberosa* forma *elongata*,

fourthly (and now) *Calciodinellum elongatum*. The combination *Calciodinellum elongatum* was not validly published by Meier et al. (2002) as these authors did not fully reference the basionym. Age: middle Eocene.

kerquelse Streng et al., 2004, p.466–467, fig.9, nos.1–6. Holotype: Streng et al., 2004, fig.9, no.1. Age: late Miocene–early Pliocene.

levantinum Meier et al., 2002, p.604–607, text-fig.2; figs.3a–i. Holotype: Meier et al., 2002, figs.3a–b. Age: Holocene.

forma ***levantinum***. Autonym. Holotype: Meier et al., 2002, figs.3a–b.

forma ***variospinosum*** (Hildebrand-Habel et al., 1999, p.83–84, pl.5, figs.8–15, text-fig.7A–C) Streng et al. 2006, p.191. Holotype: Hildebrand-Habel et al., 1999, pl.5, figs.8–11. Originally *Sphaerodinella? tuberosa* forma *variospinosa*, subsequently *Pernambugia tuberosa* forma *variospinosa*, thirdly (and now) *Calciodinellum levantinum* forma *variospinosum*. Age: middle Eocene.

limbatum (Deflandre, 1948, p.204–206, figs.10–12) Kohring, 1993a, p.59. Holotype: Deflandre, 1948, figs.10–12. Originally *Calcio granellum*, subsequently *Calcigonellum*, thirdly (and now) *Calciodinellum*. Age: late Miocene.

operosum Deflandre, 1947b, p.1781–1782, figs.1–6. Emendation: Montresor et al., 1997, p.123–124. Holotype: Deflandre, 1947b, figs.1–2. Taxonomic junior synonym: *Thoracosphaera edwardsii*, according to Fütterer (1978, p.718). Age: late Miocene.

"**CALCIOGRANELLUM**" Deflandre, 1948, p.204. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298). **Taxonomic senior synonym:** *Calcigonellum*, according to Keupp (1984, p.15–16). Type: Deflandre, 1948, figs.10–12, as *Calcio granellum limbatum*.

"***limbatum***" Deflandre, 1948, p.204–206, figs.10–12. Holotype: Deflandre, 1948, figs.10–12. **NOW** *Calciodinellum*. Originally *Calcio granellum*, subsequently *Calcigonellum*, thirdly (and now) *Calciodinellum*. Age: late Miocene.

CALCIPERIDINIUM Versteegh, 1993, p.360. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1298). Type: Versteegh, 1993, pl.2, figs.1–3, as *Calciperidinium asymmetricum*.

asymmetricum Versteegh, 1993, p.360–361, pl.2, figs.1–8. Holotype: Versteegh, 1993, pl.2, figs.1–3. Age: late Pleistocene.

CALCIPTERELLUM Deflandre, 1948, p.207. Emendation: Keupp, 1984, p.17. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1298–1299). Type: Deflandre, 1948, figs.19–21, as *Calcipterellum colomii*.

colomii Deflandre, 1948, p.208, figs.19–21. Emendation: Keupp, 1984, p.17–18. Holotype: Deflandre, 1948, figs.19–21. Age: late Miocene.

"**CALCISPHAERELLUM**" Deflandre, 1948, p.215. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1299). **Taxonomic senior synonym:** *Bicarinellum*, according to Keupp (1984, p.18). Type: Deflandre, 1948, figs.32–33, as *Calcisphaerellum flosculus*.

"***flosculus***" Deflandre, 1948, p.215–216, figs.32–33. Holotype: Deflandre, 1948, figs.32–33. **Taxonomic senior synonym:** *Biechelerella* (now *Bicarinellum*) *jurassica*, according to Keupp (1984, p.20). N.I.A. Age: Oxfordian.

"**CALCISPHAERULA**" Bonet, 1956, p.441–443. **Taxonomic senior synonym:** *Pithonella*, according to Villain (1977, p.144) and Wendler et al. (2013, p.1098) (but see Elbrächter et al., 2008, p.1299). Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1299). Fensome and Williams (2004) considered this genus to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1298) implied that this generic name can be considered validly published as it was proposed under the I.C.Z.N. Type: not designated; "type species" — *Calcisphaerula innominata*.

"***innominata**" Bonet, 1956, p.443–447, pl.22, fig.1 (part); pl.24, figs.1–2; pl.27, fig.1 (part). Emendation: Villain, 1977, as *Pithonella innominata*. Holotype: not designated (see comments under *Calcisphaerula*). **NOW** *Pithonella*. Originally *Calcisphaerula*, subsequently (and now) *Pithonella*. Age: Albian–Santonian.

CALCISTHECA Trejo, 1983, p.10. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1299). Type: Trejo, 1983, pl.52, fig.4, as *Calcistheca cuadrangulata*.

***cuadrangulata** Trejo, 1983, p.10, pl.51, figs.1–2,4–7; pl.52, figs.1–5 (not all figures identified), pl.53, figs.1–3. Holotype: Trejo, 1983, pl.52, fig.4. Age: Late Cretaceous.

"**CALEDONIDINIUM**" Reid, 1974, p.589. **Taxonomic senior synonym:** *Bitectatodinium*, by implication in Harland (1977b, p.93), who considered the "type species" of *Caledonidinium*, *Caledonidinium vermiculatum*, to be a taxonomic junior synonym of *Bitectatodinium tepikiense*. Type: Reid, 1974, pl.1, figs.4–5, as *Caledonidinium vermiculatum*.

"***vermiculatum**" Reid, 1974, p.589–590, pl.1, figs.3–5. Holotype: Reid, 1974, pl.1, figs.4–5; Fensome et al., 1995, figs.2–3 — p.1899. **Taxonomic senior synonym:** *Bitectatodinium tepikiense*, according to Harland (1977b, p.93). Age: Holocene.

"**CALICIPEDINIUM**" Dumitrică, 1973, p.825, pl.4, figs.5–14. Siliceous dinoflagellate genus. **Name not validly published:** no validly published species.

"**hexastylus**" Dumitrică, 1973, p.825, pl.4, figs.5–14. **Name not validly published:** holotype not designated. Age: middle Miocene.

"***quadripes**" Dumitrică, 1973, p.825, pl.3, figs.19–26; pl.4, figs.1–4. **Name not validly published:** holotype not designated. Age: middle Miocene.

CALIGODINIUM Drugg, 1970b, p.814–815. Emendation: Manum and Williams, 1995, p.185. Type: Drugg, 1970b, fig.9A, as *Caligodinium amiculum*.

aceras (Manum and Cookson, 1964, p.27–28, pl.6, figs.9–11) Lentin and Williams, 1973, p.21. Holotype: Manum and Cookson, 1964, pl.6, fig.9. Originally *Kalyptea*, subsequently (and now) *Caligodinium*, thirdly *Pareodinia*. Lentin and Williams (1975, p.2148) retained this species in *Caligodinium*. Taxonomic junior synonym: *Caligodinium amiculum*, according to Heilmann-Clausen (1985, p.18) — however, Lentin and Williams (1989, p.44) retained *Caligodinium amiculum*. Age: Cenomanian.

***amiculum** Drugg, 1970b, p.815, figs.8A–B,9A–E. Holotype: Drugg, 1970b, fig.9A; Biffi and Manum, 1988, text-fig.11D. Originally (and now) *Caligodinium*, subsequently *Kalyptea*. Lentin and Williams (1977b, p.17) retained this species in *Caligodinium*. Taxonomic senior synonym: *Kalyptea* (as *Caligodinium*) *aceras*, according to Heilmann-Clausen (1985, p.18) — however, Lentin and Williams (1989, p.44) retained *Caligodinium amiculum*. N.I.A. Age: Danian.

endoreticulatum Stover and Hardenbol, 1994, p.34, pl.1, figs.3a–b,4. Holotype: Stover and Hardenbol, 1994, pl.1, figs.3a–b. Age: Rupelian.

goeranii Slimani, 1994, p.94–95, pl.14, figs.34–37. Holotype: Slimani, 1994, pl.14, figs.34–36. Age: early Campanian–earliest Danian.

?*granulatum* (Jiabo, 1978, p.91, pl.6, fig.20) Lentin and Williams, 1981, p.32. Holotype: Jiabo, 1978, pl.6, fig.20. Originally *Kalyptea*, subsequently *Caligodinium*, thirdly (and now) *Caligodinium*?. Questionable assignment: Manum and Williams (1995, p.188). Age: Early Tertiary.

perforatum Guler et al., 2005, p.422,425, figs.4A–O. Holotype: Guler et al., 2005, p.420–421, figs.5C–D. Age: late Maastrichtian.

pychnum Biffi and Manum, 1988, p.178,180,184, pl.1, figs.11,13–19; pl.2, figs.1–18; pl.3, figs.1–9,11; text-fig.10A. Holotype: Biffi and Manum, 1988, pl.2, figs.1,4,7,15. Age: early Miocene.

CALLAIOSPHAERIDIUM Davey and Williams, 1966b, p.103. Emendations: Duxbury, 1980, p.113; Below, 1981a, p.27. Nomenclatural junior synonym: *Hexasphaera* Clarke and Verdier, 1967, which has the same type. Taxonomic junior synonym: *Avellodinium*, according to Below (1981a, p.27) — however, Lentin and Williams (1981, p.23) retained *Avellodinium*. Type: Deflandre and Courteville, 1939, pl.4, fig.1, as *Hystrichosphaeridium asymmetricum*.

**asymmetricum* (Deflandre and Courteville, 1939, p.100–101, pl.4, figs.1–2) Davey and Williams, 1966b, p.104. Emendation: Clarke and Verdier, 1967, p.43, as *Hexasphaera asymmetrica*. Holotype: Deflandre and Courteville, 1939, pl.4, fig.1; Fensome et al., 1993a, fig.1 — p.949. Originally *Hystrichosphaeridium*, subsequently (and now) *Callaiosphaeridium*, thirdly *Hexasphaera* (combination illegitimate). Age: Senonian.

subsp. *asymmetricum*. Autonym. Holotype: Deflandre and Courteville, 1939, pl.4, fig.1.

subsp. *latum* Heilmann-Clausen in Heilmann-Clausen and Thomsen, 1995, p.290–291, pl.14, figs.3–4; text-fig.13. Holotype: Heilmann-Clausen and Thomsen, 1995, pl.14, fig.3; text-fig.13. Age: early Barremian.

"*falsificum*" (Duxbury, 1977, p.24–26, pl.5, figs.1–3; text-fig.4) Below, 1981a, p.28. Holotype: Duxbury, 1977, pl.5, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1171. **NOW** *Avellodinium*. Originally (and now) *Avellodinium*, subsequently *Callaiosphaeridium*. Taxonomic junior synonym (at specific rank): *Hystrichosphaera furcata* forma *aulosphaeropsis* (subsequently *Spiniferites? ramosus* subsp. *aulosphaeropsis*), according to Sarjeant (1985b, p.156–157). Age: late Berriasian–early Barremian.

scabratum Khowaja-Ateequzaman and Garg, 2004a, p.100,102, pl.1, figs.1–9. Holotype: Khowaja-Ateequzaman and Garg, 2004a, pl.1, figs.1–3. Age: early Turonian.

trycherium Duxbury, 1980, p.114, pl.11, figs.6,9. Holotype: Duxbury, 1980, pl.11, fig.6. Age: Barremian.

CANGXIANELLA Xu Jinli et al., 1997, p.113,150–151. Type: Jiabo, 1978, pl.1, fig.9, as *Lejeunia fissurata*.

elongata (Jiabo, 1978, p.54–55, pl.1, figs.5–7) Xu Jinli et al., 1997, p.114. Holotype: Jiabo, 1978, pl.1, fig.6. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Age: Early Tertiary.

**fissurata* (Jiabo, 1978, p.54–55, pl.1, figs.4,8–10) Xu Jinli et al., 1997, p.114. Holotype: Jiabo, 1978, pl.1, fig.9. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Age: Early Tertiary.

granospinosa Pan Zhaoren in Xu Jinli et al., 1997, p.113, pl.40, fig.10 ex He Chengquan et al., 2009, p.382–383,651. Holotype: Xu Jinli et al., 1997, pl.40, fig.10. The name was not validly published in Xu Jinli et al. (1997),

since no English or a Latin description was provided; He Chengquan et al. (2009, p.651) validated the name by publishing an English diagnosis. Age: Oligocene.

CANNINGIA Cookson and Eisenack, 1960b, p.251. Emendations: Dörhöfer and Davies, 1980, p.36; Below, 1981a, p.30 — however, see Hedlund and Norris (1986, p.295); Helby, 1987, p.321–322. Taxonomic junior synonym: *Hashenia*, according to Chen et al. (1988, p.16); *Circulodinium*, according to Millioud (1969, p.425) — however, Jansonius (1986, p.204) and Helby (1987, p.321–322) retained *Circulodinium*. Type: Cookson and Eisenack, 1960b, pl.38, fig.1, as *Canningia reticulata*.

"*americana*" Pöthe de Baldis and Ramos, 1983, p.432–433, pl.1, figs.6,9. Holotype: Pöthe de Baldis and Ramos, 1983, pl.1, fig.9. **NOW** *Tenua* Eisenack. Originally *Canningia*, subsequently (and now) *Tenua* Eisenack. Age: early Aptian.

apiculata Jain and Garg in Jain et al., 1984, p.71–72, pl.2, figs.27–29. Holotype: Jain et al., 1984, pl.2, fig.27. Age: Kimmeridgian–early Tithonian.

"?*aspera*" Singh, 1971, p.322, pl.50, fig.1. Holotype: Singh, 1971, pl.50, fig.1; Fauconnier and Masure, 2004, pl.14, fig.1. **NOW** *Circulodinium*. Originally *Canningia*, subsequently *Canningia?*, thirdly *Epelidosphaeridia*, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Questionable assignment: Stover and Evitt (1978, p.25). Age: middle Albian.

"*attadalica*" (Cookson and Eisenack, 1962b, p.495, pl.5, figs.12–15) Stover and Evitt, 1978, p.24–25. Holotype: Cookson and Eisenack, 1962b, pl.5, fig.13. **NOW** *Circulodinium*. Originally *Cyclonephelium?*, subsequently *Aptea*, thirdly *Canningia*, fourthly (and now) *Circulodinium*. Age: Aptian–Albian.

bassensis Marshall, 1990a, p.13–14, figs.9F–G,15A–K. Holotype: Marshall, 1990a, figs.9F–G,15D–F; Fensome et al., 1996, figs.4–6,8–9 — p.2065. Age: Campanian.

"?*brevispinosa*" (Pocock, 1962, p.81, pl.14, figs.222–223) Stover and Evitt, 1978, p.25. Emendation: Brideaux, 1977, p.15–16, as *Tenua brevispinosa*. Holotype: Pocock, 1962, pl.14, fig.222; Jansonius, 1986, pl.4, fig.6; Fauconnier and Masure, 2004, pl.14, figs.7–8. **NOW** *Circulodinium*. Originally *Palaeohystrichophora*, subsequently *Tenua* Eisenack, thirdly *Canningia?*, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Questionable assignment: Stover and Evitt (1978, p.25). Age: Barremian.

"*chinensis*" He Chengquan, 1991, p.54–55, pl.9, figs.17–18. Holotype: He Chengquan, 1991, pl.9, fig.17. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: middle Eocene.

"?*circularis*" Cookson and Eisenack, 1971, p.219, pl.8, fig.6. Holotype: Cookson and Eisenack, 1971, pl.8, fig.6. **NOW** *Kallosphaeridium?*. Originally *Canningia*, subsequently *Canningia?*, thirdly *Batiacasphaera*, fourthly (and now) *Kallosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.25). Age: Middle Cretaceous, ?Turonian.

"*colliveri*" Cookson and Eisenack, 1960b, p.251, pl.38, figs.3–4. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.4; Bint, 1986, text-fig.14E. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*, thirdly *Canninginopsis*. Fauconnier and Londeix in Fauconnier and Masure (2004, p.113) retained this species in *Circulodinium*. Age: Aptian.

"*compta*" Davey, 1982b, p.268, pl.8, figs.3–6. Holotype: Davey, 1982b, pl.8, fig.3. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: early Portlandian–earliest Valanginian.

"*crassicingulata*" Burger, 1980b, p.268, figs.4C,D1–2. Holotype: Burger, 1980b, fig.4D1–2. **NOW** *Levisphaera*. Originally *Canningia*, subsequently *Batiacasphaera*, thirdly (and now) *Levisphaera*. Age: Berriasian–Valanginian.

"?*dicrypta*" (Gitmez and Sarjeant, 1972, p.225–226, pl.7, fig.6; text-fig.22) Below, 1981a, p.31. Holotype: Gitmez and Sarjeant, 1972, pl.7, fig.6; text-fig.22. **NOW** *Escharisphaeridia*. Originally *Meiourogonaulax*, subsequently

Lithodinia, thirdly *Meiourogonyaulax*?, fourthly *Canningia*?, fifthly (and now) *Escharisphaeridia*. Questionable assignment: Below (1981a, p.31). Age: early–late Kimmeridgian.

duxburyi Harding, 1990b, p.22–23, pl.5, figs.1–13; text-fig.8 ex Harding in Williams et al., 1998, p.88. Holotype: Harding, 1990b, pl.5, fig.1. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Hauterivian–early Barremian.

"*elongata*" He Chengquan, 1991, p.55, pl.9, fig.1. Holotype: He Chengquan, 1991, pl.9, fig.1. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Turonian.

fairfieldensis Willumsen, 2012, p.59–60, pl.2, figs.1–6. Holotype: Willumsen, 2012, pl.2, figs.1–2. Age: early Paleocene.

"*floreticulata*" Slimani, 1994, p.96–97, pl.15, figs.1–6. Holotype: Slimani, 1994, pl.15, figs.1–4. **NOW** *Cyclonephelium*. Originally *Canningia*, subsequently (and now) *Cyclonephelium*. Age: early–late Campanian.

grandis Helby, 1987, p.324–326, figs.29A–D,30A–D. Holotype: Helby, 1987, figs.30A–D; Fensome et al., 1996, figs.1–4 — p.2137. Age: Hauterivian.

?*granulata* Morgenroth, 1966a, p.12, pl.2, fig.10. Holotype: Morgenroth, 1966a, pl.2, fig.10. Originally *Canningia*, subsequently (and now) *Canningia*?. Questionable assignment: Stover and Evitt (1978, p.25), as a problematic species. Age: early Eocene.

"*hirtella*" (Alberti, 1961, p.28, pl.4, fig.20) Millioud, 1969, p.425. Holotype: Alberti, 1961, pl.4, fig.20. **NOW** *Circulodinium*. Originally (and now) *Circulodinium*, subsequently *Canningia*, thirdly *Cyclonephelium*. Age: Valanginian–Hauterivian.

hulinensis He Chengquan et al., 1999, p.192,199–200, pl.1, figs.1–6; text-fig.3. Holotype: He Chengquan et al., 1999, pl.1, figs.1–3; text-fig.3. Age: late Hauterivian–Barremian.

"*insignis*" He Chengquan, 1991, p.55–56, pl.9, figs.9–10. Holotype: He Chengquan, 1991, pl.9, fig.9. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Cenomanian.

keiemensis Louwye, 1997, p.149, pl.1, figs.1–6. Holotype: Louwye, 1997, pl.1, figs.1–3,6. Age: latest Cenomanian–Santonian.

"*kukebaiensis*" Mao Shaozhi and Norris, 1988, p.31, pl.1, figs.6–8. Holotype: Mao Shaozhi and Norris, 1988, pl.1, fig.7. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Turonian–Santonian.

macroreticulata Lebedeva in Ilyina et al., 1994, p.71, pl.30, figs.6–7; pl.31, figs.1–6; text-fig.10. Holotype: Ilyina et al., 1994, pl.30, figs.6–7. Age: late Coniacian.

"?*micibaculata*" Jiabo, 1978, p.54, pl.7, figs.1–2. Holotype: Jiabo, 1978, pl.7, fig.1. **NOW** *Circulodinium*?. Originally *Canningia*, subsequently *Canningia*?, thirdly (and now) *Circulodinium*?. Questionable assignment: Helby (1987, p.324–325). Lentin and Williams (1981, p.33) misspelled the specific epithet "*microbaculata*". Age: Early Tertiary.

?*microciliata* Jain, 1977b, p.178, pl.3, fig.25; pl.6, fig.78. Holotype: Jain, 1977b, pl.3, fig.25. Originally *Canningia*, subsequently (and now) *Canningia*?. Questionable assignment: Helby (1987, p.324–325). Age: early Albanian.

"*microreticulata*" (Brideaux and McIntyre, 1975, p.35, pl.11, figs.7–12; pl.12, figs.1–8) Below, 1981a, p.31. Holotype: Brideaux and McIntyre, 1975, pl.11, figs.7–9; pl.12, fig.1. **NOW** *Senoniasphaera*. Originally (and now) *Senoniasphaera*, subsequently *Canningia*. Age: middle Albanian.

"?*minor*" Cookson and Hughes, 1964, p.43, pl.8, figs.1–3,5. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. **NOW** *Kallosphaeridium? helbyi*. Originally *Canningia minor*, subsequently *Canningia? minor*, thirdly *Batiacasphaera minor*, fourthly *Chytroeisphaeridia minor*, fifthly *Kallosphaeridium? minus* (combination illegitimate), sixthly (and now) *Kallosphaeridium? helbyi*. Questionable assignment: Stover and Evitt (1978, p.25). Age: late Albian–early Cenomanian.

"subsp. *minor*". Autonym. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. **NOW** *Kallosphaeridium? helbyi* subsp. *helbyi*. Originally *Canningia? minor* subsp. *minor*, subsequently *Chytroeisphaeridia minor* subsp. *minor*, thirdly (and now) *Kallosphaeridium? helbyi* subsp. *helbyi*.

"var. *minor*". Autonym. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. **Now redundant**.

"subsp. *psilata*" (Burger, 1980a, p.71, pl.25, figs.5–11) Lentin and Williams, 1981, p.33. Holotype: Burger, 1980a, pl.25, fig.10. **NOW** *Kallosphaeridium? helbyi* subsp. *psilatatum*. Originally *Canningia? minor* var. *psilata*, subsequently *Canningia? minor* subsp. *psilata*, thirdly *Chytroeisphaeridia minor* subsp. *psilata*, fourthly (and now) *Kallosphaeridium? helbyi* subsp. *psilatatum*. Age: late Albian–early Cenomanian.

"var. *psilata*" Burger, 1980a, p.71, pl.25, figs.5–11. Holotype: Burger, 1980a, pl.25, fig.10. **NOW** *Kallosphaeridium? helbyi* subsp. *psilatatum*. Originally *Canningia? minor* var. *psilatatum*, subsequently *Canningia? minor* subsp. *psilata*, thirdly *Chytroeisphaeridia minor* subsp. *psilata*, fourthly (and now) *Kallosphaeridium? helbyi* subsp. *psilatatum*. Age: late Albian–early Cenomanian.

"*palliata*" Brideaux, 1977, p.11–12, pl.3, figs.1–8. Holotype: Brideaux, 1977, pl.3, figs.1–4. Originally *Canningia*, subsequently *Cyclonephelium*. **Taxonomic senior synonym:** *Canningia reticulata*, according to Helby (1987, p.322–323). Age: Barremian.

"*pentagona*" He Chengquan, 1991, p.56, pl.9, figs.13–14. Holotype: He Chengquan, 1991, pl.9, fig.13. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Late Cretaceous.

pitica Helby, 1987, p.326–327, figs.29E–L,30E–L. Holotype: Helby, 1987, figs.30I–L; Fensome et al., 1996, figs.4–7 — p.2281. Age: Hauterivian.

**reticulata* Cookson and Eisenack, 1960b, p.251, pl.38, figs.1–2. Emendations: Below, 1981a, p.32; Helby, 1987, p.322–323. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.1; Helby, 1987, fig.27J. Taxonomic junior synonym: *Canningia palliata*, according to Helby (1987, p.322–323). Age: Tithonian.

"*retirugosa*" He Chengquan, 1991, p.56, pl.8, fig.11. Holotype: He Chengquan, 1991, pl.8, fig.11. **NOW** *Kallosphaeridium*. Originally *Canningia*; subsequently (and now) *Kallosphaeridium*. Age: Late Cretaceous.

"?*ringnesiorum*" Manum and Cookson, 1964, p.15, pl.2, fig.10. Holotype: Manum and Cookson, 1964, pl.2, fig.10. **NOW** *Kallosphaeridium?*. Originally *Canningia*, subsequently *Canningia?*, thirdly *Batiacasphaera*, fourthly *Chytroeisphaeridia*, fifthly (and now) *Kallosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.25). Age: Campanian–Maastrichtian.

?*rotundata* Cookson and Eisenack, 1961a, p.72, pl.12, figs.1–5. Holotype: Cookson and Eisenack, 1961a, pl.12, fig.1. Originally *Canningia*, subsequently (and now) *Canningia?*, thirdly *Batiacasphaera*. Questionable assignment: Stover and Evitt (1978, p.25). Age: Senonian.

rugulosa (Clarke and Verdier, 1967, p.57–58, pl.12, figs.5–6; text-fig.23) Stover and Evitt, 1978, p.25. Holotype: Clarke and Verdier, 1967, pl.12, fig.6. Originally *Aptea*, subsequently (and now) *Canningia*. Age: Santonian.

scabrosa Cookson and Eisenack, 1970a, p.146, pl.13, figs.6–7. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.6. Age: Albian–Cenomanian.

senonica Clarke and Verdier, 1967, p.20–21, pl.1, figs.12–14; text-fig.7. Holotype: Clarke and Verdier, 1967, pl.1, fig.12. Age: Santonian.

spongireticulata Prössl, 1990, p.97, pl.13, figs.2,5,13 ex Prössl, 1992b, p.113–114. Holotype: Prössl, 1990, pl.13, figs.2,5. This name was not validly published in Prössl (1990, p.97), since that author did not specify the lodgment of the holotype. Age: late Albian–middle Turonian.

"*spumosa*" Brideaux, 1977, p.12, pl.3, figs.9–14. Holotype: Brideaux, 1977, pl.3, figs.9,14. **NOW** *Batiacasphaera*. Originally *Canningia*, subsequently *Batiacasphaera*?, thirdly (and now) *Batiacasphaera*. Age: Aptian.

torulosa Davey and Verdier, 1973, p.180,183, pl.1, figs.2,5,8. Holotype: Davey and Verdier, 1973, pl.1, fig.2. Originally (and now) *Canningia*, subsequently *Batiacasphaera*, thirdly *Ovoidinium*. Lentin and Williams (1981, p.34; 1985, p.44) retained this species in *Canningia*. Age: late Albian–early Cenomanian.

transitoria Stover and Helby, 1987d, p.262–263, figs.3A–P,4A–B. Holotype: Stover and Helby, 1987d, figs.3A–E; Fensome et al., 1996, figs.1–5 — p.2405. Age: Barremian–early Aptian.

?*turruta* Brideaux, 1977, p.13, pl.4, figs.1–9. Holotype: Brideaux, 1977, pl.4, figs.1–3. Originally (and now) *Canningia*?, subsequently *Ovoidinium*. Questionable assignment: Brideaux (1977, p.13). Sangiorgi et al. (2009, p.252) speculated that this species may belong to *Arcticacysta*. Age: Barremian.

"*wulagenensis*" He Chengquan, 1991, p.57, pl.9, fig.16. Holotype: He Chengquan, 1991, pl.9, fig.16. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Late Cretaceous.

xinjiangensis Chen et al., 1988, p.16. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.2, fig.1. Substitute name for *Hashenia reticulata* Yu Jingxian and Zhang Wangping, 1980, p.107, pl.1, fig.17; pl.2, figs.1–2; the name *Canningia reticulata* is preoccupied. Age: Turonian–Maastrichtian.

CANNINGINOPSIS Cookson and Eisenack, 1962b, p.488. Emendation: Marshall, 1990b, p.80–82. Type: Cookson and Eisenack, 1962b, pl.1, fig.16, as *Canninginopsis denticulata*.

bretonica Marshall, 1990b, p.84–86, figs.4L–T,5F–H,6L–U. Holotype: Marshall, 1990b, figs.4N,5F–G,6N–O; Fensome et al., 1996, figs.1–2,7 — p.2069. Age: late Campanian–mid Maastrichtian.

"*colliveri*" (Cookson and Eisenack, 1960b, p.251, pl.38, figs.3–4) Backhouse, 1988, p.77. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.4. **NOW** *Circulodinium*. Originally *Canningia*, subsequently (and now) *Circulodinium*, thirdly *Canninginopsis*. Fauconnier and Londeix in Fauconnier and Masure (2004, p.113) retained this species in *Circulodinium*. Age: Aptian.

**denticulata* Cookson and Eisenack, 1962b, p.488, pl.1, figs.16–19; text-fig.2. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.16; Bint, 1986, text-fig.14F; Helby et al., 1987, fig.38A. Age: Albian–Cenomanian.

intermedia Morgan, 1980, p.18, pl.3, figs.4–8. Holotype: Morgan, 1980, pl.3, figs.7–8; Helby et al., 1987, figs.29E–F. Age: early Albian.

maastrichtiensis Slimani, 1994, p.97–98, pl.16, figs.5–8,13–14. Holotype: Slimani, 1994, pl.16, figs.5–7. Taxonomic junior synonym: *Canninginopsis verrucosa* (name not validly published), according to Slimani (2001a, p.192). Age: late Maastrichtian.

ordospinosa Smith, 1992, p.342, figs.5g–h,k–l,n,p,11i. Holotype: Smith, 1992, fig.5l. Age: late Campanian–early Maastrichtian.

"*ovalis*" (Vozzhennikova, 1967, p.99, pl.40, figs.1a–b,2a–b) Lentin and Williams, 1977b, p.147. Holotype: Vozzhennikova, 1967, pl.40, figs.1a–b, lost according to Lentin and Vozzhennikova (1990, p.69), who stated that no

potential lectotype is available. **NOW** *Spinidinium*. Originally *Canninginopsis*, subsequently *Spinidinium?*, thirdly (and now) *Spinidinium*. Age: Paleocene–Eocene.

"*tabulata*" (Davey and Verdier, 1974, p.630,632, pl.92, figs.1–4; pl.93, fig.6) Duxbury, 1977, p.27. Holotype: Davey and Verdier, 1974, pl.92, figs.1,4; Eisenack and Kjellström, 1981b, p.328b; Sarjeant, 1992b, figs.3–4; Fensome et al., 1995, figs.1–2 — p.1833. **NOW** *Cerbia*. Originally *Cyclonephelium*, subsequently *Canninginopsis*, thirdly (and now) *Cerbia*. Taxonomic senior synonym: *Tenua hystrix*, according to Sarjeant (1985a, p.94; 1992b, p.681) — however, by retaining *Cerbia*, Duxbury (2002, p.76.78) retained *Cerbia tabulata* by implication. Age: Aptian.

"*verrucosa*" Wilson in Slimani, 1994, p.97. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Canninginopsis maastrichtiensis*, according to Slimani (2001a, p.192).

CANNOSPHAEROPSIS Wetzel, 1933b, p.6. Emendations: Williams and Downie, 1966c, p.222; Duxbury, 1980, p.114; Marheinecke, 1992, p.41. This name was not validly published in Wetzel (1932, p.136) since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1). This interpretation is in contrast to that of Lentin and Williams (1993, p.77). Type: Wetzel, 1933b, pl.3, figs.9a–b, as *Cannosphaeropsis utinensis*.

"*aemula*" (Deflandre, 1939a, p.187–189, pl.9, fig.12; pl.10, figs.5–8; pl.11, figs.1,7) Deflandre, 1947a, p.1576. Emendation: Below, 1982b, p.139–140, as *Rigaudella aemula*. Holotype: Deflandre, 1939a, pl.11, fig.1; Eisenack and Kjellström, 1972, figure to left on p.43; Fensome et al., 1995, fig.1 — p.1473; fig.2 — p.1475. **NOW** *Rigaudella*. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly *Adnatosphaeridium*, fourthly (and now) *Rigaudella*. Taxonomic junior synonym: *Cannosphaeropsis paucispina*, according to Below (1982b, p.139). Age: Oxfordian.

"subsp. *aemula*". Autonym. Holotype: Deflandre, 1939a, pl.11, fig.1; Eisenack and Kjellström, 1972, figure to left on p.43; Fensome et al., 1995, fig.1 — p.1473; fig.2 — p.1475. **NOW** *Rigaudella aemula* subsp. *aemula*. Originally *Cannosphaeropsis aemula* subsp. *aemula*, subsequently *Adnatosphaeridium aemulum* subsp. *aemulum*, thirdly (and now) *Rigaudella aemula* subsp. *aemula*.

"subsp. *integra*" Cookson and Eisenack, 1958, p.47, pl.7, figs.6–7. Holotype: Cookson and Eisenack, 1958, pl.7, fig.6; Fensome et al., 1995, fig.1 — p.1565; Fauconnier and Masure, 2004, pl.68, figs.8–9. **NOW** *Rigaudella aemula* subsp. *integra*. Originally *Cannosphaeropsis aemula* subsp. *integra*, subsequently *Adnatosphaeridium aemulum* subsp. *integrum*, thirdly (and now) *Rigaudella aemula* subsp. *integra*. Age: Late Jurassic.

"*apiculata*" Cookson and Eisenack, 1960b, p.254, pl.39, fig.15. Emendation: Davey, 1988, p.42–43, as *Papuadinium apiculatum*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.15; Fensome et al., 1993a, fig.1 — p.927. **NOW** *Papuadinium*. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly *Rigaudella*, fourthly (and now) *Papuadinium*. Age: Tithonian.

australis Riding and Helby, 2001h, p.227,229, figs.1A–I. Holotype: Riding and Helby, 2001h, figs.1D–F. Taxonomic junior synonym: *Hapsocysta spinosa* (name not validly published), according to Riding and Helby (2001h, p.227). Age: late Aptian–late Albian.

"*caulleryi*" (Deflandre, 1939a, p.189, pl.11, figs.2–3) Sarjeant, 1961a, p.103. Emendation: Stancliffe and Sarjeant, 1990, p.200, as *Adnatosphaeridium caulleryi*. Holotype: Deflandre, 1939a, pl.11, fig.2; Stancliffe and Sarjeant, 1990, pl.1, figs.3,5; Fauconnier and Masure, 2004, pl.1, figs.7–8. **NOW** *Adnatosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly (and now) *Adnatosphaeridium*, fourthly *Polystephanephorus*. Age: early Oxfordian.

"?*choneta*" Cookson and Eisenack, 1962b, p.493, pl.4, figs.8–10. Holotype: Cookson and Eisenack, 1962b, pl.4, fig.8. **NOW** *Adnatosphaeridium?*. Originally *Cannosphaeropsis?*, subsequently *Adnatosphaeridium*, thirdly (and now) *Adnatosphaeridium?*. Questionable assignment: Cookson and Eisenack (1962b, p.493). Age: ?Cenomanian.

?densa Cookson and Eisenack, 1962b, p.493, pl.4, figs.1–3. Holotype: Cookson and Eisenack, 1962b, pl.4, fig.1. Originally *Cannosphaeropsis*, subsequently (and now) *Cannosphaeropsis?*. Questionable assignment: Stover and Evitt (1978, p.144), as a problematic species. Age: late Albian–Cenomanian.

"?densifilosa" Cookson and Eisenack, 1974, p.70, pl.24, fig.13. Holotype: Cookson and Eisenack, 1974, pl.24, fig.13; Stancliffe and Sarjeant, 1990, pl.4, fig.1; Fauconnier and Masure, 2004, pl.1, fig.4. **NOW** *Adnatosphaeridium*. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Adnatosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.144), as a problematic species. Age: Late Jurassic.

"densiradiata" Cookson and Eisenack, 1962b, p.493, pl.4, figs.5–7. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.5–6. **NOW** *Nematosphaeropsis*. Originally *Cannosphaeropsis*, subsequently (and now) *Nematosphaeropsis*. Age: Cenomanian.

"?elegantula" Drugg, 1967, p.25, pl.4, fig.17. Holotype: Drugg, 1967, pl.4, fig.17. **NOW** *Trabeculidium*. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Trabeculidium*, fourthly *Nematosphaeropsis*. Questionable assignment: Stover and Evitt (1978, p.144) as a problematic species. Age: Danian.

"fenestrata" Deflandre and Cookson, 1955, p.283, pl.3, fig.2; text-fig.43. Holotype: Deflandre and Cookson, 1955, pl.3, fig.2. **NOW** *Aiora* Cookson and Eisenack, 1960a. Originally *Cannosphaeropsis*, subsequently (and now) *Aiora*. Age: Turonian–Santonian.

"filamentosa" Cookson and Eisenack, 1958, p.47–48, pl.7, figs.8–9; pl.8, figs.1–2. Holotype: Cookson and Eisenack, 1958, pl.7, fig.9. **NOW** *Rigaudella*. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly (and now) *Rigaudella*. Taxonomic junior synonym: *Cannosphaeropsis perforata*, according to Stancliffe and Sarjeant (1990, p.206). Age: Middle-Late Jurassic.

"filifera" (Cookson and Eisenack, 1958, p.46, pl.7, fig.4) Cookson and Eisenack, 1960a, p.8. Holotype: Cookson and Eisenack, 1958, pl.7, fig.4; Fauconnier and Masure, 2004, pl.1, figs.1–2. **NOW** *Adnatosphaeridium filiferum*. Originally *Cannosphaeropsis utinensis* subsp. *filifera*, subsequently *Cannosphaeropsis filiferum*, thirdly (and now) *Adnatosphaeridium filiferum*. Age: Campanian–early Maastrichtian.

franciscana Damassa, 1979b, p.204–205, pl.4, fig.9; pl.5, figs.1–11. Holotype: Damassa, 1979b, pl.5, figs.1–2,6. Age: early Paleocene.

?glabra Cookson and Eisenack, 1974, p.70, pl.24, fig.12. Holotype: Cookson and Eisenack, 1974, pl.24, fig.12. Originally *Cannosphaeropsis*, subsequently (and now) *Cannosphaeropsis?*. Questionable assignment: Stover and Evitt (1978, p.144) as a problematic species. Age: Middle Cretaceous.

hughesii Harding, 1990b, p.24–25, pl.6, figs.9–16 ex Harding in Williams et al., 1998, p.92. Holotype: Harding, 1990b, pl.6, figs.10,14. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Hauterivian.

?hyperacantha Cookson and Eisenack, 1960a, p.9, pl.2, figs.14–15. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.14. Originally *Cannosphaeropsis*, subsequently (and now) *Cannosphaeropsis?*. Questionable assignment: Stover and Evitt (1978, p.144) as a problematic species. Age: Campanian.

"mirabilis" Cookson and Eisenack, 1958, p.48, pl.8, figs.3–5. Holotype: Cookson and Eisenack, 1958, pl.8, fig.3. **NOW** *Peridictyocysta*. Originally *Cannosphaeropsis*, subsequently (and now) *Peridictyocysta*. Age: Late Jurassic.

passio de Verteuil and Norris, 1996a, p.130,132,134,136, pl.7, figs.1–8; pl.8, figs.1–6; pl.17, figs.1,3–5; text-fig.33. Holotype: de Verteuil and Norris, 1996a, pl.7, figs.1–3,5–6,8. N.I.A. Age: late middle Miocene.

- "paucispina"** Klement, 1960, p.72, pl.10, figs.9–10. Holotype: Klement, 1960, pl.10, fig.9; Sarjeant, 1984a, pl.3, figs.5–6. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*. **Taxonomic senior synonym:** *Cannosphaeropsis* (as *Rigaudella*) *aemula*, according to Below (1982b, p.139). Age: late Oxfordian.
- "perforata"** Alberti, 1961, p.37, pl.9, fig.14. Holotype: Alberti, 1961, pl.9, fig.14. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly *Rigaudella*. **Taxonomic senior synonym:** *Cannosphaeropsis* (now *Rigaudella*) *filamentosa*, according to Stancliffe and Sarjeant (1990, p.206). Age: ?Callovian.
- "?peridictya"** Eisenack and Cookson, 1960, p.8, pl.3, figs.5–6. Emendation: Davey, 1979b, p.556, as *Hapsocysta peridictya*. Holotype: Eisenack and Cookson, 1960, pl.3 fig.6; Fensome et al., 1995, fig.2 — p.1661; Heilmann-Clausen and Van Simaey, 2005, text-figs.6A–B. **NOW** *Hapsocysta*. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Hapsocysta*. Questionable assignment: Stover and Evitt (1978, p.144). Age: late Albian–Cenomanian.
- "philippotii"** Deflandre, 1947a, p.1574; text-figs.2–3. Holotype: Deflandre, 1947a, text-fig.3. **NOW** *Nematosphaeropsis*. Originally *Cannosphaeropsis*, subsequently (and now) *Nematosphaeropsis*, thirdly *Nematosphaeropsis?*. Taxonomic junior synonym: *Nematosphaeropsis delicata* (name not validly published), according to Slimani (2001a, p.193). Age: Senonian.
- ?praetexta** Corradini, 1973, p.163, pl.25, figs.7a–b,8; pl.35, fig.5. Holotype: Corradini, 1973, pl.25, figs.7a–b. Originally *Cannosphaeropsis*, subsequently (and now) *Cannosphaeropsis?*. Questionable assignment: Stover and Evitt (1978, p.144). Age: Late Cretaceous–Paleocene.
- ?pulchra** Alberti, 1961, p.37, pl.10, fig.5. Holotype: Alberti, 1961, pl.10, fig.5. Originally *Cannosphaeropsis*, subsequently (and now) *Cannosphaeropsis?*. Questionable assignment: Stover and Evitt (1978, p.144) as a problematic species. Age: Coniacian.
- "pusulosa"** Morgenroth, 1966b, p.8, pl.2, fig.6. Holotype: Morgenroth, 1966b, pl.2, fig.6; Sarjeant et al., 1987, pl.1, fig.8. **NOW** *Trabeculidium*. Originally *Cannosphaeropsis*, subsequently *Nematosphaeropsis*, thirdly (and now) *Trabeculidium*. Age: early Oligocene.
- quattrocchiaie** Guerstein et al. 2001, p.158–160, pl.1, figs.1–12, pl.2, figs.1–8, text-figs.4a–b. Holotype: Guerstein et al., 2001, pl.1, figs.4–8, text-figs.4a–b (not 4e–f as indicated by Guerstein et al., 2001, p.158). Age: youngest occurrence probably early Miocene.
- "reticulensis"** PASTIELS, 1948, p.49, pl.5, figs.7–10. Emendation: Sarjeant, 1986, p.9,11, as *Nematosphaeropsis reticulensis*. Holotype: PASTIELS, 1948, pl.5, fig.10; unrecognizable, according to Sarjeant (1986, p.11). Lectotype: PASTIELS, 1948, pl.5, fig.7; Sarjeant, 1986, pl.3, fig.6; designated by Sarjeant (1986, p.11). **NOW** *Nematosphaeropsis*. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly (and now) *Nematosphaeropsis*. Age: early Eocene.
- "robusta"** Morgenroth, 1966a, p.19, pl.4, fig.1. Holotype: Morgenroth, 1966a, pl.4, fig.1. **NOW** *Adnatosphaeridium*. Originally *Cannosphaeropsis*, subsequently (and now) *Adnatosphaeridium*. Age: early Eocene.
- ?scaffoldii** (Baksi, 1962, p.17, pl.2, fig.25) Downie and Sarjeant, 1965, p.101. Holotype: Baksi, 1962, pl.2, fig.25. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly (and now) *Cannosphaeropsis?*. Questionable assignment: Stover and Evitt (1978, p.144) as a problematic species. Age: Eocene.
- "?speciosa"** Alberti, 1961, p.37, pl.9, fig.13. Holotype: Alberti, 1961, pl.9, fig.13; Stancliffe and Sarjeant, 1990, pl.5, fig.6. **NOW** *Adnatosphaeridium?*. Originally *Cannosphaeropsis*, subsequently *Polystephanephorus*, thirdly *Cannosphaeropsis?*, fourthly (and now) *Adnatosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.144) as a problematic species. Age: Bathonian–Callovian.
- "thule"** Davey, 1982b, p.26–27, pl.8, figs.7–11. Emendation: Riding and Davey, 1989, p.109,112, as *Rotosphaeropsis thule*. Holotype: Davey, 1982b, pl.8, figs.8–11; Riding and Davey, 1989, pl.1. fig.4. **NOW**

Rotosphaeropsis. Originally *Cannosphaeropsis*, subsequently (and now) *Rotosphaeropsis*. N.I.A. Age: latest Kimmeridgian–late Ryazanian.

"?*tutulosa*" Cookson and Eisenack, 1960a, p.8, pl.2, figs.12–13. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.13; Fauconnier and Masure, 2004, pl.1, fig.3. **NOW** *Adnatosphaeridium*. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis*?, thirdly *Adnatosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.144) as a problematic species. Age: Cenomanian.

"*urnaformis*" Cookson, 1953, p.118, pl.2, figs.41–43. Holotype: Cookson, 1953, pl.2, figs.41–42. **NOW** *Emmetrocysta*. Originally *Cannosphaeropsis*, subsequently *Polystephanephorus*, thirdly (and now) *Emmetrocysta*. Age: Oligocene.

"*ursulae*" Morgenroth, 1966a, p.20, pl.3, figs.11–12. Holotype: Morgenroth, 1966a, pl.3, fig.11; Eisenack and Kjellström, 1972, figure to left — p.143; Fensome et al., 1995, fig.1 — p.1865. **NOW** *Eatonicysta*. Originally *Cannosphaeropsis*, subsequently *Membranilarnacia*, thirdly (and now) *Eatonicysta*. Taxonomic junior synonyms: *Membranilarnacia diktyophora*, according to Eaton (1976, p.277); *Membranilarnacia reticulata*, according to de Coninck (1969, p.43) and Gocht (1969, p.65). Age: early Eocene.

**utinensis* Wetzel, 1933b, p.6, pl.3, figs.9–17; text-fig.12. Emendations: May, 1980, p.45; Duxbury, 1980, p.114–115; Sarjeant, 1985b, p.147–149; Marheinecke, 1992, p.41–42. Holotype: Wetzel, 1933b, pl.3, figs.9a–b; lost according to Sarjeant (1985b, p.148). Lectotype: Wetzel, 1933b, pl.3, fig.11; Sarjeant, 1985b, pl.5, figs.1–2; Dietz et al., 1999, fig.10, no.7; designated by Sarjeant (1985b, p.148). This name was not validly published in Wetzel (1932, p.140) since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1). This interpretation is in contrast to that of Lentin and Williams (1993, p.80). Age: Late Cretaceous.

"subsp. *filifera*" Cookson and Eisenack, 1958, p.46, pl.7, fig.4. Holotype: Cookson and Eisenack, 1958, pl.7, fig.4; Fauconnier and Masure, 2004, pl.1, figs.1–2. **NOW** *Adnatosphaeridium filiferum*. Originally *Cannosphaeropsis utinensis* subsp. *filifera*, subsequently *Cannosphaeropsis filifera*, thirdly (and now) *Adnatosphaeridium filiferum*. Age: Campanian–early Maastrichtian.

"subsp. *utinensis*". Autonym. Holotype: Cookson and Eisenack, 1958, pl.7, fig.4. **Now redundant.**

williamsii Sarjeant, 1986, p.33–34. Holotype: Williams and Downie, 1966c, pl.24, fig.8 (as *Cannosphaeropsis reticulensis*). Age: early Eocene.

"**CANTIACIDINIUM**" Reid in Head et al., 2001, p.629. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Islandinium*, by implication in Head et al. (2001, p.629), who considered the only recorded species name, *Cantiacidinium conicum* (name not validly published), to be a taxonomic junior synonym of *Islandinium minutum*.

"*conicum*" Reid in Head et al., 2001, p.629. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Multispinula*? (now *Islandinium minuta*, according to Head et al. (2001, p.629).

CANTULODINIUM Alberti, 1961, p.23. Emendation: van Helden, 1986, p.190. Taxonomic senior synonym: *Muderongia*, according to Dörhöfer and Davies (1980, p.14) — however, Lentin and Williams (1981, p.36) retained *Cantulodinium*. Type: Alberti, 1961, pl.3, fig.20, as *Cantulodinium speciosum*.

arthuriae van Helden, 1986, p.192,194, pl.1, figs.1–6; pl.2, figs.1–8; text-figs.5a–e. Holotype: van Helden, 1986, pl.1, figs.1–2; text-fig.5b. Age: Portlandian–early Berriasian.

?*protuberatum* Wall, 1965a, p.160, pl.4, figs.14–20; pl.8, fig.8. Holotype: Wall, 1965a, pl.4, fig.15; pl.8, fig.8. Originally *Cantulodinium*, subsequently (and now) *Cantulodinium*?. Questionable assignment: Stover and Evitt (1978, p.98) as a problematic species. Age: Pliensbachian–Toarcian.

**speciosum* Alberti, 1961, p.23, pl.3, figs.20–23; pl.12, fig.3. Holotype: Alberti, 1961, pl.3, fig.20. Age: Valanginian.

CAPILLICYSTA Matsuoka and Bujak in Matsuoka et al., 1987, p.226. Emendation: de Verteuil and Norris, 1992, p.397–398, in text. Type: Matsuoka et al., 1987, pl.1, figs.1–2, as *Capillicysta fusca*.

"*applanata*" (Bradford, 1977 [April], p.47–49, fig.2, nos.1–8) Matsuoka et al., 1987, p.228. Holotype: Bradford, 1977, fig.2, nos.1–4. **NOW** *Trinovantedinium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunecysta*, thirdly (and now) *Trinovantedinium*, fourthly *Capillicysta*. Taxonomic junior synonym: *Trinovantedinium capitatum* Reid 1977 [November], by implication in Matsuoka (1984b, p.6), who did not specify priority, and de Verteuil and Norris (1992, p.408). Motile equivalent: *Protoperidinium pentagonum* (Gran, 1902) Balech, 1974, according to Bradford and Wall (1984, p.48–49). Age: Holocene.

**fusca* Matsuoka and Bujak in Matsuoka et al., 1987, p.226,228, pl.1, figs.1–12; pl.2, figs.10–11. Holotype: Matsuoka et al., 1987, pl.1, figs.1–2; Head, 1994b, pl.2, figs.7–9; Fensome et al., 1995, figs.1–2 — p.1493. Age: middle-late Miocene.

"*gloriana*" Head et al., 1989b, p.453, pl.5, figs.4,8,10–12. Holotype: Head et al., 1989b, pl.5, figs.11–12. **NOW** *Trinovantedinium*. Originally *Capillicysta*, subsequently (and now) *Trinovantedinium*. Age: late Miocene–earliest Pliocene.

CAPISOCYSTA Warny and Wrenn, 1997, p.297. Emendation: Head, 1998b, p.800. Type: Warny and Wrenn, 1997, pl.8, figs.7,10, as *Capisocysta wallii*.

lata Head, 1998b, p.802,806–807, fig.1, nos.1,3,5; fig.2, nos.1–6; fig.3, nos.1–12; fig.4, nos.1–15. Holotype: Head, 1998b, fig.1, no.1; fig.2, nos.1–2. Age: early Pliocene–Holocene.

lyellii Head, 1998b, p.807–808, fig.1, nos.2,4,6; fig.5, nos.1–6. Holotype: Head, 1998b, fig.1, no.2; fig.5, nos.3–4. Age: early Pliocene.

**wallii* Warny and Wrenn, 1997, p.298–299, pl.8, figs.1–10; text-figs.3A–C. Holotype: Warny and Wrenn, 1997, pl.8, figs.7,10. Age: Miocene–Holocene.

CARACOMIA Streng et al., 2002, p.398. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1299). Type: Gilbert and Clark, 1983, pl.1, fig.1, as *Thoracosphaera arctica*.

**arctica* (Gilbert and Clark, 1983, p.400, pl.1, figs.1–15) Streng et al., 2002, p.398. Holotype: Gilbert and Clark, 1983, pl.1, fig.1. Originally *Thoracosphaera*, subsequently *Sphaerodinella*, thirdly (and now) *Caracomia*. Age: late Miocene–Holocene.

forma *arctica*. Autonym. Holotype: Gilbert and Clark, 1983, pl.1, fig.1.

var. *arctica*. Autonym. Holotype: Gilbert and Clark, 1983, pl.1, fig.1.

forma *duplicata* Streng et al., 2009, p.240–241, pl.11, figs.1–5,10. Holotype: Streng et al., 2009, pl.11, figs.1,4,10. Age: middle Miocene.

forma *rossensis* Streng et al., 2011, p.602–603, figs.2a,e–f,k–m; figs.3a–f. Holotype: Streng et al., 2011, fig.2a. Age: Pleistocene.

forma *spinosa* Hildebrand-Habel and Streng, 2003, p.313–314, pl.2, figs.13–15; pl.3, figs.1–6; text-fig.5, nos.1–2. Holotype: Hildebrand-Habel and Streng, 2003, pl.2, figs.13–14. Age: latest middle Miocene.

var. *stupaviensis* Banasová et al., 2007, p.110–111,122, pl.1, figs.1–5. Holotype: Banasová et al., 2007, pl. figs.1–3. Age: Burdigalian.

stella Streng et al., 2002, p.398–399,401, fig.7, nos.1–5; fig.8, nos.8–10. Holotype: Streng et al., 2002, fig.7, no.1; fig.8, no.10. N.I.A. Age: early Miocene–late Pliocene.

CARDUIFOLIA Hovasse, 1932b, p.469. Siliceous dinoflagellate genus (see Dumitrică, 1973, p.824). This name was not validly published in Hovasse (1932a, p.126) since that author did not provide a description or diagnosis. Type: Hovasse, 1932b, fig.9, as *Carduifolia onopordoides*.

apiculata Hovasse, 1932b, p.469, figs.22–23. Holotype: not designated. Age: Tertiary.

gracilis Hovasse, 1932a, p.127, fig.10 ex Hovasse, 1932b, p.469. Holotype: Hovasse, 1932a, fig.10. This name was not validly published in Hovasse (1932a) since the generic name *Carduifolia* was not validly published until later in 1932. Age: middle Miocene.

"var. *spinosa*" Hovasse, 1932b, p.469. **Name not validly published:** no illustration.

lata Hovasse, 1932b, p.470, figs.24–25. Holotype: not designated. Age: Paleocene–middle Miocene.

**onopordoides* Hovasse, 1932a, p.126, fig.9 ex Hovasse, 1932b, p.469. Holotype: Hovasse, 1932a, fig.9. This name was not validly published in Hovasse (1932a) since the generic name *Carduifolia* was not validly published until later in 1932. The name *Carduifolia onopordoides* was not directly cited by Hovasse (1932b), in which publication he validated the generic name *Carduifolia*. However, given the liberal rules governing citation at that time, we accept the name as validated there, as apparently also did Loeblich Jr. and Loeblich III (1966, p.19). Age: early Paleocene.

CARINASPHERA Kohring, 1993a, p.29. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1299). Type: Kohring, 1993a, pl.4, figs.a–e, as *Carinasphaera cimbra*.

**cimbra* Kohring, 1993a, p.29–30, pl.4, figs.a–e; pl.42, fig.k. Holotype: Kohring, 1993a, pl.4, figs.a–e. Age: late middle Eocene.

CARINELLUM Keupp, 1981, p.50–51. Calcareous dinoflagellate genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1299). Type: Keupp, 1981, pl.41, figs.1–3, as *Carinellum monocarinatum*.

conulum Keupp, 1981, p.52–53, pl.42, figs.1–6. Holotype: Keupp, 1981, pl.42, figs.1–3. Age: early Barremian.

hyalinum Keupp, 1987, p.49, pl.13, figs.1–5; pl.14, figs.10–11. Holotype: Keupp, 1987, pl.13, figs.1–2; pl.14, figs.10–11. Keupp (1995, p.158) placed the generic name in quotes. Age: middle Albian–early Cenomanian.

lenticulare Keupp, 1987, p.48–49, pl.12, figs.1–12; pl.14, fig.9. Holotype: Keupp, 1987, pl.12, fig.3. Keupp (1995, p.158) placed the generic name in quotes. Age: middle Albian–early Cenomanian.

**monocarinatum* Keupp, 1981, p.51–52, pl.40, figs.4–15; pl.41, figs.1–12. Holotype: Keupp, 1981, pl.41, figs.1–3. Age: late Hauterivian.

parasolis Keupp, 1984, p.22, pl.10, figs.9–12. Holotype: Keupp, 1984, pl.10, figs.9–10. N.I.A. Age: Eocene.

turbosimile Kienel, 1994, p.50–51, pl.10, figs.7–11. Holotype: Kienel, 1994, pl.10, figs.7–8,10–11. Age: Danian.

"*vimineum*" Keupp, 1987, p.49–50, pl.13, figs.7–12; pl.14, figs.1–8. Holotype: Keupp, 1987, pl.13, figs.7–8. **NOW** *Pentadinellum*. Originally *Carinellum*, subsequently (and now) *Pentadinellum*. Age: middle Albian–early Cenomanian.

CARNARVONODINIUM Parker, 1988, p.167–168. Type: Parker, 1988, fig.3A, as *Carnarvonodinium morganii*.

granulatum Jiang Qinghua in Jiang Qinghua et al., 1992, p.81, pl.1, figs.1–3. Holotype: Jiang Qinghua et al., 1992, pl.1, fig.2. Age: Kimmeridgian–Tithonian.

**morganii* Parker, 1988, p.168,170, figs.3A–F. Holotype: Parker, 1988, fig.3A; Fensome et al., 1996, fig.1 — p.2233. Age: Tithonian.

striatigranulatum Parker, 1988, p.170, figs.3G–K. Holotype: Parker, 1988, figs.3G–H; Fensome et al., 1996, figs.1–2 — p.2381. Age: Tithonian.

CARPATELLA Grigorovich, 1969a, p.74. Emendations: Fechner and Mohr, 1986, p.183–184; Damassa, 1988, p.168,170,172. Taxonomic junior synonym: *Paraireiana*, according to Chen et al. (1988, p.21). Type: Grigorovich, 1969a, pl.1, fig.1, as *Carpatella cornuta*.

circularis (He Chengquan, 1991, p.171, pl.8, fig.13) Lentin and Williams, 1993, p.81. Holotype: He Chengquan, 1991, pl.8, fig.13. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: Paleocene.

**cornuta* Grigorovich, 1969a, p.74–75, pl.1, figs.1–6. Emendations: Fechner and Mohr, 1986, p.184,186–187; Damassa, 1988, p.170,172. Holotype: Grigorovich, 1969a, pl.1, fig.1, lost according to Damassa (1988, p.174). Neotype: Damassa, 1988, pl.1, figs.1,4,7, designated by Damassa (1988, p.174). Age: Danian.

fusifformis (He Chengquan, 1991, p.171, pl.8, figs.6–8) Lentin and Williams, 1993, p.81. Holotype: He Chengquan, 1991, pl.8, fig.6. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: middle Eocene.

humera He Chengquan, 1991, p.104–105, pl.7, figs.10–11. Holotype: He Chengquan, 1991, pl.7, fig.10. Age: Paleocene.

lamprota (He Chengquan, 1991, p.171–172, pl.8, figs.15–16) Lentin and Williams, 1993, p.82. Holotype: He Chengquan, 1991, pl.8, fig.15. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: early Eocene.

scabrota (He Chengquan, 1991, p.172, pl.8, fig.14) Lentin and Williams, 1993, p.82. Holotype: He Chengquan, 1991, pl.8, fig.14. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: Paleocene.

septata Willumsen, 2004, p.120–121,123, pl.1, figs.3–4; pl.2, figs.1–6. Holotype: Willumsen, 2004, pl.1, fig.4. Age: latest Maastrichtian–earliest Paleocene.

sinensis (He Chengquan, 1984a, p.769, pl.1, figs.8–11) Chen et al., 1988, p.21. Holotype: He Chengquan, 1984a, pl.1, fig.8. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: Paleocene–Eocene.

truncata Willumsen, 2004, p.124, pl.1, figs. 5–6. Holotype: Willumsen, 2004, pl.1, fig.6. Age: earliest Paleocene.

CARPATODINIUM Drugg, 1978, p.64. Emendation: Below, 1990, p.44. Type: Beju, 1971, pl.4, figs.4a–b; text-fig.5, as *Meiourogonyaulax? predae*.

**predae* (Beju, 1971, p.288–289, pl.4, figs.4a–b,5–7; text-fig.5) Drugg, 1978, p.64. Emendations: Drugg, 1978, p.64 and Below, 1990, p.45–46, both as *Carpathodinium predae*. Holotype: Beju, 1971, pl.4, figs.4a–b; text-fig.5; Eisenack and Kjellström, 1975b, p.792d; Fensome et al., 1995, figs.1–4 — p.1679. Originally *Meiourogonyaulax?*, subsequently *Lithodinia?*, thirdly (and now) *Carpathodinium*. Age: Callovian–early Oxfordian.

CARPISTOMIOSPHAERA Nowak, 1968, p.301. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1299). Type: I. Nagy, 1966, pl.5, fig.15, as *Cadosina borzae*.

***borzae** (I. Nagy, 1966, p.92, pl.5, figs.15–16) Nowak, 1968, p.301. Holotype: I. Nagy, 1966, pl.5, fig.15. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Carpistomiosphaera*. Age: Kimmeridgian.

moraviensis Řehánek, 1985a, p.375–376, pl.6, figs.1–6. Holotype: Řehánek, 1985a, pl.6, figs.1–2. Age: late Albian.

tithonica Nowak, 1968, p.303, pl.31, fig.7. Holotype: Nowak, 1968, pl.31, fig.7. Age: Tithonian.

CARPODINIUM Cookson and Eisenack, 1962b, p.489. Emendation: Leffingwell and Morgan, 1977, p.297. Type: Cookson and Eisenack, 1962b, pl.1, figs.6–9, as *Carpodinium granulatum*.

***granulatum** Cookson and Eisenack, 1962b, p.489, pl.1, figs.6–10. Emendation: Leffingwell and Morgan, 1977, p.297–298. Holotype: Cookson and Eisenack, 1962b, pl.1, figs.6–9; Jan du Chêne et al., 1986a, pl.16, figs.1–4. Age: Albian.

obliquicostatum Cookson and Hughes, 1964, p.48, pl.6, figs.1–6. Holotype: Cookson and Hughes, 1964, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.16, figs.10–12. Age: late Albian–early Cenomanian.

CASPIDIINIUM Marret in Marret et al., 2004, p.7–9. Type: Marret et al., 2004, pl.1, figs.1–5, as *Caspidium rugosum*.

***rugosum** Marret in Marret et al., 2004, p.9–11, pl.1, figs.1–9: text-figs.3A–E. Holotype: Marret et al., 2004, pl.1, figs.1–5. Age: late Holocene.

CASSICULOSPHAERIDIA Davey, 1969a, p.141. Taxonomic senior synonym: *Valensiella*, according to Courtinat (1989, p.182) — however, Slimani (1994, p.98) retained *Cassiculosphaeridia*. Type: Davey, 1969a, pl.4, fig.3, as *Cassiculosphaeridia reticulata*.

alta Pearce, 2010, p.64, p.64,66, pl.1, figs.7–9. Holotype: pl.1, figs.7–9. Age: early Cenomanian–mid Coniacian.

"**altomurata**" Courtinat in Courtinat and Gaillard, 1980, p.11–12, pl.2, fig.16; pl.5, fig.7. Holotype: Courtinat and Gaillard, 1980, pl.2, fig.16; pl.5, fig.7. **NOW** *Valensiella*. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: late Oxfordian.

?**cribrosa** Dodekova, 1994, p.20, pl.2, figs.1–5,12–13. Holotype: Dodekova, 1994, pl.2, figs.1–3. Questionable assignment: Dodekova (1994, p.20). Age: Tithonian.

"**delicata**" Stover and Helby, 1987a, p.103, figs.2A–H. Holotype: Stover and Helby, 1987a, figs.2A–C; Stevens, 1987, figs.9K–M; Fensome et al., 1996, figs.1–3 — p.2107. **NOW** *Valensiella*. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: Berriasian.

"**dictydia**" (Sarjeant, 1972, p.41, pl.3, fig.3; pl.6, fig.6) Riley and Fenton, 1982, p.199. Holotype: Sarjeant, 1972, pl.6, fig.6. **NOW** *Valensiella*. Originally *Chytroesphaeridia*, subsequently *Batiacasphaera*, thirdly *Escharisphaeridia*, fourthly *Cassiculosphaeridia*, fifthly (and now) *Valensiella*. This combination was not validly published in Riley and Fenton (1980, p.340), since these authors did not reference the basionym. Age: Bathonian–Callovian.

?*intermedia* Slimani, 1994, p.99–100, pl.18, figs.13–15. Holotype: Slimani, 1994, pl.18, figs.14–15. Questionable assignment: Slimani (1994, p.99). Taxonomic junior synonym: *Chytroisphaeridia everricula* (name not validly published), according to Slimani (1994, p.99). Age: late Campanian–Danian.

magna Davey, 1974, p.46, pl.1, figs.3–7. Emendation: Harding, 1990b, p.49, as *Cassiculosphaeridia magna*. Holotype: Davey, 1974, pl.1, fig.6. Originally (and now) *Cassiculosphaeridia*, subsequently *Valensiella*. Slimani (1994, p.100) retained this species in *Cassiculosphaeridia*. Age: early–late Barremian.

"*ovalis*" Harker and Sarjeant in Harker et al., 1990, p.87–88, pl.2, figs.7–8, 11–12; text-fig.19 ex Harker and Sarjeant, 1991, p.708. Holotype: Harker et al., 1990, pl.2, fig.7; text-fig.19. **NOW** *Valensiella*. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. This name was not validly published by Harker and Sarjeant in Harker et al. (1990), since these authors did not specify place of lodgement of the holotype (I.C.N. Article 40.7). Age: late Campanian.

"*parvula*" Batten and Lister, 1988, p.341,343, figs.1h,2c–d. Holotype: Batten and Lister, 1988, figs.2c–d. **NOW** *Valensiella*. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: Barremian.

"*pontiformis*" He Chengquan, 1991, p.57–58, pl.8, figs.1–5; pl.54, fig.5. Holotype: He Chengquan, 1991, pl.8, fig.4. **NOW** *Valensiella*. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: middle-late Eocene.

pygmaeus Stevens, 1987, p.186,188, figs.4L–Q. Holotype: Stevens, 1987, figs.4L–N; Fensome et al., 1996, figs.1–3 — p.2309. Originally (and now) *Cassiculosphaeridia*, subsequently *Valensiella*. Slimani (1994, p.100) retained this species in *Cassiculosphaeridia*. N.I.A. Age: early Berriasian.

**reticulata* Davey, 1969a, p.142, pl.3, fig.7; pl.4, fig.3. Holotype: Davey, 1969a, pl.4, fig.3. Originally (and now) *Cassiculosphaeridia*, subsequently *Valensiella*. Slimani (1994, p.98) retained this species in *Cassiculosphaeridia*. Age: Cenomanian.

"*sarstedtensis*" Below, 1982d, p.344–345, figs.1–2. Holotype: Below, 1982d, fig.1. **NOW** *Valensiella*. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: late Aptian.

solida Riding and Helby, 2001g, p.199–200, figs.10A–P. Holotype: Riding and Helby, 2001g, figs.10E–G. Age: Oxfordian–Tithonian.

"*tazadensis*" Below, 1981a, p.33–34, pl.10, figs.8–10; pl.12, fig.16. Holotype: Below, 1981a, pl.10, fig.10; Fensome et al., 1991, fig.3 — p.755. **NOW** *Valensiella*. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: Hauterivian–early Barremian.

?*tocheri* Schiøler, 1993, p.104, pl.4, figs.4–12. Holotype: Schiøler, 1993, pl.4, figs.4–5. Questionable assignment: Schiøler (1993, p.104). Age: late Maastrichtian.

unicata Harding, 1990b, p.49–50, pl.27, figs.9–14 ex Harding in Williams et al. 1998, p.97. Holotype: Harding, 1990b, pl.27, figs.9,11. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Hauterivian.

CASSIDIUM Drugg, 1967, p.22. Type: Harris, 1965, pl.27, fig.5, as *Ovoidites fragilis*.

filosum Wilson, 1988, p.14–15, pl.2, figs.8a–b,9; pl.3, figs.2a–b. Holotype: Wilson, 1988, pl.2, figs.8a–b; Fensome et al., 1996, figs.1–2 — p.2125. Age: Paleocene.

**fragile* (Harris, 1965, p.97, pl.27, figs.4–5) Drugg, 1967, p.22. Holotype: Harris, 1965, pl.27, fig.5. Originally *Ovoidites* (Appendix A), subsequently (and now) *Cassidium*. Age: early Eocene.

"*hexalobosum*" Cookson and Eisenack, 1974, p.76, pl.26, figs.6–7. Holotype: Cookson and Eisenack, 1974, pl.26, fig.7. **NOW** *Cyclonephelium*?. Originally *Cassidium*, subsequently *Cyclonephelium*, thirdly (and now) *Cyclonephelium*?. Age: Middle Cretaceous–Senonian.

CASTELLODINIUM Williams et al., 2015, p.301–302. Type: Michoux, 1988, pl.1, figs.1–3; text-figs.13A–B, as *Wilsonidium compactum*.

**compactum* (Michoux, 1988, p.38–39, pl.9, figs.1–9; pl.10, figs.1–9 (not fig.10); text-figs.13A–B,14) Williams et al., 2015, p.301. Holotype: Michoux, 1988, pl.9, figs.1–3; text-figs.13A–B. Originally *Wilsonidium*, subsequently (and now) *Castellodinium*. Age: middle Eocene.

?*intermedium* (Cookson and Eisenack, 1961b, p.40, pl.1, figs.5–6) Williams et al., 2015, p.302. Holotype: Cookson and Eisenack, 1961b, pl.1, fig.5. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly (and now) *Castellodinium*. Questionable assignment: Williams et al. (2015, p.302). Age: Eocene.

?*tuberosuturatum* (He Chengquan, 1991, p.103, pl.37, figs.7–8) Williams et al., 2015, p.302. Holotype: He Chengquan, 1991, pl.37, fig.8. Originally *Wilsonidium*, subsequently (and now) *Castellodinium*? Questionable assignment: Williams et al. (2015, p.302). Age: middle Eocene.

CATASTOMOCYSTIS Singh, 1983, p.151. Type: Singh, 1983, pl.55, figs.1–2, as *Catastomocystis spinosa*.

microreticulata Singh, 1983, p.153, pl.56, figs.4–6. Holotype: Singh, 1983, pl.56, fig.4. Age: early Cenomanian.

**spinosa* Singh, 1983, p.152, pl.55, figs.1–8; pl.56, figs.1–3; text-fig.18. Holotype: Singh, 1983, pl.55, figs.1–2; Fensome et al., 1995, fig.1 — p.1795. Age: early Cenomanian.

CAUCA Davey and Verdier, 1971, p.14. Taxonomic senior synonym: *Hystrichodinium*, according to Below (1981b, p.120–121) — however, Lentin and Williams (1985, p.48) retained *Cauca*. Type: Alberti, 1961, pl.9, fig.4, as *Hystrichodinium parvum*.

bayuiana Mantle, 2009b, p.102,103, pl.9, figs.1–9; text-fig.2. Holotype: Mantle, 2009b, pl.9, fig.3. Age: Callovian.

**parva* (Alberti, 1961, p.16, pl.9, figs.1–4) Davey and Verdier, 1971, p.14–15. Holotype: Alberti, 1961, pl.9, fig.4. Originally *Hystrichodinium*, subsequently (and now) *Cauca*. Age: early Aptian–Albian.

?*velata* (Wetzel, 1952, p.403–404, pl.A, fig.7; text-fig.24) Sarjeant, 1984c, p.133. Emendation: Sarjeant, 1984c, p.133, as *Cauca? velata*. Holotype: Wetzel, 1952, pl.A, fig.7; text-fig.24; Sarjeant, 1984c, pl.3, figs.4–6; text-fig.6. Originally *Hystrichosphaeridium oligacanthum* subsp. *velatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *velatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *velatum*, fourthly (and now) *Cauca? velata*. Questionable assignment: Sarjeant (1984c, p.133–134). Age: Paleocene.

CAUVERIDINIUM Khowaja-Ateequzzaman and Jain, 1990, p.172,174. Type: Khowaja-Ateequzzaman and Jain, 1990, pl.1, figs.1–5; text-figs.1A–C, as *Cauveridinium indicum*.

**indicum* Khowaja-Ateequzzaman and Jain, 1990, p.174,176, pl.1, figs.1–6; pl.2, fig.6; pl.3, figs.5–6; text-figs.1A–D. Holotype: Khowaja-Ateequzzaman and Jain, 1990, pl.1, figs.1–5; text-figs.1A–C; Fauconnier and Masure, 2004, pl.12, figs.1–2,4. Age: Turonian–Santonian.

intermedium Khowaja-Ateequzzaman and Jain, 1990, p.178, pl.2, figs.1–5; text-figs.2A–B. Holotype: Khowaja-Ateequzzaman and Jain, 1990, pl.2, figs.1–5; text-figs.2A–B; Fauconnier and Masure, 2004, pl.12, figs.5,7–9. Age: Turonian–Santonian.

longispinosum Khowaja-Ateequzzaman and Jain, 1990, p.178–179, pl.3, figs.1–4; text-fig.3. Holotype: Khowaja-Ateequzzaman and Jain, 1990, pl.3, figs.1–4; text-fig.3; Fauconnier and Masure, 2004, pl.12, figs.10–11. Age: Turonian–Santonian.

membraniphorum (Cookson and Eisenack, 1962b, p.495, pl.6, figs.8–14) Masure in Fauconnier and Masure, 2004, p.97. Holotype: Cookson and Eisenack, 1962b, pl.6, fig.9. Originally *Cyclonephelium*, subsequently *Maghrebinia*, thirdly (and now) *Cauveridinium*. Age: Albian–Cenomanian.

CAVATODISSILIODINIUM Feist-Burkhardt and Monteil, 2001, p.50,52. Type: Feist-Burkhardt and Monteil, 2001, fig.2, nos.6–7; fig.18, nos.7–8; fig.19, no.2, as *Cavatodissiliodinium hansgochti*.

***hansgochti** Feist-Burkhardt and Monteil, 2001, p.52,54,56, fig.2, nos.1–7; fig.18, nos.1–8, fig.19, no.2. Holotype: Feist-Burkhardt and Monteil, 2001, fig.2, nos.6–7; fig.18, nos.7–8; fig.19, no.2. Age: early Bajocian.

CENTOSPHAERA Wind and Wise in Wise and Wind, 1977, p.299. Calcareous dinoflagellate genus (see Fütterer, 1990, p.541, Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299). Type: Wise and Wind, 1977, pl.25, figs.1–3, as *Centosphaera barbata*.

***barbata** Wind and Wise in Wise and Wind, 1977, p.299, pl.25, figs.1–6; pl.26, figs.1–3; pl.27, figs.1–7. Holotype: Wise and Wind, 1977, pl.25, figs.1–3. Age: Maastrichtian.

CEPADINIUM Duxbury, 1983, p.58. Type: Duxbury, 1983, pl.9, fig.8; text-figs.27A–E, as *Cepadinium variable*.

****variable**" Duxbury, 1983, p.58,61, pl.9, figs.1,4,8; text-figs.27A–E,28A–F. Holotype: Duxbury, 1983, pl.9, fig.8; text-figs.27A–E; Fensome et al., 1995, figs.3,6 — p.1877. **Taxonomic senior synonym:** *Deflandrea* (now *Cepadinium*) *ventriosum* Alberti, 1959b, according to Lister and Batten (1988b, p.43). The nomenclatural type of the genus *Cepadinium* remains the holotype of *Cepadinium variable*. Age: early Aptian.

+**ventriosum** (Alberti, 1959b, p.101, pl.9, figs.14–15) Lentin and Williams, 1989, p.51. Holotype: Alberti, 1959b, pl.9, fig.14; Eisenack and Klement, 1964, p.239; Fensome et al., 1995, fig.1 — p.1895. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Cepadinium*. Taxonomic junior synonym: *Cepadinium variable*, according to Lister and Batten (1988b, p.43). The nomenclatural type of the genus *Cepadinium* remains the holotype of *Cepadinium variable*. Age: early Aptian.

"**CERATIOPSIS**" Vozzhennikova, 1963, p.181. Emendation: Bujak et al., 1980, p.27. **Name illegitimate** — **senior homonym:** *Ceratiopsis* de Wildeman, 1896. **Taxonomic senior synonym:** *Cerodinium*, by implication in Lentin and Williams (1977b, p.20), who considered *Ceratiopsis* to be the senior name. Taxonomic senior synonym: *Deflandrea*, according to Lentin and Williams (1976, p.153) — however, Lentin and Williams (1985, p.48) retained *Ceratiopsis*. Lindgren (1985, p.670) maintained that the name *Ceratiopsis* was not validly published in Vozzhennikova 1963, stating that the species *Ceratiopsis leptoderma* was described, but not the genus *Ceratiopsis* and that the latter was not monotypic, containing three species. However, since only one species, *Ceratiopsis leptoderma*, was assigned to *Ceratiopsis* by Vozzhennikova (1963), the single description provided can be applied to both genus and species and the name *Ceratiopsis* can be deemed to have been validly published in Vozzhennikova (1963) (I.C.N. Article 38.5). Type: Vozzhennikova, 1963, text-fig.8, as *Ceratiopsis leptoderma*.

"**albertii**" (Corradini, 1973, p.174–175, pl.27, figs.7a–b,8; pl.28, fig.2) Lentin and Williams, 1977b, p.20. Holotype: Corradini, 1973, pl.27, figs.7a–b. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Taxonomic junior synonym (at specific rank): *Peridinium pedunculatum* forma *divaricans* (subsequently *Phelodinium tricuspe* subsp. *divaricans*), according to Sarjeant (1985b, p.158) and Lentin and Williams (1993, p.504,511). Age: Late Cretaceous–Paleocene.

"*baltica*" (Vozzhennikova, 1967, p.154, pl.117, figs.2a–b) Lentin and Williams, 1977b, p.20. Holotype: Vozzhennikova, 1967, pl.117, figs.2a–b; Lentin and Vozzhennikova, 1990, pl.3, figs.4–6; text-fig.14. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally (and now) *Cerodinium*, subsequently *Deflandrea*, thirdly *Ceratiopsis* (combination illegitimate). Age: Eocene.

"*boloniensis*" (Riegel, 1974, p.354–355, pl.1, figs.6–10; text-fig.3) Lentin and Williams, 1977b, p.20. Emendation: Riegel and Sarjeant, 1982, p.296–297, as *Phelodinium boloniense*. Holotype: Riegel, 1974, pl.1, fig.7; Sarjeant et al., 1987, pl.2, fig.2. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly *Senegalinium*, fourthly *Phelodinium*, fifthly (and now) *Cerodinium*. Age: ?Senonian.

"*cordifera*" (May, 1980, p.74–75, pl.8, fig.4) Lentin and Williams, 1981, p.37. Holotype: May, 1980, pl.8, fig.4. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Maastrichtian.

"*crassistriata*" (Jain et al., 1975, p.8–9, pl.6, figs.64–65) Lentin and Williams, 1977b, p.20. Holotype: Jain et al., 1975, pl.6, fig.65. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Danian.

"*dartmooria*" (Cookson and Eisenack, 1965b, p.133–134, pl.16, figs.1–2; text-fig.1) Lentin and Williams, 1981, p.38. Holotype: Cookson and Eisenack, 1965b, pl.16, figs.1–2; text-fig.1; Stover, 1974, pl.3, figs.4a–b; pl.4, figs.1a–d. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Paleocene.

"*depressa*" (Morgenroth, 1966a, p.8, pl.1, fig.2) Lentin and Williams, 1977b, p.20. Holotype: Morgenroth, 1966a, pl.1, fig.2. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Eocene.

"*diebelii*" (Alberti, 1959b, p.99–100, pl.9, figs.18–21) Vozzhennikova, 1967, p.159. Holotype: Alberti, 1959b, pl.9, fig.18. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: late Senonian–Paleocene.

"*elongata*" (Jiabo, 1978, p.54–55, pl.1, figs.5–7) Lentin and Williams, 1981, p.38. Holotype: Jiabo, 1978, pl.1, fig.6. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cangxianella*. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Age: Early Tertiary.

"*fissurata*" (Jiabo, 1978, p.55, pl.1, figs.4,8–10) Lentin and Williams, 1981, p.38. Holotype: Jiabo, 1978, pl.1, fig.9. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cangxianella*. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Age: Early Tertiary.

"*fusiformis*" He Chengquan, 1991, p.75, pl.34, figs.15–16. Holotype: He Chengquan, 1991, pl.34, fig.16. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Following I.C.N. Article 55.1, the species name *Ceratiopsis fusiformis* is validly published even though the generic name *Ceratiopsis* is illegitimate. Age: Paleocene.

"*granulostrata*" (Jain and Millepied, 1973, p.24–25, pl.1, figs.7–11; pl.2, fig.18; pl.3, fig.29) Lentin and Williams, 1977b, p.21. Holotype: Jain and Millepied, 1973, pl.1, fig.7. **Combination illegitimate:** the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Senegalinium*, subsequently *Deflandrea*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: Maastrichtian.

"**leptoderma*" Vozzhennikova, 1963, p.181; text-fig.8. Holotype: Vozzhennikova, 1963, text-fig.8; Lentin and Vozzhennikova, 1990, pl.4, figs.4–5; text-fig.15. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name

illegitimate), subsequently *Deflandrea*, thirdly (and now) *Cerodinium*. Following I.C.N. Article 55.1, the species name *Ceratiopsis leptoderma* is validly published even though the generic name *Ceratiopsis* is illegitimate. Age: Paleocene.

"*markovae*" Vozzhennikova, 1967, p.159, pl.119, figs.5,7; pl.120, figs.1–4. Holotype: Vozzhennikova, 1967, pl.120, fig.2; Lentin and Vozzhennikova, 1990, pl.3, figs.7–8; text-fig.16. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Deflandrea*, thirdly (and now) *Cerodinium*. Following I.C.N. Article 55.1, the species name *Ceratiopsis markovae* is validly published even though the generic name *Ceratiopsis* is illegitimate. Age: Paleocene.

"*medcalfii*" (Stover, 1974, p.175–176, pl.3, figs.3a–c; text-figs.3G,6C) Heilmann-Clausen, 1985, p.19. Holotype: Stover, 1974, pl.3, figs.3a–c. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium medcalfii*. Originally *Deflandrea medcalfii*, subsequently *Deflandrea dartmooria* subsp. *medcalfii*, thirdly *Ceratiopsis medcalfii* (combination illegitimate), fourthly (and now) *Cerodinium medcalfii*. Age: middle Paleocene.

"*navarriana*" Srivastava, 1995, p.274, pl.7, figs.1–3. Holotype: Srivastava, 1995, pl.7, fig.2. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Following I.C.N. Article 55.1, the species name *Ceratiopsis navarriana* is validly published even though the generic name *Ceratiopsis* is illegitimate. Age: Maastrichtian.

"*obliquipes*" (Deflandre and Cookson, 1955, p.252, pl.4, fig.6) Lentin and Williams, 1980, p.41. Holotype: Deflandre and Cookson, 1955, pl.4, fig.6. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Deflandrea?*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: middle Paleocene–early Eocene.

"*pannucea*" (Stanley, 1965, p.220, pl.22, figs.1–4,8–10) Lentin and Williams, 1977b, p.21. Holotype: Stanley, 1965, pl.22, figs.3–4. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Deflandrea?*, fourthly *Ceratiopsis* (combination illegitimate), fifthly (and now) *Cerodinium*. Age: Paleocene.

"*pedibaculifera*" He Chengquan, 1991, p.75–76, pl.34, fig.14. Holotype: He Chengquan, 1991, pl.34, fig.14. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Following I.C.N. Article 55.1, the species name *Ceratiopsis pedibaculifera* is validly published even though the generic name *Ceratiopsis* is illegitimate. Age: Paleocene.

"*prutensis*" Grigorovich, 1971, p.92,94, pl.2, fig.2. Holotype: Grigorovich, 1971, pl.2, fig.2. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Deflandrea?*, thirdly (and now) *Cerodinium*. Following I.C.N. Article 55.1, the species name *Ceratiopsis prutensis* is validly published even though the generic name *Ceratiopsis* is illegitimate. Age: Paleocene.

"*sibirica*" (Vozzhennikova, 1963, p.181; text-figs.9–10) Lentin and Williams, 1977b, p.21. Emendation: Lentin and Vozzhennikova, 1990, p.39–40, as *Cerodinium sibiricum*. Holotype: Vozzhennikova, 1963, text-fig.9; Lentin and Vozzhennikova, 1990, pl.4, figs.1–2. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally (and now) *Cerodinium*, subsequently *Ceratiopsis* (combination illegitimate), thirdly *Deflandrea*. Age: Paleocene–Eocene.

"*speciosa*" (Alberti, 1959b, p.97, pl.9, figs.12–13) Lentin and Williams, 1977b, p.21. Holotype: Alberti, 1959b, pl.9, fig.13. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: late Paleocene.

"*striata*" (Drugg, 1967, p.18, pl.2, figs.13–14) Lentin and Williams, 1977b, p.21. Holotype: Drugg, 1967, pl.2, fig.13. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Paleocene.

"*subquadra*" (Corradini, 1973, p.175–176, pl.28, fig.1) Lentin and Williams, 1977b, p.22. Holotype: Corradini, 1973, pl.28, fig.1. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*?, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: Senonian.

"*taenialis*" He Chengquan, 1991, p.76, pl.32, figs.1–5. Holotype: He Chengquan, 1991, pl.32, fig.1. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Following I.C.N. Article 55.1, the species name *Ceratiopsis taenialis* is validly published even though the generic name *Ceratiopsis* is illegitimate. Age: Paleocene.

"*wardenensis*" (Williams and Downie, 1966c, p.233, pl.26, fig.5) Bujak et al., 1980, p.27. Holotype: Williams and Downie, 1966c, pl.26, fig.5; Bujak et al., 1980, pl.11, fig.3. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Eocene.

"*warrenii*" (Schumacker-Lambry, 1978, p.40–41, pl.4, figs.5–6) Lentin and Williams, 1981, p.40. Holotype: Schumacker-Lambry, 1978, pl.4, fig.6. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Paleocene (Landenian).

"subsp. *brevicornis*" Vozzhennikova, 1967, p.160. **Name not validly published**: no illustrations.

"subsp. *diebelii*". Autonym. Holotype: Alberti, 1959b, pl.9, fig.18. **NOW** *Cerodinium diebelii* subsp. *diebelii*. Originally *Deflandrea diebelii* subsp. *diebelii*, subsequently *Ceratiopsis diebelii* subsp. *diebelii* (combination illegitimate), thirdly (and now) *Cerodinium diebelii* subsp. *diebelii*.

"subsp. *rigida*" (May, 1980, p.75–76, pl.8, figs.9–10,15) Lentin and Williams, 1981, p.38. Holotype: May, 1980, pl.8, figs.9,15. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium diebelii* subsp. *rigidum*. Originally *Deflandrea diebelii* subsp. *rigida*, subsequently *Ceratiopsis diebelii* subsp. *rigida* (combination illegitimate), thirdly (and now) *Cerodinium diebelii* subsp. *rigidum*. Age: Maastrichtian.

"subsp. *elongata*" Mao Shaozhi and Norris, 1988, p.42, pl.9, figs.10–12. Holotype: Mao Shaozhi and Norris, 1988, pl.9, fig.10. **NOW** *Cerodinium speciosum* subsp. *elongatum*. Originally *Ceratiopsis* (generic name illegitimate) *speciosa* subsp. *elongata*, subsequently (and now) *Cerodinium speciosum* subsp. *elongatum*. Age: late Paleocene.

"subsp. *glabra*" (Gocht, 1969, p.10, text-fig.3) Lentin and Williams, 1977b, p.21. Holotype: Gocht, 1969, text-fig.3. **Combination illegitimate**: the generic name *Ceratiopsis* is illegitimate. **NOW** *Cerodinium glabrum*. Originally *Deflandrea speciosa* forma *glabra*, subsequently *Deflandrea speciosa* subsp. *glabra*, thirdly *Ceratiopsis speciosa* subsp. *glabra* (combination illegitimate), fourthly *Cerodinium speciosum* subsp. *glabrum*, fifthly (and now) *Cerodinium glabrum*. Age: late Paleocene.

"subsp. *speciosa*". Autonym. Holotype: Alberti, 1959b, pl.9, fig.13. **NOW** *Cerodinium speciosum* subsp. *speciosum*. Originally *Deflandrea speciosa* subsp. *speciosa*, subsequently *Ceratiopsis speciosa* subsp. *speciosa* (combination illegitimate), thirdly (and now) *Cerodinium speciosum* subsp. *speciosum*.

CERBIA Below, 1981a, p.8. Taxonomic senior synonym: *Tenua* Eisenack, according to Sarjeant (1985a, p.93–94; 1992b, p.678) — however, Duxbury (2002, p.76,78) retained *Cerbia*. Type: Davey and Verdier, 1974, pl.92, figs.1,4, as *Cyclonephelium tabulatum*.

"*aucda*" Below, 1981a, p.8–9, pl.4, figs.3,5a–b; pl.12, fig.20; text-figs.6a–c,g. Holotype: Below, 1981a, pl.4, fig.3; Fensome et al., 1991, fig.1 — p.577. **NOW** *Tenua* Eisenack. Originally *Cerbia*, subsequently (and now) *Tenua* Eisenack. N.I.A. Age: Barremian.

"*formosa*" Mao Shaozhi and Norris, 1988, p.31–32, pl.1, figs.9–10; text-fig.8, nos.1–2. Holotype: Mao Shaozhi and Norris, 1988, pl.1, fig.9; text-fig.8, no.2. **NOW** *Tenua* Eisenack. Originally *Cerbia*, subsequently (and now) *Tenua* Eisenack. Age: late Eocene–early Oligocene.

magna Duxbury, 2001, p.101–102, fig.4, nos.1–4. Holotype: Duxbury, 2001, fig.4, no.3. Age: late Barremian.

monile Duxbury, 2002, p.78, pl.1, figs.7–8,10–12. Holotype: Duxbury, 2002, pl.1, figs.7–8. Since Duxbury expressly derived the specific epithet from the Latin noun "*monile*" (necklace), it should be cited as *monile*, not *monilis*. NIA. Age: late Aptian–early Albian.

"*suturispinosa*" He Chengquan, 1991, p.173, pl.10, figs.1–3. Holotype: He Chengquan, 1991, pl.10, fig.1. **NOW** *Tenua* Eisenack. Originally *Cerbia*, subsequently (and now) *Tenua* Eisenack. Age: middle Eocene.

**tabulata* (Davey and Verdier, 1974, p.630,632, pl.92, figs.1–4; pl.93, fig.6) Below, 1981a, p.9. Holotype: Davey and Verdier, 1974, pl.92, figs.1,4; Eisenack and Kjellström, 1981b, p.328b; Sarjeant, 1992b, figs.3–4; Fensome et al., 1995, figs.1–2 — p.1833. Originally *Cyclonephelium*, subsequently *Canninginopsis*, thirdly (and now) *Cerbia*. Taxonomic senior synonym: *Tenua hystrix*, according to Sarjeant (1985a, p.94; 1992b, p.681) — however, by retaining *Cerbia*, Duxbury (2002, p.76,78) retained *Cerbia tabulata* by implication. Age: Aptian.

CEREBROCYSTA Bujak in Bujak et al., 1980, p.42. Type: Bujak et al., 1980, pl.13, figs.4–5, as *Cerebrocysta bartonensis*.

**bartonensis* Bujak in Bujak et al., 1980, p.42, pl.13, figs.4–11. Holotype: Bujak et al., 1980, pl.13, figs.4–5; Fensome et al., 1993a, figs.1–2 — p.967. Age: middle Eocene (see Aubry, 1986).

"*cassinascoenis*" Zevenboom and Santarelli in Zevenboom, 1995, p.155–156, pl.7, figs.13–18. Holotype: Zevenboom, 1995, pl.7, figs.13–15. **Name not validly published**: considered a manuscript name by the authors. Age: Langhian–earliest Serravallian.

irregularis Schreck et al., 2012, p.90–91, pl.3, figs.11–20. Holotype: Schreck et al., 2012, pl.3, figs.11–14. Age: latest Langhian–early Tortonian.

lagae Louwye, 1999, p.117,119, pl.3, figs.8–11. Holotype: Louwye, 1999, pl.3, figs.8–11. Age: late Miocene.

magna Bujak, 1994, p.121, pl.2, figs.10–11. Holotype: Bujak, 1994, pl.2, fig.10. Age: Ypresian–Lutetian.

mediterranea Biffi and Manum, 1988, p.202,204, pl.11, figs.8–14. Holotype: Biffi and Manum, 1988, pl.11, fig.11. Age: early Miocene.

?*namocensis* Head et al., 1989b, p.453–454,456, pl.3, figs.10–11,18–22. Holotype: Head et al., 1989b, pl.3, figs.10–11. Questionable assignment: Head et al. (1989b, p.453). Age: late Miocene.

"*perforocresta*" Zevenboom and Santarelli in Zevenboom, 1995, p.156–157, pl.8, figs.1–3. Holotype: Zevenboom, 1995, pl.8, figs.1–3. **Name not validly published**: considered a manuscript name by the authors. Age: Serravallian–early Tortonian.

poulsenii de Verteuil and Norris, 1996a, p.148–149, pl.12, figs.9–21; pl.13, figs.1–12. Holotype: de Verteuil and Norris, 1996a, pl.12, figs.9–14. Age: early–late Miocene.

"*powellii*" Zevenboom and Santarelli in Zevenboom, 1995, p.157, pl.7, figs.19–20. Holotype: Zevenboom, 1995, pl.7, figs.19–20. **Name not validly published**: considered a manuscript name by the authors. Age: early Langhian–earliest Serravallian.

satchelliae de Verteuil and Norris, 1996a, p.149–150, pl.13, figs.13–15; pl.14, figs.1–6. Holotype: de Verteuil and Norris, 1996a, pl.14, figs.1–4. Age: early Miocene.

waipawaensis (Wilson, 1988, p.28, pl.17, figs.4,5a–b) Fensome et al., 2009, p.18. Holotype: Wilson, 1988, pl.17, fig.5a–b; Fensome et al., 1996, figs.2–3 — p.2441. Originally *Pyxidinospis*, subsequently (and now) *Cerebrocysta*. Age: middle to late Eocene.

CERIOCYSTA Xu Jinli et al., 1997, p.49,145. Type: Xu Jinli et al., 1997, pl.1, figs.1a–c, as *Ceriocysta crassa*.

cervicalis Xu Jinli et al., 1997, p.51, pl.3, figs.1a–b,2 ex He Chengquan et al., 2009, p.339, 652. Holotype: Xu Jinli et al., 1997, pl.3, figs.1a–b. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.652) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

**crassa* Xu Jinli et al., 1997, p.50–51,145–146, pl.1, figs.1a–c,2a–c,3a–b,4; pl.2, figs.1,2a–b; pl.3, fig.3; pl.4, figs.1a–b,2a–b,3a–b; pl.46, figs.1–2,4; pl.47, fig.1; text-fig.1. Holotype: Xu Jinli et al., 1997, pl.1, figs.1a–c. Age: middle-late Eocene.

"*intermedia*" Xu Jinli et al., 1997, p.51, pl.1, figs.5a–b,6; pl.2, fig.3; pl.46, figs.5a–b; pl.47, figs.2a–b,3a–c. **Name not validly published:** holotype not designated. The holotype was not designated in Xu Jinli et al. (1997), nor did these authors provide a Latin or English description. He Chengquan et al. (2009, p.651) provided an English description, but effectively did not designate a holotype: they referred to the measurements of the holotype but do not clearly indicate the figure in which it is illustrated, and thus according to I.C.N. Article 43.3, this name remains not validly published. Age: middle-late Eocene.

CERNICYSTA Stover and Helby, 1987d, p.263,265. Type: Morgan, 1980, pl.18, figs.4–6, as *Lithodinia helbyi*.

**helbyi* (Morgan, 1980, p.26, pl.18, figs.4–7) Stover and Helby, 1987d, p.265,267. Holotype: Morgan, 1980, pl.18, figs.4–6; Fensome et al., 1996, figs.1–3 — p.2149. Originally *Lithodinia*, subsequently (and now) *Cernicysta*. Age: middle Aptian–early Albian.

CERODINIUM Vozzhennikova, 1963, p.181. Emendation: Lentin and Williams, 1987, p.114. Taxonomic senior synonym: *Deflandrea*, according to Lentin and Williams (1976, p.154) — however, Lentin and Williams (1987, p.114) retained *Cerodinium*. Taxonomic junior synonym: *Ceratiopsis*, by implication in Lentin and Williams (1977b, p.20), who considered *Ceratiopsis* to be the senior name. Type: Vozzhennikova, 1963, text-fig.9, as *Cerodinium sibiricum*.

albertii (Corradini, 1973, p.174–175, pl.27, figs.7a–b,8; pl.28, fig.2) Lentin and Williams, 1987, p.114. Holotype: Corradini, 1973, pl.27, figs.7a–b. Originally *Deflandrea*, subsequently *Senegalinium?*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Taxonomic junior synonym (at specific rank): *Peridinium pedunculatum* forma *divaricans* (subsequently *Phelodinium tricuspe* subsp. *divaricans*), according to Sarjeant (1985b, p.158) and Lentin and Williams (1993, p.504,511). Age: Late Cretaceous–Paleocene.

angulatum Crouch et al., 2014, p.65, pl.2, figs.1–9. Holotype: Crouch et al., 2014, pl.2, figs.1–2. Age: late Paleocene–early Eocene.

balticum Vozzhennikova, 1967, p.154, pl.117, figs.2a–b. Holotype: Vozzhennikova, 1967, pl.117, figs.2a–b; Lentin and Vozzhennikova, 1990, pl.3, figs.4–6; text-fig.14. Originally (and now) *Cerodinium*, subsequently *Deflandrea*, thirdly *Ceratiopsis* (combination illegitimate). Lentin and Vozzhennikova (1990, p.34–35) provided an "expanded description" for this species. Age: Eocene.

boloniense (Riegel, 1974, p.354–355, pl.1, figs.6–10; text-fig.3) Lentin and Williams, 1989, p.54. Emendation: Riegel and Sarjeant, 1982, p.296–297, as *Phelodinium boloniense*. Holotype: Riegel, 1974, pl.1, fig.7; Sarjeant et

al., 1987, pl.2, fig.2. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Ceratiopsis* (combination illegitimate), fourthly *Phelodinium*, fifthly (and now) *Cerodinium*. Age: ?Senonian.

conspicuum Marheinecke, 1992, p.70–71, pl.17, figs.1–4,12; text-fig.15. Holotype: Marheinecke, 1986, pl.19, figs.3–6, as "*Deflandrea* i.w.S.sp."; Marheinecke, 1992, pl.17, figs.1–3. Contrary to the opinion of Lentin and Williams (1993, p.90), Williams et al. (1998, p.102) considered this name to be validly published. Age: late Maastrichtian.

cordiferum (May, 1980, p.74–75, pl.8, fig.4) Lentin and Williams, 1987, p.114. Holotype: May, 1980, pl.8, fig.4. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Maastrichtian.

crassistriatum (Jain et al., 1975, p.8–9, pl.6, figs.64–65) Lentin and Williams, 1987, p.114. Holotype: Jain et al., 1975, pl.6, fig.65. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Danian.

dartmoorium (Cookson and Eisenack, 1965b, p.133–134, pl.16, figs.1–2; text-fig.1) Lentin and Williams, 1987, p.114. Holotype: Cookson and Eisenack, 1965b, pl.16, figs.1–2; text-fig.1; Stover, 1974, pl.3, figs.4a–b; pl.4, figs.1a–d. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Paleocene.

depressum (Morgenroth, 1966a, p.8, pl.1, fig.2) Lentin and Williams, 1987, p.114. Holotype: Morgenroth, 1966a, pl.1, fig.2. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Eocene.

diebelii (Alberti, 1959b, p.99–100, pl.9, figs.18–21) Lentin and Williams, 1987, p.114. Holotype: Alberti, 1959b, pl.9, fig.18. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: late Senonian–Paleocene.

subsp. **diebelii**. Autonym. Holotype: Alberti, 1959b, pl.9, fig.18. Originally *Deflandrea diebelii* subsp. *diebelii*, subsequently *Ceratiopsis diebelii* subsp. *diebelii* (combination illegitimate), thirdly (and now) *Cerodinium diebelii* subsp. *diebelii*.

subsp. **rigidum** (May, 1980, p.75–76, pl.8, figs.9–10,15) Lentin and Williams, 1987, p.114. Holotype: May, 1980, pl.8, figs.9,15. Originally *Deflandrea diebelii* subsp. *rigida*, subsequently *Ceratiopsis diebelii* subsp. *rigida* (combination illegitimate), thirdly (and now) *Cerodinium diebelii* subsp. *rigidum*. Age: Maastrichtian.

"elongatum" (Jiabo, 1978, p.54–55, pl.1, figs.5–7) Lentin and Williams, 1987, p.114. Holotype: Jiabo, 1978, pl.1, fig.6. **NOW** *Cangxianella*. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Age: Early Tertiary.

"fissuratum" (Jiabo, 1978, p.55, pl.1, figs.4,8–10) Lentin and Williams, 1987, p.114. Holotype: Jiabo, 1978, pl.1, fig.9. **NOW** *Cangxianella*. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Age: Early Tertiary.

fusiforme (He Chengquan, 1991, p.75, pl.34, figs.15–16) Lentin and Williams, 1993, p.91. Holotype: He Chengquan, 1991, pl.34, fig.16. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Age: Paleocene.

glabrum (Gocht, 1969, p.10, text-fig.3) Fensome et al., 2009, p.19. Holotype: Gocht, 1969, text-fig.3. Originally *Deflandrea speciosa* forma *glabra*, subsequently *Deflandrea speciosa* subsp. *glabra*, thirdly *Ceratiopsis speciosa* subsp. *glabra* (combination illegitimate), fourthly *Cerodinium speciosum* subsp. *glabrum*, fifthly (and now) *Cerodinium glabrum*. Age: late Paleocene.

granulostriatum (Jain and Millepied, 1973, p.24–25, pl.1, figs.7–11; pl.2, fig.18; pl.3, fig.29) Lentin and Williams, 1987, p.114. Holotype: Jain and Millepied, 1973, pl.1, fig.7. Originally *Senegalinium*, subsequently *Deflandrea*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: Maastrichtian.

kangiliense Hansen in Nøhr-Hansen and Heilmann-Clausen, 2001, p.158,160,162–164, fig.4, nos.1–9, fig.5, nos.1–9. Holotype: Nøhr-Hansen and Heilmann-Clausen, 2001, fig.4, nos.1–3. Nøhr-Hansen and Heilmann-Clausen (2001, p.158) cited the authorship as "n. sp. ex Hansen 1980" in reference to an unpublished thesis by Hansen. Since the use of this name by Nøhr-Hansen and Heilmann-Clausen (2001) represents its first effective publication as well as its first valid publication, the authorship citation is here given as "Hansen in Nøhr-Hansen and Heilmann-Clausen" rather than "Hansen ex Nøhr-Hansen and Heilmann-Clausen". Age: middle Danian–earliest Selandian.

leptodermum (Vozzhennikova, 1963, p.181; text-fig.8) Lentin and Williams, 1987, p.114. Holotype: Vozzhennikova, 1963, text-fig.8; Lentin and Vozzhennikova, 1990, pl.4, figs.4–5; text-fig.15. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Deflandrea*, thirdly (and now) *Cerodinium*. Lentin and Vozzhennikova (1990, p.36) provided an "expanded description" for this species. Age: Paleocene.

markovae (Vozzhennikova, 1967, p.159, pl.119, figs.5,7; pl.120, figs.1–4) Lentin and Williams, 1987, p.114. Holotype: Vozzhennikova, 1967, pl.120, fig.2; Lentin and Vozzhennikova, 1990, pl.3, figs.7–8; text-fig.16. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Deflandrea*, thirdly (and now) *Cerodinium*. Lentin and Vozzhennikova (1990, p.38) provided an "expanded description" for this species. Age: Paleocene–Eocene.

medcalfii (Stover, 1974, p.175–176, pl.3, figs.3a–c; text-figs.3G,6C) Lentin and Williams, 1987, p.114. Holotype: Stover, 1974, pl.3, figs.3a–c. Originally *Deflandrea medcalfii*, subsequently *Deflandrea dartmooria* subsp. *medcalfii*, thirdly *Ceratiopsis medcalfii* (combination illegitimate), fourthly (and now) *Cerodinium medcalfii*. Age: middle Paleocene.

mediterraneum Slimani et al., 2008, p.340, figs.9G–L. Holotype: Slimani et al., 2008, figs.9G–H. Age: early Danian.

navarrianum (Srivastava, 1995, p.274, pl.7, figs.1–3) Williams et al., 1998, p.103. Holotype: Srivastava, 1995, pl.7, fig.2. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Age: Maastrichtian.

nielsii Willumsen, 2011, p.218–219, figs.7D,J. Holotype: Willumsen, 2011, fig.7J. Age: early Paleocene.

obliquipes (Deflandre and Cookson, 1955, p.252, pl.4, fig.6) Lentin and Williams, 1987, p.114. Holotype: Deflandre and Cookson, 1955, pl.4, fig.6. Originally *Deflandrea*, subsequently *Deflandrea?*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: middle Paleocene–early Eocene.

panuceum (Stanley, 1965, p.220, pl.22, figs.1–4,8–10) Lentin and Williams, 1987, p.115. Holotype: Stanley, 1965, pl.22, figs.3–4. Originally *Deflandrea*, subsequently *Senegalinium?*, thirdly *Deflandrea?*, fourthly *Ceratiopsis* (combination illegitimate), fifthly (and now) *Cerodinium*. Age: Paleocene.

pedibaculiferum (He Chengquan, 1991, p.75–76, pl.34, fig.14) Lentin and Williams, 1993, p.92. Holotype: He Chengquan, 1991, pl.34, fig.14. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Age: Paleocene.

prutense (Grigorovich, 1971, p.92,94, pl.2, fig.2) Lentin and Williams, 1987, p.115. Holotype: Grigorovich, 1971, pl.2, fig.2. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Deflandrea?*, thirdly (and now) *Cerodinium*. Age: Paleocene.

quiriquinaense (Takahashi, 1979, p.33, pl.1, figs.1a–c,2a–b,3) Lentin and Williams, 1989, p.55. Holotype: Takahashi, 1979, pl.1, figs.1a–c. Originally *Deflandrea*, subsequently (and now) *Cerodinium*. Age: Late Cretaceous.

**sibiricum* Vozzhennikova, 1963, p.181, text-figs.9–10. Emendation: Lentin and Vozzhennikova, 1990, p.39–40, as *Cerodinium sibiricum*. Holotype: Vozzhennikova, 1963, text-fig.9; Lentin and Vozzhennikova, 1990, pl.4, figs.1–2. Originally (and now) *Cerodinium*, subsequently *Ceratiopsis* (combination illegitimate), thirdly *Deflandrea*. Age: Paleocene–Eocene.

speciosum (Alberti, 1959b, p.97, pl.9, figs.12–13) Lentin and Williams, 1987, p.115. Holotype: Alberti, 1959b, pl.9, fig.13. Originally *Deflandrea*, subsequently (and now) *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*. Age: late Paleocene.

subsp. *elongatum* (Mao Shaozhi and Norris, 1988, p.42, pl.9, figs.10–12) Lentin and Williams, 1989, p.55. Holotype: Mao Shaozhi and Norris, 1988, pl.9, fig.10. Originally *Ceratiopsis* (an illegitimate generic name) *speciosa* subsp. *elongata* subsequently (and now) *Cerodinium speciosum* subsp. *elongatum*. Age: late Paleocene.

"subsp. *glabrum*" (Gocht, 1969, p.10, text-fig.3) Lentin and Williams, 1987, p.115. Holotype: Gocht, 1969, text-fig.3. **NOW** *Cerodinium glabrum*. Originally *Deflandrea speciosa* forma *glabra*, subsequently *Deflandrea speciosa* subsp. *glabra*, thirdly *Ceratiopsis speciosa* subsp. *glabra* (combination illegitimate), fourthly *Cerodinium speciosum* subsp. *glabrum*, fifthly (and now) *Cerodinium glabrum*. Age: late Paleocene.

subsp. *speciosum*. Autonym. Holotype: Alberti, 1959b, pl.9, fig.13. Originally *Deflandrea speciosa* subsp. *speciosa*, subsequently *Ceratiopsis speciosa* subsp. *speciosa* (combination illegitimate), thirdly (and now) *Cerodinium speciosum* subsp. *speciosum*.

striatum (Drugg, 1967, p.18, pl.2, figs.13–14) Lentin and Williams, 1987, p.115. Holotype: Drugg, 1967, pl.2, fig.13. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Paleocene.

subquadrum (Corradini, 1973, p.175–176, pl.28, fig.1) Lentin and Williams, 1987, p.115. Holotype: Corradini, 1973, pl.28, fig.1. Originally *Deflandrea*, subsequently *Senegalinium?*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: Senonian.

taeniale (He Chengquan, 1991, p.76, pl.32, figs.1–5) Lentin and Williams, 1993, p.93. Holotype: He Chengquan, 1991, pl.32, fig.1. Originally *Ceratiopsis* (generic name illegitimate), subsequently (and now) *Cerodinium*. Age: Paleocene.

verrucosum (Heisecke, 1970, p.232,234, pl.9, figs.2–3; pl.10, fig.3) Lentin and Williams, 1989, p.56. Holotype: Heisecke, 1970, pl.9, fig.2; pl.10, fig.3. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Cerodinium*. Age: Danian.

wardenense (Williams and Downie, 1966c, p.233, pl.26, fig.5) Lentin and Williams, 1987, p.115. Holotype: Williams and Downie, 1966c, pl.26, fig.5; Bujak et al., 1980, pl.11, fig.3. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Eocene.

warrenii (Schumacker-Lambry, 1978, p.40–41, pl.4, figs.5–6) Lentin and Williams, 1987, p.115. Holotype: Schumacker-Lambry, 1978, pl.4, fig.6. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Paleocene (Landenian).

CERVISIELLA Hildebrand-Habel et al., 1999, p.78. Emendation: Streng et al., 2004, p.467. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299). Type: Stradner, 1961, fig.71, as *Thoracosphaera saxea*.

operculata (Bramlette and Martini, 1964, p.305–306, pl.5, figs.3–7) Streng et al., 2004, p.467. Emendation: Streng et al., 2004, p.467, by provision of a "new diagnosis" and a "new description" for *Cervisiella operculata*. Holotype: Bramlette and Martini, 1964, pl.5, figs.4–5. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly

Pirumella, fourthly *Operculodinella*, fifthly (and now) *Cervisiella*. Taxonomic junior synonym: *Thoracosphaera atlantica*, according to Fütterer (1990, p.540). Age: Maastrichtian–Paleocene.

**saxea* (Stradner, 1961, p.84, fig.71) Hildebrand-Habel et al., 1999, p.78. Holotype: Stradner, 1961, fig.71. Originally *Thoracosphaera*, subsequently *Obliquipithonella* (combination not validly published), thirdly *Pirumella*, fourthly (and now) *Cervisiella*. Age: Danian.

CHAENOSPHAERULA Damassa, 1997, p.167,169. Type: Damassa, 1997, pl.1, figs.1–2; text-fig.6B, as *Chaenosphaerula magnifica*.

**magnifica* Damassa, 1997, p.169,171,173, pl.1, figs.1–12; pl.2, figs.4–7; pl.3, figs.1–3,6–9; text-figs.6A–D,7A–D,8A–D,9A–D. Holotype: Damassa, 1997, pl.1, figs.1–2; text-fig.6B. Age: late Oligocene.

CHARLESDOWNIEA Lentin and Vozzhennikova, 1989, p.225,227. Emendation: Williams et al., 2015, p.302. Type: Williams and Downie, 1966b, pl.18, fig.8; text-fig.47, as *Wetzeliella coleothrypta*.

"*aculeata*" (Michoux, 1988, p.24,26, pl.1, figs.1,4,7–8; pl.2, figs.1–2; text-figs.5A–B,6A–B) Lentin and Vozzhennikova, 1990, p.74. Holotype: Michoux, 1988, pl.1, figs.1,4,7; text-figs.5A–B. **NOW** *Michouxdinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Michouxdinium*. Age: early Eocene.

"*clathrata*" (Eisenack, 1938b, p.187; text-fig.5) Lentin and Vozzhennikova, 1989, p.227. Holotype: Eisenack, 1938b, text-fig.5; Eisenack, 1954b, pl.7, fig.12. **NOW** *Talladinium*? Originally *Wetzeliella*, subsequently *Kisselevia*?, thirdly *Charlesdowniea*, fourthly (and now) *Talladinium*? Taxonomic senior synonym: *Wetzeliella* (as *Hystriospheraidium*) *articulata*, according to PASTIELS (1948, p.42) — however, this synonymy has not been generally accepted. Age: late Eocene–early Oligocene.

"subsp. *angulosa*" (Châteauneuf and Gruas-Cavagnetto, 1978, p.69–70, pl.5, figs.8–9) Lentin and Vozzhennikova, 1989, p.227. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.5, figs.8–9. **NOW** *Talladinium*? *angulosum*. Originally *Kisselevia clathrata* subsp. *angulosa*, subsequently *Charlesdowniea*? *clathrata* subsp. *angulosa*, thirdly (and now) *Talladinium*? *angulosum*. Age: early Oligocene (Sannoisian).

"subsp. *clathrata*". Autonym. Holotype: Eisenack, 1938b, text-fig.5; Eisenack, 1954b, pl.7, fig.12. **Now redundant**. Originally *Wetzeliella clathrata* subsp. *clathrata*, subsequently *Kisselevia*? *clathrata* subsp. *clathrata*, thirdly *Charlesdowniea clathrata* subsp. *clathrata*.

**coleothrypta* (Williams and Downie, 1966b, p.185–186, pl.18, figs.8–9; text-fig.47) Lentin and Vozzhennikova, 1989, p.225. Holotype: Williams and Downie, 1966b, pl.18, fig.8; text-fig.47; Bujak et al., 1980, pl.12, figs.7–8. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly (and now) *Charlesdowniea*. Age: early Eocene.

"subsp. *coleothrypta*". Autonym. Holotype: Williams and Downie, 1966b, pl.18, fig.8; text-fig.47; Bujak et al., 1980, pl.12, figs.7–8. **Now redundant**. Originally *Kisselevia coleothrypta* subsp. *coleothrypta*, subsequently *Charlesdowniea coleothrypta* subsp. *coleothrypta*.

"subsp. *rotundata*" (Châteauneuf and Gruas-Cavagnetto, 1978, p.68–69, pl.3, fig.5) Lentin and Vozzhennikova, 1989, p.227. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.3, fig.5. **NOW** *Charlesdowniea*? *rotundata*. Originally *Kisselevia coleothrypta* subsp. *rotundata*, subsequently *Charlesdowniea coleothrypta* subsp. *rotundata*, thirdly (and now) *Charlesdowniea*? *rotundata*. Age: middle Eocene (Lutetian–Bartonian).

"*columna*" (Michoux, 1988, p.28,30, pl.1, figs.2–3,5–6; pl.2, figs.3–5; text-figs.7A–B) Lentin and Vozzhennikova, 1990, p.74. Holotype: Michoux, 1988, pl.1, figs.2–3. **NOW** *Piladinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Piladinium*. N.I.A. Age: early Eocene.

"*crassoramosa*" (Williams and Downie, 1966b, p.189–190; pl.19, figs.1,5,7; text-fig.50) Lentin and Vozzhennikova, 1989, p.227. Holotype: Williams and Downie, 1966b, pl.19, fig.7. **NOW** *Sophismatia crassoramosa*. Originally *Wetzeliella tenuivirgula* var. *crassoramosa*, subsequently *Wetzeliella tenuivirgula* subsp. *crassoramosa*, thirdly *Kisselevia tenuivirgula* subsp. *crassoramosa*, fourthly *Kisselevia crassoramosa*, fifthly *Charlesdowniea crassoramosa*, sixthly (and now) *Sophismatia crassoramosa*. Age: early Eocene.

"*edwardsii*" (Wilson, 1967c, p.477, figs.8–9) Lentin and Vozzhennikova, 1989, p.227. Holotype: Wilson, 1967c, fig.8. **NOW** *Piladinium*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Piladinium*. Age: early Eocene.

?*fasciata* (Rozen, 1965, p.296–297; pl.2, fig.13; text-fig.4) Lentin and Vozzhennikova, 1989, p.227. Holotype: Rozen, 1965, pl.2, fig.13; text-fig.4. Originally *Wetzeliella clathrata* var. *fasciata*, subsequently *Wetzeliella clathrata* subsp. *fasciata*, thirdly *Kisselevia? clathrata* subsp. *fasciata*, fourthly *Kisselevia fasciata*, fifthly *Charlesdowniea fasciata*, sixthly *Charlesdowniea? fasciata*. Questionable assignment: Williams et al. (2015, p.302). Age: late Eocene.

"*fusiformis*" (Mao Shaozhi and Norris, 1988, p.49–50, pl.13, figs.2–4) Lentin and Williams, 1993, p.94. Holotype: Mao Shaozhi and Norris, 1988, pl.13, fig.3. **NOW** *Talladinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Talladinium*. Age: early Oligocene.

"*limitata*" Stover and Hardenbol, 1994, p.34–35, pl.10, figs.70a–c, 71a–c. Holotype: Stover and Hardenbol, 1994, pl.10, figs.70a–c. **NOW** *Michouxdinium*. Originally *Charlesdowniea*, subsequently (and now) *Michouxdinium*. Age: Rupelian.

"*marginata*" Andreeva-Grigorovich and Savitskaya, 1993, p.43–44, pl.2, figs.1–3. Holotype: Andreeva-Grigorovich and Savitskaya, 1993, pl.2, fig.2; Andreeva-Grigorovich et al., 2011, pl.18, fig.4. **NOW** *Talladinium*. Originally *Charlesdowniea*, subsequently (and now) *Talladinium*. Age: Rupelian–Chattian.

?*pengchiahsuensis* (Shaw Chenglong, 1999a, p.40, figs.5–7, 14–15) Fensome and Williams, 2004, p.118. Holotype: Shaw Chenglong, 1999a, figs.5–7. Originally *Kisselevia*, subsequently (and now) *Charlesdowniea*. Questionable assignment: Williams et al. (2015, p.302). Age: Eocene.

"*proserpina*" van Mourik et al., 2001, p.239,241, figs.7a–e. Holotype: van Mourik et al., 2001, figs.7b–c. **NOW** *Michouxdinium*. Originally *Charlesdowniea*, subsequently (and now) *Michouxdinium*. N.I.A. Age: late Eocene.

"*reticulata*" (Williams and Downie, 1966b, p.187–188, pl.19, figs.3,6; text-fig.48) Lentin and Vozzhennikova, 1989, p.227. Holotype: Williams and Downie, 1966b, pl.19, figs.3,6; text-fig.48. **NOW** *Sophismatia*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

"*rhomboidalis*" (He Chengquan, 1991, p.93, pl.35, figs.11–13) Lentin and Williams, 1993, p.94. Holotype: He Chengquan, 1991, pl.35, figs.11–12. **NOW** *Michouxdinium?* Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Michouxdinium?* Age: middle Eocene

?*rotundata* (Châteauneuf and Gruas-Cavagnetto, 1978, p.68–69, pl.3, fig.5) Williams et al., 2015, p.302. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.3, fig.5. Originally *Kisselevia coleothrypta* subsp. *rotundata*, subsequently *Charlesdowniea coleothrypta* subsp. *rotundata*, thirdly (and now) *Charlesdowniea? rotundata*. Questionable assignment: Williams et al. (2015, p.302). Age: middle Eocene (Lutetian–Bartonian).

"*stellata*" (Damassa, 1979a, p.834,837, pl.7, figs.1–7) Lentin and Vozzhennikova, 1989, p.227. Holotype: Damassa, 1979a, pl.7, figs.1–2. **NOW** *Vallodinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Vallodinium*. Age: early-middle Eocene.

?*taiwaniana* (Shaw Chenglong, 1999a, p.38–39, figs.8–10, 19–21) Fensome and Williams, 2004, p.118. Holotype: Shaw Chenglong, 1999a, figs.8–10. Originally *Kisselevia*, subsequently (and now) *Charlesdowniea*. Questionable assignment: Williams et al. (2015, p.302). Age: Eocene.

"*tenuivirgula*" (Williams and Downie, 1966b, p.188–189, pl.19, figs.1–2,4–5,7; text-figs.49–50) Lentin and Vozzhennikova, 1989, p.227. Holotype: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49. **NOW** *Sophismatia*. Originally *Wetziella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

"subsp. *conopia*" (Williams and Downie, 1966b, p.184, pl.18, fig.5) Lentin and Vozzhennikova, 1989, p.227. Holotype: Williams and Downie, 1966b, pl.18, fig.5. **NOW** *Sophismatia conopia*. Originally *Wetziella articulata* var. *conopia*, subsequently *Wetziella articulata* subsp. *conopia*, thirdly *Kisselevia tenuivirgula* subsp. *conopia*, fourthly *Charlesdowniea tenuivirgula* subsp. *conopia*, fifthly (and now) *Sophismatia conopia*. Age: early Eocene.

"subsp. *exouros*" (Islam, 1983c, p.88, pl.3, figs.3–4) Lentin and Vozzhennikova, 1989, p.228. Holotype: Islam, 1983c, pl.3, fig.3. **NOW** *Sophismatia? exouros*. Originally *Kisselevia tenuivirgula* subsp. *exouros*, subsequently *Charlesdowniea tenuivirgula* subsp. *exouros*, thirdly (and now) *Sophismatia? exouros*. Age: middle Eocene.

"subsp. *tenuivirgula*". Autonym. Holotype: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49. **NOW redundant**. Originally *Wetziella tenuivirgula* subsp. *tenuivirgula*, subsequently *Kisselevia tenuivirgula* subsp. *tenuivirgula*, thirdly *Charlesdowniea tenuivirgula* subsp. *tenuivirgula*.

"*variabilis*" (Bujak in Bujak et al., 1980, p.67, pl.17, figs.1–6; text-fig.16) Lentin and Vozzhennikova, 1989, p.228. Holotype: Bujak et al., 1980, pl.17, figs.1–3. **NOW** *Michouxdinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Michouxdinium*. Age: middle Eocene (see Aubry, 1986).

"*wulagenensis*" (Mao Shaozhi and Norris, 1988, p.50, pl.13, figs.5–10) Lentin and Williams, 1993, p.95. Holotype: Mao Shaozhi and Norris, 1988, pl.13, fig.6. **NOW** *Talladinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Talladinium*. Age: late Eocene.

CHATANGIELLA Vozzhennikova, 1967, p.128–129. Emendations: Lentin and Williams, 1976, p.51–52; Marshall, 1988, p.199–200 — however, see Lentin and Vozzhennikova (1990, p.40). Taxonomic junior synonyms: *Australiella* and *Cooksoniella*, both according to Lentin and Williams (1976, p.155 and p.151–152 respectively). Lentin and Williams (1976, p.93–94) considered *Chatangiella* to be a possible taxonomic junior synonym of *Bulbodinium*. Type: Vozzhennikova, 1967, pl.56, fig.1; pl.57, fig.1, as *Chatangiella niiga*.

"*?armata*" (Cookson and Eisenack, 1970a, p.142–143, pl.13, fig.9) Lentin and Williams, 1976, p.53. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.9. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly *Chatangiella?*, fourthly (and now) *Isabelidinium*. Questionable assignment: Stover and Evitt (1978, p.99). Age: Senonian.

"*arvensis*" Marshall, 1988, p.201,203, figs.7,17M–X. Holotype: Marshall, 1988, figs.7,17M–R; Fensome et al., 1996, figs.1–4,8–10 — p.2037. **NOW** *Arvalidinium*. Originally *Chatangiella*, subsequently (and now) *Arvalidinium*. Age: Santonian.

"*biapertura*" (McIntyre, 1975, p.66, pl.3, figs.5–8) Lentin and Williams, 1976, p.53. Holotype: McIntyre, 1975, pl.3, figs.5–6. Originally *Deflandrea*, subsequently (and now) *Chatangiella?*. Questionable assignment: Lentin and Williams (1976, p.53). Age: Campanian–Maastrichtian.

bondarenkoi (Vozzhennikova, 1967, p.130–131, pl.59, figs.1a–b; pl.60, fig.2) Lentin and Williams, 1976, p.53. Emendations: Lentin and Vozzhennikova, 1990, p.41 and Lebedeva in Ilyina et al., 1994, p.68–69, both as *Chatangiella bondarenkoi*. Holotype: Vozzhennikova, 1967, pl.59, fig.1b; pl.60, fig.2; Lentin and Vozzhennikova, 1990, pl.4, figs.6–7; text-fig.17. Originally *Australiella*, subsequently (and now) *Chatangiella*. Taxonomic junior synonyms: *Australiella* (as *Chatangiella*) *chetiensis* and *Chatangiella obtusa*, both according to Lentin and Vozzhennikova (1990, p.41) — however, Lebedeva in Ilyina et al. (1994, p.67) retained *Chatangiella chetiensis* and *Chatangiella obtusa* is now considered a taxonomic junior synonym of *Australiella* (as and now *Chatangiella chetiensis*). Age: Santonian.

"*campbellensis*" (Wilson, 1967b, p.225, figs.2–3) Lentin and Williams, 1976, p.53. Holotype: Wilson, 1967b, fig.2. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Isabelidinium*. Age: Maastrichtian (see Wilson, 1972).

cassidea Lebedeva, 1988, p.76–77, pl.19, figs.1–4. Holotype: Lebedeva, 1988, pl.19, figs.1–2. Taxonomic senior synonym: *Chatangiella niiga*, according to Lentin and Vozzhennikova (1990, p.45) — however, Lebedeva in Ilyina et al. (1994, p.69) retained *Chatangiella cassidea*. Age: Santonian.

chetiensis (Vozzhennikova, 1967, p.131, pl.60, figs.1a–b) Lentin and Williams, 1976, p.54. Emendation: Lebedeva in Ilyina et al., 1994, p.67–68, as *Chatangiella chetiensis*. Holotype: Vozzhennikova, 1967, pl.60, figs.1a–b. Originally *Australiella*, subsequently (and now) *Chatangiella*. Taxonomic senior synonym: *Australiella* (as *Chatangiella*) *bondarenkoi*, according to Lentin and Vozzhennikova (1990, p.41) — however, Lebedeva in Ilyina et al. (1994, p.67) retained *Chatangiella chetiensis*. Taxonomic junior synonym: *Chatangiella obtusa*, according to Lebedeva in Ilyina et al. (1994, p.67). Age: Santonian.

coronata (McIntyre, 1975, p.64–65, pl.3, figs.1–4) Lentin and Williams, 1976, p.54. Holotype: McIntyre, 1975, pl.3, figs.1–2. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. Age: Campanian.

?*dakotaensis* (Stanley, 1965, p.217–218, pl.19, figs.1–3) Stover and Evitt, 1978, p.99. Holotype: Stanley, 1965, pl.19, figs.1–3. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Chatangiella*?. Questionable assignment: Stover and Evitt (1978, p.99); and Lebedeva (2000, p.112,121). Age: Paleocene.

decorosa (McIntyre, 1975, p.63–64, pl.2, figs.1–4) Lentin and Williams, 1976, p.54. Holotype: McIntyre, 1975, pl.2, fig.1. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. Taxonomic junior synonym: *Deflandrea ditissima*, according to Harker and Sarjeant in Harker et al. (1990, p.110) — however, Harker and Sarjeant in Harker et al. (1990, p.111) also retained *Chatangiella ditissima*. Age: Campanian–Maastrichtian.

ditissima (McIntyre, 1975, p.62–63, pl.1, figs.1–4) Lentin and Williams, 1976, p.54. Holotype: McIntyre, 1975, pl.1, figs.1–2. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. Taxonomic senior synonym: *Deflandrea* (as *Chatangiella*) *decorosa*, according to Harker and Sarjeant in Harker et al. (1990, p.111) — however, Harker and Sarjeant in Harker et al. (1990, p.111) also retained *Chatangiella ditissima*. Age: Santonian–Maastrichtian.

eminens Pearce, 2010, p.67, pl.2, figs.1–6. Holotype: Pearce, 2010, pl.2, figs.1–6. Age: middle to late Santonian.

granulifera (Manum, 1963, p.61–64, pl.3, figs.5–9) Lentin and Williams, 1976, p.54. Holotype: Manum, 1963, pl.3, figs.5–6. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Taxonomic junior synonym: *Cooksoniella* (as and now *Chatangiella*) *vnigrii*, according to Lentin and Vozzhennikova (1990, p.47) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (as and now *Chatangiella*) *vnigrii*. Age: Senonian.

"subsp. *echinata*" (Wheeler and Sarjeant, 1990, p.317–318, pl.15, figs.1–4; text-figs.13a–b ex Wheeler and Sarjeant, 1992, p.382) Lentin and Williams, 1993, p.96. Holotype: Wheeler and Sarjeant, 1990, pl.15, figs.1–2; text-figs.13a–b. Originally *Chatangiella vnigrii* subsp. *echinata*, subsequently *Chatangiella granulifera* subsp. *echinata*. **Taxonomic senior synonym** (at specific rank): *Chatangiella madura*, according to Lebedeva (2000, p.115). This name was not validly published in Wheeler and Sarjeant (1990), since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: Campanian.

subsp. *granulifera*. Autonym. Holotype: Manum, 1963, pl.3, figs.5–6. Originally *Australiella granulifera* subsp. *granulifera*, subsequently (and now) *Chatangiella granulifera* subsp. *granulifera*.

subsp. *tenuis* (Davey, 1970, p.340–341, pl.2, fig.1) Lentin and Williams, 1976, p.54. Holotype: Davey, 1970, pl.2, fig.1. Originally *Deflandrea granulifera* var. *tenuis*, subsequently *Australiella granulifera* subsp. *tenuis*, thirdly (and now) *Chatangiella granulifera* subsp. *tenuis*. Age: Albanian.

hexacalpis Harker and Sarjeant in Harker et al., 1990, p.117–118, pl.8, figs.11–12,14–16; text-figs.22A–B ex Harker and Sarjeant, 1991, p.709. Holotype: Harker et al., 1990, pl.8, fig.11; text-figs.22A–B. The name was not validly published in Harker and Sarjeant (1991), since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Campanian.

"*karinae*" Kirsch, 2000, p.33–34, pl.4, figs.9–11; text-fig.9. Holotype: Kirsch, 2000, pl.4, fig.9. **Name not validly published:** no English or Latin description. Age: ?middle-late Campanian.

madura Lentin and Williams, 1976, p.54. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.10. Originally *Deflandrea manumii*, subsequently *Chatangiella manumii* (combination illegitimate), thirdly (and now) *Chatangiella madura*. Substitute name for *Chatangiella manumii* (Cookson and Eisenack, 1970a, p.141–142, pl.11, figs.10–11) Lentin and Williams, 1976, p.54 (an illegitimate name). Taxonomic junior synonym (at specific rank): *Chatangiella vnigrii* subsp. *echinata* (subsequently *Chatangiella granulifera* subsp. *echinata*), according to Lebedeva (2000, p.115). Age: Senonian.

"*magna*" (Davey, 1970, p.342–343, pl.2, figs.6–8) Lentin and Williams, 1976, p.54. Holotype: Davey, 1970, pl.2, fig.6. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Isabelidinium*. Age: Cenomanian.

"*manumii*" (Cookson and Eisenack, 1970a, p.141–142, pl.11, figs.10–11) Lentin and Williams, 1976, p.54. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.10; Lentin and Vozzhennikova, 1990, pl.4, fig.3; text-fig.19. **Combination illegitimate** — **senior homonym:** *Chatangiella manumii* (Vozzhennikova, 1967) Lentin and Williams, 1976. **Substitute name:** *Chatangiella madura*. Originally *Deflandrea manumii*, subsequently *Chatangiella manumii* (combination illegitimate), thirdly (and now) *Chatangiella madura*. Lentin and Vozzhennikova (1990, p.43–44) provided an "expanded description" for this species. Taxonomic junior synonym (at specific rank): *Chatangiella vnigrii* subsp. *echinata* (subsequently *Chatangiella granulifera* subsp. *echinata*), according to Lebedeva (2000, p.115). Age: Senonian.

manumii (Vozzhennikova, 1967, p.184–185, pl.108, figs.1–4) Lentin and Williams, 1976, p.54. Holotype: Vozzhennikova, 1967, pl.108, fig.1; Lentin and Vozzhennikova, 1990, pl.4, fig.3; text-fig.19. Originally *Cooksoniella*, subsequently (and now) *Chatangiella*. Junior homonym: *Chatangiella manumii* (Cookson and Eisenack, 1970a) Lentin and Williams, 1976. Lentin and Vozzhennikova (1990, p.43–44) provided an "expanded description" for this species. Age: Turonian–Campanian.

mcintyreii Nøhr-Hansen, 1996, p.31–32, pl.2, figs.4–9. Holotype: Nøhr-Hansen, 1996, pl.2, fig.4. Age: early Coniacian.

micracantha (Cookson and Eisenack, 1960a, p.3, pl.1, fig.9) Lentin and Williams, 1976, p.54. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.9; Cookson and Manum, 1964, pl.76, figs.9–11. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Campanian.

?*multispinosa* (Cookson and Eisenack, 1970a, p.141, pl.11, figs.7–9) Lentin and Williams, 1976, p.54. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.8. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Chatangiella?*. Questionable assignment: Stover and Evitt (1978, p.99); and Lebedeva (2000, p.112,121). Age: Albian–Cenomanian.

**niiga* Vozzhennikova, 1967, p.129, pl.56, figs.1–4; pl.57, figs.1–4; pl.58, figs.1–4. Emendation: Lentin and Vozzhennikova, 1990, p.45–46. Holotype: Vozzhennikova, 1967, pl.56, fig.1; pl.57, fig.1; Lentin and Vozzhennikova, 1990, pl.5, figs.1–2; text-fig.20. Taxonomic junior synonym: *Chatangiella cassidea*, according to Lentin and Vozzhennikova (1990, p.45) — however, Lebedeva in Ilyina et al. (1994, p.69) retained *Chatangiella cassidea*. Age: Santonian.

"*obtusa*" Lebedeva, 1988, p.75–76, pl.18, figs.5–6. Holotype: Lebedeva, 1988, pl.18, figs.5–6. **Taxonomic senior synonym:** *Australiella* (as and now *Chatangiella*) *chetiensis*, according to Lebedeva in Ilyina et al. (1994, p.67). Taxonomic senior synonym: *Australiella* (as and now *Chatangiella*) *bondarenkoi*, according to Lentin and

Vozzhennikova (1990, p.41) — however, *Chatangiella obtusa* is now considered a taxonomic junior synonym of *Australiella* (as and now *Chatangiella*) *chetiensis*. Age: Santonian.

packhamii Marshall, 1990a, p.20,22, figs.11A–I,12D,22L–M,23A–H. Holotype: Marshall, 1990a, figs.11A,23G–H; Fensome et al., 1996, figs.5–6,9 — p.2257. Age: Campanian.

porata Aurisano, 1984, p.1–2, figs.3A–E. Holotype: Aurisano, 1984, fig.3A. Age: late Campanian.

porosa Marshall, 1988, p.200, figs.6A–F,16A–T. Holotype: Marshall, 1988, figs.6A,16A–F; Fensome et al., 1996, figs.1–6,12 — p.2291. Age: Santonian.

?*robusta* (Benson, 1976, p.199,200,202, pl.11, figs.9–12; pl.12, fig.1) Stover and Evitt, 1978, p.99. Holotype: Benson, 1976, pl.11, figs.9–12; pl.12, fig.1. Originally *Trithyrodinium*, subsequently (and now) *Chatangiella*?. Questionable assignment: Stover and Evitt (1978, p.99); and Lebedeva (2000, p.112,121). Taxonomic junior synonym: *Trithyrodinium inequale* (name not validly published), according to Slimani (2001a, p.192). Age: late Maastrichtian.

"?scheii" (Manum, 1963, p.56–58, pl.1, figs.1–16; text-fig.1) Lentin and Williams, 1976, p.54. Holotype: Manum, 1963, pl.1, figs.1–4; text-fig.1. **NOW** *Arvalidinium*. Originally *Deflandrea*, subsequently *Cooksoniella*, thirdly *Chatangiella*?, fourthly (and now) *Arvalidinium*. Questionable assignment: Lentin and Williams (1976, p.54). Age: Middle Cretaceous (early Late Cretaceous, according to Manum and Cookson, 1964).

serratula (Cookson and Eisenack, 1958, p.28, pl.4, fig.4) Lentin and Williams, 1976, p.55. Holotype: Cookson and Eisenack, 1958, pl.4, fig.4. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. N.I.A. Age: Campanian–early Maastrichtian.

spectabilis (Alberti, 1959b, p.99, pl.9, fig.78) Lentin and Williams, 1976, p.55. Emendation: Lebedeva in Ilyina et al., 1994, p.66, as *Chatangiella spectabilis*. Holotype: Alberti, 1959b, pl.9, fig.78. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: late Senonian.

spinata Lebedeva, 2000, p.116, pl.1, figs.7–8. Holotype: Lebedeva, 2000, pl.1, fig.7. This name was not validly published in Ilyina et al. (1994, p.58), since these authors did not provide a description or illustration. Age: Campanian.

tanamaensis Lebedeva, 1988, p.74–75, pl.18, figs.1–4. Holotype: Lebedeva, 1988, pl.18, figs.1–3. Age: Santonian.

tripartita (Cookson and Eisenack, 1960a, p.2–3, pl.1, fig.10) Lentin and Williams, 1976, p.55. Emendation: Cookson and Manum, 1964, p.521–522, as *Deflandrea tripartita*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.10; Cookson and Manum, 1964, pl.76, figs.1–2. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Senonian.

?*tubifera* (Cookson and Eisenack, 1982, p.31–32, pl.3, figs.12–14) Lentin and Williams, 1985, p.54. Holotype: Cookson and Eisenack, 1982, pl.3, fig.12. Originally *Deflandrea*, subsequently (and now) *Chatangiella*?. Questionable assignment: Lentin and Williams (1985, p.54); and Lebedeva (2000, p.113,121). Age: Barremian–early Aptian.

turbo Harker and Sarjeant in Harker et al., 1990, p.118–120, pl.9, figs.5–8; text-fig.23 ex Harker and Sarjeant, 1991, p.709. Holotype: Harker et al., 1990, pl.9, fig.7; text-fig.23. This name was not validly published in Harker et al. (1990), since the lodgement of the holotype was not specified (I.C.N. Article 40.7). N.I.A. Age: Campanian.

verrucosa (Manum, 1963, p.60–61, pl.3, figs.1–4) Lentin and Williams, 1976, p.55. Holotype: Manum, 1963, pl.3, figs.1–2. Originally *Deflandrea*, subsequently *Trithyrodinium*, thirdly *Australiella*, fourthly (and now) *Chatangiella*. Taxonomic junior synonym: *Cooksoniella* (as and now *Chatangiella*) *vnigrii*, according to Yun Hyesu (1981, p.66) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (as and now *Chatangiella*) *vnigrii*. Age: Middle Cretaceous.

victoriensis (Cookson and Manum, 1964, p.522, pl.76, figs.3–8) Lentin and Williams, 1976, p.55. Emendation: Lebedeva in Ilyina et al., 1994, p.67, as *Chatangiella victoriensis*. Holotype: Cookson and Manum, 1964, pl.76, figs.3–4; Helby et al., 1987, fig.41A. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Senonian.

vnigrii (Vozzhennikova, 1967, p.185, pl.59, fig.2; pl.79, fig.3; pl.107, fig.1; pl.109, figs.1–2; pl.110, figs.2–3) Lentin and Williams, 1976, p.55. Emendation: Lebedeva in Ilyina et al., 1994, p.70, as *Chatangiella vnigrii*. Holotype: Vozzhennikova, 1967, pl.109, figs.2a–b (not pl.107, fig.1. as indicated in the caption); Lentin and Vozzhennikova, 1990, pl.5, figs.4–5; text-fig.21. Originally *Cooksoniella*, subsequently *Chatangiella*. Taxonomic senior synonym: *Deflandrea* (as and now *Chatangiella*) *granulifera*, according to Lentin and Vozzhennikova (1990, p.47) and *Deflandrea* (as and now *Chatangiella*) *verrucosa*, according to Yun Hyesu (1981, p.66) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Chatangiella vnigrii*. Wheeler and Sarjeant (1990, p.317) suggested that the correct spelling for the species epithet could be "*vnigrorum*"; however, the correct epithet is "*vnigrii*", since it is derived from the name of a single institution. Age: Turonian–Santonian.

"subsp. *echinata*" Wheeler and Sarjeant, 1990, p.317–318, pl.15, figs.1–4; text-figs.13a–b ex Wheeler and Sarjeant, 1992, p.382. Holotype: Wheeler and Sarjeant, 1990, pl.15, figs.1–2; text-figs.13a–b. Originally *Chatangiella vnigrii* subsp. *echinata*, subsequently *Chatangiella granulifera* subsp. *echinata*. **Taxonomic senior synonym** (at specific rank): *Chatangiella madura*, according to Lebedeva (2000, p.115). This name was not validly published in Wheeler and Sarjeant (1990), since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: Campanian.

"subsp. *vnigrii*". Autonym. Holotype: Vozzhennikova, 1967, pl.109, figs.2a–b (not pl.107, fig.1 as indicated in the caption); Lentin and Vozzhennikova, 1990, pl.5, figs.4–5; text-fig.21. **Now redundant.**

williamsii Yun Hyesu, 1981, p.66–67, pl.13, figs.8,12,14. Holotype: Yun Hyesu, 1981, pl.13, fig.12; Fensome et al., 1991, fig.2 — p.769. Age: early Santonian.

"**CHATEAUNEUFACYSTA**" Ionescu, 2003, p.40. **Name not validly published:** name of type not validly published. Type: Ionescu, 2003, pl.1, fig.2, as *Chateauneufacysta moesica*.

"**moesica*" Ionescu, 2003, p.40, pl.1, figs.1–6. **Name not validly published:** lodgement of holotype not specified. Holotype: Ionescu, 2003, pl.1, fig.2. Age: Bartonian–Priabonian.

"**CHELINOCYSTA**" Sarjeant, 1967a, p.327. **Name not validly published:** no description. Taxonomic junior synonym: *Chelinocysta* (name not validly published), by implication in Clarke et al. (1968, p.182, who considered *Chelinocysta lita* (name not validly published) to be a taxonomic junior synonym of *Ellipsodinium rugulosum*.

"*lita*" Sarjeant, 1967a, p.327. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Ellipsodinium rugulosum*, according to Clarke et al. (1968, p.182).

CHICHAOUADINIUM Below, 1981a, p.122–123. Type: Below, 1981a, pl.10, figs.13a–c; text-fig.81h (not 81e), as *Chichaouadinium arabicum*.

**arabicum* Below, 1981a, p.123–124, pl.10, figs.11–12,13a–c,15a–b,16–17; text-figs.81a–i. Holotype: Below, 1981a, pl.10, figs.13a–c; text-fig.81h (not 81e); Fensome et al., 1991, figs.1–3 — p.571. Age: Albanian.

boydii (Morgan, 1975, p.159–160, pl.1, figs.3a–d) Bujak and Davies, 1983, p.162. Holotype: Morgan, 1975, pl.1, figs.3a–d; Helby et al., 1987, fig.29D. Originally *Spinidinium*, subsequently (and now) *Chichaouadinium*. Age: late Aptian–Albanian.

"*davidii*" (Morgan, 1975, p.157–159, pl.1, figs.1a–b,2a–d) Bujak and Davies, 1983, p.162. Holotype: Morgan, 1975, pl.1, figs.1a–b; Helby et al., 1987, fig.29A. **NOW** *Diconodinium*. Originally (and now) *Diconodinium*, subsequently *Chichaouadinium*. Age: Aptian–Albian.

"*limpidum*" (Singh, 1971, p.359–361, pl.61, figs.1–12; text-fig.62) Below, 1981a, p.123. Holotype: Singh, 1971, pl.61, figs.1–2. Originally *Deflandrea*, subsequently *Chichaouadinium*. **Taxonomic senior synonym:** *Deflandrea* (as *Spinidinium?*) *vestita*, according to Lentin and Williams (1973, p.43). Age: middle-late Albian.

vestitum (Brideaux, 1971, p.99–101, pl.29, figs.99–103; text-figs.10a,d) Bujak and Davies, 1983, p.162. Holotype: Brideaux, 1971, pl.29, figs.99,102–103; text-figs.10a,d. Originally *Spinidinium*, subsequently *Deflandrea*, thirdly *Spinidinium?*, fourthly (and now) *Chichaouadinium*. Taxonomic junior synonym: *Deflandrea* (subsequently *Chichaouadinium*) *limpida*, according to Lentin and Williams (1973, p.43). Age: late Albian–early Cenomanian.

CHIROPTERIDIUM Gocht, 1960, p.221. Taxonomic junior synonym: *Galea* Maier (an illegitimate name), by implication in Sarjeant (1983, p.108), who transferred the "type species" of *Galea*, *Galea galea*, to *Chiropteridium*. Taxonomic junior synonym: *Membranophoridium*, according to Brosius (1963, p.47) and Schindler (1992, p.202) — however, Lentin and Williams (1993, p.421) retained *Membranophoridium*. Type: Gocht, 1960, pl.17, fig.1, as *Chiropteridium lobospinosum*.

"*aspinatum*" (Gerlach, 1961, p.199–201, pl.29, figs.7–8) Brosius, 1963, p.48. Holotype: designated by Gerlach (1961), but not clearly related to an illustration. Lectotype: Gerlach, 1961, pl.29, fig.7; Fensome et al., 1993a, fig.1 — p.945; designated by Gocht (1969, p.61). **NOW** *Membranophoridium*. Originally (and now) *Membranophoridium*, subsequently *Chiropteridium*. Age: middle Oligocene.

"*brevifolium*" Schindler, 1992, p.204–206, figs.6a–d. Holotype: Schindler, 1992, fig.6b. **Taxonomic Senior Synonym:** *Chiropteridium lobospinosum*, according to Pross (1997, p.102). Age: middle Oligocene.

conispinum Williams, 1978, p.794,797, pl.2, figs.1–6. Holotype: Williams, 1978, pl.2, figs.1–2. Age: Oligocene.

"*dispersum*" Gocht, 1960, p.227, pl.18, figs.1–16; text-figs.16–27. Holotype: Gocht, 1960, pl.18, fig.1. **Taxonomic senior synonym:** *Galea* (as *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). Taxonomic junior synonym: *Membranophoridium multispinatum*, according to Brosius (1963, p.48) and Gocht (1969, p.63). Age: middle Oligocene.

eocenicum Heilmann-Clausen and Van Simaëys, 2005, p.154, pl.2, figs.1–5. Holotype: Heilmann-Clausen and Van Simaëys, 2005, pl.2, figs.1–2. Age: middle Eocene.

galea (Maier, 1959, p.306, pl.29, fig.4; text-fig.2) Sarjeant, 1983, p.108. Emendation: Sarjeant, 1983, p.110, as *Chiropteridium galea*. Holotype: Maier, 1959, pl.29, fig.4; Eisenack and Kjellström, 1975b, p.88a; Fensome et al., 1995, fig.1 — p.1495. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*, fourthly *Areoligera?*, fifthly (and now) *Chiropteridium*. Taxonomic junior synonyms: *Chiropteridium dispersum*, *Galea* (subsequently *Baltisphaeridium*) *mespilana* and *Galea* (subsequently *Baltisphaeridium*) *levis*, all according to Sarjeant (1983, p.108–109); *Membranophoridium multispinatum*, by implication in Brosius (1963, p.48) and Gocht (1969, p.63), who considered *Membranophoridium multispinatum* to be a taxonomic junior synonym of *Galea* (as *Chiropteridium dispersa*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium*) *galea*; *Membranophoridium* (subsequently *Chiropteridium*) *partispinatum*, by implication in Matsuoka and Bujak (1988, p.40), who considered *Membranophoridium partispinatum* to be a taxonomic junior synonym of *Galea* (as *Chiropteridium mespilana*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium*) *galea*. Fensome et al. (1990, p.622) stated: "The following observations can be made: Article 68.1 [effectively equivalent to Article 55.1 in the I.C.N.] of the I.C.B.N. implies that a specific epithet is to be considered valid at the date of its original proposal provided all requirements for valid publication are met, except that the generic name is illegitimate; apart from the fact that the generic name *Galea* is an illegitimate homonym, Maier (1959) fulfilled all requirements for the equivalent of valid publication under the I.C.Z.N.; and the I.C.B.N. accepts all names thus published under alternate recognized codes from the dates of their valid publication (or equivalent), if these names are transferred into the jurisdiction of the I.C.B.N. Thus *Baltisphaeridium* (now

Chiropteridium *galea* (Maier, 1959) Sarjeant, 1964a can be considered to be a validly published botanical name, with priority of the specific epithet dating back to 1959. In considering *Galea* (as *Chiropteridium*) *galea* Maier, 1959, *Galea* (al. *Baltisphaeridium*) *levis* Maier, 1959 and *Galea* (al. *Baltisphaeridium*) *mespilanum* Maier, 1959 to be synonymous, Sarjeant (1983, p.108–109) chose *Galea* (as *Chiropteridium*) *galea* to be the senior name; as the first synonymizing author, his choice of epithet has priority. Lentin and Williams (1989, p.59) considered *Galea* (as *Chiropteridium*) *mespilana* to be the senior name." N.I.A. Age: Oligocene.

"*inornatum*" Drugg, 1970b, p.811–812, figs.3C–F. Holotype: Drugg, 1970b, fig.3C. **NOW** *Senoniasphaera*. Originally *Chiropteridium*, subsequently (and now) *Senoniasphaera*. Age: Danian.

"*korykos*" (Maier, 1959, p.310–311, pl.30, figs.7–8) Lentin and Williams, 1973, p.25. Holotype: Maier, 1959, pl.30, fig.7, lost according to Sarjeant (1983, p.91–92). Lectotype: Maier, 1959, pl.30, fig.8, designated by Sarjeant (1983, p.91–92). Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Chiropteridium*?, fourthly *Hystrichosphaeridium*?. **Taxonomic senior synonym:** *Xanthidium* (as and now *Spiniferites*) *ramosum*, according to Sarjeant (1983, p.91–92). Questionable assignment: Lentin and Williams (1973, p.25). N.I.A. Age: late Oligocene–middle Miocene.

**lobospinosum* Gocht, 1960, p.222–223, 226–227, pl.17, figs.1–16; text-figs.1–15. Holotype: Gocht, 1960, pl.17, fig.1; Fauconnier and Masure, 2004, pl.13, figs.3–4. Originally *Hystrichosphaeridium* (name not validly published), subsequently (and now) *Chiropteridium*, thirdly *Baltisphaeridium* (combination not validly published; Appendix A). Taxonomic junior synonym: *Chiropteridium brevifolium*, according to Pross (1997, p.102). The name *Hystrichosphaeridium lobospinosum* was not validly published in Weiler (1956, p.138–139) and Maier (1959, p.314) since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1b). Age: middle Oligocene.

"*mespilanum*" (Maier, 1959, p.306–307, pl.29, figs.5–6) Lentin and Williams, 1973, p.26. Holotype: Maier, 1959, pl.29, fig.5. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Chiropteridium*, fourthly *Hystrichosphaeridium*. **Taxonomic senior synonym:** *Galea* (now *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). Taxonomic junior synonym: *Membranophoridium* (subsequently *Chiropteridium*) *partispinatum*, according to Matsuoka and Bujak (1988, p.40). Age: middle Oligocene–middle Miocene.

"*partispinatum*" (Gerlach, 1961, p.201, pl.29, figs.3,6) Brosius, 1963, p.48. Holotype: Gerlach, 1961, pl.29, fig.6; Fauconnier and Masure, 2004, pl.13, figs.1–2. Originally *Membranophoridium*, subsequently *Chiropteridium*. **Taxonomic senior synonym:** *Galea* (as and now *Chiropteridium*) *galea*, by implication in Matsuoka and Bujak (1988, p.40), who considered *Chiropteridium partispinatum* to be a taxonomic junior synonym of *Chiropteridium mespilanum*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium*) *galea*. Age: middle-late Oligocene.

CHLAMYDOPHORELLA Cookson and Eisenack, 1958, p.56. Emendation: Duxbury, 1983, p.41. Taxonomic junior synonyms: *Gardodinium*, by implication in Davey (1978, p.893), who transferred the "type species" of *Gardodinium*, *Gardodinium trabeculosum*, to *Chlamydophorella* — however, Lentin and Williams (1981, p.108) retained *Gardodinium*; *Sepispinula*, by implication in Schiøler and Wilson (1998, p.328), who considered the type, *Sepispinula ancoriferum*, to be a taxonomic junior synonym of *Chlamydophorella ambigua* — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula*. Type: Cookson and Eisenack, 1958, pl.11, fig.1, as *Chlamydophorella nyei*.

"*albertii*" (Neale and Sarjeant, 1962, p.445–446, pl.19, fig.8; text-figs.4a–b [not fig.6]) Davey, 1978, p.893. Holotype: Neale and Sarjeant, 1962, pl.19, fig.8; text-figs.4a–b. Originally *Gardodinium*, subsequently *Chlamydophorella*. **Taxonomic senior synonym:** *Scriniodinium* (as and now *Gardodinium*) *trabeculosum*, according to Harding (1996, p.359). Age: Hauterivian.

"*ambigua*" (Deflandre, 1937b, p.81, pl.16 [al. pl.13], figs.8–9) Stover and Helby, 1987d, p.277. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. **NOW** *Sepispinula*?. Originally *Micrhystridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Polysphaeridium*, fourthly

Chlamydophorella, fifthly *Dapsilidinium*, sixthly *Gorgonisphaeridium* (Appendix A), seventhly (and now) *Sepispinula*?. Taxonomic junior synonyms: *Hystrichosphaeridium* (now *Sepispinula*?) *huguoniotii*, according to Clarke and Verdier (1967, p.54) and *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, both according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499–500) retained *Sepispinula ancorifera* and *Sepispinula huguoniotii*. Age: Late Cretaceous.

"*apiculata*" Cookson and Eisenack, 1970a, p.150–151, pl.13, fig.3. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.3. Originally *Chlamydophorella*, subsequently *Chlamydophorella*?. **Taxonomic senior synonym:** *Chlamydophorella nyei*, according to Morgan (1980, p.18–19). Questionable assignment: Stover and Evitt (1978, p.28). Age: Albian–Cenomanian.

delicata Hultberg, 1985c, p.114–115, pl.2, fig.B. Holotype: Hultberg, 1985c, pl.2, fig.B. Age: late Danian.

discreta Clarke and Verdier, 1967, p.24, pl.2, figs.9–10; text-fig.9. Holotype: Clarke and Verdier, 1967, pl.2, fig.10. Age: Cenomanian–Santonian.

ectotabulata Smelror, 1989, p.141–143,145, pl.1, figs.1–4; pl.2, figs.1–4; pl.3, figs.1–5; text-figs.2A–C. Holotype: Smelror, 1989, pl.2, fig.1 (labelled as pl.2, fig.2 in the plate caption). This name was not validly published in Smelror (1988b, p.151,155), who did not provide a description. Age: late Bathonian–Oxfordian.

"*elongata*" (Singh, 1971, p.381–383, pl.68, figs.3–4) Davey, 1978, p.893. Holotype: Singh, 1971, pl.68, fig.3. Originally *Gardodinium*, subsequently *Chlamydophorella*. **Taxonomic senior synonym:** *Gardodinium eisenackii*, according to Brideaux and McIntyre (1975, p.33). Age: middle Albian.

fenestrata Jain and Garg in Jain et al., 1984, p.72, pl.1, figs.18–19. Holotype: Jain et al., 1984, pl.1, fig.19. Age: Kimmeridgian–early Tithonian.

?*grossa* Manum and Cookson, 1964, p.17–18, pl.5, fig.1–2. Holotype: Manum and Cookson, 1964, pl.5, fig.1. Originally *Chlamydophorella*, subsequently (and now) *Chlamydophorella*?. Questionable assignment: Ioannides (1986, p.16). Age: Cenomanian.

haigii Backhouse, 2006, p.58,60, pl.1, figs.1–8. Holotype: Backhouse, 2006, pl.1, figs.1–2. Age: early-middle Albian.

"*huguoniotii*" (Valensi, 1955a, p.38–39, text-fig.2a) Davey, 1978, p.893. Holotype: Valensi, 1955a, text-fig.2a; Fauconnier and Masure, 2004, pl.72, figs.1–3. **NOW** *Sepispinula*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium*?, fifthly *Chlamydophorella*, sixthly *Sepispinula*, seventhly (and now) *Sepispinula*?. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula*?) *ambiguum*, according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.500) retained *Hystrichosphaeridium* (as and now *Sepispinula*) *huguoniotii*. Taxonomic junior synonym: *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Hystrichosphaeridium* (as and now *Sepispinula*) *ancoriferum*. Age: Late Cretaceous.

"*inconscripita*" Wilson in Slimani, 2001a, p.192. **Name not validly published:** no description. **Taxonomic senior synonym:** *Histiocysta? variornata*, according to Slimani (2001a, p.192).

"*lagena*" Cookson and Eisenack, 1970a, p.151, pl.13, fig.4. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.4. **Taxonomic senior synonym:** *Chlamydophorella nyei*, according to Morgan (1980, p.18–19). Age: Albian–Cenomanian.

largissima Singh, 1971, p.378, pl.67, figs.5–6. Holotype: Singh, 1971, pl.67, figs.5–6. Originally (and now) *Chlamydophorella largissima*, subsequently *Chlamydophorella nyei* subsp. *largissima*. Lentin and Williams (1981, p.44) retained this taxon at the species rank. Age: middle Albian.

"*magnifica*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

"?*membranoidea*" Vozzhennikova, 1967, p.114–115, pl.48, figs.1–2,3a–b,4a–b,5–8,9a–c,10. Emendation: Lentin and Vozzhennikova, 1990, p.103, as *Lagenadinium? membranoideum*. Holotype: Vozzhennikova, 1967, pl.48, figs.9a–b; Lentin and Vozzhennikova, 1990, text-fig.58; lost according to Lentin and Vozzhennikova (1990, p.103). Lectotype: ?Vozzhennikova, 1967, pl.48, fig.6; Lentin and Vozzhennikova, 1990, pl.10, figs.6–7; designated by Lentin and Vozzhennikova (1990, p.103). **NOW** *Stephanelyton*. Originally *Chlamydophorella*, subsequently *Chlamydophorella?*, thirdly *Lagenadinium?*, fourthly (and now) *Stephanelyton*. Questionable assignment: Stover and Evitt (1978, p.28). Taxonomic junior synonym: *Stephanelyton cretaceum*, according to Heilmann-Clausen in Heilmann-Clausen and Thomsen (1995, p.301) — however, Courtinat (1999, p.178) retained *Stephanelyton cretaceum*. Age: Late Jurassic.

membranoperforata Below, 1982d, p.345, fig.3. Holotype: Below, 1982d, fig.3. Age: late Barremian.

?*multifibrata* Schiøler, 1993, p.104,106, pl.5, figs.7–12. Holotype: Schiøler, 1993, pl.5, fig.9. Questionable assignment: Schiøler (1993, p.104). Age: Maastrichtian.

**neyi* Cookson and Eisenack, 1958, p.56, pl.11, figs.1–3. Holotype: Cookson and Eisenack, 1958, pl.11, fig.1. Taxonomic junior synonyms: *Chlamydophorella apiculata* and *Chlamydophorella lagena*, both according to Morgan (1980, p.18–19). Age: Aptian–Turonian.

"subsp. *largissima*" (Singh, 1971, p.378, pl.67, figs.5–6) Below, 1981a, p.34. Holotype: Singh, 1971, pl.67, figs.5–6. **NOW** *Chlamydophorella largissima*. Originally (and now) *Chlamydophorella largissima*, subsequently *Chlamydophorella neyi* subsp. *largissima*. Age: middle Albian.

"subsp. *neyi*". Autonym. Holotype: Cookson and Eisenack, 1958, pl.11, fig.1. **Now redundant.**

"*ordinalis*" (Davey, 1974, p.51, pl.3, figs.5–6) Davey, 1978, p.893. Holotype: Davey, 1974, pl.3, fig.6. **NOW** *Gardodinium*. Originally (and now) *Gardodinium*, subsequently *Chlamydophorella*. Age: Aptian–Turonian.

ovulum Wheeler and Sarjeant, 1990, p.315–316, pl.12, figs.4–6; text-figs.12a–b ex Wheeler and Sarjeant, 1992, p.381. Holotype: Wheeler and Sarjeant, 1990, pl.12, fig.4. This name was not validly published in Wheeler and Sarjeant (1990), since the lodgement of the holotype was not specified (I.C.N. Article 40.7). N.I.A. Age: late Callovian–early Oxfordian.

"*pyriformis*" (Vozzhennikova, 1967, p.179, pl.100, figs.1,4) Davey, 1978, p.893. Holotype: Vozzhennikova, 1967, pl.100, fig.4; Lentin and Vozzhennikova, 1990, text-fig.57; lost according to Lentin and Vozzhennikova (1990, p.101). Neotype: Lentin and Vozzhennikova, 1990, pl.12, figs.8–10, designated by Lentin and Vozzhennikova (1990, p.101). Originally *Gardodinium*, subsequently *Chlamydophorella*. **Taxonomic senior synonym:** *Scriniodinium* (as and now *Gardodinium*) *trabeculosum*, according to Harding (1996, p.359). Lentin and Vozzhennikova (1990, p.102) provided an "expanded description" for the species, as *Gardodinium pyriforme*. Age: Early Cretaceous (Barremian).

raritubula Dodekova, 1975, p.27–28, pl.1, figs.7–10; pl.6, figs.13–16; text-fig.6. Holotype: Dodekova, 1975, pl.6, figs.13–14. Age: late Bathonian.

regularis (Xu Jinli et al., 1997, p.115,152, pl.36, figs.1a–b,2a–b,3a–b,4a–b,5–6) He Chengquan et al., 2009, p.342. Holotype: Xu Jinli et al., 1997, pl.36, figs.1a–b. Originally *Ctenophora*, subsequently (and now) *Chlamydophorella*. This name was cited as "*Ctenosphaera regularis*" by Xu Jinli et al. (1997, p.115). Age: Oligocene.

solida Morgan, 1980, p.19, pl.30, figs.7–16. Holotype: Morgan, 1980, pl.30, figs.9–12. Age: middle Aptian–earliest Albian.

?*suemegensis* (Góczán, 1962, p.192, pl.2, figs.12–14) Sarjeant and Stancliffe, 1994, p.56. Holotype: Góczán, 1962, pl.2, figs.12–14. Originally *Micrhystridium* (Appendix A), subsequently (and now) *Chlamyphorella*?. Questionable assignment: Sarjeant and Stancliffe (1994, p.56). Age: early Aptian.

?*tabulata* Singh, 1971, p.379, pl.67, fig.7. Holotype: Singh, 1971, pl.67, fig.7. Questionable assignment: Stover and Evitt (1978, p.28). Age: middle Albian.

"*trabeculosa*" (Gocht, 1959, p.62, pl.4, fig.5) Davey, 1978, p.893. Emendation: Harding, 1996, p.359,361,363, as *Gardodinium trabeculosum*. Holotype: Gocht, 1959, pl.4, fig.5; Harding, 1996, pl.3, figs.1,6–7. **NOW** *Gardodinium*. Originally *Scriniodinium*, subsequently (and now) *Gardodinium*, thirdly *Chlamyphorella*. Taxonomic junior synonyms: *Gardodinium eisenackii*, according to Davey (1974, p.51); *Gardodinium albertii* and *Gardodinium pyriforme*, both according to Harding (1996, p.359); *Gardodinium elongatum*, by implication in Brideaux and McIntyre (1975, p.33), who considered *Gardodinium elongatum* to be a taxonomic junior synonym of *Gardodinium eisenackii*. Age: Hauterivian.

?*urna* Cookson and Eisenack, 1960a, p.10, pl.3, fig.7. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.7. Questionable assignment: Stover and Evitt (1978, p.28). N.I.A. Age: late Albian–Cenomanian.

wallala Cookson and Eisenack, 1960b, p.255, pl.38, fig.13; pl.39, fig.11. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.13. N.I.A. Age: Oxfordian–early Kimmeridgian.

CHLONOVIELLA Lebedeva in Ilyina et al., 1994, p.63. Type: Ilyina et al., 1994, pl.20, figs.6–7, as *Chlonoviella agapica*.

**agapica* Lebedeva in Ilyina et al., 1994, p.63–64, pl.19, figs.7–8; pl.20, figs.1–9; text-fig.8. Holotype: Ilyina et al., 1994, pl.20, figs.6–7. Age: late Cenomanian–early Santonian.

CHYTROEISPHAERIDIA (Sarjeant, 1962a, p.492) Downie and Sarjeant, 1965, p.102. Emendations: Pocock, 1972, p.99–100 and Davey, 1979d, p.211, both as *Chytroeisphaeridia*. Originally *Leiosphaeridia* subgenus *Chytroeisphaeridia* (Appendix A), subsequently (and now) *Chytroeisphaeridia*. Taxonomic junior synonym: *Tapeinosphaeridium*, according to Davey (1979d, p.211). Type: Sarjeant, 1962a, pl.70, fig.13, as *Leiosphaeridia* subgenus *Chytroeisphaeridia chytrooides*.

baetica Riegel, 1974, p.349–350,353–354, pl.1, figs.1–5; text-fig.2. Emendation: Riegel and Sarjeant, 1982, p.299–300. Holotype: Riegel, 1974, pl.1, fig.2. Questionable assignment: Davey (1979d, p.216) — however, Riegel and Sarjeant (1982, p.299–300) retained the species in *Chytroeisphaeridia* without question. Age: ?Senonian.

"*caddaensis*" Filatoff, 1975, p.89–90, pl.29, figs.7–9. Holotype: Filatoff, 1975, pl.29, fig.7; Helby et al., 1987, figs.16A–B. **NOW** *Dissiliodinium*. Originally *Chytroeisphaeridia*, subsequently (and now) *Dissiliodinium*. Age: Bajocian.

"*cariacoensis*" Wall, 1967, p.113, pl.16, figs.13–14. Emendation: Matsuoka, 1987, p.53, as *Brigantedinium cariaeoense*. Holotype: Wall, 1967, pl.16, fig.14. **NOW** *Brigantedinium*. Originally *Chytroeisphaeridia*, subsequently (and now) *Brigantedinium*. Motile equivalent: *Protoperidinium avellanum* (Meunier, 1919) Balech, 1974, according to Wall and Dale (1967, p.350) and Harland (1981, p.68). Age: Quaternary.

cerastes Davey, 1979d, p.212,214, pl.2, figs.8–9. Holotype: Davey, 1979d, pl.2, fig.8. N.I.A. Age: early Oxfordian.

**chytrooides* (Sarjeant, 1962a, p.493–494, pl.70, figs.13,16) Downie and Sarjeant, 1965, p.103. Emendation: Davey, 1979d, p.211, as *Chytroeisphaeridia chytrooides*. Holotype: Sarjeant, 1962a, pl.70, fig.13. Originally *Leiosphaeridia* subgenus *Chytroeisphaeridia* (Appendix A), subsequently (and now) *Chytroeisphaeridia*. Age: Oxfordian.

"*dictydia*" Sarjeant, 1972, p.41, pl.3, fig.3; pl.6, fig.6. Holotype: Sarjeant, 1972, pl.6, fig.6. **NOW** *Valensiella*. Originally *Chytroeisphaeridia*, subsequently *Batiacasphaera*, thirdly *Escharisphaeridia*, fourthly *Cassiculospaeridia*, fifthly (and now) *Valensiella*. Age: Bathonian–Callovian.

elongata He Chengquan, 1991, p.115, pl.6, fig.6. Holotype: He Chengquan, 1991, pl.6, fig.6. Age: Paleocene.

"*euteiches*" Davey, 1969a, p.141, pl.3, figs.8–9. Holotype: Davey, 1969a, pl.3, fig.8. **NOW** *Batiacasphaera*. Originally *Chytroeisphaeridia*, subsequently (and now) *Batiacasphaera*. Age: Cenomanian.

"*everricula*" Wilson in Slimani, 1994, p.99. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Cassiculospaeridia? intermedia*, according to Slimani (1994, p.99). Slimani (2001a, p.192) spelled the epithet "*everrecula*".

"*explanata*" Bujak in Bujak et al., 1980, p.44, pl.13, figs.13–14. Holotype: Bujak et al., 1980, pl.13, figs.13–14. **NOW** *Batiacasphaera*. Originally *Chytroeisphaeridia*, subsequently (and now) *Batiacasphaera*. Age: middle Eocene (see Aubry, 1986).

gochti (Dodekova, 1975, p.31, pl.3, figs.8,10–13) Jansonius, 1986, p.205. Holotype: Dodekova, 1975, pl.3, fig.10. Originally *Tectatodinium*, subsequently *Dodekovia*, thirdly (and now) *Chytroeisphaeridia*. Lentin and Williams (1989, p.61) retained this species in *Chytroeisphaeridia*. Age: late Bathonian.

"*granulata*" Courtinat in Courtinat and Gaillard, 1980, p.13–14, pl.1, figs.4,6; text-fig.2b. Holotype: Courtinat and Gaillard, 1980, pl.1, fig.6. **NOW** *Escharisphaeridia*. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia*, thirdly *Sentusidinium*. Age: late Oxfordian.

"*grossa*" Smelror, 1988b, p.150,152, figs.10C,E. Holotype: Smelror, 1988b, fig.10C. **Taxonomic senior synonym**: *Tapeinosphaeridium* (as *Chytroeisphaeridia*) *hyalinum*, according to Riding (1990, p.311). Age: early Callovian–early Oxfordian.

"*hungarica*" Sütő-Szentai, 1990, p.851, pl.4, figs.5a–b. Holotype: Sütő-Szentai, 1990, pl.4, figs.5a–b. **Name not validly published**: lodgement of holotype not specified (I.C.N. Article 40.7). Age: late Miocene.

hyalina (Raynaud, 1978, p.394–395, pl.2, fig.18) Lentin and Williams, 1981, p.45. Holotype: Raynaud, 1978, pl.2, fig.18. Originally *Tapeinosphaeridium*, subsequently (and now) *Chytroeisphaeridia*. Taxonomic junior synonym: *Chytroeisphaeridia grossa*, according to Riding (1990, p.311). This combination was not validly published in Riley and Fenton (1980, p.340), since these authors did not reference the basionym. Age: early-middle Callovian.

"*kendelbachia*" (Morbey, 1975, p.38, pl.14, figs.1–4; pl.17, figs.1–3) Stover and Evitt, 1978. Holotype: Morbey, 1975, pl.14, fig.1; pl.17, fig.1. **NOW** *Heibergella*. Originally *Rhombodella* (Appendix A), subsequently *Chytroeisphaeridia*, thirdly (and now) *Heibergella*. Below (1987a, p.94) considered this species to be a questionable taxonomic junior synonym of *Suessia swabiana*. Age: Rhaetian.

"*laevigata*" Grabowska in Malinowskiej and Piwockiego, 1996, p.364–365, pl.109, fig.4. Holotype: Malinowskiej and Piwockiego, 1996, pl.109, fig.4. **Name not validly published**: no Latin or English description. Questionable assignment: Grabowska in Malinowskiej and Piwockiego (1996, p.364). Age: late Eocene–early Oligocene.

"*mantelli*" Gitmez and Sarjeant, 1972, p.186, pl.1, figs.3–4; pl.12, fig.3. Holotype: Gitmez and Sarjeant, 1972, pl.1, fig.3. **NOW** *Escharisphaeridia*. Originally *Chytroeisphaeridia*, subsequently *Chytroeisphaeridia?*, thirdly (and now) *Escharisphaeridia*. Questionable assignment: Stover and Evitt (1978, p.29). Age: early–late Kimmeridgian.

microgranulata He Chengquan, 1991, p.116, pl.49, figs.14–18; pl.51, figs.3–12. Holotype: He Chengquan, 1991, pl.49, fig.17; pl.51, fig.6. He Chengquan et al. (2009, p.218) indicated that they were validating this species, but it is not clear why they considered the name to have been invalid in He Chengquan (1991). Age: early Eocene.

"*minor*" (Cookson and Hughes, 1964, p.43, pl.8, figs.1–3,5) Morgan, 1980, p.19. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. **NOW** *Kallosphaeridium? helbyi*. Originally *Canningia minor*, subsequently *Canningia? minor*, thirdly *Batiacasphaera minor*, fourthly *Chytroeisphaeridia minor*, fifthly *Kallosphaeridium? minus* (name illegitimate), sixthly (and now) *Kallosphaeridium? helbyi*. Age: late Albian–early Cenomanian.

"subsp. *minor*". Autonym. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. **NOW** *Kallosphaeridium? helbyi* subsp. *helbyi*. Originally *Canningia? minor* subsp. *minor*, subsequently *Chytroeisphaeridia minor* subsp. *minor*, thirdly (and now) *Kallosphaeridium? helbyi* subsp. *helbyi*.

"subsp. *psilata*" (Burger, 1980a, p.71, pl.25, figs.5–11) Lentin and Williams, 1985, p.58. Holotype: Burger, 1980a, pl.25, fig.10. **NOW** *Kallosphaeridium? helbyi* subsp. *psilatum*. Originally *Canningia? minor* var. *psilata*, subsequently *Canningia? minor* subsp. *psilata*, thirdly *Chytroeisphaeridia minor* subsp. *psilata*, fourthly (and now) *Kallosphaeridium? helbyi* subsp. *psilatum*. Age: Aptian–Albian.

minuta Qian Zeshu et al., 1986, p.22–23, pl.1, figs.7–10,12–14; pl.3, figs.1–9. Holotype: Qian Zeshu et al., 1986, pl.1, fig.10. Age: Paleocene–Eocene.

"*ovata*" Yu Jingxian and Zhang Wangping, 1980, p.106, pl.1, figs.12–13. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.1, fig.13. **NOW** *Escharisphaeridia?*. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia?*. Age: Late Cretaceous.

"?*parva*" Grabowska in Malinowskiej and Piwockiego, 1996, p.365, pl.109, figs.2a–c,3. Holotype: Malinowskiej and Piwockiego, 1996, pl.109, figs.2a–c. **Name not validly published**: no Latin or English description. Questionable assignment: Grabowska in Malinowskiej and Piwockiego (1996, p.365). This name was also not validly published in Słodkowska (1994, p.17) since that author did not provide a description. Age: late Eocene–early Oligocene.

pericompsa (Ioannides et al., 1977, p.463, pl.5, figs.1–4; text-fig.13) Davey, 1979d, p.216. Holotype: Ioannides et al., 1977, pl.5, fig.1. Originally *Tapeinosphaeridium*, subsequently (and now) *Chytroeisphaeridia*. Age: middle Kimmeridgian.

"*pocockii*" Sarjeant, 1968, p.230, pl.3, fig.9. Holotype: Sarjeant, 1968, pl.3, fig.9; Eisenack and Kjellström, 1972, p.185; Davey, 1979d, pl.2, figs.7,10; Fensome et al., 1995, fig.1 — p.1673. **NOW** *Escharisphaeridia*. Originally *Chytroeisphaeridia*, subsequently *Lithodinia*, thirdly (and now) *Escharisphaeridia*. Age: late Callovian.

"*reticulata*" Davey, 1969b, p.14, pl.4, figs.3–4,6. Holotype: Davey, 1969b, pl.4, fig.3. **NOW** *Batiacasphaera?*. Originally *Chytroeisphaeridia*, subsequently *Fromea* (Appendix A), thirdly *Batiacasphaera*, fourthly (and now) *Batiacasphaera?*. Age: Campanian–Maastrichtian.

"*ringnesiorum*" (Manum and Cookson, 1964, p.15, pl.2, fig.10) Morgan, 1980, p.19. Holotype: Manum and Cookson, 1964, pl.2, fig.10. **NOW** *Kallosphaeridium?*. Originally *Canningia*, subsequently *Canningia?*, thirdly *Batiacasphaera*, fourthly *Chytroeisphaeridia*, fifthly (and now) *Kallosphaeridium?*. The plural ending is necessary because the species is named after the Ringnes brothers. Age: Campanian–Maastrichtian.

"*rugosa*" Courtinat in Courtinat and Gaillard, 1980, p.15–16, pl.1, fig.12; pl.2, fig.1; text-fig.2d. Holotype: Courtinat and Gaillard, 1980, pl.2, fig.1. **NOW** *Escharisphaeridia*. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia*. Age: late Oxfordian.

?*scabrata* Pocock, 1972, p.100, pl.27, figs.23–25. Holotype: Pocock, 1972, pl.27, figs.24–25; Jansonius, 1986, pl.3, figs.13–14. Originally *Chytroeisphaeridia*, subsequently (and now) *Chytroeisphaeridia?*. Questionable assignment: Stover and Evitt (1978, p.28) as a problematic species. Age: late Bajocian.

"*shangsica*" He Chengquan, 1984b, p.162, pl.8, figs.16–19. Holotype: He Chengquan, 1984b, pl.8, fig.16. **NOW** *Escharisphaeridia*. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia*. Age: Tertiary.

"*simplicia*" Wall, 1965b, p.308; text-figs.7,20. Holotype: Wall, 1965b, text-figs.7,20; Eisenack and Kjellström, 1972, p.187; Fensome et al., 1995, fig.1 — p.1785. **Name not validly published:** no Latin diagnosis. **NOW** *Brigantedinium*. Originally *Chytrioisphaeridia simplicia* (name not validly published), subsequently (and now) *Brigantedinium simplex*. Motile equivalent: *Protoperidinium conicoides* (Paulsen, 1905) Balech, 1974, according to Harland (1981, p.68). This name was not validly published in Wall (1965b), since that author did not provide a Latin diagnosis, a requirement prior to 2012 since this species is based on living material (I.C.N. Article 39). Age: extant.

"*solida*" Wilson in Slimani, 2001a, p.192. **Name not validly published:** no description. **Taxonomic senior synonym:** *Batiacasphaera solida*, according to Slimani (2003, p.268–269).

"*spinosa*" Boltenhagen, 1977, p.54–55, pl.7, figs.1a–b,2,3a–b,4a–b,5a–b. Emendation: Masure in Fauconnier and Masure, 2004, p.116–117, as *Trichodinium boltenhagenii*. Holotype: Boltenhagen, 1977, pl.7, figs.1a–b; Fauconnier and Masure, 2004, pl.15, fig.6. **NOW** *Trichodinium boltenhagenii*. Originally *Chytrioisphaeridia spinosa*, subsequently *Cleistosphaeridium? spinosum*, thirdly *Circulodinium spinosum*, fourthly (and now) *Trichodinium boltenhagenii*. Age: Cenomanian–Turonian.

"*suibinensis*" Sun Xuekun and He Chengquan, 1992, p.197,204, pl.2, figs.4–5. Holotype: Sun Xuekun and He Chengquan, 1992, pl.2, figs.4–5. **NOW** *Pyxidinospis*. Originally *Chytrioisphaeridia*, subsequently (and now) *Pyxidinospis*. Age: Late Jurassic.

tuberosa Sütő-Szentai, 1982a, p.212,219–220 pl.6, figs.1–4. Holotype: Sütő-Szentai, 1982a, pl.6, fig.1. Age: late Miocene.

"?*variabilis*" Pocock, 1972, p.100, pl.23, figs.14–16. Holotype: Pocock, 1972, pl.23, fig.15; Jansonius, 1986, pl.3, figs.15–17; text-fig.8; Jan du Chêne et al., 1986a, pl.39, figs.5–7. **NOW** *Endoscrinium?*. Originally *Chytrioisphaeridia*, subsequently *Chytrioisphaeridia?*, thirdly *Gonyaulacysta*, fourthly *Gonyaulacysta?*, fifthly (and now) *Endoscrinium?*. Questionable assignment: Lentin and Williams (1977b, p.26). Age: late Bajocian.

yujingxianii He Chengquan et al., 2009, p.219–220,644–645, pl.70, figs.7–8. Holotype: Yu Jingxian, 1982, pl.4, fig.17, as *Chytrioisphaeridia euteiches*. Age: Berriasian–Valanginian.

"**CILIOSPHAERIDIUM**" Grigorovich, 1971, p.94. **Taxonomic senior synonym:** *Impletosphaeridium*, according to Stover and Evitt (1978, p.232–233). Type: Grigorovich, 1971, pl.2, fig.1, as *Ciliosphaeridium cingulatum*.

"**cingulatum*" Grigorovich, 1971, p.94, pl.2, fig.1. Holotype: Grigorovich, 1971, pl.2, fig.1; Fensome et al., 1993a, fig.1 — p.1059. **NOW** *Impletosphaeridium*. Originally *Ciliosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Paleocene.

CINCTACTINISCUS Dumitrică, 1973, p.823. Siliceous dinoflagellate genus. Type: Hovasse, 1943, fig.3, as *Gymnaster cinctus*.

**cinctus* (Hovasse, 1943, p.279, fig.3) Dumitrică, 1973, p.824. Holotype: Hovasse, 1943, fig.3. Originally *Gymnaster*, subsequently (and now) *Cinctactiniscus*. Age: early Miocene.

intermedius Dumitrică, 1973, p.824, pl.1, figs.5,7–8; pl.5, fig.2. Holotype: Dumitrică, 1973, pl.1, fig.8. Age: early Oligocene–early Miocene.

robustus Dumitrică, 1973, p.823–824, pl.1, figs.1–4; pl.5, figs.1,3. Holotype: Dumitrică, 1973, pl.1, fig.1. Age: early Oligocene.

CIRCULODINIUM Alberti, 1961, p.28. Taxonomic senior synonyms: *Canningia*, according to Millioud (1969, p.425) and *Cyclonephelium*, according to Davey (1978, p.894) — however, Jansonius (1986, p.204) retained

Circulodinium. Duxbury (2002, p.78) considered that *Circulodinium* may be a taxonomic junior synonym of *Tenua* Eisenack. Type: Alberti, 1961, pl.4, fig.20, as *Circulodinium hirtellum*.

?*araneosum* (Brideaux, 1977, p.22–23, pl.9, figs.1–3) Fauconnier in Fauconnier and Masure, 2004, p.115. Holotype: Brideaux, 1977, pl.9, figs.1–2. Originally *Cleistosphaeridium*, subsequently *Heterosphaeridium*, thirdly (and now) *Circulodinium*?. Questionable assignment: Fauconnier and Londeix in Fauconnier and Masure (2004, p.115–116). Age: Aptian–Albian.

asperum (Singh, 1971, p.322, pl.50, fig.1) Helby, 1987, p.324–325. Holotype: Singh, 1971, pl.50, fig.1; Fauconnier and Masure, 2004, pl.14, fig.1. Originally *Canningia*, subsequently *Canningia*?, thirdly *Epelidosphaeridia*, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Age: middle Albian.

asymmetricum (Burger, 1980b, p.270, figs.6c,7a–c) He Chengquan and Sun Xuekun, 2000, p.52. Holotype: Burger, 1980b, fig.7a; Fauconnier and Masure, 2004, pl.14, fig.2. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. This combination was also proposed by Fauconnier in Fauconnier and Masure (2004, p.113). Age: Neocomian.

attadalicum (Cookson and Eisenack, 1962b, p.495, pl.5, figs.12–15) Helby, 1987, p.324–325. Holotype: Cookson and Eisenack, 1962b, pl.5, fig.13. Originally *Cyclonephelium*?, subsequently *Aptea*, thirdly *Canningia*, fourthly (and now) *Circulodinium*. Age: Aptian–Albian.

"*australe*" (Burger, 1980b, p.268–269, figs.5C–D,6A) Islam, 1993, p.83. Emendation: Fauconnier in Fauconnier and Masure, 2004, p.116, as *Trichodinium australe*. Holotype: Burger, 1980b, fig.5D; Fauconnier and Masure, 2004, pl.15, figs.3–5. **NOW** *Trichodinium*. Originally *Cleistosphaeridium*, subsequently *Circulodinium*, thirdly (and now) *Trichodinium*. Age: Neocomian.

barbiferum (Cookson and Eisenack, 1982, p.42, pl.7, figs.8–9) Fauconnier in Fauconnier and Masure, 2004, p.113. Holotype: Cookson and Eisenack, 1982, pl.7, fig.9. Originally *Cyclonephelium*?, subsequently (and now) *Circulodinium*. Age: Albian–Cenomanian.

brevispinatum (Millioud, 1969, p.427–428, pl.1, figs.8–9) Fauconnier in Fauconnier and Masure 2004, p.114. Holotype: Millioud, 1969, pl.1, figs.8–9. Originally *Cyclonephelium distinctum* var. *brevispinatum*, subsequently *Cyclonephelium distinctum* subsp. *brevispinatum*, thirdly *Cyclonephelium brevispinatum*, fourthly (and now) *Circulodinium brevispinatum*. This combination was not validly published by Below in Davey (1994, p.13) since the basionym was not fully referenced. Age: late Hauterivian–early Aptian.

brevispinosum (Pocock, 1962, p.81, pl.14, figs.222–223) Jansonius, 1986, p.204. Emendation: Brideaux, 1977, p.15–16, as *Tenua brevispinosa*. Holotype: Pocock, 1962, pl.14, fig.222; Jansonius, 1986, pl.4, fig.6; Fauconnier and Masure, 2004, pl.14, figs.7–8. Originally *Palaeohystrichophora*, subsequently *Tenua* Eisenack, thirdly *Canningia*?, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Helby (1987, p.324–325) also proposed this combination. Age: Barremian.

chinense (He Chengquan, 1991, p.54–55, pl.9, figs.17–18) He Chengquan et al., 2009, p.268. Holotype: He Chengquan, 1991, pl.9, fig.17. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: middle Eocene.

cingulatum He Chengquan et al., 1999, p.193, pl.2, figs.1–3. Holotype: He Chengquan et al., 1999, pl.2, fig.1. Age: late Hauterivian–Barremian.

colliveri (Cookson and Eisenack, 1960b, p.251, pl.38, figs.3–4) Helby, 1987, p.324–325. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.4. Originally *Canningia*, subsequently (and now) *Circulodinium*, thirdly *Canninginopsis*. Fauconnier and Londeix in Fauconnier and Masure (2004, p.113) retained this species in *Circulodinium*. Age: Aptian.

compta (Davey, 1982b, p.268, pl.8, figs.3–6) Helby, 1987, p.324–325. Holotype: Davey, 1982b, pl.8, fig.3. Originally *Canningia*, subsequently (and now) *Circulodinium*. Davey (1988, p.36) also proposed this combination. Age: early Portlandian–earliest Valanginian.

copei Bailey et al., 1997, p.235–236, figs.3a–f. Holotype: Bailey et al., 1997, fig.3a. Age: late Kimmeridgian.

deflandrei Alberti, 1961, p.29, pl.4, figs.7–13. Holotype: Alberti, 1961, pl.4, fig.13. Taxonomic senior synonym: *Cyclonephelium distinctum*, according to Millioud (1969, p.427) and Harker and Sarjeant in Harker et al. (1990, p.80) — however, Fauconnier and Londeix in Fauconnier and Masure (2004, p.114) retained *Circulodinium deflandrei*. Age: late Barremian.

densebarbatum (Cookson and Eisenack, 1960b, p.253, pl.38, figs.9–10) Fauconnier in Fauconnier and Masure, 2004, p.114. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.10; Fauconnier and Masure, 2004, pl.14, figs.3–4. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. Age: Tithonian.

distinctum (Deflandre and Cookson, 1955, p.285–286, pl.2, fig.14; text-figs.47–48) Jansonius, 1986, p.204. Holotype: Deflandre and Cookson, 1955, pl.2, fig.14. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. Taxonomic junior synonym: *Circulodinium deflandrei*, according to Millioud (1969, p.427) and Harker and Sarjeant in Harker et al. (1990, p.80) — however, Fauconnier and Londeix in Fauconnier and Masure (2004, p.114) retained *Circulodinium deflandrei*. Age: Senonian.

subsp. **distinctum**. Autonym. Holotype: Deflandre and Cookson, 1955, pl.2, fig.14. Originally *Cyclonephelium distinctum* subsp. *distinctum*, subsequently (and now) *Circulodinium distinctum* subsp. *distinctum*.

subsp. **laevigatum** (Mehrotra and Sarjeant, 1986, p.719–720, pl.8, figs.1–2; pl.9, fig.2; text-fig.7a) Lentin and Williams, 1989, p.63. Holotype: Mehrotra and Sarjeant, 1986, pl.9, fig.2; text-fig.7a. Originally *Cyclonephelium distinctum* subsp. *laevigatum*, subsequently (and now) *Circulodinium distinctum* subsp. *laevigatum* Age: Valanginian.

"subsp. **longispinatum**" (Davey, 1978, p.894, pl.3, figs.4,7–8) Lentin and Williams, 1989, p.63. Holotype: Davey, 1978, pl.3, fig.7. **NOW** *Cyclonephelium longispinatum*. Originally *Cyclonephelium distinctum* subsp. *longispinatum*, subsequently *Circulodinium distinctum* subsp. *longispinatum*, thirdly (and now) *Cyclonephelium longispinatum*. Age: Turonian.

subsp. **psilatum** (Yu Jingxian and Zhang Wangping, 1980, p.115, pl.6, figs.1–2) Lentin and Williams, 1989, p.63. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.6, fig.2. Originally *Cyclonephelium distinctum* var. *psilatum*, subsequently *Cyclonephelium distinctum* subsp. *psilatum*, thirdly (and now) *Circulodinium distinctum* subsp. *psilatum*. Age: Turonian–Santonian.

elongatum (He Chengquan, 1991, p.55, pl.9, fig.1) He Chengquan et al., 2009, p.270. Holotype: He Chengquan, 1991, pl.9, fig.1. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Turonian.

"**formosum**" Iosifova, 1992, p.61, pl.9, figs.3a–c; text-figs.1c–d. Holotype: Iosifova, 1992, pl.9, figs.3a–c; text-figs.1c–d; Iosifova, 1996, pl.16, figs.6a–b; text-figs.5A–B. **NOW** *Cyclonephelium*. Originally *Circulodinium*, subsequently (and now) *Cyclonephelium*. Age: Valanginian.

***hirtellum** Alberti, 1961, p.28–29, pl.4, fig.20. Holotype: Alberti, 1961, pl.4, fig.20. Originally (and now) *Circulodinium*, subsequently *Canningia*, thirdly *Cyclonephelium*. Helby (1987, p.322,324–325) retained this species in *Circulodinium*. Backhouse (1988, p.83) considered this species to be a possible taxonomic junior synonym of *Tenua* (as *Cyclonephelium*) *hystrix*. Age: Valanginian–Hauterivian.

?**indicum** Mehrotra and Sarjeant, 1987, p.163, pl.2, fig.2; pl.7, fig.1 ex Lentin and Williams, 1989, p.63. Holotype: Mehrotra and Sarjeant, 1987, pl.2, fig.2. Originally *Cyclonephelium* (name illegitimate), subsequently *Circulodinium*, thirdly (and now) *Circulodinium*?. Questionable assignment: Fauconnier and Londeix in Fauconnier and Masure (2004, p.116). The name *Cyclonephelium indicum* was illegitimate in Mehrotra and Sarjeant (1987) since that name is preoccupied. By "transferring" the species to *Circulodinium*, Lentin and Williams (1989) effectively created a "new name". Age: Paleocene.

insigne (He Chengquan, 1991, p.55–56, pl.9, figs.9–10) He Chengquan et al., 2009, p.271. Holotype: He Chengquan, 1991, pl.9, fig.9. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Cenomanian.

kukebaiense (Mao Shaozhi and Norris, 1988, p.31, pl.1, figs.6–8) He Chengquan et al., 2009, p.271. Holotype: Mao Shaozhi and Norris, 1988, pl.1, fig.7. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Turonian–Santonian.

latoaculeum (Yun Hyesu, 1981, p.42–43, pl.11, figs.17–19) Prince et al., 1999, p.160. Holotype: Yun Hyesu, 1981, pl.11, fig.18; Fensome et al., 1991, fig.2 — p.657; fig.2 — p.693 (mislabelled as *Cleistosphaeridium multifurcatum* subsp. *multifurcatum*); Fensome et al., 1993a, fig.2 — p.1261; Fauconnier and Masure, 2004, pl.35, figs.9–10. Originally *Cleistosphaeridium multifurcatum* subsp. *latoaculeum*, subsequently *Heterosphaeridium latoaculeum*, thirdly (and now) *Circulodinium latoaculeum*. Age: early Santonian.

?*micibaculatum* (Jiabo, 1978, p.54, pl.7, figs.1–2) He Chengquan et al., 2009, p.271. Holotype: Jiabo, 1978, pl.7, fig.1. Originally *Canningia*, subsequently *Canningia?*, thirdly (and now) *Circulodinium?*. Questionable assignment: He Chengquan et al. (2009, p.271). Age: Early Tertiary.

paucispinum (Davey, 1969a, p.170, pl.9, figs.1–2) Fauconnier in Fauconnier and Masure, 2004, p.115. Holotype: Davey, 1969a, pl.9, fig.1; pl.14, figs.5–6; Fauconnier and Masure, 2004, pl.14, figs.5–6. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. Age: Cenomanian.

pentagonum (He Chengquan, 1991, p.56, pl.9, figs.13–14) He Chengquan et al., 2009, p.272. Holotype: He Chengquan, 1991, pl.9, fig.13. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Late Cretaceous.

"*spinosum*" (Boltenhagen, 1977, p.54–55, pl.7, figs.1a–b,2,3a–b,4a–b,5a–b) Islam, 1993, p.83. Emendation: Masure in Fauconnier and Masure, 2004, p.116–117, as *Trichodinium boltenhagenii*. Holotype: Boltenhagen, 1977, pl.7, figs.1a–b; Fauconnier and Masure, 2004, pl.15, fig.6. **NOW** *Trichodinium boltenhagenii*. Originally *Chytroeisphaeridia spinosa*, subsequently *Cleistosphaeridium? spinosum*, thirdly *Circulodinium spinosum*, fourthly (and now) *Trichodinium boltenhagenii*. Age: Cenomanian–Turonian.

vermiculatum Stover and Helby, 1987c, p.230, figs.4A–M. Holotype: Stover and Helby, 1987c, figs.4C–D; Fensome et al., 1996, figs.2–3 — p.2427. Age: late Hauterivian–Barremian.

wulagenense (He Chengquan, 1991, p.57, pl.9, fig.16) He Chengquan et al., 2009, p.272. Holotype: He Chengquan, 1991, pl.9, fig.16. Originally *Canningia*, subsequently (and now) *Circulodinium*. Age: Late Cretaceous.

CIRRUSPHAERA Monteil, 1992a, p.277. Type: Monteil, 1992a, pl.2, figs.1–9, as *Cirrusphaera dissimilis*.

**dissimilis* Monteil, 1992a, p.277, pl.2, figs.1–12. Holotype: Monteil, 1992a, pl.2, figs.1–9; Fauconnier and Masure, 2004, pl.16, figs.1–3. Age: middle-late Berriasian.

CLADOPYXIDIUM McLean, 1972, p.862. Emendations: Stover and Evitt, 1978, p.29–30; Below, 1987b, p.32–33. Taxonomic senior synonym: *Palaeostomocystis*, by implication in Marheinecke (1992, p.105) who transferred the "type species" of *Palaeostomocystis*, *Palaeostomocystis reticulata*, to *Cladopyxidium* — however, Lentin and Williams (1993, p.107) retained *Cladopyxidium*. Type: McLean, 1972, pl.1, figs.5–8, as *Cladopyxidium septatum*.

exilimuratum Schumacker-Lambry, 1978, p.37, pl.2, figs.5–8. Holotype: Schumacker-Lambry, 1978, pl.2, figs.5–6. Originally (and now) *Cladopyxidium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.64) retained this species in *Cladopyxidium*. Age: late Paleocene (Landenian).

foveolatum McMinn, 1988, p.148–150, figs.5A–F,6A–B. Emendation: Marheinecke, 1992, p.105. Holotype: McMinn, 1988, figs.5A,C,E; Fensome et al., 1996, figs.1–3 — p.2131. Age: Maastrichtian.

globosum Marheinecke, 1992, p.104–105, pl.22, figs.1–2. Holotype: Marheinecke, 1992, pl.22, figs.1–2. Contrary to the opinion of Lentin and Williams (1993, p.107), Williams et al. (1998, p.118) considered this name to be validly published. Age: late Maastrichtian.

?**halebayense** Slimani, 1994, p.10–11, pl.1, figs.1–4,21–23. Holotype: Slimani, 1994, pl.1, figs.3–4,23. Questionable assignment: Slimani (1994, p.10). Age: late Maastrichtian.

marheinecke Williams et al., 1998, p.118. Holotype: Marheinecke, 1992, pl.21, figs.8–10, as *Cladopyxidium velatum*. Originally *Cladopyxidium velatum* Marheinecke, subsequently (and now) *Cladopyxidium marheinecke*. This is the substitute name for *Cladopyxidium velatum* Marheinecke 1992, p.104, pl.21, figs.8–10; pl.22, figs.13–15 (an illegitimate name). Age: late Maastrichtian.

paucireticulatum Slimani, 1994, p.11–12, pl.1, figs.14–15,28–30. Holotype: Slimani, 1994, pl.1, figs.14–15,28–29. Age: early–late Maastrichtian.

"**reticulatum**" (Deflandre, 1937b, p.53–54, pl.12 [al. pl.9], figs.4–5) Marheinecke, 1992, p.105. Emendation: Marheinecke, 1992, p.105–106, as *Cladopyxidium reticulatum*. Holotype: Deflandre, 1935, pl.9, fig.13; Deflandre, 1936a, fig.133; Deflandre, 1937b, pl.12 (al. pl.9), fig.4. **Combination illegitimate**: this is the "type species" of the genus *Palaeostomocystis*, which is senior to *Cladopyxidium*. **NOW** *Palaeostomocystis* (Appendix A). Originally (and now) *Palaeostomocystis* (Appendix A), subsequently *Cladopyxidium*. Lentin and Williams (1993, p.107) retained this species in *Palaeostomocystis*. Age: Late Cretaceous.

+**saeptum** (Morgenroth, 1968, p.536–537, pl.41, figs.7–9; pl.42, fig.1) Stover and Evitt, 1978, p.30. Holotype: Morgenroth, 1968, pl.41, fig.7; Eisenack and Kjellström, 1971, p.516a; Fensome et al., 1995, fig.1 — p.1755. Originally *Microdinium*, subsequently (and now) *Cladopyxidium*. Taxonomic junior synonyms: *Microdinium robustum* and *Cladopyxidium septatum*, both according to Stover and Evitt (1978, p.30). The nomenclatural type of the genus *Cladopyxidium* remains the holotype of *Cladopyxidium septatum*. Age: Danian.

"***septatum**" McLean, 1972, p.862–863, pl.1, figs.1–3,5–8,10–12. Holotype: McLean, 1972, pl.1, figs.5–8; Fensome et al., 1995, figs.4–6,9 — p.1779. **Taxonomic senior synonym**: *Cladopyxidium saeptum*, according to Stover and Evitt (1978, p.30). The nomenclatural type of the genus *Cladopyxidium* remains the holotype of *Cladopyxidium septatum*. Age: late Paleocene.

septocrispum Below, 1987b, p.33–34, pl.18, figs.6–10,12–13,15. Holotype: Below, 1987b, pl.18, fig.6; Fensome et al., 1993a, fig.1 — p.1333. Age: late Maastrichtian.

svalbardense (Below, 1987b, p.60, pl.29, figs.1–6; text-figs.13a–g) Lentin and Williams, 1989, p.64. Holotype: Below, 1987b, pl.29, figs.1,3–4,6; text-figs.13c–g; Fensome et al., 1993a, figs.1,3–4,6 — p.1361. Originally *Cladopyxis* (Appendix B), subsequently (and now) *Cladopyxidium*. Age: Toarcian.

velatum Below, 1987b, p.34–36, pl.18, figs.1–5,11,14,16; text-figs.9a–f. Holotype: Below, 1987b, pl.18, figs.1–3; Fensome et al., 1993a, figs.1–3 — p.1369. Junior homonym: *Cladopyxidium velatum* Marheinecke, 1992. Age: late Maastrichtian.

"**velatum**" Marheinecke, 1992, p.104, pl.21, figs.8–10; pl.22, figs.13–15. Holotype: Marheinecke, 1992, pl.21, figs.8–10. **Name illegitimate** — **senior homonym**: *Cladopyxidium velatum* Below, 1987b. **Substitute name**: *Cladopyxidium marheinecke*. Originally *Cladopyxidium velatum* Marheinecke (name illegitimate), subsequently (and now) *Cladopyxidium marheinecke*. Age: late Maastrichtian.

verrucosum Marheinecke, 1992, p.103, pl.22, figs.5–8,12. Holotype: Marheinecke, 1992, pl.22, figs.7–8,12. Contrary to the opinion of Lentin and Williams (1993, p.108), Williams et al. (1998, p.118) considered this name to be validly published. Age: early Maastrichtian.

CLATHROCTENOCYSTIS Wiggins, 1972, p.302–303. Type: Wiggins, 1972, pl.2, figs.A–C, as *Clathroctenocystis elegans*.

asaphes (Drugg, 1978, p.63–64, pl.2, figs.8–10) Stover and Helby, 1987d, p.277. Holotype: Drugg, 1978, pl.2, fig.8. Originally *Belodinium*, subsequently (and now) *Clathroctenocystis*. The epithet is based on a Greek adjective that has the same Latinized ending for all three genders (J. Jansonius, personal communication). Age: early Oxfordian.

calabaza Stevens and Helby, 1987, p.170–172, figs.6A–F,7A–H. Holotype: Stevens and Helby, 1987, figs.7A–C; Fensome et al., 1996, figs.1–3 — p.2077. N.I.A. Age: early Berriasian.

***elegans** Wiggins, 1972, p.303–304, pl.2, figs.A–C; pl.3, figs.A–D; text-fig.3. Holotype: Wiggins, 1972, pl.2, figs.A–C. Age: Neocomian, ?Valanginian or early Hauterivian.

"**obsoleta**" (Dodekova, 1975, p.23–24, pl.4, figs.1–12; text-fig.5) Stover and Helby, 1987d, p.277. Holotype: Dodekova, 1975, pl.4, figs.1–4. **NOW** *Belodinium*. Originally (and now) *Belodinium*, subsequently *Clathroctenocystis*. Age: late Bathonian.

CLEISTOSPHAERIDIUM Davey et al., 1966, p.166. Emendation: Eaton et al., 2001, p.176. Taxonomic senior synonym: *Systematophora*, according to Islam (1993, p.88) — however, Eaton et al. (2001, p.176) retained *Cleistosphaeridium*. Taxonomic junior synonym: *Laticavodinium*, according to Stover and Williams (1987, p.145) — however, *Laticavodinium* is now considered to be a taxonomic junior synonym of *Impletosphaeridium*. Type: Davey et al., 1966, pl.10, fig.7, as *Cleistosphaeridium diversispinosum*.

"**aciculare**" Davey, 1969a, p.158, pl.6, figs.11–12. Holotype: Davey, 1969a, pl.6, figs.11–12; Fauconnier and Masure, 2004, pl.23, fig.9. **NOW** *Downiesphaeridium?*. Originally *Cleistosphaeridium*, subsequently *Downiesphaeridium*, thirdly (and now) *Downiesphaeridium?*. Questionable assignment: Davey (1969a, p.158). Age: Albian–Cenomanian.

"**actinocoronatum**" Benedek, 1972, p.34, pl.12, fig.13; text-fig.13. Emendation: Bujak and Matsuoka, 1986, p.238–239, as *Reticulosphaera actinocoronata*. Holotype: Benedek, 1972, pl.12, fig.13; Benedek and Sarjeant, 1981, fig.10, no.5; text-fig.11; Sarjeant et al., 1987, pl.2, fig.4; Fensome et al., 1993a, fig.1 — p.879. **NOW** *Reticulosphaera*. Originally *Cleistosphaeridium*, subsequently *Areosphaeridium?*, thirdly (and now) *Reticulosphaera*. Taxonomic junior synonym: *Reticulosphaera stellata*, according to Bujak and Matsuoka (1986, p.238). Age: middle-late Oligocene.

"**ambiguum**" (Deflandre, 1937b, p.81, pl.16 [al. pl.13], figs.8–9) Jiabo, 1978, p.60. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. **NOW** *Sepispinula?*. Originally *Micrhystridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Polysphaeridium*, fourthly *Chlamydophorella*, fifthly *Dapsilidinium*, sixthly *Gorgonisphaeridium* (Appendix A), seventhly (and now) *Sepispinula?*. Taxonomic junior synonyms: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) and *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, both according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499–500) retained *Sepispinula ancorifera* and *Sepispinula? huguoniotii*. Age: Late Cretaceous.

"**ancoriferum**" (Cookson and Eisenack, 1960a, p.8, pl.2, fig.11) Davey et al., 1966, p.167. Emendation: Cookson and Eisenack, 1968, p.119–120, as *Cleistosphaeridium ancoriferum*. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.11. **NOW** *Sepispinula*. Originally *Hystrichosphaeridium*, subsequently *Cleistosphaeridium*, thirdly (and now) *Sepispinula*. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula?*) *ambiguum*, according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula ancorifera*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula ancorifera*. Age: Albian–Cenomanian.

ancyreum (Cookson and Eisenack, 1965a, p.126, pl.14, figs.1–3) Eaton et al., 2001, p.191. Holotype: Cookson and Eisenack, 1965a, pl.14, fig.1; Fauconnier and Masure, 2004, pl.76, figs.1–3. Originally *Systematophora ancyrea*, subsequently *Systematophora placacantha* var. *ancyrea* (combination not validly published), thirdly (and now)

Cleistosphaeridium ancyreum. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Cleistosphaeridium*) *placacanthum*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: late Eocene.

"**araneosum**" Brideaux, 1977, p.22–23, pl.9, figs.1–3. Holotype: Brideaux, 1977, pl.9, figs.1–2. **NOW** *Circulodinium?*. Originally *Cleistosphaeridium*, subsequently *Heterosphaeridium*, thirdly (and now) *Circulodinium?*. Age: Aptian–Albian.

"**armatum**" (Deflandre, 1937b, p.76–77, pl.16 (al. pl.13), figs.6–7) Davey, 1969a, p.153. Emendation: Davey, 1969a, p.153, as *Cleistosphaeridium armatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.6; Fauconnier and Masure, 2004, pl.23, figs.1–3. **NOW** *Downiesphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Age: late Senonian.

"**ashdodense**" (Rossignol, 1962, p.132, pl.2, fig.2) Davey et al., 1969, p.15. Holotype: Rossignol, 1962, pl.2, fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*. **Taxonomic senior synonym:** *Lingulodinium machaerophorum*, according to Wall (1967, p.109). This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: Pleistocene.

"**australe**" Burger, 1980b, p.268–269, figs.5C–D,6A. Emendation: Fauconnier in Fauconnier and Masure, 2004, p.116, as *Trichodinium australe*. Holotype: Burger, 1980b, fig.5D; Fauconnier and Masure, 2004, pl.15, figs.3–5. **NOW** *Trichodinium*. Originally *Cleistosphaeridium*, subsequently *Circulodinium*, thirdly (and now) *Trichodinium*. Age: Neocomian.

"**baculatum**" He Chengquan and Li Peng, 1981, p.62, pl.34, figs.21–22. Holotype: He Chengquan and Li Peng, 1981, pl.34, fig.21; Fauconnier and Masure, 2004, pl.4, fig.7. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: late Oligocene.

"**?bahiaense**" (Regali et al., 1974, p.289–290, pl.23, fig.5) Lentin and Williams, 1981, p.47. Holotype: Regali et al., 1974, pl.23, fig.5. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Cleistosphaeridium?*, thirdly *Impletosphaeridium?*, fourthly (and now) *Operculodinium*. Questionable assignment: Lentin and Williams (1981, p.47). Age: Eocene–Oligocene.

"**bergmannii**" Archangelsky, 1969a, p.414–415, pl.2, figs.8,11. Holotype: Archangelsky, 1969a, pl.2, fig.11. **NOW** *Lingulodinium*. Originally *Cleistosphaeridium*, subsequently *Operculodinium*, thirdly *Downiesphaeridium*, fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Solisphaeridium filamentosum* (Appendix A) and *Impletosphaeridium charrieri*, both according to Quattrocchio and Sarjeant (2003, p.142). Age: Eocene.

"**?bifide**" (Jiabo, 1978, p.51–52, pl.22, figs.7–16) Lentin and Williams, 1981, p.48. Holotype: Jiabo, 1978, pl.22, fig.8. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently *Cleistosphaeridium?*, thirdly (and now) *Sentusidinium*. Questionable assignment: Lentin and Williams (1981, p.48). Age: Early Tertiary.

"**bifurcatum**" Jiabo, 1978, p.60–61, pl.20, figs.11–12. Holotype: Jiabo, 1978, pl.20, fig.11. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

"**brevibaculum**" Song Zhichen in Song Zhichen et al., 1985, p.31, pl.4, fig.10. Holotype: Song Zhichen et al., 1985, pl.4, fig.10. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Cenozoic.

"**?brevispinosum**" Jain and Millepied, 1975, p.150, pl.5, figs.80–82. Holotype: Jain and Millepied, 1975, pl.5, figs.80–81. **NOW** *Sentusidinium? millepiedii*. Originally *Cleistosphaeridium? brevispinosum*, subsequently *Sentusidinium brevispinosum* (combination illegitimate), thirdly *Sentusidinium? brevispinosum* (combination illegitimate), fourthly (and now) *Sentusidinium? millepiedii*. Questionable assignment: Stover and Evitt (1978, p.31). Age: Aptian.

"**bulbum**" Yu Jingxian, 1989, p.140, pl.51, figs.8–9. Holotype: Yu Jingxian, 1989, pl.51, fig.8. **NOW** *Downiesphaeridium?*. Originally *Cleistosphaeridium*, subsequently *Downiesphaeridium*, thirdly (and now) *Downiesphaeridium?*. Age: Eocene.

"**centrocarpum**" (Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4) Jiabo, 1978, p.61. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6. **NOW** *Operculodinium centrocarpum*. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum* (Appendix A), thirdly *Cordosphaeridium centrocarpum*, fourthly *Cordosphaeridium tiara* subsp. *centrocarpum*, fifthly (and now) *Operculodinium centrocarpum*, sixthly *Cordosphaeridium microtriainum* subsp. *centrocarpum*, seventhly *Cleistosphaeridium centrocarpum*. Taxonomic junior synonyms: *Operculodinium? echigoense*, according to Matsuoka et al. (1997, p.22); *Membranilarnacia delicata*, according to Jain (1980, p.140). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Age: Miocene.

"**cephalum**" Kar, 1985, p.181, pl.40, figs.1–2; pl.41, fig.1. Holotype: Kar, 1985, pl.40, fig.1. **Taxonomic senior synonym:** *Baltisphaeridium* (as *Operculodinium*) *israelianum*, according to Jain and Garg (1991, p.78). Age: early Eocene.

"**clavulum**" (Davey, 1969a, p.154–155, pl.6, figs.9–10) Below, 1982c, p.15. Holotype: Davey, 1969a, pl.6, fig.9; Fauconnier and Masure, 2004, pl.50, fig.1. **NOW** *Impletosphaeridium? clavulum*. Originally *Cleistosphaeridium polypes* var. *clavulum*, subsequently *Cleistosphaeridium polypes* subsp. *clavulum*, thirdly *Impletosphaeridium polypes* subsp. *clavulum*, fourthly *Bacchidinium polypes* subsp. *clavulum*, fifthly *Cleistosphaeridium clavulum*, sixthly *Impletosphaeridium clavulum*, seventhly (and now) *Impletosphaeridium? clavulum*. Age: Cenomanian.

"**commixtum**" Jiabo, 1978, p.61–62, pl.21, figs.3–5. Holotype: Jiabo, 1978, pl.21, fig.3. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

"**danicum**" (Wetzel, 1952, p.396–397, pl.A, figs.5–6; text-fig.8) Davey et al., 1969, p.15. Emendation: Sarjeant, 1984c, p.129–130, as *Achomosphaera danica*. Holotype: Wetzel, 1952, pl.A, fig.6; Dietz et al., 1999, text-fig.6b. **NOW** *Achomosphaera*. Originally *Areoligera*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Achomosphaera*. Questionable assignment: Davey et al. (1969, p.15). Taxonomic senior synonym: *Areoligera senonensis*, according to Lejeune-Carpentier and Sarjeant (1981, p.15) — however, Sarjeant (1984c, p.130) retained *Cleistosphaeridium* (as *Achomosphaera*) *danicum*. This combination was not validly published in Davey et al. (1966, p.170), since those authors did not fully reference the basionym. Age: Paleocene.

"**deflandrei**" Courtinat, 1989, p.166, pl.12, fig.5; pl.13, fig.12. Holotype: Deflandre, 1939a, pl.10, fig.9; Deflandre, 1947c, fig.1, no.5. **Name illegitimate** — **nomenclatural senior synonym:** *Hystrichosphaeridium* (now *Impletosphaeridium*) *ehrenbergii*, which has the same type. Courtinat (1989, p.166) erected the species *Cleistosphaeridium deflandrei* and designated as holotype the specimen illustrated in Deflandre (1939a, pl.10, fig.9) and Deflandre (1947c, fig.1, no.5). This is the only specimen of *Hystrichosphaeridium ehrenbergii* illustrated by Deflandre (1947c) when he erected that species, and which thus must be considered its holotype. Courtinat (1989, p.166) considered *Hystrichosphaeridium ehrenbergii* to be not validly published, since Deflandre (1947c) did not give a diagnosis or designate a holotype. I.C.N. Article 40.1 implies that designation of a holotype was not required before 1958. Also, according to I.C.N. Article 38.1), "In order to be validly published, a name of a new taxon ... must ... be accompanied by a description or diagnosis ... or ... by a reference to a previously and effectively published description or diagnosis ...". Deflandre (1947c, fig.1, no.5) referred to "*H. cf. hirsutum* (Ehr.) Defl. 1938", this reference including a description by Deflandre (1939a, p.191). Hence, *Hystrichosphaeridium ehrenbergii* must be regarded as having been validly published by Deflandre (1947c); consequently *Cleistosphaeridium deflandrei* is an illegitimate name. Age: Jurassic.

"**digitale**" He Chengquan, 1991, p.141, pl.25, figs.14–16; text-fig.26. Holotype: He Chengquan, 1991, pl.25, fig.14. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: early Eocene.

"disjunctum" Davey et al., 1966, p.169–170, pl.11, fig.9. Holotype: Davey et al., 1966, pl.11, fig.9; Bujak et al., 1980, pl.8, figs.1–2. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Lingulodinium*) *machaerophorum*, according to Reid (1974, p.591). Age: early Eocene.

***diversispinosum** Davey et al., 1966, p.167, pl.10, fig.7. Emendation: Eaton et al., 2001, p.177. Holotype: Davey et al., 1966, pl.10, fig.7; Bujak et al., 1980, pl.7, figs.7–8; Islam, 1993, pl.1, figs.1–10; text-figs.1A–B; Eaton et al., 2001, figs.1A–B, 2A–B; Fauconnier and Masure, 2004, pl.77, fig.9. Originally (and now) *Cleistosphaeridium*, subsequently *Systematophora*. Eaton et al. (2001, p.177) retained this species in *Cleistosphaeridium*. Taxonomic junior synonym: *Areosphaeridium polypetellum*, according to Islam (1993, p.88) — however, Eaton et al. (2001, p.194) retained *Cleistosphaeridium polypetellum*. Age: early Eocene.

"echinoides" (Maier, 1959, p.318–319, pl.32, figs.5–6) Davey et al., 1969, p.15. Holotype: Maier, 1959, pl.32, fig.6. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*. **Taxonomic senior synonym:** *Xanthidium* (as *Spiniferites*) *ramosum*, according to Sarjeant (1983, p.91–92). This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: middle Oligocene–middle Miocene.

"?ehrenbergii" (Deflandre, 1947c, fig.1, no.5) Davey et al., 1969, p.16. Emendation: Masure in Fauconnier and Masure, 2004, p.337–338, as *Impletosphaeridium ehrenbergii*. Holotype: Deflandre, 1939a, pl.10, fig.9, as *Hystrichosphaeridium* cf. *hirsutum*; Deflandre, 1947c, fig.1, no.5; Fauconnier and Masure, 2004, pl.48, figs.9,11. **NOW** *Impletosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Impletosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.32) as a problematic species. For a full discussion see *Impletosphaeridium ehrenbergii*. Age: Oxfordian.

"elegans" He Chengquan, 1991, p.141–142, pl.24, figs.5–6; text-fig.27. Holotype: He Chengquan, 1991, pl.24, fig.5. **Name illegitimate** — **senior homonym:** *Cleistosphaeridium elegans* He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989. **Substitute name:** *Cleistosphaeridium xinjiangense*. **NOW** *Impletosphaeridium xinjiangense*. Originally *Cleistosphaeridium elegans* He Chengquan, 1991 (name illegitimate), subsequently *Cleistosphaeridium xinjiangense*, thirdly (and now) *Impletosphaeridium xinjiangense*. Age: Paleocene.

"elegans" He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.43, pl.18, figs.1–4. Holotype: He Chengquan et al., 1989, pl.18, fig.1. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Junior homonym: *Cleistosphaeridium elegans* He Chengquan, 1991. Age: Early Tertiary.

"eocenicum" Mehrotra and Sah, 1982, p.129, pl.3, fig.8. **Name not validly published:** no description. Age: Eocene.

"?erectum" (Manum and Cookson, 1964, p.14, pl.3, figs.5–6) Stover and Evitt, 1978, p.31. Holotype: Manum and Cookson, 1964, pl.3, fig.5. **NOW** *Kiokansium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium?*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Kiokansium?*. Questionable assignment: Stover and Evitt (1978, p.31). Age: Albion–Turonian.

"flexuosum" Davey et al., 1966, p.169, pl.2, fig.5. Emendation: Sarkar and Singh, 1988, p.39, as *Cleistosphaeridium flexuosum*. Holotype: Davey et al., 1966, pl.2, fig.5; Fauconnier and Masure, 2004, pl.23, fig.8. **NOW** *Downiesphaeridium*. Originally *Cleistosphaeridium?*, subsequently *Polysphaeridium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Questionable assignment: Davey et al. (1966, p.169) — however, Sarkar and Singh (1988, p.39) included the species in *Cleistosphaeridium* without question. Age: Cenomanian.

"fungosum" Harding, 1990b, p.43–44, pl.25, figs.1–9. Holotype: Harding, 1990b, pl.25, fig.1. **Name not validly published:** lodgement of holotype not specified (I.C.N. Article 40.7). **NOW** *Sentusidinium*. Originally *Cleistosphaeridium* (name not validly published), subsequently (and now) *Sentusidinium*. Age: early Barremian.

"*furcillatum*" Prössl, 1990, p.100, pl.7, figs.12,14 ex Prössl, 1992b, p.113–114. Holotype: Prössl, 1990, pl.7, figs.12,14; Fauconnier and Masure, 2004, pl.49, figs.1–2. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. This name was not validly published in Prössl (1990, p.100), since that author did not specify the lodgment of the holotype. Age: Hauterivian–early Barremian.

"*garampaniense*" Mehrotra and Sah, 1982, p.129, pl.3, fig.9. **Name not validly published**: no description. Age: Eocene.

"*giganteum*" (Caro, 1973, p.360–361, pl.2, fig.12) Stover and Evitt, 1978, p.31. Holotype: Caro, 1973, pl.2, fig.12; Fauconnier and Masure, 2004, pl.49, figs.13–14. **NOW** *Exochosphaeridium*. Originally *Polysphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Impletosphaeridium*, fourthly (and now) *Exochosphaeridium*. Age: early Eocene.

"*granulatum*" Burger, 1980a, p.77, pl.33, figs.2–4,6–10. Holotype: Burger, 1980a, pl.33, fig.2; Fauconnier and Masure, 2004, pl.49, figs.3–4. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Albian.

"*hallembayense*" Wilson in Slimani, 2001a, p.193. **Name not validly published**: no description. **Taxonomic senior synonym**: *Pervosphaeridium elegans*, according to Slimani (2001a, p.193).

"*heteracanthum*" (Deflandre and Cookson, 1955, p.276, pl.2, figs.5–6; text-figs.40–41) Davey et al., 1966, p.168. Emendation: Radmacher et al., 2014, p.33,36, as *Heterosphaeridium heteracanthum*. Holotype: Deflandre and Cookson, 1955, pl.2, fig.5; Fauconnier and Masure, 2004, pl.35, figs.7–8. **NOW** *Heterosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Heterosphaeridium*, fifthly *Heterosphaeridium?* Age: Late Cretaceous–early Eocene.

"*huguoniotii*" (Valensi, 1955a, p.38–39, text-fig.2a) Davey, 1969a, p.155–156. Holotype: Valensi, 1955a, text-fig.2a; Fauconnier and Masure, 2004, pl.72, figs.1–3. **NOW** *Sepispinula?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Chlamydophorella*, sixthly *Sepispinula*, seventhly (and now) *Sepispinula?*. Questionable assignment: Stover and Evitt (1978, p.32) as a problematic species. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula?*) *ambiguum*, according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.500) retained *Hystrichosphaeridium* (as and now *Sepispinula?*) *huguoniotii*. Taxonomic junior synonym: *Hystrichosphaeridium* (subsequently *Sepispinula*) *ancoriferum*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Hystrichosphaeridium* (as and now *Sepispinula*) *ancoriferum*. Age: Late Cretaceous.

"subsp. *huguoniotii*". Autonym. Holotype: Valensi, 1955a, text-fig.2a; Fauconnier and Masure, 2004, pl.72, figs.1–3. **Now redundant**. Originally *Cleistosphaeridium huguoniotii* subsp. *huguoniotii*, subsequently *Cleistosphaeridium? huguoniotii* subsp. *huguoniotii*, thirdly *Sepispinula huguoniotii* subsp. *huguoniotii*.

"var. *huguoniotii*". Autonym. Holotype: Valensi, 1955a, text-fig.2a. **Now redundant**.

"subsp. *pertusum*" (Davey, 1969a, p.156–157, pl.7, figs.6–7,9) Lentin and Williams, 1973, p.28. Holotype: Davey, 1969a, pl.7, fig.7. **NOW** *Sepispinula pertusa*. Originally *Cleistosphaeridium huguoniotii* var. *pertusum*, subsequently *Cleistosphaeridium huguoniotii* subsp. *pertusum*, thirdly *Cleistosphaeridium? huguoniotii* subsp. *pertusum*, fourthly *Dapsilidinium ambiguum* subsp. *pertusum*, fifthly *Sepispinula huguoniotii* subsp. *pertusa*, sixthly (and now) *Sepispinula pertusa*. Age: late Cenomanian.

"var. *pertusum*" Davey, 1969a, p.156–157, pl.7, figs.6–7,9. Holotype: Davey, 1969a, pl.7, fig.7. **NOW** *Sepispinula pertusa*. Originally *Cleistosphaeridium huguoniotii* var. *pertusum*, subsequently *Cleistosphaeridium huguoniotii* subsp. *pertusum*, thirdly *Cleistosphaeridium? huguoniotii* subsp. *pertusum*,

fourthly *Dapsilidinium ambiguum* subsp. *pertusum*, fifthly *Sepispinula huguoniotii* subsp. *pertusa*, sixthly (and now) *Sepispinula pertusa*. Age: late Cenomanian.

"iaculigerum" (Klement, 1960, p.57–58, pl.7, fig.10) Brenner, 1988, p.42–43. Emendation: Sarjeant, 1984a, p.171, as *Operculodinium? iaculigerum*. Holotype: Klement, 1960, pl.7, fig.10; Sarjeant, 1984a, pl.2, fig.5; text-fig.7; Brenner, 1988, pl.14, fig.7; Fauconnier and Masure, 2004, pl.23, figs.4–5. **NOW** *Downiesphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Operculodinium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Taxonomic junior synonym: *Cleistosphaeridium? polyacanthum*, according to Brenner (1988, p.42) — however, Islam (1993, p.84) retained *Cleistosphaeridium?* (as *Downiesphaeridium*) *polyacanthum*. Age: middle Kimmeridgian.

"?insolitum" (Eaton, 1976, p.308, pl.21, figs.5,8; text-fig.25B) Stover and Evitt, 1978, p.31. Holotype: Eaton, 1976, pl.21, fig.5; Fauconnier and Masure, 2004, pl.49, figs.5–6. **NOW** *Impletosphaeridium*. Originally (and now) *Impletosphaeridium*, subsequently *Cleistosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.31). Age: early-middle Eocene (see Aubry, 1986).

"?israelianum" (Rossignol, 1962, p.132, pl.2, fig.3) Davey et al., 1966, p.170. Holotype: Rossignol, 1962, pl.2, fig.3. Combination not validly published: basionym not fully referenced. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Operculodinium*, fifthly *Cordosphaeridium* (combination not validly published). Taxonomic junior synonyms: *Cleistosphaeridium cephalum*, according to Jain and Garg (1991, p.78); *Operculodinium crassum*, according to Edwards and Andrieu (1992, p.262) — however, Head (1996b, p.1231) retained *Operculodinium crassum*; and *Hystrichosphaeridium westii* (name not validly published), by implication in Wall and Dale (1968a, p.315, as "hystrichosphere type x of West"). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859, questionably according to Wall and Dale (1968c, p.272), and without question according to Matsuoka (1989, p.224). Age: Pleistocene.

lacustre Köhler and Clausen, 2000, p.42–43, pl.1, figs.1–6, figs.3a–d. Holotype: Köhler and Clausen, 2000, pl.1, figs.1–2,4. Age: late Oligocene.

"laxabaculum" Song Zhichen in Song Zhichen et al., 1985, p.31–32, pl.4, fig.11. Holotype: Song Zhichen et al., 1985, pl.4, fig.11. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: ?early Pleistocene.

"leve" (Maier, 1959, p.308, pl.30, figs.1–2) Davey et al., 1969, p.16. Holotype: Maier, 1959, pl.30, fig.1; Sarjeant, 1983, pl.2, fig.3, pl.5, fig.1; text-fig.2. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*. **Taxonomic senior synonym:** *Galea* (now *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: late Oligocene–middle Miocene.

"?lumectum" (Sarjeant, 1960a, p.139–140, pl.6, fig.1; text-fig.2) Davey et al., 1969, p.16. Holotype: Sarjeant, 1960a, pl.6, fig.1; text-fig.2. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly (and now) *Impletosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.32) as a problematic species. This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: late Oxfordian.

"machaerophorum" (Deflandre and Cookson, 1955, p.274, pl.9, figs.4,8) Davey et al., 1966, p.170. Holotype: Deflandre and Cookson, 1955, pl.9, fig.4. **Combination not validly published:** basionym not fully referenced. **NOW** *Lingulodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Cleistosphaeridium disjunctum*, according to Reid (1974, p.591); *Cleistosphaeridium mikirii*, according to Jain and Garg (1983, p.61); *Hystrichosphaeridium ashdodense*, according to Wall (1967, p.109); *Baltisphaeridium* (subsequently *Lingulodinium*) *funginum*, *Lingulodinium brevispinosum* and *Lingulodinium sadoense*, all according to Kokinos and Anderson (1995, p.162); *Hystrichosphaeridium redonense*, questionably according to Harland (1977b, p.94) and according to Rochon et al. (1999, p.20). Motile equivalent: *Gonyaulax* (now *Lingulodinium*) *polyedra* Stein, 1883, according to Wall and Dale (1968c, p.271). Age: Miocene.

"*mediterraneum*" Corradini, 1973, p.137–138, pl.19, figs.5a–b; text-fig.4. Holotype: Corradini, 1973, text-fig.4. **NOW** *Pervosphaeridium*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Pervosphaeridium*. Age: Senonian.

"*microcystum*" (Bujak in Bujak et al., 1980, p.88,90, pl.22, figs.2–5) Lentin and Williams, 1981, p.49. Holotype: Bujak et al., 1980, pl.22, figs.2–3; Fauconnier and Masure, 2004, pl.64, figs.4–5. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Cleistosphaeridium*, thirdly *Sentusidinium*, fourthly (and now) *Pilosidinium*. Age: middle Eocene (see Aubry, 1986).

"*mikirii*" Mehrotra, 1981, p.14–15, pl.1, figs.2–5. Holotype: Mehrotra, 1981, pl.1, fig.2. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Lingulodinium*) *machaerophorum*, according to Jain and Garg (1983, p.61). Mehrotra and Sah (1982, p.129) also proposed this name. Age: middle Eocene.

"*minus*" Jiabo, 1978, p.62, pl.20, figs.13–16. Holotype: Jiabo, 1978, pl.20, fig.16. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

"*mojsisovicsii*" Morbey, 1975, p.40, pl.15, figs.5a–b,6–9. Holotype: Morbey, 1975, pl.15, figs.5a–b. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Beaumontella*) *caminuspinum*, according to Below (1987a, p.70). Questionable assignment: Stover and Evitt (1978, p.31). Age: Rhaetian–Hettangian.

"*multifurcatum*" (Deflandre, 1937b, p.76, pl.16 [al. pl.13], figs.1–3) Davey et al., 1969, p.16. Emendation: Masure in Fauconnier and Masure, 2004, p.270, as *Exochosphaeridium multifurcatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), figs.1–2; Fensome et al., 1991, figs.1–2 — p.691; fig.1 — p.693; Fensome et al., 1993a, fig.1 — p.1261; figs.1–2 — p.1265; Fauconnier and Masure, 2004, pl.37, figs.10–11. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Heterosphaeridium*, sixthly (and now) *Exochosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.31). This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"subsp. *latoaculeum*" Yun Hyesu, 1981, p.42–43, pl.11, figs.17–19. Holotype: Yun Hyesu, 1981, pl.11, fig.18; Fensome et al., 1991, fig.2 — p.657; fig.2 — p.693 (mislabelled as *Cleistosphaeridium multifurcatum* subsp. *multifurcatum*); Fensome et al., 1993a, fig.2 — p.1261; Fauconnier and Masure, 2004, pl.35, figs.9–10. **NOW** *Circulodinium latoaculeum*. Originally *Cleistosphaeridium multifurcatum* subsp. *latoaculeum*, subsequently *Heterosphaeridium latoaculeum*, thirdly (and now) *Circulodinium latoaculeum*. Age: early Santonian.

"subsp. *multifurcatum*". Autonym. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), figs.1–2; Fensome et al., 1991, figs.1–2 — p.691; fig.1 — p.693; Fensome et al., 1993a, fig.1 — p.1261; figs.1–2 — p.1265. **Now redundant.**

"*multifurcillatum*" Prössl, 1990, p.100–101, pl.9, figs.2,8,11 ex Prössl, 1992b, p.113–114. Holotype: Prössl, 1990, pl.9, figs.8,11; Fauconnier and Masure, 2004, pl.49, figs.9–10. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. This name was not validly published in Prössl (1990, p.100–101), since that author did not specify the lodgment of the holotype. Age: early Hauterivian–late Barremian.

"*multispinosum*" (Singh, 1964, p.141–142, pl.20, figs.1–2) Brideaux, 1971, p.93. Holotype: Singh, 1964, pl.20, fig.1; Fauconnier and Masure, 2004, pl.23, fig.10. **NOW** *Cometodinium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly *Downiesphaeridium*, fifthly (and now) *Cometodinium*. Questionable assignment: Stover and Evitt (1978, p.31). Age: middle Albian–early Cenomanian.

"*nanus*" (Rozen, 1965, p.311, pl.2, figs.7–8; text-fig.21) Sarjeant, 1981, p.122. Holotype: Rozen, 1965, pl.2, figs.7–8. **NOW** *Impletosphaeridium nanus*. Originally *Cordosphaeridium microtriainum* var. *nanus*, subsequently *Cordosphaeridium microtriainum* subsp. *nanus*, thirdly *Cleistosphaeridium? nanus*, fourthly (and now) *Impletosphaeridium nanus*. Questionable assignment: Sarjeant (1981, p.122). N.I.A. Age: late Eocene.

"*nenjiangense*" Gao Ruiqi et al., 1992a, p.18,24, pl.3, figs.1–9; pl.4, figs.1–7. Holotype: Gao Ruiqi et al., 1992a, pl.3, fig.1. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly *Spicadinium* (Appendix A). **Taxonomic senior synonym:** *Spicadinium akidoton* (Appendix A), according to Mao Shaozhi et al. (1999, p.159). Age: Campanian.

"*oligacanthum*" (Wetzel, 1952, p.402–405, pl.A, figs.4,7–8,11a–b; text-figs.21–25) Davey et al., 1969, p.16. Emendation: Wilson and Sarjeant in Sarjeant, 1984c, p.128, as *Laticavodinium oligacanthum*. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625; Dietz et al., 1999, text-fig.6g. **NOW** *Impletosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium?*, fourthly *Laticavodinium*, fifthly (and now) *Impletosphaeridium?*. Questionable assignment: Davey et al. (1969, p.16). This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: Danian.

"subsp. *complanatum*" (Wetzel, 1952, p.404–405, pl.A, figs.11a–b) Lentin and Williams, 1973, p.29. Emendation: Sarjeant, 1984c, p.142, as *Solisphaeridium stimulierum* subsp. *complanatum*. Holotype: Wetzel, 1952, pl.A, figs.11a–b; Sarjeant, 1984c, pl.4, fig.6; text-fig.13. **NOW** *Micrhystridium stimulierum?* subsp. *complanatum* (Appendix A). Originally *Hystrichosphaeridium oligacanthum* subsp. *complanatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *complanatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *complanatum*, fourthly *Solisphaeridium stimulierum* subsp. *complanatum* (Appendix A), fifthly (and now) *Micrhystridium stimulierum?* subsp. *complanatum* (Appendix A). Age: Paleocene.

"subsp. *granulatum*" (Wetzel, 1952, p.404, text-fig.25) Lentin and Williams, 1973, p.29. Emendation: Sarjeant, 1984c, p.136, as *Surculosphaeridium? granulatum*. Holotype: Wetzel, 1952, text-fig.25; Sarjeant, 1984c, pl.5, figs.1–3; text-fig.8. **NOW** *Surculosphaeridium? granulatum*. Originally *Hystrichosphaeridium oligacanthum* subsp. *granulatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *granulatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *granulatum*, fourthly (and now) *Surculosphaeridium? granulatum*. Age: Paleocene.

"subsp. *oligacanthum*". Autonym. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625. **Now redundant.** Originally *Hystrichosphaeridium oligacanthum* subsp. *oligacanthum*, subsequently *Baltisphaeridium oligacanthum* subsp. *oligacanthum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *oligacanthum*.

"subsp. *stella*" (Wetzel, 1952, p.403, pl.A, fig.4; text-fig.23) Lentin and Williams, 1973, p.29. Emendation: Sarjeant, 1984c, p.135, as *Surculosphaeridium phoenix* subsp. *stella*. Holotype: Wetzel, 1952, pl.A, fig.4; Dietz et al. 1999, text-fig.6f. **NOW** *Surculosphaeridium? stella*. Originally *Hystrichosphaeridium oligacanthum* subsp. *stella*, subsequently *Baltisphaeridium oligacanthum* subsp. *stella* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *stella*, fourthly *Surculosphaeridium? phoenix* subsp. *stella*, fifthly (and now) *Surculosphaeridium? stella*. N.I.A. Age: Paleocene.

"subsp. *velatum*" (Wetzel, 1952, p.403–404, pl.A, fig.7; text-fig.24) Lentin and Williams, 1973, p.29. Emendation: Sarjeant, 1984c, p.133, as *Cauca? velata*. Holotype: Wetzel, 1952, pl.A, fig.7; text-fig.24; Sarjeant, 1984c, pl.3, figs.4–6; text-fig.6. **NOW** *Cauca? velata*. Originally *Hystrichosphaeridium oligacanthum* subsp. *velatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *velatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *velatum*, fourthly (and now) *Cauca? velata*. Age: Paleocene.

"*panniforme*" (Gerlach, 1961, p.196–198, pl.28, fig.13) Stover and Evitt, 1978, p.31. Holotype: Gerlach, 1961, pl.28, fig.13. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium*, subsequently (and now) *Impletosphaeridium*, thirdly *Cleistosphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Cleistosphaeridium*) *placacanthum*, according to Sarjeant (1984b, p.86–87) — however, Eaton et al. (2001, p.191) retained *Baltisphaeridium* (as and now *Impletosphaeridium*) *panniforme*. Age: middle Oligocene.

"*panshanense*" Jiabo, 1978, p.63, pl.22, figs.1–6. Holotype: Jiabo, 1978, pl.22, fig.1. **NOW** *Sentusidinium*. Originally *Cleistosphaeridium*, subsequently (and now) *Sentusidinium*. Age: Early Tertiary.

"*parvum*" Davey, 1969a, p.157–158, pl.7, figs.11–12. Holotype: Davey, 1969a, pl.7, fig.11. **Taxonomic senior synonym:** *Palaeostomocystis* (as and now *Diacrocanthidium*) *echinulatum* (Appendix A), according to Bujak in Bujak et al. (1980, p.52). Age: early–late Cenomanian.

"*patagonicum*" Archangelsky, 1969b, p.200–201, pl.3, figs.9–10. Holotype: Archangelsky, 1969b, pl.3, figs.9–10. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently *Cleistosphaeridium?*, thirdly (and now) *Impletosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.32) as a problematic species. Age: Eocene.

"*paucifurcatum*" Cookson and Eisenack, 1982, p.39, pl.8, figs.5–6. Holotype: Cookson and Eisenack, 1982, pl.8, fig.5. **NOW** *Spiniferites?*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium?*, thirdly (and now) *Spiniferites?*. Age: Paleocene.

"*pectiniforme*" (Gerlach, 1961, p.195–196, pl.28, fig.14; text-fig.18) Davey et al., 1969, p.16. Emendations: Sarjeant, 1984b, p.83–84,86, as *Areosphaeridium pectiniforme*; Stover and Williams, 1995, p.114, as *Enneadocysta pectiniformis*. Holotype: Gerlach, 1961, pl.28, fig.14; Sarjeant, 1984b, pl.1, fig.2; pl.4, fig.2; Fauconnier and Masure, 2004, pl.7, figs.4–5. **NOW** *Enneadocysta*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Areosphaeridium?*, fourthly *Areosphaeridium*, fifthly (and now) *Enneadocysta*. Taxonomic junior synonym: *Areosphaeridium* (now *Enneadocysta*) *multicornutum*, according to Sarjeant (1984b, p.83–84,86) — however, Stover and Williams (1995, p.112) retained *Areosphaeridium* (as *Enneadocysta*) *multicornutum*. This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: middle Oligocene.

"*perforoconum*" Yun Hyesu, 1981, p.43, pl.15, figs.1–4. Holotype: Yun Hyesu, 1981, pl.15, fig.4; Fensome et al., 1991, fig.4 — p.707; Fauconnier and Masure, 2004, pl.70, figs.2–3. **NOW** *Sentusidinium*. Originally *Cleistosphaeridium*, subsequently (and now) *Sentusidinium*. Age: early Santonian.

"*pilosum*" (Ehrenberg, 1854, pl.37, section 8, fig.4) Davey et al., 1966, p.170. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **Combination not validly published:** basionym not fully referenced. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. Age: Oxfordian.

"*placacanthum*" (Deflandre and Cookson, 1955, p.276–277, pl.9, figs.1–3) Eaton et al., 2001, p.190. Emendation: May, 1980, p.68, as *Systematophora placacantha*. Holotype: Deflandre and Cookson, 1955, pl.9, figs.1–2; Fauconnier and Masure, 2004, pl.76, figs.14–16. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Systematophora*, fifthly (and now) *Cleistosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (now *Impletosphaeridium*) *panniforme*, according to Sarjeant (1984b, p.86–87) — however, Eaton et al. (2001, p.191) retained *Baltisphaeridium* (as and now *Impletosphaeridium*) *panniforme*; *Systematophora ancyrea*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: Miocene.

"*polyacanthum*" Gitmez, 1970, p.284–286, pl.12, fig.10; text-fig.22. Holotype: Gitmez, 1970, pl.12, fig.10; text-fig.22b; Fauconnier and Masure, 2004, pl.23, figs.6–7. Originally *Cleistosphaeridium*, subsequently *Cleistosphaeridium?*, thirdly *Downiesphaeridium*. Questionable assignment: Stover and Evitt (1978, p.31). **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Impletosphaeridium?*) *polytrichum*, according to Masure in Fauconnier and Masure (2004, p.196). Taxonomic senior synonym: *Baltisphaeridium* (as *Cleistosphaeridium*) *iaculigerum*, according to Brenner (1988, p.42) — however, neither Islam (1993, p.84), who retained *Downiesphaeridium polyacanthum*, nor Masure in Fauconnier and Masure (2004, p.196) followed this synonymy. Age: early Kimmeridgian.

"?*polyozum*" (Brosius, 1963, p.45, pl.1, fig.6; pl.6, fig.5; text-figs.2a–d) Stover and Evitt, 1978, p.31–32. Holotype: Brosius, 1963, pl.1, fig.6. **NOW** *Impletosphaeridium?*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium?*, thirdly *Surculosphaeridium*, fourthly (and now) *Impletosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.31). For etymology, see under *Impletosphaeridium? polyozum*. Age: late Oligocene.

"*polypes*" (Cookson and Eisenack, 1962b, p.491–492, pl.4, figs.11–13) Davey, 1969a, p.154. Emendation: Duxbury, 1983, p.49, as *Kiokansium polypes*. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. Originally *Hystrichosphaeridium recurvatum* subsp. *polypes*, subsequently *Polysphaeridium? polypes* (combination not validly published), thirdly *Cleistosphaeridium polypes*, fourthly *Bacchidinium polypes*, fifthly *Impletosphaeridium polypes*, sixthly *Kiokansium polypes*. **Taxonomic senior synonym** (at specific rank): *Hystrichosphaeridium* (as and now *Kiokansium*) *unituberculatum*, by implication in Duxbury (1983, p.49), who considered *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*) to be the senior name. Taxonomic junior synonym: *Cleistosphaeridium? solidum*, according to Below (1982c, p.16). Age: Albian–Cenomanian.

"subsp. *clavulum*" (Davey, 1969a, p.154–155, pl.6, figs.9–10) Lentin and Williams, 1973, p.30. Holotype: Davey, 1969a, pl.6, fig.9; Fauconnier and Masure, 2004, pl.50, fig.1. **NOW** *Impletosphaeridium? clavulum*. Originally *Cleistosphaeridium polypes* var. *clavulum*, subsequently *Cleistosphaeridium polypes* subsp. *clavulum*, thirdly *Impletosphaeridium polypes* subsp. *clavulum*, fourthly *Bacchidinium polypes* subsp. *clavulum*, fifthly *Cleistosphaeridium clavulum*, sixthly *Impletosphaeridium clavulum*, seventhly (and now) *Impletosphaeridium? clavulum*. Age: Cenomanian.

"var. *clavulum*" Davey, 1969a, p.154–155, pl.6, figs.9–10. Holotype: Davey, 1969a, pl.6, fig.9; Fauconnier and Masure, 2004, pl.50, fig.1. **NOW** *Impletosphaeridium? clavulum*. Originally *Cleistosphaeridium polypes* var. *clavulum*, subsequently *Cleistosphaeridium polypes* subsp. *clavulum*, thirdly *Impletosphaeridium polypes* subsp. *clavulum*, fourthly *Bacchidinium polypes* subsp. *clavulum*, fifthly *Cleistosphaeridium clavulum*, sixthly *Impletosphaeridium clavulum*, seventhly (and now) *Impletosphaeridium? clavulum*. Age: Cenomanian.

"subsp. *polypes*". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. **Now redundant**. Originally *Cleistosphaeridium polypes* subsp. *polypes*, subsequently *Bacchidinium polypes* subsp. *polypes*, thirdly *Impletosphaeridium polypes* subsp. *polypes*, fourthly *Kiokansium polypes* subsp. *polypes*.

"var. *polypes*". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. **Now redundant**.

polypetellum (Islam, 1983c, p.82,84, pl.2, figs.1–6) Stover and Williams, 1995, p.102. Holotype: Islam, 1983c, pl.2, fig.1. Originally *Areosphaeridium*, subsequently (and now) *Cleistosphaeridium*. Taxonomic senior synonym: *Cleistosphaeridium* (as *Systematophora*) *diversispinosum*, according to Islam (1993, p.88) — however, Eaton et al. (2001, p.194) retained *Cleistosphaeridium polypetellum*. Eaton et al. (2001, p.194) also proposed this combination. Age: early-middle Eocene.

"*polytrichum*" (Valensi, 1947, p.818, text-fig.4) Davey et al., 1969, p.16. Holotype: Valensi, 1947, text-fig.4; Fauconnier and Masure, 2004, pl.24, figs.1–6. **NOW** *Impletosphaeridium?* Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Impletosphaeridium*, fifthly *Downiesphaeridium*, sixthly (and now) *Impletosphaeridium?*. Taxonomic junior synonym: *Cleistosphaeridium* (as *Downiesphaeridium*) *polyacanthum*, according to Masure in Fauconnier and Masure (2004, p.196). The combination *Cleistosphaeridium polytrichum* was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: late Bathonian.

"*radiculopse*" Mao Shaozhi and Norris, 1988, p.38, pl.7, figs.21–23. Holotype: Mao Shaozhi and Norris, 1988, pl.7, fig.21. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Late Cretaceous.

regulatum Zhou Heyi, 1985, p.7, pl.1, figs.16–17,19–21. Holotype: Zhou Heyi, 1985, pl.1, fig.16. Originally (and now) *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly *Sepispinula*?. He Chengquan et al. (2009, p.290) retained this species in *Cleistosphaeridium*. Age: middle Oligocene.

reticuloideum Xu Jinli et al., 1997, p.98, pl.32, fig.17; pl.34, figs.25a–b,26a–b,27; pl.35, figs.1a–b,4a–c,6a–b,7a–b,8a–b ex He Chengquan et al., 2009, p.653. Holotype: Xu Jinli et al., 1997, pl.35, figs.4a–c. The name was not validly published in Xu Jinli et al. (1997), since no English or a Latin description was provided; He Chengquan et al. (2009, p.653) validated the name by publishing an English diagnosis. Age: Oligocene.

"sarmentum" Stancliffe, 1991, p.187–188, pl.1, figs.1–2; pl.2, fig.6; text-figs.5A–B. Holotype: Stancliffe, 1991, pl.1, figs.1–2; text-figs.5A–B. **NOW** *Downiesphaeridium*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Downiesphaeridium*. N.I.A. Age: late Oxfordian.

"selseyense" Islam, 1983b, p.337, pl.2, figs.3,7. Holotype: Islam, 1983b, pl.2, fig.3. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: middle Eocene.

"separatum" McIntyre and Brideaux, 1980, p.19–20, pl.6, figs.4–5,7–8. Holotype: McIntyre and Brideaux, 1980, pl.6, figs.4–5. **NOW** *Sentusidinium*. Originally *Cleistosphaeridium*, subsequently (and now) *Sentusidinium*. Taxonomic junior synonym: *Sentusidinium cuculliforme*, according to Courtinat in Fauconnier and Masure (2004, p.486). Age: Valanginian.

"shandongense" He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.44, pl.18, figs.5–6; pl.30, figs.3–6. Holotype: He Chengquan et al., 1989, pl.18, fig.6. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

sijuense Saxena and Sarkar, 2000, p.257, pl.1, figs.7–8. Holotype: Saxena and Sarkar, 2000, pl.1, fig.8. Age: middle Eocene.

"?solidum" Yun Hyesu, 1981, p.43–44, pl.11, figs.9,13–14. Holotype: Yun Hyesu, 1981, pl.11, fig.13; Fensome et al., 1991, fig.2 — p.739. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, by implication in Below (1982c, p.16), who considered *Cleistosphaeridium solidum* to be a taxonomic junior synonym of *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*), which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*. Questionable assignment: Yun Hyesu (1981, p.43). Age: early Santonian.

"?sphericum" Horowitz, 1975, p.24, pl.1, fig.5. Holotype: Horowitz, 1975, pl.1, fig.5. **NOW** *Impletosphaeridium*?. Originally *Cleistosphaeridium*, subsequently *Cleistosphaeridium*?, thirdly (and now) *Impletosphaeridium*?. Questionable assignment: Stover and Evitt (1978, p.32) as a problematic species. Age: Late Jurassic.

"?spinsum" (Boltenhagen, 1977, p.54–55, pl.7, figs.1a–b,2,3a–b,4a–b,5a–b) Lentin and Williams, 1981, p.51. Emendation: Masure in Fauconnier and Masure, 2004, p.116–117, as *Trichodinium boltenhagenii*. Holotype: Boltenhagen, 1977, pl.7, figs.1a–b; Fauconnier and Masure, 2004, pl.15, fig.6. **NOW** *Trichodinium boltenhagenii*. Originally *Chytroisphaeridia spinosa*, subsequently *Cleistosphaeridium? spinosum*, thirdly *Circulodinium spinosum*, fourthly (and now) *Trichodinium boltenhagenii*. Questionable assignment: Lentin and Williams (1981, p.51). Age: Cenomanian–Turonian.

"spinulastrum" Islam, 1983b, p.337–338, pl.2, figs.1–2. Holotype: Islam, 1983b, pl.2, fig.1; Islam, 1993, pl.1, fig.11. **NOW** *Downiesphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Downiesphaeridium*. Age: middle Eocene.

"?spiralisetum" (de Wit, 1943, p.383; text-figs.2,11) Davey et al., 1969, p.16. Holotype: de Wit, 1943; text-figs.2,11, lost according to R. de Wit (personal communication to G.L.W.). **NOW** *Impletosphaeridium*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Impletosphaeridium*?. Questionable assignment: Davey et al. (1969, p.16). This combination was not validly

published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*spissum*" McIntyre and Brideaux, 1980, p.20, pl.7, figs.1–9. Holotype: McIntyre and Brideaux, 1980, pl.7, figs.1–4. **NOW** *Prolixosphaeridiopsis* (Appendix A). Originally *Cleistosphaeridium*, subsequently *Prolixosphaeridium?*, thirdly (and now) *Prolixosphaeridiopsis* (Appendix A). Age: Valanginian.

"*tenuae*" Harris, 1974, p.164, pl.2, figs.7–9. Holotype: Harris, 1974, pl.2, figs.8–9. **NOW** *Sepispinula?*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Sepispinula?*. Age: Paleocene.

"*tenuifilum*" Cookson and Eisenack, 1982, p.40, pl.8, fig.14. Holotype: Cookson and Eisenack, 1982, pl.8, fig.14. **NOW** *Impletosphaeridium?*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium?*. Age: Paleocene.

"*tianshanense*" He Chengquan, 1991, p.142, pl.25, figs.4–7; text-fig.28. Holotype: He Chengquan, 1991, pl.25, fig.4. **NOW** *Impletosphaeridium*. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: early Eocene.

"*tiara*" (Klumpp, 1953, p.390–391, pl.17, figs.8–10) Davey et al., 1969, p.16. Holotype: Klumpp, 1953, pl.17, figs.8–9. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium*, fourthly *Cleistosphaeridium*, fifthly (and now) *Operculodinium*. This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. N.I.A. Age: Eocene.

"subsp. *centrocarpum*" (Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4) Morgenroth, 1966a, p.26. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4. **NOW** *Operculodinium centrocarpum*. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum* (Appendix A), thirdly *Cordosphaeridium tiara* subsp. *centrocarpum*, fourthly (and now) *Operculodinium centrocarpum*, fifthly *Cordosphaeridium microtriainum* subsp. *centrocarpum*, sixthly *Cleistosphaeridium centrocarpum*. Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Age: Miocene.

"subsp. *tiara*". Autonym. Holotype: Klumpp, 1953, pl.17, figs.8–9. **Now redundant**. N.I.A.

"*tribuliferum*" (Sarjeant, 1962a, p.487–488, pl.70, fig.4; text-figs.6c,7) Davey et al., 1969, p.16. Holotype: Sarjeant, 1962a, pl.70, fig.4; Fauconnier and Masure, 2004, pl.23, fig.11. **NOW** *Downiesphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly *Impletosphaeridium*, fifthly (and now) *Downiesphaeridium*. Questionable assignment: Stover and Evitt (1978, p.32). This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Age: Oxfordian.

"*uncinispinosum*" (de Coninck, 1969, p.32–33, pl.9, figs.6–8) Sarjeant, 1981, p.123–124. Holotype: de Coninck, 1969, pl.9, figs.6–8. **NOW** *Operculodinium*. Originally *Cordosphaeridium*, subsequently *Cordosphaeridium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Operculodinium*. Age: early Eocene.

"*varispinosum*" (Sarjeant, 1959, p.338–340, pl.13, fig.7; text-fig.6) Woollam and Riding, 1983, p.3. Holotype: Sarjeant, 1959, pl.13, fig.7; text-fig.6; Fauconnier and Masure, 2004, pl.49, fig.8. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Tenua* Eisenack, thirdly *Sentusidinium*, fourthly *Sentusidinium?*, fifthly *Cleistosphaeridium*, sixthly (and now) *Impletosphaeridium*. Age: early Callovian.

"*williamsii*" (Boltenhagen, 1977, p.41–42, pl.2, figs.6–7) Lentin and Williams, 1981, p.51. Holotype: Boltenhagen, 1977, pl.2, fig.6; Fauconnier and Masure, 2004, pl.50, fig.6. **NOW** *Impletosphaeridium*. Originally *Polysphaeridium*, subsequently *Cleistosphaeridium?*, thirdly (and now) *Impletosphaeridium*. Questionable assignment: Lentin and Williams (1981, p.51). Age: Cenomanian–early Turonian.

"*xinjiangense*" Lentin and Williams, 1993, p.117. Holotype: He Chengquan, 1991, pl.24, fig.5. **NOW** *Impletosphaeridium xinjiangense*. Originally *Cleistosphaeridium elegans* He Chengquan (name illegitimate), subsequently *Cleistosphaeridium xinjiangense*, thirdly (and now) *Impletosphaeridium xinjiangense*. Substitute name for *Cleistosphaeridium elegans* He Chengquan, 1991, p.141–142, pl.24, figs.5–6; text-fig.27 (an illegitimate name). Age: Paleocene.

"**COCCOPTERUM**" Silva, 1970, p.942. Substitute name for *Pterococcus* Lohmann 1904, p.47 (an illegitimate name). **Taxonomic senior synonym:** *Nematosphaeropsis*, by implication in Reid (1974, p.592), who included the "type species" of *Coccolpaterum*, *Coccolpaterum labyrinthus*, in *Nematosphaeropsis*, and Fensome et al. (1993b, p.93). Type: Ostenfeld, 1903, fig.127, as *Pterosperma labyrinthus*.

"**labyrinthus*" (Ostenfeld, 1903, p.578, fig.127) Silva, 1970, p.942. Holotype: Ostenfeld, 1903, fig.127. **NOW** *Nematosphaeropsis*. Originally *Pterosperma* (Appendix A), subsequently *Pterococcus* (combination illegitimate), thirdly *Coccolpaterum*, fourthly (and now) *Nematosphaeropsis*. Taxonomic junior synonym: *Nematosphaeropsis balcombiana*, according to Reid (1974, p.592) — however, Wrenn (1988, p.139) retained *Nematosphaeropsis balcombiana*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). N.I.A. Age: extant.

"**CODONIA**" Cookson and Eisenack, 1960a, p.11. **Name illegitimate** — **senior homonym:** *Codonia* Dumortier, 1822. **Substitute name:** *Codoniella*. Type: Cookson and Eisenack, 1960a, pl.3, fig.1, as *Codonia campanulata*.

"**campanulata*" Cookson and Eisenack, 1960a, p.11, pl.3, figs.1–3. Emendation: Davey, 1979b, p.556, as *Codoniella campanulata*. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.1. **NOW** *Codoniella*. Originally *Codonia* (generic name illegitimate), subsequently (and now) *Codoniella*. Age: Santonian.

CODONIELLA Cookson and Eisenack, 1961a, p.75. Emendation: Davey, 1979b, p.555. Substitute name for *Codonia* Cookson and Eisenack, 1960a (an illegitimate name). Type: Cookson and Eisenack, 1960a, pl.3, fig.1, as *Codonia campanulata*.

**campanulata* (Cookson and Eisenack, 1960a, p.11, pl.3, figs.1–3) Downie and Sarjeant, 1965, p.103. Emendation: Davey, 1979b, p.556, as *Codoniella campanulata*. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.1. Originally *Codonia* (generic name illegitimate), subsequently (and now) *Codoniella*. Age: Santonian.

?*langparensis* Jain et al., 1975, p.12, pl.4, fig.56; pl.5, figs.57–58. Holotype: Jain et al., 1975, pl.5, fig.58. Originally *Codoniella*, subsequently (and now) *Codoniella*? Questionable assignment: Stover and Evitt (1978, p.227). Age: Danian.

psygma Davey, 1979b, p.556, pl.2, figs.9–14. Holotype: Davey, 1979b, pl.2, figs.9–10. N.I.A. Age: Aptian–Albian.

COLOMISPHAERA Nowak, 1968, p.304. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1299). Fensome and Williams (2004) considered this genus to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1299) implied that this generic name can be considered validly published as it was proposed under the I.C.Z.N. Řehánek and Cecca (1993, p.153) indicated that Řehánek (1985a) provided an emendation for this genus; however, the latter author did not indicate that he was emending *Colomisphaera*. Type: not designated; type species — *Fibrosphaera minutissima*.

carpathica (Borza, 1964, p.191, pl.1, figs.3–4) Nowak, 1968, p.307. Holotype: Borza, 1964, pl.1, fig.3. Originally *Stomiosphaera*, subsequently (and now) *Colomisphaera*. Age: Kimmeridgian.

cieszynica Nowak, 1968, p.309–310, pl.30, figs.1–5. Holotype: Nowak, 1968, pl.30, figs.1–2. Although Nowak (1968, p.308) cites this as a new species and designated a holotype, he listed "*Stomiosphaera cieszynica* Nowak 1965" as a synonym; we have been unable to confirm the earlier name and reference. Age: Tithonian.

conferta Řehánek, 1985b, p.171–173, pl.1, figs.1–8. Holotype: Řehánek, 1985b, pl.1, figs.1–2. Age: early Valanginian.

fibrata (I. Nagy, 1966, p.92–93,100, pl.5, figs.14,22) Nowak, 1968, p.306. Holotype: I. Nagy, 1966, pl.5, fig.14. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Oxfordian.

fortis Řehánek, 1982, p.220–221, table 1 — p.224; pl.1, figs.1–8. Holotype: Řehánek, 1982, pl.1, figs.1–2. Age: late Tithonian.

heliosphaera (Vogler, 1941, p.281, pl.20, fig.6) Řehánek and Cecca, 1993, p.154. Holotype: Vogler, 1941, pl.20, fig.6. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Neocomian? (Oxfordian–Berriasian, according to I. Nagy, 1966, p.88).

lapidosa (Vogler, 1941, p.281, pl.21, fig.58) Řehánek, 1987a, p.278. Holotype: Vogler, 1941, pl.21, fig.58. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Neocomian?

**minutissima* (Colom, 1935, p.12, pl.2, fig.8; text-fig.4a [four specimens]) Nowak, 1968, p.304. Holotype not designated. Originally *Fibroesphaerae* (generic name not validly published; Appendix A), subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*, fourthly *Schizosphaerella*. Fensome and Williams (2004) considered this name to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1298) implied that it can be considered validly published as it was proposed under the I.C.Z.N. Elbrächter et al. (2008, p.1299) effectively retained this species in *Colomisphaera*. Age: Late Early Jurassic.

modica Řehánek, 1984, p.180–182, pl.83, figs.1–6. Holotype: Řehánek, 1984, pl.83, figs.1–2. Age: Late Cretaceous.

ornata Nowak, 1968, p.308–309, pl.31, figs.4–5. Holotype: Nowak, 1968, pl.31, figs.4–5. Age: Tithonian.

pokornyi Řehánek, 1985a, p.373–374, pl.4, figs.1–6. Holotype: Řehánek, 1985a, pl.4, figs.1–2. Age: late Albanian.

pulla (Borza, 1964, p.192–193, pl.2, figs.1–2) Nowak, 1968, p.310. Holotype: Borza, 1964, pl.2, fig.1. Originally *Stomiosphaera*, subsequently *Cadosina*, thirdly (and now) *Colomisphaera*. Age: Kimmeridgian.

tenuis (I. Nagy, 1966, p.93, pl.5, fig.18) Řehánek, 1987a, p.278. Holotype: I. Nagy, 1966, pl.5, fig.18. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Age: Oxfordian.

varia Řehánek, 1982, p.222,224,226–227, pl.2, figs.1–9. Holotype: Řehánek, 1982, pl.2, figs.1–2. Age: Late Cretaceous.

verrucosa Řehánek, 1985a, p.374, pl.5, figs.1–6. Holotype: Řehánek, 1985a, pl.5, fig.1. Age: late Albanian.

COLONSAYDINIUM Hunt in Hunt et al., 1985, p.103. Type: Hunt et al., 1985, pl.2, figs.4–5, as *Colonsaydinium psilatatum*.

**psilatatum* Hunt in Hunt et al., 1985, p.108, pl.2, figs.4–9; text-fig.3, nos.1–2. Holotype: Hunt et al., 1985, pl.2, figs.4–5; Fensome et al., 1995, figs.1–2 — p.1713. Age: late Quaternary.

COMETODINIUM Deflandre and Courteville, 1939, p.98. Emendation: Monteil, 1991a, p.440. Type: Deflandre and Courteville, 1939, pl.2, fig.1, as *Cometodinium obscurum* (which see for lectotype).

breve Beilstein, 1994, p.199–200, pl.31, figs.7–8. Holotype: Beilstein, 1994, pl.31, fig.7. Age: Campanian–Maastrichtian.

?*comatum* Srivastava, 1984, p.29, pl.7, figs.4–8. Holotype: Srivastava, 1984, pl.7, fig.4; Monteil, 1991a, pl.1, fig.3. Questionable assignment: Monteil (1991a, p.440). Age: late Barremian.

habibii Monteil, 1991a, p.441–443, pl.3, figs.1a–b,2a–b,5; pl.4, figs.1–4; pl.5, figs.1–3; pl.6, fig.1; text-fig.3. Holotype: Monteil, 1991a, pl.3, figs.1a–b; Fauconnier and Masure, 2004, pl.16, fig.11. Age: Tithonian–earliest Valanginian to ?early Aptian.

jurassicum Poulsen, 1996, p.79–80, pl.2, figs.3–4. Holotype: Poulsen, 1996, pl.2, fig.4. Age: middle Oxfordian–early Volgian.

multispinosum (Singh, 1964, p.141, pl.20, figs.1–2) Masure in Fauconnier and Masure, 2004, p.133. Holotype: Singh, 1964, pl.20, fig.1; Fauconnier and Masure, 2004, pl.23, fig.10. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium*?, fourthly *Downiesphaeridium*, fifthly (and now) *Cometodinium*. Age: middle Albian–early Cenomanian.

**obscurum* Deflandre and Courteville, 1939, p.99, pl.2, fig.1. Emendation: Monteil, 1991a, p.443–444. Holotype: Deflandre and Courteville, 1939, pl.2, fig.1, lost according to Monteil (1991a, p.439). Lectotype: Monteil, 1991a, pl.1, figs.1a–b, designated by Monteil (1991a, p.444); Fauconnier and Masure, 2004, pl.16, figs.5–6. Age: Turonian.

whitei (Deflandre and Courteville, 1939, p.103, pl.3, figs.5–6) Stover and Evitt, 1978, p.227. Emendation: Monteil, 1991a, p.444, as *Cometodinium whitei*. Holotype: Deflandre and Courteville, 1939, pl.3, fig.5, lost according to Monteil (1991a, p.439). Neotype: Monteil, 1991a, pl.2, figs.1a–c; pl.3, fig.9, designated by Monteil (1991a, p.444); Fauconnier and Masure, 2004, pl.16, figs.7–8. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Comasphaeridium* (Appendix A), fifthly *Cometodinium*?, sixthly (and now) *Cometodinium*. Questionable assignment: Stover and Evitt (1978, p.227); however, Monteil (1991a, 444) assigned the species to *Cometodinium* without question. Age: Senonian.

COMMITTOSPHAERA Řehánek, 1985a, p.376. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1299). Type: Vogler, 1941, pl.20, fig.5, as *Cadosina sublapidosa*.

czestochowiensis Řehánek in Řehánek and Heliasz, 1993, p.87–88, pl.2, figs.1–5. Holotype: Řehánek and Heliasz, 1993, pl.2, fig.1. Age: middle Oxfordian.

palaviensis Řehánek, 1985a, p.376–377, pl.2, figs.5–7. Holotype: Řehánek, 1985a, pl.2, figs.5,7. Age: middle Tithonian.

**sublapidosa* Vogler, 1941, p.280–281, pl.20, fig.5 ex Řehánek, 1985a, p.376–377. Holotype: Vogler, 1941, pl.20, fig.5. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Committosphaera*. In proposing this name, Řehánek (1985a, p.377) did not fully reference the "basonym"; however, since he was using zoological nomenclature, this was not a requirement. Age: Neocomian?

"**COMPARODINIUM**" Morbey, 1975, p.43. Emendation: Wille and Gocht, 1979, p.226,228. **Taxonomic senior synonym:** *Valvaeodinium*, according to Below (1987b, p.64). Type: Morbey, 1975, pl.15, figs.14a–b; text-fig.19a, no.a, as *Comparodinium koessenium*.

"*aquilonium*" Dörhöfer and Davies, 1980, p.24,26, figs.26E,I,28A–H. Emendation: Below, 1987b, p.69, as *Valvaeodinium aquilonium*. Holotype: Dörhöfer and Davies, 1980, fig.26E. **NOW** *Valvaeodinium*. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Toarcian to Bajocian–Bathonian.

"?*cavum*" Davies, 1983, p.16, pl.2, figs.10–15; text-fig.9. Emendation: Below, 1987b, p.70, as *Valvaeodinium cavum*. Holotype: Davies, 1983, pl.2, figs.10–11. **NOW** *Valvaeodinium*. Originally *Comparodinium*?, subsequently (and now) *Valvaeodinium*. Questionable assignment: Davies (1983, p.16). Age: Toarcian–Bajocian.

"*diacrorhaetium*" Morbey, 1975, p.44, pl.16, figs.3–6; text-fig.20. Holotype: Morbey, 1975, pl.16, figs.3–6; text-fig.20a. Originally *Comparodinium*, subsequently *Valvaeodinium*. **Taxonomic senior synonym:** *Comparodinium* (now *Valvaeodinium*) *koessenium*, according to Below (1987b, p.66). Age: Rhaetian.

"**koessenium*" Morbey, 1975, p.44, pl.15, figs.14a–b; pl.16, figs.1–2; text-figs.19a,nos.a–b; 19b, no.i. Holotype: Morbey, 1975, pl.15, figs.14a–b; text-fig.19a, no.a; Fensome et al., 1995, figs.1–3 — p.1589. **NOW** *Valvaeodinium*. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Taxonomic junior synonym: *Comparodinium* (subsequently *Valvaeodinium*) *diacrorhaetium*, according to Below (1987b, p.66). Age: Rhaetian–Hettangian.

"*lineatum*" Wille and Gocht, 1979, p.235,237, figs.13a–b,14a–b,15a–b,16a–b; fig.24, nos.10–11; fig.27, nos.7a–b; figs.8–9,10a–b,11; fig.28, nos.1a–b. Holotype: Wille and Gocht, 1979, figs.13a–b; fig.27, nos.9a–b. **NOW** *Valvaeodinium*. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian–Toarcian.

"*perpunctatum*" Wille and Gocht, 1979, p.238, figs.24, no.4; fig.28, nos.7–8). Holotype: Wille and Gocht, 1979, fig.28, no.7. **NOW** *Valvaeodinium*. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian.

"*punctatum*" Wille and Gocht, 1979, p.228–231, figs.3a–b,4a–b,5a–d,6–8,9a–b,10a–b; fig.24, nos.6–9; fig.26, nos.1a–b,2a–b,3a–b,4–5,6a–b,7a–b,8–9,10a–b,11,12a–b. Emendation: Below, 1987b, p.73, as *Valvaeodinium punctatum*. Holotype: Wille and Gocht, 1979, figs.3a–b; fig.26, nos.1a–b. **NOW** *Valvaeodinium*. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian–Toarcian.

"subsp. *magnum*" (Wille and Gocht, 1979, p.231, fig.24, no.9; fig.26, no.11) Lentin and Williams, 1981, p.53. Holotype: Wille and Gocht, 1979, fig.26, no.11. **NOW** *Valvaeodinium punctatum* subsp. *magnum*. Originally *Comparodinium punctatum* var. *magnum*, subsequently *Comparodinium punctatum* subsp. *magnum*, thirdly *Valvaeodinium punctatum* var. *magnum*, fourthly (and now) *Valvaeodinium punctatum* subsp. *magnum*. Age: Toarcian.

"var. *magnum*" Wille and Gocht, 1979, p.231, fig.24, no.9; fig.26, no.11. Holotype: Wille and Gocht, 1979, fig.26, no.11. **NOW** *Valvaeodinium punctatum* subsp. *magnum*. Originally *Comparodinium punctatum* var. *magnum*, subsequently *Comparodinium punctatum* subsp. *magnum*, thirdly *Valvaeodinium punctatum* var. *magnum*, fourthly (and now) *Valvaeodinium punctatum* subsp. *magnum*. Age: Toarcian.

"subsp. *punctatum*". Autonym. Holotype: Wille and Gocht, 1979, figs.3a–b; fig.26, nos.1a–b. **NOW** *Valvaeodinium punctatum* subsp. *punctatum*. Originally *Comparodinium punctatum* subsp. *punctatum*, subsequently (and now) *Valvaeodinium punctatum* subsp. *punctatum*.

"var. *punctatum*". Autonym. Holotype: Wille and Gocht, 1979, figs.3a–b; fig.26, nos.1a–b. **Now redundant.**

"*scalatum*" Wille and Gocht, 1979, p.231,233–234, figs.11a–b,12a–b; fig.24, nos.12–13; fig.28, nos.2a–b,3a–c,4a–b,5–6. Emendation: Below, 1987b, p.74, as *Valvaeodinium scalatum*. Holotype: Wille and Gocht, 1979, figs.11a–b; fig.28, nos.2a–b. **NOW** *Valvaeodinium*. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian–Toarcian.

"*stipulatum*" Wille and Gocht, 1979, p.237–238, figs.17a–b; fig.24, no.5; fig.28, nos.9–12. Emendation: Below, 1987b, p.79, as *Valvaeodinium stipulatum*. Holotype: Wille and Gocht, 1979, figs.17a–b; fig.28, nos.9–12. **NOW** *Valvaeodinium*. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian.

COMPOSITOSPHAERIDIUM Dodekova, 1974, p.25–26. Emendations: Courtinat, 1989, p.164; Stancliffe and Sarjeant, 1990, p.202. Junior homonym: *Compositosphaeridium* Erkmen and Sarjeant, 1980. Taxonomic junior synonym: *Compositosphaeridium* Dodekova, by implication in Lentin and Williams (1981, p.53), who included the "type species" of *Compositosphaeridium* Erkmen and Sarjeant, *Compositosphaeridium bulgaricum*, in *Compositosphaeridium* Dodekova. Type: Davey and Williams, 1966b, pl.10, fig.4, as *Hystrichosphaeridium costatum*.

?*bahamaense* Masure, 1988b, p.128, pl.2, figs.1A–C (not figs.1,2A–B); figs.2A–D (not figs.2C,3A–C). Holotype: Masure, 1988b, pl.2, figs.1A–C (not figs.1,2A–B); Fauconnier and Masure, 2004, pl.16, figs.12–13. Questionable assignment: Masure (1988b, p.128). Age: Cenomanian.

bulgaricum (Erkmen and Sarjeant, 1980, p.66–67) Lentin and Williams, 1981, p.53. Holotype: Dodekova, 1974, pl.1, figs.4–6; text-fig.1; Stancliffe and Sarjeant, 1990, pl.5, fig.5; text-fig.3, no.5, both as *Compositosphaeridium costatum*. Originally *Compositosphaeridium* Erkmen and Sarjeant (generic name illegitimate), subsequently (and now) *Compositosphaeridium* Dodekova. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Compositosphaeridium*) *polonicum*, according to Dodekova (1990, p.9) — however, Stancliffe and Sarjeant (1990, p.203) retained *Compositosphaeridium bulgaricum*. Age: Bathonian.

**costatum* (Davey and Williams, 1966b, p.62, pl.10, fig.4) Dodekova, 1974, p.26. Holotype: Davey and Williams, 1966b, pl.10, fig.4; Stancliffe and Sarjeant, 1990, pl.3, fig.1. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Compositosphaeridium* Dodekova. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Compositosphaeridium*?) *polonicum*, according to Beju (1971, p.292) — however, Masure in Fauconnier and Masure (2004, p.137) retained *Compositosphaeridium costatum*. If the latter synonymy is followed, the nomenclatural type of the genus *Compositosphaeridium* Dodekova would remain the holotype of *Compositosphaeridium costatum*. Age: Oxfordian.

?*polonicum* (Górka, 1965, p.306–307, pl.3, figs.5–6) Lentin and Williams, 1981, p.53. Emendations: Erkmen and Sarjeant, 1980, p.68, as *Compositosphaeridium polonicum*; Courtinat, 1989, p.164, as *Compositosphaeridium polonicum* — however, see Stancliffe and Sarjeant (1990, p.203). Holotype: Górka, 1965, pl.3, fig.5. Originally *Hystrichosphaeridium*, subsequently *Compositosphaeridium* Erkmen and Sarjeant (combination illegitimate), thirdly *Compositosphaeridium* Dodekova, fourthly (and now) *Compositosphaeridium?* Dodekova. Questionable assignment: Masure in Fauconnier and Masure (2004, p.138). Taxonomic junior synonyms: *Hystrichosphaeridium* (subsequently *Compositosphaeridium*) *costatum*, according to Beju (1971, p.292); *Compositosphaeridium bulgaricum*, according to Dodekova (1990, p.9) — however, Stancliffe and Sarjeant (1990, p.203) retained *Compositosphaeridium bulgaricum* and Masure in Fauconnier and Masure (2004, p.137) retained *Compositosphaeridium costatum*. If the synonymy of *Compositosphaeridium costatum* with *Compositosphaeridium?* *polonicum* were to be followed, the nomenclatural type of the genus *Compositosphaeridium* Dodekova would remain the holotype of *Compositosphaeridium costatum*. Age: Oxfordian.

"**COMPOSITOSPHAERIDIUM**" Erkmen and Sarjeant, 1980, p.65–66. **Name illegitimate — senior homonym:** *Compositosphaeridium* Dodekova, 1974. **Taxonomic senior synonym:** *Compositosphaeridium* Dodekova, by implication in Lentin and Williams (1981, p.53), who included the "type species" of *Compositosphaeridium* Erkmen and Sarjeant, *Compositosphaeridium bulgaricum*, in *Compositosphaeridium* Dodekova. Erkmen and Sarjeant cited the generic name as "*Compositosphaeridium* Dodekova, 1974" but gave the "type species" as "*Compositosphaeridium bulgaricum* Erkmen and Sarjeant sp. nov., nom. nov. pro *Compositosphaeridium costatum* Dodekova, 1974, non Davey and Williams, 1966 [1966b herein]" Since a type once designated is permanent (I.C.N. Article 7.2) except through formal conservation, Erkmen and Sarjeant (1980) effectively and validly published a new generic name, *Compositosphaeridium* Erkmen and Sarjeant, which is illegitimate as a junior homonym of *Compositosphaeridium* Dodekova. Type: Dodekova, 1974, pl.1, figs.4–6, text-fig.1, as *Compositosphaeridium costatum*, designated by Erkmen and Sarjeant (1980, p.67).

"**bulgaricum*" Erkmen and Sarjeant, 1980, p.66–67. Holotype: Dodekova, 1974, pl.1, figs.4–6, text-fig.1, as *Compositosphaeridium costatum*, designated by Erkmen and Sarjeant (1980, p.67). **NOW** *Compositosphaeridium* Dodekova. Originally *Compositosphaeridium* Erkmen and Sarjeant, subsequently (and now) *Compositosphaeridium* Dodekova. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Compositosphaeridium*)

polonicum, according to Dodekova (1990, p.9) — however, Stancliffe and Sarjeant (1990, p.203) retained *Compositosphaeridium bulgaricum*. Following I.C.N. Article 55.1, the species name *Compositosphaeridium bulgarium* is validly published even though the generic name *Compositosphaeridium* Erkmén and Sarjeant is illegitimate. Age: Bathonian.

"**polonicum**" (Górka, 1965, p.306–307, pl.3, figs.5–6) Erkmén and Sarjeant, 1980, p.67. Emendations: Erkmén and Sarjeant, 1980, p.68, as *Compositosphaeridium polonicum*; Courtinat, 1989, p.164, as *Compositosphaeridium polonicum* — however see Stancliffe and Sarjeant (1990, p.203). Holotype: Górka, 1965, pl.3, fig.5. **Combination illegitimate**: generic name illegitimate. **NOW** *Compositosphaeridium?* Dodekova. Originally *Hystrichosphaeridium*, subsequently *Compositosphaeridium* Erkmén and Sarjeant (combination illegitimate), thirdly *Compositosphaeridium* Dodekova, fourthly (and now) *Compositosphaeridium?* Dodekova. Taxonomic junior synonyms: *Hystrichosphaeridium* (subsequently *Compositosphaeridium*) *costatum*, according to Beju (1971, p.292); *Compositosphaeridium bulgaricum*, according to Dodekova (1990, p.9) — however, Stancliffe and Sarjeant (1990, p.203) retained *Compositosphaeridium bulgaricum* and Masure in Fauconnier and Masure (2004, p.137) retained *Compositosphaeridium costatum*. Age: Oxfordian.

"**CONEJOCONUS**" Knauer, 1970, p.89. **Name illegitimate** — **nomenclatural senior synonym**: *Bonetocardiella*, which has the same type (see also Villain (1975, p.196)). Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298, who noted that the cyst wall is pithonelloid and so dinoflagellate affinity is questionable). Fensome and Williams (2004) considered this genus to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1298) implied that this generic name can be considered validly published as it was proposed under the I.C.Z.N. Type: not designated; "type species" — *Stomiosphaera conoidea*.

"**cardiiformis**" (Ayala Castañares and Seigle, 1962, p.16–17, pl.1, figs.1–5, 7–9) Knauer, 1970, p.89. Holotype: information not available. Originally *Stomiosphaera*, subsequently *Bonetocardiella*, thirdly *Conejoconus* (generic name illegitimate). **Taxonomic senior synonym**: *Leptodermella* (now *Bonetocardiella*) *maestrichtiensis*, according to Villain (1975, p.198). Taxonomic junior synonym: *Stomiosphaera conoidea*, according to Andri (1972, p.15) — however, the latter species has generally been retained as the type of *Bonetocardiella*. Age: information not available.

"***conoideus**" (Bonet, 1956, p.454–456, pl.22, figs.1[part]–2; pl.27, fig.1[part]) Knauer, 1970, p.89. Holotype not designated. **NOW** *Bonetocardiella*. Originally *Stomiosphaera*, subsequently *Bonetocardiella* thirdly *Conejoconus* (generic name illegitimate). Taxonomic junior synonym: *Stomiosphaera cardiiformis*, according to Andri (1972, p.15) — however that species was later considered to be a taxonomic junior synonym of *Leptodermella* (now *Bonetocardiella*) *maestrichtiensis*. Age: Middle Cretaceous.

CONGRUENTIA Kohring in Keupp et al., 1991, p.168. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299). Type: Keupp et al., 1991, pl.5, figs.7–8, as *Congruentia eocaenica*.

***eocaenica** Kohring in Keupp et al., 1991, p.168, pl.5, figs.5–10. Holotype: Keupp et al., 1991, pl.5, figs.7–8. Age: late Eocene.

"**CONICOIDIUM**" Jiabo, 1978, p.45–46. Emendation Xu Jinli and Mao Shaozhi, 1989, p.302. **Taxonomic senior synonym**: *Parabohaidina*, according to Sun Xuekun (1994, p.80). He Chengquan et al. (2009, p.465) considered this taxon to be a subgenus of *Parabohaidina*, *Parabohaidina* subgenus *Conicoidium*, which see. Chen et al. (1988, p.15) and Fensome et al. (1990, p.153) included this genus in the acritarchs; however, Xu Jinli and Mao Shaozhi (1989, p.302) showed that it is a dinoflagellate. Type: Jiabo, 1978, pl.18, fig.7, as *Conicoidium tuberculatum*.

"**granorugosum**" Jiabo, 1978, p.46, pl.18, figs.11–12. Holotype: Jiabo, 1978, pl.18, fig.12. **NOW** *Parabohaidina*. Originally *Conicoidium*, subsequently (and now) *Parabohaidina*. Taxonomic senior synonym: *Parabohaidina retirugosa*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.465) retained this species separately. Age: Early Tertiary.

"**granulatum**" He Chengquan, 1984b, p.156–157, pl.2, figs.22–27; text-fig.1. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.302. Holotype: He Chengquan, 1984b, pl.2, fig.26. **NOW** *Parabohaidina arenata*. Originally *Conicoidium granulatum*, subsequently *Parabohaidina granulata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Parabohaidina granulata* Jiabo), thirdly (and now) *Parabohaidina arenata*. Taxonomic senior synonym: *Parabohaidina granulata*, according to Sun Xuekun (1994, p.82)) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Tertiary.

"subsp. **minor**" Tang in Cai Zhiguo et al., 1998, p.239, pl.80, figs.8. Holotype: Cai Zhiguo et al., 1998, pl.80, figs.8. **Name not validly published**: no English or Latin description or diagnosis. Originally *Conicoidium granulatum* subsp. *minor* (name not validly published), subsequently *Parabohaidina granulata* (He Chengquan) subsp. *minor* (name not validly published).

"**laevigatum**" Jiabo, 1978, p.46, pl.18, fig.1. Holotype: Jiabo, 1978, pl.18, fig.1. **NOW** *Parabohaidina runcinatus*. Originally *Conicoidium laevigatum*, subsequently *Parabohaidina laevigata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Parabohaidina laevigata* Jiabo), thirdly (and now) *Parabohaidina runcinatus*. Taxonomic senior synonym: *Parabohaidina laevigata*, according to Sun Xuekun (1994, p.82)) — however, He Chengquan et al. (2009, p.466) retained this species separately. Age: Early Tertiary.

"***tuberculatum**" Jiabo, 1978, p.46, pl.18, figs.5–10; text-fig.7. Holotype: Jiabo, 1978, pl.18, fig.7. **NOW** *Parabohaidina bulla*. Originally *Conicoidium tuberculatum*, subsequently *Parabohaidina tuberculata* (Jiabo) He Chengquan et al. (illegitimate name, non *Parabohaidina tuberculata* He Chengquan), thirdly (and now) *Parabohaidina bulla*. Taxonomic senior synonym: *Parabohaidina tuberculata*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.466) retained this species separately. Age: Early Tertiary.

"**CONIFERATIUM**" Burgess, 1971, p.80–81. **Taxonomic senior synonym**: *Apteodinium*, according Stover and Evitt (1978, p.141–142). Type: Burgess, 1971, pl.1, fig.9, as *Coniferatium frontierense*.

"***frontierense**" Burgess, 1971, p.81, pl.1, figs.6,9; text-fig.13. Holotype: Burgess, 1971, pl.1, fig.9; Jan du Chêne et al., 1986a, pl.15, figs.1–6. **NOW** *Apteodinium*. Originally *Coniferatium*, subsequently (and now) *Apteodinium*. Age: Albian–early Cenomanian.

CONNEXIMURA May, 1980, p.45–46. Emendation: Marheinecke, 1992, p.112. Type: Morgenroth, 1968, pl.45, figs.7–8, as *Hystrichokolpoma? fimbriata*.

***fimbriata** (Morgenroth, 1968, p.547–548, pl.45, figs.7–8) May, 1980, p.46. Emendations: May, 1980, p.46 and Marheinecke, 1992, p.112–113, both as *Conneximura fimbriata*. Holotype: Morgenroth, 1968, pl.45, figs.7–8; Eisenack and Kjellström, 1972, p.515; Fensome et al., 1995, figs.1–2 — p.1483. Originally *Hystrichokolpoma?*, subsequently *Danea*, thirdly (and now) *Conneximura*. Age: Danian.

CONOSPHAERIDIUM Cookson and Eisenack, 1969, p.5. Taxonomic senior synonym: *Litosphaeridium*, by implication in Sarjeant (1969, p.14), who transferred the "type species" of *Conosphaeridium*, *Conosphaeridium striatoconum*, to *Litosphaeridium* — however, Lentin and Williams (1973, p.31) retained *Conosphaeridium*. Type: Deflandre and Cookson, 1955, text-fig.36, as *Hystrichosphaeridium striatoconum*.

abbreviatum Wilson, 1984c, p.552,554, figs.11–13. Holotype: Wilson, 1984c, fig.11; Fensome et al., 1996, fig.1 — p.2017. Age: late Santonian–Campanian; however, see Fensome et al. (1996, p.2018).

lifum Slimani et al., 2012, p.341–342, fig.3A–L. Holotype: Slimani et al., 2012, fig.3A–C,E. Age: late Maastrichtian–early Danian.

***striatoconum** (Deflandre and Cookson, 1955, p.275, pl.2, fig.10; text-fig.36) Cookson and Eisenack, 1969, p.5. Holotype: Deflandre and Cookson, 1955; text-fig.36. Originally *Hystrichosphaeridium*, subsequently

Baltisphaeridium (Appendix A), thirdly *Litosphaeridium*?, fourthly (and now) *Conosphaeridium*. Age: middle Senonian.

truncatum He Chengquan, 1991, p.157, pl.14, fig.12. Holotype: He Chengquan, 1991, pl.14, fig.12. Age: middle Eocene.

"**tubulosum**" Cookson and Eisenack, 1969, p.5,7, pl.2, figs.D–F. Holotype: Cookson and Eisenack, 1969, pl.2, fig.E. **NOW** *Kleithriasphaeridium*. Originally *Conosphaeridium*, subsequently (and now) *Kleithriasphaeridium*. Age: Albian–Cenomanian.

"**CONTRANGULARIA**" Wan Chuanbiao and Zhang Ying, 1990, p.11,13–14. Emendation: Mao Shaozhi et al., 1999, p.154–155. **Taxonomic senior synonym:** *Vesperopsis*, by implication in He Chengquan et al. (2009, p.307). Originally *Contrangularia*, subsequently *Vesperopsis* subgenus *Contrangularia* (name not validly published). It appears that He Chengquan et al. (2009, p. 307) intended to change the rank of this taxon from genus to subgenus; however they neither gave a clear indication of the new rank nor provided a basionym citation. Type: Wan Chuanbiao and Zhang Ying, 1990, pl.3, fig.2, as *Contrangularia reticulata*.

"**granulata**" Wan Chuanbiao and Zhang Ying, 1990, p.12, pl.3, figs.7–9. Emendation: Mao Shaozhi et al., 1999, p.155. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.3, fig.8. **NOW** *Vesperopsis*. Originally *Contrangularia*, subsequently (and now) *Vesperopsis*. Age: Early Cretaceous.

"***reticulata**" Wan Chuanbiao and Zhang Ying, 1990, p.11–12, pl.3, figs.2,4,6. Emendation: Mao Shaozhi et al., 1999, p.155. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.3, fig.2; Mao Shaozhi et al., 1999, pl.4, fig.9. **NOW** *Vesperopsis*. Originally *Contrangularia*, subsequently (and now) *Vesperopsis*. Age: Early Cretaceous.

COOKSONIDIUM Stover and Williams, 1995, p.106–107. Type: Cookson and Eisenack, 1965a, pl.15, fig.7, as *Cordosphaeridium capricornum*.

***capricornum** (Cookson and Eisenack, 1965a, p.128–129, pl.15, figs.1–9) Stover and Williams, 1995, p.107. Emendation: Stover and Williams, 1995, p.107, as *Cooksonidium capricornum*. Holotype: Cookson and Eisenack, 1965a, pl.15, fig.7; Fauconnier and Masure, 2004, pl.7, figs.7–10. Originally *Cordosphaeridium*, subsequently *Systematophora*?, thirdly *Areosphaeridium*, fourthly (and now) *Cooksonidium*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Areosphaeridium*) *dictyostilum*, according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Cooksonidium* (as *Areosphaeridium*) *capricornum*. Age: late Eocene.

coniunctum (Prössl, 1992b, p.106–108, pl.2, figs.1–2,4–5,7,9,12–14; pl.3, figs.1,4,7,12–14) Masure and Michoux in Fauconnier and Masure, 2004, p.143. Holotype: Prössl, 1992b, pl.3, figs.1,4,7; Fauconnier and Masure, 2004, pl.8, figs.1–3. Originally *Areosphaeridium*, subsequently (and now) *Cooksonidium*. Age: middle Eocene.

"**COOKSONIELLA**" Vozzhennikova, 1967, p.183–184. **Taxonomic senior synonym:** *Chatangiella*, according to Lentin and Williams (1976, p.155). Type: Vozzhennikova, 1967, pl.109, figs.2a–b, as *Cooksoniella vnigrii*.

"**?damasii**" (Lejeune-Carpentier, 1942, p.B185–B186, figs.9–14) Lentin and Williams, 1973, p.31. Holotype: Lejeune-Carpentier, 1942, fig.10; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.3; text-fig.9a. **NOW** *Deflandrea*?. Originally *Peridinium* (Appendix B), subsequently *Cooksoniella*, thirdly *Palaeoperidinium*, fourthly *Deflandrea*, fifthly (and now) *Deflandrea*?. Questionable assignment: Lentin and Williams (1973, p.31). Age: Senonian.

"**larjakiensis**" (Vozzhennikova, 1967, p.71–72, pl.16, figs.1a–b,2a–b) Harker and Sarjeant, 1975, p.224. Holotype: Vozzhennikova, 1967, pl.16, figs.1a–b; Lentin and Vozzhennikova, 1990, text-fig.32; lost according to Lentin and Vozzhennikova (1990, p.61). Originally *Peridinium conicum* var. *larjakiense* (Appendix B), subsequently *Palaeoperidinium deflandrei* subsp. *larjakiense*, thirdly *Cooksoniella larjakiensis*, fourthly *Palaeoperidinium*

larjakiense. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Age: Paleocene.

"*manumii*" Vozzhennikova, 1967, p.184–185, pl.107, figs.1–4. Holotype: Vozzhennikova, 1967, pl.108, fig.1; Lentin and Vozzhennikova, 1990, pl.4, fig.3; text-fig.19. **NOW** *Chatangiella*. Originally *Cooksoniella*, subsequently (and now) *Chatangiella*. Age: Senonian.

"?*paleocenica*" (Cookson and Eisenack, 1965c, p.142–143, pl.19, figs.1–4; text-figs.2a–b) Lentin and Williams, 1973, p.31. Holotype: Cookson and Eisenack, 1965c, pl.19, figs.2–3. **NOW** *Ginginodinium*. Originally *Peridinium* (Appendix B), subsequently *Cooksoniella*?, thirdly *Palaeoperidinium*, fourthly (and now) *Ginginodinium*. Questionable assignment: Lentin and Williams (1973, p.31). Age: middle Paleocene.

"*scheii*" (Manum, 1963, p.56–58, pl.1, figs.1–16; text-fig.1) Lentin and Williams, 1973, p.31. Holotype: Manum, 1963, pl.1, figs.1–4; text-fig.1. **NOW** *Arvalidinium*. Originally *Deflandrea*, subsequently *Cooksoniella*, thirdly *Chatangiella*?, fourthly (and now) *Arvalidinium*. Age: Middle Cretaceous (early Late Cretaceous, according to Manum and Cookson, 1964).

"*sverdrupiana*" (Manum, 1963, p.59–60, pl.2, figs.6–15; text-fig.3) Williams and Brideaux, 1975, p.57. Emendation: Lebedeva in Ilyina et al., 1994, p.64, as *Spinidinium sverdrupianum*. Holotype: Manum, 1963, pl.2, figs.12–13. **NOW** *Spinidinium*. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Subtilisphaera*, fourthly *Cooksoniella* (combination not validly published). Age: Cenomanian.

"**vnigrii*" Vozzhennikova, 1967, p.185, pl.59, fig.2; pl.79, fig.3; pl.107, fig.1; pl.109, figs.1–2; pl.110, figs.2–3. Emendation: Lebedeva in Ilyina et al., 1994, p.70, as *Chatangiella vnigrii*. Holotype: Vozzhennikova, 1967, pl.109, figs.2a–b (not pl.107, fig.1 as indicated in the caption); Lentin and Vozzhennikova, 1990, pl.5, figs.4–5; text-fig.21. **NOW** *Chatangiella*. Originally *Cooksoniella*, subsequently (and now) *Chatangiella*. Taxonomic senior synonyms: *Deflandrea* (as and now *Chatangiella*) *granulifera*, according to Lentin and Vozzhennikova (1990, p.47) and *Deflandrea* (as and now *Chatangiella*) *verrucosa*, according to Yun Hyesu (1981, p.66) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (as and now *Chatangiella*) *vnigrii*. Wheeler and Sarjeant (1990, p.317) suggested that the spelling for the species epithet could be "*vnigriorum*". Age: Turonian–Santonian.

"**CORBELLA**" Odin, 2008, p.24. Calcareous dinoflagellate genus (as a taxonomic junior synonym of *Coronadinium*). **Taxonomic senior synonym:** *Coronadinium*, according to Odin (2009, p.187). Odin (2008) did not provide an English or Latin description; however, the name *Corbella* can be considered validly published as Odin was using the I.C.Z.N. (fide Odin, 2008, p.42). Type: Odin, 2008, appendix pl.2, fig.29, as *Corbella vitilis*.

"**vitalis*" Odin 2008, p.24–26, pl.9, figs.138; pl.10, figs.155–163; appendix pl.2, figs.29–30. Holotype: Odin, 2008, appendix pl.2, fig.29. **NOW** *Coronadinium*. Originally *Corbella*, subsequently (and now) *Coronadinium*. Odin (2008) did not provide an English or Latin description; however, the name *Corbella vitilis* can be considered validly published as Odin was using the I.C.Z.N. (fide Odin, 2008, p.42). Age: Campanian–Maastrichtian.

"subsp. *biremis*" Odin 2008, p.25–26, pl.10, figs.160–163; appendix pl.2, fig.30. Holotype: Odin, 2008, appendix pl.2, fig.30. **NOW** *Coronadinium vitilis* subsp. *biremis*. Originally *Corbella vitilis* subsp. *biremis*, subsequently (and now) *Coronadinium vitilis* subsp. *biremis*. Odin (2008) did not provide an English or Latin description; however, the name *Corbella vitalis* can be considered validly published as Odin was using the I.C.Z.N. (fide Odin, 2008, p.42). Age: Campanian–Maastrichtian.

"subsp. *vitalis*" Autonym. Holotype: Odin, 2008, appendix pl.2, fig.29. **NOW** *Coronadinium vitilis* subsp. *vitalis*. Originally *Corbella vitilis* subsp. *vitalis*, subsequently (and now) *Coronadinium vitilis* subsp. *vitalis*. Age: Campanian–Maastrichtian.

CORCULODINIUM Batten and Lister, 1988, p.350. Emendation: Courtinat, 2000, p.172. Type: Batten and Lister, 1988, figs.3h–i, as *Corculodinium uniconicum*.

inaffectum (Drugg, 1978, p.68, pl.3, figs.10–12) Courtinat, 2000, p.173. Holotype: Drugg, 1978, pl.3, fig.10. Originally *Geiselodinium*, subsequently *Subtilisphaera*, thirdly *Subtilisphaera?*, fourthly (and now) *Corculodinium*. Taxonomic junior synonym: *Geiselodinium paeminosum*, according to Courtinat (2000, p.173). Age: early Kimmeridgian.

***uniconicum** Batten and Lister, 1988, p.350–351, figs.3h–k. Holotype: Batten and Lister, 1988, figs.3h–i. Age: Barremian.

CORDOSPHAERIDIUM Eisenack, 1963b, p.261. Emendations: Morgenroth, 1968, p.548; Davey, 1969c, p.35; Sarjeant, 1981, p.100–101; He Chengquan, 1991, p.157–158,213. Taxonomic junior synonym: *Tityrosphaeridium*, according to Lentin and Williams (1985, p.70; 1989, p.370) and Edwards (2001, p.G19). Type: Klumpp, 1953, pl.18, figs.1–2, as *Hystrichosphaeridium inodes*.

aulichnum He Chengquan, 1991, p.165, pl.14, figs.1–2; text-fig.38. Holotype: He Chengquan, 1991, pl.14, fig.2. He Chengquan (1991, p.165) included this species in *Cordosphaeridium* subgenus *Tarimocystium*. Age: middle Eocene.

"**axiale**" Eisenack, 1965b, p.150, pl.15, figs.1–4. Holotype: Eisenack, 1965b, pl.15, fig.2. **NOW** *Fibrocyta*. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocyta*. Age: late Eocene–early Oligocene.

biarmatum Morgenroth, 1966a, p.21, pl.4, figs.6–7. Holotype: Morgenroth, 1966a, pl.4, figs.6–7. Originally (and now) *Cordosphaeridium*, subsequently *Tityrosphaeridium?*. Lentin and Williams (1985, p.70) retained this species in *Cordosphaeridium*. Age: early Eocene.

"**bipolare**" Cookson and Eisenack, 1965b, p.135, pl.16, figs.7–8. Holotype: Cookson and Eisenack, 1965b, pl.16, fig.8. **NOW** *Fibrocyta*. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocyta*. Age: early Eocene.

brevispinum He Chengquan, 1991, p.165, pl.20, fig.9. Holotype: He Chengquan, 1991, pl.20, fig.9. He Chengquan (1991, p.165) included this species in *Cordosphaeridium* subgenus *Tarimocystium*. Age: middle Eocene.

brevitubulosum He Chengquan, 1991, p.166,214, pl.13, figs.9–12; text-fig.39. Holotype: He Chengquan, 1991, pl.13, fig.12; text-fig.39. He Chengquan (1991, p.165,213) designated this species as the "type species" of *Cordosphaeridium* subgenus *Tarimocystium*. Age: middle Eocene.

?**callosum** Morgenroth, 1966a, p.21, pl.4, figs.8–10. Holotype: Morgenroth, 1966a, pl.4, figs.9–10. Originally *Cordosphaeridium*, subsequently (and now) *Cordosphaeridium?*, thirdly *Tityrosphaeridium?*. Lentin and Williams (1985, p.70) retained this species in *Cordosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.147). Age: early Eocene.

cantharellus (Brosius, 1963, p.40–41, pl.6, fig.1; text-fig.2, nos.11a–c) Gocht, 1969, p.45. Holotype: Brosius, 1963, pl.6, fig.1; Fensome et al., 1993a, fig.1 — p.1021. Originally *Hystrichosphaeridium*, subsequently (and now) *Cordosphaeridium*, thirdly *Tityrosphaeridium*. This species was retained in *Cordosphaeridium* by Edwards (2001, p.G19). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.91), since these authors did not fully reference the basionym. N.I.A. Age: late Oligocene.

capillaceum Schumacker-Lambry, 1978, p.37–38, pl.2, figs.11–12. Holotype: Schumacker-Lambry, 1978, pl.2, fig.11. Age: late Paleocene (Landenian).

"**capricornum**" Cookson and Eisenack, 1965a, p.128–129, pl.15, figs.1–9. Emendation: Stover and Williams, 1995, p.107, as *Cooksonidium capricornum*. Holotype: Cookson and Eisenack, 1965a, pl.15, fig.7; Fauconnier and Masure, 2004, pl.7, figs.7–10. **NOW** *Cooksonidium*. Originally *Cordosphaeridium*, subsequently *Systematophora?*, thirdly *Areosphaeridium*, fourthly (and now) *Cooksonidium*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Areosphaeridium*) *dictyostilum*, according to Sarjeant (1981, p.115–116) — however,

Lentin and Williams (1985, p.26) retained *Cordosphaeridium* (as *Areosphaeridium*, now *Cooksonidium*) *capricornum*. Age: late Eocene.

catherineae Pearce, 2010, p.51–52, pl.1, figs.10–13; text-fig.3. Holotype: Pearce, 2010, pl.1, figs.10–13; text-fig.3. Age: middle-late Santonian to mid-early Campanian.

"centrocarpum" (Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4) de Coninck, 1965, p.33. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6. **NOW** *Operculodinium centrocarpum*. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum* (Appendix A), thirdly *Cordosphaeridium centrocarpum*, fourthly *Cordosphaeridium tiara* subsp. *centrocarpum*, fifthly (and now) *Operculodinium centrocarpum*, sixthly *Cordosphaeridium microtrianum* subsp. *centrocarpum*, seventhly *Cleistosphaeridium centrocarpum*. Taxonomic junior synonyms: *Operculodinium? echigoense*, according to Matsuoka et al. (1997, p.22); *Membranilarnacia delicata*, according to Jain (1980, p.140). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Age: Miocene.

"chimaera" Cookson and Eisenack, 1968, p.118, caption to figs.5M–N. **Name not validly published:** no description. N.I.A.

commune Corradini, 1973, p.151, pl.22, figs.1a–b; pl.33, figs.1,3. Holotype: Corradini, 1973, pl.22, figs.1a–b. Originally (and now) *Cordosphaeridium*, subsequently *Achomosphaera*. Lentin and Williams (1985, p.70) retained this species in *Cordosphaeridium*. Age: Late Cretaceous–Paleocene.

cordium Shaw Chenglong, 1999b, p.165–167, figs.10–15. Holotype: Shaw Chenglong, 1999b, figs.10–15. Age: Eocene.

"costatum" (Davey and Williams, 1966b, p.62, pl.10, fig.4) Górka, 1970, p.489–490. Holotype: Davey and Williams, 1966b, pl.10, fig.4; Stancliffe and Sarjeant, 1990, pl.3, fig.1. **NOW** *Compositosphaeridium* Dodekova. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Compositosphaeridium* Dodekova. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Compositosphaeridium?*) *polonicum*, according to Beju (1971, p.292) — however, Masure in Fauconnier and Masure (2004, p.137) retained *Compositosphaeridium costatum*. Age: Oxfordian.

?*cracenospinosum* Davey and Williams, 1966b, p.87, pl.3, fig.3 (not 4). Holotype: Davey and Williams, 1966b, pl.3, fig.3 (not 4); Bujak et al., 1980, pl.7, fig.9. Originally *Cordosphaeridium*, subsequently (and now) *Cordosphaeridium?*, thirdly *Achomosphaera?*. Lentin and Williams (1985, p.70) retained this species in *Cordosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.147). Age: early Eocene.

crassum He Chengquan, 1991, p.166, pl.14, fig.3. Holotype: He Chengquan, 1991, pl.14, fig.3. He Chengquan (1991, p.165) included this species in *Cordosphaeridium* subgenus *Tarimocystium*. Age: middle Eocene.

delimurum Fensome et al., 2009, p.23, pl.2, figs.l–q. Holotype: Fensome et al., 2009, pl.2, figs.l,p. Age: youngest occurrence, Lutetian.

"?difficile" (Manum and Cookson, 1964, p.12–14, pl.3, figs.1–3,7) Davey and Williams, 1966b, p.91. Holotype: Manum and Cookson, 1964, pl.3, fig.1; Fauconnier and Masure, 2004, pl.36, figs.2–4. **Combination not validly published:** basionym not fully referenced. **NOW** *Heterosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium?* (combination not validly published), thirdly (and now) *Heterosphaeridium*. Questionable assignment: Davey and Williams (1966b, p.91). Age: Cenomanian.

"digitatum" Wilson in Slimani, 2001a, p.193. **Name not validly published:** no description. **Taxonomic senior synonym:** *Diversispina* (as and now *Kleithriasphaeridium*) *truncata*, according to Slimani (2001a, p.193).

digitiforme He Chengquan, 1991, p.158, pl.19, figs.1–2; text-fig.33. Holotype: He Chengquan, 1991, pl.19, fig.1. Age: middle Eocene.

"**diktyoplokum**" (Klumpp, 1953, p.392, pl.18, figs.3–7, not pl.18, figs.8–10, which are now *Cordosphaeridium latum*) Eisenack, 1963b, p.262. Emendation: Eaton, 1971, p.358–359, as *Areosphaeridium diktyoplokum*. Holotype: Klumpp, 1953, pl.18, figs.3–4. **NOW** *Areosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Areosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (now *Areosphaeridium*) *dictyostilum*, according to Eaton (1971, p.359) — however, Sarjeant (1981, p.115) retained *Hystrichosphaeridium* (as and now *Areosphaeridium*) *dictyostilum*. Age: middle-late Eocene.

"subsp. **diktyoplokum**". Autonym. Holotype: Klumpp, 1953, pl.18, figs.3–4. **Now redundant**. Originally *Hystrichosphaeridium diktyoplokum* subsp. *diktyoplokum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *diktyoplokum*, thirdly *Areosphaeridium diktyoplokum* subsp. *diktyoplokum*.

"subsp. **latum**" (Klumpp, 1953, p.392, pl.18, figs.8–10) Eisenack, 1963b, p.262. Emendation: Sarjeant, 1981, p.106–107, as *Plethysyrinx lata* — however, see Lentin and Williams (1985, p.72). Holotype: Klumpp, 1953, pl.18, figs.8–9. **NOW** *Cordosphaeridium latum*. Originally *Hystrichosphaeridium diktyoplokum* subsp. *latum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *latum*, thirdly *Areosphaeridium diktyoplokum* subsp. *latum*, fourthly *Plethysyrinx lata*, fifthly (and now) *Cordosphaeridium latum*. Age: Eocene.

"**divergens**" (Eisenack, 1954b, p.67, pl.9, figs.13–16) Eisenack, 1963b, p.262. Holotype: Eisenack, 1954b, pl.9, fig.14. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published, Appendix A), thirdly *Cordosphaeridium*, fourthly (and now) *Operculodinium*. Age: early Oligocene.

"**einodes**" (Eisenack, 1958a, p.402, pl.27, figs.3–4) Eisenack, 1963b, p.262. Emendation: Sarjeant, 1985a, p.74–75, as *Kleithriasphaeridium einodes*. Holotype: Eisenack, 1958a, pl.27, fig.3; Sarjeant, 1985a, pl.5, figs.3–4. **NOW** *Kleithriasphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Kleithriasphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Kleithriasphaeridium*) *simplicispinum*, according to Below (1982c, p.17). Age: late Aptian.

"**?erectum**" (Manum and Cookson, 1964, p.14, pl.3, figs.5–6) Davey and Williams, 1969, p.6. Holotype: Manum and Cookson, 1964, pl.3, fig.5. **NOW** *Kiokansium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium?*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Kiokansium?*. Questionable assignment: Davey and Williams (1969, p.6). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.91), since these authors did not fully reference the basionym. Age: Albian–Turonian.

"**exilimurum**" Davey and Williams, 1966b, p.87–88, pl.11, fig.2. Holotype: Davey and Williams, 1966b, pl.11, fig.2; Bujak et al., 1980, pl.7, figs.4–5. Originally *Cordosphaeridium*, subsequently *Hystrichosphaerina?*, thirdly *Tityrosphaeridium?*. Lentin and Williams (1989, p.73) retained this species in *Cordosphaeridium*. **Taxonomic senior synonym:** *Cordosphaeridium fibrospinum*, according to Fensome et al. (2009, p.23). Taxonomic junior synonym: *Achomosphaera* (subsequently *Cordosphaeridium*) *valianta*, according to Jain (1982, p.52). Age: early Eocene.

"**?fasciatum**" Davey and Williams, 1966b, p.90, pl.7, figs.5–6. Holotype: Davey and Williams, 1966b, pl.7, fig.5. **NOW** *Kleithriasphaeridium*. Originally *Cordosphaeridium?*, subsequently (and now) *Kleithriasphaeridium*. Questionable assignment: Davey and Williams (1966b, p.90). Age: Barremian.

"**?fibroferum**" Cookson and Eisenack, 1982, p.40, pl.5, figs.6–9. Holotype: Cookson and Eisenack, 1982, pl.5, fig.7. Questionable assignment: Cookson and Eisenack (1982, p.40). Lentin and Williams (1985, p.71) considered *Florentinia verdieri* to be a possible taxonomic junior synonym of this species. Age: Albian–Cenomanian.

"**fibrospinum**" Davey and Williams, 1966b, p.86, pl.5, fig.5. Emendation: Davey, 1969c, p.36, as a revised diagnosis for *Cordosphaeridium fibrospinum*. Holotype: Davey and Williams, 1966b, pl.5, fig.5; Bujak et al., 1980, pl.7, figs.3,6. Originally (and now) *Cordosphaeridium*, subsequently *Emmetrocyta?*, thirdly *Tityrosphaeridium?*. Lentin and Williams (1989, p.74) retained this species in *Cordosphaeridium*. Taxonomic

junior synonyms: *Cordosphaeridium exilimurum* and *Achomosphaera* (subsequently *Cordosphaeridium*) *valianta*, both according to Fensome et al. (2009, p.23). Age: early Eocene.

"*filosum*" Wilson, 1967a, p.66, figs.2b,31–32,34. Holotype: Wilson, 1967a, figs.2b,32. **NOW** *Turbiosphaera*. Originally *Cordosphaeridium*, subsequently (and now) *Turbiosphaera*. Age: Paleocene–Oligocene.

"*floripes*" (Deflandre and Cookson, 1955, p.276, pl.7, figs.1–2,7) Eisenack, 1963b, p.262. Holotype: Deflandre and Cookson, 1955, pl.7, fig.1. **NOW** *Homotryblium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Homotryblium*. Taxonomic junior synonym: *Homotryblium plectilum*, according to Bujak in Bujak et al. (1980, p.64) — however, Stover in Lentin and Williams (1985, p.168) retained *Homotryblium plectilum*. Age: Early Tertiary.

"subsp. *breviradiatum*" (Cookson and Eisenack, 1961b, p.44, pl.2, figs.10–11) Eisenack, 1963b, p.262. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.10–11. **NOW** *Homotryblium floripes* subsp. *breviradiatum*. Originally *Hystrichosphaeridium floripes* subsp. *breviradiatum*, subsequently *Cordosphaeridium floripes* subsp. *breviradiatum*, thirdly (and now) *Homotryblium floripes* subsp. *breviradiatum*. Age: late Eocene.

"subsp. *floripes*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.7, fig.1. **NOW** *Homotryblium floripes* subsp. *floripes*. Originally *Hystrichosphaeridium floripes* subsp. *floripes*, subsequently *Cordosphaeridium floripes* subsp. *floripes*, thirdly (and now) *Homotryblium floripes* subsp. *floripes*.

funiculatum Morgenroth, 1966a, p.22–23, pl.6, figs.2–3. Emendation: Brinkhuis, 1992, p.97, as *Cordosphaeridium funiculatum*. Holotype: Morgenroth, 1966a, pl.6, fig.2. Originally (and now) *Cordosphaeridium*, subsequently *Tityrosphaeridium*?. Lentin and Williams (1985, p.71) retained this species in *Cordosphaeridium*. Age: early Eocene.

furcans He Chengquan, 1991, p.159–160, pl.51, figs.13–14. Holotype: He Chengquan, 1991, pl.51, fig.13. Age: Paleocene.

gracile (Eisenack, 1954b, p.66, pl.8, fig.17; pl.10, figs.3–8; pl.12, figs.7,21) Davey and Williams, 1966b, p.84. Emendation: Davey and Williams, 1966b, p.84–85, as *Cordosphaeridium gracile*. Holotype: Eisenack, 1954b, pl.10, fig.5. Originally *Hystrichosphaeridium inodes* subsp. *gracile*, subsequently *Cordosphaeridium inodes* subsp. *gracile*, thirdly (and now) *Cordosphaeridium gracile*, fourthly *Tityrosphaeridium gracile*. Lentin and Williams (1985, p.71) retained this species in *Cordosphaeridium*. Age: Oligocene.

forma *areolatum* (Eisenack, 1954b, p.67, pl.12, fig.21) Williams and Fensome, 2016, p.140. Holotype: Eisenack, 1954b, p.67, pl.12, fig.21. Originally *Hystrichosphaeridium inodes* subsp. *gracile* forma *areolatum*, subsequently (and now) *Cordosphaeridium gracile* forma *areolatum*. Williams and Fensome (2016, p.140) noted that the distinctive surface texture described by Eisenack (1954b) may be a preservational artifact, and hence they recommended that this taxon be restricted to its type. Age: Oligocene.

forma *gracile*. Autonym. Holotype: Eisenack, 1954b, pl.10, fig.5. Originally *Hystrichosphaeridium inodes* subsp. *gracile* forma *gracile*, subsequently (and now) *Cordosphaeridium gracile* forma *gracile*.

granulatum Khanna and Singh, 1981b, p.403, fig.2, nos.11–12; text-fig.14. Holotype: Khanna and Singh, 1981b, fig.2, no.11. Age: late middle Eocene.

?*hirundo* (Eisenack, 1958a, p.404–405, pl.24, fig.12) Stover and Evitt, 1978, p.147. Emendation: Sarjeant, 1985a, p.76–77, as *Achomosphaera hirundo*. Holotype: Eisenack, 1958a, pl.24, fig.12. Originally *Hystrichosphaeridium*, subsequently *Achomosphaera*, thirdly *Lanternosphaeridium*, fourthly (and now) *Cordosphaeridium*?, fifthly *Spiniferites*?. Lentin and Williams (1989, p.74) questionably retained this species in *Cordosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.47). N.I.A. Age: Early Cretaceous.

**inodes* (Klumpp, 1953, p.391, pl.18, figs.1–2) Eisenack, 1963b, p.261. Emendations: Morgenroth, 1968, p.549–550, as *Cordosphaeridium inodes*; Sarjeant, 1981, p.102–105, as *Cordosphaeridium inodes* — however, see Lentin and Williams (1985, p.72). Holotype: Klumpp, 1953, pl.18, figs.1–2. Originally *Hystrichosphaeridium*, subsequently (and now) *Cordosphaeridium*. Jain and Garg (1986b, p.64–65) considered *Cordosphaeridium sanghamallae* to be a possible taxonomic junior synonym of this species. Age: late Eocene.

"subsp. *gracile*" (Eisenack, 1954b, p.66, pl.8, fig.17; pl.10, figs.3–8; pl.12, figs.7,21) Eisenack, 1963b, p.261. Emendation: Davey and Williams, 1966b, p.84–85, as *Cordosphaeridium gracile*. Holotype: Eisenack, 1954b, pl.10, fig.5. **NOW** *Cordosphaeridium gracile*. Originally *Hystrichosphaeridium inodes* subsp. *gracile*, subsequently *Cordosphaeridium inodes* subsp. *gracile*, thirdly (and now) *Cordosphaeridium gracile*, fourthly *Tityrosphaeridium gracile*. Age: Oligocene.

subsp. *inodes*. Autonym. Holotype: Klumpp, 1953, pl.18, figs.1–2. Originally *Hystrichosphaeridium inodes* subsp. *inodes*, subsequently (and now) *Cordosphaeridium inodes* subsp. *inodes*.

subsp. *longipes* Hansen, 1977, p.17,19, figs.17C–E. Holotype: Hansen, 1977, fig.17E. Age: early Paleocene.

"subsp. *minimum*" Morgenroth, 1966a, p.24, pl.5, figs.6–7. Holotype: Morgenroth, 1966a, pl.5, figs.6–7. **Taxonomic senior synonym at specific rank:** *Hystrichosphaeridium* (now *Minisphaeridium*) *latrictum*, according to Fensome et al. (2009, p.44). Originally *Cordosphaeridium inodes* subsp. *minimum*, subsequently *Cordosphaeridium minimum*. Age: early Eocene.

"subsp. *minus*" Morgenroth, 1966a, p.24, pl.5, figs.4–5. Holotype: Morgenroth, 1966a, pl.5, figs.4–5. **NOW** *Cordosphaeridium minus*. Originally *Cordosphaeridium inodes* subsp. *minus*, subsequently (and now) *Cordosphaeridium minus*. Age: early Eocene.

subsp. *ovale* He Chengquan, 1991, p.161, pl.17, figs.1–3. Holotype: He Chengquan, 1991, pl.17, fig.3. Age: middle Eocene.

"subsp. *robustum*" Gocht, 1969, p.42, pl.2, figs.1–2. Emendation: Sarjeant, 1981, p.105–106, as *Cordosphaeridium robustum* — however, see Lentin and Williams (1985, p.73). Holotype: Gocht, 1969, pl.2, fig.1. **NOW** *Cordosphaeridium robustum*. Originally *Cordosphaeridium inodes* subsp. *robustum*, subsequently (and now) *Cordosphaeridium robustum*. Age: Eocene.

"*israelianum*" (Rossignol, 1962, p.132, pl.2, fig.3) Lentin and Williams 1993, p.126. Holotype: Rossignol, 1962, pl.2, fig.3. **Combination not validly published:** not intended. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Operculodinium*, fifthly *Cordosphaeridium* (combination not validly published). Taxonomic junior synonyms: *Cleistosphaeridium cephalum*, according to Jain and Garg (1991, p.78); *Operculodinium crassum*, according to Edwards and Andrie (1992, p.262) — however, Head (1996b, p.1231) retained *Operculodinium crassum*; and *Hystrichosphaeridium westii* (name not validly published), by implication in Wall and Dale (1968a, p.315, as "hystrichosphere type x of West"). It is clear from the fact that Lentin and Williams (1989, p.126) attributed this combination to Davey et al. (1966) that they did not intend to effect this combination; Davey et al. proposed the combination *Cleistosphaeridium israelianum*. Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859, questionably according to Wall and Dale (1968c, p.272), and without question according to Matsuoka (1989, p.224). Age: Pleistocene.

"*klumppiae*" Corradini, 1973, p.152, pl.22, figs.2a–c. Holotype: Corradini, 1973, pl.22, figs.2a–c. **NOW** *Fibrocysta*. Originally *Cordosphaeridium*, subsequently (and now) *Fibrocysta*. Age: Late Cretaceous–Paleocene.

"*latispinosum*" Davey and Williams, 1966b, p.88, pl.5, fig.8. Holotype: Davey and Williams, 1966b, pl.5, fig.8; Bujak et al., 1980, pl.8, figs.7–9. **NOW** *Achilleodinium*. Originally *Cordosphaeridium*, subsequently (and now) *Achilleodinium*, thirdly *Tityrosphaeridium*?. Age: early Eocene.

latum (Klumpp, 1953, p.392, pl.18, figs.8–10) Lentin and Williams, 1985, p.72. Emendation: Sarjeant, 1981, p.106–107, as *Plethysyrinx lata* — however, see Lentin and Williams (1985, p.72). Holotype: Klumpp, 1953, pl.18, figs.8–9; Sarjeant, 1981, pl.5, figs.2–3 (not 3–4). Originally *Hystrichosphaeridium diktyoplokum* subsp. *latum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *latum*, thirdly *Areosphaeridium diktyoplokum* subsp. *latum*, fourthly *Plethysyrinx lata*, fifthly (and now) *Cordosphaeridium latum*. Age: Eocene.

"*lemniscatum*" Corradini, 1973, p.152–153, pl.22, figs.4a–b,5; pl.33, figs.2,4; pl.39, fig.2. Holotype: Corradini, 1973, pl.22, fig.5; Fensome et al., 1995, fig.3 — p.1601. **NOW** *Disphaerogena*. Originally *Cordosphaeridium*, subsequently *Cordosphaeridium?*, thirdly *Plethysyrinx*, fourthly *Cyclapophysis*, fifthly (and now) *Disphaerogena*. Questionable assignment: Stover and Evitt (1978, p.147). Age: Late Cretaceous–Paleocene.

"*majus*" (Lejeune-Carpentier, 1940, p.B220–B221; text-fig.13) Corradini, 1973, p.149. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.12, as *Amphorosphaeridium majus*. Holotype: Lejeune-Carpentier, 1940, text-fig.13; Strel et al., 1977, pl.1, fig.7; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.6–7; text-fig.7. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Dapsilidinium?* (combination not validly published), fifthly *Amphorosphaeridium*, sixthly (and now) *Exochosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.76). Taxonomic junior synonym: *Baltisphaeridium* (as *Exochosphaeridium*) *bifidum*, including the subspecies *Exochosphaeridium bifidum* var. *involutum* (as *Exochosphaeridium bifidum* subsp. *involutum*), both according to Peyrot (2011, p.284). Age: Late Cretaceous.

"*microtriainum*" (Klumpp, 1953, p.390, pl.17, figs.6–7) Eisenack 1963b, p.263. Emendation: Sarjeant, 1981, p.110–112, as *Achomosphaera microtriaina*. Holotype: Klumpp, 1953, pl.17, figs.6–7; Sarjeant, 1981, pl.2, figs.1–2; text-fig.2. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly *Cordosphaeridium?*, fourthly *Polysphaeridium*, fifthly *Achomosphaera*, sixthly (and now) *Operculodinium*. Questionable assignment: Stover and Evitt (1978, p.147) as a problematic species. Age: late Eocene.

"subsp. *centrocarpum*" (Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4) de Coninck, 1969, p.32. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6. **NOW** *Operculodinium centrocarpum*. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum* (Appendix A), thirdly *Cordosphaeridium centrocarpum*, fourthly *Cordosphaeridium tiara* subsp. *centrocarpum*, fifthly (and now) *Operculodinium centrocarpum*, sixthly *Cordosphaeridium microtriainum* subsp. *centrocarpum*, seventhly *Cleistosphaeridium centrocarpum*. Taxonomic junior synonyms: *Operculodinium? echigoense*, according to Matsuoka et al. (1997, p.22); *Membranilarnacia delicata*, according to Jain (1980, p.140). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Age: Miocene.

"subsp. *microtriainum*". Autonym. Holotype: Klumpp, 1953, pl.17, figs.6–7 and Sarjeant, 1981, pl.2, figs.1–2; text-fig.2. **Now redundant**.

"var. *microtriainum*". Autonym. Holotype: Klumpp, 1953, pl.17, figs.6–7 and Sarjeant, 1981, pl.2, figs.1–2; text-fig.2. **Now redundant**.

"subsp. *nanus*" (Rozen, 1965, p.311, pl.2, figs.7–8; text-fig.21) Lentin and Williams, 1973, p.33. Holotype: Rozen, 1965, pl.2, figs.7–8. **NOW** *Impletosphaeridium nanus*. Originally *Cordosphaeridium microtriainum* var. *nanus*, subsequently *Cordosphaeridium microtriainum* subsp. *nanus*, thirdly *Cleistosphaeridium? nanus*, fourthly (and now) *Impletosphaeridium nanus*. N.I.A. Age: late Eocene.

"var. *nanus*" Rozen, 1965, p.311, pl.2, figs.7–8; text-fig.21. Holotype: Rozen, 1965, pl.2, figs.7–8. **NOW** *Impletosphaeridium nanus*. Originally *Cordosphaeridium microtriainum* var. *nanus*, subsequently *Cordosphaeridium microtriainum* subsp. *nanus*, thirdly *Cleistosphaeridium? nanus*, fourthly (and now) *Impletosphaeridium nanus*. N.I.A. Age: late Eocene.

"*minimum*" (Morgenroth, 1966a, p.24, pl.5, figs.6–7) Benedek, 1972, p.25–26. Holotype: Morgenroth, 1966a, pl.5, figs.6–7. **Taxonomic senior synonym at specific rank:** *Hystrichosphaeridium* (now *Minisphaeridium*) *latirictum*

according to Fensome et al. (2009, p.44). Originally *Cordosphaeridium inodes* subsp. *minimum*, subsequently *Cordosphaeridium minimum*. Age: early Eocene.

minus (Morgenroth, 1966a, p.24, pl.5, figs.4–5) Islam, 1983b, p.338. Holotype: Morgenroth, 1966a, pl.5, figs.4–5. Originally *Cordosphaeridium inodes* subsp. *minus*, subsequently (and now) *Cordosphaeridium minus*. Age: early Eocene.

mirabile He Chengquan, 1991, p.162, pl.15, fig.7; text-fig.34. Holotype: He Chengquan, 1991, pl.15, fig.7; text-fig.34. Age: Paleocene–middle Eocene.

moniliforme He Chengquan, 1991, p.161–162, pl.24, figs.9–12. Holotype: He Chengquan, 1991, pl.24, fig.10. Age: Paleocene.

"multispinosum" Davey and Williams, 1966b, p.89–90, pl.3, fig.6. Holotype: Davey and Williams, 1966b, pl.3, fig.6; Bujak et al., 1980, pl.7, figs.1–2. **NOW** *Amphorosphaeridium?*. Originally *Cordosphaeridium*, subsequently (and now) *Amphorosphaeridium?*. Age: early Eocene.

odontodes He Chengquan, 1991, p.163, pl.15, fig.6; pl.19, figs.3,8; text-fig.35. Holotype: He Chengquan, 1991, pl.19, fig.3. Age: middle Eocene.

operculatum He Chengquan, 1991, p.166–167, pl.14, figs.4–6; text-figs.40a–b. Holotype: He Chengquan, 1991, pl.14, fig.5; text-fig.40b. He Chengquan (1991, p.166) included this species in *Cordosphaeridium* subgenus *Tarimocystium*. Age: middle Eocene.

"palmatum" (White, 1842, p.39–40, pl.4, fig.12) de Coninck, 1965, p.32. Holotype: White, 1842, pl.4, fig.12. Originally *Xanthidium tubiferum* var. *palmatum* (Appendix A), subsequently *Xanthidium palmatum* (Appendix A), thirdly *Spiniferites palmatus*, fourthly *Cordosphaeridium palmatum*, fifthly *Hystrichosphaeridium palmatum* (combination illegitimate), sixthly *Hystrichosphaeridium duplum* (name illegitimate). **Nomenclatural senior synonym:** *Xanthidium tubiferum* var. *recurvatum* (as *Hystrichosphaeridium recurvatum*), which has the same type. Nomenclatural junior synonyms: *Xanthidium tubiferum* var. *palmaforme* and *Hystrichosphaeridium duplum*, both of which have the same holotype as *Hystrichosphaeridium palmatum*. This is not an illegitimate combination. For a full discussion, see *Hystrichosphaeridium recurvatum*. Age: Senonian.

reticulatum He Chengquan, 1991, p.163–164, pl.20, figs.6–7; text-fig.36. Holotype: He Chengquan, 1991, pl.20, fig.7. Age: Paleocene–early Eocene.

robustum (Gocht, 1969, p.42, pl.2, figs.1–2) Sarjeant, 1981, p.105. Emendation: Sarjeant, 1981, p.105–106, as *Cordosphaeridium robustum* — however, see Lentin and Williams (1985, p.73). Holotype: Gocht, 1969, pl.2, fig.1; Sarjeant, 1981, pl.2, figs.1–2. Originally *Cordosphaeridium inodes* subsp. *robustum*, subsequently (and now) *Cordosphaeridium robustum*. Islam (1983a, p.235) also proposed this combination. Age: Eocene.

sangchamallae Mehrotra and Sinha, 1981, p.153, pl.2, figs.7–8. Holotype: Mehrotra and Sinha, 1981, pl.2, fig.7. Jain and Garg (1986b, p.64–65) considered *Hystrichosphaeridium* (as *Cordosphaeridium*) *inodes* to be the possible senior synonym of this species. Age: Late Cretaceous (following Jain and Garg, 1986b, p.64–65).

senegalense Jain and Millepied, 1975, p.149, pl.5, fig.68. Holotype: Jain and Millepied, 1975, pl.5, fig.68. Originally (and now) *Cordosphaeridium*, subsequently *Tityrosphaeridium?*. Lentin and Williams (1985, p.73) retained this species in *Cordosphaeridium*. Age: Campanian–Maastrichtian.

?simplex Michael, 1964, p.32–33, pl.3, fig.4. Holotype: Michael, 1964, pl.3, fig.4. Originally *Cordosphaeridium*, subsequently (and now) *Cordosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.147). Age: early Barremian.

"solaster" Morgenroth, 1966a, p.25, pl.5, figs.8–9. Holotype: Morgenroth, 1966a, pl.5, figs.8–9. **NOW** *Exochosphaeridium?*. Originally *Cordosphaeridium*, subsequently (and now) *Exochosphaeridium?*. Age: early Eocene.

?*solidospinosum* Gedl, 1995, p.197, pl.4, fig.2; pl.5, figs.7–8. Holotype: Gedl, 1995, pl.5, figs.7–8. Questionable assignment: Gedl (1995, p.197). Age: early-middle Eocene.

"*spinosum*" (White, 1842, p.37, pl.4, fig.6) de Coninck, 1965, p.31. Holotype: White, 1842, pl.4, fig.6; lost according to Sarjeant (1966b, p.141). **Combination not validly published**: basionym not fully referenced. **NOW** *Exochosphaeridium*?. Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Cordosphaeridium* (combination not validly published), fifthly *Exochosphaeridium*, sixthly (and now) *Exochosphaeridium*?. Age: Late Cretaceous.

"var. *deflandrei*" (Lejeune-Carpentier, 1941, p.84, fig.6) de Coninck, 1965, p.31. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.14, as *Fibrocysta? deflandrei*. Holotype: Lejeune-Carpentier, 1941, fig.6; Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.5–6; text-fig.8. **Combination not validly published**: basionym not fully referenced. **NOW** *Fibrocysta? deflandrei*. Originally *Hystrichosphaeridium spinosum* var. *deflandrei*, subsequently *Baltisphaeridium spinosum* var. *deflandrei* (Appendix A), thirdly *Cordosphaeridium spinosum* var. *deflandrei* (combination not validly published), fourthly *Exochosphaeridium spinosum* var. *deflandrei*, fifthly *Exochosphaeridium spinosum* subsp. *deflandrei*, sixthly *Exochosphaeridium? spinosum* subsp. *deflandrei*, seventhly (and now) *Fibrocysta? deflandrei*. Age: Late Cretaceous.

taeniforme He Chengquan, 1991, p.164, pl.18, figs.8–9; text-fig.37. Holotype: He Chengquan, 1991, pl.18, fig.9. Age: middle Eocene.

taiwanianum Shaw Chenglong, 1999b, p.168, figs.16–19. Holotype: Shaw Chenglong, 1999b, figs.16–17. Age: Eocene.

?*tenuistriatum* Heisecke, 1970, p.245, pl.7, fig.1; pl.12, figs.3–4. Emendation: Quattrocchio and Sarjeant, 1996, p.118, as *Tityrosphaeridium tenuistriatum*. Holotype: Heisecke, 1970, pl.7, fig.1; pl.12, figs.3–4. Originally *Cordosphaeridium*, subsequently (and now) *Cordosphaeridium*?, thirdly *Tityrosphaeridium*?, fourthly *Tityrosphaeridium*. This species is here retained questionably in *Cordosphaeridium* since *Tityrosphaeridium* is now considered a taxonomic junior synonym of *Cordosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.147). Age: early Paleocene.

tianshanense He Chengquan, 1991, p.164, pl.18, figs.4–7. Holotype: He Chengquan, 1991, pl.18, fig.4. Age: middle Eocene.

"*tiara*" (Klumpp, 1953, p.390–391, pl.17, figs.8–10) Morgenroth, 1966a, p.25. Holotype: Klumpp, 1953, pl.17, figs.8–9. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium*, fourthly *Cleistosphaeridium*, fifthly (and now) *Operculodinium*. N.I.A. Age: Eocene.

"subsp. *centrocarpum*" (Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4) Morgenroth, 1966a, p.26. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6. **NOW** *Operculodinium centrocarpum*. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum* (Appendix A), thirdly *Cordosphaeridium centrocarpum*, fourthly *Cordosphaeridium tiara* subsp. *centrocarpum*, fifthly (and now) *Operculodinium centrocarpum*, sixthly *Cordosphaeridium microtriainum* subsp. *centrocarpum*, seventhly *Cleistosphaeridium centrocarpum*. Taxonomic junior synonyms: *Operculodinium? echigoense*, according to Matsuoka et al. (1997, p.22); *Membranilarnacia delicata*, according to Jain (1980, p.140). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Age: Miocene.

"subsp. *tiara*". Autonym. Holotype: Klumpp, 1953, pl.17, figs.8–9. **Now redundant**. N.I.A.

?*trompetum* (Cookson and Eisenack, 1982, p.47, pl.4, fig.22) Lentin and Williams, 1985, p.74. Holotype: Cookson and Eisenack, 1982, pl.4, fig.22. Originally *Polysphaeridium*, subsequently (and now) *Cordosphaeridium*?. Questionable assignment: Lentin and Williams (1985, p.74). N.I.A. Age: Paleocene.

"truncigerum" (Deflandre, 1937b, p.71–72, pl.13 (al. pl.10), figs.6–7) de Coninck, 1975, p.80. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. **NOW** *Raetiaedinium*. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium?*, seventhly *Florentinia*, eighthly *Pervosphaeridium?*, ninthly (and now) *Raetiaedinium*. Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes*, by implication in Yun Hyesu (1981, p.27), who considered *Cordosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Cordosphaeridium* (as *Pervosphaeridium*) *truncigerum*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

"?uncinispinosum" de Coninck, 1969, p.32–33, pl.9, figs.6–8. Holotype: de Coninck, 1969, pl.9, figs.6–8. **NOW** *Operculodinium*. Originally *Cordosphaeridium*, subsequently *Cordosphaeridium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Operculodinium*. Questionable assignment: Stover and Evitt (1978, p.147) as a problematic species. Age: early Eocene.

"valiantum" (Sah et al., 1970, p.145, pl.1, figs.8–9) Stover and Evitt, 1978, p.147. Holotype: Sah et al., 1970, pl.1, fig.8. Originally *Achomosphaera*, subsequently *Cordosphaeridium*. **Taxonomic senior synonym:** *Cordosphaeridium fibrospinosum*, according to Fensome et al. (2009, p.23). Taxonomic senior synonym: *Cordosphaeridium exilimurum*, according to Jain (1982, p.52). Age: Late Cretaceous.

varians May, 1980, p.47–48, pl.2, figs.4,7–8; pl.14, figs.1–3; pl.15, figs.2a–b,3a–d; pl.16, figs.6a–10b. Holotype: May, 1980, pl.2, figs.4,7–8. Age: Campanian–Maastrichtian.

vulgatum Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.64–65, pl.13, figs.10–13. Holotype: Liu Zhili et al., 1992, pl.13, fig.13. Age: Early Tertiary.

"xanthium" Benedek, 1972, p.27–28, pl.9, fig.8; text-fig.9. Emendation: Benedek and Sarjeant, 1981, p.342–343, as *Lingulodinium xanthium*. Holotype: Benedek, 1972, pl.9, fig.8; Benedek and Sarjeant, 1981, fig.9, no.5. **NOW** *Operculodinium*. Originally *Cordosphaeridium*, subsequently (and now) *Operculodinium*, thirdly *Lingulodinium*. Age: middle-late Oligocene.

CORDOSPHAERIDIUM subgenus **CORDOSPHAERIDIUM**. Autonym. All the species of the autonym are those included under the entry for the genus, but not specified as belonging to *Cordosphaeridium* subgenus *Tarimocystium*. Type: Klumpp, 1953, pl.18, figs.1–2, as *Hystrichosphaeridium inodes*.

CORDOSPHAERIDIUM subgenus **TARIMOCYSTIUM** He Chengquan, 1991, p.165,213–214. He Chengquan (1991, p.165) included the following species in this subgenus: *Cordosphaeridium aulichnum*, *Cordosphaeridium brevispinum*, *Cordosphaeridium brevitubulosum*, *Cordosphaeridium crassum*, and *Cordosphaeridium operculatum*. Citations for the above species are included under *Cordosphaeridium*. He Chengquan et al. (2009, p.148–150) also used this subgenus name. Type: He Chengquan, 1991, pl.13, fig.12; text-fig.39, as *Cordosphaeridium (Tarimocystium) brevitubulosum*.

CORNUDINIUM Pocock, 1972, p.93. Type: Pocock, 1972, pl.24, fig.15, as *Cornudinium stavelense*.

bicuneatum (Deflandre, 1939a, p.180, pl.8, fig.7 ex Sarjeant, 1967b, p.248) Courtinat, 1989, p.220. Holotype: Deflandre, 1939a, pl.8, fig.7. Originally *Palaeoperidinium*, subsequently *Scrinioidinium*, thirdly *Glossodinium*, fourthly *Dinopterygium*, fifthly (and now) *Cornudinium*. The name *Palaeoperidinium bicuneatum* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.141) accepted Sarjeant's (1967b) indirect reference to Deflandre (1939a), in which the name *Palaeoperidinium bicuneatum* was first proposed, as indication of a type (I.C.N. Article 40.3). Age: Oxfordian.

**stavelyense* Pocock, 1972, p.94, pl.24, figs.15–16. Holotype: Pocock, 1972, pl.24, fig.15; Jansonius, 1986, pl.5, figs.7–8. Age: ?late Callovian–Oxfordian (following Jansonius in Lentin and Williams, 1989, p.76).

CORONADINIUM Willems in Williams et al., 1998, p.141. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299, the latter noting that the cyst wall is pithonelloid and so dinoflagellate affinity is questionable). Substitute name for *Amphora* Willems, 1995a, p.66–67 (an illegitimate name). Taxonomic junior synonym: *Corbella* Odin 2008, according to Odin (2009, p.187). Type: Willems, 1995a, pl.3, figs.1–3, as *Amphora coronata*.

**coronatum* (Willems, 1995a, p.67,69, pl.3, figs.1–6; pl.4, figs.1–4) Willems in Williams et al., 1998, p.142. Holotype: Willems, 1995a, pl.3, figs.1–3. Originally *Amphora* (generic name illegitimate), subsequently (and now) *Coronadinium*. Age: early Campanian.

vitis (Odin 2008, p.24–26, pl.9, figs.138; pl.10, figs.155–163; appendix pl.2, figs.29–30) Odin, 2009, p.187. Holotype: Odin, 2008, appendix pl.2, fig.29. Originally *Corbella*, subsequently (and now) *Coronadinium*. Age: Campanian–Maastrichtian.

subsp. *biremis* (Odin, 2008, p.25–26, pl.10, figs.160–163; appendix pl.2, fig.30) Odin 2009, p.187. Holotype: Odin, 2008, appendix pl.2, fig.30. Originally *Corbella vitilis* subsp. *biremis*, subsequently (and now) *Coronadinium vitilis* subsp. *biremis*. Odin (2009, p.187) did not fully reference the basionym when he proposed this combination; however, as he was using the I.C.Z.N., the name can be considered validly published. Age: Campanian–Maastrichtian.

subsp. *vitis* Autonym. Holotype: Odin, 2008, appendix pl.2, fig.29. Originally *Corbella vitilis* subsp. *vitis*, subsequently (and now) *Coronadinium vitilis* subsp. *vitis*. Age: Campanian–Maastrichtian.

CORONIFERA Cookson and Eisenack, 1958, p.45. Emendations: Davey, 1969a, p.161; Davey, 1974, p.47; May, 1980, p.48; Mao Shaozhi and Norris, 1988, p.35–36. Type: Cookson and Eisenack, 1958, pl.12, fig.6, as *Coronifera oceanica*.

albertii Millioud, 1969, p.425–426, pl.1, fig.4. Holotype: Millioud, 1969, pl.1, fig.4. Age: late Hauterivian.

caperata Jiabo, 1978, p.65, pl.23, fig.18; text-fig.10. Holotype: Jiabo, 1978, pl.23, fig.18; text-fig.10. Age: Early Tertiary.

granulata Slimani, 1994, p.71–72, pl.11, figs.1–4. Holotype: Slimani, 1994, pl.11, figs.1–4. Age: latest early–late Maastrichtian.

hebspina (Yun Hyesu, 1981, p.23–24, pl.12, figs.2,4,6a–b; text-fig.6b) Peyrot, 2011, p.288. Holotype: Yun Hyesu, 1981, pl.12, figs.6a–b; Fensome et al., 1991, figs.3–4 — p.643; fig.3 — p.697. Originally *Coronifera oceanica* subsp. *hebspina*, subsequently *Coronifera pedata* subsp. *hebspina*, thirdly (and now) *Coronifera hebspina*. Lentin and Williams (1989, p.77) inadvertently both transferred this taxon to *Coronifera pedata* and retained it as a subspecies of *Coronifera oceanica*. Lentin and Williams (1993, p.131) retained this taxon as a subspecies of *Coronifera oceanica*. Age: early Santonian.

"*kaiseri*" Ashraf, 1979, p.139–140, pl.8, figs.7–8. Holotype: Ashraf, 1979, pl.8, fig.7. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Florentinia*) *radiculatum*, according to Below (1982c, p.9). Age: Early Cretaceous.

kirae Prössl, 1992a, p.264–265, pl.2, figs.1–2,5–7,11; text-figs.3a–b. Holotype: Prössl, 1992a, pl.2, figs.5–6. Age: middle Albian.

minor (Yu Jingxian and Zhang Wangping, 1980, p.111–112, pl.4, figs.4–5) Mao Shaozhi and Norris, 1988, p.36. Emendation: Mao Shaozhi and Norris, 1988, p.36, as *Coronifera minor*. Holotype: Yu Jingxian and Zhang

Wangping, 1980, pl.4, fig.5. Originally *Diphyes*, subsequently (and now) *Coronifera*. Age: Cenomanian–Santonian.

minuta Xu Jinli et al., 1997, p.100–101, pl.22, fig.11 ex He Chengquan et al., 2009, p.653. Holotype: Xu Jinli et al., 1997, pl.22, fig.11. The name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.653) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

"*monstruosa*" (Tasch in Tasch et al., 1964, p.195, pl.1, fig.12) Stover and Evitt, 1978, p.148. Holotype: Tasch et al., 1964, pl.1, fig.12. Originally *Hystrichosphaeridium*, subsequently (and now) *Diphyes?*, thirdly *Coronifera*. Taxonomic senior synonym: *Coronifera oceanica*, according to Below (1982c, p.5) — however, Fauconnier in Fauconnier and Masure (2004, p.176) retained *Hystrichosphaeridium* (as *Diphyes?*) *monstruosum*. Age: Albian.

**oceanica* Cookson and Eisenack, 1958, p.45, pl.12, figs.5–6. Emendation: May, 1980, p.48–49. Holotype: Cookson and Eisenack, 1958, pl.12, fig.6; Fensome et al., 1991, fig.2 — p.697; fig.2 — p.701. Taxonomic senior synonym: *Hystrichosphaera?* (as *Coronifera*) *pedata*, according to Sarjeant (1985b, p.145–147) — however, Kirsch (1991, p.71) retained *Coronifera oceanica*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Coronifera*) *monstruosum*, according to Below (1982c, p.5) — however, Fauconnier in Fauconnier and Masure (2004, p.176) retained *Hystrichosphaeridium* (as *Diphyes?*) *monstruosum*. Age: Albian.

"subsp. *hebspina*" Yun Hyesu, 1981, p.23–24, pl.12, figs.2,4,6a–b; text-fig.6b. Holotype: Yun Hyesu, 1981, pl.12, figs.6a–b; Fensome et al., 1991, figs.3–4 — p.643; fig.3 — p.697. **NOW** *Coronifera hebspina*. Originally *Coronifera oceanica* subsp. *hebspina*, subsequently *Coronifera pedata* subsp. *hebspina*, thirdly (and now) *Coronifera hebspina*. Age: early Santonian.

subsp. *magna* (Wetzel, 1955, p.35,38, figs.9–10,14) Sarjeant, 1984c, p.138–139. Emendation: Sarjeant, 1984c, p.138–139, as *Coronifera oceanica* subsp. *magna*. Holotype: Wetzel, 1955, fig.9; Sarjeant, 1984c, pl.5, figs.4–5; text-fig.11 (two illustrations); Fensome et al., 1991, figs.1–3 — p.663; fig.1 — p.697. Originally *Hystrichosphaeridium pseudhystrichodinium* subsp. *magnum*, subsequently *Baltisphaeridium pseudhystrichodinium* subsp. *magnum* (Appendix A), thirdly (and now) *Coronifera oceanica* subsp. *magna*, fourthly *Coronifera pedata* subsp. *magna*. Lentin and Williams (1989, p.77) retained this taxon as a subspecies of *Coronifera oceanica*. Age: Paleocene.

subsp. *oceanica*. Autonym. Holotype: Cookson and Eisenack, 1958, pl.12, fig.6; Fensome et al., 1991, fig.2 — p.697; fig.2 — p.701.

?*ovata* Jiabo, 1978, p.66, pl.23, fig.19. Holotype: Jiabo, 1978, pl.23, fig.19. Questionable assignment: He Chengquan et al. (2009, p.221). Age: Early Tertiary.

pedata (Wetzel, 1933b, p.55–56, pl.4, fig.35 ex Downie and Sarjeant, 1965, p.119) Sarjeant, 1985b, p.145–147. Emendation: Sarjeant, 1985b, p.145–146, as *Coronifera pedata*. Holotype: Wetzel, 1933b, pl.4, fig.35; Sarjeant, 1985b, pl.4, fig.5. Originally *Hystrichosphaera?*, subsequently *Spiniferites?*, thirdly (and now) *Coronifera*. Taxonomic senior synonym: *Coronifera oceanica*, by implication in Sarjeant (1985b, p.145–147), who believed *Hystrichosphaera* (as *Coronifera*) *pedata* to be the senior name — however, Kirsch (1991, p.71) retained the two species. The name *Hystrichosphaera? pedata* was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous.

"subsp. *hebspina*" (Yun Hyesu, 1981, p.23–24, pl.12, figs.2,4,6a–b; text-fig.6b) Lentin and Williams, 1989, p.77. Holotype: Yun Hyesu, 1981, pl.12, figs.6a–b; Fensome et al., 1991, figs.3–4 — p.643; fig.3 — p.697. **NOW** *Coronifera hebspina*. Originally *Coronifera oceanica* subsp. *hebspina*, subsequently *Coronifera pedata* subsp. *hebspina*, thirdly (and now) *Coronifera hebspina*. Lentin and Williams (1989, p.77) incorrectly attributed this combination to Sarjeant (1985b, p.147). Age: early Santonian.

"subsp. *magna*" (Wetzel, 1955, p.35,38, figs.9–10,14) Sarjeant, 1985b, p.147. Emendation: Sarjeant, 1984c, p.138–139, as *Coronifera oceanica* subsp. *magna*. Holotype: Wetzel, 1955, fig.9; Sarjeant, 1984c, pl.5, figs.4–5; text-fig.11 (two illustrations), and Fensome et al., 1991, figs.1–3 — p.663; fig.1 — p.697.

NOW *Coronifera oceanica* subsp. *magna*. Originally *Hystrichosphaeridium pseudhystrichodinium* subsp. *magnum*, subsequently *Baltisphaeridium pseudhystrichodinium* subsp. *magnum* (Appendix A), thirdly (and now) *Coronifera oceanica* subsp. *magna*, fourthly *Coronifera pedata* subsp. *magna*. Age: Paleocene.

"subsp. *pedata*". Autonym. Holotype: Wetzel, 1933b, pl.4, fig.35; Sarjeant, 1985b, pl.4, fig.5. **Now redundant.**

striolata (Deflandre, 1937b, p.72–73, pl.15 [al. pl.12], figs.1–2) Stover and Evitt, 1978, p.148. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.1. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium*, fourthly (and now) *Coronifera*. See also the discussion under *Operculodinium hirsutum*. Age: Late Cretaceous.

?subsp. **minor** Wetzel, 1933b, p.45–46, pl.4, fig.26 ex Sarjeant, 1984c, p.132. Holotype: Wetzel, 1933b, pl.4, fig.26. Originally *Hystrichosphaera hirsuta* forma *minor* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *minus* (combination not validly published; Appendix A), thirdly *Operculodinium hirsutum* subsp. *minus* (combination not validly published), fourthly (and now) *Coronifera striolata* subsp. *minor*?. Questionable assignment: Sarjeant (1984c, p.132). This taxon was first described and illustrated in Wetzel (1932, caption to pl.3, fig.13 — p.144; pl.3, fig.13) but the name was not validly published since the species name *Xanthidium hirsutum* Ehrenberg, 1837b was not validly published and additionally since the generic name *Hystrichosphaera* Wetzel, 1933b was not validly published at that time. Sarjeant (1984c, p.132) validly published this name, as *Coronifera striolata* subsp. *minor* and noted that the attribution was "emphatically provisional". This is possibly a taxonomic synonym of *Hystrichosphaera hirsuta* forma *minor* (name not validly published), which has a different holotype. Age: Late Cretaceous.

subsp. **striolata**. Autonym. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.1.

?subsp. **varians** Wetzel, 1933b, p.47–48, pl.4, figs.27–29 ex Sarjeant, 1984c, p.132. Holotype not specified. Lectotype: Wetzel, 1933b, fig.29; designated by Lentin and Williams (1989, p.78). Originally *Hystrichosphaera hirsuta* forma *varians* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *varians* (combination not validly published; Appendix A), thirdly *Operculodinium hirsutum* subsp. *varians* (combination not validly published), fourthly (and now) *Coronifera striolata*? subsp. *varians*. Questionable assignment: Sarjeant (1984c, p.132). The name *Hystrichosphaera hirsuta* forma *varians* was not validly published in Wetzel (1933b), since the species name *Hystrichosphaera hirsuta* is not validly published. This is possibly a taxonomic synonym of *Hystrichosphaera hirsuta* forma *varians* (name not validly published), which has a different holotype. Age: Late Cretaceous.

?**tubulosa** Cookson and Eisenack, 1974, p.73, pl.28, fig.12. Holotype: Cookson and Eisenack, 1974, pl.28, fig.12. Originally *Coronifera*, subsequently (and now) *Coronifera*?. Questionable assignment: Stover and Evitt (1978, p.148). Age: Paleocene.

CORRADINISPHAERIDIUM Masure, 1986, p.110. Type: Corradini, 1973, pl.23, fig.6, as *Lanternosphaeridium personatum*.

horridum (Deflandre, 1937b, p.74, pl.15 [al. pl.12], figs.7–8) Masure, 1986, p.112. Emendation: Masure, 1986, p.112–113, as *Corradinisphaeridium horridum*. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), figs.7–8; Masure, 1986, pl.1, figs.4–6 and text-fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Corradinisphaeridium*. Taxonomic junior synonym: *Lanternosphaeridium* (as *Fibrocyta*?) *mutinense*, according to Masure (1986, p.112). Age: Senonian.

***personatum** (Corradini, 1973, p.157, pl.23, figs.5–6) Masure, 1986, p.110–112. Emendation: Masure, 1986, p.110–111, as *Corradinisphaeridium personatum*. Holotype: Corradini, 1973, pl.23, fig.6; Eisenack and Kjellström, 1981b, p.770f; Masure, 1986, pl.1, figs.1–3; text-figs.1a–b; Fensome et al., 1995, figs.1–3, 5–7 — p.1663. Originally *Lanternosphaeridium*, subsequently *Operculodinium*?, thirdly (and now) *Corradinisphaeridium*. Age: Senonian.

CORRUDINIUM Stover and Evitt, 1978, p.148–149. Type: Drugg, 1970b, figs.11–J, as *Gonyaulacysta incomposita*.

cristatum Châteauneuf, 1980, p.136, pl.21, figs.3–7. Holotype: Châteauneuf, 1980, pl.21, figs.3–4; Jan du Chêne et al., 1986a, pl.17, figs.7–8. Age: late Eocene (Auversian).

devernaliae Head and Norris, 2003, p.8, fig.7, nos.1–20. Holotype: Head and Norris, 2003, fig.7, nos.14–17. Age: early Pliocene.

eyrense Clowes and Wilson, 2006, p.404, figs.4J–L,5A–C. Holotype: Clowes and Wilson, 2006, figs.4J–L. Age: middle Ypresian.

harlandii Matsuoka, 1983b, p.117–118, pl.4, figs.5a–c,6a–c,7a–b; text-figs.11A–B. Holotype: Matsuoka, 1983b, pl.4, figs.6a–c; Jan du Chêne et al., 1986a, pl.17, figs.15–17. Age: Pliocene or younger.

***incompositum** (Drugg, 1970b, p.810–811, figs.1E–O,2A) Stover and Evitt, 1978, p.149. Holotype: Drugg, 1970b, figs.11–J; Eisenack and Kjellström, 1975a, page labelled "nach S.306d"; Jan du Chêne et al., 1986a, pl.17, figs.1–?2; Fensome et al., 1995, figs.1–2 — p.1561. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly (and now) *Corrudinium*. Age: Oligocene.

?labradori Head et al., 1989b, p.456, pl.3, figs.1–9,12. Holotype: Head et al., 1989b, pl.3, figs.1–3,5–6. Questionable assignment: Head et al. (1989b, p.456). Since the epithet is based on a geographic locality, a preferable epithet would have been *labradorensis* (I.C.N. Recommendation 60D). However, in the interests of stability, we do not correct the original spelling. Age: late Miocene–early Pliocene.

obscurum Wilson, 1988, p.16, pl.4, figs.3a–b,6a–b. Holotype: Wilson, 1988, pl.4, figs.6a–b; Fensome et al., 1996, figs.3–4 — p.2249. Age: early Eocene.

octagoense Clowes and Wilson, 2006, p.402, figs.4D–I. Holotype: Clowes and Wilson, 2006, figs.4D–F. Age: Lutetian–early Priabonian.

regulare Clowes and Wilson, 2006, p.402, figs.3G–L,4A–C. Holotype: Clowes and Wilson, 2006, figs.3G–I. Age: Lutetian–Rupelian.

"reticulatum" Grabowska in Malinowskiej and Piwockiego, 1996, p.353–354, pl.109, figs.1a–c. Holotype: Malinowskiej and Piwockiego, 1996, pl.109, figs.1a–c. **Name not validly published:** no Latin or English description. Age: early to late Eocene.

vermiculatum (Wilson, 1988, p.26–27, pl.16, figs.1–2) Clowes and Wilson, 2006, p.406. Holotype: Wilson, 1988, pl.16, fig.2; Fensome et al., 1996, fig.2 — p.2429. Originally *Ochetodinium*, subsequently (and now) *Corrudinium*. Age: early Eocene.

COSTACYSTA Heilmann-Clausen and Van Simaey, 2005, p.158. Type: Heilmann-Clausen and Van Simaey, 2005, pl.2, fig.15, as *Costacysta bucina*.

"bucina" Waagstein and Heilmann-Clausen, 1995, p.190. **Name not validly published:** no description or illustration.

***bucina** Heilmann-Clausen and Van Simaey, 2005, p.160, pl.2, figs.13–16. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.2, fig.15. Age: middle Eocene.

COUSTEAUDINIUM de Verteuil and Norris, 1996a, p.109,111. Type: de Verteuil and Norris, 1996a, pl.1, figs.1–3,6,9, as *Cousteaudinium aubryae*.

**aubryae* de Verteuil and Norris, 1996a, p.111–112,114, pl.1, figs.1–9; pl.2, figs.1–12; pl.18, figs.2–3. Holotype: de Verteuil and Norris, 1996a, pl.1, figs.1–3,6,9. Age: early–early middle Miocene.

subsp. *aubryae*. Autonym. Holotype: de Verteuil and Norris, 1996a, pl.1, figs.1–3,6,9.

subsp. *gonoperforatum* Strauss in Strauss et al., 2001, p.403–404, pl.1, figs.1–3. Holotype: Strauss et al., pl.1, fig.2. Originally *Thalassiphora gonoperforata* (name not validly published), subsequently (and now) *Coosteaudinium aubryae* subsp. *gonoperforatum*. Age: middle Miocene.

CRASPEDODINIUM Cookson and Eisenack, 1974, p.75. Emendation: Riding and Helby, 2001f, p.142–143. Taxonomic senior synonym: *Ovoidinium*, according to Lentin and Williams (1976, p.157) — however, Stover and Evitt (1978, p.34) retained *Craspedodinium*. Type: Cookson and Eisenack, 1974, pl.25, fig.7, as *Craspedodinium indistinctum*.

americanum (Habib, 1970, p.372, pl.10, fig.10) Stover and Evitt, 1978, p.34. Holotype: Habib, 1970, pl.10, fig.10. Originally *Xenikoon*, subsequently (and now) *Craspedodinium*. Age: Albian–Cenomanian.

"*defloccatum*" (Davey and Verdier, 1973, p.198, pl.3, figs.6,8) Mehrotra and Sarjeant, 1984c, p.48,50. Holotype: Davey and Verdier, 1973, pl.3, fig.8. **NOW** *Leberidocysta*. Originally *Hexagonifera*, subsequently *Thalassiphora*, thirdly (and now) *Leberidocysta*, fourthly *Disphaeria*, fifthly *Craspedodinium*. Age: late Albian–early Cenomanian.

**indistinctum* Cookson and Eisenack, 1974, p.76, pl.25, figs.6–8. Emendation: Riding and Helby, 2001h, p.229–230, as *Craspedodinium indistinctum*. Holotype: Cookson and Eisenack, 1974, pl.25, fig.7. Originally (and now) *Craspedodinium*, subsequently *Ovoidinium*?. Stover and Evitt (1978, p.34) retained this species in *Craspedodinium*. Age: late Albian (as revised by Riding and Helby, 2001h, p.232).

"*pergamentaceum*" (Burger, 1980a, p.88, pl.47, figs.2–3) Mehrotra and Sarjeant, 1984c, p.50. Holotype: Burger, 1980a, pl.47, fig.3. **NOW** *Leberidocysta*?. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Leberidocysta*?, thirdly *Craspedodinium*. Age: Aptian.

swanense Riding and Helby, 2001f, p.143,145,147, figs.1A–L,2A–H. Holotype: Riding and Helby, 2001f, fig.1L. Age: Kimmeridgian.

"*turonicum*" Prössl, 1990, p.108–109, pl.16, figs.1–2,6–7 ex Prössl, 1992b, p.113–114. Holotype: Prössl, 1990, pl.16, figs.1–2. **NOW** *Senoniasphaera*. Originally *Craspedodinium*, subsequently (and now) *Senoniasphaera*. This name was not validly published in Prössl (1990, p.108–109), since that author did not specify the lodgement of the holotype. Taxonomic junior synonym: *Senoniasphaera rotundata* subsp. *alveolata*, according to Pearce et al. (2011, p.92). Age: middle Cenomanian–late Turonian.

CRIBROPERIDINIUM Neale and Sarjeant, 1962, p.443. Emendations: Davey, 1969a, p.125; Sarjeant, 1982b, p.40; Helenes, 1984, p.112. Taxonomic junior synonyms: *Acanthaulax*, according to Poulsen (1996, p.71); *Meristaulax* Brenner, 1988, by implication in Jan du Chêne et al. (1986a, p.76) and Lentin and Williams (1993, p.423), who listed *Meristaulax* Sarjeant as a taxonomic junior synonym of *Cribroperidinium* on the basis of the morphology of Sarjeant's lectotype of *Meristaulax granulata*, which is now the type of *Meristaulax* Brenner; *Meristaulax* Sarjeant, according to Poulsen (1996, p.71); *Millioudodinium*, according to Duxbury (1980, p.122) and Lentin and Williams (1993, p.134). See also Sarjeant (1988, p.287; 1989, p.94) for discussions. Type: Neale and Sarjeant, 1962, pl.19, fig.4; text-fig.3a–b, as *Cribroperidinium sepimentum*.

aceras (Eisenack, 1958a, p.391, pl.21, figs.1–2) Sarjeant, 1985a, p.57. Emendation: Sarjeant, 1985a, p.57,59, as *Cribroperidinium aceras*. Holotype: Eisenack, 1958a, pl.21, fig.1; Sarjeant, 1985a, pl.4, figs.1–2; Jan du Chêne et al., 1986a, pl.2, figs.6–7. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*? (combination not validly published), thirdly *Leptodinium*, fourthly *Acanthaulax*?, fifthly (and now) *Cribroperidinium*. Age: Aptian.

- ?aequum* (Mao Shaozhi and Norris, 1988, p.35, pl.2, figs.17–19; text-fig.9) Lentin and Williams, 1989, p.79. Holotype: Mao Shaozhi and Norris, 1988, pl.2, fig.17. Originally *Millioudodinium?*, subsequently (and now) *Cribrroperidinium?*. Questionable assignment: Lentin and Williams (1989, p.79). Age: Late Cretaceous.
- aichmetes* (Sarjeant, 1966b, p.123–124, pl.13, figs.5–6; text-fig.30) Helenes, 1984, p.118. Holotype: Sarjeant, 1966b, pl.13, figs.5–6; text-fig.30; Jan du Chêne et al., 1986a, pl.20, figs.5–7. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribrroperidinium*. Age: late Barremian.
- angulosum* (Gitmez, 1970, p.252, pl.2, figs.4–5; text-figs.7A–B) Poulsen, 1996, p.77. Holotype: Gitmez, 1970, pl.2, figs.4–5; text-figs.7A–B; Jan du Chêne et al., 1986a, pl.2, figs.11–15. Originally *Gonyaulacysta*, subsequently *Acanthaulax*, thirdly *Meristaulax* Sarjeant, fourthly *Acanthaulax?*, fifthly *Rhynchodiniopsis*, sixthly (and now) *Cribrroperidinium*. Taxonomic senior synonym: *Gonyaulax* (now *Cribrroperidinium*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Acanthaulax?* (as *Meristaulax*, now *Cribrroperidinium*) *angulosa*. Age: early Kimmeridgian.
- aparsium* Stover and Helby, 1987c, p.230,232–234, figs.5A–D,6A–L. Holotype: Stover and Helby, 1987c, figs.6A–D; Fensome et al., 1996, figs.1–3 — p.2033. Age: Hauterivian–Aptian.
- apione* (Cookson and Eisenack, 1958, p.36, pl.3, fig.7; text-figs.3–4) Morgan, 1980, p.20. Holotype: Cookson and Eisenack, 1958, text-figs.3–4; Jan du Chêne et al., 1986a, pl.33, fig.6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribrroperidinium*. Taxonomic senior synonym: *Gonyaulax* (as *Cribrroperidinium*) *edwardsii*, according to Burger (1980a, p.82) — however, Jan du Chêne et al. (1986a, p.76) retained *Cribrroperidinium apione*. Helenes (1984, p.118) also proposed this combination. Age: Albian.
- asarotum* Stevens, 1987, p.188, figs.5A–J. Holotype: Stevens, 1987, figs.5A–C; Fensome et al., 1996, figs.1–3 — p.2041. N.I.A. Age: early Berriasian.
- auctificum* (Brideaux, 1971, p.82–83, pl.23, figs.40–41; text-figs.9a–b) Stover and Evitt, 1978, p.150. Holotype: Brideaux, 1971, pl.23, figs.40–41; text-figs.9a–b; Jan du Chêne et al., 1986a, pl.30, figs.7–8. Originally *Gonyaulacysta*, subsequently (and now) *Cribrroperidinium*. Age: late Albian.
- ?birkelundiae* (Fensome, 1979, p.38–40, pl.5, figs.5,8,11; text-figs.14A–C) Helenes, 1984, p.126. Holotype: Fensome, 1979, pl.5, figs.5,8,11; text-figs.14A–B; Jan du Chêne et al., 1986a, pl.24, figs.1–3. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribrroperidinium?*. Questionable assignment: Helenes (1984, p.126). Age: Portlandian.
- boreas* (Davey, 1974, p.52–53, pl.4, figs.1–4; pl.7, fig.5) Helenes, 1984, p.121. Holotype: Davey, 1974, pl.4, figs.1–4; Jan du Chêne et al., 1986a, pl.21, figs.1–4. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly (and now) *Cribrroperidinium*. N.I.A. Age: late Barremian.
- "?cauda"* (Gitmez and Sarjeant, 1972, p.193–194, pl.2, figs.1–2,4–5) Helenes, 1984, p.124. Holotype: Gitmez and Sarjeant, 1972, pl.2, figs.1–2. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribrroperidinium?*. Questionable assignment: Helenes (1984, p.124) as a problematic species. **Taxonomic senior synonym:** *Gonyaulacysta* (as and now *Cribrroperidinium*) *globata*, according to Poulsen (1996, p.72). N.I.A. Age: early–late Kimmeridgian.
- colum* Duxbury, 2001, p.103–104, fig.5, nos.1–4. Holotype: Duxbury, 2001, fig.5, nos.1–2. N.I.A. Age: late Hauterivian–middle Barremian.
- complexum* Bailey, 1993, p.219–220, pl.1, figs.1–9. Holotype: Bailey, 1993, pl.1, figs.2–3. Age: early Kimmeridgian.
- "comptum"* (Duxbury, 1980, p.122–123, pl.2, figs.1–2,4) Lentin and Williams, 1981, p.59. Holotype: Duxbury, 1980, pl.2, figs.1–2,4; Jan du Chêne et al., 1986a, pl.10, figs.9–10. Originally *Gonyaulacysta*, subsequently

Cribroperidinium, thirdly *Acanthaulax*, fourthly *Apteodinium*. **Taxonomic senior synonym:** *Apteodinium* (now *Cribroperidinium*) *spinoreticulatum*, according to Lucas-Clark (1987, p.178). Age: middle-late Barremian.

confossum (Duxbury, 1977, p.33, pl.2, figs.2–4) Helenes, 1984, p.128. Holotype: Duxbury, 1977, pl.2, figs.3–4; Jan du Chêne et al., 1986a, pl.19, fig.5. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Cribroperidinium?*, fourthly (and now) *Cribroperidinium*. Questionable assignment: Helenes (1984, p.128) — however, Jan du Chêne et al. (1986a, p.77) included it in *Cribroperidinium* without question. Age: late Hauterivian.

"**conjunctum**" (Eisenack and Cookson, 1960, p.5, pl.1, figs.7–8) Helenes, 1984, p.121. Holotype: Eisenack and Cookson, 1960, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.33, figs.7–9. Originally *Apteodinium*, subsequently *Cribroperidinium*. **Taxonomic senior synonym:** *Apteodinium maculatum*, according to Backhouse (1988, p.74). Age: Aptian.

conopium Duxbury, 1983, p.43, pl.4, fig.11. Holotype: Duxbury, 1983, pl.4, fig.11; Jan du Chêne et al., 1986a, pl.21, figs.6–7. Age: early Albian.

cooksoniae Norvick, 1976, p.36–37, pl.1, figs.1–3; text-figs.13a–d. Holotype: Norvick, 1976, pl.1, fig.2; Jan du Chêne et al., 1986a, pl.31, fig.7. Age: Cenomanian.

?**cornutum** Davey, 1974, p.48–49, pl.2, figs.1–5. Holotype: Davey, 1974, pl.2, figs.2–3; Jan du Chêne et al., 1986a, pl.21, figs.8–9. Originally *Cribroperidinium*, subsequently *Occisucysta*, thirdly (and now) *Cribroperidinium?*. Lentin and Williams (1981, p.55) retained this species in *Cribroperidinium*. Questionable assignment: Helenes (1984, p.128). Age: middle-late Barremian.

corrugatum Riding and Helby, 2001f, p.147,149–150, figs.3A–I,4A–B. Holotype: Riding and Helby, 2001f, fig.3A. Age: Kimmeridgian.

crassinervum (Deflandre, 1939b, p.144, pl.6, fig.5 ex Sarjeant, 1967b, p.248–249) Nøhr-Hansen, 1986, p.33. Emendation: Nøhr-Hansen, 1986, p.33, as *Cribroperidinium crassinervum*. Holotype: Deflandre, 1939b, pl.6, fig.5; Jan du Chêne et al., 1986a, pl.70, figs.1–4. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Leptodinium*, fourthly *Leptodinium?*, fifthly (and now) *Cribroperidinium*. The name *Palaeoperidinium crassinervum* was not validly published in Deflandre (1939b) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.146) accepted Sarjeant's (1967b) indirect reference to Deflandre (1939b) as indication of a type (I.C.N. Article 40.3). Jan du Chêne et al. (1986a, p.211) recommended that this name be restricted to the holotype. Age: Kimmeridgian.

crispum (Wetzel, 1967a, p.870, pl.15, figs.4a–b) Fenton, 1981, p.255. Emendations: Sarjeant, 1980b, p.119–120, as *Hystrichosphaeridium crispum*; Fenton, 1981, p.255,257, as *Cribroperidinium crispum*. Holotype: Wetzel, 1967a, pl.15, figs.4a–b; Dietz et al., 1999, text-fig.5a. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Hystrichogonyaulax*, fifthly (and now) *Cribroperidinium*, sixthly *Acanthaulax*. Poulsen (1996, p.77) retained this species in *Cribroperidinium*. Age: Middle Jurassic.

"**cristatum**" (Riley in Fisher and Riley, 1980, p.320, pl.1, figs.8,12) Lentin and Williams, 1985, p.77. Holotype: Fisher and Riley, 1980, pl.1, figs.8,12; Jan du Chêne et al., 1986a, pl.67, fig.20. **Combination not validly published:** basionym not fully referenced. **NOW** *Leptodinium volgense*. Originally *Gonyaulacysta cristata*, subsequently *Leptodinium cristatum* (combination illegitimate), thirdly (and now) *Leptodinium volgense*, fourthly *Millioudodinium cristatum*, fifthly *Cribroperidinium cristatum* (combination not validly published). Age: Volgian.

delicatum Backhouse, 1988, p.80, pl.23, figs.1a–c,2,3a–b,4a–b. Holotype: Backhouse, 1988, pl.23, figs.4a–b; Fensome et al., 1996, figs.6–7 — p.2109. Age: late Valanginian–Hauterivian.

"**diaphanum**" (Cookson and Eisenack, 1958, p.36, pl.3, figs.13–14; text-figs.10–11) Stover and Evitt, 1978, p.150. Holotype: Cookson and Eisenack, 1958, pl.3, figs.13–14; text-figs.10–11; Jan du Chêne et al., 1986a, pl.32, fig.6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Cribroperidinium*. **Taxonomic senior synonym:** *Gonyaulax* (as *Cribroperidinium*) *muderongensis*, according to Backhouse (1988, p.80). Age: Aptian.

?*downiei* (Sarjeant, 1960a, p.138–139) Poulsen, 1996, p.77. Holotype: Downie, 1957, pl.20, fig.10, as *Hystrichosphaeridium pattei*; Jan du Chêne et al., 1986a, pl.3, figs.7–9. Originally *Baltisphaeridium* (Appendix A), subsequently *Acanthaulax*, thirdly *Acanthaulax*?, fourthly *Cyclonephelium*, fifthly (and now) *Cribroperidinium*?. Questionable assignment: Poulsen (1996, p.77). Age: Kimmeridgian.

?*edwardsii* (Cookson and Eisenack, 1958, p.32, pl.3, figs.5–6; text-fig.7) Davey, 1969a, p.128. Holotype: Cookson and Eisenack, 1958, pl.3, fig.6; text-fig.7; Jan du Chêne et al., 1986a, pl.32, fig.4; pl.33, fig.3. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Cribroperidinium*, fourthly (and now) *Cribroperidinium*?. Questionable assignment: Helenes (1984, p.125) as a problematic species. Taxonomic junior synonyms: *Gonyaulax* (now *Cribroperidinium*) *apione*, according to Burger (1980a, p.82) — however, Jan du Chêne et al. (1986a, p.76) retained *Cribroperidinium apione*; *Gonyaulax* (as *Cribroperidinium*) *orthoceras*, according to Davey and Verdier (1971, p.17) — however, Below (1981a, p.39–40) and Lentin and Williams (1985, p.79) retained *Cribroperidinium orthoceras*. Age: Albian–early Turonian.

?*ehrenbergii* (Gitmez, 1970, p.252–254, pl.2, figs.8–9; text-fig.8) Helenes, 1984, p.124. Holotype: Gitmez, 1970, pl.2, figs.8–9; text-fig.8, lost according to Jan du Chêne et al. (1986a, p.80). Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*?. Questionable assignment: Helenes (1984, p.124) as a problematic species. Lentin and Williams (1989, p.8) recommended that this name be restricted to the holotype. Age: early Kimmeridgian.

?*erymnoseptatum* Bailey, 1993, p.220, pl.2, figs.1–9. Holotype: Bailey, 1993, pl.2, figs.1–2. Age: Kimmeridgian.

?*exilicristatum* (Davey, 1969a, p.121, pl.1, figs.1–2; text-figs.9A–B) Stover and Evitt, 1978, p.150. Holotype: Davey, 1969a, pl.1, fig.1; text-figs.9A–B; Jan du Chêne et al., 1986a, pl.26, figs.1–4. Originally *Gonyaulacysta*, subsequently (and now) *Cribroperidinium*. Age: Cenomanian.

?*fetchemense* (Sarjeant, 1966b, p.128,130, pl.15, figs.1–2; text-fig.33) Helenes, 1984, p.121. Holotype: Sarjeant, 1966b, pl.15, figs.1–2; text-fig.33; Helenes, 1984, text-figs.4A–B; Jan du Chêne et al., 1986a, pl.20, figs.1–4; Fensome et al., 1993a, figs.1–2 — p.1189. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*. Age: early Cenomanian.

?*forulatum* (Yu Jingxian, 1982, p.241, pl.2, figs.3–4,6–8) Lentin and Williams, 1985, p.78. Holotype: Yu Jingxian, 1982, pl.2, fig.8. Originally *Gonyaulacysta*, subsequently (and now) *Cribroperidinium*?. Questionable assignment: Lentin and Williams (1985, p.78). Age: Late Jurassic–Early Cretaceous.

?*fragile* Duxbury, 2001, p.104–105, fig.6, nos.1–4. Holotype: Duxbury, 2001, fig.6, nos.1–2. Age: early Barremian.

?*gigas* (Raynaud, 1978, p.392–393, pl.2, fig.16) Helenes, 1984, p.128. Holotype: Raynaud, 1978, pl.2, fig.16; Jan du Chêne et al., 1986a, pl.30, fig.6. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*?. Questionable assignment: Helenes (1984, p.128). N.I.A. Age: late Kimmeridgian–Portlandian.

?*giuseppei* (Morgenroth, 1966a, p.5, pl.2, figs.3–6) Helenes, 1984, p.121. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*?, fourthly *Rhynchodiniopsis*?, fifthly (and now) *Cribroperidinium*. Age: early Eocene.

"subsp. *giuseppei*". Autonym. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **Now redundant.** Originally *Gonyaulax giuseppei* subsp. *giuseppei* (Appendix B), subsequently *Gonyaulacysta giuseppei* subsp. *giuseppei*, thirdly *Millioudodinium? giuseppei* subsp. *giuseppei*, fourthly *Rhynchodiniopsis? giuseppei* subsp. *giuseppei*, fifthly *Cribroperidinium giuseppei* subsp. *giuseppei*. Taxonomic junior synonym: *Gonyaulax* (as *Rhynchodiniopsis?*) *giuseppei* subsp. *major*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81).

"subsp. *majus*" (Morgenroth, 1966a, p.6, pl.2, figs.5–6) Lentin and Williams, 1985, p.78. Holotype: Morgenroth, 1966a, pl.2, figs.5–6. Originally *Gonyaulax giuseppei* subsp. *major* (Appendix B), subsequently *Gonyaulacysta giuseppei* subsp. *major*, thirdly *Millioudodinium? giuseppei* subsp. *majus*, fourthly *Rhynchodiniopsis? giuseppei* subsp. *major*, fifthly *Cribroperidinium giuseppei* subsp. *majus*.

Taxonomic senior synonym: *Gonyaulax* (as *Cribroperidinium*) *giuseppeii* subsp. *giuseppeii*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81). Age: early Eocene.

globatum (Gitmez and Sarjeant, 1972, p.195,197, pl.3, figs.1–2; text-figs.5A–B) Helenes, 1984, p.124. Holotype: Gitmez and Sarjeant, 1972, pl.3, fig.1; text-fig.5A; Jan du Chêne et al., 1986a, pl.29, fig.3. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribroperidinium?*, fifthly (and now) *Cribroperidinium*. Questionable assignment: Helenes (1984, p.124) as a problematic species — however, Poulsen (1996, p.72) included the species in *Cribroperidinium* without question. Taxonomic junior synonyms: *Gonyaulacysta cauda* and *Gonyaulacysta systremmata*, both according to Poulsen (1996, p.72). Age: middle-late Kimmeridgian.

?**globosum** (Brideaux, 1971, p.81, pl.23, figs.37–38; text-figs.7g–h) Helenes, 1984, p.128. Holotype: Brideaux, 1971, pl.23, figs.37–38; text-fig.7g; Jan du Chêne et al., 1986a, pl.28, figs.10–11. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly (and now) *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.128). Age: middle-late Albian.

graemei Williams et al., 1998, p.147. Holotype: Slimani, 1994, pl.14, figs.5–9. Originally *Apteodinium wilsonii*, subsequently *Cribroperidinium wilsonii* (name illegitimate), thirdly (and now) *Cribroperidinium graemei*. Substitute name for *Cribroperidinium wilsonii* (Slimani, 1994, p.90–91, pl.14, figs.5–11) Schiøler et al., 1997, p.81 (an illegitimate name). Taxonomic junior synonym: *Gonyaulacysta filosa* (name not validly published), according to Schiøler et al. (1997, p.81). Age: early Campanian–late Maastrichtian.

"subsp. **graemei**". Autonym. Holotype: Slimani, 1994, pl.14, figs.5–9. **Now redundant.**

"subsp. **trabeculosum**" (Slimani and Louwye, 2013, p.13,15; pll.2, figs.1–9,11,13) Williams and Fensome, 2016, p.140. Holotype: Slimani and Louwye, 2013, pl.2, figs.1–3. **NOW** *Cribroperidinium wilsonii* (Yun Hyesu, 1981) subsp. *trabeculosum*. Originally (and now) *Cribroperidinium wilsonii* (Yun Hyesu, 1981) subsp. *trabeculosum* subsequently *Cribroperidinium graemei* subsp. *trabeculosum*. Slimani and Louwye (2013) did not specify whether they were including this subspecies in *Cribroperidinium wilsonii* (Yun Hyesu, 1981) Poulsen or *Cribroperidinium wilsonii* (Slimani, 1994) Schiøler. Williams and Fensome (2016, p.140) assumed that the intended assignment was to the latter, which is illegitimate, and so transferred the subspecies to the substitute name *Cribroperidinium graemei*. However, H. Slimani (personal communication to GLW) affirms that the taxon was intended to be a subspecies of *Cribroperidinium wilsonii* (Yun Hyesu, 1981) Poulsen. Age: late Campanian.

?**granomembranceum** (Matsuoka, 1983b, p.121–122, pl.1, figs.1a–c,2,3a–b,4a–b,5a–b; text-figs.14A–B) Lentin and Williams, 1985, p.78. Holotype: Matsuoka, 1983b, pl.1, figs.1a–c; Jan du Chêne et al., 1986a, pl.27, figs.1–2. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium?*. Questionable assignment: Lentin and Williams (1985, p.78). Age: early-middle Miocene.

granulatum (Klement, 1960, p.39–41, pl.4, figs.10–13; text-figs.18–20) Stover and Evitt, 1978, p.150. Emendation: Sarjeant, 1984a, p.161–162, as *Meristaulax granulata*. Holotype: Klement, 1960, pl.4, figs.10–11; text-figs.18–20; Fensome et al., 1995, figs.1–2 — p.1525; disintegrated according to Sarjeant (1984a, p.162). Lectotype (designated by Sarjeant, 1984a, p.162): Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2a–b; Fensome et al., 1995, figs.5–6 — p.1525 — however, Brenner (1988, p.35) argued that this specimen is not conspecific with the holotype. Lectotype (designated by Brenner, 1988, p.35): Brenner, 1988, pl.1, figs.3a–c; Fensome et al., 1995, figs.7–9 — p.1525. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Meristaulax* Sarjeant, sixthly *Acanthaulax*. Poulsen (1996, p.73) retained this species in *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *venusta*, according to Schrank (2005, p.56); *Gonyaulax* (now *Cribroperidinium*) *granuligera*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156–158) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*; *Gonyaulacysta* (as *Acanthaulax?*, now *Cribroperidinium*) *angulosa*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*) *angulosa*. Brenner (1988, p.35) stated that the specimen designated as the lectotype by Sarjeant (1984a, p.102) cannot be a lectotype since it is not from the same sample as the holotype, citing Article 8 of the 1983 I.C.B.N. (Voss et al., 1983). The current I.C.N. Article 9 indicates that a lectotype must

be part of the original material, which can include any specimens seen by the original author, whether or not cited in the original publication, and thus not necessarily from the same sample. Hence, Sarjeant's lectotype cannot be invalidated for that reason. However, Brenner also argued that the morphology of Sarjeant's lectotype differs sufficiently from that of the holotype to constitute a separate species. Thus, Brenner proposed a new lectotype from the same sample as Klement's holotype and illustrated it (Brenner, 1988, pl.1, figs.3a–c); this specimen was not figured in Klement (1960). I.C.N. Article 9.18 specifies that the choice of a lectotype by an author may be superseded if it can be shown to be in serious conflict with the protologue. In contrast to Lentin and Williams (1993, p.2), Williams et al. (1998, p.148) followed Brenner (1988). See also discussion under *Meristaulax granulata* (Klement). Age: middle Oxfordian–early Kimmeridgian.

granuligerum (Klement, 1960, p.41–42, pl.5, figs.4–5) Stover and Evitt, 1978, p.150. Emendation: Sarjeant, 1984a, p.156, as *Cryptarchaeodinium granuligerum*. Holotype: Klement, 1960, pl.5, figs.4–5; Sarjeant, 1984a, pl.1, figs.3–4; text-fig.1; Jan du Chêne et al., 1986a, pl.27, figs.11–14. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Cryptarchaeodinium*, sixthly *Acanthaulax*. Poulsen (1996, p.75) retained this species in *Cribroperidinium*. Taxonomic senior synonym: *Gonyaulax* (as *Cribroperidinium*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156–158) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*. Age: middle Oxfordian–early Kimmeridgian.

hansenii Poulsen, 1996, p.75–76, pl.9, figs.1–4; pl.10, figs.1–3. Holotype: Poulsen, 1996, pl.9, figs.1–2. Age: middle Volgian–Valanginian.

?**intricatum** Davey, 1969a, p.125–128, pl.2, figs.1–3; text-figs.11a–b–12a–b. Holotype: Davey, 1969a, pl.2, fig.1; text-figs.11a, 12a; Jan du Chêne et al., 1986a, pl.24, figs.10–11. Originally *Cribroperidinium*, subsequently (and now) *Cribroperidinium*?. Questionable assignment: Helenes (1984, p.125) as a problematic species. Age: Albanian.

janinae Górka, 1982, p.106, 108, 110, pls.1–2; text-figs.A–D. Holotype: Górka, 1982, pl.1, fig.3. Age: early Hauterivian.

jubaris (Davies, 1983, p.19, pl.5, figs.13–20; text-fig.13) Lentin and Williams, 1985, p.79. Holotype: Davies, 1983, pl.5, fig.16; Jan du Chêne et al., 1986a, pl.150, figs.17–18. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium*. N.I.A. Age: Tithonian.

kashiense (He Chengquan, 1991, p.108–109, pl.4, figs.34–37) Lentin and Williams, 1993, p.138. Holotype: He Chengquan, 1991, pl.4, fig.37. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium*. Age: Paleocene–Eocene.

leedervillense Backhouse, 1988, p.80, pl.23, figs.7–9; pl.24, fig.1; pl.47, fig.2. Holotype: Backhouse, 1988, pl.23, fig.8 (not 7); Fensome et al., 1996, fig.2 — p.2189. Age: late Valanginian–early Barremian.

?**longicorne** (Downie, 1957, p.420, pl.20, fig.8; text-figs.2a–b) Lentin and Williams, 1985, p.79. Holotype: Downie, 1957, pl.20, fig.8; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.30, fig.1. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta*?, fourthly *Millioudodinium*, fifthly (and now) *Cribroperidinium*?. Questionable assignment: Lentin and Williams (1985, p.79). Age: late Kimmeridgian.

magnificum Smith and Harding, 2004, p.367, 371–373, pl.2, figs.1–9; pl.6, figs.4–6; text-fig.5. Holotype: Smith and Harding, 2004, pl.2, figs.1, 4, 7. Age: middle to late Volgian.

magnum (Jain, 1977b, p.175–176, pl.4, figs.40–42) Williams et al., 1998, p.149. Holotype: Jain, 1977b, pl.4, figs.41–42; Jan du Chêne et al., 1986a, pl.122, fig.8. Originally *Trichodinium*, subsequently *Acanthaulax*, thirdly (and now) *Cribroperidinium*. Age: early Albanian.

?**muderongense** (Cookson and Eisenack, 1958, p.32, pl.3, figs.3–4; text-fig.15) Davey, 1969a, p.128. Holotype: Cookson and Eisenack, 1958, pl.3, fig.3; text-fig.15. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Cribroperidinium*, fourthly (and now)

Cribroperidinium?. Taxonomic junior synonym: *Gonyaulax* (as *Cribroperidinium*) *diaphana*, according to Backhouse (1988, p.80). Questionable assignment: Helenes (1984, p.125) as a problematic species. Age: Aptian.

?*murochoratum* Dürr, 1987, p.72–74, fig.2; fig.4, nos.1–2; fig.5, nos.6–7; fig.6, nos.4,6–8. Holotype: Dürr, 1987, fig.4, nos.1–2. Questionable assignment: Dürr (1987, p.72). Age: middle Kimmeridgian.

nuciforme (Deflandre, 1939a, p.180, pl.8, figs.4–6 ex Sarjeant, 1962a, p.482–483) Courtinat, 1989, p.203. Holotype: Deflandre, 1939a, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.11, figs.1–3. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulax* (Appendix B), thirdly *Gonyaulacysta*, fourthly *Apteodinium*, fifthly *Millioudodinium*, sixthly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Palaeoperidinium nuciformoides*, according to Sarjeant (1968, p.227). The name *Palaeoperidinium nuciforme* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. Age: Oxfordian.

?*obesum* (Brideaux, 1971, p.82, pl.23, fig.39; text-figs.8a–b) Helenes, 1984, p.130. Holotype: Brideaux, 1971, pl.23, fig.39; text-figs.8a–b; Jan du Chêne et al., 1986a, pl.30, fig.9. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.130). Age: late Albian.

orthoceras (Eisenack, 1958a, p.388, pl.21, figs.3–11; pl.24, fig.1) Davey, 1969a, p.128–129. Emendation: Sarjeant, 1985a, p.51,53, as *Cribroperidinium orthoceras*. Holotype: Eisenack, 1958a, pl.21, fig.5; Sarjeant, 1985a, pl.1, figs.1,4; text-fig.1; Jan du Chêne et al., 1986a, pl.24, figs.7–8. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.125) and Jan du Chêne et al. (1986a, p.80) as a problematic species — however, Sarjeant (1985a, p.49) retained the species in *Cribroperidinium* without question. Taxonomic senior synonym: *Gonyaulax* (as *Cribroperidinium*) *edwardsii*, according to Davey and Verdier (1971, p.17) — however, Below (1981a, p.39–40) and Lentin and Williams (1985, p.79) retained *Cribroperidinium orthoceras*. Age: Aptian.

?*paliuros* (Sarjeant, 1962a, p.260, pl.1, fig.7; text-fig.5) Poulsen, 1996, p.77. Holotype: Sarjeant, 1962a, pl.1, fig.7. Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Acanthaulax?*, fifthly (and now) *Cribroperidinium?*. Questionable assignment: Poulsen (1996, p.77). N.I.A. Age: Oxfordian.

palla (Sarjeant, 1966b, p.113–114, pl.13, figs.3–4; text-fig.24) Helenes, 1984, p.124. Holotype: Sarjeant, 1966b, pl.13, figs.3–4; Jan du Chêne et al., 1986a, pl.27, figs.15–17. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Cribroperidinium*. N.I.A. Age: early Barremian.

?*pannonicum* (Nagy, 1965, p.200–201, pl.1, figs.1–2; pl.2, fig.10; text-figs.1–2) Helenes, 1984, p.130. Holotype: Nagy, 1965, pl.1, figs.1–2; pl.2, fig.10; Jan du Chêne et al., 1986a, pl.31, figs.1–4. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.130). Age: early Pliocene.

?*parorthoceras* (Davey, 1968, p.1) Helenes, 1984, p.130. Holotype: Sarjeant, 1966b, pl.14, figs.5–6; text-fig.29, as *Gonyaulacysta orthoceras*; Jan du Chêne et al., 1986a, pl.26, figs.6–8. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.130). Age: late Barremian.

?*perforans* (Cookson and Eisenack, 1958, p.30–32, pl.2, figs.1–4,7–8; text-figs.8–9) Morgan, 1980, p.21. Holotype: Cookson and Eisenack, 1958, pl.2, fig.1; text-figs.8–9; Jan du Chêne et al., 1986a, pl.32, fig.2. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Leptodinium?*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium*, sixthly (and now) *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.130). Age: Late Jurassic.

subsp. *kunzeviense* (Vozzhennikova, 1967, p.87, pl.27, fig.6; pl.30, fig.2; pl.33, fig.6) Lentin and Williams, 1989, p.83. Holotype: Vozzhennikova, 1967, pl.30, fig.2, lost according to Lentin and Vozzhennikova

(1990, p.94). Originally *Gonyaulax perforans* var. *kunzeviensis* (Appendix B), subsequently *Gonyaulacysta kunzeviensis*, thirdly *Gonyaulacysta perforans* var. *kunzeviensis* (combination not validly published), fourthly (and now) *Cribroperidinium?* *perforans* subsp. *kunzeviense*. According to Lentin and Vozzhennikova (1990, p.94), no potential lectotype is available. Age: Valanginian.

subsp. *perforans*. Autonym. Holotype: Cookson and Eisenack, 1958, pl.2, fig.1; text-figs.8–9; Jan du Chêne et al., 1986a, pl.32, fig.2.

?*pyrum* (Drugg, 1967, p.14, pl.1, fig.17; pl.9, figs.6a–b) Stover and Evitt, 1978, p.150. Holotype: Drugg, 1967, pl.1, fig.17; Jan du Chêne et al., 1986a, pl.27, figs.3–5. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium?*. Questionable assignment: Stover and Evitt (1978, p.150). N.I.A. Age: Maastrichtian–Danian.

reticulatum Quattrocchio and Volkheimer, 1985, p.192–193, pl.A, figs.1–3; pl.C, figs.a–b. Holotype: Quattrocchio and Volkheimer, 1985, pl.A, fig.1; pl.C, figs.a–b. Age: Berriasian.

?*saetigerum* (McIntyre and Brideaux, 1980, p.15, pl.3, figs.2–3,7) Helenes, 1984, p.130. Holotype: McIntyre and Brideaux, 1980, pl.3, figs.2–3,7; Jan du Chêne et al., 1986a, pl.24, figs.4–6. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.130). Age: Valanginian.

sarjeantii (Vozzhennikova, 1967, p.87–89, pl.25, figs.1–2; pl.28, fig.4; pl.31, figs.1a–b,2a–b,3; pl.32, figs.1,2a–c,3,4a–b) Helenes, 1984, p.130. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53, lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3 and Lentin and Vozzhennikova, 1990, pl.16, fig.4, designated by Lentin and Vozzhennikova (1990, p.95). Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium?*, sixthly (and now) *Cribroperidinium*. Questionable assignment: Helenes (1984, p.130) — however, Lentin and Vozzhennikova (1990, p.95–97) retained this species in *Cribroperidinium* without question and provided an "expanded description". Age: Tithonian.

subsp. *sarjeantii*. Autonym. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). Originally *Gonyaulacysta sarjeantii* subsp. *sarjeantii*, subsequently *Millioudodinium sarjeantii* subsp. *sarjeantii*, thirdly *Rhynchodiniopsis sarjeantii* subsp. *sarjeantii*, fourthly *Cribroperidinium?* *sarjeantii* subsp. *sarjeantii*, fifthly (and now) *Cribroperidinium sarjeantii* subsp. *sarjeantii*.

subsp. *sphaericum* (Vozzhennikova, 1967, p.89, pl.25, figs.1–2; pl.28, fig.4; pl.32, figs.1–4) Lentin and Williams, 1985, p.80. Holotype: Vozzhennikova, 1967, pl.28, fig.4; Jan du Chêne et al., 1986a, pl.20, fig.9; lost according to Lentin and Vozzhennikova (1990, p.97). Lectotype: Lentin and Vozzhennikova, 1990, pl.16, figs.1–2, designated by Lentin and Vozzhennikova (1990, p.97). Originally *Gonyaulax sarjeantii* var. *sphaerica* (Appendix B), subsequently *Gonyaulacysta sarjeantii* subsp. *sphaerica*, thirdly *Millioudodinium sarjeantii* subsp. *sphaericum*, fourthly *Rhynchodiniopsis sarjeantii* subsp. *sphaerica*, fifthly *Cribroperidinium?* *sarjeantii* subsp. *sphaericum*, sixthly (and now) *Cribroperidinium sarjeantii* subsp. *sphaericum*. Lentin and Vozzhennikova (1990, p.97–98) provided an "expanded description" for this subspecies. Age: Tithonian.

?*scottii* (Cookson and Eisenack, 1958, p.30, pl.2, figs.5–6) Helenes, 1984, p.131. Holotype: Cookson and Eisenack, 1958, pl.2, fig.5; Jan du Chêne et al., 1986a, pl.33, fig.5. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. Questionable assignment: Helenes (1984, p.130). Age: early-middle Kimmeridgian.

**sepimentum* Neale and Sarjeant, 1962, p.443–444, pl.19, fig.4; text-figs.3a–b. Holotype: Neale and Sarjeant, 1962, pl.19, fig.4; text-fig.3a–b; Jan du Chêne et al., 1986a, pl.19, fig.4. N.I.A. Age: Hauterivian.

septatum (Hultberg, 1985c, p.104–105, pl.1, fig.C) Poulsen, 1996, p.77. Holotype: Hultberg, 1985c, pl.1, fig.C. Originally *Acanthaulax*, subsequently (and now) *Cribroperidinium*. Age: late Maastrichtian–Danian.

spinoreticulatum (McIntyre and Brideaux, 1980, p.15–16, pl.3, figs.4,8–12) Århus, 1992, p.310. Holotype: McIntyre and Brideaux, 1980, pl.3, figs.4,9,12; Jan du Chêne et al., 1986a, pl.13, figs.9–11. Originally *Millioudodinium*, subsequently *Apteodinium*, thirdly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Gonyaulacysta* (as *Apteodinium*) *compta*, according to Lucas-Clark (1987, p.178). Age: Valanginian.

?strigosum (Yu Jingxian, 1982, p.240–241, pl.2, figs.1–2; pl.3, fig.3) Lentin and Williams, 1985, p.80. Holotype: Yu Jingxian, 1982, pl.2, fig.2. Originally *Gonyaulacysta*, subsequently (and now) *Cribroperidinium?*. Questionable assignment: Lentin and Williams (1985, p.80). Age: Late Jurassic–Early Cretaceous.

swithini Williams et al., 1998, p.151. Holotype: Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2,5; Fensome et al., 1995, figs.5–6 — p.1525. Originally *Meristaulax granulata* Brenner (name illegitimate), subsequently *Cribroperidinium swithini*. Substitute name for *Meristaulax granulata* Brenner, 1988, p.65–66, pl.3, figs.2,5; the name *Cribroperidinium granulatum* is preoccupied. Since the epithet is based on a given name, it ends in "i" rather than "ii" (I.C.N. Recommendation 60C.2). Age: Late Jurassic.

"?systemmatus" (Gitmez and Sarjeant, 1972, p.204–205, pl.5, figs.7–8) Stover and Evitt, 1978, p.150. Holotype: Gitmez and Sarjeant, 1972, pl.5, figs.7–8; Jan du Chêne et al., 1986a, pl.29, figs.4–7. Originally *Gonyaulacysta*, subsequently *Cribroperidinium*, thirdly *Millioudodinium*, fourthly *Cribroperidinium?*, fifthly *Acanthaulax*. **Taxonomic senior synonym:** *Gonyaulacysta* (as and now *Cribroperidinium*) *globata*, according to Poulsen (1996, p.72). Questionable assignment: Helenes (1984, p.125) as a problematic species. N.I.A. Age: early Kimmeridgian.

tensiftense Below, 1981a, p.41–42, pl.1, figs.10,11a–b; pl.13, figs.3a–e,4–5; text-figs.24a–d. Holotype: Below, 1981a, pl.1, fig.10; Jan du Chêne et al., 1986a, pl.19, fig.8; Fensome et al., 1991, fig.1 — p.757. Age: Barremian–Albian.

?tenuiceras (Eisenack, 1958a, p.389–391, pl.21, figs.14–15; pl.22, figs.1–3; pl.24, fig.2; text-figs.4a–c,5) Poulsen, 1996, p.78. Emendations: Sarjeant, 1985a, p.63,65, as *Acanthaulax tenuiceras*; Jan du Chêne et al., 1986b, p.29–30, as *Tehamadinium tenuiceras*. Holotype: Eisenack, 1958a, pl.21, fig.15; Sarjeant, 1985a, pl.6, figs.1–2; text-fig.3; Jan du Chêne et al., 1986a, pl.118, fig.1; Jan du Chêne et al., 1986b, pl.24, fig.5. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly *Diacanthum*, fourthly *Occisucysta*, fifthly *Acanthaulax?*, sixthly *Tehamadinium*, seventhly (and now) *Cribroperidinium?*. Questionable assignment: Poulsen (1996, p.78). Taxonomic junior synonym: *Occisucysta victorii*, according to Pöthe de Baldis and Ramos (1988, p.33). Age: late Barremian–Aptian.

tenuitabulatum (Gerlach, 1961, p.159, pl.25, figs.10–11; text-figs.1–3) Helenes, 1984, p.124. Emendation: Sarjeant, 1984b, p.76, as *Rhynchodiniopsis tenuitabulata*. Holotype: Gerlach, 1961, pl.25, figs.10–11, lost according to Sarjeant (1984b, p.78). Lectotype: Sarjeant, 1984b, pl.2, fig.3, designated by Sarjeant (1984b, p.78). Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribroperidinium*, fifthly *Rhynchodiniopsis*. Lentin and Williams (1985, p.81) retained this species in *Cribroperidinium*. Age: middle Oligocene–middle Miocene.

undoryense Smith and Harding, 2004, p.374,375, pl.3, figs.1–6; pl.4, figs.7–9; text-fig.6. Holotype: Smith and Harding, 2004, pl.3, figs.1–3. Age: middle Volgian.

ventriosum (Wetzel, 1933a, p.161–162, pl.2, figs.4–6; text-figs.1,8) Lentin and Williams, 1973, p.35. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.5, as *Cribroperidinium ventriosum*. Holotype: Wetzel, 1933a, pl.2, fig.4; Lejeune-Carpentier, 1946, fig.2; Lejeune-Carpentier and Sarjeant, 1981, pl.1, figs.3–4; text-fig.3. Originally *Peridinium* (Appendix B), subsequently *Palaeoperidinium* (combination not validly published), thirdly (and now) *Cribroperidinium*. This combination was not validly published in Sarjeant (1967b, p.257) since that author did not fully reference the basionym. Age: Senonian.

?*venulosum* (Mao Shaozhi and Norris, 1988, p.34–35, pl.3, figs.1–2; text-fig.9) Lentin and Williams, 1989, p.84. Holotype: Mao Shaozhi and Norris, 1988, pl.3, fig.1. Originally *Millioudodinium*?, subsequently (and now) *Cribroperidinium*?. Questionable assignment: Lentin and Williams (1989, p.84). Age: Late Cretaceous.

"*venustum*" (Klement, 1960, p.44–45, pl.5, figs.10–13; text-fig.22) Poulsen, 1996, p.76. Holotype: Klement, 1960, pl.5, figs.10–11. **Taxonomic senior synonym:** *Gonyaulax* (as *Cribroperidinium*) *granulata*, according to Schrank (2005, p.56). Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Gonyaulacysta*, fifthly *Cribroperidinium*. Age: middle Oxfordian–Kimmeridgian.

vexillum Prössl, 1990, p.101, pl.17, figs.3,6,9; pl.19, figs.5,7 ex Prössl, 1992b, p.113–114. Holotype: Prössl, 1990, pl.19, figs.5,7. This name was not validly published in Prössl (1990, p.101), since that author did not specify the lodgment of the holotype. Age: late Turonian.

volkovae Iosifova, 1996, p.215,217,219, pl.2, figs.4,6a–b; text-figs.6A–B. Holotype: Iosifova, 1996, pl.2, figs.6a–b; text-figs.6A–B. Age: Ryazanian–?Hauterivian.

wetzeli (Lejeune-Carpentier, 1939, p.B526; text-figs.1–2) Helenes, 1984, p.124. Emendations: Lejeune-Carpentier, 1946, p.B189–B190, as *Gonyaulax wetzeli*; Lejeune-Carpentier and Sarjeant, 1981, p.2–3, as *Gonyaulacysta wetzeli*. Holotype: Lejeune-Carpentier, 1939, text-figs.1–2; Lejeune-Carpentier and Sarjeant, 1981, pl.5, figs.5–6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta*?, fourthly (and now) *Cribroperidinium*, fifthly *Millioudodinium*. Lentin and Williams (1989, p.84) retained this species in *Cribroperidinium*. Age: Senonian.

"*wilsonii*" (Slimani, 1994, p.90–91, pl.14, figs.5–11) Schiøler et al., 1997, p.81. Holotype: Slimani, 1994, pl.14, figs.5–9. **Combination illegitimate — senior homonym:** *Cribroperidinium wilsonii* (Yun Hyesu, 1981) Poulsen, 1996. **Substitute name:** *Cribroperidinium graemei*. Originally *Apteodinium wilsonii*, subsequently *Cribroperidinium wilsonii* (combination illegitimate), thirdly (and now) *Cribroperidinium graemei*. Taxonomic junior synonym: *Gonyaulacysta filosa*, according to Schiøler et al. (1997, p.81). Age: early Campanian–late Maastrichtian.

wilsonii (Yun Hyesu, 1981, p.7–8, pl.1, figs.2–3,6–7a–b) Poulsen, 1996, p.78. Holotype: Yun Hyesu, 1981, pl.1, fig.6; Jan du Chêne et al., 1986a, pl.2, fig.18; Fensome et al., 1991, fig.3 — p.773. Originally *Acanthaulax*, subsequently (and now) *Cribroperidinium*. Taxonomic junior synonym: *Acanthaulax saetosa* (name not validly published), according to Slimani (2001a, p.192). Junior homonym: *Cribroperidinium wilsonii* (Slimani, 1994) Schiøler et al., 1997. Age: late Campanian.

subsp. *trabeculosum* Slimani and Louwye, 2013, p.13,15; pl.2, figs.1–9,11,13. Holotype: Slimani and Louwye, 2013, pl.2, figs.1–3. Originally (and now) *Cribroperidinium wilsonii* (Yun Hyesu) subsp. *trabeculosum*, subsequently *Cribroperidinium graemei* subsp. *trabeculosum*. Slimani and Louwye (2013) did not specify whether they were including this subspecies in *Cribroperidinium wilsonii* (Yun Hyesu, 1981) Poulsen or *Cribroperidinium wilsonii* (Slimani, 1994) Schiøler. Williams and Fensome (2016, p.140) assumed that the intended assignment was to the latter, which is illegitimate, and so transferred the subspecies to the substitute name *Cribroperidinium graemei*. However, H. Slimani (personal communication to GLW) affirms that the taxon was intended to be a subspecies of *Cribroperidinium wilsonii* (Yun Hyesu, 1981) Poulsen. Age: late Campanian.

subsp. *wilsonii*. Autonym. Holotype: Holotype: Slimani, 1994, pl.14, figs.5–9.

xinjiangense (He Chengquan, 1991, p.109, pl.4, fig.21) Lentin and Williams, 1993, p.141. Holotype: He Chengquan, 1991, pl.4, fig.21. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium*. Age: Paleocene–late Eocene.

CRISTADINIUM Head et al., 1989b, p.456. Type: Head et al., 1989b, pl.1, figs.10–11, as *Cristadinium cristatoserratum*.

**cristoserratum* Head et al., 1989b, p.456, pl.1, figs.9–11,13–15. Holotype: Head et al., 1989b, pl.1, figs.10–11. Age: late Miocene.

diminutivum Head et al., 1989b, p.456–457, pl.1, figs.8,12,16; pl.2, figs.8–9. Holotype: Head et al., 1989b, pl.1, fig.8. Age: late Miocene–earliest Pliocene.

headii Willumsen et al., 2014, p.276–277, pl.1, figs.1–10. Holotype: Willumsen et al., pl.1, figs.1–4. Age: Aquitanian.

"**CRUSSOLIA**" Wolfard and Van Erve, 1981, p.323–325. Emendation: Smelror and Århus, 1989, p.39. **Taxonomic senior synonym:** *Evansia*, according to Below (1990, p.73). Type: Wolfard and Van Erve, 1981, pl.1, figs.1–2, as *Crussolia deflandrei*.

"*dalei*" Smelror and Århus, 1989, p.42, figs.2A–D,3A–D,4A–D. Holotype: Smelror and Århus, 1989, figs.3A–B. **NOW** *Evansia*. Originally *Crussolia*, subsequently (and now) *Evansia*. Age: late Callovian.

"**deflandrei*" Wolfard and Van Erve, 1981, p.325–326,328, pl.1, figs.1–2; pl.2, figs.1–4; text-fig.3. Holotype: Wolfard and Van Erve, 1981, pl.1, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1103. **NOW** *Evansia*. Originally *Crussolia*, subsequently (and now) *Evansia*. Age: Callovian–early Oxfordian.

"*labyrinth*" Partington et al., 1993, p.379. **Name not validly published:** no description or illustration.

"*perireticulata*" Århus et al., 1989, p.46, figs.5a–i. Holotype: Århus et al., 1989, fig.5a. **NOW** *Evansia*. Originally *Crussolia*, subsequently (and now) *Evansia*. Age: Callovian.

CRUSTOCADOSINA Řehánek, 1985a, p.371. Calcareous dinoflagellates genus (see Elbrächter et al., 2008, p.1299). Fensome and Williams (2004) considered this genus to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1299) implied that this generic name can be considered validly published as it was proposed under the I.C.Z.N. Type: not designated; "type species" — *Cadosina semiradiata* (name not validly published).

fragilis Řehánek, 1985a, p.371–373, pl.3, figs.1–6. Holotype: Řehánek, 1985a, pl.3, figs.1–2. Age: late Albian.

**semiradiata* (Wanner, 1940, p.81, text-figs.36–37) Řehánek, 1985a, p.371–372. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Crustocadosina*. Fensome and Williams (2004) considered this name to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1299) implied that this generic name can be considered validly published as it was proposed under the I.C.Z.N. Age: Late Jurassic?

CRYODINIUM Esper and Zonneveld, 2001, p.36–37. This name was also proposed by Esper and Zonneveld (2002, p.201–202). Type: Esper and Zonneveld, 2001, pl.3, figs.1–3, as *Cryodinium meridianum*.

**meridianum* Esper and Zonneveld, 2001, p.37–38, text-fig.13; pl.3, figs.1–9. Holotype: Esper and Zonneveld, 2001, pl.3, figs.1–3; Esper and Zonneveld, 2002, pl.2, figs.4–6. This name was also proposed by Esper and Zonneveld (2002, p.202–203). Age: Holocene.

CRYPTARCHAEODINIUM Deflandre, 1939b, p.145. Emendations: Gitmez, 1970, p.246; Stover and Evitt, 1978, p.228; Sarjeant, 1984a, p.155–156 — however, see Lentin and Williams (1985, p.81). Type: Deflandre, 1939b, pl.6, fig.6, as *Cryptarchaeodinium calcaratum*.

**calcaratum* Deflandre, 1939b, p.145, pl.6, fig.6. Emendation: Gitmez, 1970, p.246–248. Holotype: Deflandre, 1939b, pl.6, fig.6. Age: Kimmeridgian.

"*granuligerum*" (Klement, 1960, p.41–42, pl.5, figs.4–5) Sarjeant, 1984a, p.156. Emendation: Sarjeant, 1984a, p.156–158, as *Cryptoarchaeodinium granuligerum*. Holotype: Klement, 1960, pl.5, figs.4–5; Sarjeant, 1984a, pl.1, figs.3–4; text-fig.1; Jan du Chêne et al., 1986a, pl.27, figs.11–14. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Cryptarchaeodinium*, sixthly *Acanthaulax*. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*. Age: middle Oxfordian–early Kimmeridgian.

longispinum He Chengquan, 1991, p.106, pl.21, figs.11–14; text-fig.13. Holotype: He Chengquan, 1991, pl.21, fig.13; text-fig.13. Age: early Eocene.

CTENIDODINIUM Deflandre, 1939a, p.181. Emendations: Sarjeant, 1966b, p.154; Sarjeant, 1975a, p.55; Woollam, 1983, p.190; Benson, 1985, p.150. Taxonomic junior synonyms: *Brotzenia*, according to Stover and Evitt (1978, p.203) — however, *Brotzenia* is now considered a taxonomic junior synonym of *Dichadogonyaulax*; *Hystrichogonyaulax*, by implication in Jan du Chêne et al. (1985b, p.110), who transferred the "type species" of *Hystrichogonyaulax*, *Hystrichogonyaulax cornigera*, to *Ctenidodinium*; *Dichadogonyaulax*, according to Lentin and Williams (1973, p.46) — however, Sarjeant (1975a, p.50) and Benson (1985, p.152) retained *Dichadogonyaulax*; *Korystocysta*, according to Courtinat (1989, p.208) — however, Lentin and Williams (1989, p.213) retained *Korystocysta*. Type: Eisenack, 1935, pl.4, fig.9, as *Lithodinia jurassica* var. *ornata*.

"*adelum*" (Fenton et al., 1980, p.155–156, pl.14, figs.1–4; text-figs.3A–B) Lentin and Williams, 1981, p.61. Holotype: Fenton et al., 1980, pl.14, fig.3; text-figs.3A–B; Fensome et al., 1993a, fig.1 — p.883. **NOW** *Bradleyella*. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly (and now) *Bradleyella*. For etymology see under *Bradleyella*. Age: late Bajocian.

ancora Riding and Helby, 2001d, p.69,71, figs.3A–L. Holotype: Riding and Helby, 2001d, figs.3G, J. The epithet is avowedly based on the Latin noun *ancora* (anchor) and thus should be cited as "*ancora*", not "*ancorum*" as indicated in Riding and Helby. N.I.A. Age: latest Bathonian–Callovian.

capitatum Wheeler and Sarjeant, 1990, p.304,306, pl.7, figs.5–6; pl.8, figs.1–2; text-fig.9 ex Wheeler and Sarjeant, 1992, p.381. Holotype: Wheeler and Sarjeant, 1990, pl.7, figs.5–6; pl.8, fig.1; text-fig.9. This name was not validly published in Wheeler and Sarjeant (1990), since the lodgement of the holotype was not cited (I.C.N. Article 40.7). Age: Middle Jurassic.

"?*chondrum*" Drugg, 1978, p.66, pl.1, figs.8–11. Holotype: Drugg, 1978, pl.1, fig.10. **NOW** *Dichadogonyaulax*. Originally *Ctenidodinium*, subsequently *Ctenidodinium?*, thirdly (and now) *Dichadogonyaulax*. Questionable assignment: Woollam (1983, p.193). Age: early Kimmeridgian.

combazii Dupin, 1968, p.2, pl.1, figs.1–6; text-figs.1–4. Holotype: Dupin, 1968, pl.1, figs.4–5. Woollam (1983, p.193) considered *Gonyaulax* (as *Hystrichogonyaulax*) *cornigera* to be the possible taxonomic senior synonym of this species. Age: middle-late Bathonian.

complanatum Harding, 1990b, p.25–26, pl.7, figs.1–12; text-fig.9 ex Harding in Williams et al. 1998, p.153. Holotype: Harding, 1990b, pl.7, fig.1. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Hauterivian–late Barremian.

continuum Gocht, 1970b, p.141–142, pl.26, fig.3; pl.27, fig.5; pl.29, figs.1–2; pl.32, fig.15; pl.33, fig.8. Holotype: Gocht, 1970b, pl.32, fig.15. Age: early Bathonian.

cornigerum (Valensi, 1953, p.27, pl.1, figs.4,8,10; pl.2, figs.1–2; pl.13, fig.5; text-fig.2a) Jan du Chêne et al., 1985b, p.110. Emendation: Jan du Chêne et al., 1985b, p.110, as *Ctenidodinium cornigerum*. Holotype: Valensi, 1953, pl.1, fig.8. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?* (combination not validly

published), thirdly *Hystrichogonyaulax*, fourthly (and now) *Ctenidodinium*. Woollam (1983, p.193) considered *Ctenidodinium combazii* to be a possible taxonomic junior synonym of this species. Age: Bathonian.

coronatum Prauss, 1989, p.35,37, pl.13, figs.5–8,11–12; text-fig.12. Holotype: Prauss, 1989, pl.13, figs.7–8; text-fig.12. Age: middle Callovian.

"?**cristatum**" (Horowitz, 1975, p.25, pl.1, fig.8) Stover and Evitt, 1978, p.204. Emendation: Wheeler and Sarjeant, 1990, p.306–307, as *Dichadogonyaulax cristata*. Holotype: Horowitz, 1975, pl.1, fig.8; Fensome et al., 1995, fig.1 — p.1479; lost according to Sarjeant (1988, p.177). Neotype: Wheeler and Sarjeant, 1990, pl.8, fig.4; text-figs.10a–b; Fensome et al., 1995, fig.1 — p.1479; designated by Wheeler and Sarjeant (1992, p.382). **NOW** *Dichadogonyaulax*. Originally *Brotzenia*, subsequently *Ctenidodinium?*, thirdly *Dichadogonyaulax*. Questionable assignment: Stover and Evitt (1978, p.204). Taxonomic senior synonym: *Lithodinia jurassica* var. *ornata* (as *Ctenidodinium ornatum*), according to Woollam (1983, p.190) — however, Sarjeant (1988, p.180) retained *Ctenidodinium* (as *Dichadogonyaulax*) *cristatum*. Age: Late Triassic (probably not in place).

"**culmula**" (Norris, 1965, p.793–795, figs.1–2,6–9) Lentin and Williams, 1973, p.35. Holotype: Norris, 1965, figs.8–9. **NOW** *Dichadogonyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Avellodinium*. N.I.A. Age: Portlandian.

elegantulum Millioud, 1969, p.427, pl.2, figs.1–3. Emendation: Below, 1981a, p.42. Holotype: Millioud, 1969, pl.2, figs.1–2. Age: late Hauterivian–Barremian.

"**eodentatum**" Loy and Wille in Partington et al., 1993, p.380. **Name not validly published:** no description or illustration.

fuscibasilarum Riding and Helby, 2001d, p.71–72, figs.4A–L. Holotype: Riding and Helby, 2001d, figs.4J–K. Age: middle-late Callovian.

"**gochtii**" (Sarjeant, 1976a, p.11,13, pl.2, fig.1; pl.3, fig.4; text-figs.2A–C) Stover and Evitt, 1978, p.204. Holotype: Sarjeant, 1976a, pl.2, fig.1; text-figs.2A–B. **NOW** *Korystocysta*. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly (and now) *Korystocysta*. Taxonomic senior synonym: *Gonyaulax* (now *Korystocysta*) *pachyderma*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as *Korystocysta*) *kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *gochtii*. Taxonomic junior synonym: *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, according to Riley and Fenton (1982, p.199) and Hergreen et al. (2000, p.50). Age: Bathonian.

"**kettonense**" (Sarjeant, 1976a, p.13,15, pl.1, figs.1–2; pl.3, figs.1–2; pl.6, fig.1; text-figs.3A–D) Stover and Evitt, 1978, p.204. Holotype: Sarjeant, 1976a, pl.1, figs.1–2; Fensome et al., 1995, figs.1–4 — p.1583. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly (and now) *Korystocysta*. **Taxonomic senior synonym:** *Dichadogonyaulax* (now *Korystocysta*) *gochtii*, according to Riley and Fenton (1982, p.199) and Hergreen et al. (2000, p.50). Taxonomic senior synonyms: *Gonyaulax* (now *Korystocysta*) *pachyderma* and *Leptodinium* (subsequently *Korystocysta*) *norrisii*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as *Korystocysta*) *kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Korystocysta kettonensis*. Age: Bathonian.

"?**mosaicum**" Dodekova, 1975, p.18–19, pl.1, figs.1–6; pl.2, figs.1–3,6. Holotype: Dodekova, 1975, pl.1, figs.1–3. **NOW** *Mosaicodinium*. Originally *Ctenidodinium*, subsequently *Ctenidodinium?*, thirdly *Eodinia*, fourthly (and now) *Mosaicodinium*. Questionable assignment: Benson (1985, p.152). Age: late Bathonian.

"**norrisii**" (Pocock, 1972, p.92–93, pl.24, figs.9–12; text-fig.9) Stover and Evitt, 1978, p.204. Holotype: Pocock, 1972, pl.24, fig.9; Jansonius, 1986, pl.2, figs.6–8; text-fig.5. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Korystocysta*. **Taxonomic senior synonym:** *Gonyaulax* (now *Korystocysta*) *pachyderma*, according to Benson (1985, p.154). Taxonomic junior synonym: *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Korystocysta kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *kettonensis*. Age: Callovian.

***ornatum** (Eisenack, 1935, p.176, pl.4, figs.9–10; text-figs.1–4) Deflandre, 1939a, p.181. Holotype: Eisenack, 1935, pl.4, fig.9. Originally *Lithodinia jurassica* var. *ornata*, subsequently (and now) *Ctenidodinium ornatum*, thirdly *Gonyaulacysta ornata*. Lentin and Williams (1973, p.35) retained this species in *Ctenidodinium*. Taxonomic junior synonym: *Brotzenia* (as *Ctenidodinium*?; now *Dichadogonyaulax cristata*, according to Woollam (1983, p.190) — however, Sarjeant (1988, p.180) retained *Brotzenia* (as *Dichadogonyaulax cristata*). Age: Oxfordian.

"**?pachydermum**" (Deflandre, 1939a, p.176–178, pl.7, figs.6–10; text-figs.7–10) Gocht, 1970b, p.142–143. Holotype: Deflandre, 1939a, pl.7, figs.6–7. **NOW** *Korystocysta*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Ctenidodinium*, fourthly *Ctenidodinium*?, fifthly (and now) *Korystocysta*, sixthly *Dichadogonyaulax*. Questionable assignment: Stover and Evitt (1978, p.204). Taxonomic junior synonyms: *Leptodinium* (as *Korystocysta*) *norrisii*, according to Benson (1985, p.154); *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *kettonensis*. Age: Oxfordian.

"**panneum**" (Norris, 1965, p.796–798, figs.3,10–13) Lentin and Williams, 1973, p.36. Holotype: Norris, 1965, figs.10–12. **NOW** *Dichadogonyaulax*?. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly (and now) *Dichadogonyaulax*?. Age: Kimmeridgian–Portlandian.

planocristatum Riding and Helby, 2001d, p.72–73, figs.5A–O. Holotype: Riding and Helby, 2001d, fig.5J. Age: middle-late Callovian.

?rotundum Dodekova, 1975, p.19–20, pl.4, figs.13–14; text-fig.1. Holotype: Dodekova, 1975, pl.4, figs.13–14; text-fig.1. Originally *Ctenidodinium*, subsequently *Dichadogonyaulax*, thirdly (and now) *Ctenidodinium*?. Questionable assignment: Benson (1985, p.152). Dodekova (1990, p.36) considered *Dichadogonyaulax stauromatos* to be a probable taxonomic junior synonym of this species. Age: late Bathonian.

"**saepitum**" (Ashraf, 1979, p.128, pl.2, fig.27; pl.3, figs.1–3,5) Jan du Chêne et al., 1986a, p.288. Holotype: Ashraf, 1979 pl.3, fig.2. **NOW** *Leptodinium*. Originally (and now) *Leptodinium*, subsequently *Hystrichogonyaulax*, thirdly *Rhynchodiniopsis*, fourthly *Ctenidodinium*. Age: Late Jurassic (Malm).

?schizoblatum (Norris, 1965, p.798–800, figs.4–5,14–17) Lentin and Williams, 1973, p.36. Holotype: Norris, 1965, figs.5,15–17. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly (and now) *Ctenidodinium*?. Questionable assignment: Benson (1985, p.152). Age: Portlandian.

?scissum McIntyre and Brideaux, 1980, p.21, pl.8, figs.6–9; pl.9, figs.1–6. Holotype: McIntyre and Brideaux, 1980, pl.8, figs.6,8–9. Originally *Ctenidodinium*, subsequently (and now) *Ctenidodinium*?. Questionable assignment: Benson (1985, p.152). Age: Valanginian.

"**sellwoodii**" (Sarjeant, 1975a, p.52,55, pl.1, figs.A–H; pl.2, figs.I–K; pl.3, figs.L–Q) Stover and Evitt, 1978, p.204. Holotype: Sarjeant, 1975a, pl.1, figs.A–B; pl.2, figs.I–K. **NOW** *Dichadogonyaulax*. Originally (and now) *Dichadogonyaulax*, subsequently *Ctenidodinium*. Taxonomic junior synonym: *Dichadogonyaulax stauromatos*, according to Riley and Fenton (1982, p.199) and Lentin and Williams (1993, p.179–180). Age: Bathonian.

"**?stauromatos**" (Sarjeant, 1976a, p.9–11, pl.2, fig.4; pl.3, figs.5–6; text-figs.1A–C) Stover and Evitt, 1978, p.204. Holotype: Sarjeant, 1976a, pl.2, fig.4. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly *Ctenidodinium*?. Questionable assignment: Benson (1985, p.152). **Taxonomic senior synonym:** *Dichadogonyaulax* (as *Ctenidodinium*) *sellwoodii*, according to Riley and Fenton (1982, p.199) and Conway (1990, p.35). Taxonomic senior synonym: *Ctenidodinium tenellum*, according to Courtinat (1989, p.209) — however, Lentin and Williams (1993, p.179–180) retained *Dichadogonyaulax stauromatos* as a taxonomic junior synonym of *Dichadogonyaulax sellwoodii*. Dodekova (1990, p.36) considered *Ctenidodinium? rotundum* to be a probable taxonomic senior synonym of this species. N.I.A. Age: Bathonian.

tenellum Deflandre, 1939a, p.182, pl.9, figs.9–10. Holotype: Deflandre, 1939a, pl.9, figs.9–10. Taxonomic junior synonym: *Dichadogonyaulax stauromatos*, according to Courtinat (1989, p.209) — however, Lentin and Williams

(1993, p.179–180) retained *Dichadogonyaulax stauromatos* as a taxonomic junior synonym of *Dichadogonyaulax sellwoodii*. Sarjeant (1978a, p.37) recommended "that this species name should be allowed to fall into disuse". Woollam (1980, p.250) considered *Dichadogonyaulax* (as *Ctenidodinium*) *sellwoodii* and *Dichadogonyaulax* (as *Ctenidodinium*) *stauromatos* to be possible taxonomic junior synonyms of this species. Age: Oxfordian.

?thulium (Davies, 1983, p.19–20, pl.5, figs.1–8,10–12; text-fig.14) Jan du Chêne et al., 1986b, p.32. Holotype: Davies, 1983, pl.5, figs.10–11. Originally *Occisucysta*, subsequently (and now) *Ctenidodinium*?. Questionable assignment: Jan du Chêne et al. (1986b, p.32). Age: middle Callovian–Oxfordian.

"**CTENOPHORA**" Xu Jinli et al., 1997, p.115,151–152. **Taxonomic senior synonym:** *Chlamydophorella*, by implication in He Chengquan et al. (2009, p.342), who transferred the type of *Ctenophora* to *Chlamydophorella*. Xu Jinli et al. (1997, p.115) spelled the name as "*Ctenosphaera*" but as "*Ctenophora*" on p.151 in association with the English diagnosis; thus we consider the latter spelling to be correct. Moreover, Xu Jinli et al. (1997, p.151) indicated that the name is derived from the Latin meaning "comb-bearer", and thus the spelling *Ctenophora* makes more sense than *Ctenosphaera* on the basis of the etymological derivation. Type: Xu Jinli et al., 1997, pl.36, figs.1a–b, as *Ctenophora regularis*.

"***regularis**" Xu Jinli et al., 1997, p.115,152, pl.36, figs.1a–b,2a–b,3a–b,4a–b,5–6. Holotype: Xu Jinli et al., 1997, pl.36, figs.1a–b. **NOW** *Chlamydophorella*. Originally *Ctenophora*, subsequently (and now) *Chlamydophorella*. This name was cited as "*Ctenosphaera regularis*" by Xu Jinli et al. (1997, p.115). Age: Oligocene.

"**CUBICULOSPHERA**" Harris, 1974, p.163–164. **Taxonomic senior synonym:** *Geiselodinium*, according to Stover and Evitt (1978, p.230–231). Type: Harris, 1974, pl.2, fig.10, as *Cubiculosphaera maslinensis*.

"***maslinensis**" Harris, 1974, p.164, pl.2, fig.10. Holotype: Harris, 1974, pl.2, fig.10. **NOW** *Geiselodinium*. Originally *Cubiculosphaera*, subsequently (and now) *Geiselodinium*. Age: middle Eocene.

CUBODINELLUM Keupp, 1987, p.48. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299). Type: Keupp, 1987, pl.9, figs.5–6,9, as *Cubodinellum renei*.

***renei** Keupp, 1987, p.48, pl.9, figs.5–10. Holotype: Keupp, 1987, pl.9, figs.5–6,9. Age: middle Albian–early Cenomanian.

sulcatum Zügel, 1994, p.53–54, pl.11, figs.6–9. Holotype: Zügel, 1994, pl.11, figs.6–9. Age: late Cenomanian.

CULVERSPHAERA Prince et al., 2008, p.88. Type: Clarke and Verdier, 1967, pl.10, fig.2, as *Nematosphaeropsis velata*.

***velata** (Clarke and Verdier, 1967, p.51–52, pl.10, figs.1–2; text-fig.22) Prince et al., 2008, p.88. Holotype: Clarke and Verdier, 1967, pl.10, fig.2. Originally *Nematosphaeropsis*, subsequently *Spiniferites*?, thirdly (and now) *Culversphaera*. Age: Santonian.

"**CYCLAPOPHYSIS**" Benson, 1976, p.182. **Taxonomic senior synonym:** *Disphaerogena*, according to Sarjeant (1985b, p.140–141). Taxonomic junior synonym: *Plethysyrinx*, according to Stover and Williams (1987, p.179). Type: Benson, 1976, pl.1, figs.9–12, as *Cyclapophysis monmouthensis*.

***irregularis** Wilson, 1988, p.16, pl.4, figs.4–5,7a–b. Holotype: Wilson, 1988, pl.4, figs.7a–b; Fensome et al., 1996, figs.1–2 — p.2173. **NOW** *Disphaerogena*. Originally *Cyclapophysis*, subsequently (and now) *Disphaerogena*. Age: middle Eocene.

"*lemniscata*" (Corradini, 1973, p.152–153, pl.22, figs.4a–b,5; pl.33, figs.2,4; pl.39, fig.2) Lentin and Williams, 1985, July, p.84. Holotype: Corradini, 1973, pl.22, fig.5; Fensome et al., 1995, fig.3 — p.1601. **NOW** *Disphaerogena*. Originally *Cordosphaeridium*, subsequently *Cordosphaeridium*?, thirdly *Plethysyrinx*, fourthly *Cyclapophysis*, fifthly (and now) *Disphaerogena*. Heilmann-Clausen (1985, p.20; October) also proposed this combination. Age: Late Cretaceous–Paleocene.

"**monmouthensis*" Benson, 1976, p.183, pl.1, figs.9–12; pl.2, fig.1. Holotype: Benson, 1976, pl.1, figs.9–12. **Taxonomic senior synonym:** *Disphaerogena carposphaeropsis*, according to Sarjeant (1985b, p.141). Age: late Maastrichtian–early Paleocene.

CYCLONEPHELIUM Deflandre and Cookson, 1955, p.285. Emendations: Cookson and Eisenack, 1962b, p.493–494; Williams and Downie, 1966c, p.223; Ioannides et al., 1977, p.450; Sarjeant and Stover, 1978, p.51; Stover and Evitt, 1978, p.35; Dörhöfer and Davies, 1980, p.41. Taxonomic junior synonyms: *Circulodinium*, according to Davey (1978, p.894) — however, Jansonius (1986, p.204) retained *Circulodinium*; *Tenua* Eisenack, according to Sarjeant and Stover (1978, p.49) — however, Sarjeant (1985a, p.93) retained *Tenua* Eisenack. *Cyclonephelium* was a not validly published in Deflandre and Cookson (1954, p.1237), since these authors did not provide a description. Type: Deflandre and Cookson, 1955, pl.2, fig.12, as *Cyclonephelium compactum*.

?*ambiguum* He Chengquan, 1991, p.135, pl.28, figs.7–8. Holotype: He Chengquan, 1991, pl.28, fig.7. Questionable assignment: He Chengquan (1991, p.135). Age: Paleocene.

areolatum Cookson and Eisenack, 1960b, p.253, pl.38, figs.7–8. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.8. Originally (and now) *Cyclonephelium*, subsequently *Yalkalpodinium*. Stover and Williams (1987, p.231) retained this species in *Cyclonephelium*. Age: Tithonian.

"*asperum*" (Singh, 1971, p.322, pl.50, fig.1) Below, 1981a, p.10. Holotype: Singh, 1971, pl.50, fig.1; Fauconnier and Masure, 2004, pl.14, fig.1. **NOW** *Circulodinium*. Originally *Canningia*, subsequently *Canningia*?, thirdly *Epelidosphaeridia*, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Age: middle Albian.

"*assamicum*" Jain et al., 1975, p.11, pl.5, figs.61–62; pl.6, fig.73. Holotype: Jain et al., 1975, pl.5, fig.61; Fauconnier and Masure, 2004, pl.30, figs.1–2. **NOW** *Glaphyrocysta*?. Originally *Cyclonephelium*, subsequently *Cyclonephelium*?, thirdly *Glaphyrocysta*, fourthly (and now) *Glaphyrocysta*? Questionable assignment: Stover and Evitt (1978, p.36). Age: Danian.

"*asymmetricum*" Burger, 1980b, p.270, figs.6c,7a–c. Holotype: Burger, 1980b, fig.7a; Fauconnier and Masure, 2004, pl.14, fig.2. **NOW** *Circulodinium*. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. Age: Neocomian.

"?*attadalicum*" Cookson and Eisenack, 1962b, p.495, pl.5, figs.12–15. Holotype: Cookson and Eisenack, 1962b, pl.5, fig.13. **NOW** *Circulodinium*. Originally *Cyclonephelium*?, subsequently *Aptea*, thirdly *Canningia*, fourthly (and now) *Circulodinium*. Questionable assignment: Cookson and Eisenack (1962b, p.495). Age: Aptian–Albian.

"*australe*" (Pöthe de Baldis, 1966, p.225, pl.1, fig.h) Heisecke, 1970, p.252. Holotype: Pöthe de Baldis, 1966, fig.h. **NOW** *Membranilarnacia*?. Originally *Membranilarnax*, subsequently *Cyclonephelium*, thirdly *Membranilarnacia*, fourthly (and now) *Membranilarnacia*?. Age: Early Tertiary.

?*baculatum* Song Zhichen in Song Zhichen et al., 1985, p.30, pl.6, figs.1–3. Holotype: Song Zhichen et al., 1985, pl.6, figs.1–2. Questionable assignment: Song Zhichen in Song Zhichen et al. (1985, p.30). Age: ?early Pleistocene.

"?*barbiferum*" Cookson and Eisenack, 1982, p.42, pl.7, figs.8–9. Holotype: Cookson and Eisenack, 1982, pl.7, fig.9. **NOW** *Circulodinium*. Originally *Cyclonephelium*?, subsequently (and now) *Circulodinium*. Questionable assignment: Cookson and Eisenack (1982, p.42). Age: Albian–Cenomanian.

"*brevispinatum*" (Millioud, 1969, p.427–428, pl.1, figs.8–9) Below, 1981a, p.11 [February]. Holotype: Millioud, 1969, pl.1, figs.8–9. **NOW** *Circulodinium brevispinatum*. Originally *Cyclonephelium distinctum* var. *brevispinatum*, subsequently *Cyclonephelium distinctum* subsp. *brevispinatum*, thirdly *Cyclonephelium brevispinatum*, fourthly (and now) *Circulodinium brevispinatum*. Yun Hyesu (1981, p.51; May) also proposed this combination. Age: late Hauterivian–early Aptian.

"*brevispinosum*" (Pocock, 1962, p.81, pl.14, figs.222–223) Lentin and Williams, 1981, p.63. Emendation: Brideaux, 1977, p.15–16, as *Tenua brevispinosa*. Holotype: Pocock, 1962, pl.14, fig.222; Jansonius, 1986, pl.4, fig.6; Fauconnier and Masure, 2004, pl.14, figs.7–8. **NOW** *Circulodinium*. Originally *Palaeohystrichophora*, subsequently *Tenua* Eisenack, thirdly *Canningia*?, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Age: Barremian.

?*bulbosum* Smith and Harding, 2004, p.375,376, pl.4, figs.6–10; pl.5, figs.4–6; text-fig.7. Holotype: Smith and Harding, 2004, pl.4, figs.6–8. Questionable assignment: Smith and Harding (2004, p.375). Age: middle Volgian.

"?*castelcasiense*" Corradini, 1973, p.161, pl.24, figs.2,5a–b; pl.35, figs.1–2. Holotype: Corradini, 1973, pl.24, fig.2; Fauconnier and Masure, 2004, pl.30, figs.3–7. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently *Cyclonephelium*?, thirdly (and now) *Glaphyrocysta*. Questionable assignment: Marheinecke (1992, p.73). Age: Late Cretaceous–Paleocene.

"subsp. *castelcasiense*". Autonym. Holotype: Corradini, 1973, pl.24, fig.2; Fauconnier and Masure, 2004, pl.30, figs.3–7. **NOW** *Glaphyrocysta castelcasiensis* subsp. *castelcasiensis*. Originally *Cyclonephelium?* *castelcasiense* subsp. *castelcasiense*, subsequently (and now) *Glaphyrocysta castelcasiensis* subsp. *castelcasiensis*.

"subsp. *prominentum*" Marheinecke, 1992, p.73–74, pl.15, figs.1–4. Holotype: Marheinecke, 1992, pl.15, figs.1–4; Fauconnier and Masure, 2004, pl.30, figs.8–10. **NOW** *Glaphyrocysta castelcasiensis* subsp. *prominenta*. Originally *Cyclonephelium?* *castelcasiense* subsp. *prominentum*, subsequently (and now) *Glaphyrocysta castelcasiensis* subsp. *prominenta*. Contrary to the opinion of Lentin and Williams (1993, p.147), Williams et al. (1998, p.157) considered this name to be validly published. Age: late Maastrichtian.

chabaca Below, 1981a, p.12–13, pl.4, figs.9–11; pl.9, figs.2–3; pl.15, fig.25. Holotype: Below, 1981a, pl.4, fig.9; Fensome et al., 1991, figs.1–2 — p.607; Fauconnier and Masure, 2004, pl.18, figs.1–3. N.I.A. Age: Aptian–Cenomanian.

circulatum He Chengquan, 1991, p.135, pl.10, figs.7–12. Holotype: He Chengquan, 1991, pl.10, fig.7. Age: middle-late Eocene.

clathromarginatum Cookson and Eisenack, 1962b, p.495, pl.6, figs.1–4. Holotype: Cookson and Eisenack, 1962b, pl.6, fig.2; Fauconnier and Masure, 2004, pl.17, fig.6. Age: late Albian–Cenomanian.

combibaculum Song Zhichen in Song Zhichen et al., 1985, p.29–30, pl.6, figs.10–11; Fauconnier and Masure, 2004, pl.32, fig.5. Holotype: Song Zhichen et al., 1985, pl.6, figs.10–11. Age: ?early Pleistocene.

"*combinatum*" Jiabo, 1978, p.78, pl.27, fig.3. Holotype: Jiabo, 1978, pl.27, fig.3; Fauconnier and Masure, 2004, pl.32, fig.5. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: Early Tertiary.

**compactum* Deflandre and Cookson, 1955, p.285, pl.2, figs.11–13; text-figs.44–46. Holotype: Deflandre and Cookson, 1955, pl.2, fig.12; Bint, 1986, text-fig.15A; Fauconnier and Masure, 2004, pl.17, figs.1–5. Age: Albian–Santonian.

crassimarginatum Cookson and Eisenack, 1974, p.74–75, pl.28, figs.1–4. Holotype: Cookson and Eisenack, 1974, pl.28, fig.3. Age: Middle Cretaceous.

"*cuculliforme*" (Davies, 1983, p.29, pl.10, figs.1–4; text-fig.26) Århus, 1992, p.312. Holotype: Davies, 1983, pl.10, figs.3–4; Fauconnier and Masure, 2004, pl.69, figs.1–3. Originally *Sentusidinium*, subsequently *Sentusidinium?*, thirdly *Cyclonephelium*. **Taxonomic senior synonym:** *Cleistosphaeridium* (now *Sentusidinium*) *separatum*, according to Courtinat in Fauconnier and Masure (2004, p.486). Age: Berriasian–Valanginian.

deconinckii Boltenhagen, 1977, p.52–53, pl.4, figs.5a–b,6. Holotype: Boltenhagen, 1977, pl.4, figs.5a–b; Fauconnier and Masure, 2004, pl.18, figs.5–6. Age: Campanian.

"*densebarbatum*" Cookson and Eisenack, 1960b, p.253, pl.38, figs.9–10. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.10; Fauconnier and Masure, 2004, pl.14, figs.3–4. **NOW** *Circulodinium*. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. Age: Tithonian.

"*distinctum*" Deflandre and Cookson, 1955, p.285–286, pl.2, fig.14; text-figs.47–48. Holotype: Deflandre and Cookson, 1955, pl.2, fig.14. **NOW** *Circulodinium*. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. Taxonomic junior synonym: *Circulodinium deflandrei*, according to Millioud (1969, p.427) and Harker and Sarjeant in Harker et al. (1990, p.80) — however, Fauconnier and Londeix in Fauconnier and Masure (2004, p.114) retained *Circulodinium deflandrei*. Age: Senonian.

"subsp. *brevispinatum*" (Millioud, 1969, p.427–428, pl.1, figs.8–9) Lentin and Williams, 1973, p.36. Holotype: Millioud, 1969, pl.1, figs.8–9. **NOW** *Circulodinium brevispinatum*. Originally *Cyclonephelium distinctum* var. *brevispinatum*, subsequently *Cyclonephelium distinctum* subsp. *brevispinatum*, thirdly *Cyclonephelium brevispinatum*, fourthly (and now) *Circulodinium brevispinatum*. Age: late Hauterivian–early Aptian.

"var. *brevispinatum*" Millioud, 1969, p.427–428, pl.1, figs.8–9. Holotype: Millioud, 1969, pl.1, figs.8–9. **NOW** *Circulodinium brevispinatum*. Originally *Cyclonephelium distinctum* var. *brevispinatum*, subsequently *Cyclonephelium distinctum* subsp. *brevispinatum*, thirdly *Cyclonephelium brevispinatum*, fourthly (and now) *Circulodinium brevispinatum*. Age: late Hauterivian–early Aptian.

"subsp. *distinctum*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.2, fig.14. **NOW** *Circulodinium distinctum* subsp. *distinctum*. Originally *Cyclonephelium distinctum* subsp. *distinctum*, subsequently (and now) *Circulodinium distinctum* subsp. *distinctum*.

"var. *distinctum*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.2, fig.14. **Now redundant.**

"subsp. *laevigatum*" Mehrotra and Sarjeant, 1986, p.719–720, pl.8, figs.1–2; pl.9, fig.2; text-fig.7a. Holotype: Mehrotra and Sarjeant, 1986, pl.9, fig.2; text-fig.7a. **NOW** *Circulodinium distinctum* subsp. *laevigatum*. Originally *Cyclonephelium distinctum* subsp. *laevigatum*, subsequently (and now) *Circulodinium distinctum* subsp. *laevigatum*. Age: Valanginian.

"subsp. *longispinatum*" Davey, 1978, p.894, pl.3, figs.4,7–8. Holotype: Davey, 1978, pl.3, fig.7. **NOW** *Cyclonephelium longispinatum*. Originally *Cyclonephelium distinctum* subsp. *longispinatum*, subsequently *Circulodinium distinctum* subsp. *longispinatum*, thirdly (and now) *Cyclonephelium longispinatum*. Age: Turonian.

"subsp. *psilatum*" (Yu Jingxian and Zhang Wangping, 1980, p.115, pl.6, figs.1–2) Lentin and Williams, 1985, p.86. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.6, fig.2. **NOW** *Circulodinium distinctum* subsp. *psilatum*. Originally *Cyclonephelium distinctum* var. *psilatum*, subsequently *Cyclonephelium distinctum* subsp. *psilatum*, thirdly (and now) *Circulodinium distinctum* subsp. *psilatum*. Age: Turonian–Santonian.

"var. *psilatum*" Yu Jingxian and Zhang Wangping, 1980, p.115, pl.6, figs.1–2. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.6, fig.2. **NOW** *Circulodinium distinctum* subsp. *psilatum*. Originally *Cyclonephelium distinctum* var. *psilatum*, subsequently *Cyclonephelium distinctum* subsp. *psilatum*, thirdly (and now) *Circulodinium distinctum* subsp. *psilatum*. Age: Turonian–Santonian.

"**divaricatum**" Williams and Downie, 1966c, p.223–224, pl.25, fig.1; text-fig.60. Holotype: Williams and Downie, 1966c, pl.25, fig.1; text-fig.60. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: early Eocene.

"**downiei**" (Sarjeant, 1960a, p.138) Ioannides et al., 1977, p.451. Holotype: Downie, 1957, pl.20, fig.10, as *Hystrichosphaeridium pattei*; Jan du Chêne et al., 1986a, pl.3, figs.7–9. **NOW** *Cribroperidinium?*. Originally *Baltisphaeridium* (Appendix A), subsequently *Acanthaulax*, thirdly *Acanthaulax?*, fourthly *Cyclonephelium*, fifthly (and now) *Cribroperidinium?*. Age: Kimmeridgian.

?**dubium** (Jain and Millepied, 1975, p.152, pl.5, figs.75–76) Sarjeant and Stover, 1978, p.52. Holotype: Jain and Millepied, 1975, pl.5, fig.76. Originally *Tenua* Eisenack, subsequently *Cyclonephelium*, thirdly (and now) *Cyclonephelium?*. Questionable assignment: Fauconnier and Londeix in Fauconnier and Masure (2004, p.147) as a problematic species. Age: Campanian–Maastrichtian.

"**eisenackii**" Davey, 1969a, p.170, pl.8, figs.3–4; pl.9, fig.4; text-figs.16a–b. Holotype: Davey, 1969a, pl.8, fig.4. **NOW** *Pseudoceratium*. Originally *Cyclonephelium*, subsequently *Aptea*, thirdly (and now) *Pseudoceratium*. Taxonomic senior synonym: *Aptea* (now *Pseudoceratium*) *polymorpha*, according to Cookson and Eisenack (1974, p.74) — however, Below (1981a, p.7) retained *Cyclonephelium* (as *Aptea*) *eisenackii*. Age: late Albian.

"?**expansum**" Corradini, 1973, p.161–162, pl.24, figs.8a–b; text-fig.7. Emendation: Roncaglia and Corradini, 1997, p.187–188, as *Glaphyrocysta expansa*. Holotype: Corradini, 1973, pl.24, figs.8a–b; Fauconnier and Masure, 2004, pl.32, figs.3–4. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently *Cyclonephelium?*, thirdly (and now) *Glaphyrocysta*. Questionable assignment: Stover and Evitt (1978, p.36) as a problematic species. Age: Late Cretaceous–Paleocene.

"**exuberans**" Deflandre and Cookson, 1955, p.285 ex Eaton, 1976, p.255. Emendation: Sarjeant, 1986, p.29–31, as *Glaphyrocysta exuberans*. Holotype: PASTIELS, 1948, pl.5, figs.11,13, as *Membranilarnax pterospermoides*, designated by Eaton (1976, p.255); lost according to Sarjeant (1986, p.30). Neotype: Eaton, 1976, pl.8, fig.2, designated by Sarjeant (1986, p.30). **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Name not validly published in Deflandre and Cookson (1955, p.285) since these authors did not provide a description or a direct reference to one (as required after 1952 by ICBN Article 32.3). Name not validly published in Williams and Downie (1966c, p.225) since holotype not designated. Age: Late Cretaceous.

filoreticulatum (Slimani, 1994, p.96–97, pl.15, figs.1–6) Prince et al., 1999, p.164. Holotype: Slimani, 1994, pl.15, figs.1–4. Originally *Canningia*, subsequently (and now) *Cyclonephelium*. Age: early–late Campanian.

formosum (Iosifova, 1992, p.61, pl.9, figs.3a–c; text-figs.1c–d) Fauconnier in Fauconnier and Masure, 2004, p.146. Holotype: Iosifova, 1992, pl.9, figs.3a–c; text-figs.1c–d; Iosifova, 1996, pl.16, figs.6a–b; text-figs.5A–B. Originally *Circulodinium*, subsequently (and now) *Cyclonephelium*. Age: Valanginian.

?**granulatum** (Horowitz, 1975, p.25, pl.1, fig.4) Stover and Evitt, 1978, p.36. Holotype: Horowitz, 1975, pl.1, fig.4. Originally *Doidyx*, subsequently (and now) *Cyclonephelium?*. Questionable assignment: Stover and Evitt (1978, p.36) as a problematic species. Conway and Cousminer (1983, p.35) questioned the age assigned to this species. Age: Late Triassic (probably not in place).

?**hexalobosum** (Cookson and Eisenack, 1974, p.76, pl.26, figs.6–7) Stover and Evitt, 1978, p.36. Holotype: Cookson and Eisenack, 1974, pl.26, fig.7. Originally *Cassidium*, subsequently *Cyclonephelium*, thirdly (and now) *Cyclonephelium?*. Questionable assignment: Fauconnier and Londeix in Fauconnier and Masure (2004, p.147) as a problematic species. Age: Middle Cretaceous–Senonian.

"**hirtellum**" (Alberti, 1961, p.28, pl.4, fig.20) Davey, 1978, p.894. Holotype: Alberti, 1961, pl.4, fig.20. **NOW** *Circulodinium*. Originally (and now) *Circulodinium*, subsequently *Canningia*, thirdly *Cyclonephelium*. Backhouse (1988, p.83) considered *Tenua* (as *Cyclonephelium*) *hystrix* to be the possible taxonomic senior synonym of this species. Below (1981a, p.10) also proposed this combination. Age: Valanginian–Hauterivian.

"hughesii" Clarke and Verdier, 1967, p.21–22, pl.2, fig.6; text-fig.8. Holotype: Clarke and Verdier, 1967, pl.2, fig.6; Fauconnier and Masure, 2004, pl.18, figs.7–8. Age: Cenomanian–early Turonian.

"hystrix" (Eisenack, 1958a, p.410, pl.23, figs.1–4; text-fig.10) Davey, 1978, p.894. Emendation: Sarjeant, 1985a, p.94–95, as *Tenua hystrix*. Holotype: Eisenack, 1958a, pl.23, fig.1; Sarjeant, 1985a, pl.10, fig.5; Sarjeant, 1992b, fig.1; Fauconnier and Masure, 2004, pl.80, fig.3. **NOW** *Tenua* Eisenack. Originally (and now) *Tenua* Eisenack, subsequently *Cyclonephelium*. Taxonomic junior synonyms: *Tenua hystricella*, according to Eisenack and Kjellström (1972, p.1039); *Cyclonephelium* (as *Cerbia*) *tabulata*, according to Sarjeant (1985a, p.95–96; 1992b, p.681). Backhouse (1988, p.83) considered *Circulodinium hirtellum* to be a possible taxonomic junior synonym of this species. Sarjeant and Stover (1978, p.52) also proposed this combination. N.I.A. Age: Aptian.

"inconspicuum" Duxbury, 1983, p.32–33, pl.3, fig.6. Holotype: Duxbury, 1983, pl.3, fig.6; Fauconnier and Masure, 2004, pl.17, fig.7. Age: late Aptian.

"incultum" Morgenroth, 1966b, p.9, pl.2, fig.5. Holotype: Morgenroth, 1966b, pl.2, fig.5. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: early Oligocene.

"indicum" Khanna and Singh, 1981b, p.405–406, fig.4, nos.1–2; text-fig.16. Holotype: Khanna and Singh, 1981b, fig.4, no.1. **NOW** *Glaphyrocysta jabliensis*. Originally *Cyclonephelium indicum*, subsequently (and now) *Glaphyrocysta jabliensis*. Junior homonym: *Cyclonephelium indicum* Mehrotra and Sarjeant, 1987. This name was not validly published in Khanna (1979, p.219), Singh et al. (1979, p.35–36) and Khanna and Singh (1981a, pl.4, fig.11), since these authors did not provide a description. Age: middle Eocene.

"indicum" Mehrotra and Sarjeant, 1987, p.163, pl.2, fig.2; pl.7, fig.1. Holotype: Mehrotra and Sarjeant, 1987, pl.2, fig.2. **Name illegitimate** — **senior homonym**: *Cyclonephelium indicum* Khanna and Singh, 1981b. **NOW** *Circulodinium*?. Originally *Cyclonephelium* (name illegitimate), subsequently *Circulodinium*, thirdly (and now) *Circulodinium*?. Age: Paleocene.

"intonsum" Duxbury, 1983, p.33–34, pl.2, fig.7; pl.10, fig.12; text-figs.13–14. Holotype: Duxbury, 1983, pl.2, fig.7; text-figs.13,14A; Fauconnier and Masure, 2004, pl.18, fig.9. Age: late Aptian–early Albian.

"intricatum" Eaton, 1971, p.365, pl.4, figs.8–10. Holotype: Eaton, 1971, pl.4, fig.8. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle Oligocene.

"laciniiforme" Gerlach, 1961, p.206, pl.29, fig.4. Holotype: Gerlach, 1961, pl.29, fig.4; Fauconnier and Masure, 2004, pl.33, fig.1. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle-late Oligocene.

"lemniscatum" Stanley, 1965, p.229–230, pl.24, figs.1–6. Holotype: Stanley, 1965, pl.24, figs.1–2. **NOW** *Areoligera*. Originally *Cyclonephelium*, subsequently (and now) *Areoligera*. Age: Paleocene.

"longispinatum" (Davey, 1978, p.894, pl.3, figs.4,7–8) Fauconnier in Fauconnier and Masure, 2004, p.146. Holotype: Davey, 1978, pl.3, fig.7. Originally *Cyclonephelium distinctum* subsp. *longispinatum*, subsequently *Circulodinium distinctum* subsp. *longispinatum*, thirdly (and now) *Cyclonephelium longispinatum*. This taxon was raised to specific rank by Fauconnier in Fauconnier and Masure (2004, p.146). Age: Turonian.

"longispinosum" He Chengquan, 1991, p.136, pl.9, fig.19; pl.60, fig.5. Holotype: He Chengquan, 1991, pl.9, fig.19. Age: middle Eocene.

"maugaad" Below, 1981a, p.15, pl.11, figs.2,3a–b; pl.15, fig.20. Holotype: Below, 1981a, pl.11, fig.2; Fensome et al., 1991, fig.1 — p.671; Fauconnier and Masure, 2004, pl.18, fig.10. N.I.A. Age: Hauterivian–Aptian.

"membraniphorum" Cookson and Eisenack, 1962b, p.495, pl.6, figs.8–14. Holotype: Cookson and Eisenack, 1962b, pl.6, fig.9. **NOW** *Cauveridinium*. Originally *Cyclonephelium*, subsequently *Maghrebina*, thirdly (and now) *Cauveridinium*. Age: Albian–Cenomanian.

"*microfenestratum*" Bujak, 1976, p.112, pl.3, fig.12; pl.4, figs.1–7; text-fig.31. Holotype: Bujak, 1976, pl.4, figs.4–5; Bujak et al., 1980, pl.14, fig.1; Fauconnier and Masure, 2004, pl.33, figs.2–3. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle Eocene.

"*operculatum*" Yu Jingxian, 1982, p.252–253, pl.7, figs.20–22. Holotype: Yu Jingxian, 1982, pl.7, fig.21. Questionable assignment: Fauconnier and Londeix in Fauconnier and Masure (2004, p.147) as a problematic species. Age: Late Jurassic–Early Cretaceous.

"*ordinatum*" Williams and Downie, 1966c, p.225–227, pl.25, fig.3; text-fig.62. Holotype: Williams and Downie, 1966c, pl.25, fig.3; text-fig.62. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: early Eocene.

"*palliatum*" (Brideaux, 1977, p.11–12, pl.3, figs.1–8) Below, 1981a, p.10. Holotype: Brideaux, 1977, pl.3, figs.1–4. Originally *Canningia*, subsequently *Cyclonephelium*. **Taxonomic senior synonym:** *Canningia reticulata*, according to Helby (1987, p.322). Age: Barremian.

"*pastielsii*" Deflandre and Cookson, 1955, p.285 ex de Coninck, 1965, p.44. Emendation: Sarjeant, 1986, p.27–29, as *Glaphyrocysta pastielsii*. Holotype: PASTIELS, 1948, pl.5, fig.15, as *Membranilarnacia* cf. *liradisoides*; Fauconnier and Masure, 2004, pl.33, fig.9. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Name not validly published in Deflandre and Cookson (1955, p.285) since these authors did not provide a description or a direct reference to one (as required after 1952 by ICBN Article 32.3). Age: early Eocene.

"*paucimarginatum*" Cookson and Eisenack, 1962b, p.494, pl.6, fig.5–7. Holotype: Cookson and Eisenack, 1962b, pl.6, fig.6; Bint, 1986, text-fig.15C; Fauconnier and Masure, 2004, pl.17, fig.8. Age: ?late Albian–Cenomanian.

"*paucispinum*" Davey, 1969a, p.170, pl.9, figs.1–2. Holotype: Davey, 1969a, pl.9, fig.1; Fauconnier and Masure, 2004, pl.14, figs.5–6. **NOW** *Circulodinium*. Originally *Cyclonephelium*, subsequently (and now) *Circulodinium*. Age: Cenomanian.

"*perforatum*" Wilson in Soncini and Rauscher, 1988, p.448. **Name not validly published:** no description. **Taxonomic senior synonym:** *Glaphyrocysta wilsonii*, according to Slimani (2001a, p.192).

"*reductum*" Châteauneuf, 1980, p.136, pl.21, fig.10. Holotype: Châteauneuf, 1980, pl.21, fig.10; Fauconnier and Masure, 2004, pl.18, figs.11–15. **NOW** *Tenua* Eisenack. Originally *Cyclonephelium*, subsequently (and now) *Tenua* Eisenack. Age: late Eocene (Marinesian–Ludian).

"*regulatum*" Jiabo, 1978, p.78, pl.27, figs.1–2. Holotype: Jiabo, 1978, pl.27, fig.1. **NOW** *Membranilarnacia*. Originally *Cyclonephelium*, subsequently *Membranophoridium?*, thirdly (and now) *Membranilarnacia*. Age: Early Tertiary.

"*reticulosum*" Gerlach, 1961, p.204, pl.29, fig.2. Holotype: Gerlach, 1961, pl.29, fig.2. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently *Glaphyrocysta?*, thirdly (and now) *Glaphyrocysta*. Age: middle-late Oligocene.

"*retiintextum*" Cookson, 1965a, p.88, pl.11, fig.4. Holotype: Cookson, 1965a, pl.11, fig.4; Eisenack and Kjellström, 1972, p.325; Fensome et al., 1996, fig.1 — p.2329. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: ?Senonian.

"*semicirculatum*" Morgenroth, 1966b, p.9–10, pl.2, figs.3–4. Holotype: Morgenroth, 1966b, pl.2, fig.3. **NOW** *Licracysta*. Originally *Cyclonephelium*, subsequently *Areoligera*, thirdly (and now) *Licracysta*. Age: middle Oligocene.

"*semitectum*" Bujak in Bujak et al., 1980, p.46,48,50, pl.14, figs.2–9; text-fig.13. Holotype: Bujak et al., 1980, pl.14, figs.4–6; Fauconnier and Masure, 2004, pl.33, figs.10–11. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*, thirdly *Riculacysta* (combination not validly published). Taxonomic senior

synonym: *Riculacysta perforata*, according to Köthe (1990, p.50) — however, Kirsch (1991, p.129) retained *Cyclonephelium* (as *Riculacysta*, now *Glaphyrocysta*) *semitectum*. Age: middle Eocene (see Aubry, 1986).

"*spinetum*" Eaton, 1976, p.259–260, pl.8, fig.3; text-fig.12. Holotype: Eaton, 1976, pl.8, fig.3; text-fig.12; Bujak et al., 1980, pl.9, figs.10–11; Fauconnier and Masure, 2004, pl.34, fig.1. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently *Glaphyrocysta*?, thirdly (and now) *Glaphyrocysta*. Age: early-middle Eocene.

"*tabulatum*" Davey and Verdier, 1974, p.630,632, pl.92, figs.1–4; pl.93, fig.6. Holotype: Davey and Verdier, 1974, pl.92, figs.1,4; Eisenack and Kjellström, 1981b, p.328b; Sarjeant, 1992b, figs.3–4; Fensome et al., 1995, figs.1–2 — p.1833. **NOW** *Cerbia*. Originally *Cyclonephelium*, subsequently *Canninginopsis*, thirdly (and now) *Cerbia*. Taxonomic senior synonym: *Tenua hystrix*, according to Sarjeant (1985a, p.94; 1992b, p.681) — however, by retaining *Cerbia*, Duxbury (2002, p.76,78) retained *Cerbia tabulata* by implication. Age: Aptian.

?*tarimense* He Chengquan, 1991, p.136–137, pl.28, fig.9. Holotype: He Chengquan, 1991, pl.28, fig.9. Questionable assignment: He Chengquan (1991, p.136). Age: Paleocene.

"*textum*" Bujak, 1976, p.110, pl.3, figs.6–11; text-figs.3G–H. Holotype: Bujak, 1976, pl.3, fig.7; Fauconnier and Masure, 2004, pl.34, figs.2–3. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle Eocene (see Aubry, 1986).

uncinatum (Norvick, 1976, p.74–75, pl.8, figs.11–12) Stover and Evitt, 1978, p.36. Holotype: Norvick, 1976, pl.8, fig.11; Fauconnier and Masure, 2004, pl.17, figs.10–11. Originally *Adnatosphaeridium*, subsequently (and now) *Cyclonephelium*. Age: Cenomanian.

vannophorum Davey, 1969a, p.168,170, pl.9, fig.3; pl.11, figs.11–12; text-fig.16E. Holotype: Davey, 1969a, pl.9, fig.3; pl.11, fig.11; Fauconnier and Masure, 2004, pl.17, fig.12. Age: Cenomanian.

"*variabile*" Cookson and Eisenack, 1967a, p.134–135, pl.19, figs.9–11. Holotype: Cookson and Eisenack, 1967a, pl.19, fig.9; Fauconnier and Masure, 2004, pl.77, figs.6–8. **NOW** *Systematophora*?. Originally *Cyclonephelium*, subsequently *Systematophora*?. Age: Paleocene.

"*variatum*" Jiabo, 1978, p.78–79, pl.27, figs.6–10. Holotype: Jiabo, 1978, pl.27, fig.6. **NOW** *Membranilarnacia*. Originally *Cyclonephelium*, subsequently *Membranophoridium*, thirdly (and now) *Membranilarnacia*. Age: Early Tertiary.

"*vicinum*" Eaton, 1976, p.260–261, pl.8, figs.4–5; text-fig.13. Holotype: Eaton, 1976, pl.8, fig.4; text-fig.13; Bujak et al., 1980, pl.9, figs.9,12; Fauconnier and Masure, 2004, pl.34, figs.11–14. **NOW** *Glaphyrocysta*?. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*?. Age: early-middle Eocene (see Bujak et al., 1980, p.19 and Aubry, 1986).

"*vutilare*" Cookson, 1965b, p.138–139, pl.24, figs.1–7. Holotype: Cookson, 1965b, pl.24, figs.1–2. **NOW** *Renidinium*. Originally *Cyclonephelium*, subsequently (and now) *Renidinium*. Age: Paleocene.

CYGNUSICYSTA Riding and Helby, 2001e, p.112–114. Type: Riding and Helby, 2001e, fig.1L, as *Cygnusicysta taltarniana*.

**taltarniana* Riding and Helby, 2001e, p.114, figs.1A–L. Holotype: Riding and Helby, 2001e, fig.1L. Age: Jurassic (late Callovian)–Early Cretaceous.

CYLINDRATUS Banasová et al., 2007, p.113 ex Streng et al., 2009, p.230–232. Calcareous dinoflagellate genus (see Gottschling and Soehner, 2013, p.127). The name was not validly published in Banasová et al. (2007), since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1). Type: Streng et al., 2009, p.3, fig.2, as *Cylindratus borzae*.

**borzae* Banasová et al., 2007, p.113, pl.2, figs.17–20; pl.3, figs.1–2 ex Streng et al., 2009, p.232, pl.3, figs.1–9. Holotype: Streng et al., 2009, pl.3, fig.2. The name was not validly published in Banasová et al. (2007), since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1). Age: middle Miocene.

CYLINDRODINELLUM Zügel, 1994, p.56. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299). Type: Zügel, 1994, pl.12, figs.1–2, as *Cylindrodinellum scriblitinum*.

**scriblitinum* Zügel, 1994, p.56–57, pl.12, figs.1–5. Holotype: Zügel, 1994, pl.12, figs.1–2. Age: middle Turonian.

CYMOSSOPHAERIDIUM Davey, 1982b, p.18. Type: Davey, 1982b, pl.3, figs.5,8,11, as *Cymosphaeridium validum*.

benmoreense Schiøler and Wilson, 1998, p.328,330, pl.9, figs.1–7. Holotype: Schiøler and Wilson, 1998, pl.9, fig.3. Age: middle Coniacian–mid Santonian.

?*phoenix* (Duxbury, 1980, p.124–125, pl.13, figs.5–6; text-fig.9) Fauconnier in Fauconnier and Masure, 2004, p.159. Holotype: Duxbury, 1980, pl.13, figs.5–6; text-fig.9; Fauconnier and Masure, 2004, pl.19, figs.4–11. Originally *Hystriosphæridium*?, subsequently *Surculosphaeridium*?, thirdly (and now) *Cymosphaeridium*?. Questionable assignment: Fauconnier in Fauconnier and Masure (2004, p.159). N.I.A. Age: Barremian.

**validum* Davey, 1982b, p.18–19, pl.3, figs.5–6,8,11. Holotype: Davey, 1982b, pl.3, figs.5,8,11; Fensome et al., 1995, figs.1–3 — p.1875; Fauconnier and Masure, 2004, pl.19, figs.1–3. Age: Hauterivian.

"**CYSTODINIOPSIS**" Vozzhennikova, 1963, p.185. **Taxonomic senior synonym:** *Palaeocystodinium*, by implication in Vozzhennikova (1967, p.152), who transferred the "type species" of *Cystodiniopsis* — *Cystodiniopsis hyperxantha*, to *Palaeocystodinium*. Type: Vozzhennikova, 1963, fig.20, as *Cystodiniopsis hyperxantha* (which see for lectotype).

"**hyperxantha*" Vozzhennikova, 1963, p.185, fig.20. Emendation: Lentin and Vozzhennikova, 1990, p.60, as *Palaeocystodinium hyperxanthum*. Holotype: Vozzhennikova, 1963, fig.20, lost according to Lentin and Vozzhennikova (1990, p.60). Lectotype: Lentin and Vozzhennikova, 1990, pl.7, fig.7; text-fig.31, designated by Lentin and Vozzhennikova (1990, p.60). **NOW** *Palaeocystodinium*?. Originally *Cystodiniopsis*, subsequently *Palaeocystodinium*, thirdly (and now) *Palaeocystodinium*?. Age: Paleocene.

"**CYSTODINIOPSIS**" Vozzhennikova, 1967, p.192. **Name not validly published:** no validly published species. See also Loeblich Jr. and Loeblich III (1969, p.194), Lindgren (1985, p.670) and Fensome et al. (1993b, p.132–133) for discussions. This name cannot be legitimized since it would create a junior homonym of the name *Cystodiniopsis* Vozzhennikova, 1963.

"*gracilis*" Vozzhennikova, 1967, p.192. **Name not validly published:** no type or illustration. Although Vozzhennikova (1967, p.192) indicated that this species was illustrated in her pl.38, fig.5, there is no such illustration in Vozzhennikova (1967). See also Loeblich Jr. and Loeblich III (1969, p.194) and Lindgren (1985, p.670) for discussions of the validity of this species. Age: Late Cretaceous.

DALELLA McMinn and Sun Xuekun, 1994, p.42–43. Emendation: Zevenboom and Santarelli in Zevenboom, 1995, p.142. Type: McMinn and Sun Xuekun, 1994, pl.1, figs.1–3, as *Dalella chathamensis*.

**chathamensis* McMinn and Sun Xuekun, 1994, p.43,45, pl.1, figs.1–12; text-figs.2A–C. Holotype: McMinn and Sun Xuekun, 1994, pl.1, figs.1–3. Age: Holocene.

"*siciliensis*" Zevenboom and Santarelli in Zevenboom, 1995, p.143, pl.3, figs.1–6. Holotype: Zevenboom, 1995, pl.3, figs.1–3. **Name not validly published:** considered a manuscript name by the authors. Age: latest middle Miocene–early late Miocene.

"**DAMASSADINIUM**" Fensome et al., 1993b, p.90. Substitute name for *Danea* Morgenroth, 1968. Emendation: Drugg, 1970b, p.815–816, for *Danea*. **Name illegitimate — nomenclatural senior synonym:** *Danea*, which is not an illegitimate junior homonym of *Danaea* Smith 1793 as was incorrectly postulated by Fensome et al. (1993b). Names can be considered homonyms only if they are spelled identically, unless conservation or rejection has been formally invoked. See Silva (undated: Index Nominum Algarum). Type: Morgenroth, 1968, pl.43, figs.5–6, as *Danea mutabilis*.

"*abbreviatum*" (Damassa, 1984, p.54–55, pl.1, figs.1–6; pl.3, figs.2–6; pl.4, figs.3–4) Fensome et al., 1993b, p.90. Holotype: Damassa, 1984, pl.1, figs.1–6. **NOW** *Danea*. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early–late Eocene.

"*+californicum*" (Drugg, 1967, p.30, pl.5, figs.14–15; pl.9, fig.8) Fensome et al., 1993b, p.90. Holotype: Drugg, 1967, pl.5, fig.15. **NOW** *Danea*. Originally *Palmnickia*, subsequently *Samlandia*, thirdly (and now) *Danea*, fourthly *Damassadinium* (generic name illegitimate). Taxonomic junior synonym: *Danea mutabilis*, according to Damassa (1979b, p.193). The nomenclatural type of the genus *Damassadinium* (name illegitimate) remains the holotype of *Danea mutabilis*. Age: Danian.

"*chibane*" (Below, 1981a, p.43–45, pl.6, figs.3a–b,4a–c; pl.15, figs.1–2; text-figs.33a–d,34–39) Fensome et al., 1993b, p.90. Holotype: Below, 1981a, pl.6, figs.4a–c; Fensome et al., 1991, figs.1–3 — p.613. **NOW** *Danea*. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: middle Aptian (Gargasian).

"*crassimuratum*" (Wilson, 1988, p.17, pl.5, figs.1a–b,2,3a–b,4) Fensome et al., 1993b, p.90. Holotype: Wilson, 1988, pl.5, figs.1a–b; Fensome et al., 1996, figs.1–2 — p.2097. **NOW** *Danea*. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early–middle Eocene.

"*fibrosum*" (Hultberg, 1985c, p.119–120, pl.3, figs.H–I) Fensome et al., 1993b, p.90. Holotype: Hultberg, 1985c, pl.3, fig.H. **NOW** *Danea*. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: late Maastrichtian.

"*heterospinosum*" (Matsuoka, 1983c, p.117–122, pl.1, figs.1a–g,2a–b; pl.2, figs.1a–b,2–6,7a–b,8; text-figs.2A–B,3A–D,4A–B) Fensome et al., 1993b, p.90. Holotype: Matsuoka, 1983c, pl.1, figs.1a–g;text-fig.2A–B. **NOW** *Danea*. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: middle Eocene.

"*impages*" (Damassa, 1979a, p.821–822, pl.1, figs.1–3; pl.2, figs.1–9; text-fig.3) Fensome et al., 1993b, p.91. Holotype: Damassa, 1979a, pl.1, figs.1–2. **NOW** *Danea*. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early–middle Eocene.

"*manicatum*" (Damassa, 1984, p.55–56, pl.1, figs.7–12; pl.2, figs.1–3; pl.3, figs.1,7–8; pl.4, figs.1–2) Fensome et al., 1993b, p.91. Holotype: Damassa, 1984, pl.2, figs.1–3. **NOW** *Danea*. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early Eocene.

"*spinosum*" Slimani et al., 2008, p.330–331, figs.3A–F. Holotype: Slimani et al. 2008, figs.3A–C. **NOW** *Danea*. Originally *Damassadinium* (generic name illegitimate), subsequently (and now) *Danea*. Age: early Danian.

"**DAMPIERODINIUM**" Parker in Riding and Helby, 2001g, p.212. **Name not validly published:** based on an unpublished thesis, listed in synonymy. **Taxonomic senior synonym:** *Stanfordella*, by implication in Riding and Helby (2001g, p.212).

"*ovum*" Parker in Riding and Helby, 2001g, p.212. **Name not validly published**: based on an unpublished thesis, listed in synonymy. **Taxonomic senior synonym**: *Stanfordella granulosa*, by implication in Riding and Helby (2001g, p.212).

DANEA Morgenroth, 1968, p.541–542. Emendation: Drugg, 1970b, p.815–816. Nomenclatural junior synonym: *Damassadinium*, which has the same type. *Danea* Morgenroth is not an illegitimate junior homonym of *Danaea* Smith 1793 as was incorrectly postulated by Fensome et al. (1993b). Names can be considered homonyms only if they are spelled identically, unless conservation or rejection has been formally invoked. See Silva (undated: Index Nominum Algarum). Type: Morgenroth, 1968, pl.48, figs.5–6, as *Danea mutabilis*.

abbreviata Damassa, 1984, p.54–55, pl.1, figs.1–6; pl.3, figs.2–6; pl.4, figs.3–4. Holotype: Damassa, 1984, pl.1, figs.1–6. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early–late Eocene.

+*californica* (Drugg, 1967, p.30, pl.5, figs.14–15; pl.9, fig.8) Stover and Evitt, 1978, p.152. Holotype: Drugg, 1967, pl.5, fig.15. Originally *Palmnickia*, subsequently *Samlandia*, thirdly (and now) *Danea*, fourthly *Damassadinium* (generic name illegitimate). Taxonomic junior synonym: *Danea mutabilis*, according to Damassa (1979b, p.193). The nomenclatural type of the genus *Danea* remains the holotype of *Danea mutabilis*. Age: Danian.

chibanis Below, 1981a, p.43–45, pl.6, figs.3a–b,4a–c; pl.15, figs.1–2; text-figs.33a–d,34–39. Holotype: Below, 1981a, pl.6, figs.4a–c; Fensome et al., 1991, figs.1–3 — p.613. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: middle Aptian (Gargasian).

crassimurata Wilson, 1988, p.17, pl.5, figs.1a–b,2,3a–b,4. Holotype: Wilson, 1988, pl.5, figs.1a–b; Fensome et al., 1996, figs.1–2 — p.2097. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early-middle Eocene.

fibrosa Hultberg, 1985c, p.119–120, pl.3, figs.H–I. Holotype: Hultberg, 1985c, pl.3, fig.H. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: late Maastrichtian.

"*fimbriata*" (Morgenroth, 1968, p.547–548, pl.45, figs.7–8) Stover and Evitt, 1978, p.152. Emendations: May, 1980, p.46, and Marheinecke, 1992, p.112–113, both as *Conneximura fimbriata*. Holotype: Morgenroth, 1968, pl.45, figs.7–8; Eisenack and Kjellström, 1972, p.515; Fensome et al., 1995, figs.1–2 — p.1483. **NOW** *Conneximura*. Originally *Hystrichokolpoma*?, subsequently *Danea*, thirdly (and now) *Conneximura*. Age: Danian.

heterospinosa Matsuoka, 1983c, p.117–122, pl.1, figs.1–2; pl.2, figs.1–8; text-figs.2–4. Holotype: Matsuoka, 1983c, pl.1, fig.1. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: middle Eocene.

impages Damassa, 1979a, p.821–822, pl.1, figs.1–3; pl.2, figs.1–9; text-fig.3. Holotype: Damassa, 1979a, pl.1, figs.1–2. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early-middle Eocene.

manicata Damassa, 1984, p.55–56, pl.1, figs.7–12; pl.2, figs.1–3; pl.3, figs.1,7–8; pl.4, figs.1–2. Holotype: Damassa, 1984, pl.2, figs.1–3. Originally (and now) *Danea*, subsequently *Damassadinium* (generic name illegitimate). Age: early Eocene.

"**mutabilis*" Morgenroth, 1968, p.542–544, pl.43, figs.5–9; pl.44, figs.1–3. Holotype: Morgenroth, 1968, pl.43, figs.5–6. **Taxonomic senior synonym**: *Palmnickia* (as *Danea*) *californica*, according to Damassa (1979b, p.193). The nomenclatural type of the genus *Danea* remains the holotype of *Danea mutabilis*. Age: Danian.

spinosa (Slimani et al., 2008) comb. nov.

Damassadinium spinosa Slimani et al. 2008, p.330–331, figs.3A–F.

Holotype: Slimani et al. 2008, figs.3A–C. Originally *Damassadinium* (generic name illegitimate), subsequently (and

now) *Danea*. The combination *Danea spinosa* is proposed here since *Damassadinium* is a nomenclatural junior synonym of *Danea*. Age: early Danian.

DAPCODINIUM Evitt, 1961a, p.996. Emendations: Dörhöfer and Davies, 1980, p.23; Below, 1987a, p.141. Taxonomic junior synonyms: *Opaeopsomus*, *Mancodinium* and *Maturodinium*, all according to Dörhöfer and Davies (1980, p.23) — however, Lentin and Williams (1985, p.230–231) retained *Mancodinium* and *Maturodinium*. Type: Evitt, 1961a, pl.119, figs.1–2; text-figs.10–11, as *Dapcodinium priscus*.

"**coalitum**" Davies, 1983, p.14, pl.1, figs.1–8; text-fig.6. Holotype: Davies, 1983, pl.1, figs.7–8. **NOW** *Mancodinium*. Originally *Dapcodinium*, subsequently (and now) *Mancodinium*. Age: Toarcian–early Bajocian.

"**holotabulatum**" Davies, 1983, p.14–15, pl.1, figs.9–19; text-fig.7. Emendation: Below, 1987b, p.30, as *Rosswangia holotabulata*. Holotype: Davies, 1983, pl.1, figs.9–11. **NOW** *Rosswangia*. Originally *Dapcodinium*, subsequently (and now) *Rosswangia*. Age: Toarcian–Bathonian.

"**inornatum**" (Morgenroth, 1970, p.354–355, pl.13, figs.5–8 [plate caption transposed with that of pl.12, fig.6]) Dörhöfer and Davies, 1980, p.23. Holotype: Morgenroth, 1970, pl.13, figs.5–6; Fensome et al., 1993a, figs.1–2 — p.1237; figs.1–2 p.1241. **NOW** *Maturodinium*. Originally (and now) *Maturodinium*, subsequently *Dapcodinium*. Age: late Pliensbachian.

ovale Below, 1987a, p.141–144, pl.24, figs.1–15; pl.25, figs.1–7,11–12,14; text-figs.72a–f,73a–h. Holotype: Below, 1987a, pl.24, figs.2,5; Fensome et al., 1993a, fig.1 — p.1273; figs.1,3 — p.1277. Age: late Pliensbachian–Toarcian.

subsp. **granulatum** (Below, 1987a, p.144, pl.25, figs.1–7,11–12,14) Lentin and Williams, 1989, p.94. Holotype: Below, 1987a, pl.25, figs.1–4; Fensome et al., 1993a, figs.1–4 — p.1225; fig.2 — p.1273. Originally *Dapcodinium ovale* var. *granulatum*, subsequently (and now) *Dapcodinium ovale* subsp. *granulatum*. Age: late Pliensbachian–Aalenian.

"var. **granulatum**" Below, 1987a, p.144, pl.25, figs.1–7,11–12,14. Holotype: Below, 1987a, pl.25, figs.1–4; Fensome et al., 1993a, figs.1–4 — p.1225; fig.2 — p.1273. **NOW** *Dapcodinium ovale* subsp. *granulatum*. Originally *Dapcodinium ovale* var. *granulatum*, subsequently (and now) *Dapcodinium ovale* subsp. *granulatum*. Age: late Pliensbachian–Aalenian.

subsp. **ovale**. Autonym. Holotype: Below, 1987a, pl.25, figs.1–4; Fensome et al., 1993a, fig.1 — p.1273; figs.1,3 — p.1277.

"var. **ovale**". Autonym. Holotype: Below, 1987a, pl.25, figs.1–4; Fensome et al., 1993a, fig.1 — p.1273; figs.1,3 — p.1277. **Now redundant**.

polyedricum Below, 1987a, p.144–149, pl.23, figs.1–5,12–18; text-figs.74a–f,75,76a–k. Holotype: Below, 1987a, pl.23, figs.1,4–5; Fensome et al., 1993a, figs.3–4 — p.1285. Age: Norian.

***priscum** Evitt, 1961a, p.996–1001, pl.119, figs.1–14; text-figs.1–20. Emendation: Below, 1987a, p.149. Holotype: Evitt, 1961a, pl.119, figs.1–2; text-figs.10–11. The epithet was erroneously indicated as a noun in apposition in Fensome and Williams (2004). Age: Hettangian.

sacculus Below, 1987a, p.150, pl.25, figs.8–10,15. Holotype: Below, 1987a, pl.25, figs.9–10,15 (not 8); Fensome et al., 1993a, figs.2–4 — p.1309. N.I.A. Age: early Pliensbachian.

"**semitabulatum**" (Morgenroth, 1970, p.352–353, pl.12, figs.3–6; pl.13, figs.1–4) Dörhöfer and Davies, 1980, p.23. Emendation: Below, 1987b, p.23, as *Mancodinium semitabulatum*. Holotype: Morgenroth, 1970, pl.12, fig.3; Fensome et al., 1993a, fig.1 — p.1319; fig.1 — p.1323. **NOW** *Mancodinium*. Originally (and now) *Mancodinium*, subsequently *Dapcodinium*. Taxonomic junior synonym: *Parvulodinium penitabulatum*, according to Pruss (1989, p.25). Age: late Pliensbachian.

"*wapellense*" (Pocock, 1972, p.97, pl.24, fig.14) Dörhöfer and Davies, 1980, p.23. Emendation: Dörhöfer and Davies, 1980, p.23, as *Dapcodinium wapellense*. Holotype: Pocock, 1972, pl.24, fig.14. **NOW** *Opaeopsomus*. Originally (and now) *Opaeopsomus*, subsequently *Dapcodinium*, thirdly *Valvaeodinium*. Age: Callovian.

DAPSILIDINIUM Bujak et al., 1980, p.27–28. Type: Davey and Williams, 1966b, pl.4, fig.10, as *Polysphaeridium pastielsii*.

?*amalthei* (Wetzel, 1966, p.317, pl.31, figs.2,2a–b) Lentin and Williams, 1981, p.68. Holotype: Wetzel, 1966, pl.31, figs.2,2a. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*, thirdly *Polysphaeridium?*, fourthly (and now) *Dapsilidinium?*. Questionable assignment: Lentin and Williams (1981, p.68). Age: late Toarcian.

"*ambiguum*" (Deflandre, 1937b, p.81, pl.16 [al. pl.13], figs.8–9) Wheeler and Sarjeant, 1990, p.310–111. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. **NOW** *Sepispinula?*. Originally *Micrhystridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Polysphaeridium*, fourthly *Chlamydophorella*, fifthly *Dapsilidinium*, sixthly *Gorgonisphaeridium* (Appendix A), seventhly (and now) *Sepispinula?*. Taxonomic junior synonyms: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) and *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, both according to Yun Hyesu (1981, p.44) and Schiöler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499–500) retained *Sepispinula ancorifera* and *Sepispinula huguoniotii*. Age: Late Cretaceous.

"subsp. *ambiguum*". Autonym. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. **Now redundant.**

"subsp. *pertusum*" (Davey, 1969a, p.156–157, pl.7, figs.6–7,9) Lentin and Williams, 1993, p.156. Holotype: Davey, 1969a, pl.7, fig.7. **NOW** *Sepispinula pertusa*. Originally *Cleistosphaeridium huguoniotii* var. *pertusum*, subsequently *Cleistosphaeridium huguoniotii* subsp. *pertusum*, thirdly *Cleistosphaeridium huguoniotii* subsp. *pertusum*, fourthly *Dapsilidinium ambiguum* subsp. *pertusum*, fifthly *Sepispinula huguoniotii* subsp. *pertusa*, sixthly (and now) *Sepispinula pertusa*. Age: late Cenomanian.

"*asperum*" (Maier, 1959, p.319, pl.33, fig.2) Bujak et al., 1980, p.28. Emendation: Sarjeant, 1983, p.113–114, as *Polysphaeridium asperum*. Holotype: Maier, 1959, pl.33, fig.2. **NOW** *Polysphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium*, fourthly (and now) *Polysphaeridium*. Age: middle Miocene.

assamicum (Mehrotra, 1983, p.18, pl.5, figs.4,8–9) Lentin and Williams, 1985, p.91. Holotype: Mehrotra, 1983, pl.5, fig.4. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Age: Early Tertiary.

"?*belgicum*" (Sarjeant, 1969, p.15) Lentin and Williams, 1981, p.69. Holotype: Pastsiels, 1948, pl.3, fig.16, as *Hystrichosphaeridium fluctuans*, lost according to Sarjeant (1986, p.18). **NOW** *Polysphaeridium*. Originally (and now) *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*. Questionable assignment: Lentin and Williams (1981, p.69). Age: early Eocene.

"?*caminuspinum*" (Wall, 1965a, p.165, pl.9, fig.4) Lentin and Williams, 1981, p.69. Holotype: Wall, 1965a, pl.9, fig.4. **NOW** *Beaumontella?*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Beaumontella?*. Questionable assignment: Lentin and Williams (1981, p.69). Taxonomic junior synonym: *Cleistosphaeridium mojsisovicsii*, according to Below (1987a, p.70). Age: early Sinemurian.

chems (Below, 1982c, p.27–28, pl.2, figs.8a–b; text-fig.6b) Lentin and Williams, 1985, p.91. Holotype: Below, 1982c, pl.2, figs.8a–b; Fauconnier and Masure, 2004, pl.19, figs.12–13. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. N.I.A. Age: late Hauterivian.

"?*conispinum*" (Davey and Verdier, 1973, p.193–194, pl.4, figs.4,6,8–9) Lentin and Williams, 1981, p.69. Emendation: Lucas-Clark, 1984, p.187, as *Litosphaeridium conispinum*. Holotype: Davey and Verdier, 1973, pl.4, fig.8. **NOW** *Litosphaeridium*. Originally (and now) *Litosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?. Questionable assignment: Lentin and Williams (1981, p.69). Age: late Albian.

daveyi (Boltenhagen, 1977, p.37–38,40, pl.2, figs.3–4) Lentin and Williams, 1981, p.69. Holotype: Boltenhagen, 1977, pl.2, fig.3; Fauconnier and Masure, 2004, pl.20, fig.3. Originally *Polysphaeridium*?, subsequently (and now) *Dapsilidinium*. Age: late Cenomanian–Turonian.

?*deflandrei* (Valensi, 1947, p.817; text-fig.3) Lentin and Williams, 1981, p.69. Holotype: Valensi, 1947, text-fig.3; Fauconnier and Masure, 2004, pl.21, figs.1–4. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly (and now) *Dapsilidinium*?. Questionable assignment: Lentin and Williams (1981, p.69). Age: Middle Jurassic.

duma (Below, 1982c, p.28, pl.2, figs.9a–b,10a–b,11–12; text-fig.6a) Lentin and Williams, 1985, p.92. Holotype: Below, 1982c, pl.2, figs.9a–b; Fauconnier and Masure, 2004, pl.19, figs.14–15. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. N.I.A. Age: Hauterivian–Albian.

?*elongatum* (Jain and Millepied, 1975, p.150–151, pl.5, figs.73–74) Lentin and Williams, 1981, p.69. Holotype: Jain and Millepied, 1975, pl.5, fig.74. **NOW** *Exochosphaeridium*. Originally *Polysphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?, fourthly (and now) *Exochosphaeridium*. Questionable assignment: Lentin and Williams (1981, p.69). Age: Maastrichtian.

"?*fucosum*" (Valensi, 1955a, p.40; text-fig.2b) Lentin and Williams, 1981, p.69. Holotype: Valensi, 1955a, text-fig.2b; Fauconnier and Masure, 2004, pl.52, figs.8–11. **NOW** *Litosphaeridium*. Originally *Micrhystridium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium*?, fourthly *Dapsilidinium*?, fifthly (and now) *Litosphaeridium*. Questionable assignment: Lentin and Williams (1981, p.69). Taxonomic junior synonyms (at specific rank): *Hystrichosphaeridium tubiferum* var. *brevispinum* and *Hystrichosphaeridium* (as *Litosphaeridium*) *arundum*, both according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.190,227) retained *Hystrichosphaeridium tubiferum* subsp. *brevispinum* and *Litosphaeridium arundum*. Age: Late Cretaceous.

"*granulosum*" (Jain and Millepied, 1975, p.151–152, pl.5, figs.69–70) Lentin and Williams, 1981, p.69. Holotype: Jain and Millepied, 1975, pl.5, fig.69. **NOW** *Pervosphaeridium*?. Originally *Polysphaeridium*, subsequently *Dapsilidinium*, thirdly (and now) *Pervosphaeridium*?. Age: Campanian–Maastrichtian.

hystrichosum Islam, 1983a, p.235–236, pl.1, figs.4–6. Holotype: Islam, 1983a, pl.1, fig.4. Age: early Eocene.

laminaspinosum (Davey and Williams, 1966b, p.94–95, pl.8, fig.8) Lentin and Williams, 1981, p.69. Holotype: Davey and Williams, 1966b, pl.8, fig.8; Fauconnier and Masure, 2004, pl.19, fig.16. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Age: Cenomanian.

"?*langii*" (Wall, 1965a, p.165, pl.6, figs.9–11; pl.9, fig.9) Lentin and Williams, 1981, p.69. Emendations: Morbey, 1975, p.41–42, as *Hystrichosphaeridium langii*; Below, 1987a, p.70, as *Beaumontella langii*. Holotype: Wall, 1965a, pl.6, fig.9; pl.9, fig.9; Fensome et al., 1995, figs.1–2 — p.1595. **NOW** *Beaumontella*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?, fourthly (and now) *Beaumontella*. Questionable assignment: Lentin and Williams (1981, p.69). Age: Hettangian–early Sinemurian.

"?*majus*" (Lejeune-Carpentier, 1940, p.B220–B221; text-fig.13) Lentin and Williams, 1981, p.69. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.12, as *Amphorosphaeridium majus*. Holotype: Lejeune-Carpentier, 1940, text-fig.13; Strel et al., 1977, pl.1, fig.7; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.6–7; text-fig.7. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Cordosphaeridium*, fourthly *Dapsilidinium*? (combination not validly published), fifthly *Amphorosphaeridium*, sixthly (and now) *Exochosphaeridium*. Questionable assignment: Lentin and Williams (1981, p.69). Taxonomic junior synonyms: *Baltisphaeridium* (as *Exochosphaeridium*) *bifidum* and *Exochosphaeridium bifidum* var. *involutum* (as *Exochosphaeridium bifidum* subsp. *involutum*), both according to Peyrot (2011, p.284). Age: Late Cretaceous.

marinum Singh, 1983, p.121, pl.41, figs.7–9. Holotype: Singh, 1983, pl.41, fig.7; Fauconnier and Masure, 2004, pl.20, fig.1. Age: Cenomanian.

multispinosum (Davey, 1974, p.60, pl.7, fig.4) Bujak et al., 1980, p.28. Holotype: Davey, 1974, pl.7, fig.4. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Age: early–late Barremian.

"*pachydermum*" (Cookson and Eisenack, 1960b, p.251–252, pl.38, fig.5; text-fig.5) Lentin and Williams, 1993, p.158. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.5; Fauconnier and Masure, 2004, pl.48, fig.10. **NOW** *Impletosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Dapsilidinium*, fifthly (and now) *Impletosphaeridium*. Age: Oxfordian–Tithonian.

**pastielsii* (Davey and Williams, 1966b, p.92–93, pl.4, fig.10) Bujak et al., 1980, p.28. Holotype: Davey and Williams, 1966b, pl.4, fig.10; Eisenack and Kjellström, 1972, p.923; Bujak et al., 1980, pl.6, figs.6,9; Fensome et al., 1995, fig.1 — p.1647; Fauconnier and Masure, 2004, pl.19, figs.17–19. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Taxonomic junior synonym: *Polysphaeridium* (now *Dapsilidinium*) *pseudocolligerum* according to Mertens et al. (2014, p.532) — however, Fensome et al., in press retained *Dapsilidinium pseudocolligerum* as a separate species. Age: early Eocene.

?*paulinae* (Valensi, 1953, p.48, pl.12, fig.6) Lentin and Williams, 1981, p.70. Holotype: Valensi, 1953, pl.12, fig.6. Originally *Micrhystridium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?*, fourthly (and now) *Dapsilidinium?*. Questionable assignment: Lentin and Williams (1981, p.70). Age: Middle Jurassic.

pseudocolligerum (Stover, 1977, p.74–75, pl.1, figs.14–19) Bujak et al., 1980, p.28. Holotype: Stover, 1977, pl.1, figs.14–16. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Taxonomic senior synonym: *Polysphaeridium* (now *Dapsilidinium*) *pastielsii* according to Mertens et al. (2014, p.532) — however, Fensome et al., in press retained *Dapsilidinium pseudocolligerum* as a separate species. Age: early Oligocene–early Miocene.

?*pumilum* (Davey and Williams, 1966b, p.93–94, pl.7, figs.3–4) Lentin and Williams, 1981, p.70. Holotype: Davey and Williams, 1966b, pl.7, fig.3; Fauconnier and Masure, 2004, pl.20, fig.2. Originally *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly (and now) *Dapsilidinium?*. Questionable assignment: Lentin and Williams (1981, p.93). Age: Cenomanian.

?*punctatum* (Jain and Millepieid, 1975, p.151, pl.5, figs.71–72) Lentin and Williams, 1981, p.70. Holotype: Jain and Millepieid, 1975, pl.5, fig.72. Originally *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly (and now) *Dapsilidinium?*. Questionable assignment: Lentin and Williams (1981, p.70). Age: Maastrichtian.

"?*rhabdophorum*" (Valensi, 1955b, p.593, pl.3, fig.7) Lentin and Williams, 1981, p.70. Holotype: Valensi, 1955b, pl.3, fig.7; Fauconnier and Masure, 2004, pl.20, figs.10–11. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Exochosphaeridium*. Questionable assignment: Lentin and Williams (1981, p.70). Age: Late Cretaceous.

?*simplex* (White, 1842, p.38, pl.4, fig.10) Bujak et al., 1980, p.28. Holotype: White, 1842, pl.4, fig.10. Originally *Xanthidium tubiferum* var. *simplex* (Appendix A), subsequently *Xanthidium simplex* (Appendix A), thirdly *Hystrichosphaeridium simplex*, fourthly *Polysphaeridium? simplex*, fifthly (and now) *Dapsilidinium simplex*. Questionable assignment: Stover and Williams (1987, p.70). Age: Late Cretaceous.

stelacum Islam, 1983a, p.236, pl.1, figs.7–8. Holotype: Islam, 1983a, pl.1, fig.7. Age: early Eocene.

warrenii (Habib, 1976, p.383, pl.2, figs.4,6a–b) Lentin and Williams, 1981, p.70. Holotype: Habib, 1976, pl.2, figs.6a–b. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Age: Berriasian–Aptian?

DAVEYA Monteil, 1996, p.40–41. Type: Monteil, 1996, pl.1, figs.1–9; pl.2, figs.1–9, as *Daveya boresphaera*.

***boresphaera** Monteil, 1996, p.41–42, pl.1, figs.1–9; pl.2, figs.1–9; pl.3, figs.1–9, pl.4, figs.1–9; pl.5, figs.1–9; pl.6, figs.1–12; pl.7, figs.1–10; pl.8, figs.1–7; text-figs.2A–D,3A–D,4A–B. Holotype: Monteil, 1996, pl.1, figs.1–9; pl.2, figs.1–9. Age: late Ryazanian.

solaris (Davey, 1988, p.38, pl.4, figs.7–9) Davey, 1999, p.20. Holotype: Davey, 1988, pl.4, figs.7–9; Fensome et al., 1996, figs.1–3 — p.2367. Originally *Gonyaulacysta*, subsequently (and now) *Daveya*. N.I.A. Age: late Berriasian.

DEFLAGYMNium Oлару, 1978a, p.86 (al. p.82). Oлару (1978b, p.38) also cited this genus as new. Type: Oлару, 1978a, pl.8, fig.8, as *Deflagymnium elongatum*.

***elongatum** Oлару, 1978a, p.86 (al. p.82), pl.8, fig.8. Holotype: Oлару, 1978a, pl.8, fig.8; Oлару, 1978b, fig.3 (not pl.1, fig.2); Fensome et al., 1993a, fig.1 — p.1143. Oлару (1978b, p.38) also cited this species as new. Age: Maastrichtian.

DEFLANDREA Eisenack, 1938b, p.187. Emendations: Williams and Downie, 1966c, p.231; Stover, 1974, p.169–170, as a revised description; Lentin and Williams, 1976, p.35–36. Taxonomic junior synonyms: *Ceratiopsis* Vozzhennikova, 1963, according to Lentin and Williams (1976, p.153) — however, Lentin and Williams (1977b, p.20; 1985, p.48) retained *Ceratiopsis*; *Cerodinium*, according to Lentin and Williams (1976, p.154) — however, Lentin and Williams (1987, p.114) retained *Cerodinium*; *Senegalinium*, according to Herngreen (1975, p.60–61) — however, Lentin and Williams (1977b, p.144) retained *Senegalinium*. Type: Eisenack, 1938b, text-fig.6, as *Deflandrea phosphoritica*.

"acribes" Davey and Verdier, 1971, p.38–39, pl.2, figs.10,12. Emendation: Goodman and Evitt, 1981, p.48,50,52–53, as *Angustidinium acribes*. Holotype: Davey and Verdier, 1971, pl.2, fig.10; Fensome et al., 1993a, fig.1 — p.875. **NOW** *Angustidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Alterbia?* (combination illegitimate), fourthly (and now) *Angustidinium*, fifthly *Moiesiodinium*. Age: early Albian.

"acuminata" Cookson and Eisenack, 1958, p.27, pl.4, figs.5–8. Holotype: Cookson and Eisenack, 1958, pl.4, fig.5. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*, fourthly (and now) *Isabelidinium*. Age: Cenomanian–early Turonian.

"acutula" Wilson, 1967b, p.225–226, figs.11–12. Emendation: Khowaja-Ateequzzaman et al., 1991, p.41–42, as *Alterbidinium acutulum*. Holotype: Wilson, 1967b, fig.12. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Taxonomic junior synonyms: *Albertia* (as *Alterbia*) *recticornis*, according to Whitney (1979, p.125) and Lentin and Williams (1993, p.14); *Albertia* (as *Alterbia*) *curvicornis*, according to Whitney (1979, p.125). Age: Maastrichtian (see Wilson, 1972).

"aenigmatica" Boltenhagen, 1977, p.86–88, pl.14, figs.5a–b,6–10. Holotype: Boltenhagen, 1977, pl.14, figs.5a–b. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: latest Albian–Turonian.

"albertii" Corradini, 1973, p.174–175, pl.27, figs.7a–b,8; pl.28, fig.2. Holotype: Corradini, 1973, pl.27, figs.7a–b. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Taxonomic junior synonym (at specific rank): *Peridinium pedunculatum* forma *divaricans* (subsequently *Phelodinium tricuspe* subsp. *divaricans*), according to Sarjeant (1985b, p.158) and Lentin and Williams (1993, p.504,511). Age: Late Cretaceous–Paleocene.

amabilis He Chengquan, 1991, p.77, pl.30, figs.1–7. Holotype: He Chengquan, 1991, pl.30, fig.5. Age: middle-late Eocene.

"amphiata" McIntyre, 1975, p.65–66, pl.2, figs.5–8. Holotype: McIntyre, 1975, pl.2, figs.5–6. **NOW** *Isabelidinium?*. Originally *Deflandrea*, subsequently *Isabelia?* (combination illegitimate), thirdly *Alterbia* (combination illegitimate), fourthly (and now) *Isabelidinium?*. Age: Campanian–Maastrichtian.

andromiensis Vozzhennikova, 1967, p.142–143, pl.71, figs.3–4; pl.72, figs.1–2. Holotype: Vozzhennikova, 1967, pl.71, fig.3; Lentin and Vozzhennikova, 1990, pl.5, fig.7; text-fig.22. Lentin and Vozzhennikova (1990, p.49) provided an "expanded description" for this species. Age: Eocene.

antarctica Wilson, 1967a, p.58,60, figs.23–24,26–27. Holotype: Wilson, 1967a, fig.23. Age: ?Eocene (erratic).

"**?apicidentata**" Jiabo, 1978, p.81, pl.2, fig.11. Holotype: Jiabo, 1978, pl.2, fig.11. **NOW** *Geiselodinium*. Originally *Deflandrea*?, subsequently (and now) *Geiselodinium*. Questionable assignment: Jiabo (1978, p.81). Age: Early Tertiary.

apiculiformis Andreeva-Grigorovich and Savitskaya, 1993, p.45, pl.1, fig.6. Holotype: Andreeva-Grigorovich and Savitskaya, 1993, pl.1, fig.6. Age: early Eocene.

arcuata Vozzhennikova, 1967, p.143–144, pl.66, fig.1; pl.68, figs.3a–b. Emendation: Lentin and Vozzhennikova, 1990, p.50. Holotype: Vozzhennikova, 1967, pl.68, figs.3a–b; Lentin and Vozzhennikova, 1990, pl.6, figs.6–8; text-fig.23. Age: late Eocene–early Oligocene.

"forma **arcuata**". Autonym. Holotype: Vozzhennikova, 1967, pl.68, figs.3a–b; Lentin and Vozzhennikova, 1990, pl.6, figs.6–8; text-fig.23. **Now redundant**.

subsp. **arcuata**. Autonym. Holotype: Vozzhennikova, 1967, pl.68, figs.3a–b; Lentin and Vozzhennikova, 1990, pl.6, figs.6–8; text-fig.23.

"forma **oporiensis**" Grigorovich, 1971, p.92, pl.1, fig.5. Holotype: Grigorovich, 1971, pl.1, fig.5. **NOW** *Deflandrea arcuata* subsp. *oporiensis*. Originally *Deflandrea arcuata* forma *oporiensis*, subsequently (and now) *Deflandrea arcuata* subsp. *oporiensis*. Age: Eocene.

subsp. **oporiensis** (Grigorovich, 1971, p.92, pl.1, fig.5) Lentin and Williams, 1977b, p.40. Holotype: Grigorovich, 1971, pl.1, fig.5. Originally *Deflandrea arcuata* forma *oporiensis*, subsequently (and now) *Deflandrea arcuata* subsp. *oporiensis*. Age: Eocene.

"**armata**" Cookson and Eisenack, 1970a, p.142–143, pl.13, fig.9. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.9. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly *Chatangiella*?, fourthly (and now) *Isabelidinium*. Age: Senonian.

"**articulata**" Vozzhennikova in Paschenyi et al., 1992, p.71. **Name not validly published**: no description or illustration.

"**asymmetrica**" Davey and Verdier, 1971, p.39–40, pl.2, figs.4,6. Holotype: Davey and Verdier, 1971, pl.2, fig.6. **Name illegitimate** — **senior homonym**: *Deflandrea asymmetrica* Wilson, 1967a. Substitute name: *Deflandrea deformans*. **NOW** *Subtilisphaera deformans*. Originally *Deflandrea asymmetrica* (name illegitimate), subsequently *Deflandrea deformans*, thirdly *Deflandrea daveyi* (name illegitimate), fourthly *Subtilisphaera asymmetrica* (name illegitimate), fifthly (and now) *Subtilisphaera deformans*. Age: middle Albian.

"**asymmetrica**" Wilson, 1967a, p.62–63, figs.17–21. Holotype: Wilson, 1967a, figs.19–21. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*?, fourthly (and now) *Alterbidinium*, fifthly *Magallanesium*. Junior homonym: *Deflandrea asymmetrica*: Davey and Verdier, 1971. Age: ?Eocene (erratic).

"**bakeri**" Deflandre and Cookson, 1955, p.251, pl.4, figs.1–4. Emendation: Stover, 1974, p.169–170, as a "revised description" for *Deflandrea bakeri*. Holotype: Deflandre and Cookson, 1955, pl.4, fig.1. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*, fourthly *Alterbia* (combination illegitimate). Age: Paleocene–early Eocene.

"forma **bakeri**". Autonym. Holotype: Deflandre and Cookson, 1955, pl.4, fig.1. **Now redundant**.

- "forma *pellucida*" Deflandre and Cookson, 1955, p.251, pl.4, fig.3. Holotype: Deflandre and Cookson, 1955, pl.4, fig.3; Cookson and Eisenack, 1958, pl.4, fig.9; Stover, 1974, pl.1, figs.7a–b. **NOW** *Isabelidinium pellucidum*. Originally *Deflandrea bakeri* forma *pellucida*, subsequently *Deflandrea pellucida*, thirdly *Isabelia pellucida* (combination illegitimate), fourthly (and now) *Isabelidinium pellucidum*, fifthly *Alterbia pellucida* (combination illegitimate). Age: Paleocene–early Eocene.
- "*balcattensis*" Cookson and Eisenack, 1969, p.3–5, figs.1B–F. Holotype: Cookson and Eisenack, 1969, fig.1B. **NOW** *Subtilisphaera*. Originally *Deflandrea*, subsequently (and now) *Subtilisphaera*. Age: Albian–Cenomanian.
- "*balmei*" Cookson and Eisenack, 1962b, p.486. Emendation: Morgan, 1977, p.130, as *Alterbia minor*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.1; Morgan, 1977, text-fig.2. **NOW** *Spinidinium balmei*. Originally *Deflandrea minor* (name illegitimate), subsequently *Deflandrea balmei*, thirdly *Alterbia balmei* (combination illegitimate), fourthly *Isabelidinium balmei*, fifthly (and now) *Spinidinium balmei*, sixthly *Magallanesium balmei*. Taxonomic senior synonym: *Palaeohystrichophora* (as *Diconodinium*) *minuta*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea* (as *Isabelidinium*, now *Spinidinium*) *balmei*. Age: Late Cretaceous.
- "*baltica*" (Vozzhennikova, 1967, p.154, pl.117, figs.2a–b) Lentin and Williams, 1976, p.38. Holotype: Vozzhennikova, 1967, pl.117, figs.2a–b; Lentin and Vozzhennikova, 1990, pl.3 figs.4–6; text-fig.14. **NOW** *Cerodinium*. Originally (and now) *Cerodinium*, subsequently *Deflandrea*, thirdly *Ceratiopsis* (combination illegitimate). Age: Eocene.
- "*belfastensis*" Cookson and Eisenack, 1961a, p.71, pl.11, figs.4–6. Holotype: Cookson and Eisenack, 1961a, pl.11, fig.4; Helby et al., 1987, fig.41D. **Taxonomic senior synonym:** *Deflandrea* (now *Isabelidinium*) *cooksoniae*, according to Fensome et al. (2009, p.39). Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*. Age: Late Cretaceous.
- bella* He Chengquan, 1991, p.77–78, pl.30, fig.8; text-fig.9. Holotype: He Chengquan, 1991, pl.30, fig.8; text-fig.9. Age: middle Eocene.
- "*biapertura*" McIntyre, 1975, p.66, pl.3, figs.5–8. Holotype: McIntyre, 1975, pl.3, figs.5–6. **NOW** *Chatangiella*?. Originally *Deflandrea*, subsequently (and now) *Chatangiella*?. Age: Campanian–Maastrichtian.
- "*bicavata*" (Jain and Millepied, 1973, p.23, pl.1, figs.1–4; text-fig.1B) Henggreen, 1975, p.61. Holotype: Jain and Millepied, 1973, pl.1, figs.1–3; Fensome et al., 1993a, figs.1–2 — p.975. **NOW** *Senegalinium*. Originally (and now) *Senegalinium*, subsequently *Deflandrea*, thirdly *Alterbia* (combination illegitimate). Age: Campanian–Maastrichtian.
- "*boloniensis*" Riegel, 1974, p.354–355, pl.1, figs.6–10; text-fig.3. Emendation: Riegel and Sarjeant, 1982, p.296–297, as *Phelodinium boloniense*. Holotype: Riegel, 1974, pl.1, fig.7; Sarjeant et al., 1987, pl.2, fig.2. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly *Senegalinium*, fourthly *Phelodinium*, fifthly (and now) *Cerodinium*. Age: ?Senonian.
- "*campbellensis*" Wilson, 1967b, p.225, figs.2–3. Holotype: Wilson, 1967b, fig.2. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Isabelidinium*. Age: Maastrichtian (see Wilson, 1972).
- carpatica* Grigorovich, 1969b, p.68–69, pl.1, fig.2. Holotype: Grigorovich, 1969b, pl.1, fig.2. Age: Paleocene.
- "*cincta*" Cookson and Eisenack, 1958, p.26, pl.4, figs.1–3. Holotype: Cookson and Eisenack, 1958, pl.4, fig.3. **NOW** *Ovoidinium*. Originally *Deflandrea*, subsequently *Evittia* Pocock (combination illegitimate), thirdly *Pocockia*, fourthly (and now) *Ovoidinium*, fifthly *Ascodinium*. Age: late Neocomian–early Aptian.
- communis* He Chengquan, 1991, p.78, pl.29, fig.18. Holotype: He Chengquan, 1991, pl.29, fig.18. Age: late Eocene.
- "*conica*" Vozzhennikova, 1960. **Name not validly published:** no description.

"*conorata*" Stover, 1974, p.171–172, pl.1, figs.8a–b; text-fig.3C. Holotype: Stover, 1974, pl.1, figs.8a–b. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidium*, fourthly *Eurydinium*, fifthly (and now) *Manumiella*. Age: early-middle Paleocene.

convexa Wilson, 1988, p.17, pl.6, figs.3–5. Holotype: Wilson, 1988, pl.6, fig.5; Fensome et al., 1996, fig.3 — p.2093. Age: middle Eocene.

"*cooksoniae*" Alberti, 1959b, p.97, pl.9, figs.1–6. Holotype: Alberti, 1959b, pl.9, fig.2. **NOW** *Isabelidium*. Originally *Deflandrea*, subsequently *Australiella*, thirdly *Isabelia* (combination illegitimate), fourthly (and now) *Isabelidium*. Taxonomic junior synonyms: *Deflandrea* (as *Isabelidium*) *belfastensis* and *Isabelidium bujakii*, according to Fensome et al. (2009, p.39). Age: Late Cretaceous.

"*cordifera*" May, 1980, p.74–75, pl.8, fig.4. Holotype: May, 1980, pl.8, fig.4. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Maastrichtian.

cornumammillata Jan du Chêne and Châteauneuf, 1975, p.31–32, pl.2, figs.1–13. Holotype: Jan du Chêne and Châteauneuf, 1975, pl.2, figs.7–8. Age: early Eocene (early Ilerdian).

"*coronata*" McIntyre, 1975, p.64–65, pl.3, figs.1–4. Holotype: McIntyre, 1975, pl.3, figs.1–2. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. Age: Paleocene.

"*corrugatella*" May, 1980, range chart 11, adjacent to p.21. **Name not validly published**: no description.

"*crassistriata*" Jain et al., 1975, p.8–9, pl.6, figs.64–65. Holotype: Jain et al., 1975, pl.6, fig.65. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Danian.

"*cretacea*" Cookson, 1956, p.184–185, pl.1, figs.1–7 (but see discussion under *Isabelidium cretaceum*). Holotype: Cookson, 1956, pl.1, fig.1; Helby et al., 1987, fig.42L. **NOW** *Isabelidium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidium*, fourthly *Manumiella*? Age: Late Cretaceous.

"*cuvillieri*" Boltenhagen, 1977, p.99–100, pl.17, figs.3,4a–b,5a–b,6. Holotype: Boltenhagen, 1977, pl.17, fig.3. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: Campanian.

cygniformis Pöthe de Baldis, 1966, p.221–222, pl.2, fig.c. Holotype: Pöthe de Baldis, 1966, pl.2, fig.c. Age: Early Tertiary.

"*dakotaensis*" Stanley, 1965, p.217–218, pl.19, figs.1–3. Holotype: Stanley, 1965, pl.19, figs.1–3. **NOW** *Chatangiella*?. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidium*, fourthly (and now) *Chatangiella*?. Age: Paleocene.

?*damasii* (Lejeune-Carpentier, 1942, p.B185–B186, figs.9–14) Lejeune-Carpentier and Sarjeant, 1981, p.16. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.16, as *Deflandrea? damasii*. Holotype: Lejeune-Carpentier, 1942, fig.10; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.3; text-fig.9a. Originally *Peridinium* (Appendix B), subsequently *Cooksoniella*?, thirdly *Palaeoperidinium*, fourthly *Deflandrea*, fifthly (and now) *Deflandrea*?. Questionable assignment: Lentin and Williams (1985, p.95). Age: Senonian.

danica Lange, 1969, p.114–115, pl.1, fig.6. Holotype: Lange, 1969, pl.1, fig.6. Age: Danian.

"*dartmooria*" Cookson and Eisenack, 1965b, p.133–134, pl.16, figs.1–2; text-fig.1. Holotype: Cookson and Eisenack, 1965b, pl.16, figs.1–2; text-fig.1; Stover, 1974, pl.3, figs.4a–b; pl.4, figs.1a–d. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: Paleocene.

"subsp. *dartmooria*". Autonym. Holotype: Cookson and Eisenack, 1965b, pl.16, figs.1–2; text-fig.1; Stover, 1974, pl.3, figs.4a–b; pl.4, figs.1a–d. **Now redundant.**

"subsp. *medcalfii*" (Stover, 1974, p.175–176, pl.3, figs.3a–c; text-figs.3G,6C) Lentin and Williams, 1976, p.39. Holotype: Stover, 1974, pl.3, figs.3a–c. **NOW** *Cerodinium medcalfii*. Originally *Deflandrea medcalfii*, subsequently *Deflandrea dartmooria* subsp. *medcalfii*, thirdly *Ceratiopsis medcalfii* (combination illegitimate), fourthly (and now) *Cerodinium medcalfii*. Age: middle Paleocene.

"*daveyi*" Lentin and Williams, 1973, p.40. Holotype: Davey and Verdier, 1971, pl.2, fig.6. **Name illegitimate — nomenclatural senior synonym:** *Deflandrea deformans*, which has the same type. **NOW** *Subtilisphaera deformans*. Originally *Deflandrea asymmetrica* (name illegitimate), subsequently *Deflandrea deformans*, thirdly *Deflandrea daveyi* (name illegitimate), fourthly *Subtilisphaera asymmetrica* (name illegitimate), fifthly (and now) *Subtilisphaera deformans*. Substitute name for *Deflandrea asymmetrica* Davey and Verdier, 1971, p.39–40, pl.2, figs.4,6 (an illegitimate name). Age: middle Albian.

"*decorosa*" McIntyre, 1975, p.63–64, pl.2, figs.1–4. Holotype: McIntyre, 1975, pl.2, fig.1. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. Taxonomic junior synonym: *Deflandrea ditissima*, according to Harker and Sarjeant in Harker et al. (1990, p.110) — however, Harker and Sarjeant in Harker et al. (1990, p.111) also retained *Chatangiella ditissima*. Age: Campanian–Maastrichtian.

"*deformans*" Davey and Verdier, 1973, p.197. Holotype: Davey and Verdier, 1971, pl.2, fig.6. **NOW** *Subtilisphaera deformans*. Originally *Deflandrea asymmetrica* (name illegitimate), subsequently *Deflandrea deformans*, thirdly *Deflandrea daveyi* (name illegitimate), fourthly *Subtilisphaera asymmetrica* (name illegitimate), fifthly (and now) *Subtilisphaera deformans*. Substitute name for *Deflandrea asymmetrica* Davey and Verdier, 1971, p.39–40, pl.2, figs.4,6 (an illegitimate name). Nomenclatural junior synonym: *Deflandrea daveyi* Lentin and Williams, 1973, which has the same type. Age: middle Albian.

"*delicata*" Balteş, 1969, p.34, pl.1, fig.7 ex Lentin and Williams, 1973, p.40. Holotype: Balteş, 1969, pl.1, fig.7, designated by Lentin and Williams (1973, p.40). **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidium*, thirdly (and now) *Manumiella*. This name was not validly published in Balteş (1969, p.34), since that author considered the name to be provisional. Age: early Eocene.

delineata Cookson and Eisenack, 1965c, p.140–141, pl.18, figs.3–5; text-fig.1. Holotype: Cookson and Eisenack, 1965c, pl.18, figs.4–5; text-fig.1. Taxonomic junior synonym (at specific rank): *Ceratium fusus* forma *nodosum* (subsequently *Palaeocystodinium? rhomboides* subsp. *nodosum*), according to Sarjeant (1985b, p.157). Age: Paleocene.

denticulata Alberti, 1959b, p.102–103, text-fig.1. Holotype: Alberti, 1959b, text-fig.1. Age: Paleocene–early Eocene.

"forma *denticulata*". Autonym. Holotype: Alberti, 1959b, text-fig.1. **Now redundant.**

subsp. *denticulata*. Autonym. Holotype: Alberti, 1959b, text-fig.1.

"forma *minor*" de Coninck, 1969, p.16, pl.1, figs.16–17; pl.2, figs.1–2. Holotype: de Coninck, 1969, pl.1, figs.16–17. **NOW** *Deflandrea denticulata* subsp. *minor*. Originally *Deflandrea denticulata* forma *minor*, subsequently (and now) *Deflandrea denticulata* subsp. *minor*. Age: early Eocene.

subsp. *minor* (de Coninck, 1969, p.16, pl.1, figs.16–17; pl.2, figs.1–2) Lentin and Williams, 1973, p.40. Holotype: de Coninck, 1969, pl.1, figs.16–17. Originally *Deflandrea denticulata* forma *minor*, subsequently (and now) *Deflandrea denticulata* subsp. *minor*. Age: early Eocene.

"*depressa*" Morgenroth, 1966a, p.8, pl.1, fig.2. Holotype: Morgenroth, 1966a, pl.1, fig.2. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Eocene.

"*diebelii*" Alberti, 1959b, p.99–100, pl.9, figs.18–21. Holotype: Alberti, 1959b, pl.9, fig.18. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: late Senonian–Paleocene.

"subsp. *diebelii*". Autonym. Holotype: Alberti, 1959b, pl.9, fig.18. **NOW** *Cerodinium diebelii* subsp. *diebelii*. Originally *Deflandrea diebelii* subsp. *diebelii*, subsequently *Ceratiopsis diebelii* subsp. *diebelii* (combination illegitimate), thirdly (and now) *Cerodinium diebelii* subsp. *diebelii*.

"subsp. *rigida*" May, 1980, p.75–76, pl.8, figs.9–10,15. Holotype: May, 1980, pl.8, figs.9,15. **NOW** *Cerodinium diebelii* subsp. *rigidum*. Originally *Deflandrea diebelii* subsp. *rigida*, subsequently *Ceratiopsis diebelii* subsp. *rigida* (combination illegitimate), thirdly (and now) *Cerodinium diebelii* subsp. *rigidum*. Age: Maastrichtian.

"*dilwynensis*" Cookson and Eisenack, 1965c, p.141, pl.18, figs.6–9. Holotype: Cookson and Eisenack, 1965c, pl.18, figs.7–8. **NOW** *Senegalinium?*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium?*. Age: Paleocene.

"*dingxingensis*" Tang in Cai Zhiguo et al., 1998, p.243, pl.82, figs.1–2. Holotype: Cai Zhiguo et al., 1998, pl.82, fig.1. **Name not validly published:** no Latin or English description or diagnosis. Age: early Eocene.

dissoluta Vozzhennikova, 1967, p.144, pl.73, figs.1–4. Holotype: Vozzhennikova, 1967, pl.73, fig.1, lost according to Lentin and Vozzhennikova (1990, p.51). Lectotype: Lentin and Vozzhennikova, 1990, pl.6, figs.1–5; text-fig.24, designated by Lentin and Vozzhennikova (1990, p.51). Lentin and Vozzhennikova (1990, p.52) provided an "expanded description" for this species. Age: Eocene.

"*distincta*" Wilson, 1967a, p.63–64, figs.9–10. Holotype: Wilson, 1967a, fig.9. **NOW** *Alterbidinium?*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium?*. Age: Early Tertiary (erratic).

"*ditissima*" McIntyre, 1975, p.62–63, pl.1, figs.1–4. Holotype: McIntyre, 1975, pl.1, figs.1–2. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. Taxonomic senior synonym: *Deflandrea* (as *Chatangiella decorosa*, according to Harker and Sarjeant in Harker et al. (1990, p.110) — however, Harker and Sarjeant in Harker et al. (1990, p.111) also retained *Chatangiella ditissima*. Age: Santonian–Maastrichtian.

"*dongyingensis*" Jiabo, 1978, p.82, pl.4, figs.6–9; pl.5, figs.1–6. Holotype: Jiabo, 1978, pl.4, fig.6. **NOW** *Subtilisphaera*. Originally *Deflandrea*, subsequently (and now) *Subtilisphaera*. Age: Early Tertiary.

"*druggii*" Stover, 1974, p.171, pl.1, figs.3a–b,4; text-fig.3B. Holotype: Stover, 1974, pl.1, figs.3a–b. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidium*, fourthly (and now) *Manumiella*. Taxonomic senior synonym: *Broomea* (as and now *Manumiella seelandica*, according to Firth (1987, p.213) — however, Thorn et al. (2009, p.443) retained *Manumiella druggii*. Taxonomic junior synonym: *Isabelidium tingitanense*, according to Lentin and Williams (1985, p.201). Age: early-middle Paleocene.

"*dubia*" (Jain and Millepied, 1973, p.25, pl.2, figs.12–13) Hengreen, 1975, p.61. Emendation: Masare et al., 1996, p.180, as *Andalusiella dubia*. Holotype: Jain and Millepied, 1973, pl.2, fig.13. **NOW** *Andalusiella*. Originally *Senegalinium*, subsequently *Deflandrea*, thirdly *Deflandrea?*, fourthly *Andalusiella?*, fifthly (and now) *Andalusiella*. Questionable assignment: Lentin and Williams (1976, p.40). Age: Maastrichtian.

"*echinoidea*" Cookson and Eisenack, 1960a, p.2, pl.1, figs.5–6. Emendation: Sverdløve and Habib, 1974, p.58–59, as *Deflandrea echinoidea*. Holotype: Cookson and Eisenack, 1960a, pl.1, figs.5. **NOW** *Spinidium*. Originally *Deflandrea*, subsequently (and now) *Spinidium*, thirdly *Vozzhennikovia*, fourthly *Spinidium?* Age: Santonian–Campanian.

- "ectorugosa"** Archangelsky, 1969b, p.192, pl.1, figs.5–7. Holotype: Archangelsky, 1969b, pl.1, figs.5–6. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Eocene.
- "elegantica"** Andreeva-Grigorovich and Savitskaya, 1993, p.45–46, pl.1, figs.1–2. Holotype: Andreeva-Grigorovich and Savitskaya, 1993, pl.1, fig.1. Age: Eocene–Oligocene.
- "endopapillata"** Archangelsky, 1969b, p.192–193, pl.1, figs.8–9; pl.2, figs.3–4. Holotype: Archangelsky, 1969b, pl.1, figs.8–9. **Taxonomic senior synonym:** *Deflandrea heterophlycta*, according to Stover and Evitt (1978, p.101). Age: late Eocene.
- "eocenica"** Balteş, 1969, p.34, pl.5, figs.8–9 ex Lentin and Williams, 1973, p.40. Holotype: Balteş, 1969, pl.5, fig.9, designated by Lentin and Williams (1973, p.40). This name was not validly published in Balteş (1969, p.34), since that author considered the name to be provisional. Age: early Eocene.
- "euthema"** Davey and Verdier, 1971, p.40, pl.3, figs.1–3. Holotype: Davey and Verdier, 1971, pl.3, fig.2. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Subtilisphaera?*, thirdly (and now) *Eurydinium*. Age: middle-late Albian.
- "extensa"** Stover, 1974, p.178–179, pl.5, figs.4a–c, 5a–d, 6. Holotype: Stover, 1974, pl.5, figs.4a–c; Fensome et al., 1993a, figs.1–3 — p.1167. **NOW** *Gippslandia*. Originally *Deflandrea*, subsequently *Vozzhennikovia?*, thirdly *Dioxya?*, fourthly *Lentinia*, fifthly (and now) *Gippslandia*. Age: middle-late Eocene.
- "extrema"** Cookson and Eisenack, 1974, p.48, pl.20, fig.4. Holotype: Cookson and Eisenack, 1974, pl.20, fig.4. **NOW** *Spongodinium?*. Originally *Deflandrea*, subsequently (and now) *Spongodinium?*, thirdly *Isabelidinium?*. Age: Albian–Cenomanian.
- "eyrensis"** Cookson and Eisenack, 1971, p.217–218, pl.7, figs.2–3. Holotype: Cookson and Eisenack, 1971, pl.7, fig.3. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Alterbia?* (combination illegitimate), thirdly (and now) *Eurydinium*. Age: Albian–Cenomanian.
- "?filigrana"** Benedek, 1972, p.12–13, pl.4, figs.3a–b. Holotype: Benedek, 1972, pl.4, figs.3a–b; Benedek and Sarjeant, 1981, fig.4, fig.8, nos.1–2. **NOW** *Phthanoperidinium*. Originally *Deflandrea?*, subsequently *Vozzhennikovia?*, thirdly *Dioxya*, fourthly (and now) *Phthanoperidinium*. Questionable assignment: Benedek (1972, p.12). Age: middle Oligocene.
- "flounderensis"** Stover, 1974, p.174–175, pl.3, figs.1a–c, 2a–b; text-figs.3F, 4E. Holotype: Stover, 1974, pl.3, figs.1a–c. Age: early Eocene.
- "foliacea"** Eisenack and Cookson, 1960, p.2, pl.1, fig.3. Holotype: Eisenack and Cookson, 1960, pl.1, fig.3. **NOW** *Subtilisphaera*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Subtilisphaera*. Age: Turonian–mid Senonian.
- "foveolata"** Wilson, 1984b, p.547, figs.2–11. Holotype: Wilson, 1984b, figs.2–4; Fensome et al., 1996, figs.1–3 — p.2129. Age: Paleocene.
- "fuegiensis"** Menéndez, 1965, p.8–9, pl.1, figs.1–3; pl.3, fig.16. Holotype: Menéndez, 1965, pl.1, fig.1; pl.3, fig.16. Age: Late Cretaceous.
- "gaditana"** Riegel, 1974, p.356–357, pl.2, figs.8–9; pl.3, figs.1–2. Emendation: Riegel and Sarjeant, 1982, p.297–299, as *Phelodinium gaditanum*. Holotype: Riegel, 1974, pl.2, figs.8–9; Riegel and Sarjeant, 1982, fig.7D. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Lejeunia* (combination illegitimate), fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: ?Senonian.

galeata (Lejeune-Carpentier, 1942, p.B186–B188, figs.15–20) Lentin and Williams, 1973, p.41. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.18–19, as *Deflandrea galeata*. Holotype: Lejeune-Carpentier, 1942, figs.15–16. Originally *Peridinium* (Appendix B), subsequently (and now) *Deflandrea*. Age: Senonian.

"*gallia*" Davey and Verdier, 1973, p.196–197, pl.3, figs.1–4. Holotype: Davey and Verdier, 1973, pl.3, figs.1,3. **NOW** *Isabelidium*. Originally *Deflandrea*, subsequently *Spinidium*, thirdly (and now) *Isabelidium*. Age: late Albian–early Cenomanian.

"*gambangensis*" Cookson and Eisenack, 1970a, p.140, pl.11, figs.1–2. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.1. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelidium*, thirdly (and now) *Eucladinium*. Age: Senonian.

"*glabra*" Cookson and Eisenack, 1969, p.3, fig.1A. Holotype: Cookson and Eisenack, 1969, fig.1A. **NOW** *Isabelidium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidium*. Age: Albian–Cenomanian.

"*globosa*" Davey, 1970, p.344, pl.2, fig.3. Holotype: Davey, 1970, pl.2, fig.3. **NOW** *Isabelidium*?. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidium*?. Age: Cenomanian.

"*glomerata*" Davey, 1970, p.343–344, pl.1, figs.7–9. Holotype: Davey, 1970, pl.1, figs.7–8. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidium*, fourthly (and now) *Eurydinium*. Age: Cenomanian.

granulata Menéndez, 1965, p.9–10, pl.1, fig.4. Holotype: Menéndez, 1965, pl.1, fig.4. Age: Eocene–Oligocene.

"*granulifera*" Manum, 1963, p.61, pl.3, figs.5–9. Holotype: Manum, 1963, pl.3, figs.5–6. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Taxonomic junior synonym: *Cooksoniella* (as and now *Chatangiella*) *vnigrii*, according to Lentin and Vozzhennikova (1990, p.47) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (as and now *Chatangiella*) *granulifera*. Age: Senonian.

"var. *granulifera*". Autonym. Holotype: Manum, 1963, pl.3, figs.5–6. **Now redundant.**

"var. *tenuis*" Davey, 1970, p.340–341, pl.2, fig.1. Holotype: Davey, 1970, pl.2, fig.1. **NOW** *Chatangiella granulifera* subsp. *tenuis*. Originally *Deflandrea granulifera* var. *tenuis*, subsequently *Australiella granulifera* subsp. *tenuis*, thirdly (and now) *Chatangiella granulifera* subsp. *tenuis*. Age: Albian.

"*granulosa*" Cookson and Eisenack, 1965a, p.122, pl.11, figs.8–9. Holotype: Cookson and Eisenack, 1965a, pl.11, fig.8. **Taxonomic senior synonym:** *Deflandrea phosphoritica*, according to Stover (1974, p.177). Age: late Eocene.

"*granulostriata*" (Jain and Millepied, 1973, p.24–25, pl.1, figs.7–11; pl.2, fig.18; pl.3, fig.29) Lentin and Williams, 1976, p.41. Holotype: Jain and Millepied, 1973, pl.1, fig.7. **NOW** *Cerodinium*. Originally *Senegalinium*, subsequently *Deflandrea*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: Maastrichtian.

guangraoensis Xu Jinli, 1987, p.150–151; pl.2, figs.3–4,8–9. Holotype: Xu Jinli, 1987, pl.2, fig.4. Age: ?middle-late Eocene.

heterophlycta Deflandre and Cookson, 1955, p.249–250, pl.5, fig.6; text-fig.5. Holotype: Deflandre and Cookson, 1955, text-fig.5; Verdier, 1970, pl.1, figs.1–4. Taxonomic junior synonym: *Deflandrea endopapillata*, according to Stover and Evitt (1978, p.101). This name was not validly published in Deflandre and Cookson (1954, p.1236), since no description was given. Age: late Eocene.

"forma *heterophlycta*". Autonym. Holotype: Deflandre and Cookson, 1955, text-fig.5; Verdier, 1970, pl.1, figs.1–4. **Now redundant.**

"subsp. *heterophlycta*". Autonym. Holotype: Deflandre and Cookson, 1955, text-fig.5; Verdier, 1970, pl.1, figs.1–4. **Now redundant.**

"forma *pusulosa*" Rozen, 1965, p.293–294, pl.1, figs.3–4; text-fig.2. Holotype: Rozen, 1965, pl.1, figs.3–4. Originally *Deflandrea heterophlycta* forma *pusulosa*, subsequently *Deflandrea heterophlycta* subsp. *pusulosa*. **Taxonomic senior synonym:** *Deflandrea phosphoritica*, according to Lentin and Williams (1976, p.41). Age: late Eocene.

"subsp. *pusulosa*" (Rozen, 1965, p.293–294, pl.1, figs.3–4; text-fig.2) Lentin and Williams, 1973, p.41. Holotype: Rozen, 1965, pl.1, figs.3–4. Originally *Deflandrea heterophlycta* forma *pusulosa*, subsequently *Deflandrea heterophlycta* subsp. *pusulosa*. **Taxonomic senior synonym:** *Deflandrea phosphoritica*, according to Lentin and Williams (1976, p.41). Age: late Eocene.

hialina Balteş, 1969, p.34, pl.1, figs.3–4 ex Lentin and Williams, 1973, p.41. Holotype: Balteş, 1969, pl.1, fig.4, designated by Lentin and Williams (1973, p.41). This name was not validly published in Balteş (1969, p.34), since that author considered the name to be provisional. Age: Oligocene–early Miocene.

"*ingramii*" Cookson and Eisenack, 1970a, p.143, pl.12, figs.7–9. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.9; Eisenack and Kjellström, 1975a, figure to left — p.190a; Fensome et al., 1996, fig.3 — p.2167. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*, fourthly (and now) *Eurydinium*. Age: Albian–Cenomanian.

intrasphaerula Mao Shaozhi and Norris, 1988, p.43, pl.10, figs.4–6; text-fig.13. Holotype: Mao Shaozhi and Norris, 1988, pl.10, fig.4. Age: early Oligocene.

"*irmoechinata*" Heisecke, 1970, p.230, pl.1, fig.3; pl.2, figs.2–3. Holotype: Heisecke, 1970, pl.1, fig.3; pl.2, figs.2–3. **NOW** *Spinidinium?* Originally *Deflandrea*, subsequently *Gonyaulacysta*, thirdly (and now) *Spinidinium?*, fourthly *Volkheimeridium*. Age: early Paleocene.

"*kansana*" (Tasch in Tasch et al., 1964, p.196, pl.1, fig.1) Lentin and Williams, 1973, p.42. Holotype: Tasch et al., 1964, pl.1, fig.1. **NOW** *Ovoidinium?*. Originally *Peridinium* (Appendix B), subsequently *Deflandrea?*, thirdly (and now) *Ovoidinium?*, fourthly *Ascodinium?*. Questionable assignment: Lentin and Williams (1973, p.42). Age: Albian.

kashiensis He Chengquan, 1991, p.80, pl.29, figs.19–21. Holotype: He Chengquan, 1991, pl.29, fig.20. Age: middle-late Eocene.

"*korjonensis*" Cookson and Eisenack, 1958, p.27–28, pl.4, figs.10–11. Holotype: Cookson and Eisenack, 1958, pl.4, fig.10; Eisenack and Klement, 1964, p.191; Fensome et al., 1996, fig.1 — p.2187. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Campanian–early Maastrichtian.

"*laevigata*" Malloy, 1972, p.64, pl.1, figs.1–7. Holotype: Malloy, 1972, pl.1, fig.5. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Andalusiella*, fourthly *Lejeunecysta*, fifthly (and now) *Senegalinium*. Taxonomic junior synonym: *Senegalinium psilatatum*, according to Herngreen (1975, p.61). Age: Senonian.

"*lata*" Cookson and Eisenack, 1968, p.110, figs.1A–C. Holotype: Cookson and Eisenack, 1968, fig.1A. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Age: ?Santonian–early Campanian.

"*leptoderma*" (Vozzhennikova, 1963, p.181; text-fig.8) Lentin and Williams, 1976, p.41. Holotype: Vozzhennikova, 1963, text-fig.8; Lentin and Vozzhennikova, 1990, pl.4, figs.4–5; text-fig.15. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Deflandrea*, thirdly (and now) *Cerodinium*. Age: Paleocene.

leptodermata Cookson and Eisenack, 1965a, p.121–122, pl.11, figs.6–7. Holotype: Cookson and Eisenack, 1965a, pl.11, fig.6. Taxonomic junior synonym: *Deflandrea micropoda*, according to Stover and Evitt (1978, p.101). Age: late Eocene.

"limpida" Singh, 1971, p.359–361, pl.61, figs.1–12; text-fig.62. Holotype: Singh, 1971, pl.61, figs.1–2. Originally *Deflandrea*, subsequently *Chichaouadinium*. **Taxonomic senior synonym:** *Spinidinium* (now *Chichaouadinium*) *vestitum*, according to Lentin and Williams (1973, p.43). Age: middle-late Albian.

"longispinosa" Wilson, 1968, p.59–60, figs.1–10. Holotype: Wilson, 1968, fig.4. **NOW** *Apectodinium*. Originally *Deflandrea*, subsequently *Wetzeliella*, thirdly (and now) *Apectodinium*. Age: Paleocene or early Eocene.

lucyedwardsiae Lucas-Clark, 2006, p.192–194, pl.1, fig.16; pl.2, figs.1–9. Holotype: Lucas-Clark, 2006, pl.2, figs.1–3. Age: Paleocene.

"macmurdoensis" (Wilson, 1967a, p.60–62, figs.11–16,22; text-fig.2a) Lentin and Williams, 1976, p.64. Holotype: Wilson, 1967a, figs.11–13. **NOW** *Spinidinium*. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Magallanesium*. Age: Early Tertiary.

"macrocyta" Cookson and Eisenack, 1960a, p.3, pl.1, figs.7–8. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.7. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Campanian.

"madurensis" Cookson and Eisenack, 1970a, p.140, pl.11, figs.3–4. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.3; Eisenack and Kjellström, 1975a, page labelled "nach S.194"; Fensome et al., 1996, fig.1 — p.2219. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

"magna" Davey, 1970, p.342–343, pl.2, figs.6–8. Holotype: Davey, 1970, pl.2, fig.6. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Isabelidinium*. Age: Cenomanian.

"magnifica" Stanley, 1965, p.218–219, pl.20, figs.1–6. Holotype: Stanley, 1965, pl.20, figs.4–6. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Taxonomic junior synonym (at specific rank): *Peridinium crassipes* forma *altum*, according to Sarjeant (1985b, p.159) and Lentin and Williams (1993, p.503). Age: Paleocene.

"manumii" Cookson and Eisenack, 1970a, p.141–142, pl.11, figs.10–11. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.10; Lentin and Vozzhennikova, 1990, pl.4, fig.3; text-fig.19. **NOW** *Chatangiella madura*. Originally *Deflandrea manumii*, subsequently *Chatangiella manumii* (combination illegitimate), thirdly (and now) *Chatangiella madura*. Taxonomic junior synonym (at specific rank): *Chatangiella vnigrii* subsp. *echinata* (subsequently *Chatangiella granulifera* subsp. *echinata*), according to Lebedeva (2000, p.115). Age: Senonian.

"markovae" (Vozzhennikova, 1967, p.159, pl.119, figs.5,7; pl.120, figs.1–4) Lentin and Williams, 1976, p.42. Holotype: Vozzhennikova, 1967, pl.120, fig.2; Lentin and Vozzhennikova, 1990, pl.3, fig.7–8; text-fig.16. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Deflandrea*, thirdly (and now) *Cerodinium*. Age: Paleocene–Eocene.

"medcalfii" Stover, 1974, p.175–176, pl.3, figs.3a–c; text-figs.3G,6C. Holotype: Stover, 1974, pl.3, figs.3a–c. **NOW** *Cerodinium medcalfii*. Originally *Deflandrea medcalfii*, subsequently *Deflandrea dartmooria* subsp. *medcalfii*, thirdly *Ceratiopsis medcalfii* (combination illegitimate), fourthly (and now) *Cerodinium medcalfii*. Age: middle Paleocene.

"menendezii" Pöthe de Baldis, 1966, p.223, pl.2, fig.a. Holotype: Pöthe de Baldis, 1966, pl.2, fig.a. **Taxonomic senior synonym:** *Deflandrea phosphoritica*, according to Lentin and Williams (1976, p.42). Age: Early Tertiary.

"*micracantha*" Cookson and Eisenack, 1960a, p.3, pl.1, fig.9. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.9; Cookson and Manum, 1964, pl.76, figs.9–11. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Campanian.

"*microarma*" McIntyre, 1975, p.65, pl.1, figs.5–8. Holotype: McIntyre, 1975, pl.1, figs.5–6. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Campanian–Maastrichtian.

"*microgranulata*" Stanley, 1965, p.219, pl.19, figs.4–6. Holotype: Stanley, 1965, pl.19, figs.4–5. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Paleocene.

"*mikropoda*" Cookson and Eisenack, 1974, p.49, pl.27, fig.11. Holotype: Cookson and Eisenack, 1974, pl.27, fig.11. **Taxonomic senior synonym:** *Deflandrea leptodermata*, according to Stover and Evitt (1978, p.101). Age: late Eocene.

"*microspinosa*" Boltenhagen, 1977, p.98–99, pl.17, figs.1a–c, 2a–b. Holotype: Boltenhagen, 1977, pl.17, figs.1a–c. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: Campanian–Maastrichtian.

"?*microverrucosa*" Yu Jingxian and Zhang Wangping, 1980, p.109, pl.3, figs.1–2. **Incorrect orthographic variant** of *Deflandrea*? (now *Alterbidinium*) *microverrucosa*, which see.

"*microverrucosa*" Yu Jingxian and Zhang Wangping, 1980, p.109, pl.3, figs.1–2. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.3, fig.2. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Isabelidinium*?, thirdly (and now) *Alterbidinium*. Yu Jingxian and Zhang Wangping (1980, p.109) spelled the epithet as "*microverrucosa*" in their text, but as "*microverrucosa*" in the plate caption. DINOFLAJ2 and later editions of the "Lentin and Williams Index" have cited the spelling as "*microverrucosa*", but He Chengquan et al. (2009, p.416) used "*microverrucosa*", a practice that we follow here. Age: Campanian–early Maastrichtian.

"*minor*" Alberti, 1959b, p.98, pl.9, figs.9–11. Emendation: Khowaja-Ateequzzaman et al., 1991, p.44, as *Alterbidinium minus*. Holotype: Alberti, 1959b, pl.9, fig.10. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Junior homonym: *Deflandrea minor* Cookson and Eisenack, 1960a. Age: late Senonian.

"*minor*" Cookson and Eisenack, 1960a, p.2, pl.1, figs.1–4. Emendation: Morgan, 1977, p.130, as *Alterbia minor*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.1; Morgan, 1977, text-fig.2. **Name illegitimate — senior homonym:** *Deflandrea minor* Alberti, 1959b. Substitute name: *Deflandrea balmei*. **NOW** *Spinidinium balmei*. Originally *Deflandrea minor* (name illegitimate), subsequently *Deflandrea balmei*, thirdly *Alterbia balmei* (combination illegitimate), fourthly *Isabelidinium balmei*, fifthly (and now) *Spinidinium balmei*, sixthly *Magallanesium balmei*. Taxonomic senior synonym: *Palaeohystrichophora* (as *Diconodinium*) *minuta*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea minor* (as *Isabelidinium balmei*). Age: Late Cretaceous.

"*minuta*" Jiabo, 1978, p.83, pl.3, figs.10–11. Holotype: Jiabo, 1978, pl.3, fig.11. **NOW** *Saeptodinium*. Originally *Deflandrea*, subsequently *Sanshuia*, thirdly *Geiselodinium*, fourthly (and now) *Saeptodinium*. Age: Early Tertiary.

"*montanaensis*" Harland, 1977a, p.184–185, pl.25, figs.4, 6–7, 10–12. Holotype: Harland, 1977a, pl.25, fig.4. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Alterbia* (combination illegitimate), fourthly (and now) *Alterbidinium*. Age: late Campanian–Maastrichtian.

"*multispinosa*" Cookson and Eisenack, 1970a, p.141, pl.11, figs.7–9. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.8. **NOW** *Chatangiella*?. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Chatangiella*?. Age: Albian–Cenomanian.

musculopsis Mao Shaozhi and Norris, 1988, p.43–44, pl.10, figs.7–10; text-fig.14. Holotype: Mao Shaozhi and Norris, 1988, pl.10, fig.8. Age: late Paleocene–early Oligocene.

"*nucula*" Cookson and Eisenack, 1962b, p.486, pl.1, fig.13. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.13. **NOW** *Amphidiadema*. Originally *Deflandrea*, subsequently (and now) *Amphidiadema*. N.I.A. Age: Senonian.

"*obliquipes*" Deflandre and Cookson, 1955, p.252, pl.4, fig.6. Holotype: Deflandre and Cookson, 1955, pl.4, fig.6. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Deflandrea?*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Questionable assignment: Stover and Evitt (1978, p.101). Age: middle Paleocene–early Eocene.

"*obscura*" Drugg, 1967, p.17, pl.2, figs.8–9; pl.9, fig.5. Holotype: Drugg, 1967, pl.2, fig.8. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Maastrichtian–Danian.

oebisfeldensis Alberti, 1959b, p.95–96, pl.8, figs.10–13. Holotype: Alberti, 1959b, pl.8, fig.13. Age: Paleocene–early Eocene.

"forma ***angustata***" Vozzhennikova, 1967, p.146–147, pl.72, figs.3–4. Holotype: Vozzhennikova, 1967, pl.72, fig.3; Lentin and Vozzhennikova, 1990, pl.5, fig.9; text-fig.25. **NOW** *Deflandrea oebisfeldensis* subsp. *angustata*. Originally *Deflandrea oebisfeldensis* forma *angustata*, subsequently (and now) *Deflandrea oebisfeldensis* subsp. *angustata*. Age: Eocene.

subsp. ***angustata*** (Vozzhennikova, 1967, p.146–147, pl.72, figs.3–4) Lentin and Williams, 1973, p.43. Holotype: Vozzhennikova, 1967, pl.72, fig.3; Lentin and Vozzhennikova, 1990, pl.5, fig.9; text-fig.25. Originally *Deflandrea oebisfeldensis* forma *angustata*, subsequently (and now) *Deflandrea oebisfeldensis* subsp. *angustata*. Lentin and Vozzhennikova (1990, p.53) provided an "expanded description" for this subspecies. Age: Eocene.

subsp. ***longicornis*** He Chengquan, 1991, p.81–82, pl.31, fig.11. Holotype: He Chengquan, 1991, pl.31, fig.11. Age: Paleocene.

"forma ***oebisfeldensis***". Autonym. Holotype: Alberti, 1959b, pl.8, fig.13. **Now redundant.**

subsp. ***oebisfeldensis***. Autonym. Holotype: Alberti, 1959b, pl.8, fig.13.

"forma ***ovalis***" Vozzhennikova, 1967, p.146, pl.71, fig.2. Holotype: Vozzhennikova, 1967, pl.71, fig.2; Lentin and Vozzhennikova, 1990, text-fig.26, lost according to Lentin and Vozzhennikova (1990, p.54). **NOW** *Deflandrea oebisfeldensis* subsp. *ovalis*. Originally *Deflandrea oebisfeldensis* forma *ovalis*, subsequently (and now) *Deflandrea oebisfeldensis* subsp. *ovalis*. Age: Eocene.

subsp. ***ovalis*** (Vozzhennikova, 1967, p.146, pl.71, fig.2) Lentin and Williams, 1973, p.43. Holotype: Vozzhennikova, 1967, pl.71, fig.2; Lentin and Vozzhennikova, 1990, text-fig.26, lost according to Lentin and Vozzhennikova (1990, p.54). Originally *Deflandrea oebisfeldensis* forma *ovalis*, subsequently (and now) *Deflandrea oebisfeldensis* subsp. *ovalis*. According to Lentin and Vozzhennikova (1990, p.54), no potential lectotype is available. Age: Eocene.

"*ornata*" (May, 1980, p.77–78, pl.9, figs.3–5) Lentin and Williams, 1981, p.258. Holotype: May, 1980, pl.9, figs.3–4. **NOW** *Spinidinium?* Originally *Deflandrea*, subsequently *Spinidinium*, thirdly (and now) *Spinidinium?* Age: Campanian–basal Maastrichtian.

"*ovata*" Jiabo, 1978, p.84, pl.4, figs.1–3. Emendation: Mao Shaozhi et al., 1995, p.51, as *Sanshuia ovata*. Holotype: Jiabo, 1978, pl.4, fig.2. **NOW** *Sanshuia*. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Sanshuia*, fourthly *Geiselodinium*, fifthly *Saepodinium*. Age: Early Tertiary.

?*pachycera* Deflandre and Cookson, 1955, p.252, pl.4, fig.7. Holotype: Deflandre and Cookson, 1955, pl.4, fig.7. Originally *Deflandrea*, subsequently (and now) *Deflandrea*?. Questionable assignment: Stover and Evitt (1978, p.101). The derivation of the epithet *pachyceros* was not stated in the protologue. Since Principle 5 of the I.C.N. states that taxon names are to be treated as Latin and since compound epithets are conventionally treated as adjectives, the epithet should be rendered as "*pachycera*", in agreement with the feminine gender of the generic name (the neuter would be "*pachycerum*" and the masculine "*pachycerus*"). Age: late Paleocene–early Eocene.

"?pannucea" Stanley, 1965, p.220, pl.22, figs.1–4,8–10. Holotype: Stanley, 1965, pl.22, figs.3–4. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*?, thirdly *Deflandrea*?, fourthly *Ceratiopsis* (combination illegitimate), fifthly (and now) *Cerodinium*. Questionable assignment: Stover and Evitt (1978, p.101). Age: Paleocene.

?*papillata* Oleinik, 1975, p.226–227, pl.1, figs.6a–b,7. Holotype: Oleinik, 1975, pl.1, figs.6a–b. Originally *Deflandrea*, subsequently (and now) *Deflandrea*?. Questionable assignment: Lentin and Williams (1981, p.77). Age: late Eocene.

"*parva*" Cookson and Eisenack, 1958, p.28, pl.4, figs.12–13. Holotype: Cookson and Eisenack, 1958, pl.4, fig.12; lost according to Cookson and Eisenack (1960a, p.5). Neotype: Cookson and Eisenack, 1960a, pl.1, fig.23, designated by Cookson and Eisenack (1960a, p.5). **NOW** *Ascodinium*. Originally *Deflandrea*, subsequently (and now) *Ascodinium*. Age: late Albian–Cenomanian.

"*pellucida*" (Deflandre and Cookson, 1955, p.251, pl.4, fig.3) Cookson and Eisenack, 1958, p.27. Holotype: Deflandre and Cookson, 1955, pl.4, fig.3; Cookson and Eisenack, 1958, pl.4, fig.9; Stover, 1974, pl.1, figs.7a–b. **NOW** *Isabelidinium pellucidum*. Originally *Deflandrea bakeri* forma *pellucida*, subsequently *Deflandrea pellucida*, thirdly *Isabelia pellucida* (combination illegitimate), fourthly (and now) *Isabelidinium pellucidum*, fifthly *Alterbia pellucida* (combination illegitimate). Age: Paleocene–early Eocene.

"*pentagonalis*" Corradini, 1973, p.175, pl.28, fig.3. Holotype: Corradini, 1973, pl.28, fig.3; Eisenack and Kjellström, 1981a, page labelled "nach S.208"; Fensome et al., 1995, fig.1 — p.1649. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeuncysta*, fifthly (and now) *Phelodinium*. Age: Senonian.

"*pentaradiata*" Cookson and Eisenack, 1965c, p.139–140, pl.18, figs.1–2. Holotype: Cookson and Eisenack, 1965c, pl.18, fig.1; Stover, 1974, pl.2, figs.6a–b. **NOW** *Alterbidinium*?. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*?. Age: Paleocene.

"subsp. *pentaradiata*". Autonym. Holotype: Cookson and Eisenack, 1965c, pl.18, fig.1; Stover, 1974, pl.2, figs.6a–b. **NOW** *Alterbidinium*? *pentaradiatum* subsp. *pentaradiatum*. Originally *Deflandrea pentaradiata* subsp. *pentaradiata*, subsequently *Alterbia*? *pentaradiata* subsp. *pentaradiata* (combination illegitimate), thirdly (and now) *Alterbidinium*? *pentaradiatum* subsp. *pentaradiatum*.

"subsp. *preceda*" Cookson and Eisenack, 1974, p.49, pl.20, figs.1–2. Holotype: Cookson and Eisenack, 1974, pl.20, fig.1. **NOW** *Alterbidinium*? *pentaradiatum* subsp. *precedum*. Originally *Deflandrea pentaradiata* subsp. *preceda*, subsequently *Alterbia*? *pentaradiata* subsp. *preceda* (combination illegitimate), thirdly (and now) *Alterbidinium*? *pentaradiatum* subsp. *precedum*. Age: Paleocene.

"*perlucida*" Alberti, 1959b, p.102, pl.9, figs.16–17. Holotype: Alberti, 1959b, pl.9, fig.16. **NOW** *Subtilisphaera*. Originally *Deflandrea*, subsequently (and now) *Subtilisphaera*. Taxonomic junior synonyms: *Deflandrea* (as *Subtilisphaera*) *pirnaensis*, according to Fensome et al. (2009, p.60); by implication, *Scriniodinium cooksoniae*, which Sarjeant and Anderson (1969, p.232–233) considered to be a taxonomic junior synonym of *Deflandrea pirnaensis*; and *Deflandrea* (now *Subtilisphaera*) *rotundata*, according to Davey (1974, p.65) — however, Lentin and Williams (1976, p.119) retained *Deflandrea* (as *Subtilisphaera*) *rotundata*. Age: late Barremian.

**phosphoritica* Eisenack, 1938b, p.187; text-fig.6. Holotype: Eisenack, 1938b, text-fig.6; Eisenack, 1954b, pl.9, fig.11 (not pl.9, fig.8 as indicated in Eisenack, 1954b, caption to pl.9, fig.8 — p.91). Taxonomic junior synonyms: *Deflandrea granulosa*, according to Stover (1974, p.177); *Deflandrea menendezii*, according to Lentin and Williams

(1976, p.42); *Deflandrea heterophlycta* forma *pusulosa*, according to Lentin and Williams (1976, p.41). Age: late Eocene–early Oligocene.

subsp. *australis* Cookson and Eisenack, 1961b, p.39–40, pl.1, figs.2–3. Holotype: Cookson and Eisenack, 1961b, pl.1, fig.2. Age: Eocene.

"forma *australis*". Autonym. Holotype: Cookson and Eisenack, 1961b, pl.1, fig.2. **Now redundant.**

var. *australis*. Autonym. Holotype: Cookson and Eisenack, 1961b, pl.1, fig.2.

"forma *lata*" Vozzhennikova, 1967, p.142, pl.69, figs.5–6. Holotype: cited, but not related to an illustration. **NOW** *Deflandrea phosphoritica* subsp. *australis* var. *lata*. Originally *Deflandrea phosphoritica* subsp. *australis* forma *lata*, subsequently (and now) *Deflandrea phosphoritica* subsp. *australis* var. *lata*. According to Lentin and Vozzhennikova (1990, p.55), the original material is lost and no potential lectotype is available. Age: Eocene–early Oligocene.

var. *lata* (Vozzhennikova, 1967, p.142, pl.69, figs.5–6) Lentin and Williams, 1973, p.44. Holotype: cited, but not related to an illustration. Originally *Deflandrea phosphoritica* subsp. *australis* forma *lata*, subsequently (and now) *Deflandrea phosphoritica* subsp. *australis* var. *lata*. According to Lentin and Vozzhennikova (1990, p.55), the original material is lost and no potential lectotype is available. Age: Eocene–early Oligocene.

"forma *attenuata*" Vozzhennikova, 1967, p.140–141, pl.65, figs.2–4; pl.67, figs.2–4; pl.69, fig.4; pl.70, figs.1,4,6–7,10. Holotype: Reissinger, 1950, pl.19, fig.10; Lentin and Vozzhennikova, 1990, text-fig.28; current repository unknown, according to Lentin and Vozzhennikova (1990, p.56). **NOW** *Deflandrea phosphoritica* subsp. *phosphoritica* var. *attenuata*. Originally *Deflandrea phosphoritica* subsp. *phosphoritica* forma *attenuata*, subsequently (and now) *Deflandrea phosphoritica* subsp. *phosphoritica* var. *attenuata*. Age: Eocene–early Oligocene.

"forma *phosphoritica*". Autonym. Holotype: Eisenack, 1938b, text-fig.6; Eisenack, 1954b, pl.9, fig.11 (not pl.9, fig.8 as indicated in Eisenack, 1954b, caption to pl.9, fig.8 — p.91). **Now redundant.**

subsp. *phosphoritica*. Autonym. Holotype: Eisenack, 1938b, text-fig.6; Eisenack, 1954b, pl.9, fig.11 (not pl.9, fig.8 as indicated in Eisenack, 1954b, caption to pl.9, fig.8 — p.91).

var. *attenuata* (Vozzhennikova, 1967, p.140–141, pl.65, figs.2–4; pl.67, figs.2–4; pl.69, fig.4; pl.70, figs.1,4,6–7,10) Lentin and Williams, 1973, p.44. Holotype: Reissinger, 1950, pl.19, fig.10; Lentin and Vozzhennikova, 1990, text-fig.28; current repository unknown, according to Lentin and Vozzhennikova (1990, p.56). Originally *Deflandrea phosphoritica* subsp. *phosphoritica* forma *attenuata*, subsequently (and now) *Deflandrea phosphoritica* subsp. *phosphoritica* var. *attenuata*. Age: Eocene–early Oligocene.

var. *phosphoritica*. Autonym. Holotype: Eisenack, 1938b, text-fig.6; Eisenack, 1954b, pl.9, fig.11 (not pl.9, fig.8 as indicated in Eisenack, 1954b, caption to pl.9, fig.8 — p.91).

var. *spinulosa* (Alberti, 1959b, p.95, pl.8, figs.8–9) Strauss in Pross, 1997, p.118. Holotype: Alberti, 1959b, pl.8, fig.8. Originally *Deflandrea spinulosa*, subsequently (and now) *Deflandrea phosphoritica* var. *spinulosa*. Pross (1997, p.118) attributed this combination to an unpublished thesis by Strauss. Age: middle-late Oligocene.

subsp. *vozhennikovae* Grigorovich, 1972, p.66, pl.1, fig.3. Holotype: Grigorovich, 1972, pl.1, fig.3. Age: early Miocene.

"*pilosa*" Davey, 1969b, p.9, pl.3, figs.2–5. Holotype: Davey, 1969b, pl.3, figs.2,5. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Alterbidinium*. Age: Campanian–Maastrichtian.

"*pirnaensis*" Alberti, 1959b, p.100, pl.8, figs.1,5. Holotype: Alberti, 1959b, pl.8, fig.1. **Taxonomic senior synonym:** *Subtilisphaera perlucida*, according to Fensome et al. (2009, p.60). Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly *Subtilisphaera*? Taxonomic junior synonym: *Scriniodinium cooksoniae*, according to Sarjeant and Anderson (1969, p.232–233). Age: ?middle Turonian.

"*plea*" (Tasch in Tasch et al., 1964, p.196, pl.1, fig.15) Lentin and Williams, 1973, p.44. Holotype: Tasch et al., 1964, pl.1, fig.15. Originally *Peridinium* (Appendix B), subsequently (and now) *Deflandrea*?, thirdly *Gonyaulacysta*?. Stover and Evitt (1978, p.101) retained this species in *Deflandrea*. Questionable assignment: Lentin and Williams (1973, p.44). Age: Albian.

"*pontis-mariae*" (Deflandre, 1936b, p.167, pl.2, figs.7–9) Davey, 1970, p.341. Holotype: Deflandre, 1936b, pl.2, fig.7. **NOW** *Subtilisphaera*. Originally *Gymnodinium* (Appendix B), subsequently *Deflandrea*, thirdly *Ascodinium*, fourthly (and now) *Subtilisphaera*. This combination was not validly published in Vozzhennikova (1965, p.109–caption to pl.49, fig.5), since that author did not fully reference the basionym. Age: ?Senonian.

"*prutensis*" (Grigorovich, 1971, p.92,94, pl.2, fig.2) Stover and Evitt, 1978, p.101. Holotype: Grigorovich, 1971, pl.2, fig.2. **NOW** *Cerodinium*. Originally *Ceratiopsis* (generic name illegitimate), subsequently *Ceratiopsis*? (an illegitimate generic name), thirdly *Deflandrea*?, fourthly (and now) *Cerodinium*. Questionable assignment: Stover and Evitt (1978, p.101). Age: Paleocene.

"*psilata*" Yu Jingxian and Zhang Wangping, 1980, p.108–109, pl.2, figs.19–20. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.2, fig.20. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently (and now) *Isabelidinium*. Age: Campanian–early Maastrichtian.

"*pulchra*" Benson, 1976, p.194, pl.9, figs.4–9. Holotype: Benson, 1976, pl.9, figs.4–7. **NOW** *Spinidinium*? Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Magallanesium*, fourthly (and now) *Spinidinium*? Age: early Paleocene.

"*quiriquinaensis*" Takahashi, 1979, p.33, pl.1, figs.1a–c,2a–b,3. Holotype: Takahashi, 1979, pl.1, figs.1a–c. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently (and now) *Cerodinium*. Age: Late Cretaceous.

"*raijae*" Kjellström, 1973, p.20–22, fig.16. Holotype: Kjellström, 1973, fig.16. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Eurydinium*, fourthly (and now) *Manumiella*. Age: middle-late Maastrichtian.

"*rectangularis*" Cookson and Eisenack, 1962b, p.486, pl.1, figs.14–15. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.14; Jan du Chêne et al., 1986a, pl.48, figs.14–15. **NOW** *Amphidiadema*. Originally *Deflandrea*, subsequently (and now) *Amphidiadema*. Taxonomic senior synonym: *Triblastula* (as *Hystrichosphaeropsis*) *quasicribrata*, according to Stover and Evitt (1978, p.94), who were following Gocht (1976, p.322) — however, Gocht (1976, p.322) had only included in synonymy the specimen of *Amphidiadema rectangularis* illustrated by Kjellström (1973, fig.17). Age: late Turonian–mid Senonian.

"subsp. *rectangularis*". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.14; Jan du Chêne et al., 1986a, pl.48, figs.14–15. **Now redundant.** Originally *Deflandrea rectangularis* subsp. *rectangularis*, subsequently *Amphidiadema rectangularis* subsp. *rectangularis*.

"var. *rectangularis*". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.1, fig.14; Jan du Chêne et al., 1986a, pl.48, figs.14–15. **Now redundant.**

"subsp. *samuelsonii*" (Kjellström, 1973, p.22, fig.18) Lentin and Williams, 1975, p.2149. Holotype: Kjellström, 1973, fig.18. Originally *Deflandrea rectangularis* var. *samuelsonii*, subsequently *Deflandrea rectangularis* subsp. *samuelsonii*, thirdly *Amphidiadema rectangularis* subsp. *samuelsonii*. **Taxonomic senior synonym:** *Triblastula* (as and now *Hystrichosphaeropsis*) *quasicribrata*, according to Gocht (1976, p.322). Age: early–late Maastrichtian.

- "var. **samuelsonii**" Kjellström, 1973, p.22, fig.18. Holotype: Kjellström, 1973, fig.18. Originally *Deflandrea rectangularis* var. *samuelsonii*, subsequently *Deflandrea rectangularis* subsp. *samuelsonii*, thirdly *Amphidiadema rectangularis* subsp. *samuelsonii*. **Taxonomic senior synonym:** *Triblastula* (as and now *Hystrichosphaeropsis*) *quasicribrata*, according to Gocht (1976, p.322). Age: early–late Maastrichtian.
- "**rhombica**" Cookson and Eisenack, 1974, p.49–50, pl.20, figs.5–9. Holotype: Cookson and Eisenack, 1974, pl.20, fig.7. **NOW** *Spinidinium echinoideum* subsp. *rhombicum*. Originally *Deflandrea rhombica*, subsequently (and now) *Spinidinium echinoideum* subsp. *rhombicum*, thirdly *Spinidinium rhombicum*. Age: Albian–Cenomanian.
- "**rhombohedra**" Benson, 1976, p.195, pl.9, figs.10–12. Holotype: Benson, 1976, pl.9, figs.10–12. **NOW** *Andalusiella*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Andalusiella*. Age: early Paleocene.
- "**rhombovalis**" Cookson and Eisenack, 1970a, p.143, pl.12, figs.10–11. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.11. **NOW** *Isabelidinium?*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Isabelidinium?*. Age: late Albian–Senonian.
- "**robusta**" Balteş, 1969, p.35, pl.5, fig.11. Holotype: not designated. **Name not validly published:** provisional designation. The name cannot be legitimized since it would be a junior homonym of *Deflandrea robusta* Deflandre and Cookson, 1955. Age: Eocene.
- robusta** Deflandre and Cookson, 1955, p.250, pl.4, fig.9. Holotype: Deflandre and Cookson, 1955, pl.4, fig.9; Stover, 1974, pl.2, fig.5. Age: Eocene.
- "**rotundata**" Eisenack and Cookson, 1960, p.2, pl.1, figs.1–2. Holotype: Eisenack and Cookson, 1960, pl.1, fig.1. **NOW** *Subtilisphaera*. Originally *Deflandrea*, subsequently (and now) *Subtilisphaera*. Taxonomic senior synonym: *Deflandrea* (as *Subtilisphaera*) *perlucida*, according to Davey (1974, p.65) — however, Lentin and Williams (1976, p.119) retained *Deflandrea* (as *Subtilisphaera*) *rotundata*. Age: Albian.
- "**sagittula**" Drugg, 1970b, p.809–810, figs.1A–C. Holotype: Drugg, 1970b, fig.1A. **NOW** *Spinidinium?* Originally *Deflandrea*, subsequently *Spinidinium*, thirdly (and now) *Spinidinium?* N.I.A. Age: early Eocene.
- scabrata** Wilson, 1988, p.18, pl.6, figs.1a–b,2. Holotype: Wilson, 1988, pl.6, fig.2; Fensome et al., 1996, fig.3 — p.2339. Age: early-middle Eocene; see Fensome et al. (1996, p.2340).
- "**scheii**" Manum, 1963, p.56–58, pl.1, figs.1–16; text-fig.1. Holotype: Manum, 1963, pl.1, figs.1–4; text-fig.1. **NOW** *Arvalidinium*. Originally *Deflandrea*, subsequently *Cooksoniella*, thirdly *Chatangiella?*, fourthly (and now) *Arvalidinium*. Age: Middle Cretaceous (early Late Cretaceous, according to Manum and Cookson, 1964).
- scitula** He Chengquan, 1991, p.83–84, pl.30, fig.13. Holotype: He Chengquan, 1991, pl.30, fig.13. Age: late Eocene.
- scolensis** Grigorovich, 1971, p.92, pl.1, fig.3. Holotype: Grigorovich, 1971, pl.1, fig.3. Age: Eocene.
- "**sergipensis**" Herngreen, 1975, p.61, pl.3, figs.13–15. Holotype: Herngreen, 1975, pl.3, figs.14–15. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: late Senonian.
- "**serrata**" Cookson and Eisenack, 1958, p.28, pl.4, fig.4. Holotype: Cookson and Eisenack, 1958, pl.4, fig.4. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently (and now) *Chatangiella*. N.I.A. Age: Campanian–Maastrichtian.
- severnensis** Benson, 1976, p.195–196, pl.10, figs.1–3. Holotype: Benson, 1976, pl.10, figs.1–3. Age: late Maastrichtian.

shandongensis Xu Jinli, 1987, p.151, pl.1, figs.2–4. Holotype: Xu Jinli, 1987, pl.1, fig.2. Age: ?middle-late Eocene.

"*sibirica*" (Vozzhennikova, 1963, p.181; text-figs.9–10) Lentin and Williams, 1976, p.44. Emendation: Lentin and Vozzhennikova, 1990, p.39–40, as *Cerodinium sibiricum*. Holotype: Vozzhennikova, 1963, text-fig.9; Lentin and Vozzhennikova, 1990, pl.4, figs.1–2. **NOW** *Cerodinium*. Originally (and now) *Cerodinium*, subsequently *Ceratiopsis* (combination illegitimate), thirdly *Deflandrea*. Age: Paleocene–Eocene.

"*speciosa*" Alberti, 1959b, p.97, pl.9, figs.12–13. Holotype: Alberti, 1959b, pl.9, fig.13. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: late Paleocene.

"forma *glabra*" Gocht, 1969, p.10, text-fig.3. Holotype: Gocht, 1969, text-fig.3, as *Deflandrea speciosa* forma *glabra*. **NOW** *Cerodinium glabrum*. Originally *Deflandrea speciosa* forma *glabra*, subsequently *Deflandrea speciosa* subsp. *glabra*, thirdly *Ceratiopsis speciosa* subsp. *glabra* (combination illegitimate), fourthly *Cerodinium speciosum* subsp. *glabrum*, fifthly (and now) *Cerodinium glabrum*. Age: late Paleocene.

"subsp. *glabra*" (Gocht, 1969, p.10; text-fig.3) Lentin and Williams, 1973, p.45. Holotype: Gocht, 1969, text-fig.3. **NOW** *Cerodinium glabrum*. Originally *Deflandrea speciosa* forma *glabra*, subsequently *Deflandrea speciosa* subsp. *glabra*, thirdly *Ceratiopsis speciosa* subsp. *glabra* (combination illegitimate), fourthly *Cerodinium speciosum* subsp. *glabrum*, fifthly (and now) *Cerodinium glabrum*. Age: late Paleocene.

"forma *speciosa*". Autonym. Holotype: Alberti, 1959b, pl.9, fig.13. **Now redundant**.

"subsp. *speciosa*". Autonym. Holotype: Alberti, 1959b, pl.9, fig.13. **NOW** *Cerodinium speciosum* subsp. *speciosum*. Originally *Deflandrea speciosa* subsp. *speciosa*, subsequently *Ceratiopsis speciosa* subsp. *speciosa* (combination illegitimate), thirdly (and now) *Cerodinium speciosum* subsp. *speciosum*.

"*spectabilis*" (Alberti, 1959b, p.99, pl.9, fig.78) Lentin and Williams, 1973, p.45. Emendation: Lebedeva in Ilyina et al., 1994, p.66, as *Chatangiella spectabilis*. Holotype: Alberti, 1959b, pl.9, fig.78. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: late Senonian.

"*spicata*" May, 1980, p.79, pl.9, figs.18–20. Holotype: May, 1980, pl.9, fig.19. **NOW** *Andalusiella*. Originally *Deflandrea*, subsequently (and now) *Andalusiella*. Age: Campanian–Maastrichtian.

"*spinosissima*" Cookson and Eisenack, 1970a, p.141, pl.11, figs.5–6. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.5. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

"*spinulosa*" Alberti, 1959b, p.95, pl.8, figs.8–9. Holotype: Alberti, 1959b, pl.8, fig.8. **NOW** *Deflandrea phosphoritica* var. *spinulosa*. Originally *Deflandrea spinulosa*, subsequently (and now) *Deflandrea phosphoritica* var. *spinulosa*. Age: middle-late Oligocene.

"*stagonoides*" (Benedek, 1972, p.10, pl.2, fig.12; text-fig.5) Lentin and Williams, 1976, p.44. Emendation: Benedek and Sarjeant, 1981, p.324, as *Ascodinium stagonoides*. Holotype: Benedek, 1972, pl.2, fig.12; Benedek and Sarjeant, 1981, fig.3, nos.1,3. **NOW** *Senoniasphaera*. Originally *Ascodinium*, subsequently *Deflandrea*, thirdly (and now) *Senoniasphaera*. Age: late Oligocene.

"*striata*" Drugg, 1967, p.18, pl.2, figs.13–14. Holotype: Drugg, 1967, pl.2, fig.13. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Paleocene.

"subquadra" Corradini, 1973, p.175–176, pl.28, fig.1. Holotype: Corradini, 1973, pl.28, fig.1. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*?, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: Senonian.

subtilis He Chengquan, 1991, p.84, pl.29, figs.15–17. Holotype: He Chengquan, 1991, pl.29, fig.16. Age: late Eocene.

superposita He Chengquan, 1991, p.84–85, pl.34, figs.17–18. Holotype: He Chengquan, 1991, pl.34, fig.17. This species was not validly published in Xu Jinli (1987, p.151), who cited it as "*Deflandrea superposita* He (MS)", a manuscript name. Age: middle-late Eocene.

"suspecta" (Manum and Cookson, 1964, p.9–10, pl.1, figs.9–13) Davey, 1970, p.342. Holotype: Manum and Cookson, 1964, pl.1, fig.9. **NOW** *Trithyrodinium*. Originally *Hexagonifera*, subsequently (and now) *Trithyrodinium*, thirdly *Deflandrea*. Age: Cenomanian.

"sverdrupiana" Manum, 1963, p.59–60, pl.2, figs.6–15; text-fig.3. Emendation: Lebedeva in Ilyina et al., 1994, p.64, as *Spinidinium sverdrupianum*. Holotype: Manum, 1963, pl.2, figs.12–13. **NOW** *Spinidinium*. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Subtilisphaera*, fourthly *Cooksoniella* (combination not validly published). Age: Cenomanian.

"?tenera" Krutzsch, 1962, p.44, pl.11, figs.20–22; text-fig.1e. Holotype: Krutzsch, 1962, pl.11, figs.20–22. **NOW** *Geiselodinium*. Originally *Deflandrea*?, subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Geiselodinium*. Questionable assignment: Krutzsch (1962, p.44). Age: middle Eocene.

"terrula" Davey, 1974, p.65, pl.8, figs.4–5. Emendation: Harding, 1986a, p.101–102,104, as *Subtilisphaera terrula*. Holotype: Davey, 1974, pl.8, fig.4. **NOW** *Subtilisphaera*. Originally *Deflandrea*, subsequently *Subtilisphaera*?, thirdly (and now) *Subtilisphaera*. N.I.A. Age: middle Barremian.

"thomasii" Cookson and Eisenack, 1961a, p.71–72, pl.11, figs.7–10. Holotype: Cookson and Eisenack, 1961a, pl.11, fig.8. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Senonian.

translucida Châteauneuf, 1980, p.138, pl.22, fig.9; pl.23, fig.6. Holotype: Châteauneuf, 1980, pl.22, fig.9. Age: Eocene (Lutetian–Ludian).

tribulosa Islam, 1983c, p.85, pl.1, figs.9–10. Holotype: Islam, 1983c, pl.1, fig.10. Age: middle Eocene.

"tripartita" Cookson and Eisenack, 1960a, p.2–3, pl.1, fig.10. Emendation: Cookson and Manum, 1964, p.521–522, as *Deflandrea tripartita*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.10; Cookson and Manum, 1964, pl.76, figs.1–2. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Senonian.

truncata Stover, 1974, p.176–177, pl.5, figs.2,3a–c; text-figs.3A,6I. Holotype: Stover, 1974, pl.5, figs.3a–c. Age: early Eocene.

tuberculata Hultberg, 1985c, p.120–121, pl.3, figs.A–C. Holotype: Hultberg, 1985c, pl.3, fig.A. Age: late Maastrichtian.

"tubifera" Cookson and Eisenack, 1982, p.31–32, pl.3, figs.12–14. Holotype: Cookson and Eisenack, 1982, pl.3, fig.12. **NOW** *Chatangiella*?. Originally *Deflandrea*, subsequently (and now) *Chatangiella*?. Age: Barremian–early Aptian.

"ventriosa" Alberti, 1959b, p.101, pl.9, figs.14–15. Holotype: Alberti, 1959b, pl.9, fig.14; Eisenack and Klement, 1964, p.239; Fensome et al., 1995, fig.1 — p.1895. **NOW** *Cepadinium*. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Cepadinium*. Age: early Aptian.

"*verrucosa*" Manum, 1963, p.60–61, pl.3, figs.1–4. Holotype: Manum, 1963, pl.3, figs.1–2. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Trithyrodinium*, thirdly *Australiella*, fourthly (and now) *Chatangiella*. Taxonomic junior synonym: *Cooksoniella* (as and now *Chatangiella*) *vnigrii*, according to Yun Hyesu (1981, p.66) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (as and now *Chatangiella*) *vnigrii*. Age: Middle Cretaceous.

"*vestita*" (Brideaux, 1971, p.99–101, pl.29, figs.99–103; text-figs.10a,d) Sverdløve and Habib, 1974, p.59–60. Holotype: Brideaux, 1971, pl.29, figs.99,102–103; text-figs.10a,d. **NOW** *Chichaouadinium*. Originally *Spinidinium*, subsequently *Deflandrea*, thirdly *Spinidinium?*, fourthly (and now) *Chichaouadinium*. Taxonomic junior synonym: *Deflandrea limpida*, according to Lentin and Williams (1973, p.43). Age: late Albian–early Cenomanian.

"*victoriensis*" Cookson and Manum, 1964, p.522, pl.76, figs.3–8. Emendation: Lebedeva in Ilyina et al., 1994, p.67, as *Chatangiella victoriensis*. Holotype: Cookson and Manum, 1964, pl.76, figs.3–4; Helby et al., 1987, fig.41A. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Australiella*, thirdly (and now) *Chatangiella*. Age: Senonian.

"*wardenensis*" Williams and Downie, 1966c, p.233, pl.26, fig.5. Holotype: Williams and Downie, 1966c, pl.26, fig.5; Bujak et al., 1980, pl.11, fig.3. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: early Eocene.

"*warrenii*" Schumacker-Lambry, 1978, p.40–41, pl.4, figs.5–6. Holotype: Schumacker-Lambry, 1978, pl.4, fig.6. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly (and now) *Cerodinium*. Age: late Paleocene (Landenian).

webbii Wrenn and Hart, 1988, p.352–353, fig.22, nos.2–4, fig.23, nos.4–5, fig.40, nos.1–4, fig.41 nos.1–4, fig.42, no.2. Holotype: Wrenn and Hart, 1988, fig.22, nos.2–4. Age: Eocene.

"?*wellingtoniana*" Tasch, 1963, p.336, pl.1, fig.9. Holotype: Tasch, 1963, pl.1, fig.9. **NOW** *Nannoceratopsiella* (Appendix A). Originally *Deflandrea?*, subsequently *Nannoceratopsiella* (Appendix A). Questionable assignment: Tasch (1963, p.336). Stover and Evitt (1978, p.265) considered this species to be based on a mineral grain. Age: Early Permian.

"*wetzeli*" Morgenroth, 1966a, p.9, pl.1, figs.4–5. Holotype: Morgenroth, 1966a, pl.1, figs.4–5. **NOW** *Lentinia?*. Originally *Deflandrea*, subsequently *Lentinia*, thirdly (and now) *Lentinia?* Age: early Eocene.

"**DELOZONOCYSTA**" Xu Jinli et al., 1997, p.116,152. **Taxonomic senior synonym:** *Tianjinella*, according to He Chengquan et al. (2009, p.126). Type: Xu Jinli et al., 1997, pl.8, figs.13a–b, as *Delozonocysta brevispinosa*.

"**brevispinosa*" Xu Jinli et al., 1997, p.116–117,153, pl.8, figs.12,13a–b,14a–b,15a–b,16–17; pl.9, figs.2,8; text-fig.12. **NOW** *Tianjinella*. Originally *Delozonocysta*, subsequently (and now) *Tianjinella*. Holotype: Xu Jinli et al., 1997, pl.8, figs.13a–b. Age: middle-late Eocene.

"*displicata*" Xu Jinli et al., 1997, p.117, pl.9, fig.7. Holotype: Xu Jinli et al., 1997, pl.9, fig.7. **Name not validly published:** no English or Latin description. **NOW** *Tianjinella*. Originally *Delozonocysta* (name not validly published), subsequently (and now) *Tianjinella*. Age: middle-late Eocene.

"*longispinosa*" Xu Jinli et al., 1997, p.117–118, pl.9, figs.1a–c,3a–b,4–6. Holotype: Xu Jinli et al., 1997, pl.9, figs.1a–c. **Name not validly published:** no English or Latin description. **NOW** *Tianjinella*. Originally *Delozonocysta* (name not validly published), subsequently (and now) *Tianjinella*. Age: middle-late Eocene.

"?*multispinosa*" Xu Jinli et al., 1997, p.118, pl.22, figs.7–8. Holotype: Xu Jinli et al., 1997, pl.22, fig.8. **Name not validly published:** no English or Latin description. **NOW** *Tetrachacysta*. Originally *Delozonocysta* (name not validly published), subsequently (and now) *Tetrachacysta*. Questionable assignment: Xu Jinli et al., (1997, p.118). Age: middle-late Eocene.

DESMOCYSTA Duxbury, 1983, p.43–44. Taxonomic junior synonym: *Klementia* (name not validly published, according to Duxbury (1983, p.44). Type: Duxbury, 1983, pl.8, fig.11; text-fig.20D, as *Desmocysta plekta*.

**plekta* Duxbury, 1983, p.45, pl.8, fig.11; text-figs.20A–D,21A–B. Holotype: Duxbury, 1983, pl.8, fig.11; text-fig.20D; Fensome et al., 1995, figs.1,7 — p.1671. Age: early–late Aptian.

simplex Duxbury, 2001, p.105–106, fig.7, nos.1–3. Holotype: Duxbury, 2001, fig.7, no.1. Age: late Hauterivian.

DESOTODINIUM De Schepper et al., 2004, p.431,433. Type: De Schepper et al., 2004, fig.7, nos.1–6, as *Desotodinium wrennii*.

**wrennii* De Schepper et al., 2004, p.633, fig.7, nos.1–16. Holotype: De Schepper et al., fig.7, nos.1–6. Age: Pliocene.

DIACANTHUM Habib, 1972, p.376. Emendation: Habib and Drugg, 1987, p.762. Taxonomic senior synonym: *Occisucysta*, according to Below (1981a, p.59) — however, Lentin and Williams (1981, p.90) retained *Diacanthum*. Type: Habib, 1972, pl.9, fig.1, as *Diacanthum hollisteri*.

argentinum Quattrocchio and Sarjeant, 1992, p.86–87(al. 2–238 — 2–239), pl.4, figs.10–13; pl.6, fig.4; text-figs.8A–B. Holotype: Quattrocchio and Sarjeant, 1992, pl.6, fig.4. Age: middle-late Tithonian.

"?*filapicatum*" (Gocht, 1970b, p.134–135, pl.26, figs.4,6–9; pl.27, figs.1–3,7; pl.28, fig.3; pl.31, figs.1–5; text-figs.2a,3–4) Stover and Evitt, 1978, p.152. Emendation: Riding and Bailey, 1991, p.101, as *Durotrigia filapicata*. Holotype: Gocht, 1970b, pl.31, fig.1. **NOW** *Durotrigia*. Originally *Gonyaulacysta*, subsequently *Diacanthum*, thirdly *Dichadogonyaulax*?, fourthly *Diacanthum*?, fifthly (and now) *Durotrigia*. Questionable assignment: Riding (1987a, p.260). Age: early Bathonian.

**hollisteri* Habib, 1972, p.376–377, pl.9, figs.1,3; pl.10, fig.1; text-fig.2. Emendation: Habib and Drugg, 1987, p.762, as *Diacanthum hollisteri*. Holotype: Habib, 1972, pl.9, fig.1; Fensome et al., 1995, fig.1 — p.1547. Originally (and now) *Diacanthum*, subsequently *Occisucysta*. Lentin and Williams (1981, p.80) retained this species in *Diacanthum*. Taxonomic senior synonym: *Gonyaulacysta* (as and now *Occisucysta*) *evittii*, according to Below (1982a, p.32–33) — however, Jan du Chêne et al. (1986b, p.122) and Habib and Drugg (1987, p.762–763) retained *Diacanthum hollisteri*. Age: ?Valanginian.

"*tenuiceras*" (Eisenack, 1958a, p.389–391 pl.21, figs.14–15; pl.22, figs.1–3; pl.24, fig.2; text-figs.4a–c,5) Stover and Evitt, 1978, p.152. Emendations: Sarjeant, 1985a, p.63,65–66, as *Acanthaulax? tenuiceras*; Jan du Chêne et al., 1986b, p.29–30, as *Tehamadinium tenuiceras*. Holotype: Eisenack, 1958a, pl.21, fig.15; Sarjeant, 1985a, pl.6, figs.1–2; text-fig.3; Jan du Chêne et al., 1986a, pl.118, fig.1; Jan du Chêne et al., 1986b, pl.24, fig.5. **NOW** *Cribroperidinium*?. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*?, thirdly *Diacanthum*, fourthly *Occisucysta*, fifthly *Acanthaulax*?, sixthly *Tehamadinium*, seventhly (and now) *Cribroperidinium*?. Taxonomic junior synonym: *Occisucysta victorii*, according to Pöthe de Baldis and Ramos (1988, p.33). Age: late Barremian–Aptian.

DICHADOGONYAULAX Sarjeant, 1966b, p.153. Emendations: Sarjeant, 1975a, p.50; Woollam, 1983, p.193; Benson, 1985, p.152. Taxonomic senior synonym: *Ctenidodinium*, according to Lentin and Williams (1973, p.46) — however, Sarjeant (1975a, p.50) and Benson (1985, p.152) retained *Dichadogonyaulax*. Taxonomic junior synonyms: *Brotzenia*, by implication in Fensome and Sarjeant (1982, p.56), who transferred the "type species" of *Brotzenia* — *Brotzenia cristata* — to *Dichadogonyaulax*; *Avellodinium*, by implication in Davey (1982b, p.26), who transferred the "type species" of *Dichadogonyaulax*, *Dichadogonyaulax* (originally *Gonyaulax*) *culmula*, to *Avellodinium* — however, Lentin and Williams (1985, p.31) retained that species in *Dichadogonyaulax* and retained *Avellodinium*. Although the "type species" was not validly transferred by Sarjeant (1966b, p.153), the generic name

Dichadogonyaulax was validly published by that author since it is based on a previously validly published species name (I.C.N. Article 40.3). Type: Norris, 1965, figs.8–9, as *Gonyaulax culmula*.

"*adela*" Fenton et al., 1980, p.155–156, pl.14, figs.1–4; text-figs.3A–B. Holotype: Fenton et al., 1980, pl.14, fig.3; text-figs.3A–B; Fensome et al., 1993a, fig.1 — p.883. **NOW** *Bradleyella*. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly (and now) *Bradleyella*. For etymology see under *Bradleyella*. Age: late Bajocian.

bensonii Monteil, 1992a, p.274,276, pl.1, figs.1–6; pl.8, figs.5–6. Holotype: Monteil, 1992a, pl.1, figs.1–4. Age: Berriasian–early Valanginian.

?*brenneri* Poulsen, 1996, p.66, pl.14, figs.1–3. Holotype: Poulsen, 1996, pl.14, fig.1. Questionable assignment: Poulsen (1996, p.66). Age: Oxfordian–earliest Volgian.

chondra (Drugg, 1978, p.66, pl.1, figs.8–11) Courtinat, 1989, p.209. Holotype: Drugg, 1978, pl.1, fig.10. Originally *Ctenidodinium*, subsequently *Ctenidodinium?*, thirdly (and now) *Dichadogonyaulax*. Age: early Kimmeridgian.

cristata (Horowitz, 1975, p.25, pl.1, fig.8) Fensome and Sarjeant, 1982, p.56. Emendation: Wheeler and Sarjeant, 1990, p.306–307, as *Dichadogonyaulax cristata*. Holotype: Horowitz, 1975, pl.1, fig.8; Fensome et al., 1995, fig.1 — p.1479; lost according to Sarjeant (1988, p.177). Neotype: Wheeler and Sarjeant, 1990, pl.8, fig.4; text-figs.10a–b; Fensome et al., 1995, fig.1 — p.1479; designated by Wheeler and Sarjeant (1992, p.382). Originally *Brotzenia*, subsequently *Ctenidodinium?*, thirdly (and now) *Dichadogonyaulax*. Taxonomic senior synonym: *Ctenidodinium ornatum*, according to Woollam (1983, p.190) — however, Sarjeant (1988, p.180) retained *Dichadogonyaulax cristata*. Age: Late Triassic (probably not in place).

**culmula* (Norris, 1965, p.793–795, figs.1–2,6–9) Loeblich Jr. and Loeblich III, 1968, p.211. Holotype: Norris, 1965, figs.8–9. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Avellodinium*. Lentin and Williams (1985, p.105) and Benson (1985, p.152) retained this species in *Dichadogonyaulax*. N.I.A. Age: Portlandian.

subsp. *culmula*. Autonym. Holotype: Norris, 1965, figs.8–9.

"var. *culmula*". Autonym. Holotype: Norris, 1965, figs.8–9. **Now redundant**.

subsp. *curtospina* (Quattrocchio and Sarjeant, 1992, p.90 (al. 2–242), pl.6, figs.3,6) Lentin and Williams, 1993, p.178. Holotype: Quattrocchio and Sarjeant, 1992, pl.6, fig.6. Originally *Dichadogonyaulax culmula* var. *curtospina*, subsequently (and now) *Dichadogonyaulax culmula* subsp. *curtospina*. Age: middle-late Tithonian.

"var. *curtospina*" Quattrocchio and Sarjeant, 1992, p.90 (al. 2–242), pl.6, figs.3,6. Holotype: Quattrocchio and Sarjeant, 1992, pl.6, fig.6. **NOW** *Dichadogonyaulax culmula* subsp. *curtospina*. Originally *Dichadogonyaulax culmula* var. *curtospina*, subsequently (and now) *Dichadogonyaulax culmula* subsp. *curtospina*. Age: middle-late Tithonian.

"?*filapicata*" (Gocht, 1970b, p.134–135, pl.26, figs.4,6–9; pl.27, figs.1–3,7; pl.28, fig.3; pl.31, figs.1–5; text-figs.2a,3–4) Jan du Chêne et al., 1986a, p.11. Emendation: Riding and Bailey, 1991, p.101, as *Durotrigia filapicata*. Holotype: Gocht, 1970b, pl.31, fig.1. **NOW** *Durotrigia*. Originally *Gonyaulacysta*, subsequently *Diacanthum*, thirdly *Dichadogonyaulax?*, fourthly *Diacanthum?*, fifthly (and now) *Durotrigia*. Questionable assignment: Jan du Chêne et al. (1986a, p.11). Age: early Bathonian.

"*gochti*" Sarjeant, 1976a, p.11,13, pl.2, fig.1; pl.3, fig.4; text-figs.2A–C. Holotype: Sarjeant, 1976a, pl.2, fig.1; text-figs.2A–B. **NOW** *Korystocysta*. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly (and now) *Korystocysta*. Taxonomic senior synonym: *Gonyaulax* (now *Korystocysta*) *pachyderma*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as *Korystocysta*) *kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *gochti*. Taxonomic

junior synonym: *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, according to Riley and Fenton (1982, p.199) and Hengreen et al. (2000, p.50). Age: Bathonian.

irregularis Benson, 1985, p.154, pl.2, figs.5–12. Holotype: Benson, 1985, pl.2, figs.5–6. Age: Neocomian.

"*kettonensis*" Sarjeant, 1976a, p.13,15, pl.1, figs.1–2; pl.3, figs.1–2; pl.6, fig.1; text-figs.3A–D. Holotype: Sarjeant, 1976a, pl.1, figs.1–2; Fensome et al., 1995, figs.1–4 — p.1583. **NOW** *Korystocysta*. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly (and now) *Korystocysta*. **Taxonomic senior synonym:** *Dichadogonyaulax* (now *Korystocysta*) *gochtii*, according to Riley and Fenton (1982, p.199) and Hengreen et al. (2000, p.50). Taxonomic senior synonyms: *Gonyaulax* (now *Korystocysta*) *pachyderma* and *Leptodinium* (subsequently *Korystocysta*) *norrisii*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as *Korystocysta*) *kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Korystocysta kettonensis*. Age: Bathonian.

"*norrisii*" (Pocock, 1972, p.92–93, pl.24, figs.9–12; text-fig.9) Sarjeant, 1975a, p.55. Holotype: Pocock, 1972, pl.24, fig.9; Jansonius, 1986, pl.2, figs.6–8; text-fig.5. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Korystocysta*. **Taxonomic senior synonym:** *Gonyaulax* (now *Korystocysta*) *pachyderma*, according to Benson (1985, p.154). Taxonomic junior synonym: *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Korystocysta kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *kettonensis*. Age: Callovian.

"*pachyderma*" (Deflandre, 1939a, p.176–178, pl.7, figs.6–10; text-figs.7–10) Courtinat, 1989, p.211. Holotype: Deflandre, 1939a, pl.7, figs.6–7. **NOW** *Korystocysta*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Ctenidodinium*, fourthly *Ctenidodinium?*, fifthly (and now) *Korystocysta*, sixthly *Dichadogonyaulax*. Taxonomic junior synonyms: *Leptodinium* (as *Korystocysta*) *norrisii*, according to Benson (1985, p.154); *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *kettonensis*. Age: Oxfordian.

?*pannea* (Norris, 1965, p.796–798, figs.3,10–13) Sarjeant, 1969, p.14. Holotype: Norris, 1965, figs.10–12. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly (and now) *Dichadogonyaulax?*. Benson (1985, p.152) retained this species in *Dichadogonyaulax*. Questionable assignment: Riding (1987a, p.260). This combination was not validly published in Sarjeant (1966b, p.153), since that author did not fully reference the basionym. Age: Kimmeridgian–Portlandian.

"*rotunda*" (Dodekova, 1975, p.19–20, pl.4, figs.13–14; text-fig.1) Woollam, 1983, p.193. Holotype: Dodekova, 1975, pl.4, figs.13–14; text-fig.1. **NOW** *Ctenidodinium?*. Originally *Ctenidodinium*, subsequently *Dichadogonyaulax*, thirdly (and now) *Ctenidodinium?*. Age: Bathonian.

"*schizoblata*" (Norris, 1965, p.798–800, figs.4–5,14–17) Sarjeant, 1969, p.14. Holotype: Norris, 1965, figs.5,15–17. **NOW** *Ctenidodinium?*. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly (and now) *Ctenidodinium?*. This combination was not validly published in Sarjeant (1966b, p.153), since that author did not fully reference the basionym. Age: Portlandian.

sellwoodii Sarjeant, 1975a, p.52,55, pl.1, figs.A–H; pl.2, figs.I–K; pl.3, figs.L–Q. Holotype: Sarjeant, 1975a, pl.1, figs.A–B; pl.2, figs.I–K. Originally (and now) *Dichadogonyaulax*, subsequently *Ctenidodinium*. Lentin and Williams (1993, p.179) retained this species in *Dichadogonyaulax*. Taxonomic junior synonym: *Dichadogonyaulax stauromatos*, according to Riley and Fenton (1982, p.199) and Lentin and Williams (1993, p.179–180). Age: Bathonian.

"*stauromatos*" Sarjeant, 1976a, p.9–11, pl.2, fig.4; pl.3, figs.5–6; text-figs.1A–C. Holotype: Sarjeant, 1976a, pl.2, fig.4. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly *Ctenidodinium?*. **Taxonomic senior synonym:** *Dichadogonyaulax* (as *Ctenidodinium*) *sellwoodii*, according to Riley and Fenton (1982, p.199) and Conway (1990, p.35). Taxonomic senior synonym: *Ctenidodinium tenellum*, according to Courtinat (1989, p.209)

— however, Lentin and Williams (1993, p.179–180) retained *Dichadogonyaulax stauromatos* as taxonomic junior synonym of *Dichadogonyaulax sellwoodii*. N.I.A. Age: Bathonian.

DICONODINIUM Eisenack and Cookson, 1960, p.3. Emendation: Morgan, 1977, p.125. Type: Deflandre and Cookson, 1955, pl.1, fig.5, as *Palaeohystrichophora multispina*.

"**acutum**" Jain and Millepied, 1973, p.30, pl.3, figs.41–42. Holotype: Jain and Millepied, 1973, pl.3, fig.41. **Taxonomic senior synonym:** *Diconodinium arcticum*, according to Morgan (1977, p.126). Age: Aptian.

"**arcticum**" Manum and Cookson, 1964, p.18–19, pl.6, figs.1–4. Holotype: Manum and Cookson, 1964, pl.6, fig.1. **NOW** *Laciniadinium*. Originally *Diconodinium*, subsequently (and now) *Laciniadinium*. Taxonomic junior synonym: *Diconodinium acutum*, according to Morgan (1977, p.126). Age: Cenomanian.

biconicum (Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.62, pl.7, figs.1–6; text-fig.9) Mao Shaozhi et al., 1995, p.53. Holotype: He Chengquan et al., 1989, pl.7, fig.6; text-fig.9. Originally *Phthanoperidinium*, subsequently (and now) *Diconodinium*. Age: Early Tertiary.

brevispinum He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.45–46, pl.5, fig.16; text-fig.2. Holotype: He Chengquan et al., 1989, pl.5, fig.16; text-fig.2. Mao Shaozhi et al. (1995, p.99) indicated that this name should be restricted to the holotype. Age: Early Tertiary.

?**caulleryi** Deflandre, 1935, p.229, pl.6, fig.4 ex Lentin and Williams, 1973, 46. Holotype: Deflandre, 1934, fig.7; Deflandre, 1935, pl.6, fig.4; Deflandre, 1936b, pl.5, figs.5,7. Originally *Palaeoperidinium* (name not validly published), subsequently *Diconodinium*, thirdly (and now) *Diconodinium*?. Questionable assignment: Morgan (1977, p.129). The name *Palaeoperidinium caulleryi* was not validly published in Deflandre (1935) since the generic name *Palaeoperidinium* was not validly published until 1967. The name *Diconodinium caulleryi* was not validly published in Deflandre (1966, p.4) since no holotype was indicated. A full description of this species was given in Deflandre (1936b, p.177). Age: Senonian.

cristatum Cookson and Eisenack, 1974, p.77, pl.24, figs.3–5. Emendation: Morgan, 1977, p.126. Holotype: Cookson and Eisenack, 1974, pl.24, fig.3. Age: Albian–Cenomanian.

"**dabendorfense**" (Alberti, 1961, p.5, pl.3, fig.4) Lentin and Williams, 1973, p.46. Holotype: Alberti, 1961, pl.3, fig.4. **NOW** *Luxadinium*?. Originally *Gymnodinium* (Appendix B), subsequently *Diconodinium*, thirdly (and now) *Luxadinium*?. Age: Valanginian.

davidii Morgan, 1975, p.157–159, pl.1, figs.1a–b,2a–d. Holotype: Morgan, 1975, pl.1, figs.1a–b; Helby et al., 1987, fig.29A. Originally (and now) *Diconodinium*, subsequently *Chichaouadinium*. Stover and Williams (1987, p.60) retained this species in *Diconodinium*. Age: Aptian–Albian.

"**dispersum**" (Cookson and Eisenack, 1958, p.39, pl.10, figs.12,14) Eisenack and Cookson, 1960, p.3. Emendation: Morgan, 1977, p.127, as *Diconodinium dispersum*. Holotype: Cookson and Eisenack, 1958, pl.10, fig.14; Morgan, 1977, pl.1, figs.2a–b. Originally *Palaeohystrichophora*, subsequently *Diconodinium*. **Taxonomic senior synonym:** *Palaeohystrichophora* (as and now *Diconodinium*) *multispina*, according to Stover and Helby (1987a, p.103). Age: Albian–Cenomanian.

distinctum Jain and Millepied, 1975, p.154–155, pl.6, figs.98–99. Holotype: Jain and Millepied, 1975, pl.6, fig.98. Age: Campanian–Maastrichtian.

ellipticum He Chengquan and Huang Guanjun, 1997, p.33–34,38, pl.1, fig.16. Holotype: He Chengquan and Huang Guanjun, 1997, pl.1, fig.16. Age: Callovian.

?**fehmarne** (Morgenroth, 1966a, p.4–5, pl.1, fig.1) Lentin and Williams, 1973, p.46. Holotype: Morgenroth, 1966a, pl.1, fig.1. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Diconodinium*?. Questionable assignment: Lentin and Williams (1973, p.46). Age: early Eocene.

"firmum" Harland, 1973, p.669–670, pl.84, figs.8–9,15; text-fig.6. Holotype: Harland, 1973, pl.84, fig.8. **NOW** *Laciniadinium*. Originally *Diconodinium*, subsequently (and now) *Laciniadinium*. Age: late Campanian.

?**glabrum** Eisenack and Cookson, 1960, p.3–4, pl.1, fig.11. Holotype: Eisenack and Cookson, 1960, pl.1, fig.11; Morgan, 1977, pl.2, figs.4a–c. Originally *Diconodinium*, subsequently (and now) *Diconodinium?*. Questionable assignment: Morgan (1977, p.129). Age: late Albian–Cenomanian.

gracile Oleinik, 1975, p.224–225, pl.1, figs.1–2. Holotype: Oleinik, 1975, pl.1, figs.1–2. Age: late Eocene–late Oligocene.

"inequicornutum" Balteş, 1971, p.5, pl.1, figs.8–12; pl.2, figs.1–3 ex Stover and Evitt, 1978, p.180. Holotype: Balteş, 1971, pl.2, fig.2; Fensome et al., 1996, fig.5 — p.2161; designated by Stover and Evitt (1978, p.180) as a lectotype. **NOW** *Komewuia*. Originally *Diconodinium* (name not validly published), subsequently *Pontiadinium*, thirdly (and now) *Komewuia*. This name was not validly published in Balteş (1971) since that author did not designate a holotype. Age: early Pliocene.

"inflatum" Eisenack and Cookson, 1960, p.4, pl.1, figs.12–13. Emendation: Morgan, 1977, p.136, as *Laciniadinium? inflatum*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.13; Morgan, 1977, pl.2, figs.5a–c. **NOW** *Laciniadinium?*. Originally *Diconodinium*, subsequently (and now) *Laciniadinium?*. Age: late Albian–Cenomanian.

longicorne Olaru, 1978a, p.89, pl.12, fig.6. Holotype: Olaru, 1978a, pl.12, fig.6; Olaru, 1978b, pl.1, fig.2 (not 3). Olaru (1978b, p.38) also cited this species as new. Age: Campanian.

lurense Guerstein et al., 2005, p.333,335, figs.3A–C,4A–I,5A–I. Holotype: Guerstein et al., 2005, figs.3A,4A. Age: late Maastrichtian to Danian.

martianum Srivastava, 1995, p.286, pl.14, figs.1–10. Holotype: Srivastava, 1995, pl.14, figs.1–2. Age: Campanian.

micropunctatum Backhouse, 1988, p.84, pl.25, figs.10a–b,11; pl.26, figs.1a–b. Holotype: Backhouse, 1988, pl.26, figs.1a–b; Fensome et al., 1996, figs.3–4 — p.2227. Age: early Aptian.

minutum (Deflandre and Cookson, 1955, p.257, text-fig.4) Deflandre and Deflandre-Rigaud, 1966, fiche 2967. Holotype: Deflandre and Cookson, 1955, text-fig.4. Originally *Palaeohystrichophora*, subsequently (and now) *Diconodinium*. Taxonomic junior synonym: *Deflandrea* (as *Alterbia*; now *Isabelidinium*) *balmei*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea* (as *Isabelidinium*) *balmei*. Age: Santonian.

***multispinum** (Deflandre and Cookson, 1955, p.257, pl.1, fig.5) Eisenack and Cookson, 1960, p.3. Emendation: Morgan, 1977, p.127–128, as *Diconodinium multispinum*. Holotype: Deflandre and Cookson, 1955, pl.1, fig.5; Morgan, 1977, pl.1, figs.1a–b. Originally *Palaeohystrichophora*, subsequently (and now) *Diconodinium*. Taxonomic junior synonyms: *Palaeohystrichophora* (as *Diconodinium*) *dispersa*, according to Stover and Helby (1987a, p.103); *Diconodinium pusillum*, according to Morgan (1977, p.127) — however, Below (1981a, p.124) retained *Diconodinium pusillum*. Age: Santonian.

"parvum" Wilson in Aurisano, 1984, p.5. **Name not validly published**: no description. Aurisano (1984, p.5) named *Diconodinium wilsonii* on the similarity (but not expressly the synonymy) between his new species and Wilson's unpublished species. *Diconodinium parvum* presumably equates with *Biconidinium parvum*, another thesis name, effectively published by Slimani (2001a, p.192), which Slimani synonymized with *Diconodinium wilsonii*.

paucigranulatum Burger, 1980a, p.86, pl.44, figs.1–3. Holotype: Burger, 1980a, pl.44, fig.3. Age: Aptian.

pelliferum (Cookson and Eisenack, 1958, p.38, pl.10, fig.11) Eisenack and Cookson, 1960, p.3. Emendation: Morgan, 1977, p.128, as *Diconodinium pelliferum*. Holotype: Cookson and Eisenack, 1958, pl.10, fig.11; Morgan, 1977, pl.1, figs.7a–b. Originally *Palaeohystrichophora*, subsequently (and now) *Diconodinium*. Age: Albian.

psilatum Morgan, 1977, p.128, pl.1, fig.5. Holotype: Morgan, 1977, pl.1, fig.5. Age: Albian–Maastrichtian.

pusillum Singh, 1971, p.383–384, pl.68, figs.5–8. Holotype: Singh, 1971, pl.68, fig.5. Taxonomic senior synonym: *Palaeohystrichophora* (as *Diconodinium*) *multispina*, according to Morgan (1977, p.127) — however, Below (1981a, p.124) retained *Diconodinium pusillum*. Age: middle-late Albian.

"***rhombiforme***" Vozzhennikova, 1967, p.50, pl.7, figs.1–4; pl.15, fig.5. Emendation: Lentin and Vozzhennikova, 1990, p.57–58, as *Laciniadinium rhombiforme*. Holotype: Vozzhennikova, 1967, pl.7, fig.3; pl.15, fig.5, lost according to Lentin and Vozzhennikova (1990, p.57). Neotype: Vozzhennikova, 1967, pl.7, fig.2; Lentin and Vozzhennikova, 1990, pl.10, figs.4–5; text-fig.29; designated by Lentin and Vozzhennikova (1990, p.57). **NOW** *Laciniadinium*. Originally *Diconodinium*, subsequently *Diconodinium?*, thirdly (and now) *Laciniadinium*. Questionable assignment: Morgan (1977, p.129). Age: Turonian.

sinense He Chengquan, 1991, p.174, pl.2, figs.1–4. Holotype: He Chengquan, 1991, pl.2, fig.3. Age: Cenomanian–Paleocene.

"***tenuistriatum***" Eisenack and Cookson, 1960, p.4, pl.1, figs.14–16. Holotype: Eisenack and Cookson, 1960, pl.1, figs.14–15; Morgan, 1977, pl.2, figs.3a–b. **NOW** *Laciniadinium*. Originally *Diconodinium*, subsequently (and now) *Laciniadinium*. Age: late Albian–Cenomanian.

ventriosum (Alberti, 1961, p.5–6, pl.3, fig.5) Lentin and Williams, 1973, p.47. Holotype: Alberti, 1961, pl.3, fig.5. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Diconodinium*. Morgan (1977, p.130) stated that *Gymnodinium ventriosum* was transferred to *Subtilisphaera* Jain and Millepied, 1973, by Jain and Millepied (1973, p.27); however, we have been unable to verify this. Age: Turonian.

vitricorne Roncaglia et al., 1999, p.303,305, fig.16, nos.1–5. Holotype: Roncaglia et al., 1999, fig.16, nos.1–2. Roncaglia et al. cited the epithet as "*vitricornu*", a compound of two Latin nouns, "*vitrum*" and "*cornu*". Since, in botanical tradition (Nicolson, 1986), compound epithets generally are made to agree with the gender of the generic name, we cite the specific epithet as "*vitricorne*". Age: Campanian.

wilsonii Aurisano, 1984, p.3,5, figs.4A–D. Holotype: Aurisano, 1984, figs.4A–C. Taxonomic junior synonym: *Biconodinium parvum* (name not validly published), according to Slimani (2001a, p.192). See also *Diconodinium parvum*. Age: late Campanian–latest Maastrichtian.

"**DICTYOPYXIDIA**" Eisenack, 1961, p.316. Substitute name for *Dictyopyxis* Cookson and Eisenack, 1960b (March), p.255 (an illegitimate name). **Taxonomic senior synonym:** *Ellipsoidictyum*, according to Sarjeant (1976a, p.23). Type: Cookson and Eisenack, 1960b, pl.39, fig.12, as *Dictyopyxis areolata*.

"***areolata***" (Cookson and Eisenack, 1960b, p.255, pl.39, figs.12–14) Eisenack and Kjellström, 1972, p.347. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.12. Originally *Dictyopyxis*, subsequently *Dictyopyxidia*. **Taxonomic senior synonym:** *Ellipsoidictyum cinctum*, according to Sarjeant (1976a, p.23–24). Age: Oxfordian–early Kimmeridgian.

"***circulata***" Clarke and Verdier, 1967, p.67–68, pl.1, fig.11; pl.2, fig.3; text-fig.28. Holotype: Clarke and Verdier, 1967, pl.1, fig.11. **NOW** *Elytrocysta*. Originally *Dictyopyxidia*, subsequently *Ellipsoidictyum*, thirdly (and now) *Elytrocysta*. Age: Cenomanian–Santonian.

"***imperfecta***" Brideaux and McIntyre, 1975, p.25–26, pl.7, figs.1–5. Holotype: Brideaux and McIntyre, 1975, pl.7, figs.1–3. **NOW** *Ellipsoidictyum*. Originally *Dictyopyxidia*, subsequently (and now) *Ellipsoidictyum*. Age: early–middle Albian.

"***punctata***" Jain, 1977b, p.186–187, pl.4, figs.51–52. Holotype: Jain, 1977b, pl.4, fig.51. **NOW** *Ellipsoidictyum*. Originally *Dictyopyxidia*, subsequently (and now) *Ellipsoidictyum*. Age: early Albian.

"reticulata" (Valensi, 1953, p.28, pl.2, figs.4–5,14,19; pl.13, fig.6; text-fig.2d ex Sarjeant, 1968, p.230) Lentin and Williams, 1973, p.47. Holotype: Valensi, 1953, pl.2, figs.4–5; Fauconnier and Masure, 2004, pl.28, figs.1–4. **NOW** *Epiplosphaera*. Originally *Palaeoperidinium* (name not validly published), subsequently *Dictyopyxis* (generic name illegitimate), thirdly *Dictyopyxidida*, fourthly *Ellipsoidictyum*, fifthly (and now) *Epiplosphaera*. Taxonomic senior synonym: *Epiplosphaera bireticulata*, by implication in Courtinat (1989, p.176), who believed *Palaeoperidinium* (as *Epiplosphaera*) *reticulatum* to be the senior name — however, Poulsen (1992a, p.66) retained the two species. Age: Bajocian.

"DICTYOPYXIS" Cookson and Eisenack, 1960b, p.255. **Name illegitimate** — **senior homonym:** *Dictyopyxis* Ehrenberg, 1844b. Substitute name: *Dictyopyxidida*. **Taxonomic senior synonym:** *Ellipsoidictyum*, according to Sarjeant (1976a, p.23). Type: Cookson and Eisenack, 1960b, pl.39, fig.12, as *Dictyopyxis areolata*.

"*areolata" Cookson and Eisenack, 1960b, p.255, pl.39, figs.12–14. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.12. Originally *Dictyopyxis* (generic name illegitimate), subsequently *Dictyopyxidida*. **Taxonomic senior synonym:** *Ellipsoidictyum cinctum*, according to Sarjeant (1976a, p.23–24). Following I.C.N. Article 55.1, the species name *Dictyopyxis areolata* is validly published even though the generic name *Dictyopyxis* is illegitimate. Age: Oxfordian–early Kimmeridgian.

"circulata" Habib, 1972, p.368. **Name not validly published:** no description or illustration.

"elliptica" Ott in Riding and Helby, 2001f, p.170. **Name not validly published:** no description. **Taxonomic senior synonym:** *Striatodinium ottii*, according to Riding and Helby (2001f, p.170).

"reticulata" Valensi, 1953, p.28, pl.2, figs.4–5,14,19; pl.13, fig.6; text-fig.2d ex Sarjeant, 1968, p.230. Holotype: Valensi, 1953, pl.2, figs.4–5; Fauconnier and Masure, 2004, pl.28, figs.1–4. **NOW** *Epiplosphaera*. Originally *Palaeoperidinium* (name not validly published), subsequently *Dictyopyxis* (generic name illegitimate), thirdly *Dictyopyxidida*, fourthly *Ellipsoidictyum*, fifthly (and now) *Epiplosphaera*. Taxonomic senior synonym: *Epiplosphaera bireticulata*, by implication in Courtinat (1989, p.176), who believed *Palaeoperidinium* (as *Epiplosphaera*) *reticulatum* to be the senior name — however, Poulsen (1992a, p.66) retained the two species. The name *Palaeoperidinium reticulatum* was not validly published in Valensi (1953) since the generic name *Palaeoperidinium* was not validly published until 1967. Following I.C.N. Article 55.1, the species name *Dictyopyxis reticulata* is validly published even though the generic name *Dictyopyxis* is illegitimate. Age: Bajocian.

"DIMIDIADINIUM" Brideaux, 1977, p.37. **Taxonomic senior synonym:** *Tubotuberella*, by implication in Sarjeant (1982b, p.42), who retained the type of the genus in *Tubotuberella*. Type: Sarjeant, 1968, pl.3, fig.8; text-fig.3, as *Gonyaulacysta dangeardii*.

"*dangeardii" (Sarjeant, 1968, p.226–227, pl.1, fig.21; pl.3, figs.8,15; text-fig.3) Brideaux, 1977, p.37. Emendation: Sarjeant, 1982b, p.42–43, as *Tubotuberella dangeardii*. Holotype: Sarjeant, 1968, pl.3, fig.8; text-fig.3; Sarjeant, 1982b, text-figs.5c–d; Jan du Chêne et al., 1986a, pl.127, figs.4–7; Fensome et al., 1993a, figs.1,3–4 — p.1089; figs.1,4–5 — p.1093. **NOW** *Tubotuberella*. Originally *Gonyaulacysta*, subsequently *Dimidiadinium*, thirdly (and now) *Tubotuberella*. Age: Oxfordian.

"sphaerocephalum" (Vozzhennikova, 1967, p.181, pl.103, figs.1a–b,2,3a–b; pl.104, figs.4,5a–b) Brideaux, 1977, p.38. Holotype: Vozzhennikova, 1967, pl.103, fig.2; Lentin and Vozzhennikova, 1990, text-fig.55; lost according to Lentin and Vozzhennikova (1990, p.98). Originally *Tubotuberella*, subsequently *Dimidiadinium*. **Taxonomic senior synonym:** *Gonyaulax* (as and now *Gonyaulacysta*) *eisenackii*, according to Sarjeant (1982b, p.32). Brenner (1988, p.93) considered *Leptodinium* (now *Tubotuberella*) *egemenii* and *Gonyaulacysta* (now *Tubotuberella*) *vozhennikovae*, to be questionable taxonomic junior synonyms of this species. According to Lentin and Vozzhennikova (1990, p.98), no potential lectotype is available. Age: Late Jurassic.

"uncinatum" Brideaux, 1977, p.38–39, pl.15, figs.2–5,7–8. Holotype: Brideaux, 1977, pl.15, figs.2–5; Jan du Chêne et al., 1986a, pl.127, figs.1–3. **NOW** *Tubotuberella*. Originally *Dimidiadinium*, subsequently (and now) *Tubotuberella*. Age: Hauterivian–Barremian.

DIMIDIUM Pearce, 2010, p.56–57. Type: Clarke and Verdier, 1967, pl.4, figs.11–13, as *Gonyaulacysta striata*.

**striata* (Clarke and Verdier, 1967, p.31, pl.4, figs.11–13; pl.5, fig.15; text-fig.12) Pearce, 2010, p.57. Holotype: Clarke and Verdier, 1967, pl.4, figs.11–13, Jan du Chêne et al., 1986a, pl.88, figs.9–11. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Impagidinium*, fourthly *Pterodinium*, fifthly (and now) *Dimidium*. Age: Santonian.

DIMORPHOSPHAERA Keupp, 1979a, p.21. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299). Type: Keupp, 1979a, pl.3, figs.1–2, as *Dimorphosphaera aequatoriana*.

**aequatoriana* Keupp, 1979a, p.21,23, pl.3, figs.1–3. Holotype: Keupp, 1979a, pl.3, figs.1–2. Taxonomic junior synonym: *Dimorphosphaera pogonias*, according to Keupp (1981, p.26). Age: early Barremian.

"*pogonias*" Keupp, 1979c, p.658,660, pl.6, figs.13–15. Holotype: Keupp, 1979c, pl.6, figs.13–15. **Taxonomic senior synonym:** *Dimorphosphaera aequatoriana*, according to Keupp (1981, p.26). Age: middle Barremian.

DINAURELIA Wille and Gocht, 1985, p.129–131,133–135. Taxonomic senior synonym: *Rosswangia*, according to Below (1987b, p.29) — however, Stover and Williams (1987, p.79) retained *Dinaurelia*. Type: Wille and Gocht, 1985, pl.1, figs.1a–d, as *Dinaurelia pyrgos*.

**pyrgos* Wille and Gocht, 1985, p.129–131,133–135, pl.1, figs.1a–d,2–3; pl.2, figs.1a–d,2a–b,3,4a–b; pl.3, figs.1a–b,2–5; pl.4, figs.1a–b,2,3a–c,4a–b,5; pl.5, figs.1a–b; text-figs.1A–C,2A–B,3A–B,4A–B,5A–B,6B. Holotype: Wille and Gocht, 1985, pl.1, figs.1a–d; text-figs.2A–B; Fensome et al., 1995, figs.1–4,10 — p.1719. Originally (and now) *Dinaurelia*, subsequently *Rosswangia*. N.I.A. Age: late Bajocian.

DINGODINIUM Cookson and Eisenack, 1958, p.39. Emendations: Mehrotra and Sarjeant, 1984b, p.295; Stover and Helby (1987d, p.281) as a revised description. Taxonomic junior synonym: *Parvocavatus*, according to Fisher and Riley (1980, p.319–320). Type: Cookson and Eisenack, 1958, pl.1, fig.10, as *Dingodinium jurassicum*.

"*albertii*" Sarjeant, 1966c, p.210–211, pl.21, fig.3; pl.23, fig.1. Holotype: Sarjeant, 1966c, pl.21, fig.3. **Taxonomic senior synonym:** *Dingodinium cerviculum*, according to Haskell (1970, p.60) and Khowaja-Ateequzzaman et al. (1990, p.274). Questionable assignment: Sarjeant (1966c, p.210); however, Duxbury (1977, p.29) retained this species in *Dingodinium* without question. Age: early Barremian.

cerviculum Cookson and Eisenack, 1958, p.40, pl.1, figs.12–14. Emendations: Mehrotra and Sarjeant, 1984b, p.296–300; Khowaja-Ateequzzaman et al., 1990, p.274. Holotype: Cookson and Eisenack, 1958, pl.1, fig.14. Taxonomic junior synonym: *Dingodinium? albertii*, according to Haskell (1970, p.60) and Khowaja-Ateequzzaman et al. (1990, p.274). Age: late Neocomian–Aptian.

?*cooksoniae* Pocock, 1972, p.99, pl.23, fig.9; text-fig.16. Holotype: Pocock, 1972, pl.23, fig.9; Jansonius, 1986, pl.5, figs.4–5; text-fig.7. Originally *Dingodinium*, subsequently (and now) *Dingodinium?*. Questionable assignment: Jansonius (1986, p.207). Age: Oxfordian–Kimmeridgian.

europaeum Eisenack, 1958a, p.392–393, pl.24, fig.4. Emendation: Sarjeant, 1985a, p.85,87. Holotype: Eisenack, 1958a, pl.24, fig.4. Age: late Aptian.

?*exiguum* Lentin and Williams, 1981, p.84. Holotype: Jiabo, 1978, pl.6, fig.11. Originally *Dingodinium minutum* (name illegitimate), subsequently *Dingodinium exiguum*, thirdly (and now) *Dingodinium? exiguum*. Questionable assignment: Stover and Helby (1987d, p.282). Substitute name for *Dingodinium minutum* Jiabo, 1978, p.87, pl.6, fig.11 (an illegitimate name). Age: Early Tertiary.

harsveldtii Herngreen et al., 1984, p.8,10–11, pl.1, figs.4–8. Holotype: Herngreen et al., 1984, pl.1, figs.4–5. Age: middle Callovian–?Portlandian.

**jurassicum* Cookson and Eisenack, 1958, p.39, pl.1, figs.10–11. Holotype: Cookson and Eisenack, 1958, pl.1, fig.10; Helby et al., 1987, fig.18F. Age: Late Jurassic.

?*magnum* Jiabo, 1978, p.87, pl.6, fig.21. Holotype: Jiabo, 1978, pl.6, fig.21. Originally *Dingodinium*, subsequently (and now) *Dingodinium*?. Questionable assignment: Stover and Helby (1987d, p.282). Age: Early Tertiary.

minutum Dodekova, 1975, p.25, pl.5, figs.13–15. Emendation: Poulsen, 1996, p.82. Holotype: Dodekova, 1975, pl.5, figs.13–15. Junior homonym: *Dingodinium minutum* Jiabo, 1978. Taxonomic junior synonym: *Dingodinium scabratum*, according to Poulsen (1996, p.82). Age: late Bathonian.

"*minutum*" Jiabo, 1978, p.87, pl.6, fig.11. Holotype: Jiabo, 1978, pl.6, fig.11. **Name illegitimate** — **senior homonym**: *Dingodinium minutum* Dodekova, 1975. **Substitute name**: *Dingodinium? exiguum*. Originally *Dingodinium minutum* Jiabo, 1978 (name illegitimate), subsequently *Dingodinium exiguum*, thirdly (and now) *Dingodinium? exiguum*. Age: Early Tertiary.

?*ovatum* Jiabo, 1978, p.87, pl.6, fig.18. Holotype: Jiabo, 1978, pl.6, fig.18. Originally *Dingodinium*, subsequently (and now) *Dingodinium*?. Questionable assignment: Stover and Helby (1987d, p.282). Age: Early Tertiary.

"*pakistanicum*" Beju, 1978, p.4. **Name not validly published**: no description or illustration.

sanmartinoi Pöthe de Baldis and Ramos, 1983, p.437–438, pl.2, figs.1–2. Holotype: Pöthe de Baldis and Ramos, 1983, pl.2, figs.1–2. Age: early Aptian.

"*scabratum*" (Kumar, 1986b, p.399, pl.5, fig.3; pl.6, figs.4,6; text-fig.9) Lentin and Williams, 1989, p.111. Holotype: Kumar, 1986b, pl.6, fig.6. Originally *Parvocavatus*, subsequently *Dingodinium*. **Taxonomic senior synonym**: *Dingodinium minutum* Dodekova, according to Poulsen (1996, p.82). Age: Kimmeridgian–Tithonian.

?*spinosum* (Duxbury, 1977, p.46–47, pl.9, fig.3; text-fig.17) Davey, 1979c, p.60. Holotype: Duxbury, 1977, pl.9, fig.3; text-fig.17. Originally *Parvocavatus*, subsequently *Dingodinium*, thirdly (and now) *Dingodinium*?. Questionable assignment: Stover and Helby (1987d, p.282). This combination, as "*Dingodinium spinatum*", was not validly published in Fisher and Riley (1976, p.52), since these authors did not fully reference the basionym. Age: late Berriasian.

subtile Pestchevitskaya, 2006, p.S644–645, pl.7, figs.2,6–8,10–11; text-fig.3E. Holotype: Pestchevitskaya, 2006, pl.7, fig.2. Age: Berriasian–early Valanginian.

swanense Stover and Helby, 1987a, p.104–105,107, figs.3A–H. Holotype: Stover and Helby, 1987a, figs.3A–B; Fensome et al., 1996, figs.1–2 — p.2393. Age: Kimmeridgian.

tuberosum (Gitmez, 1970, p.307–308, pl.6, fig.9; text-fig.31) Fisher and Riley, 1980, p.319–320. Emendation: Poulsen, 1996, p.83, as *Dingodinium tuberosum*. Holotype: Gitmez, 1970, pl.6, fig.9; text-fig.31. Originally *Parvocavatus*, subsequently (and now) *Dingodinium*, thirdly *Dingodinium*?. Questionable assignment: Stover and Helby (1987d, p.282) — however, Poulsen (1996, p.83) retained this species in *Dingodinium* without question. This combination was not validly published in Fisher and Riley (1976, p.52), since these authors did not fully reference the basionym. Age: early Kimmeridgian.

DINOGYMNIOPSIS Gao Ruiqi et al., 1992a, p.18–19,24–25. Type: Gao Ruiqi et al., 1992a, pl.1, fig.10, as *Dinogymniopsis minor*.

daqingensis Gao Ruiqi et al., 1992b, p.50–51,61–62, pl.9, figs.15–24 ex He Chengquan et al., 2009, p.344. Holotype: Gao Ruiqi et al., 1992b, pl.9, fig.17, designated by He Chengquan et al. (2009, p.344). This name was not validly published in Gao Ruiqi et al. (1992b) as no holotype was designated. Age: Late Cretaceous.

"*granulata*" (Jiabo, 1978, p.94, pl.6, figs.7–8) Gao Ruiqi et al., 1992a, p.19,25. Holotype: Jiabo, 1978, pl.6, fig.7. **NOW** *Tetrachacysta*. Originally *Dinogymnium*, subsequently *Microdinium*, thirdly *Dinogymniopsis*, fourthly (and now) *Tetrachacysta*. Age: Early Tertiary.

**minor* Gao Ruiqi et al., 1992a, p.19,25–26, pl.1, figs.10–16. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.10. Age: Campanian.

"*spinulosa*" Gao Ruiqi et al., 1992a, p.19–20,26, pl.1, figs.7–8. **NOW** *Tetrachacysta*. Originally *Dinogymniopsis*, subsequently (and now) *Tetrachacysta*. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.7. Age: Cenomanian.

torosa Gao Ruiqi et al., 1992a, p.20,26–27, pl.1, fig.9. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.9. Age: Campanian.

"*tuberculata*" Gao Ruiqi et al., 1992a, p.20,27, pl.1, figs.5–6. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.5. **NOW** *Tetrachacysta*. Originally *Dinogymniopsis*, subsequently (and now) *Tetrachacysta*. Age: Cenomanian.

DINOGYMNIUM Evitt et al., 1967, p.4–8. Emendation: Lentin and Vozzhennikova, 1990, p.14. Type: Evitt et al., 1967, pl.1, figs.21–23; pl.2, fig.5; text-figs.16–18, as *Dinogymnium acuminatum*.

**acuminatum* Evitt et al., 1967, p.8–16, pls.1–2; pl.3, figs.1–8,10,12,20; text-figs.11–23. Holotype: Evitt et al., 1967, pl.1, figs.21–23; pl.2, fig.5; text-figs.16–18. Taxonomic junior synonyms: *Gymnodinium* (subsequently *Dinogymnium*) *kasachstanicum* and *Dinogymnium microgranulosum*, both according to Lentin and Vozzhennikova (1990, p.15). Age: Maastrichtian.

aerlicum Londeix et al., 1996, p.380, pl.1, figs.10a–c,11a–c; text-figs.7E–F. Holotype: Londeix et al., 1996, pl.1, figs.11a–c; text-fig.7E. Age: late Berriasian.

albertii Clarke and Verdier, 1967, p.33, pl.17, figs.3–4; text-fig.13. Holotype: Clarke and Verdier, 1967, pl.17, fig.3–4. Age: Santonian.

"?*amphidoxosum*" Jiabo, 1978, p.93, pl.6, fig.2. Holotype: Jiabo, 1978, pl.6, fig.2. **NOW** *Tetrachacysta*. Originally *Dinogymnium?*, subsequently *Microdinium*, thirdly (and now) *Tetrachacysta*. Questionable assignment: Jiabo (1978, p.93). Age: Early Tertiary.

"*assamicum*" Jain et al., 1975, p.4, pl.2, figs.28–29. Holotype: Jain et al., 1975, pl.2, fig.28. **NOW** *Alisogymnium*. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Taxonomic senior synonym: *Gymnodinium* (as *Dinogymnium*) *sphaerocephalum*, according to Jain (1977a, p.133–134) — however, Lentin and Vozzhennikova (1990, p.28) retained *Gymnodinium* (as *Alisogymnium*) *assamicum*. Age: Maastrichtian.

avellana (Lejeune-Carpentier, 1951, p.B309; text-fig.3) Evitt et al., 1967, p.16–17. Emendation: Lejeune-Carpentier and Sarjeant, 1983, p.10–11. Holotype: Lejeune-Carpentier, 1951, text-fig.3; Streel et al., 1977, pl.2, fig.7. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Boltenhagen (1977, p.76) also proposed this combination. N.I.A. Age: Maastrichtian.

biconicum Jain and Millepied, 1975, p.136, pl.1, figs.3–4. Holotype: Jain and Millepied, 1975, pl.1, fig.4. Age: Campanian–Maastrichtian.

"*cavituberculatum*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.66–67, pl.7, figs.11–12. Holotype: Liu Zhili et al., 1992, pl.7, fig.11. **Taxonomic senior synonym:** *Tetrachacysta tuberculata*, according to He Chengquan et al. (2009, p.377). Age: Early Tertiary.

"*cerviculum*" Cookson and Eisenack, 1970a, p.138, pl.10, fig.6. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.6; Lentin and Vozzhennikova, 1990, Appendix A, fig.34. **NOW** *Alisogymnium*. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Senonian.

"*cooksoniae*" Boltenhagen, 1977, p.75–76, pl.11, figs.5a–c,6–7. Holotype: Boltenhagen, 1977, pl.11, figs.5a–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.40. **NOW** *Amphigymnium*. Originally *Dinogymnium*, subsequently (and now) *Amphigymnium*. Age: Campanian.

cretaceum (Deflandre, 1936b, p.164–165, pl.2, figs.1–3) Evitt et al., 1967, p.17–18. Holotype: Deflandre, 1934, figs.9–10; Deflandre, 1935, pl.5, figs.6–7; text-figs.4–5; Deflandre, 1936b, pl.2, figs.1–2. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Age: ?Senonian.

"subsp. *undulacostatum*" (Boltenhagen, 1977, p.68–69, pl.10, figs.1a–c,2a–b,3a–b,4a–b,5a–b) Lentin and Williams, 1981, p.85. **Combination not validly published**: holotype not designated. Originally *Dinogymnium cretaceum* var. *undulacostatum* (name not validly published), subsequently *Dinogymnium cretaceum* subsp. *undulacostatum* (combination not validly published). Age: Turonian–Maastrichtian.

"var. *undulacostatum*" Boltenhagen, 1977, p.68–69, pl.10, figs.1a–c,2a–b,3a–b,4a–b,5a–b. **Name not validly published**: holotype not designated. Originally *Dinogymnium cretaceum* var. *undulacostatum* (name not validly published), subsequently *Dinogymnium cretaceum* subsp. *undulacostatum* (combination not validly published). Age: Turonian–Maastrichtian.

"*curvatum*" (Vozzhennikova, 1967, p.43, pl.1, figs.10–12; pl.4, figs.2–3) Lentin and Williams, 1973, p.48. Holotype: Vozzhennikova, 1967, pl.1, fig.10; Lentin and Vozzhennikova, 1990, text-fig.5b; lost according to Lentin and Vozzhennikova (1990, p.18). Originally *Gymnodinium* (Appendix B), subsequently *Dinogymnium*. **Taxonomic senior synonym**: *Gymnodinium* (as *Dinogymnium*) *longicorne*, according to Lentin and Vozzhennikova (1990, p.18). Boltenhagen (1977, p.69) also proposed this combination. Age: Senonian.

decorum (Deflandre, 1943, p.503–504, pl.17, fig.2; text-figs.8–9) Evitt et al., 1967, p.18. Holotype: Deflandre, 1943, pl.17, fig.2; text-figs.8–9. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Age: Senonian.

"*deflandrei*" Boltenhagen, 1977, p.67–68, pl.9, figs.1b–c,2a–b,3a–b,4a–b. Holotype: Boltenhagen, 1977, pl.9, figs.1b–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.31. **NOW** *Alisogymnium*. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: late Senonian.

denticulatum (Alberti, 1961, p.5, pl.3, figs.2–3) Evitt et al., 1967, p.18. Holotype: Alberti, 1961, pl.3, fig.2. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Herngreen (1975, p.63) implied that *Dinogymnium undulosum* is a possible taxonomic junior synonym of this species. Boltenhagen (1977, p.73) also proposed this combination. Age: Senonian.

digitus (Deflandre, 1936b, p.166–167, pl.2, figs.4–5) Evitt et al., 1967, p.18–19. Holotype: Deflandre, 1935, text-figs.7–8; Deflandre, 1936b, pl.2, figs.4–5. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. N.I.A. Age: Senonian.

subsp. *crassum* (Vozzhennikova, 1967, p.44, pl.5, figs.3,9–10) Lentin and Williams, 1973, p.49. Holotype: Vozzhennikova, 1967, pl.5, fig.9; Lentin and Vozzhennikova, 1990, text-fig.3; lost according to Lentin and Vozzhennikova (1990, p.16). Originally *Gymnodinium digitus* var. *crassum* (Appendix B), subsequently (and now) *Dinogymnium digitus* subsp. *crassum*. Age: Turonian.

subsp. *digitus*. Autonym. Holotype: Deflandre, 1935, text-figs.7–8; Deflandre, 1936b, pl.2, figs.4–5. N.I.A.

"var. *indicum*" Jain et al., 1975, p.5, pl.1, fig.7; pl.2, figs.18–19. **Name not validly published**: holotype not designated. Age: Maastrichtian.

"*downiei*" Boltenhagen, 1977, p.77–78, pl.11, figs.8a–c,9a–b,10. Holotype: Boltenhagen, 1977, pl.11, figs.8a–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.36. **NOW** *Alisogymnium*. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Campanian–Maastrichtian.

- "elongatum"** May, 1977, p.112,114, pl.2, figs.11–12. Holotype: May, 1977, pl.2, figs.11–12. **NOW** *Yolkinigymnium*. Originally *Dinogymnium*, subsequently (and now) *Yolkinigymnium*. Age: late Campanian–early Maastrichtian.
- "euclaense"** Cookson and Eisenack, 1970a, p.139, pl.10, figs.9–12. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.12; Lentin and Vozzhennikova, 1990, Appendix A, fig.35. **NOW** *Alisogymnium*. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Senonian.
- "evitti"** Boltenhagen, 1977, p.66–67, pl.8, figs.9a–c,10–11. Holotype: Boltenhagen, 1977, pl.8, figs.9a–c; Lentin and Vozzhennikova, 1990, Appendix A, fig.33. **NOW** *Alisogymnium*. Originally *Dinogymnium*, subsequently (and now) *Alisogymnium*. Age: Senonian.
- ?gabonense** (Deflandre, 1965, p.388,390, pl.1, figs.1–9) Lentin and Williams, 1993, p.187. Holotype: Deflandre, 1965, pl.1, figs.1–3. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Questionable assignment: Lentin and Williams (1993, p.187). Age: Tertiary.
- "granulatum"** Jiabo, 1978, p.94, pl.6, figs.7–8. Holotype: Jiabo, 1978, pl.6, fig.7. **NOW** *Tetrachacysta*. Originally *Dinogymnium*, subsequently *Microdinium*, thirdly *Dinogymniopsis*, fourthly (and now) *Tetrachacysta*. Age: Early Tertiary.
- heterocostatum** (Deflandre, 1936b, p.165–166, pl.2, fig.6) Evitt et al., 1967, p.19–20. Holotype: Deflandre, 1935, text-fig.6; Deflandre, 1936b, pl.2, fig.6. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Age: ?Senonian.
- subsp. **heterocostatum**. Autonym. Holotype: Deflandre, 1935, text-fig.6; Deflandre, 1936b, pl.2, fig.6.
- subsp. **kolpaschevii** (Vozzhennikova, 1967, p.45, pl.3, fig.5) Lentin and Williams, 1973, p.49. Holotype: Vozzhennikova, 1967, pl.3, fig.5; Lentin and Vozzhennikova, 1990, pl.3, fig.1; text-fig.4. Originally *Gymnodinium heterocostatum* var. *kolpaschevi* (Appendix B), subsequently (and now) *Dinogymnium heterocostatum* subsp. *kolpaschevii*. Lentin and Vozzhennikova (1990, p.17) provided an "expanded description" for this taxon. Age: Senonian.
- ?hexagonum** (Deflandre-Rigaud, 1954, p.58, text-figs.1–2) Evitt et al., 1967, p.20. Holotype: Deflandre-Rigaud, 1954, text-figs.1–2. Originally *Gymnodinium* (Appendix B), subsequently *Dinogymnium*, thirdly (and now) *Dinogymnium?*. Questionable assignment: Stover and Evitt (1978, p.38) as a problematic species. Age: Campanian–?Maastrichtian.
- "hyalinum"** (Vozzhennikova, 1967, p.45, pl.1, fig.9; pl.2, fig.6; pl.3, fig.4; pl.5, fig.11) Lentin and Williams, 1973, p.49. Holotype: Vozzhennikova, 1967, pl.3, fig.4; Lentin and Vozzhennikova, 1990, pl.2, fig.8; text-fig.7; lost according to Lentin and Vozzhennikova (1990, p.21). Originally *Gymnodinium* (Appendix B), subsequently *Dinogymnium*. **Taxonomic senior synonym:** *Gymnodinium* (as *Dinogymnium*) *nelsonense*, according to Lentin and Vozzhennikova (1990, p.21). Age: Senonian.
- "kasachstanicum"** (Vozzhennikova, 1967, p.45–46, pl.2, figs.4a–b; pl.3, figs.9a–b) Lentin and Williams, 1973, p.49. Holotype: Vozzhennikova, 1967, pl.2, figs.4a–b; pl.3, figs.9a–b; Lentin and Vozzhennikova, 1990, pl.1, figs.3–7; text-fig.2. Originally *Gymnodinium* (Appendix B), subsequently *Dinogymnium*. **Taxonomic senior synonym:** *Dinogymnium acuminatum*, according to Lentin and Vozzhennikova (1990, p.15). Age: Campanian–Maastrichtian.
- "lamareense"** Jaramillo and Yepes, 1994, p.5–6, pl.2, figs.13–18. Holotype: Jaramillo and Yepes, 1994, pl.2, figs.13–15. **Name not validly published:** lodgment of holotype not specified. Age: Santonian.
- "lanceolatum"** May, 1977, p.115, pl.2, figs.9–10. Holotype: May, 1977, pl.2, figs.9–10; Lentin and Vozzhennikova, 1990, Appendix A, fig.41. **NOW** *Yolkinigymnium*. Originally *Dinogymnium*, subsequently (and now) *Yolkinigymnium*. Age: late Campanian–early Maastrichtian.

laticinctum (Deflandre, 1943, p.501,503, pl.17, fig.3; text-fig.11) Evitt et al., 1967, p.20. Holotype: Deflandre, 1943, pl.17, fig.3; text-fig.11. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Boltenhagen (1977, p.74) also proposed this combination. Age: ?Senonian.

longicorne (Vozzhennikova, 1967, p.46, pl.1, fig.8; pl.3, fig.6; pl.4, figs.6a–b,7) Harland, 1973, p.678. Emendation: Lentin and Vozzhennikova, 1990, p.18–19, as *Dinogymnium longicorne*. Holotype: Vozzhennikova, 1967, pl.1, fig.8; Lentin and Vozzhennikova, 1990, pl.2, figs.1–2; text-fig.5a. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Taxonomic junior synonym: *Gymnodinium* (as *Dinogymnium*) *curvatum*, according to Lentin and Vozzhennikova (1990, p.18). Lentin and Williams (1973, p.49) also proposed this combination. Age: Senonian.

majus Jain and Millepied, 1975, p.135–136, pl.1, figs.1–2. Holotype: Jain and Millepied, 1975, pl.1, fig.2. Age: Campanian–Maastrichtian.

marthae (Deflandre, 1943, p.500, pl.17, fig.1; text-figs.1–4) Evitt et al., 1967, p.21. Holotype: Deflandre, 1943, pl.17, fig.1; text-figs.1–4. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Age: Senonian.

"microgranulosum" Clarke and Verdier, 1967, p.34–35, pl.5, figs.7–10; text-fig.14. Holotype: Clarke and Verdier, 1967, pl.5, fig.9. **Taxonomic senior synonym:** *Dinogymnium acuminatum*, according to Lentin and Vozzhennikova (1990, p.15). Age: Santonian.

"mitratum" (Vozzhennikova, 1967, p.40, pl.1, figs.2–3; pl.5, figs.1–2,4) Lentin and Williams, 1973, p.49. Emendation: Lentin and Vozzhennikova, 1990, p.29–30, as *Amphigymnium mitratum*. Holotype: Vozzhennikova, 1967, pl.1, fig.2; Lentin and Vozzhennikova, 1990, pl.1, figs.10–11; text-fig.12; Appendix A, fig.38. **NOW** *Amphigymnium*. Originally *Amphidinium* (Appendix B), subsequently *Dinogymnium*, thirdly (and now) *Amphigymnium*. Age: Turonian–Senonian.

muticum (Vozzhennikova, 1967, p.46–47, pl.1, figs.6–7; pl.2, fig.9) Lentin and Williams, 1973, p.49. Emendation: Lentin and Vozzhennikova, 1990, p.19–20, as *Dinogymnium muticum*. Holotype: Vozzhennikova, 1967, pl.1, fig.6; Lentin and Vozzhennikova, 1990, text-fig.6a; lost according to Lentin and Vozzhennikova (1990, p.19). Neotype: Vozzhennikova, 1967, pl.1, fig.7; Lentin and Vozzhennikova, 1990, pl.2, figs.13–14; text-fig.6b; designated by Lentin and Vozzhennikova (1990, p.20). Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Age: Senonian.

nelsonense (Cookson, 1956, p.183, pl.1, figs.8–11) Evitt et al., 1967, p.21–23. Holotype: Cookson, 1956, pl.1, fig.10; Helby et al., 1987, fig.42C; Lentin and Vozzhennikova, 1990, pl.2, fig.8. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Taxonomic junior synonym: *Gymnodinium* (as *Dinogymnium*) *hyalinum*, according to Lentin and Vozzhennikova (1990, p.21). Age: Senonian.

"ovatum" Jiabo, 1978, p.94, pl.6, fig.1. Holotype: Jiabo, 1978, pl.6, fig.1. **NOW** *Tianjinella ovata*. Originally *Dinogymnium ovatum*, subsequently *Microdinium jiaboense*, thirdly (and now) *Tianjinella ovata*. Age: Early Tertiary.

"parvatum" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.67, pl.7, figs.26–28. Holotype: Liu Zhili et al., 1992, pl.7, fig.26. **NOW** *Tetrachacysta*. Originally *Dinogymnium*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

pustulicostatum May, 1977, p.115–118, pl.1, figs.1–13; pl.3, figs.1,3a–b,4a–b. Holotype: May, 1977, pl.1, figs.2–3. Age: late Campanian–early Maastrichtian.

"rigaudiae" Boltenhagen, 1977, p.73, pl.11, figs.1a–b,2–4. Holotype: Boltenhagen, 1977, pl.11, figs.1a–b; Lentin and Vozzhennikova, 1990, Appendix A, fig.39. **NOW** *Amphigymnium*. Originally *Dinogymnium*, subsequently (and now) *Amphigymnium*. Age: Campanian–Maastrichtian.

rugosum Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.67, pl.7, figs.13–16; text-fig.3. Holotype: Liu Zhili et al., 1992, pl.7, fig.14; text-fig.3. Age: Early Tertiary.

sibiricum (Vozzhennikova, 1967, p.47–48, pl.2, figs.2,3a–b; pl.3, figs.2–3) Lentin and Williams, 1973, p.50. Emendation: Lentin and Vozzhennikova, 1990, p.21–22, as *Dinogymnium sibiricum*. Holotype: Vozzhennikova, 1967, pl.3, figs.2–3; Lentin and Vozzhennikova, 1990, text-fig.8; lost according to Lentin and Vozzhennikova (1990, p.22). Lectotype: Vozzhennikova, 1967, pl.2, fig.2, designated by Lentin and Vozzhennikova (1990, p.22). Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. The combination *Dinogymnium sibiricum* was not validly published in Evitt et al. (1967, p.23), since the name *Gymnodinium sibiricum* was not validly published in Vozzhennikova (1963, text-fig.49b). Vozzhennikova (1967) validly published the species name. Age: Senonian.

"**sphaerocephalum**" (Vozzhennikova, 1967, p.48, pl.2, fig.7; pl.3, fig.1) Lentin and Williams, 1973, p.50. Emendation: Lentin and Vozzhennikova, 1990, p.25–26, as *Alisogymnium sphaerocephalum*. Holotype: Vozzhennikova, 1967, pl.3, fig.1; Lentin and Vozzhennikova, 1990, Appendix A, fig.30. **NOW** *Alisogymnium*. Originally *Gymnodinium* (Appendix B), subsequently *Dinogymnium*, thirdly (and now) *Alisogymnium*. Taxonomic junior synonym: *Dinogymnium assamicum*, according to Jain (1977a, p.133–134) — however, Lentin and Vozzhennikova (1990, p.28) retained *Dinogymnium* (as *Alisogymnium*) *assamicum*. Age: Senonian.

"subsp. **laeve**" (Vozzhennikova, 1967, p.48, pl.1, fig.4; pl.2, fig.5) Lentin and Williams, 1973, p.50. Emendation: Lentin and Vozzhennikova, 1990, p.26–27, as *Alisogymnium laeve*. Holotype: Vozzhennikova, 1967, pl.2, fig.5; Lentin and Vozzhennikova, 1990, pl.2, fig.7a; lost according to Lentin and Vozzhennikova (1990, p.26). Neotype: Harland, 1973, pl.85, figs.2–3 as *Dinogymnium* (originally *Gymnodinium*) *longicorne*; Lentin and Vozzhennikova, 1990, pl.2, fig.76; designated by Lentin and Vozzhennikova (1990, p.27). **NOW** *Alisogymnium laeve*. Originally *Gymnodinium sphaerocephalum* var. *laeve* (Appendix B), subsequently *Dinogymnium sphaerocephalum* subsp. *laeve*, thirdly (and now) *Alisogymnium laeve*. Age: Senonian.

"subsp. **sphaerocephalum**". Autonym. Holotype: Vozzhennikova, 1967, pl.3, fig.1; Lentin and Vozzhennikova, 1990, Appendix A, fig.30. **Now redundant**.

strombomorphum (Deflandre, 1943, p.501, pl.17, figs.4–6; text-figs.5–7) Evitt et al., 1967, p.23. Holotype: Deflandre, 1943, pl.17, figs.4–6; text-figs.5–7. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Age: ?Senonian.

undulosum Cookson and Eisenack, 1970a, p.138, pl.10, fig.3. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.3. Hemgreen (1975, p.63) implied that *Gymnodinium* (as *Dinogymnium*) *denticulatum* is the possible taxonomic senior synonym of this species. Age: Senonian.

"**velutinum**" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.68, pl.7, figs.20,24–25. Holotype: Liu Zhili et al., 1992, pl.7, fig.20. **Taxonomic senior synonym:** *Tetrachacysta spinulosa*, according to He Chengquan et al. (2009, p.377). Age: Early Tertiary.

vergonsense Londeix et al., 1996, p.377,379, pl.1, figs.1–3; text-fig.7A. Holotype: Londeix et al., 1996, pl.1, fig.1; text-fig.7A. Age: early Hauterivian.

vozhennikovae Lentin and Williams, 1973, p.50. Emendation: Lentin and Vozzhennikova, 1990, p.23, as *Dinogymnium vozhennikovae*. Holotype: Vozzhennikova, 1967, pl.5, fig.7; Lentin and Vozzhennikova, 1990, pl.3, figs.2–3; text-fig.9. Originally *Gymnodinium albertii* (Appendix B), subsequently (and now) *Dinogymnium vozhennikovae*. Substitute name for *Gymnodinium albertii* Vozzhennikova, 1967, p.41–42, pl.5, figs.7–8; the name *Dinogymnium albertii* is preoccupied. Age: Turonian.

westralium (Cookson and Eisenack, 1958, p.25, pl.1, fig.9) Evitt et al., 1967, p.23–24. Emendation: May, 1977, p.118, as *Dinogymnium westralium*. Holotype: Cookson and Eisenack, 1958, pl.1, fig.9. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Dinogymnium*. Age: Senonian.

DINOPTERYGIUM Deflandre, 1935, p.231. Emendations: Stover and Evitt, 1978, p.204–205; Fensome et al., 2009, p.27–28. Taxonomic junior synonyms: *Oodnadattia*, according to Norris and Sarjeant (1965, p.44), Lentin and Williams (1985, p.259), and Fensome et al. (2009, p.27); *Toolongia*, according to Stover and Evitt (1978, p.205); *Glossodinium*, by implication in Drugg (1978, p.67), who transferred the "type species" of *Glossodinium*, *Glossodinium dimorphum*, to *Dinopterygium* — however, Courtinat in Courtinat and Gaillard (1980, p.30) and Poulsen (1992b, p.45) retained *Glossodinium*; *Xiphophoridium*, according to Fensome et al. 2009, p.27. Type: Deflandre, 1935, pl.8, fig.6, as *Dinopterygium cladoides*.

"**?absidatum**" Drugg, 1978, p.66–67, pl.4, figs.7–9. Emendation: Riding, 1987b, p.60,62, as *Limbodinium absidatum*. Holotype: Drugg, 1978, pl.4, fig.7; Riding, 1987b, pl.1, fig.7; Fensome et al., 1993a, fig.1 — p.871. **NOW** *Limbodinium*. Originally *Dinopterygium*, subsequently *Dinopterygium?*, thirdly (and now) *Limbodinium*. Questionable assignment: Riding (1987a, p.260). Age: early Oxfordian.

alatum (Cookson and Eisenack, 1962b, p.487–488, pl.2, figs.1–4) Fensome et al., 2009, p.28. Emendation: Sarjeant, 1966b, p.147, as *Xiphophoridium alatum*. Holotype: Cookson and Eisenack, 1962b, pl.2, fig.1; Fensome et al., 1993a, fig.1 — p.893; Fauconnier and Masure, 2004, pl.80, fig.6. Originally *Hystriochodinium*, subsequently *Xiphophoridium*, thirdly *Pyramidium* (combination illegitimate since generic name illegitimate), fourthly *Oodnadattia*, fifthly (and now) *Dinopterygium*. Age: Albian–Cenomanian.

asteriforme (Yun Hyesu, 1981) Williams and Fensome, 2016, p.140. Holotype: Yun Hyesu, 1981, pl.8, fig.9; Fensome et al., 1991, fig.2 — p.575; Fauconnier and Masure, 2004, pl.80, fig.4. Originally *Xiphophoridium*, subsequently (and now) *Dinopterygium*. Age: early Santonian.

"bicuneatum" (Deflandre, 1939a, p.180, pl.8, fig.7 ex Sarjeant, 1967b, p.248) Lentin and Williams, 1981, p.87. Holotype: Deflandre, 1939a, pl.8, fig.7. **NOW** *Cornudinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Scriniodinium*, thirdly *Glossodinium*, fourthly *Dinopterygium*, fifthly (and now) *Cornudinium*. Age: Oxfordian.

***cladoides** Deflandre, 1935, p.231, pl.8, fig.6. Holotype: Deflandre, 1935, pl.8, fig.6; Deflandre, 1936b, pl.8, figs.1–2. Taxonomic junior synonym: *Toolongia* (as *Dinopterygium*) *medusoides*, according to Yun Hyesu (1981, p.71); *Oodnadattia tuberculata*, according to Clarke and Verdier (1967, p.36) — however, Stover and Evitt (1978, p.205) retained *Oodnadattia* (as *Dinopterygium*) *tuberculata*. A full description of this species was given in Deflandre (1936b, p.181–182). Age: Senonian.

"cooksoniae" (Kimyai, 1966, p.471, pl.2, fig.21) Lentin and Williams, 1973, p.50. Holotype: Kimyai, 1966, pl.2, fig.21. Originally *Oodnadattia*, subsequently *Dinopterygium*. **Taxonomic senior synonym:** *Oodnadattia* (now *Dinopterygium*) *tuberculata*, according to Below (1981a, p.107). Age: Cenomanian.

"dimorphum" (Ioannides et al., 1977, p.453, pl.2, figs.13–14; text-fig.8) Drugg, 1978, p.67. Holotype: Ioannides et al., 1977, pl.2, fig.13. **NOW** *Glossodinium*. Originally (and now) *Glossodinium*, subsequently *Dinopterygium*. Age: Kimmeridgian.

"fehmarne" (Lentin and Williams, 1973, p.67) Stover and Evitt, 1978, p.205. **Name not validly published:** no holotype designated. **NOW** *Heteraulacacysta*. Originally *Heteraulacacysta* (name not validly published), subsequently *Dinopterygium* (name not validly published), thirdly (and now) *Heteraulacacysta*. Age: early Eocene.

konradense Prössl, 1990, p.101–102, pl.18, figs.3,5; pl.19, figs.1,3 ex Prössl, 1992b, p.113–114. Holotype: Prössl, 1990, pl.18, figs.3,5. This name was not validly published in Prössl (1990, p.101–102), since that author did not specify the lodgment of the holotype. Age: middle Cenomanian–late Turonian.

"medusoides" (Cookson and Eisenack, 1960a, p.14, pl.3, figs.11–12) Stover and Evitt, 1978, p.205. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.11. Originally *Toolongia*, subsequently *Dinopterygium*. **Taxonomic senior synonym:** *Dinopterygium cladoides*, according to Yun Hyesu (1981, p.71). Age: Senonian.

"perforatum" Clarke and Verdier, 1967, p.36–37, pl.6, figs.1–3; text-fig.15. Emendations: Davey and Verdier, 1971, p.30, as *Pterodinium perforatum*; Below, 1981a, p.23–24 and Masure, 1988a, p.363–364, both as *Maghrebinia perforata*. Holotype: Clarke and Verdier, 1967, pl.6, figs.1–2; Masure, 1988a, pl.1, figs.1–9; text-figs.1a–b; Fensome et al., 1995, figs.1–2 — p.1653; Fauconnier and Masure, 2004, pl.10, figs.5–6. **NOW** *Atopodinium*. Originally *Dinopterygium*, subsequently *Pterodinium*, thirdly *Pterodinium?*, fourthly *Maghrebinia*, fifthly (and now) *Atopodinium*. Age: early Cenomanian.

pterophorum (Deflandre and Courteville, 1939, p.102, pl.2, figs.4–5) Lentin and Williams, 1981, p.88. Holotype: Deflandre and Courteville, 1939, pl.2, figs.4–5. Originally *Hystriosphera*, subsequently *Cymatiosphaera* (Appendix A), thirdly *Oodnadattia*, fourthly (and now) *Dinopterygium*. Age: Senonian.

reticulatum Singh, 1983, p.156, pl.57, figs.8–10. Holotype: Singh, 1983, pl.57, fig.8. Age: early Cenomanian.

tuberculatum (Eisenack and Cookson, 1960, p.6–7, pl.2, figs.10–14; text-fig.1) Stover and Evitt, 1978, p.205. Holotype: Eisenack and Cookson, 1960, pl.2, fig.10; Helby et al., 1987, fig.38G. Originally *Oodnadattia*, subsequently (and now) *Dinopterygium*. Taxonomic senior synonym: *Dinopterygium cladoides*, according to Clarke and Verdier (1967, p.36) — however, Stover and Evitt (1978, p.205) retained *Dinopterygium tuberculatum*. Taxonomic junior synonyms: *Oodnadattia cooksoniae* and *Leptodinium? micropunctatum*, both according to Below (1981a, p.107) — however, Lentin and Williams (1981, p.173) retained *Leptodinium? micropunctatum*. Age: Albian.

"verriculum" Piasecki, 1980, p.66–67, pl.1, figs.4–8; pl.5, figs.5–6. Holotype: Piasecki, 1980, pl.1, figs.7–8. **NOW** *Gramocysta*. Originally *Dinopterygium*, subsequently *Heteraulacacysta*, thirdly (and now) *Gramocysta*. Age: late Miocene.

DIOXYA Cookson and Eisenack, 1958, p.59. Emendation: Morgan, 1977, p.131. Taxonomic junior synonym: *Vozzhennikovia*, according to Morgan (1977, p.131) — however, Lentin and Williams (1981, p.88) retained *Vozzhennikovia*. Type: Cookson and Eisenack, 1958, pl.11, fig.11; text-fig.20, as *Dioxya armata*.

"apertura" (Wilson, 1967a, p.64–65, figs.3–5,8) Morgan, 1977, p.131. Holotype: Wilson, 1967a, figs.3–4; Fensome et al., 1993a, figs.1–2 — p.925. **NOW** *Vozzhennikovia*. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*, thirdly *Dioxya*. N.I.A. Age: Paleocene–Oligocene.

***armata** Cookson and Eisenack, 1958, p.59, pl.11, fig.11; text-fig.20. Emendation: Morgan, 1977, p.131–132. Holotype: Cookson and Eisenack, 1958, pl.11, fig.11; text-fig.20. Age: Albian.

"denticulata" Pöthe de Baldis and Ramos, 1983, p.438, pl.2, figs.7,11; pl.4, fig.2. Holotype: Pöthe de Baldis and Ramos, 1983, pl.2, figs.7,11; pl.4, fig.2. **NOW** *Spinidinium argentinium*. Originally *Dioxya denticulata*, subsequently (and now) *Spinidinium argentinium*, thirdly *Magallanesium denticulatum*. *Spinidinium argentinium* is a substitute name, since the epithet "*denticulatum*" is preoccupied in *Spinidinium*. Age: early Aptian.

"?extensa" (Stover, 1974, p.178–179, pl.5, figs.4a–c,5a–d,6) Morgan, 1977, p.131. Holotype: Stover, 1974, pl.5, figs.4a–c; Fensome et al., 1993a, figs.1–3 — p.1167. **NOW** *Gippslandia*. Originally *Deflandrea*, subsequently *Vozzhennikovia?*, thirdly *Dioxya?*, fourthly *Lentinia*, fifthly (and now) *Gippslandia*. Questionable assignment: Morgan (1977, p.121). Age: middle-late Eocene.

"filigrana" (Benedek, 1972, p.12–13, pl.4, figs.3a–b) Morgan, 1977, p.131. Holotype: Benedek, 1972, pl.4, figs.3a–b; Benedek and Sarjeant, 1981, figs.4,8, nos.1–2. **NOW** *Phthanoperidinium*. Originally *Deflandrea?*, subsequently *Vozzhennikovia?*, thirdly *Dioxya*, fourthly (and now) *Phthanoperidinium*. Age: middle Oligocene.

?pignerata Norris, 1986, p.46, pl.14, figs.8–14. Holotype: Norris, 1986, pl.14, fig.12. Questionable assignment: Norris (1986, p.46). Age: Eocene.

"rotunda" (Wilson, 1967a, p.65–66, figs.6–7) Morgan, 1977, p.131. Holotype: Wilson, 1967a, fig.6. **NOW** *Vozzhennikovia*. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*, thirdly *Dioxya*. Age: Eocene.

"tenella" (Morgenroth, 1966b, p.4–5, pl.1, figs.8–9) Morgan, 1977, p.131. Holotype: Morgenroth, 1966b, pl.1, fig.8. **NOW** *Lejeunecysta*. Originally *Lejeunia* (an illegitimate generic name), subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Lejeunecysta*. Age: early Oligocene.

"tenera" (Krutzsch, 1962, p.44, pl.11, figs.20–22; text-fig.1e) Morgan, 1977, p.131. Holotype: Krutzsch, 1962, pl.11, figs.20–22. **NOW** *Geiselodinium*. Originally *Deflandrea?*, subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Geiselodinium*. Age: middle Eocene.

villosa Eisenack and Cookson, 1960, p.10, pl.2, figs.15–16. Emendation: Morgan, 1977, p.134,136, as *Dioxya villosa*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.15; Morgan, 1977, pl.2, figs.6a–b. Originally (and now) *Dioxya*, subsequently *Vozzhennikovia*. Lentin and Williams (1981, p.88) retained this species in *Dioxya*. Age: Albian.

"DIPHASIOSPHAERA" Duxbury, 1980, p.115–116. **Taxonomic senior synonym:** *Hystrichostrogylon*, according to Stover and Williams (1987, p.81). Type: Duxbury, 1980, pl.1, fig.5; text-fig.6, as *Diphassiosphaera stolidota*.

***"stolidota"** Duxbury, 1980, p.116–117, pl.1, figs.5,9; text-fig.6. Emendation: Harding, 1990b, p.29, as *Hystrichostrogylon stolidotum*. Holotype: Duxbury, 1980, pl.1, fig.5; text-fig.6; Fensome et al., 1995, figs.1–3 — p.1803. **NOW** *Hystrichostrogylon*. Originally *Diphassiosphaera*, subsequently (and now) *Hystrichostrogylon*. Age: middle Barremian.

DIPHYES Cookson, 1965a, p.85 nom. cons. Emendations: Davey and Williams, 1966b, p.95–96; Goodman and Witmer, 1985, p.76. Taxonomic junior synonym: *Lingulasphaera*, according to Stover and Evitt (1978, p.38). The proposal by Harris and Fensome (2000, p.281–282) to conserve the name *Diphyes* Cookson against the name *Diphyes* Blume was ratified at the 2005 Botanical Congress). Type: Deflandre and Cookson, 1955, pl.7, fig.3, as *Hystrichosphaeridium colligerum*.

appendiculare Cookson and Eisenack, 1970a, p.149, pl.13, fig.5. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.5; Fauconnier and Masure, 2004, pl.21, figs.5–6. Age: Senonian.

bifidum Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.55, pl.1, figs.4–5. Holotype: Antolinez-Delgado and Oboh-Ikuenobe, 2007, pl.1, fig.4. Age: Paleocene–?earliest Eocene.

brevispinum Bujak, 1994, p.121,123, pl.2, figs.4–6. Holotype: Bujak, 1994, pl.2, figs.4–5. Age: Ypresian.

***colligerum** (Deflandre and Cookson, 1955, p.278–279, pl.7, fig.3) Cookson, 1965a, p.86–87. Emendations: Cookson, 1965a, p.86 and Goodman and Witmer, 1985, p.77–78, both as *Diphyes colligerum*. Holotype: Deflandre and Cookson, 1955, pl.7, fig.3. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Diphyes*. Taxonomic junior synonym: *Diphyes pseudoficusoides* according to Fensome et al. (2009, p.30). Age: early Eocene.

cretaceum Yu Jingxian and Zhang Wangping, 1980, p.111, pl.4, figs.1–2. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.4, fig.2. Age: Cenomanian–early Turonian.

ficusoides Islam, 1983b, p.338, pl.2, figs.8–9. Holotype: Islam, 1983b, pl.2, fig.8; Bujak, 1994, pl.2, fig.1. Age: middle Eocene.

latiusculum Matsuoka, 1974, p.329, pl.44, figs.6a–b. Holotype: Matsuoka, 1974, pl.44, figs.6a–b. Age: early-middle Miocene.

"minus" Yu Jingxian and Zhang Wangping, 1980, p.111–112, pl.4, figs.4–5. Emendation: Mao Shaozhi and Norris, 1988, p.36, as *Coronifera minor*. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.4, fig.5. **NOW** *Coronifera*. Originally *Diphyes*, subsequently (and now) *Coronifera*. Age: Cenomanian–Santonian.

?*monstruosum* (Tasch in Tasch et al., 1964, p.195, pl.1, fig.12) Davey and Williams, 1969, p.7. Holotype: Tasch et al., 1964, pl.1, fig.12. Originally *Hystrichosphaeridium*, subsequently (and now) *Diphyes*?, thirdly *Coronifera*. Fauconnier in Fauconnier and Masure (2004, p.176) questionably retained this species in *Diphyes*. Questionable assignment: Davey and Williams (1969, p.7); and Fauconnier in Fauconnier and Masure (2004, p.176) as a problematic species. Taxonomic senior synonym: *Coronifera oceanica*, according to Below (1982c, p.5) — however. Fauconnier in Fauconnier and Masure (2004, p.176) retained *Hystrichosphaeridium* (as *Diphyes*?) *monstruosum*. This combination was not validly published in Davey and Williams (1966b, p.97), since these authors did not fully reference the basionym. Age: Albian.

"*nudum*" Cookson, 1965a, p.87, pl.10, figs.1–4. Holotype: Cookson, 1965a, pl.10, fig.1. **NOW** *Duosphaeridium*. Originally *Diphyes*, subsequently *Duosphaeridium*. Age: late Eocene.

"*pseudoficusoides*" Bujak, 1994, p.123,125, pl.2, figs.2–3. Holotype: Bujak, 1994, pl.2, fig.3. **Taxonomic senior synonym:** *Diphyes colligerum* according to Fensome et al. (2009, p.30). Age: Ypresian–Lutetian.

recurvatum May, 1980, p.50–51, pl.1, figs.18–20. Holotype: May, 1980, pl.1, figs.18–20. Age: Maastrichtian.

spinula (Drugg, 1970b, p.817–818, figs.10G,11D–E,12A–B) Stover and Evitt, 1978, p.39. Holotype: Drugg, 1970b, fig.11D. Originally *Lingulasphaera*, subsequently (and now) *Diphyes*. N.I.A. Age: early Eocene.

?*xinjiangense* Yu Jingxian and Zhang Wangping, 1980, p.111, pl.4, fig.3. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.4, fig.3. Originally *Diphyes*, subsequently *Diphyes*?. Questionable assignment: Fauconnier in Fauconnier and Masure (2004, p.176). Age: Cenomanian–early Turonian.

"**DIPLOTESTA**" Cookson and Eisenack, 1960b, p.256. **Name illegitimate** — **senior homonym:** *Diplotesta* Brongniart, 1874. **Substitute name:** *Wallodinium*. Type: Cookson and Eisenack, 1960b, pl.39, fig.4, as *Diplotesta glaessneri*.

"*anglica*" Cookson and Hughes, 1964, p.56–57, pl.11, figs.1–5. Holotype: Cookson and Hughes, 1964, pl.11, fig.2. **NOW** *Wallodinium*. Originally *Diplotesta* (generic name illegitimate), subsequently (and now) *Wallodinium*. Following I.C.N. Article 55.1, the species name *Diplotesta anglica* is validly published even though the generic name *Diplotesta* is illegitimate. Age: late Albian–early Cenomanian.

"*bidigitata*" Manum and Cookson, 1964, p.25–26, pl.5, figs.4–6. Holotype: Manum and Cookson, 1964, pl.5, fig.6. **NOW** *Wallodinium*. Originally *Diplotesta* (generic name illegitimate), subsequently (and now) *Wallodinium*. Following I.C.N. Article 55.1, the species name *Diplotesta bidigitata* is validly published even though the generic name *Diplotesta* is illegitimate. Age: Late Cretaceous.

"**glaessneri*" Cookson and Eisenack, 1960b, p.256, pl.39, figs.4–6. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.4. **NOW** *Wallodinium*. Originally *Diplotesta* (generic name illegitimate), subsequently (and now) *Wallodinium*. Following I.C.N. Article 55.1, the species name *Diplotesta glaessneri* is validly published even though the generic name *Diplotesta* is illegitimate. Age: Oxfordian–?Aptian.

"*inflata*" Habib, 1969, p.98, pl.3, figs.14–15; pl.4, fig.2. Holotype: Habib, 1969, pl.3, fig.14. **NOW** *Wallodinium*. Originally *Diplotesta* (generic name illegitimate), subsequently (and now) *Wallodinium*. Following I.C.N. Article 55.1, the species name *Diplotesta inflata* is validly published even though the generic name *Diplotesta* is illegitimate. Age: Albian–Cenomanian.

"*krutzschii*" Alberti, 1961, p.21, pl.7, figs.19–21; pl.12, figs.6–7. Holotype: Alberti, 1961, pl.7, fig.19. **NOW** *Wallodinium*. Originally *Diplotesta* (generic name illegitimate), subsequently (and now) *Wallodinium*. Following I.C.N. Article 55.1, the species name *Diplotesta krutzschii* is validly published even though the generic name *Diplotesta* is illegitimate. Age: Hauterivian–Barremian.

"*luna*" Cookson and Eisenack, 1960a, p.10–11, pl.3, fig.21. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.21. **NOW** *Wallogdinium*. Originally *Diplotesta* (generic name illegitimate), subsequently (and now) *Wallogdinium*. Following I.C.N. Article 55.1, the species name *Diplotesta luna* is validly published even though the generic name *Diplotesta* is illegitimate. N.I.A. Age: ?late Albian–Cenomanian.

"*nodosa*" Ott in Riding and Helby, 2001f, p.157. **Name not validly published**: no description. **Taxonomic senior synonym**: *Indodinium khariense*, according to Riding and Helby (2001f, p.157).

DISCORSIA Duxbury, 1977, p.30. Emendation: Khowaja-Ateequzzaman et al., 1985, p.98. Type: Davey, 1974, pl.4, fig.9, as *Oligosphaeridium nannus*.

flabelliformis Xu Jinli et al., 1997, p.80, pl.19, figs.10–11; pl.20, figs.10–11 ex He Chengquan et al., 2009, p.654. Holotype: Xu Jinli et al., 1997, pl.20, fig.10. This name was not validly published in Xu Jinli et al. (1997), since no English or a Latin description was provided; He Chengquan et al. (2009, p.654) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

**nannus* (Davey, 1974, p.59, pl.4, figs.9–10) Duxbury, 1977, p.31. Emendations: Duxbury, 1977, p.31 and Khowaja-Ateequzzaman et al., 1985, p.98,100, both as *Discorsia nannus*. Holotype: Davey, 1974, pl.4, fig.9; Fensome et al., 1995, fig.1 — p.1619; Fauconnier and Masure, 2004, pl.22, fig.1. Originally *Oligosphaeridium*, subsequently (and now) *Discorsia*. N.I.A. Age: early Barremian.

DISPHAERIA Cookson and Eisenack, 1960a, p.11. Emendation: Norvick, 1973, p.45. Taxonomic junior synonyms: *Thalassiphora*, according to Norvick (1973, p.45) — however, Lentin and Williams (1985, p.353) retained *Thalassiphora*; *Subathua*, by implication in Sarkar and Singh (1988, p.41), who transferred the "type species" of *Subathua*, *Subathua sahnii*, to *Disphaeria* — however, Lentin and Williams (1989, p.354) accepted *Subathua sahnii* as a taxonomic junior synonym of *Adnatosphaeridium* (as *Thalassiphora patulum*). Type: Cookson and Eisenack, 1960a, pl.3, fig.13, as *Disphaeria macropylla*.

"*balcanica*" (Balteş, 1971, p.6, pl.3, figs.3–7) Norvick, 1976, p.99. Holotype: Balteş, 1971, pl.3, figs.3–7. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*, thirdly *Subathua* (combination not validly published), fourthly *Spiniferites*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora pelagica*, according to Stover and Evitt (1978, p.194) — however, Sütő-Szentai (2000, p.162) retained *Thalassiphora* (as *Spiniferites*) *balcanica*. Age: early Pliocene.

"*bononiensis*" (Corradini, 1973, p.185–186, pl.30, figs.5.6a–b,8a–b; pl.37, figs.5a–b; pl.38, fig.1; pl.39, fig.1) Yun Hyesu, 1981, p.70. Holotype: Corradini, 1973, pl.30, figs.6a–b. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Age: Late Cretaceous–Paleocene.

"*defloccata*" (Davey and Verdier, 1973, p.198, pl.3, figs.6,8) Yun Hyesu, 1981, p.70. Holotype: Davey and Verdier, 1973, pl.3, fig.8. **NOW** *Leberidocysta*. Originally *Hexagonifera*, subsequently *Thalassiphora*, thirdly (and now) *Leberidocysta*, fourthly *Disphaeria*, fifthly *Craspedodinium*. Age: late Albian–early Cenomanian.

"*delicata*" (Williams and Downie, 1966c, p.235, pl.26, fig.8) Norvick, 1973, p.46. Emendation: Eaton, 1976, p.287, as *Thalassiphora delicata*. Holotype: Williams and Downie, 1966c, pl.26, fig.8; Bujak et al., 1980, pl.10, fig.8. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Age: early Eocene.

"*flammea*" (Cookson and Eisenack, 1967b, p.252–253, pl.42, figs.1–5) Yun Hyesu, 1981, p.70. Holotype: Cookson and Eisenack, 1967b, pl.42, fig.1. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Age: late Paleocene.

"*hypoflata*" Yun Hyesu, 1981, p.70, pl.9, figs.1–3. Holotype: Yun Hyesu, 1981, pl.9, fig.1; Fensome et al., 1991, fig.1 — p.651. **NOW** *Turnhosphaera*. Originally *Disphaeria*, subsequently (and now) *Turnhosphaera*. Taxonomic junior synonym: *Nelsoniella glomerata* (name not validly published), according to Slimani (2001a, p.194). Age: early Santonian.

***macropylla** Cookson and Eisenack, 1960a, p.11, pl.3, figs.13–14. Emendation: Norvick, 1976, p.99–101. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.13; Helby et al., 1987, fig.38I; Fensome et al., 1996, fig.1 — p.2215. Age: Turonian.

"maxima" (Jain and Millepied, 1975, p.146, pl.4, figs.53–54) Yun Hyesu, 1981, p.70. Holotype: Jain and Millepied, 1975, pl.4, fig.54. **NOW** *Thalassiphora*?. Originally *Thalassiphora*, subsequently (and now) *Thalassiphora*?, thirdly *Disphaeria*. Age: Campanian–Maastrichtian.

munda (Davey and Verdier, 1973, p.196, pl.3, figs.5,7,10) Norvick, 1976, p.99. Holotype: Davey and Verdier, 1973, pl.3, fig.10. Originally *Thalassiphora*, subsequently (and now) *Disphaeria*. Lentin and Williams (1981, p.90) retained this species in *Disphaeria*. Taxonomic senior synonym: *Erikania* (now *Thalassiphora*) *dynamica*, according to Yun Hyesu (1981, p.70) — however, Lentin and Williams (1985, p.353) retained *Thalassiphora munda*. Age: late Albian–Cenomanian.

"pelagica" (Eisenack, 1954b, p.71, pl.12, figs.17–18) Norvick, 1973, p.46. Emendation: Benedek and Sarjeant, 1981, p.59–61, as *Thalassiphora pelagica*. Holotype: Eisenack, 1954b, pl.12, fig.17. **NOW** *Thalassiphora*. Originally *Pterospermopsis* (Appendix A), subsequently (and now) *Thalassiphora*, thirdly *Disphaeria*. Taxonomic junior synonyms: *Thalassiphora sueroi* and *Thalassiphora* (as *Disphaeria*) *balcanica*, both according to Stover and Evitt (1978, p.194) — however, Sütő-Szentai (2000, p.162) retained *Thalassiphora* (as *Spiniferites*) *balcanica*; *Pterocystidiopsis* (as *Thalassiphora*) *velata* and *Adnatosphaeridium* (as *Thalassiphora*) *patulum*, both according to Benedek and Gocht (1981, p.59) — however, Lentin and Williams (1985, p.354) retained *Thalassiphora patula* and Brinkhuis and Biffi (1993, p.179) retained *Pterocystidiopsis* (as and now *Thalassiphora*) *velata*; *Subathua sahnii*, according to Lentin and Williams (1985, p.340) — however, *Subathua sahnii* is now considered to be a taxonomic junior synonym of *Adnatosphaeridium* (as and now *Thalassiphora*) *patulum*; *Subathua spinosa*, according to Lentin and Williams (1985, p.340) — however, Stover and Williams (1987, p.207) retained *Subathua* (as *Thalassiphora*) *spinosa* (now *Thalassiphora simlaensis*). Age: late Eocene–early Oligocene.

"petila" (Corradini, 1973, p.186, pl.31, figs.1–2) Yun Hyesu, 1981, p.70. Emendation: Slimani, 1994, p.68, as *Wilsonisphaera petila*. Holotype: Corradini, 1973, pl.31, fig.2. **NOW** *Wilsonisphaera*. Originally *Thalassiphora*?, subsequently *Disphaeria*, thirdly (and now) *Wilsonisphaera*. Taxonomic junior synonym: *Glaphyrosphaera glabra*, according to Schiøler and Wilson (1995, p.511). Age: Senonian.

"reticulata" (Morgenroth, 1966b, p.6–7, pl.2, figs.1–2) Norvick, 1973, p.46. Holotype: Morgenroth, 1966b, pl.2, figs.1–2; Sarjeant et al., 1987, pl.1, fig.4. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Age: early Oligocene.

"sahnii" (Khanna and Singh, 1980, p.308–309, pl.1, figs.1–3,5–9; text-figs.1–2) Sarkar and Singh, 1988, p.41. Emendation: Sarkar and Singh, 1988, p.41, as *Disphaeria sahnii*. Holotype: Khanna and Singh, 1980, pl.1, fig.2; Fensome et al., 1995, fig.2 — p.1759. Originally *Subathua*, subsequently *Disphaeria*. **Taxonomic senior synonym:** *Adnatosphaeridium* (as and now *Thalassiphora*) *patulum*, according to Stover and Williams (1987, p.207) and Lentin and Williams (1989, p.354). Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Lentin and Williams (1985, p.340) — however, *Subathua sahnii* is now considered a taxonomic junior synonym of *Adnatosphaeridium* (now *Thalassiphora*) *patulum*. Age: Eocene.

"succincta" (Morgenroth, 1966b, p.7–8, pl.2, figs.7–9) Norvick, 1973, p.46. Holotype: Morgenroth, 1966b, pl.2, fig.7. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Age: early Oligocene.

"sueroi" (Pöthe de Baldis, 1966, p.224–225, pl.2, fig.d) Yun Hyesu, 1981, p.70. Holotype: Pöthe de Baldis, 1966, pl.2, fig.d. Originally *Thalassiphora*, subsequently *Disphaeria*. **Taxonomic senior synonym:** *Pterospermopsis* (as *Thalassiphora*) *pelagica*, according to Stover and Evitt (1978, p.174). Age: Early Tertiary.

tesselata Srivastava, 1984, p.37, pl.15, figs.1–8. Holotype: Srivastava, 1984, pl.15, fig.1. Age: late Barremian.

"velata" (Deflandre and Cookson, 1955, p.291, pl.8, fig.8) Yun Hyesu, 1981, p.70. Holotype: Deflandre and Cookson, 1955, pl.8, fig.8. **NOW** *Thalassiphora*. Originally *Pterocystidiopsis* (Appendix A), subsequently (and

now) *Thalassiphora*, thirdly *Disphaeria*. Taxonomic senior synonym: *Pterospermopsis* (as *Thalassiphora pelagica*, according to Benedek and Gocht (1981, p.59) and Sarjeant (1981, p.117) — however, Brinkhuis and Biffi (1993, p.179) retained *Disphaeria* (as and now *Thalassiphora velata*). Age: Early Tertiary.

DISPHAEROGENA Wetzel, 1933b, p.51. Emendation: Sarjeant, 1985b, p.140–141. Taxonomic junior synonyms: *Cyclapophysis*, according to Sarjeant (1985b, p.140–141); *Plethysyrinx*, by implication in Stover and Williams (1987, p.179), who considered *Plethysyrinx* to be a taxonomic junior synonym of *Cyclapophysis*. Stover and Evitt (1978, p.292) suggested that this is possibly a radiolarian genus. Type: Wetzel, 1933b, pl.4, fig.34, as *Disphaerogena carposphaeropsis*.

**carposphaeropsis* Wetzel, 1933b, p.51, pl.4, fig.34. Emendation: Sarjeant, 1985b, p.141–142. Holotype: Wetzel, 1933b, pl.4, fig.34; Sarjeant, 1985b, pl.3, figs.1,4; Fensome et al., 1993a, fig.1 — p.1039; Dietz et al., 1999, fig.10, no.1. Taxonomic junior synonym: *Cyclapophysis monmouthensis*, according to Sarjeant (1985b, p.141). Age: Late Cretaceous.

irregularis (Wilson, 1988, p.16, pl.4, figs.4–5, 7a–b) Lentin and Williams, 1993, p.195. Holotype: Wilson, 1988, pl.4, figs.7a–b; Fensome et al., 1996, figs.1–2 — p.2173. Originally *Cyclapophysis*, subsequently (and now) *Disphaerogena*. Age: middle Eocene.

lemniscata (Corradini, 1973, p.152–153, pl.22, figs.4a–b,5; pl.33, figs.2,4; pl.39, fig.2) Lentin and Williams, 1989, p.118. Holotype: Corradini, 1973 pl.22, fig.5; Fensome et al., 1995, fig.3 — p.1601. Originally *Cordosphaeridium*, subsequently *Cordosphaeridium?*, thirdly *Plethysyrinx*, fourthly *Cyclapophysis*, fifthly (and now) *Disphaerogena*. Age: Late Cretaceous–Paleocene.

DISSILIODINIUM Drugg, 1978, p.67–68. Emendations: Bailey and Partington, 1991, p.246; Feist-Burkhardt and Monteil, 2001, p.58,60,62. Taxonomic junior synonyms: *Okerisphaeridium*, according to Feist-Burkhardt and Monteil (2001, p.58); *Gongylodinium*, by implication in Prauss (1989, p.38), who transferred the "type species" of *Gongylodinium*, *Gongylodinium erymnoteichon*, to *Dissiliodinium* — however, Feist-Burkhardt and Monteil (1997, p.43; 2001, p.58) retained *Gongylodinium*. Type: Drugg, 1978, pl.4, fig.5, as *Dissiliodinium globulus*.

acmeum (Århus, 1992, p.312–313, figs.5E–F,H–I) Lentin and Williams, 1993, p.196. Holotype: Århus, 1992, fig.5I. Originally *Gongylodinium*, subsequently (and now) *Dissiliodinium*. Age: Valanginian.

baileyi Feist-Burkhardt and Monteil, 2001, p.68,71, fig.10, nos.1–5; fig.20, no.1; table 2 (part). Holotype: Feist-Burkhardt and Monteil, 2001, fig.10, nos.1–3; fig.20, no.1. Age: Bajocian–Bathonian.

caddaense (Filatoff, 1975, p.89–90, pl.29, figs.7–9) Stover and Helby, 1987a, p.107. Holotype: Filatoff, 1975, pl.29, fig.7; Helby et al., 1987, figs.16A–B. Originally *Chytroeisphaeridia*, subsequently (and now) *Dissiliodinium*. Age: Bajocian.

curiosum Burger and Sarjeant, 1995, p.120–122,124, figs.3,4a–c,5a–b,6a–b,7a–b,8a–b,9a–b,10a–b,11a–c,12a–b,13a–b,14a–b. Holotype: Burger and Sarjeant, 1995, figs.4a–c. Taxonomic senior synonym: *Dissiliodinium globulus*, according to Leereveld (1997, p.413) — however, Feist-Burkhardt and Monteil (2001, p.64,72) retained *Dissiliodinium curiosum*. Age: latest Jurassic–Early Cretaceous.

"*erymnoteichon*" (Fenton et al., 1980, p.158–159, pl.14, figs.6–9) Prauss, 1989, p.38. Holotype: Fenton et al., 1980, pl.14, figs.8–9; Fensome et al., 1993a, figs.2–3 — p.1149. **NOW** *Gongylodinium*. Originally (and now) *Gongylodinium*, subsequently *Dissiliodinium*. Age: late Bajocian–early Bathonian.

fragile (Kunz, 1990, p.22–23, pl.4, figs.11a–b,12a–b,13,14a–b,15; text-figs.9a–c) Feist-Burkhardt and Monteil, 2001, p.62. Holotype: Kunz, 1990, pl.4, figs.11a–b; figs.11a–b; text-figs.9a–c. Originally *Okerisphaeridium*, subsequently (and now) *Dissiliodinium*. Age: late Oxfordian.

giganteum Feist-Burkhardt, 1990, p.616–617, pl.5, figs.1,3; pl.6, figs.1,4,7; text-figs.6–7. Holotype: Feist-Burkhardt, 1990, pl.5, fig.1. Age: Aalenian–early Bajocian.

***globulus** Drugg, 1978, p.68, pl.4, figs.4–6. Holotype: Drugg, 1978, pl.4, fig.5; Fensome et al., 1995, fig.2 — p.1515. Taxonomic junior synonym: *Dissiliodinium curiosum*, according to Leereveld (1997, p.413) — however, Feist-Burkhardt and Monteil (2001, p.64,72) retained *Dissiliodinium curiosum*. N.I.A. Age: early Kimmeridgian.

?**hocneratum** (Fenton et al., 1980, p.159–160, pl.16, fig.2) Lentin and Williams, 1993, p.196. Holotype: Fenton et al., 1980, pl.16, fig.2. Originally *Gongylostinium*, subsequently *Dissiliodinium*, thirdly (and now) *Dissiliodinium*?. Questionable assignment: Feist-Burkhardt and Monteil (2001, p.64). Age: late Bajocian–early Bathonian.

lichenoides Feist-Burkhardt and Monteil, 2001, p.75–76, fig.5, nos.1–3; fig.6c; fig.17, nos.1–4; table 2 (part). Holotype: Feist-Burkhardt and Monteil, 2001, fig.5, nos.1–2; fig.17, no.4. Age: late Aalenian–early Bajocian.

minimum Feist-Burkhardt and Monteil, 2001, p.71–72, fig.3, nos.1–2; fig.6b; fig.11, nos.1–9; fig.12, nos.1–4; fig.19, no.1; table 2 (part). Holotype: Feist-Burkhardt and Monteil, 2001, fig.3, no.1; fig.11, nos.1–3. Age: late Bajocian–early Bathonian.

pauliae (Heilman-Clausen in Heilmann-Clausen and Thomsen, 1995, p.294–295, pl.5, figs.7–10,13; text-fig.14) Williams et al., 1998, p.200. Holotype: Heilmann-Clausen and Thomsen, 1995, pl.5, fig.13; text-fig.14. Originally *Gongylostinium*, subsequently (and now) *Dissiliodinium*. Age: late Barremian.

psilatam Prauss, 1989, p.39, pl.6, figs.14–16,19; text-fig.15. Holotype: Prauss, 1989, pl.6, fig.19; text-fig.15. Age: early Bajocian.

volkheimeri Quattrocchio and Sarjeant, 1992, p.70 (al. 2–222), pl.1, fig.2; pl.2, figs.1–6. Holotype: Quattrocchio and Sarjeant, 1992, pl.2, fig.1. Age: Callovian–late Tithonian.

willei Bailey and Partington, 1991, p.246, pl.1, figs.1–4; text-fig.2. Holotype: Bailey and Partington, 1991, pl.1, fig.1; text-fig.2. Age: early Bajocian–Callovian.

DISSIMULIDINIUM May et al., 1987, p.199–201. Emendation: Riding and Helby, 2001g, p.200. Type: May et al., 1987, figs.4A–C, as *Dissimulidinium lobispinosum*.

***lobispinosum** May et al., 1987, p.201–203, figs.2A–D,3A–N,4A–I. Holotype: May et al., 1987, figs.4A–C; Fensome et al., 1996, figs.1–3 — p.2201. Age: Berriasian.

purattense Riding and Helby, 2001g, p.200,202,204, figs.11A–P. Holotype: Riding and Helby, 2001g, figs.11C–D. Taxonomic junior synonym: *Ampulladinium robustum* (name not validly published), according to Riding and Helby (2001g, 200). Age: Tithonian.

DISTATODINIUM Eaton, 1976, p.262–263. Emendations: Zevenboom and Santarelli in Zevenboom, 1995, p.157–158; Fensome et al., 2009, p.30. Taxonomic junior synonym: *Bipolaribucina*, according to Chen et al. (1988, p.6–7). Type: Eaton, 1976, pl.9, fig.1, as *Distatodinium craterum*.

apenninicum Brinkhuis et al., 1992, p.237–238, pl.1, figs.1–9; pl.8 (not pl.7 as given in Brinkhuis et al., 1992, p.236), figs.1–4. Holotype: Brinkhuis et al., 1992, pl.1, figs.1–3. Age: early Miocene.

biffii Brinkhuis et al., 1992, p.238,240, pl.3, figs.1–4; pl.6, fig.4; pl.9, fig.4. Holotype: Brinkhuis et al., 1992, pl.3, figs.1–4. Brinkhuis et al. (1992, p.238) considered *Microsphaeridium ancistroides* to be the possible taxonomic senior synonym of this species. Age: latest Oligocene.

"?**biornatum**" (He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.39, pl.22, figs.18–19) Lentin and Williams, 1993, p.197. Holotype: He Chengquan et al., 1989, pl.22, fig.18. **NOW** *Songiella*.

Originally *Bipolaribucina*?, subsequently *Distatodinium*, thirdly (and now) *Songiella*. Questionable assignment: Lentin and Williams (1993, p.197). Taxonomic senior synonym: *Membranilarnacia paucitubata*, according to Mao Shaozhi et al. (1995, p.44) — however, He Chengquan et al. (2009, p.366) retained this species as *Songiella biornata*. Age: Early Tertiary.

"*cavatum*" Zevenboom and Santarelli in Zevenboom, 1995, p.158–159, pl.8, figs.4–9. Holotype: Zevenboom, 1995, pl.8, figs.4–6. **Name not validly published**: considered a manuscript name by authors. Age: latest Oligocene–early Miocene.

"**craterum*" Eaton, 1976, p.263–264, pl.9, figs.1–5. Holotype: Eaton, 1976, pl.9, fig.1; Bujak et al., 1980, pl.2, figs.10–11; Fauconnier and Masure, 2004, pl.22, figs.4–6. **Taxonomic senior synonym**: *Distatodinium paradoxum*, according to Fensome et al. (2009, p.31). Contrary to the indication by Williams et al. (1998, p.200), Zevenboom and Santarelli in Zevenboom (1995) did not provide an emendation for this species. The nomenclatural type of the genus *Distatodinium* remains the holotype of *Distatodinium craterum*. Age: middle Eocene (see Aubry, 1986).

ellipticum (Cookson, 1965a, p.87–88, pl.11, figs.1–3,3a) Eaton, 1976, p.264. Holotype: Cookson, 1965a, pl.11, fig.1. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly (and now) *Distatodinium*. Age: late Eocene.

fusiforme (Matsuoka, 1974, p.332–333, pl.46, figs.4,9–10) Bujak and Matsuoka, 1986, p.236. Holotype: Matsuoka, 1974, pl.46, fig.4; Fauconnier and Masure, 2004, pl.22, fig.7. Originally *Tanyosphaeridium*, subsequently (and now) *Distatodinium*. Age: early-middle Miocene.

+*paradoxum* (Brosius, 1963, p.41–42, pl.4, figs.1,6; text-fig.2, nos.1a–c) Eaton, 1976, p.265. Holotype: Brosius, 1963, pl.4, fig.6; Fensome et al., 1995, fig.2 — p.1639. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly *Oligosphaeridium*?, fourthly (and now) *Distatodinium*, fifthly *Bipolaribucina*. Chen et al. (1988, p.7) retained this species in *Distatodinium*. Taxonomic junior synonym: *Distatodinium craterum*, according to Fensome et al. (2009, p.31). The nomenclatural type of the genus *Distatodinium* remains the holotype of *Distatodinium craterum*. Age: late Oligocene.

parisiense Châteauneuf, 1980, p.137, pl.21, figs.11–12. Holotype: Châteauneuf, 1980, pl.21, fig.12; Fauconnier and Masure, 2004, pl.22, figs.7–9. Age: middle-late Eocene (late Lutetian–Marinesian).

pilosum Heilmann-Clausen and Van Simaey, 2005, p.163, pl.3, figs.3–4,6. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.3, fig.3. Age: middle Eocene.

"*pusillum*" (Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.53–54, pl.12, figs.1–6) Fensome and Williams 2004, p.220. Holotype: Liu Zhili et al., 1992, pl.12, fig.2. Originally *Bipolaribucina*, subsequently *Distatodinium*. **Taxonomic senior synonym**: *Oligosphaeridium minus*, according to He Chengquan et al. (2009, p.116). Age: Early Tertiary.

scariosum Liengjarern et al., 1980, p.477,481, pl.54, fig.3. Holotype: Liengjarern et al., 1980, pl.54, fig.3. Age: early Oligocene.

solidum Châteauneuf, 1980, p.137, pl.22, figs.1–2. Holotype: Châteauneuf, 1980, pl.22, fig.1; Fauconnier and Masure, 2004, pl.22, fig.11. Age: middle-late Eocene (Lutetian–Ludian).

tenerum (Benedek, 1972, p.35, pl.10, figs.13–14; text-fig.14) Eaton, 1976, p.263. Emendation: Benedek and Sarjeant, 1981, p.347–348, as *Distatodinium tenerum*. Holotype: Benedek, 1972, pl.10, fig.13; Benedek and Sarjeant, 1981, fig.1, no.5. Originally *Tanyosphaeridium*, subsequently (and now) *Distatodinium*. Age: middle Oligocene.

"*tuberculatum*" (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.54, pl.12, fig.13) Fensome and Williams 2004, p.221. Holotype: Liu Zhili et al., 1992, pl.12, fig.13. **NOW** *Gagiella*. Originally *Bipolaribucina*?, subsequently *Distatodinium*, thirdly (and now) *Distatodinium*. Age: Early Tertiary.

virgatum Stover, 1977, p.75–76, pl.1, figs.20–21. Holotype: Stover, 1977, pl.1, figs.20–21. Age: early Oligocene.

"**DIVERSISPINA**" Benson, 1976, p.184. **Taxonomic senior synonym:** *Kleithriasphaeridium*, according to Stover and Evitt (1978, p.167–168). Type: Benson, 1976, pl.2, figs.6–9, as *Diversispina truncata*.

"**truncata*" Benson, 1976, p.184–185, pl.2, figs.6–9. Holotype: Benson, 1976, pl.2, figs.6–9. **NOW** *Kleithriasphaeridium*. Originally *Diversispina*, subsequently (and now) *Kleithriasphaeridium*. Taxonomic junior synonym: *Cordosphaeridium digitatum* (name not validly published), according to Slimani (2001a, p.193). Age: late Maastrichtian–early Paleocene.

DODEKOVIA Dörrhöfer and Davies, 1980, p.26. Emendation: Below, 1987a, p.113–114. Taxonomic senior synonym: *Apteodinium*, according to Stover and Williams (1987, p.87) — however, Prauss (1989, p.18) and Fensome et al. (1993b, p.149–150) retained *Dodekovia*. Taxonomic junior synonyms: *Ovalicysta*, *Parvocysta* and *Susadinium*, all according to Below (1987a, p.113) — however, Stover and Williams (1987, p.169,171,209) and Lentin and Williams (1989, p.269,284,358) retained *Ovalicysta*, *Parvocysta* and *Susadinium*. Type: Dörrhöfer and Davies, 1980, figs.26A–D, as *Dodekovia syzygia*.

"*bullula*" (Bjaerke, 1980, p.62,64, pl.1, figs.2–6,9; text-fig.3C) Below, 1987a, p.115. Holotype: Bjaerke, 1980, pl.1, figs.4–5; Fensome et al., 1993a, figs.4–5 — p.997. **NOW** *Parvocysta*. Originally (and now) *Parvocysta*, subsequently *Dodekovia*. N.I.A. Age: Toarcian.

"*gochti*" (Dodekova, 1975, p.31, pl.3, figs.8,10–13) Dörrhöfer and Davies, 1980, p.26. Holotype: Dodekova, 1975, pl.3, fig.10. **NOW** *Chytroeisphaeridia*. Originally *Tectatodinium*, subsequently *Dodekovia*, thirdly (and now) *Chytroeisphaeridia*. Age: late Bathonian.

"*knertensis*" Below, 1987a, p.115–116, pl.16, figs.1–18. Holotype: Below, 1987a, pl.16, figs.3–6,14,18; Fensome et al., 1993a, figs.1–4,6 — p.1243. **NOW** *Susadinium*. Originally *Dodekovia*, subsequently (and now) *Susadinium*. Age: Toarcian.

"*pinna*" Below, 1987a, p.116–118, pl.14, figs.1–5,11; text-figs.65a–b. Holotype: Below, 1987a, pl.14, figs.1,3,5; Fensome et al., 1993a, figs.1,3–4 — p.1281. **NOW** *Susadinium*?. Originally *Dodekovia*, subsequently (and now) *Susadinium*?. N.I.A. Age: Toarcian.

"*pseudochytrooides*" Below, 1987a, p.118–119, pl.15, figs.4–10. Holotype: Below, 1987a, pl.15, figs.7–10; Fensome et al., 1993a, figs.3–6 — p.1291. **NOW** *Pareodinia*?. Originally *Dodekovia*, subsequently (and now) *Pareodinia*?. Age: Toarcian.

"*reticulata*" Below, 1987a, p.119, pl.15, figs.11–15. Holotype: Below, 1987a, pl.15, figs.11–15; Fensome et al., 1993a, figs.1–5 — p.1301. **NOW** *Pareodinia*?. Originally *Dodekovia*, subsequently (and now) *Pareodinia*?. Age: Toarcian.

"*scrofoides*" (Dörrhöfer and Davies, 1980, p.28–29, figs.13,24F,H–I,K,25A–D) Below, 1987a, p.120. Holotype: Dörrhöfer and Davies, 1980, fig.24I; Fensome et al., 1993a, fig.1 — p.1311; fig.2 — p.1315. **NOW** *Susadinium*. Originally (and now) *Susadinium*, subsequently *Dodekovia*. Taxonomic junior synonyms: *Parvocysta contracta* and *Facetodinium* (as *Susadinium*) *inflatum*, both according to Below (1987a, p.120). Below (1987a, p.120) provided an emendation, but apparently for *Dodekovia scrofoides* var. *scrofoides*. Age: Toarcian–Bathonian.

"var. *penicillus*" Below, 1987a, p.121, pl.17, figs.1–2,7–15,17,18. Holotype: Below, 1987a, pl.17, figs.9–12; Fensome et al., 1993a, figs.5–7 — p.1279; fig.2 — p.1311. **NOW** *Susadinium scrofoides* subsp. *penicillus*. Originally *Dodekovia scrofoides* var. *penicillus*, subsequently (and now) *Susadinium scrofoides* subsp. *penicillus*. N.I.A. Age: Toarcian.

"var. *scrofoides*". Autonym. Holotype: Dörrhöfer and Davies, 1980, fig.24I; Fensome et al., 1993a, fig.1 — p.1311; fig.2 — p.1315. **Now redundant**. Emendation: Below, 1987a, p.120.

**syzygia* Dörhöfer and Davies, 1980, p.26, figs.11,23B,E,H;26A–D,F–G. Emendation: Below, 1987a, p.121–122, as *Dodekovia syzygia*. Holotype: Dörhöfer and Davies, 1980, figs.26A–D; Fensome et al., 1995, figs.1–4 — p.1827. Originally (and now) *Dodekovia*, subsequently *Apteodinium*. Prauss (1989, p.19) retained this species in *Dodekovia*. Taxonomic junior synonym: *Ovalicysta hiata*, according to Below (1987a, p.121) — however, Lentin and Williams (1989, p.269) retained *Ovalicysta hiata*. Age: Toarcian–Bathonian.

"*tabulata*" Below, 1987a, p.123,125, pl.13, figs.1–15; text-figs.66a–i. Holotype: Below, 1987a, pl.13, figs.1,4,8,12,13; Fensome et al., 1993a, figs.1,3,5–6 — p.1365. **NOW** *Susadinium*?. Originally *Dodekovia*, subsequently (and now) *Susadinium*?. Age: Toarcian.

tegillata Prauss, 1989, p.19–20, pl.3, figs.1–6,10–12; text-fig.4. Holotype: Prauss, 1989, pl.3, figs.4–6; text-fig.4. Age: late Toarcian–early Aalenian.

"**DOIDYX**" Sarjeant, 1966c, p.205. **Taxonomic senior synonym:** *Pseudoceratium*, according to Bint (1986, p.144). Taxonomic senior synonym: *Aptea*, according to Sarjeant and Stover (1978, p.51) — however, *Aptea* is now considered to be a taxonomic junior synonym of *Pseudoceratium*. Type: Sarjeant, 1966c, pl.22, fig.8; text-fig.55, as *Doidyx anaphrissa*.

"**anaphrissa*" Sarjeant, 1966c, p.206, pl.22, fig.8; pl.23, fig.6; text-fig.55. Emendation: Harding, 1990b, p.17–18, as *Pseudoceratium anaphrissum*. Holotype: Sarjeant, 1966c, pl.22, fig.8; text-fig.55. **NOW** *Pseudoceratium*. Originally *Doidyx*, subsequently *Tenua* Eisenack, thirdly *Aptea*, fourthly (and now) *Pseudoceratium*. Age: early Barremian.

"*granulata*" Horowitz, 1975, p.25, pl.1, fig.4. Holotype: Horowitz, 1975, pl.1, fig.4. **NOW** *Cyclonephelium*?. Originally *Doidyx*, subsequently (and now) *Cyclonephelium*?. Age: Late Triassic (probably not in place).

DOLICHODINIUM Williams et al., 2015, p.303. Type: Michoux, 1988, pl.7, figs.1–5, text-fig.12, as *Wetziella uncinata*.

**uncinatum* (Michoux, 1988, p.36,38, pl.7, figs.1–6; pl.8, figs.1–7: text-fig.12) Williams et al. 2015, p.303. Holotype: Michoux, 1988, pl.7, figs.1–5; text-fig.12. Originally *Wetziella*, subsequently (and now) *Dolichodinium*. Age: early Eocene.

?*unicaudale* (Caro, 1973, p.366,368, pl.5, figs.1,9) Williams et al. 2015, p.303. Holotype: Caro, 1973, pl.5, fig.1. Originally *Wetziella*, subsequently (and now) *Dolichodinium*? Questionable assignment: Williams et al. (2015, p.303). Age: early Eocene.

DOLLIDIINIUM Helby and Stover, 1987b, p.159–160. Type: Cookson and Eisenack, 1960b, pl.38, fig.16, as *Palaeostomocystis sinuosa* (see *Dollidinium sinuosum* for lectotype).

**sinuosum* (Cookson and Eisenack, 1960b, p.258, pl.38, figs.16–17) Helby and Stover, 1987b, p.160. Emendation: Helby and Stover, 1987b, p.160, as *Dollidinium sinuosum*. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.16; Fensome et al., 1996, fig.1 — p.2363; lost according to Helby and Stover (1987b, p.164). Lectotype: Helby and Stover, 1987b, figs.4A–C; Fensome et al., 1996, fig.2 — p.2363; designated as a neotype by Helby and Stover (1987b, p.164). Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Dollidinium*. Age: Tithonian–Berriasian.

DOROCYSTA Davey, 1970, p.358. Type: Davey, 1970, pl.5, fig.6; text-fig.2A, as *Dorocysta litotes*.

**litotes* Davey, 1970, p.358–359, pl.5, figs.6–7; text-fig.2A. Holotype: Davey, 1970, pl.5, fig.6; text-fig.2A. Age: Cenomanian.

DOWNIESPHAERIDIUM Islam, 1993, p.83. Emendation: Masure in Fauconnier and Masure, 2004, p.195. Type: Islam, 1983b, pl.2, fig.1, as *Cleistosphaeridium spinulastrum*.

?**aciculare** (Davey, 1969a, p.158, pl.6, figs.11–12) Islam, 1993, p.83–84. Holotype: Davey, 1969a, pl.6, figs.11–12; Fauconnier and Masure, 2004, pl.23, fig.9. Originally *Cleistosphaeridium*, subsequently *Downiesphaeridium*, thirdly (and now) *Downiesphaeridium?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.196). Age: Albian–Cenomanian.

armatum (Deflandre, 1937b, p.76–77, pl.16 [al. pl.13], figs.6–7) Islam, 1993, p.84. Emendation: Davey, 1969a, p.153, as *Cleistosphaeridium armatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.6; Fauconnier and Masure, 2004, pl.23, figs.1–3. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Age: late Senonian.

"**bergmannii**" (Archangelsky, 1969a, p.414–415, pl.2, figs.8,11) Quattrocchio and Sarjeant, 1996, p.119–120. Holotype: Archangelsky, 1969a, pl.2, fig.11. **NOW** *Lingulodinium*. Originally *Cleistosphaeridium*, subsequently *Operculodinium*, thirdly *Downiesphaeridium*, fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Solisphaeridium filamentosum* (Appendix A) and *Impletosphaeridium charrieri*, both according to Quattrocchio and Sarjeant (2003, p.142). Age: Eocene.

?**bulbum** (Yu Jingxian, 1989, p.140, pl.51, figs.8–9) Williams et al., 1998, p.203. Holotype: Yu Jingxian, 1989, pl.51, fig.8. Originally *Cleistosphaeridium*, subsequently *Downiesphaeridium*, thirdly (and now) *Downiesphaeridium?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.196). Age: Eocene.

flexuosum (Davey et al., 1966, p.169, pl.2, fig.5) Islam, 1993, p.84. Holotype: Davey et al., 1966, pl.2, fig.5; Fauconnier and Masure, 2004, pl.23, fig.8. Originally *Cleistosphaeridium?*, subsequently *Polysphaeridium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Age: Cenomanian.

iaculigerum (Klement, 1960, p.57–58, pl.7, fig.10) Williams et al., 1998, p.203. Emendation: Sarjeant, 1984a, p.171, as *Operculodinium? iaculigerum*. Holotype: Klement, 1960, pl.7, fig.10; Sarjeant, 1984a, pl.2, fig.5; text-fig.7; Brenner, 1988, pl.14, fig.7; Fauconnier and Masure, 2004, pl.23, figs.4–5. Originally *Baltisphaeridium* (Appendix A), subsequently *Operculodinium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Taxonomic junior synonym: *Cleistosphaeridium? polyacanthum*, according to Brenner (1988, p.42) — however, Islam (1993, p.84) retained *Cleistosphaeridium?* (as *Downiesphaeridium polyacanthum*). Age: middle Kimmeridgian.

multispinosum (Singh, 1964, p.141–142, pl.20, figs.1–2) Islam, 1993, p.84. Holotype: Singh, 1964, pl.20, fig.1; Fauconnier and Masure, 2004, pl.23, fig.10. **NOW** *Cometodinium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly *Downiesphaeridium*, fifthly (and now) *Cometodinium*. Age: middle Albian–early Cenomanian.

"**polyacanthum**" (Gitmez, 1970, p.284–286, pl.12, fig.10; text-fig.22) Islam, 1993, p.84. Holotype: Gitmez, 1970, pl.12, fig.10; text-fig.22b; Fauconnier and Masure, 2004, pl.23, figs.6–7. Originally *Cleistosphaeridium*, subsequently *Cleistosphaeridium?*, thirdly *Downiesphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Impletosphaeridium?*) *polytrichum*, according to Masure in Fauconnier and Masure (2004, p.196). Taxonomic senior synonym: *Baltisphaeridium* (as *Cleistosphaeridium*) *iaculigerum*, according to Brenner (1988, p.42) — however, neither Islam (1993, p.84), who retained *Downiesphaeridium polyacanthum*, nor Masure in Fauconnier and Masure (2004, p.196) followed this synonymy. Age: early Kimmeridgian.

"**polytrichum**" (Valensi, 1947, p.818; text-fig.4) Masure in Fauconnier and Masure, 2004, p.196. Holotype: Valensi, 1947, text-fig.4; Fauconnier and Masure, 2004, pl.24, figs.1–6. **NOW** *Impletosphaeridium?* Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Impletosphaeridium*, fifthly *Downiesphaeridium*, sixthly (and now) *Impletosphaeridium?*. Taxonomic junior synonym: *Cleistosphaeridium* (as *Downiesphaeridium polyacanthum*), according to Masure in Fauconnier and Masure (2004, p.196). Age: late Bathonian.

sarmentum (Stancliffe, 1991, p.187–188, pl.1, figs.1–2; pl.2, fig.6; text-figs.5A–B) Masure in Fauconnier and Masure, 2004, p.196. Holotype: Stancliffe, 1991, pl.1, figs.1–2; text-figs.5A–B. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Downiesphaeridium*. N.I.A. Age: late Oxfordian.

***spinulastrum** (Islam, 1983b, p.337–338, pl.2, figs.1–2) Islam, 1993, p.84. Holotype: Islam, 1983b, pl.2, fig.1; Islam, 1993, pl.1, fig.11. Originally *Cleistosphaeridium*, subsequently (and now) *Downiesphaeridium*. Age: middle Eocene.

tribuliferum (Sarjeant, 1962a, p.487, pl.70, fig.4; text-figs.6c,7) Masure in Fauconnier and Masure, 2004, p.196). Holotype: Sarjeant, 1962a, pl.70, fig.4; Fauconnier and Masure, 2004, pl.23, fig.11. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly *Impletosphaeridium*, fifthly (and now) *Downiesphaeridium*. Age: Oxfordian.

DRACODINIUM Gocht, 1955, p.87. Emendations: Bujak et al., 1980, p.28; Williams et al., 2015, p.303. Taxonomic senior synonym: *Wetziella*, by implication in Williams and Downie (1966b, p.195), who transferred the "type species" of *Dracodinium*, *Dracodinium solidum*, to *Wetziella* — however, Costa and Downie (1979, p.36) and Lentin and Williams (1989, p.121) retained *Dracodinium*. Type: Gocht, 1955, text-figs.3a–b, as *Dracodinium solidum*.

astra (Denison in Costa et al., 1978, p.263, text-fig.2) Williams et al., 2015, p.304. Holotype: Costa et al., 1978, text-fig.2; Jolley and Spinner, 1989, pl.1, figs.3–4. Originally *Wetziella*, subsequently (and now) *Dracodinium*. N.I.A. Age: early Eocene.

?**brevicornutum** (Heilmann-Clausen in Heilmann-Clausen and Costa, 1989, p.472, pl.6, figs.1,6) Williams et al., 2015, p.304. Holotype: Heilmann-Clausen and Costa, 1989, pl.6, fig.1. Originally *Wetziella articulata* subsp. *brevicornuta*, subsequently (and now) *Dracodinium? brevicornutum*. Questionable assignment: Williams et al. (2015, p.304). Age: late Ypresian.

"**condylos**" (Williams and Downie, 1966b, p.193–194, pl.20, figs.1–2) Costa and Downie, 1979, p.43. Holotype: Williams and Downie, 1966b, pl.20, fig.1. **NOW** *Petalodinium*. Originally *Wetziella*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. N.I.A. Age: early Eocene.

coronatum (Vozzhennikova, 1967, p.170–171, pl.89, figs.1–3,5; pl.90, figs.1–5) Williams et al. 2015, p.304. Holotype: Vozzhennikova, 1967, pl.89, fig.1; pl.90, fig.4; Lentin and Vozzhennikova, 1990, text-fig.43; lost according to Lentin and Vozzhennikova (1990, p.80). Neotype: Iakovleva and Heilmann-Clausen, 2010, pl.12, fig.4, designated by Iakovleva and Heilmann-Clausen (2010, p.211). Originally *Rhombodinium*, subsequently *Wetziella*, thirdly (and now) *Dracodinium*. Taxonomic senior synonym: *Wetziella articulata*, according to Costa and Downie (1979, p.430) — however, Iakovleva and Heilmann-Clausen (2010, p. 211,226) retained *Rhombodinium* (as *Wetziella*) *coronatum*. Age: Ypresian.

crispum (Agelopoulos, 1967, p.21–22, pl.3, fig.8; pl.4, figs.5a–b) Williams et al. 2015, p.304. Holotype: Agelopoulos, 1967, pl.3, fig.8. Originally *Wetziella*, subsequently (and now) *Dracodinium*. Age: late Eocene.

eocaenicum (Agelopoulos, 1967, p.16–17, pl.2, figs.6–7; pl.3, figs.1–7) Williams et al., 2015, p.304. Holotype: Agelopoulos, 1967, pl.3, fig.4. Originally *Wetziella*, subsequently (and now) *Dracodinium*. Taxonomic junior synonym: *Wetziella* (subsequently *Dracodinium*) *pachyderma*, by implication in Caro (1973, p.365), who considered the name *Wetziella eocaenica* to be not effectively published; and according to Williams et al. (2015, p.304). Age: latest Ypresian.

"**granulatum**" (Wilson, 1967c, p.493, figs.29–30) Lentin and Williams, 1981, p.92. Holotype: Wilson, 1967c, fig.30. **NOW** *Epelidinium? granulatum*. Originally *Wetziella* (*Rhombodinium*) *glabra* var. *granulata*, subsequently *Rhombodinium glabrum* subsp. *granulatum*, thirdly *Dracodinium granulatum*, fourthly (and now) *Epelidinium? granulatum*. Age: late Eocene.

"*laszczynskii*" Gedl, 1995, p.205, pl.7, figs.11,13. Holotype: Gedl, 1995, pl.7, fig.13. **NOW** *Petalodinium*. Originally *Dracodinium*, subsequently (and now) *Petalodinium*. Age: early-middle Eocene.

lobiscum (Williams and Downie, 1966b, p.196, pl.20, fig.3) Williams et al., 2015, p.304. Holotype: Williams and Downie, 1966b, pl.20, fig.3. Originally *Wetziella symmetrica* var. *lobisca*, subsequently *Wetziella symmetrica* subsp. *lobisca*, thirdly *Wetziella meckelfeldensis* subsp. *lobisca*, fourthly *Wetziella lobisca*, fifthly (and now) *Dracodinium lobiscum*. Age: earliest Eocene.

magnificum (Iakovleva and Kulkova, 2001, p.18, pl.6, figs.3–4; text-fig.11) Williams et al., 2015, p.304. Holotype: Iakovleva and Kulkova, 2001, pl.6, figs.3–4; text-fig.11. Originally *Wetziella coronata* subsp. *magnifica*, subsequently *Wetziella articulata* subsp. *magnifica*, thirdly (and now) *Dracodinium magnificum*. Age: Ypresian.

modestum Iakovleva, 2016, p.5 (on PDF initially published online), pl.3, figs.3,6; text-fig.4b (part). Holotype: Iakovleva, 2016, pl.3, figs.3,6. Age: earliest Eocene.

"*pachydermum*" (Caro, 1973, p.365, pl.3, figs.4–6) Costa and Downie, 1979, p.44. Holotype: Caro, 1973, pl.3, fig.4. Originally *Wetziella*, subsequently *Dracodinium*. **Taxonomic senior synonym:** *Wetziella* (now *Dracodinium*) *eocaenicum*, by implication in Caro (1973, p.365), who considered the name *Wetziella eocaenica* to be not effectively published; and according to Williams et al. (2015, p.304). Age: latest Ypresian.

parcilimbatum Vasilyeva, 2013, p.119,121, pl.2, figs.1–4. Holotype : Vasilyeva, 2013, pl.2, fig.2. Age: Ypresian–Lutetian.

"*politum*" Bujak et al., 1980, p.29, pl.11, fig.1. Holotype: Williams and Downie, 1966b, pl.19, fig.9 (see discussion below), as *Wetziella glabra*; not Bujak et al., 1980, pl.11, fig.1 as indicated in Williams et al. (1998, p.204). **NOW** *Rhadinodinium*. Originally *Dracodinium*, subsequently (and now) *Rhadinodinium*. Aside from the holotype of *Dracodinium* (now *Rhadinodinium*) *politum* being incorrectly indicated in Williams et al. (1998), confusion is caused by the fact that the plates and captions in the originally-issued protologue publication were mixed up. Hence, in Williams and Downie (1966b, original issue), the holotype appears as pl.19, fig.9, opposite the caption labelled plate 19 but clearly intended as caption to the plate labelled 20; the correct caption for the plate labelled 19 is opposite the plate labelled 20. In the 1983 issue of the monograph, these problems were corrected and the holotype of *Dracodinium* (now *Rhadinodinium*) *politum* is pl.20, fig.9. Age: early Eocene.

"subsp. *politum*". Autonym. **Now redundant.** Holotype: Williams and Downie, 1966b, pl.19, fig.9: see discussion under *Dracodinium politum*.

"subsp. *spinulum*" Islam, 1983a, p.236, pl.2, fig.4. **NOW** *Petalodinium spinulum*. Originally *Dracodinium politum* subsp. *spinulum*, subsequently (and now) *Petalodinium spinulum*. Holotype: Islam, 1983a, pl.2, fig.4. Age: early Eocene.

"*rhomboideum*" (Alberti, 1961, p.10, pl.1, figs.1–5; pl.12, fig.9) Costa and Downie, 1979, p.44. Holotype: Alberti, 1961, pl.1, fig.3; pl.12, fig.9. **NOW** *Petalodinium*. Originally *Wetziella* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: late Eocene.

"subsp. *ovale*" Andreeva-Grigorovich and Savitskaya, 1993, p.44–45, pl.1, figs.5,7–8. Holotype: Andreeva-Grigorovich and Savitskaya, 1993, pl.1, fig.5; Andreeva-Grigorovich et al., 2011, pl.20, fig.2. **NOW** *Petalodinium rhomboideum?* subsp. *ovale*. Originally *Dracodinium rhomboideum?* subsp. *ovale*, subsequently (and now) *Petalodinium rhomboideum?* subsp. *ovale*. Andreeva-Grigorovich and Savitskaya (1993) cited this taxon as "*Dracodinium rhomboideum* subsp. *ovale* (Grigorovich, 1971) emend. Andreeva-Grigorovich and Savitskaya". However, *Rhombodinium rhomboideum* forma *ovale* was not validly published in Grigorovich (1971), since that author did not provide a description. Age: early Eocene.

subsp. *rhomboideum*. Autonym. Holotype: Alberti, 1961, pl.1, fig.3.

samladicum (Eisenack, 1954b, p.59, pl.8, figs.11–12) Costa and Downie, 1979, p.44. Holotype: Eisenack, 1954b, pl.8, fig.11. Originally *Wetziella*, subsequently (and now) *Dracodinium*. Neumann (1990, p.163) retained this

species in *Wetziella* — however, Williams et al. (2015, p.304) retained the species in *Dracodinium*. Age: early Eocene.

simile (Eisenack, 1954b, p.58–59, pl.8, figs.8–10) Costa and Downie, 1979, p.44. Holotype: Eisenack, 1954b, pl.8, fig.10. Originally *Wetziella*, subsequently (and now) *Dracodinium*. Age: early Oligocene.

**solidum* Gocht, 1955, p.88; text-figs.3a–b,4a–c,5a–c. Holotype: Gocht, 1955, text-figs.3a–b. Originally (and now) *Dracodinium*, subsequently *Wetziella*. Costa and Downie (1979, p.43) retained this species in *Dracodinium*. Age: Eocene or Oligocene.

"*variabile*" He Chengquan, 1991, p.92, pl.35, fig.1; text-fig.12. Holotype: He Chengquan, 1991, pl.35, fig.1; text-fig.12. **NOW** *Rhombodinium*. Originally *Dracodinium*, subsequently (and now) *Rhombodinium*. Age: late Eocene.

varielongitutum (Williams and Downie, 1966b, p.196–197, pl.20, figs.4,8) Costa and Downie, 1979, p.44. Holotype: Williams and Downie, 1966b, pl.20, fig.4. Originally *Wetziella*, subsequently (and now) *Dracodinium*. Age: early Eocene.

"*waipawaense*" (Wilson, 1967c, p.493–494, figs.18,20) Costa and Downie, 1979, p.44. Holotype: Wilson, 1967c, fig.18. **NOW** *Petalodinium*. Originally *Wetziella* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: early Eocene.

wetziellii (Agelopoulos, 1967, p.17–18, pl.2, figs.4,5a–b) Williams et al., 2015, p.304. Holotype: Agelopoulos, 1967, pl.2, figs.5a–b. Originally *Wetziella*, subsequently (and now) *Dracodinium*. Age: late Eocene.

DRUGGIDIUM Habib, 1973, p.49,51. Emendation: Harding, 1986b, p.18–19. Taxonomic senior synonym: *Raphidodinium*, according to Below (1987b, p.57) — however, Lentin and Williams (1989, p.121) retained *Druggidium*. Type: Habib, 1973, pl.1, fig.3; text-fig.3, as *Druggidium apicopaucicum*.

**apicopaucicum* Habib, 1973, p.51–52, pl.1, figs.1–3; pl.3, figs.1–3; text-fig.3. Holotype: Habib, 1973, pl.1, fig.3; text-fig.3. Originally (and now) *Druggidium*, subsequently *Raphidodinium*. Lentin and Williams (1989, p.121) retained this species in *Druggidium*. Age: Berriasian–Barremian.

augustum Harding, 1986b, p.20–21, pl.2, figs.1–9; text-fig.3. Holotype: Harding, 1986b, pl.2, figs.1–2. Originally (and now) *Druggidium*, subsequently *Raphidodinium*. Lentin and Williams (1989, p.122) retained this species in *Druggidium*. Age: late Hauterivian–early Barremian.

deflandrei (Millioud, 1969, p.429–430, pl.2, figs.5–7) Habib, 1973, p.52. Emendations: Habib, 1973, p.52, as *Druggidium deflandrei*; Below, 1987b, p.58–59, as *Raphidodinium deflandrei*. Holotype: Millioud, 1969, pl.2, figs.5–6. Originally *Microdinium*, subsequently (and now) *Druggidium*, thirdly *Raphidodinium*. Lentin and Williams (1989, p.122) retained this species in *Druggidium*. Age: Barremian.

discretum Slimani and Louwye, 2011, p.43. pl.1, figs.1–15. Holotype: Slimani and Louwye, 2011, pl.1, figs.1–4. Age: latest Maastrichtian.

"*fourmarieri*" (Lejeune-Carpentier, 1951, p.B311; text-fig.7) Lejeune-Carpentier and Sarjeant, 1983, p.2. Emendations: Lejeune-Carpentier and Sarjeant, 1983, p.2, as *Druggidium fourmarieri*; Slimani and Louwye, 2011, p.48, as *Phanerodinium fourmarieri*. Holotype: Lejeune-Carpentier, 1951, text-fig.7; Streel et al., 1977, pl.2, fig.10. **NOW** *Phanerodinium*. Originally (and now) *Phanerodinium*, subsequently *Druggidium*, thirdly *Druggidium*? Questionable assignment: Below (1987b, p.39), as a "nomen dubium". Age: Late Cretaceous.

jubatam Duxbury, 1980, p.117, pl.3, figs.3–4. Emendation: Harding, 1986b, p.19–20. Holotype: Duxbury, 1980, pl.3, fig.3. Age: Barremian.

?*laeve* (Lejeune-Carpentier, 1951, p.B310–B311; text-fig.6) Lejeune-Carpentier and Sarjeant, 1983, p.4. Emendation: Lejeune-Carpentier and Sarjeant, 1983, p.4, as *Druggidium laeve*. Holotype: Lejeune-Carpentier,

1951, text-fig.6. Originally *Phanerodinium cayeuxi* var. *laeve*, subsequently *Phanerodinium cayeuxi* subsp. *laeve*, thirdly *Druggidium laeve*, fourthly (and now) *Druggidium? laeve*. Questionable assignment: Below (1987b, p.39), as a "nomen dubium". Harding (1986b, p.19) recommended that this name be restricted to the holotype. Age: Senonian.

meerensis Slimani and Louwye, 2011, p.43–44. pl.1, figs.16–25, pl.2, figs.1–5. Holotype: Slimani and Louwye, 2011, pl.1, figs.16–19. Age: late Maastrichtian–early Danian.

rhabdoreticulatum Habib, 1973, p.53, pl.2, figs.3–7. Holotype: Habib, 1973, pl.2, fig.6. Originally (and now) *Druggidium*, subsequently *Raphidodinium*. Lentin and Williams (1989, p.122) retained this species in *Druggidium*. Age: Valanginian–Albian.

DUBRIDINIUM Reid, 1977, p.449. Type: Reid, 1977, pl.3, figs.35–37, as *Dubridinium cavatum*.

caperatum Reid, 1977, p.451–452, pl.4, figs.38–41,44. Holotype: Reid, 1977, pl.4, figs.38–40. Motile equivalent: *Preperidinium meunieri* (Pavillard, 1912) Elbrächter, 1993, according to Reid (1977, p.451), who used the name *Diplopeltopsis minor* (Paulsen, 1907) Pavillard, 1913, now considered a taxonomic junior synonym of *Preperidinium meunieri* (see Head, 1996b, p.1211). Age: Holocene.

cassiculus Reid, 1977, p.452–453, pl.4, figs.42–43,45. Holotype: Reid, 1977, pl.4, figs.42–43. N.I.A. Age: Holocene.

**cavatum* Reid, 1977, p.449–450, pl.3, figs.34–37. Holotype: Reid, 1977, pl.3, figs.35–37; Fensome et al., 1993a, figs.1–3 — p.1041. Motile equivalent: *Diplopsalopsis orbicularis* (Paulsen, 1907) Meunier, 1909, questionably according to Reid (1977, p.431) and according to Dale (1983, p.92). Age: Holocene.

ulsterum Reid, 1977, p.453–454, pl.4, figs.46–48. Holotype: Reid, 1977, pl.4, figs.46–47. Age: Holocene.

DUOSPHERIDIUM Davey and Williams, 1966b, p.97. Although the "type species" was not validly transferred by Davey and Williams (1966b), the generic name *Duosphaeridium* was validly published by these authors, since it is based on a previously validly published species name. Type: Cookson, 1965a, pl.10, fig.1, as *Diphyes nudum*.

**nudum* (Cookson, 1965a, p.87, pl.10, figs.1–4) Loeblich Jr. and Loeblich III, 1968, p.211. Holotype: Cookson, 1965a, pl.10, fig.1. Originally *Diphyes*, subsequently (and now) *Duosphaeridium*. This combination was not validly published by Davey and Williams (1966b, p.97), since these authors did not fully reference the basionym. Age: late Eocene.

rugosum Drugg, 1970b, p.816–817, figs.11A–C. Holotype: Drugg, 1970b, figs.11A–B. Age: Danian.

DUOTRIGIA Bailey, 1987, p.89,91,94. Nomenclatural junior synonym: *Baileyella*. Özdikmen (2009, p.234) considered *Durotrigia* Bailey to be illegitimate because it is a junior homonym of *Durotrigia* Hoffstetter, 1967; however, *Durotrigia* Hoffstetter is an animal and under the I.C.N. it does not pre-empt *Durotrigia* Bailey. Type: Bailey, 1987, pl.2, figs.1,4,9, as *Durotrigia daveyi*.

asketa Bailey, 1990, p.140, pl.2, figs.1–5; text-fig.3. Holotype: Bailey, 1990, pl.2, figs.1–3. Age: early Bathonian–earliest Callovian.

aspera Bailey and Partington, 1991, p.246,248, pl.2, figs.1–6,9 (not text-fig.3). Holotype: Bailey and Partington, 1991, pl.2, figs.1–2. Age: Bathonian.

**daveyi* Bailey, 1987, p.89,91,94, pl.1, figs.1–5; pl.2, figs.1–11; text-figs.2A–D. Holotype: Bailey, 1987, pl.2, figs.1,4,9; Fensome et al., 1993a, figs.1–2 — p.1095. Originally (and now) *Durotrigia*, subsequently *Baileyella* (generic name illegitimate). Age: early Bajocian.

filipicata (Gocht, 1970b, p.134–135, pl.26, figs.4,6–9; pl.27, figs.1–3,7; pl.28, fig.3; pl.31, figs.1–5; text-figs.2a,3–4) Riding and Bailey, 1991, p.100. Emendation: Riding and Bailey, 1991, p.101, as *Durotrigia filipicata*. Holotype: Gocht, 1970b, pl.31, fig.1. Originally *Gonyaulacysta*, subsequently *Diacanthum*, thirdly *Dichadogonyaulax*?, fourthly *Diacanthum*?, fifthly (and now) *Durotrigia*. Age: early Bathonian.

magna Riding and Helby, 2001d, p.73,75, figs.6A–F. Holotype: Riding and Helby, 2001d, fig.6B. Age: late Callovian.

omentifera Feist-Burkhardt and Monteil, 2001, p.76–77, fig.7; fig.13, nos.1–3; fig.14, nos.1–5; fig.15, nos.1–5; fig.20, nos.2–6. Holotype: Feist-Burkhardt and Monteil, 2001, fig.13, no.1; fig.20, no.4. Age: late Bajocian–early Bathonian.

vesiculata Bailey, 1990, p.140–141, pl.1, figs.1–12; pl.3, figs.1–8. Holotype: Bailey, 1990, pl.1, figs.1–2. Age: late Bajocian–?late Bathonian.

EATONICYSTA Stover and Evitt, 1978, p.41. Emendation: Stover and Williams, 1995, p.103–104. Type: Morgenroth, 1966a, pl.3, fig.11, as *Cannosphaeropsis ursulae*.

exilis Pearce, 2010, p.60, pl.3, figs.6–12. Holotype: Pearce, 2010, pl.3, figs.6–12. Age: late Campanian–early Maastrichtian.

furensis (Heilmann-Clausen in Heilmann-Clausen and Costa, 1989, p.466, pl.11, figs.1–3,5–7) Stover and Williams, 1995, p.104. Holotype: Heilmann-Clausen, 1982, fig.3A; Heilmann-Clausen and Costa, 1989, pl.11, fig.7. Originally *Eatonicysta ursulae* subsp. *furensis*, subsequently (and now) *Eatonicysta furensis*. Age: early Eocene.

"*hapala*" Schiøler and Wilson, 1993, p.346–347, pl.2, figs.1–7; text-figs.12a–b. Holotype: Schiøler and Wilson, 1993, pl.2, fig.6. **NOW** *Membranilarnacia*. Originally *Eatonicysta*, subsequently (and now) *Membranilarnacia*. Age: late Campanian–early Maastrichtian.

"*intermedia*" Stover and Williams, 1995, p.100. **Name not validly published**: no description or illustration.

mutabilireta Pearce, 2010, p.60,62, pl.4, figs.1–6. Holotype: Pearce, 2010, pl.4, figs.1–6. Age: early Campanian.

"*pterococcoides*" (Wetzel, 1933b, p.53, pl.6, fig.4) Sarjeant, 1985b, p.154–155. Emendation: Sarjeant, 1985b, p.154–155. Holotype: Wetzel, 1933b, pl.6, fig.4; Sarjeant, 1985b, pl.4, figs.3,6 (not 1–2); Dietz et al., 1999, fig.10, no.3. **NOW** *Membranilarnacia*. Originally *Membranilarnax*, subsequently (and now) *Membranilarnacia*, thirdly *Membranilarnacia*?, fourthly *Eatonicysta*. Age: Senonian.

"subsp. *minuta*" (Rozen, 1965, p.312–313, pl.2, figs.4–5; text-figs.23–24) Sarjeant, 1985b, p.155. **Name not validly published**: no holotype designated. Originally *Membranilarnacia pterococcoides* var. *minuta* (name not validly published), subsequently *Membranilarnacia pterococcoides* subsp. *minuta* (name not validly published), thirdly *Eatonicysta pterococcoides* subsp. *minuta* (name not validly published). Age: late Eocene.

"*robusta*" Stover and Williams, 1995, p.100. **Name not validly published**: no description or illustration.

sequestra Stover and Williams, 1995, p.105, pl.2, figs.1a–d; text-fig.1C. Holotype: Stover and Williams, 1995, pl.2, figs.1a–d. N.I.A. Age: Lutetian.

**ursulae* (Morgenroth, 1966a, p.20, pl.3, figs.11–12) Stover and Evitt, 1978, p.41. Emendation: Stover and Williams, 1995, p.105–106, as *Eatonicysta ursulae*. Holotype: Morgenroth, 1966a, pl.3, fig.11; Eisenack and Kjellström, 1972, figure to left — p.143; Fensome et al., 1995, fig.1 — p.1865. Originally *Cannosphaeropsis*, subsequently *Membranilarnacia*, thirdly (and now) *Eatonicysta*. Taxonomic junior synonyms: *Membranilarnacia*

diktyophora, according to Eaton (1976, p.277); *Membranilarnacia reticulata*, according to de Coninck (1969, p.43) and Gocht (1969, p.65). Age: early Eocene.

"subsp. *furensis*" Heilmann-Clausen in Heilmann-Clausen and Costa, 1989, p.466, pl.11, figs.1–3,5–7. Holotype: Heilmann-Clausen, 1982, fig.3A; Heilmann-Clausen and Costa, 1989, pl.11, fig.7. **NOW** *Eatonicysta furensis*. Originally *Eatonicysta ursulae* subsp. *furensis*, subsequently (and now) *Eatonicysta furensis*. Age: early Eocene.

"subsp. *ursulae*". Autonym. Holotype: Morgenroth, 1966a, pl.3, fig.11. **Now redundant.**

?*vestita* (White, 1842, p.36, pl.4, div.3, fig.2) Sarjeant, 1991, p.88. Holotype: White, 1842, pl.4, div.3, fig.2; Sarjeant, 1991, fig.4.1. Originally *Xanthidium* (Appendix A), subsequently (and now) *Eatonicysta*?. Questionable assignment: Sarjeant (1991, p.88); and Fauconnier and Masure in Fauconnier and Masure (2004, p.209) as a problematic species. Age: Late Cretaceous.

ECHINIDINIUM Zonneveld, 1997, p.325 ex Head et al., 2001, p.633. This name was not validly published in Zonneveld (1997) since that author did not provide a Latin diagnosis; such a diagnosis is required since the type is from a sediment trap and thus must be considered modern and not fossil. Type: Zonneveld, 1997, pl.2, figs.1–4, as *Echinidinium granulatum*.

"*aculeatum*" Zonneveld, 1997, p.328–329, pl.3, figs.1–5; text-figs.5A–B. **Name not validly published:** no Latin description provided. Holotype: Zonneveld, 1997, pl.3, figs.1–3. The holotype is from a sediment trap and does not have a stratigraphic context; hence it must be treated as an extant form rather than a fossil, its name requiring a Latin diagnosis for validation (Head, 2003a, p.171–172). Age: Holocene.

bispiniformum Zonneveld, 1997, p.329,331,333, pl.4, figs.1–4; text-figs.7A–B ex Head, 2003a, p.171. Holotype: Zonneveld, 1997, pl.4, figs.1–3. The holotype is from ocean floor sediment and has a stratigraphic context; hence it may be treated as a fossil, its name not requiring a Latin diagnosis for validation (Head, 2003a, p.171–172). This name was not validly published in Zonneveld (1997) since the generic name was not validated until 2001. By fully citing the basionym, Head (2003a, p.171) validated the name *Echinidinium bispiniformum*. Age: Holocene.

delicatum Zonneveld, 1997, p.333–334, pl.4, figs.5–7; text-figs.8A–B ex Head 2003a, p.171. Holotype: Zonneveld, 1997, pl.4, figs.5–7. The holotype is from ocean floor sediment and has a stratigraphic context; hence it may be treated as a fossil, its name not requiring a Latin diagnosis for validation (Head, 2003a, p.171–172). This name was not validly published in Zonneveld (1997) since the generic name was not validated until 2001. By fully citing the basionym, Head (2003a, p.171) validated the name *Echinidinium delicatum*. Age: Holocene.

euaxum (Head, 1993, p.24,26, fig.16, nos.1–8,11; fig.26, no.4) Head et al., 2001, p.631. Holotype: Head, 1993, fig.16, no.11. Originally *Algidasphaeridium*?, subsequently (and now) *Echinidinium*. This combination was not validly published in Zonneveld (1997, p.334) since the generic name was not validated until 2001. Age: latest Pliocene.

**granulatum* Zonneveld, 1997, p.325,327–328, pl.2, figs.1–8; text-figs.4A–B ex Head et al., 2001, p.633. Holotype: Zonneveld, 1997, pl.2, figs.1–4. This name was not validly published in Zonneveld (1997) since that author did not provide a Latin diagnosis; such a diagnosis is required since the type is from a sediment trap and thus must be considered modern and not fossil. Age: Holocene.

karaense Head et al., 2001, p.633–634, pl.3, figs.i–o. Holotype: Head et al., 2001, pl.3, figs.i–k. Age: Holocene.

?*lucidum* Heilmann-Clausen and Van Simaëys, 2005, p.163–164, pl.4, figs.1–6; text-fig.5. Holotype: Heilmann-Clausen and Van Simaëys, 2005, pl.4, figs.1–2. Questionable assignment: Heilmann-Clausen and Van Simaëys (2005, p.163). Age: late Eocene.

nordlandense Head in Head et al., 2004, p.293–294, figs.3O–P,4A–L,7A–P. Holotype: Head et al. 2004, figs.3O–P. Age: Gelasian.

slieipnerense Head and Riding in Head et al., 2004, p.294, figs.4Q–S,5A–C. Holotype: Head et al., 2004, figs.5A–C. Age: Gelasian.

"*transparantum*" Zonneveld, 1997, p.329, pl.3, figs.6–10; text-figs.6A–B. **Name not validly published:** no Latin description provided. Holotype: Zonneveld, 1997, pl.3, figs.6–8; Head, 2003a, pl.2, figs.1–3. The holotype is from a sediment trap and does not have a stratigraphic context; hence it must be treated as an extant form rather than a fossil, its name requiring a Latin diagnosis for validation (Head, 2003a, p.171–173. Age: Holocene.

zonneveldiae Head, 2003a, p.172, pl.1, figs.1–12. Holotype: Head, 2003a, pl.1, figs.1–4. Age: late Pleistocene.

ECHINOCYSTA Xu Jinli et al., 1997, p.118–119,153. Type: Xu Jinli et al., 1997, pl.16, figs.13–14, as *Echinocysta echinoides*.

**echinoides* Xu Jinli et al., 1997, p.119,154, pl.16, figs.13–14; pl.17, fig.7; pl.55, figs.4–5; text-fig.13. Holotype: Xu Jinli et al., 1997, pl.16, figs.13–14. Age: middle-late Eocene.

"*multispinata*" Xu Jinli et al., 1997, p.120, pl.16, figs.9–10. **Name not validly published:** holotype not designated. The holotype was not designated in Xu Jinli et al. (1997), nor did these authors provide a Latin or English description. He Chengquan et al. (2009, p.651) provided an English description, but effectively did not designate a holotype: they referred to the measurements of the holotype but did not clearly indicate the figure in which it is illustrated, and thus according to I.C.N. Article 43.3, this name remains not validly published. Age: middle-late Eocene.

reticuloides Xu Jinli et al., 1997, p.119, pl.9, figs.14a–c; pl.41, figs.7,11 ex He Chengquan et al., 2009, p.655. Holotype: Xu Jinli et al., 1997, pl.9, figs.14a–c. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.655) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

ECHINODINELLA Keupp, 1980a, p.132–133. Emendation: Streng et al., 2004, p.467. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1299). Keupp (1992b, p.128) placed this name in quotes. Type: Keupp, 1980a, pl.16, fig.7, as *Echinodinella erinacea*.

**erinacea* Keupp, 1980a, p.133–134, pl.16, figs.7–15; pl.17, figs.1–9. Emendation: Streng et al., 2004, p.468. Holotype: Keupp, 1980a, pl.16, fig.7. Keupp (1992b, p.129) placed the generic name in quotes. Age: late Aptian.

levata Keupp, 1981, p.18–19, pl.8, figs.1–11. Holotype: Keupp, 1981, pl.8, fig.7. Keupp (1992b, p.129) placed the generic name in quotes. Age: late Hauterivian–late Aptian.

"*triangularis*" Keupp, 1980a, p.134–135, pl.17, figs.10–15. Holotype: Keupp, 1980a, pl.17, figs.10–13. **NOW** *Praecalcionellum*. Originally *Echinodinella*, subsequently (and now) *Praecalcionellum*. Age: late Gargasian.

"**ECTOSPHERIDIUM**" Zevenboom and Santarelli in Zevenboom, 1995, p.150. **Name not validly published:** considered a manuscript name by the authors. Type: Biffi and Manum, 1988, pl.7, figs.1,5,9,12, as *Membranilarnacia? picena*.

"**picenum*" (Biffi and Manum, 1988, p.190,192, pl.7, figs.1–3,5–7,9,12) Zevenboom and Santarelli in Zevenboom, 1995, p.150. Emendation: Zevenboom and Santarelli in Zevenboom, 1995, p.151, as *Ectosphaeridium picenum*. Holotype: Biffi and Manum, 1988, pl.7, figs.1,5,9,12; Fauconnier and Masure, 2004, pl.54, figs.12–13.

Combination not validly published: generic name not validly published. **NOW** *Membranilarnacia?*. Originally (and now) *Membranilarnacia*, subsequently *Ectosphaeridium* (combination not validly published). Age: early Miocene.

ECTOSPHEROPSIS Londeix and Jan du Chêne, 1988, p.252–253. Type: Londeix and Jan du Chêne, 1988, pl.1, figs.1–5, as *Ectospheropsis burdigalensis*.

***burdigalensis** Londeix and Jan du Chêne, 1988, p.253,255,257, pl.1, figs.1–9; pl.2, figs.1–9; pl.3, figs.1–9; text-figs.3a–c,a'-c',4a–b,a'-b'. Holotype: Londeix and Jan du Chêne, 1988, pl.1, figs.1–5; Fensome et al., 1993a, figs.1–3 — p.1001. Age: Burdigalian.

EDWARDSIELLA Versteegh and Zevenboom in Versteegh, 1995, p.88. Nomenclatural junior synonym: *Novedwardsiella* (name illegitimate). Özdikmen (2009, p.234) considered *Edwardsiella* Versteegh and Zevenboom to be illegitimate because it is a junior homonym of *Edwardsiella* Andres, 1883; however, *Edwardsiella* Andres is an animal and under the I.C.N. does not pre-empt *Edwardsiella* Versteegh and Zevenboom. Versteegh and Zevenboom (1995, p.217) also proposed this name. Type: Versteegh, 1995, pl.2, figs.1,4, as *Edwardsiella sexispinosa*.

***sexispinosa** Versteegh and Zevenboom in Versteegh, 1995, p.88–89, pl.2, figs.1–4. Holotype: Versteegh, 1995, pl.2, figs.1,4; Versteegh and Zevenboom, 1995, pl.2, figs.1,4. Originally (and now) *Edwardsiella*, subsequently *Novedwardsiella* (generic name illegitimate). Age: Chattian–mid Piacenzian.

EGMONTODINIUM Gitmez and Sarjeant, 1972, p.228–229. Type: Gitmez and Sarjeant, 1972, pl.8, figs.1–2; pl.11, figs.5–6; text-figs.24A–B, as *Egmontodinium polyplacophorum*.

?**diminutum** Davies, 1983, p.15–16, pl.2, figs.4–8; text-fig.8. Holotype: Davies, 1983, pl.2, figs.6–7; Fauconnier and Masure, 2004, pl.26, fig.3. Questionable assignment: Davies (1983, p.15). Age: late Bathonian–Oxfordian.

elongatum Mantle, 2005, p.253,255,256, pl.2, figs.1–9; text-figs.6A–B. Holotype: Mantle, 2005, pl. 2, figs.4–5, text-figs.6A–B. Age: Callovian–early Oxfordian.

"**expiratum**" Davey, 1982b, p.28–29, pl.8, figs.13–16. Holotype: Davey, 1982b, pl.8, figs.13–14. **NOW** *Amphorulacysta*? Originally *Egmontodinium*, subsequently *Amphorula*, thirdly (and now) *Amphorulacysta*? Age: early Portlandian–earliest Ryazanian.

minus Kumar, 1987a, p.240–241, pl.2, figs.5–6; text-fig.3. Holotype: Kumar, 1987a, pl.2, fig.5. Age: Kimmeridgian–Tithonian.

"**ovatum**" (Gitmez and Sarjeant, 1972, p.237, pl.14, figs.1–3) Riley, 1979, p.221. Holotype: Gitmez and Sarjeant, 1972, pl.14, figs.2–3; Fauconnier and Masure, 2004, pl.77, fig.10. **NOW** *Systematophora*?. Originally *Systematophora*, subsequently (and now) *Systematophora*?, thirdly *Egmontodinium*. Age: early–late Kimmeridgian.

***polyplacophorum** Gitmez and Sarjeant, 1972, p.229–231, pl.8, figs.1–4; pl.9, fig.3; pl.11, figs.5–6,8; text-figs.24A–D. Holotype: Gitmez and Sarjeant, 1972, pl.8, figs.1–2; pl.11, figs.5–6; text-fig.24A–B; Fauconnier and Masure, 2004, pl.26, fig.1. Age: middle-late Kimmeridgian.

toryna (Cookson and Eisenack, 1960b, p.252, pl.38, figs.6,15) Davey, 1979c, p.60. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.15. Originally *Hystriosphæridium*, subsequently *Prolixosphæridium*?, thirdly *Tanyosphæridium*, fourthly (and now) *Egmontodinium*. N.I.A. Age: Tithonian–Neocomian.

EISENACKIA Deflandre and Cookson, 1955, p.258. Emendations: Sarjeant, 1966b, p.152; Davey, 1969b, p.3, as a revised diagnosis; McLean, 1973a, p.262; Quattrocchio and Sarjeant, 2003, p.144. *Eisenackia* was not validly published in Deflandre and Cookson (1954, p.1237), since no description was given. Taxonomic junior synonyms: *Alisocysta* and *Agerasphaera* (name illegitimate), both according to Quattrocchio and Sarjeant (2003, p.144) — however, Fensome et al. (in press) retained *Alisocysta*, with *Agerasphaera* as its nomenclatural junior synonym. Type: Deflandre and Cookson, 1955, pl.5, fig.2, as *Eisenackia crassitabulata*.

brevivallata (Harker and Sarjeant in Harker et al., 1990, p.97–98, pl.5, figs.5,9–17; text-figs.20a–b ex Harker and Sarjeant, 1991, p.708) Quattrocchio and Sarjeant, 2003, p.146. Holotype: Harker et al., 1990, pl.5, figs.11–12; text-figs.20a–b. Originally *Alisocysta*, subsequently (and now) *Eisenackia*. The name *Alisocysta brevivallata* was not validly published in Harker et al. (1990), since the lodgement of the holotype was not cited (I.C.N. Article 40.7). Age: late Campanian.

chilensis Quattrocchio and Sarjeant, 2003, p.146, fig.3a–d, fig.7B–C, fig.10A–B. Holotype: Quattrocchio and Sarjeant, 2003, fig.3c–d, fig.7B–C. Age: Paleocene.

"*circumtabulata*" Drugg, 1967, p.15, pl.1, figs.12–13. Holotype: Drugg, 1967, pl.1, fig.12; Damassa, 1979b, pl.3, figs.14–16; Fensome et al., 1993a, fig.1 — p.1061. **NOW** *Alisocysta*. Originally *Eisenackia*, subsequently *Hystrichokolpoma*, thirdly (and now) *Alisocysta*, fourthly *Agerasphaera* (generic name illegitimate). Quattrocchio and Sarjeant (2003, p.146) retained this species in *Eisenackia*, but Fensome et al. (in press) returned it to *Alisocysta*. Taxonomic junior synonym: *Hystrichokolpoma mentitum*, according to Schumacker-Lambry (1978, p.42) — however, Lentin and Williams (1981, p.135) retained *Hystrichokolpoma mentitum*. Age: Danian.

**crassitabulata* Deflandre and Cookson, 1955, p.258–261, pl.5, fig.2; text-figs.6–16. Emendation: McLean, 1973a, p.262. Holotype: Deflandre and Cookson, 1955, pl.5, fig.2; Fauconnier and Masure, 2004, pl.26, figs.4–5. *Eisenackia crassitabulata* was not validly published in Deflandre and Cookson (1954, p.1236), since no description was given. Age: Paleocene–early Eocene.

formosana Shaw Chenglong, 1999b, p.195, figs.133–135. Holotype: Shaw Chenglong, 1999b, figs.133–135. Age: Eocene.

hatai Fuji, 1966, p.62, pl.12, figs.1–2. Holotype: Fuji, 1966, pl.12, figs.1–2. Age: late Miocene.

?*knokkensis* Louwye, 1997, p.149–150, pl.1, figs.7–9. Holotype: Louwye, 1997, pl.1, figs.8–9. Questionable assignment: Louwye (1997, p.149). Age: Campanian.

"*margarita*" (Harland, 1979a, p.29,31,33, pl.1, figs.1–12; pl.2, figs.1–10) Quattrocchio and Sarjeant, 2003, p.146. Holotype: Harland, 1979a, pl.1, figs.5–6; pl.2, figs.5–6; Fauconnier and Masure, 2004, pl.2, fig.1. **NOW** *Alisocysta*. Originally *Agerasphaera* (generic name illegitimate), subsequently (and now) *Alisocysta*, thirdly *Eisenackia*. Taxonomic junior synonym: *Alisocysta rugolirata*, according to Damassa and Harland in Lentin and Williams (1989, p.10). Age: late Paleocene.

msounensis Slimani et al., 2008, p.336,338, figs.7A–L,8A–B. Holotype: Slimani et al., 2008, figs.7A–F,J, 8A–B. Age: early Danian.

"*ornata*" Cookson and Eisenack, 1965a, p.124, pl.13, figs.1–8. Holotype: Cookson and Eisenack, 1965a, pl.13, figs.1–2. **NOW** *Stoveracysta*. Originally *Eisenackia*, subsequently *Alisocysta*, thirdly (and now) *Stoveracysta*. Age: late Eocene.

reticulata (Damassa, 1979b, p.196,198,200, pl.3, figs.1–6; pl.4, figs.4–5; text-fig.3) Quattrocchio and Sarjeant, 2003, p.146. Holotype: Damassa, 1979b, pl.4, figs.4–5; text-fig.3. Originally *Alisocysta*, subsequently (and now) *Eisenackia*. Age: early Paleocene.

"*rugolirata*" (Damassa, 1979b, p.193–194,196, pl.3, figs.7–13,21,23,27; text-fig.2) Quattrocchio and Sarjeant, 2003, p.146. Holotype: Damassa, 1979b, pl.3, figs.7–11; Fauconnier and Masure, 2004, pl.2, figs.7–11. **Taxonomic senior synonym:** *Agerasphaera* (now *Eisenackia*) *margarita*, according to Damassa and Harland in Lentin and Williams (1989, p.10). On proposing this combination, Quattrocchio and Sarjeant did not acknowledge its earlier proposed synonymy with *Agerasphaera margarita*; hence, we continue to follow the synonymy proposed by Damassa and Harland in Lentin and Williams (1989, p.10). Age: early Paleocene.

?*scrobiculata* Morgenroth, 1966a, p.12–13, pl.2, fig.12; pl.3, fig.1. Holotype: Morgenroth, 1966a, pl.2, fig.12. Originally *Eisenackia*, subsequently (and now) *Eisenackia*?. Questionable assignment: Stover and Evitt (1978, p.43) as a problematic species. Age: early Eocene.

?*sentictum* (Below, 1987b, p.52, pl.9, figs.11–15) Lentin and Williams, 1989, p.124. Holotype: Below, 1987b, pl.9, figs.11–15; Fensome et al., 1993a, figs.1–4 — p.1329. Originally *Phanerodinium*, subsequently (and now) *Eisenackia*?. Questionable assignment: Lentin and Williams (1989, p.124). N.I.A. Age: late Albian.

taiwaniana Shaw Chenglong, 1999b, p.196,198, figs.136–141. Holotype: Shaw Chenglong, 1999b, figs.136–138. Age: Eocene.

ELLIPSODINIUM Clarke and Verdier, 1967, p.68–69. Taxonomic junior synonym: *Chelinocysta* (name not validly published), by implication in Clarke et al. (1968, p.182), who considered *Chelinocysta lita* (name not validly published) to be a taxonomic junior synonym of *Ellipsodinium rugulosum*. Lentin and Williams (1985, p.123) incorrectly stated that *Dictyopyxia* is a taxonomic junior synonym of *Ellipsodinium*. Type: Clarke and Verdier, 1967, pl.14, fig.6, as *Ellipsodinium rugulosum*.

membraniferum Prince et al., 2008, p.92, pl.1, figs.4–6. Holotype: Prince et al., 2008, pl.1, figs.4–6. Age: late Santonian.

reticulatum Duxbury, 1980, p.117–118, pl.4, figs.4,8. Holotype: Duxbury, 1980, pl.4, figs.4,8. Age: middle-late Barremian.

**rugulosum* Clarke and Verdier, 1967, p.69, pl.14, figs.4–6; text-fig.29. Holotype: Clarke and Verdier, 1967, pl.14, fig.6. Taxonomic junior synonym: *Chelinocysta lita* (name not validly published), according to Clarke et al. (1968, p.182). Age: Cenomanian–Santonian.

tenuicinctum He Chengquan, 1991, p.116, pl.7, fig.12. Holotype: He Chengquan, 1991, pl.7, fig.12. Age: middle Eocene.

ELLIPSOIDICTYUM Klement, 1960, p.78. Taxonomic junior synonyms: *Dictyopyxis* Cookson and Eisenack and *Dictyopyxia*, both according to Sarjeant (1976a, p.23); *Opaeopsomus*, according to Stover and Evitt (1978, p.69) — however, Lentin and Williams (1993, p.465) retained *Opaeopsomus*. Type: Klement, 1960, pl.6, figs.15–16, as *Ellipsoidictyum cinctum*.

**cinctum* Klement, 1960, p.78–80, pl.6, figs.15–16; pl.7, figs.1–2; text-figs.36–37. Holotype: Klement, 1960, pl.6, figs.15–16. Taxonomic junior synonym: *Dictyopyxis* (subsequently) *Dictyopyxia areolata*, according to Sarjeant (1976a, p.23–24). Age: middle Oxfordian.

"*circulatum*" (Clarke and Verdier, 1967, p.67–68, pl.1, fig.11; pl.2, fig.3; text-fig.28) Lentin and Williams, 1977b, p.56. Holotype: Clarke and Verdier, 1967, pl.1, fig.11. **NOW** *Elytrocysta*. Originally *Dictyopyxia*, subsequently *Ellipsoidictyum*, thirdly (and now) *Elytrocysta*. Age: Cenomanian–Santonian.

fenestellum Mantle, 2009b, p.105,106, pl.11, figs.2–4; text-fig.3. Holotype: Mantle, 2009b, pl.11, fig.2. Age: Callovian–Oxfordian.

"*gochti*" Fensome, 1979, p.20–22, pl.2, figs.8–9,11–12; text-fig.8. Holotype: Fensome, 1979, pl.2, figs.8–9,11–12; text-fig.8. **NOW** *Epipllosphaera*. Originally *Ellipsoidictyum*, subsequently (and now) *Epipllosphaera*. Age: early Callovian.

"*groenlandicum*" Smelror, 1988a, p.288,292,294, pl.8, figs.3,5–6; text-fig.9. Holotype: Smelror, 1988a, pl.8, figs.5–6. **NOW** *Valvaeodinium*. Originally *Ellipsoidictyum*, subsequently (and now) *Valvaeodinium*, thirdly *Valensiella* (combination not validly published). Age: early Oxfordian.

imperfectum (Brideaux and McIntyre, 1975, p.25–26, pl.7, figs.1–5) Lentin and Williams, 1977b, p.56. Holotype: Brideaux and McIntyre, 1975, pl.7, figs.1–3. Originally *Dictyopyxidia*, subsequently (and now) *Ellipsoidictyum*. Age: early-middle Albian.

subsp. **imperfectum**. Autonym. Holotype: Brideaux and McIntyre, 1975, pl.7, figs.1–3.

subsp. **prolatum** Duxbury, 2001, p.106–107, fig.8, nos.1–3. Holotype: Duxbury, 2001, fig.8, nos.2. Age: late Aptian–early Albian.

punctatum (Jain, 1977b, p.186–187, pl.4, figs.51–52) Below, 1981a, p.47. Holotype: Jain, 1977b, pl.4, fig.51. Originally *Dictyopyxidia*, subsequently (and now) *Ellipsoidictyum*. Age: early Albian.

"reticulatum" (Valensi, 1953, p.28, pl.2, figs.4–5,14,19; pl.13, fig.6; text-fig.2d ex Sarjeant, 1968, p.230) Lentin and Williams, 1977b, p.56. Holotype: Valensi, 1953, pl.2, figs.4–5; Fauconnier and Masure, 2004, pl.28, figs.1–4. **NOW** *Epiplosphaera*. Originally *Palaeoperidinium* (name not validly published), subsequently *Dictyopyxis* (generic name illegitimate), thirdly *Dictyopyxidia*, fourthly *Ellipsoidictyum*, fifthly (and now) *Epiplosphaera*. Taxonomic senior synonym: *Epiplosphaera bireticulata*, by implication in Courtinat (1989, p.176), who believed *Palaeoperidinium* (as *Epiplosphaera*) *reticulatum* to be the senior name — however, Poulsen (1992a, p.66) retained the two species. Sarjeant (1978a, p.18) also proposed this combination. Age: Bajocian.

sagena (Duxbury, 1980, p.127, pl.3, figs.6,9,12–13) Below, 1982d, p.346. Emendation: Harding, 1990b, p.35, as *Meiourogonyaulax sagena*. Holotype: Duxbury, 1980, pl.3, figs.6,9,12. Originally *Lithodinia*, subsequently *Meiourogonyaulax*, thirdly (and now) *Ellipsoidictyum*. Williams et al. (1993, p.56) also proposed this combination. N.I.A. Age: middle-late Barremian.

"scutella" (Eisenack, 1958a, p.385, pl.24, fig.3) Below, 1982d, p.348. Emendation: Sarjeant, 1985a, p.87–89, as *Parvocavatus? scutella*. Holotype: Eisenack, 1958a, pl.24, fig.3; Sarjeant, 1985a, pl.7, fig.3; pl.9, figs.4–6; Jan du Chêne et al., 1986a, pl.111, fig.1. **NOW** *Scriniodinium?*. Originally *Scriniodinium*, subsequently *Ellipsoidictyum*, thirdly *Parvocavatus?*, fourthly (and now) *Scriniodinium?*. N.I.A. Age: late Aptian.

ELYTROCYSTA Stover and Evitt, 1978, p.43–44. Type: Drugg, 1967, pl.5, fig.12, as *Membranosphaera maastrichtica*.

brevis Stover and Hardenbol, 1994, p.35–36, pl.2, figs.10a–b,11a–b,12. Holotype: Stover and Hardenbol, 1994, pl.2, figs.10a–b. Age: Rupelian.

circulata (Clarke and Verdier, 1967, p.67–68, pl.1, fig.11; pl.2, fig.3; text-fig.28) Stover and Helby, 1987d, p.282. Holotype: Clarke and Verdier, 1967, pl.1, fig.11. Originally *Dictyopyxidia*, subsequently *Ellipsoidictyum*, thirdly (and now) *Elytrocysta*. Age: Cenomanian–Santonian.

***druggii** Stover and Evitt, 1978, p.44. Holotype: Drugg, 1967, pl.5, fig.12, as *Membranosphaera maastrichtica*; Fensome et al., 1993a, fig.1 — p.1137; designated by Stover and Evitt (1978, p.44). Age: Danian.

elongata Slimani and Louwye, 2013, p.18, pl.4, figs.1–10. Holotype: Slimani and Louwye, 2013, pl.4, figs.1–4. Age: early late Maastrichtian.

EMMETROCYSTA Stover, 1975, p.42. Type: Cookson, 1953, pl.2, figs.41–42, as *Cannosphaeropsis urnaformis*.

"cheleusis" Stevens and Helby in Riding and Helby, 2001g, p.184. **Name not validly published**: no description. **Taxonomic senior synonym**: *Balcattia cheleusis*, according to Riding and Helby (2001g, p.184).

denticulata He Chengquan and Li Peng, 1981, p.63, pl.34, figs.1–5. Holotype: He Chengquan and Li Peng, 1981, pl.34, fig.1. Age: late Oligocene.

"*fibrospinosa*" (Davey and Williams, 1966b, p.86, pl.5, fig.5) Sarjeant, 1981, p.123. Emendation: Davey, 1969c, p.36, as a revised diagnosis for *Cordosphaeridium fibrospinosum*. Holotype: Davey and Williams, 1966b, pl.5, fig.5; Bujak et al., 1980, pl.7, figs.3,6. **NOW** *Cordosphaeridium*. Originally (and now) *Cordosphaeridium*, subsequently *Emmetrocyta*?, thirdly *Tityrosphaeridium*?. Questionable assignment: Sarjeant (1981, p.123). Taxonomic junior synonyms: *Cordosphaeridium exilimurum* and *Achomosphaera* (subsequently *Cordosphaeridium*) *valianta*, both according to Fensome et al. (2009, p.23). Age: early Eocene.

sarjeantii (Gitmez, 1970, p.291–292, pl.11, fig.4; text-fig.25) Stover and Evitt, 1978, p.45. Holotype: Gitmez, 1970, pl.11, fig.4; text-fig.25; Fauconnier and Masure, 2004, pl.26, fig.7. Originally *Polystephanephorus*, subsequently (and now) *Emmetrocyta*, thirdly *Hystrichosphaerina*, fourthly *Stiphrosphaeridium*. Courtinat and Pourtoy in Fauconnier and Masure (2004, p.513) retained this species in *Emmetrocyta*. Age: early Kimmeridgian.

**urnaformis* (Cookson, 1953, p.118, pl.2, figs.41–43) Stover, 1975, p.42. Holotype: Cookson, 1953, pl.2, figs.41–42. Originally *Cannosphaeropsis*, subsequently *Polystephanephorus*, thirdly (and now) *Emmetrocyta*. Age: Oligocene.

"*EMSLANDIA*" Gerlach, 1961, p.171. Emendation: Benedek and Sarjeant, 1981, p.315–316. **Taxonomic senior synonym:** *Apteodinium*, according to Stover and Evitt (1978, p.141) and Lucas-Clark (1987, p.168). Type: Gerlach, 1961, pl.26, fig.13, as *Emslandia emslandensis*.

"*australiensis*" (Deflandre and Cookson, 1955, p.248, pl.5, fig.1) Nagy, 1965, p.202. Holotype: Deflandre and Cookson, 1955, pl.5, fig.1. **Combination not validly published:** basionym not fully referenced. **NOW** *Apteodinium*. Originally *Gymnodinium* (Appendix B), subsequently *Emslandia* (combination not validly published), thirdly *Scriniodinium*, fourthly (and now) *Apteodinium*. Taxonomic junior synonym: *Emslandia crassimurata*, according to Lucas-Clark (1987, p.174). Age: middle Miocene.

"*crassimurata*" Benedek and Sarjeant, 1981, p.320,322, fig.1, nos.2,4. Holotype: Benedek, 1972, pl.3, fig.15, as *Emslandia emslandensis*, and Benedek and Sarjeant, 1981, fig.1, nos.2,4. **Taxonomic senior synonym:** *Gymnodinium* (as and now *Apteodinium*) *australiense*, according to Lucas-Clark (1987, p.174). Age: Oligocene.

"*delicata*" Timbrell, 1993, p.119. **Name not validly published:** no description or illustration.

emslandensis*" Gerlach, 1961, p.172–173, pl.26, figs.13–14. Emendation: Benedek and Sarjeant, 1981, p.316–318, as *Apteodinium emslandense*. Holotype: Gerlach, 1961, pl.26, fig.13; Benedek and Sarjeant, 1981, fig.1, no.1; Jan du Chêne et al., 1986a, pl.10, figs.17–19. **NOW *Apteodinium*. Originally *Emslandia*, subsequently (and now) *Apteodinium*. Age: middle Oligocene–middle Miocene.

"*spiridoides*" (Benedek, 1972, p.5, pl.2, figs.1a–b; pl.15, figs.1–6) Benedek and Sarjeant, 1981, p.318. Emendation: Benedek and Sarjeant, 1981, p.319, as *Emslandia spiridoides*. Holotype: Benedek, 1972, pl.2, figs.1a–b; Benedek and Sarjeant, 1981, fig.2, nos.1–3; Jan du Chêne et al., 1986a, pl.11, figs.6–9. **NOW** *Apteodinium*. Originally (and now) *Apteodinium*, subsequently *Emslandia*. Taxonomic junior synonym: *Apteodinium tectatum*, according to Lucas-Clark (1987, p.178). Age: middle Oligocene.

ENDOCERATIUM Vozzhennikova, 1965, p.89. Taxonomic senior synonym: *Pseudoceratium*, according to Helby (1987, p.313–315) — however, Lentin and Williams (1989, p.125) retained *Endoceratium*. Although the "type species", *Endoceratium ludbrookiae*, was not validly transferred by Vozzhennikova (1965), the generic name *Endoceratium* was validly published by that author, since it is based on a previously validly published species name (I.C.N. Article 40.3). Type: Cookson and Eisenack, 1958, pl.5, fig.7, as *Ceratocystidiopsis ludbrookiae*.

dettmanniae (Cookson and Hughes, 1964, p.51–52, pl.7, figs.1–4) Stover and Evitt, 1978, p.45. Emendation: Harding and Hughes, 1990, p.312,314, as *Endoceratium dettmanniae*. Holotype: Cookson and Hughes, 1964, pl.7, fig.1. Originally *Pseudoceratium*, subsequently (and now) *Endoceratium*. Lentin and Williams (1989, p.125) retained this species in *Endoceratium*. Morgan (1980, p.22) also proposed this combination. Age: late Albian–early Cenomanian.

exquisitum Morgan, 1980, p.22, pl.10, figs.11–12. Holotype: Morgan, 1980, pl.10, figs.11–12; Helby et al., 1987, fig.29I. Originally (and now) *Endoceratium*, subsequently *Pseudoceratium*. Lentin and Williams (1989, p.125) retained this species in *Endoceratium*. Age: Albanian.

**ludbrookiae* (Cookson and Eisenack, 1958, p.52–54, pl.5, figs.7–8) Loeblich Jr. and Loeblich III, 1966, p.93. Emendation: Morgan, 1980, p.23, as *Endoceratium ludbrookiae*. Holotype: Cookson and Eisenack, 1958, pl.5, fig.7. Originally *Ceratocystidiopsis* (Appendix A), subsequently *Pseudoceratium*, thirdly (and now) *Endoceratium*. Lentin and Williams (1989, p.126) retained this species in *Endoceratium*. This combination was not validly published in Vozzhennikova (1965, p.89), since that author did not fully reference the basionym. Age: Albanian.

"*pentagonum*" Singh, 1983, p.128–129, pl.44, figs.2–3. Holotype: Singh, 1983, pl.44, fig.2. **NOW** *Nyktericysta*. Originally *Endoceratium*, subsequently (and now) *Nyktericysta*. Age: middle Cenomanian.

"*perforatum*" Vozzhennikova, 1967, p.188–189, pl.112, figs.1a–b,3; pl.113, fig.1. Emendation: Yun Hyesu, 1981, p.62, as *Xenascus perforatus*. Holotype: Vozzhennikova, 1967, pl.112, fig.1a; Lentin and Vozzhennikova, 1990, pl.16, fig.5; text-fig.69. **NOW** *Xenascus*. Originally *Endoceratium*, subsequently (and now) *Xenascus*. Taxonomic senior synonym: *Hystrichosphaera* (as *Phoberocysta*, now *Xenascus*) *ceratioides*, according to Davey and Verdier (1971, p.27) — however, Yun Hyesu (1981, p.62) retained *Xenascus perforatus*. Lentin and Vozzhennikova (1990, p.118–119) provided an "expanded description" for this species, as *Xenascus perforatus*. Age: Late Cretaceous.

pflugii Prössl, 1990, p.98, pl.3, figs.7–8 ex Prössl, 1992b, p.113–114. Holotype: Prössl, 1990, pl.3, fig.8. This name was not validly published in Prössl (1990, p.98), since that author did not specify the lodgment of the holotype. Age: late Hauterivian.

turneri (Cookson and Eisenack, 1958, p.55, pl.5, figs.2–6) Stover and Evitt, 1978, p.45. Holotype: Cookson and Eisenack, 1958, pl.5, fig.3. Originally *Pseudoceratium*, subsequently (and now) *Endoceratium*. Lentin and Williams (1989, p.126) retained this species in *Endoceratium*. Age: Aptian–Albanian.

ENDOSCRINIUM (Klement, 1960, p.18) Vozzhennikova, 1967, p.174. Emendations: Vozzhennikova, 1965, p.88; Gocht, 1970b, p.143–144; Riding and Fensome, 2003, p.19–20. Originally *Scriniodinium* subgenus *Endoscrinium*, subsequently *Endoscrinium*. Taxonomic senior synonym: *Scriniodinium*, according to Stover and Evitt (1978, p.187) and Dodekova (1990, p.30–31) — however, Lentin and Williams (1993, p.207) retained *Endoscrinium*. Taxonomic junior synonym: *Athigmatocysta*, according to Below (1981a, p.48) — however, Harding (1990b, p.28) and Riding and Fensome (2003, p.23–24) retained *Athigmatocysta*; *Wetzelopsis* (name not validly published) by implication, as the type of *Wetzelopsis*, as *Endoscrinium irregulare*, is now included in *Endoscrinium*. As a generic name, *Endoscrinium* was not validly published in Vozzhennikova (1965, p.88), since that author did not fully reference the basionym. Type: Deflandre, 1939a, pl.5, figs.7–8, as *Gymnodinium galeritum*.

acroferum (Prauss, 1989, p.45–46, pl.9, figs.1–2, pl.14, figs.17–22; text-fig.21) Riding and Fensome, 2003, p.21. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Holotype: Prauss, 1989, pl.14, figs.19–21; text-fig.21. Age: late Bathonian–late Callovian.

"*amalthei*" (Wetzel, 1966, p.318, pl.31, fig.6) Lentin and Williams, 1981, p.96. Emendation: Sarjeant, 1980b, p.117–118, as *Scriniodinium amalthei*. Holotype: Wetzel, 1966, pl.31, fig.6. **NOW** *Scriniodinium*?. Originally *Membranilarnacia*, subsequently *Membranilarnacia*?, thirdly *Scriniodinium*, fourthly *Endoscrinium*, fifthly (and now) *Scriniodinium*?. Age: late Pliensbachian.

"*anceps*" Raynaud, 1978, p.392, pl.1, fig.17. Holotype: Raynaud, 1978, pl.1, fig.17; Jan du Chêne et al., 1986a, pl.110, figs.6–8. **NOW** *Scriniodinium*. Originally *Endoscrinium*, subsequently (and now) *Scriniodinium*. Age: late Kimmeridgian–Valanginian.

asymmetricum Riding, 1987a, p.261, fig.7, nos.1,2,5; fig.12. Holotype: Riding, 1987a, fig.7, no.1. Originally (and now) *Endoscrinium*, subsequently *Scriniodinium*. Lentin and Williams (1993, p.207) retained this species in *Endoscrinium*. Age: late Bathonian–early Callovian.

attadalense (Cookson and Eisenack, 1958, p.25, pl.1, fig.7) Riding and Fensome, 2003, p.21. Holotype: Cookson and Eisenack, 1958, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.112, figs.4–7; Riding and Fensome, 2003, text-fig.4B. Originally *Gymnodinium* (Appendix B), subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*. Riding and Fensome (2003, p.21) cited the basionym as *Scriniodinium attadalense* rather than *Gymnodinium attadalense*, but otherwise fully referenced the basionym; hence, their validation of the combination is accepted here. Age: Aptian.

bessebae Below, 1981a, p.48–49, pl.7, figs.4–6, 7a–b, 8; pl.14, figs.6, 7a–b, 8; text-figs.48a–b, 49a–b, 50–51, 52a–d. Holotype: Below, 1981a, pl.7, figs.7a–b; Jan du Chêne et al., 1986a, pl.104, figs.12–13; Fensome et al., 1991, figs.4–7 — p.589. Originally (and now) *Endoscrinium*, subsequently *Scriniodinium*. Lentin and Williams (1993, p.208) retained this species in *Endoscrinium*. N.I.A. Age: Barremian.

"*campanula*" (Gocht, 1959, p.61–62, pl.4, fig.6; pl.5, figs.1a–b) Vozzhennikova, 1967, p.175. Holotype: Gocht, 1959, pl.5, figs.1a–b; Jan du Chêne et al., 1986a, pl.110, figs.1–5; Fensome et al., 1991, figs.1–3 — p.593; figs.1–5 — p.597. Originally (and now) *Scriniodinium*, subsequently *Endoscrinium*, thirdly *Scriniodinium?*. Taxonomic junior synonym: *Gonyaulacysta fragosa*, according to Harker and Sarjeant (1975, p.224) and Brideaux and McIntyre (1975, p.33). N.I.A. Age: Hauterivian.

"subsp. *campanula*". Autonym. Holotype: Gocht, 1959, pl.5, figs.1a–b; Jan du Chêne et al., 1986a, pl.110, figs.1–5; Fensome et al., 1991, figs.1–3 — p.593; figs.1–5 — p.597. **NOW** *Scriniodinium campanula* subsp. *campanula*. Originally *Endoscrinium campanula* subsp. *campanula*, subsequently *Scriniodinium? campanula* subsp. *campanula*, thirdly (and now) *Scriniodinium campanula* subsp. *campanula*. N.I.A.

"subsp. *nichan*" Below, 1981a, p.50–51, pl.7, fig.2. Holotype: Below, 1981a, pl.7, fig.2; Jan du Chêne et al., 1986a, pl.110, figs.9–10; Fensome et al., 1991, figs.4–5 — p.593; figs.1–3 — p.695. **NOW** *Scriniodinium campanula* subsp. *nichan*. Originally *Endoscrinium campanula* subsp. *nichan*, subsequently *Scriniodinium? campanula* subsp. *nichan*, thirdly (and now) *Scriniodinium campanula* subsp. *nichan*. N.I.A. Age: Hauterivian.

"*eisenackii*" (Deflandre, 1939a, p.171, pl.6, figs.7–10; text-figs.3–4) Gocht, 1970b, p.146–147. Emendation: Sarjeant, 1982b, p.32–33, as *Gonyaulacysta eisenackii*. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. **NOW** *Gonyaulacysta*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Gonyaulacysta*, thirdly *Endoscrinium*, fourthly *Tubotuberella*. Taxonomic junior synonym: *Tubotuberella sphaerocephala*, according to Sarjeant (1982b, p.32). Age: Oxfordian.

"subsp. *eisenackii*". Autonym. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. **Now redundant**. Originally *Gonyaulax eisenackii* subsp. *eisenackii* (Appendix B), subsequently *Endoscrinium eisenackii* subsp. *eisenackii*, thirdly *Gonyaulacysta eisenackii* subsp. *eisenackii*, fourthly *Tubotuberella eisenackii* subsp. *eisenackii*. Taxonomic junior synonym: *Gonyaulax* (as *Gonyaulacysta*) *eisenackii* subsp. *oligodentata*, according to Sarjeant (1982b, p.32). Age: Oxfordian.

"subsp. *oligodentatum*" (Cookson and Eisenack, 1958, p.30, pl.2, fig.11) Gocht, 1970b, p.146. Holotype: Cookson and Eisenack, 1958, pl.2, fig.11; Jan du Chêne et al., 1986a, pl.125, figs.10–11. Originally *Gonyaulax eisenackii* subsp. *oligodentata* (Appendix B), subsequently *Gonyaulacysta eisenackii* subsp. *oligodentata*, thirdly *Endoscrinium eisenackii* subsp. *oligodentatum*, fourthly *Tubotuberella eisenackii* subsp. *oligodentata*. **Taxonomic senior synonym:** *Gonyaulax* (as *Gonyaulacysta*, now *Endoscrinium*) *eisenackii* subsp. *eisenackii*, according to Sarjeant (1982b, p.32). Age: Late Jurassic.

**galeritum* (Deflandre, 1939a, p.167, pl.5, figs.7–9; pl.6, fig.1) Vozzhennikova, 1967, p.176. Emendation: Riding and Fensome, 2003, p.20. Holotype: Deflandre, 1939a, pl.5, figs.7–8; Eisenack and Klement, 1964, p.759, 761; Jan du Chêne et al., 1986a, pl.104, figs.10–11; Fensome et al., 1995, fig.1 — p.1501; figs.1–2 — p.1505. Originally *Gymnodinium* (Appendix B), subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*. Lentin and Williams (1993, p.208) retained this species in *Endoscrinium*. This combination was not validly published in Vozzhennikova (1965, p.88), since that author did not fully reference the basionym. Riding and Fensome (2003, p.23) considered

that this species may be the taxonomic senior synonym of *Scriniodinium* (now *Endoscrinium*) *obscurum*. Age: Oxfordian.

subsp. *fornicatum* (Klement, 1960, p.25–26, pl.1, figs.7–12) Lentin and Williams, 1973, p.54. Holotype: Klement, 1960, pl.1, figs.7–8; Jan du Chêne et al., 1986a, pl.107, figs.4–6; Fensome et al., 1995, figs.1–2 — p.1489. Originally *Scriniodinium galeritum* subsp. *fornicatum*, subsequently (and now) *Endoscrinium galeritum* subsp. *fornicatum*. Age: middle Oxfordian.

subsp. *galeritum*. Autonym. Holotype: Deflandre, 1939a, pl.5, figs.7–8; Eisenack and Klement, 1964, p.759,761; Jan du Chêne et al., 1986a, pl.104, figs.10–11; Fensome et al., 1995, fig.1 — p.1501; figs.1–2 — p.1505. Originally *Scriniodinium galeritum* subsp. *galeritum*, subsequently (and now) *Endoscrinium galeritum* subsp. *galeritum*.

subsp. *reticulatum* (Klement, 1960, p.26–27, pl.2, figs.1–2) Górka, 1970, p.491. Holotype: Klement, 1960, pl.2, figs.1–2; Eisenack and Klement, 1964, p.765; Jan du Chêne et al., 1986a, pl.108, figs.9–10; Fensome et al., 1995, figs.1–2 — p.1739; disintegrated according to Sarjeant (1984a, p.155). Originally *Scriniodinium galeritum* subsp. *reticulatum*, subsequently (and now) *Endoscrinium galeritum* subsp. *reticulatum*. Lentin and Williams (1973, p.54) also proposed this combination. Jan du Chêne et al. (1986a, p.316–317) and Riding and Fensome (2003, p.23) considered *Scriniodinium* (now *Endoscrinium*) *subvallare* to be a possible taxonomic synonym of this taxon. Age: middle Oxfordian.

"*glabrum*" (Duxbury, 1977, p.24, pl.11, figs.1,6; text-fig.3) Below, 1981a, p.48. Holotype: Duxbury, 1977, pl.11, figs.1,6; text-fig.3; Jan du Chêne et al., 1986a, pl.111, figs.9–10; Fensome et al., 1995, figs.1–2 — p.1511. **NOW** *Athigmatocysta*. Originally (and now) *Athigmatocysta*, subsequently *Endoscrinium*, thirdly *Scriniodinium*. Age: late Berriasian–mid Barremian.

"*gochti*" (Pocock, 1972, p.90, pl.22, fig.12; text-fig.6) Muir and Sarjeant, 1978, p.205. Holotype: Pocock, 1972, pl.22, fig.12; Jan du Chêne et al., 1986a, pl.93, figs.4–8. **NOW** *Rhynchodiniopsis*. Originally *Scriniodinium*, subsequently *Scriniodinium*?, thirdly *Endoscrinium*, fourthly (and now) *Rhynchodiniopsis*. Sarjeant (1978a, p.29) also proposed this combination. Age: late Bajocian.

granulatum (Raynaud, 1978, p.391–392, pl.2, figs.6,12) Lentin and Williams, 1981, p.97. Holotype: Raynaud, 1978, pl.2, fig.6; Jan du Chêne et al., 1986a, pl.111, figs.13–14. Originally *Athigmatocysta*, subsequently (and now) *Endoscrinium*, thirdly *Scriniodinium*. Lentin and Williams (1993, p.209) retained this species in *Endoscrinium*. Age: late Kimmeridgian–Portlandian.

hauterivianum (Duxbury, 2001, p.113–114, fig.13, nos.1–3) Riding and Fensome, 2003, p.21. Holotype: Duxbury, 2001, fig.13, no.2. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: early–early late Hauterivian.

heikeae (Prössl, 1990, p.106, pl.12, figs.1–2,4–5,9 ex Prössl, 1992b, p.113,116) Riding and Fensome, 2003, p.22. Holotype: Prössl, 1990, pl.12, figs.1,4,9. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. This name was not validly published in Prössl (1990, p.106), since that author did not specify the lodgment of the holotype. Age: Albian.

indicum (Jain and Garg in Jain et al., 1984, p.72–73, pl.2, figs.22–23) Riding and Fensome, 2003, p.22. Holotype: Jain et al., 1984, pl.2, fig.22. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: Kimmeridgian–early Tithonian.

irregulare (Cookson and Eisenack, 1958, p.28–29, pl.10, figs.1–2) Riding and Fensome, 2003, p.22. Holotype: Cookson and Eisenack, 1958, pl.10, fig.1; Jan du Chêne et al., 1986a, pl.109, figs.1–2. Originally *Wetzeliella*, subsequently *Wetzeliopsis* (name not validly published), thirdly *Scriniodinium*?, fourthly *Tubotuberella*, fifthly (and now) *Endoscrinium*. Taxonomic junior synonym: *Wetzeliella meckelfeldensis*, according to Costa and Downie (1979, p.43) — however, Lentin and Williams (1981, p.290) retained *Wetzeliella meckelfeldensis*. Riding and Fensome (2003, p.22) cited the basionym as *Scriniodinium irregulare* rather than *Wetzeliella irregularis*, but

otherwise fully referenced the basionym; hence, their validation of the combination is accepted here. Age: Late Jurassic.

kempiae (Stover and Helby, 1987a, p.114–115, figs.14A–B,15A–F,16A–I) Lentin and Williams, 1989, p.127. Holotype: Stover and Helby, 1987a, figs.15A–F; Fensome et al., 1996, figs.1–6 — p.2183. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: early Callovian.

klementii (Pocock, 1972, p.91, pl.23, figs.1–2; text-fig.7) Sarjeant, 1978a, p.29. Holotype: Pocock, 1972, pl.23, figs.1–2; Jan du Chêne et al., 1986a, pl.108, figs.5–8. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Endoscrinium*, fourthly *Scrinioicassis*. This species was retained in *Endoscrinium* by Riding and Fensome (2003, p.22). Age: Callovian.

luridum (Deflandre, 1939a, p.166, pl.5, figs.4–6) Gocht, 1970b, p.144–146. Holotype: Deflandre, 1939a, pl.5, figs.4–5; Jan du Chêne et al., 1986a, pl.109, figs.6–8. Originally *Gymnodinium* (Appendix B), subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*, fourthly *Tubotuberella*. Lentin and Williams (1993, p.209) retained this species in *Endoscrinium*. Age: early Oxfordian.

?novissimum (Morgenroth, 1968, p.540–541, pl.43, figs.3–4) Riding and Fensome, 2003, p.23. Holotype: Morgenroth, 1968, pl.43, fig.4. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Endoscrinium?*. Questionable assignment: Riding and Fensome (2003, p.23). Age: Danian.

obscurum (Manum and Cookson, 1964, p.21–22, pl.4, figs.5–6) Riding and Fensome, 2003, p.23. Holotype: Manum and Cookson, 1964, pl.4, fig.6. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Endoscrinium*. Riding and Fensome (2003, p.23) considered that this species may be a taxonomic junior synonym of *Endoscrinium galeritum*, the type being reworked. Age: Late Cretaceous.

"oxfordianum" (Sarjeant, 1962a, p.485, pl.69, figs.13–14) Vozzhennikova, 1967, p.177. Holotype: Sarjeant, 1962a, pl.69, fig.14. **NOW** *Scriniodinium?*. Originally *Scriniodinium*, subsequently *Endoscrinium*, thirdly *Sirmiodinium*, fourthly (and now) *Scriniodinium?*. Age: Oxfordian.

"pharo" Duxbury, 1977, p.32, pl.9, fig.5; text-fig.8. Holotype: Duxbury, 1977, pl.9, fig.5; Jan du Chêne et al., 1986a, pl.111, figs.11–12. **NOW** *Scriniodinium*. Originally *Endoscrinium*, subsequently (and now) *Scriniodinium*. Duxbury (1977) gave as derivation for the epithet the Greek "*pharos*" ("lighthouse"); however, he gave the epithet as "*pharo*". N.I.A. Age: late Berriasian–early Valanginian.

"prolatum" (Stevens, 1987, p.193–195, figs.9A–J) Lentin and Williams, 1989, p.128. Holotype: Stevens, 1987, figs.9A–C; Fensome et al., 1996, figs.1–3 — p.2299. **NOW** *Scriniodinium*. Originally (and now) *Scriniodinium*, subsequently *Endoscrinium*. Age: early Berriasian.

reticulatum (Pocock, 1972, p.91–92, pl.23, fig.3) Riding and Fensome, 2003, p.23. Holotype: Pocock, 1972, pl.23, fig.3; Jan du Chêne et al., 1986a, pl.108, figs.1–4. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly *Scrinioicassis*, fourthly (and now) *Endoscrinium*. Age: Callovian.

rostratum (Brideaux and McIntyre, 1975, p.33–34, pl.10, figs.6–14; pl.11, figs.1–3) Below, 1981a, p.51. Holotype: Brideaux and McIntyre, 1975, pl.10, figs.12–14; Jan du Chêne et al., 1986a, pl.111, figs.2–4. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Lentin and Williams (1993, p.210) retained this species in *Endoscrinium*. Age: middle Albian.

subvallare (Sarjeant, 1962b, p.262–263, pl.1, fig.10; text-fig.7) Lentin and Williams, 1973, p.54. Holotype: Sarjeant, 1962b, pl.1, fig.10; text-fig.7. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Lentin and Williams (1993, p.210) retained this species in *Endoscrinium*. Jan du Chêne et al. (1986a, p.316–317) and Riding and Fensome (2003, p.23) considered *Scriniodinium* (now *Endoscrinium*) *galeritum* subsp. *reticulatum* to be a possible taxonomic synonym of this species. Age: late Oxfordian.

?*tabulatum* Miles, 1990, p.81–82, pl.1, figs.1–12; text-figs.3A–B. Holotype: Miles, 1990, pl.1, figs.1–6. Questionable assignment: Riding and Fensome (2003, p.23); these authors considered that the species may belong to the genus *Impagidinium*. Age: late Albian.

?*variabile* (Pocock, 1972, p.100, pl.23, figs.14–16) Jansonius, 1986, p.207. Holotype: Pocock, 1972, pl.23, fig.15; Jansonius, 1986, pl.3, figs.15–17; text-fig.8; Jan du Chêne et al., 1986a, pl.39, figs.5–7. Originally *Chytroeisphaeridia*, subsequently *Chytroeisphaeridia*?, thirdly *Gonyaulacysta*, fourthly *Gonyaulacysta*?, fifthly (and now) *Endoscrinium*?. Questionable assignment: Jansonius (1986, p.207). Riding and Fensome (2003, p.23) recommended that the use of this name be restricted to the holotype. Age: late Bajocian.

velum Pestchevitskaya, 2009, p.106,108, pl.1, figs.3–4; text fig.2A. Holotype: Pestchevitskaya, 2009, pl.1, figs.3–4. Age: Berriasian–early Valanginian.

"**ENERGLYNIA**" Sarjeant, 1976b, p.164. **Taxonomic senior synonym:** *Wanaea*, according to Riley and Fenton (1982, p.199–200) and Lentin and Williams (1993, p.210). Type: Dodekova, 1975, pl.3, figs.1–4, as *Wanaea acollaris*.

"**+acollaris**" (Dodekova, 1975, p.20–21, pl.2, figs.9–10; pl.3, figs.1–7,9; text-fig.2) Sarjeant, 1978a, p.14. Holotype: Dodekova, 1975, pl.3, figs.1–4. **NOW** *Wanaea*. Originally (and now) *Wanaea*, subsequently *Energlynia*. Taxonomic junior synonyms: *Wanaea* (as *Energlynia*) *indotata*, according to Woollam (1980, p.250); *Energlynia kyrbasia*, according to Fenton and Fisher (1978, p.236) — however, Feist-Burkhardt and Monteil (1997, p.45) retained *Wanaea indotata*; *Wanaea zoharensis*, according to Fensome (1981, p.50) — however, Riding and Helby (2001b, p.51) retained *Wanaea zoharensis*. The nomenclatural type of the genus *Energlynia* remains the holotype of *Energlynia kyrbasia*. Age: late Bathonian.

"**indotata**" (Drugg, 1978, p.74–75, pl.8, figs.11–14) Fensome, 1981, p.51. Holotype: Drugg, 1978, pl.8, fig.12. **NOW** *Wanaea*. Originally (and now) *Wanaea*, subsequently *Energlynia*. Taxonomic senior synonym: *Wanaea* (as *Energlynia*) *acollaris*, according to Woollam (1980, p.250) — however, Feist-Burkhardt and Monteil (1997, p.45) retained *Wanaea indotata*. Age: Bajocian–Callovian.

"***kyrbasia**" Sarjeant, 1976b, p.166,168,170,172, figs.1–16. Holotype: Sarjeant, 1976b, figs.1,6–7. **Taxonomic senior synonym:** *Wanaea* (subsequently *Energlynia*) *acollaris*, according to Fenton and Fisher (1978, p.236). The nomenclatural type of the genus *Energlynia* remains the holotype of *Energlynia kyrbasia*. Age: late Bathonian.

ENNEADOCYSTA Stover and Williams, 1995, p.108–109. Emendation: Fensome et al., 2007, p.394. This name was not validly published in Bujak (1994, p.119), since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1b). Type: Gerlach, 1961, pl.28, fig.14, as *Baltisphaeridium pectiniforme*.

arcuata (Eaton, 1971, p.360–363, pl.3, figs.1–9; text-figs.4–5) Stover and Williams, 1995, p.108. Emendation: Stover and Williams, 1995, p.109, as *Enneadocysta arcuata*. Holotype: Eaton, 1971, pl.3, fig.1; text-fig.4; Bujak et al., 1980, pl.2, fig.6. Originally *Areosphaeridium*, subsequently (and now) *Enneadocysta*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Enneadocysta*?) *dictyostilum*, according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Enneadocysta*) *arcuatum*. Age: middle Eocene.

brevistila Fensome et al., 2007, p.397,398,400,402, pl.4, figs.1–4,7,8. Holotype: Fensome et al. 2007, pl.4, figs.1,2. Age: early Priabonian.

deconinckii Stover and Williams, 1995, p.110, pl.2, figs.3a–f; pl.3, figs.1a–c; text-figs.1D,F. Holotype: Stover and Williams, 1995, pl.2, figs.3a–f. Age: Bartonian–Rupelian.

dictyostila (Menéndez, 1965, p.11–12, pl.2, fig.6; pl.3, figs.18–22) Stover and Williams, 1995, p.109. Emendations: Sarjeant, 1981, p.115, as *Areosphaeridium dictyostilum*; Fensome et al., 2007, p.396–397, as *Enneadocysta dictyostila*. Holotype: Menéndez, 1965, pl.2, fig.6; pl.3, figs.18–20. Originally *Hystrichosphaeridium*,

subsequently *Oligosphaeridium?*, thirdly *Areosphaeridium*, fourthly *Enneadocysta?*, fifthly (and now) *Enneadocysta*. Stover and Williams (1995, p.109) questionably assigned this species to *Enneadocysta*; however Fensome et al. (2007, p.396) included it without question. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Areosphaeridium*) *diktyoplokum*, according to Eaton (1971, p.359) — however, Sarjeant (1981, p.115) retained *Areosphaeridium* (now *Enneadocysta?*) *dictyostilum*. Taxonomic junior synonyms: *Enneadocysta partridgei*, according to Fensome et al. (2007, p.396); *Areosphaeridium* (now *Enneadocysta*) *arcuatum* and *Cordosphaeridium* (now *Cooksonidium*) *capricornum*, both according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Enneadocysta*) *arcuatum* and *Cordosphaeridium* (now *Cooksonidium*) *capricornum*. Age: Tertiary.

fenestrata (Bujak, 1976, p.107,109–110, pl.2, figs.9–12; pl.3, figs.1–4; text-figs.3D–F) Stover and Williams, 1995, p.108. Emendation: Stover and Williams, 1995, p.110, as *Enneadocysta fenestrata*. Holotype: Bujak, 1976, pl.3, fig.2. Originally *Areosphaeridium*, subsequently (and now) *Enneadocysta*. Age: middle Eocene (see Aubry, 1986).

harrisii Stover and Williams, 1995, p.111–112, pl.3, figs.2a–c,3,4a–d,5; text-figs.1D,H. Holotype: Cookson and Eisenack, 1965a, pl.15, fig.1. Age: late Eocene.

inessae Iakovleva in Oreshkina et al., 2015, p.75, fig.10, nos.8–9,11–12; fig.11, nos.1–11; fig.17, nos.3,6,10,14,18; fig.18, nos.1–15; text-fig.24. Holotype: Oreshkina et al., 2015, fig.11, nos.1–2,5–6. Age: Bartonian–Priabonian.

magna Fensome et al., 2007, p.394–396, pl.1, figs.1–20, pl.2, figs.1–19; text-figs.5A,B,6A–E. Holotype: Fensome et al., 2007, pl.1, figs.5–7. Age: Rupelian.

multicornuta (Eaton, 1971, p.363–364, pl.4, figs.1–7; text-fig.6) Stover and Williams, 1995, p.109. Emendation: Stover and Williams, 1995, p.112–113, as *Enneadocysta multicornuta*. Holotype: Eaton, 1971, pl.4, fig.1; text-fig.6. Originally *Areosphaeridium*, subsequently (and now) *Enneadocysta*. Taxonomic senior synonym: *Baltisphaeridium* (now *Enneadocysta*) *pectiniforme*, according to Sarjeant (1984b, p.83–84,86) — however, Stover and Williams (1995, p.112) retained *Areosphaeridium* (as *Enneadocysta*) *multicornutum*. Age: Eocene.

"partridgei" Stover and Williams, 1995, p.113–114, pl.4, figs.4a–e,5; pl.5, figs.1a–c,2a–c,3a–c,4,5a–b; text-figs.1D,J. Holotype: Stover and Williams, 1995, pl.4, figs.4a–e. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Enneadocysta*) *dictyostilum*, according to Fensome et al. (2007, p.396). Age: Bartonian–Rupelian.

****pectiniformis*** (Gerlach, 1961, p.195–196, pl.28, fig.14; text-fig.18) Stover and Williams, 1995, p.108. Emendations: Sarjeant, 1984b, p.83–84,86, as *Areosphaeridium pectiniforme*; Stover and Williams, 1995, p.114, as *Enneadocysta pectiniformis*. Holotype: Gerlach, 1961, pl.28, fig.14; Sarjeant, 1984b, pl.1, fig.2; pl.4, fig.2; Fauconnier and Masure, 2004, pl.7, figs.4–5. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Areosphaeridium?*, fourthly *Areosphaeridium*, fifthly (and now) *Enneadocysta*. Taxonomic junior synonym: *Areosphaeridium* (now *Enneadocysta*) *multicornuta*, according to Sarjeant (1984b, p.83–84,86) — however, Stover and Williams (1995, p.112) retained *Areosphaeridium* (as *Enneadocysta*) *multicornutum*. This combination was not validly published in Bujak (1994, p.119) since that author did not fully reference the basionym. Age: early Oligocene (see Stover and Williams, 1995).

robusta Stover and Williams, 1995, p.115, pl.7, figs.1a–c; text-fig.1K. Holotype: Stover and Williams, 1995, pl.7, figs.1a–c. Age: Lutetian.

EOCLADOPYXIS Morgenroth, 1966a, p.7. Emendation: Stover and Evitt, 1978, p.206–207. Type: Morgenroth, 1966a, pl.3, figs.2–3, as *Eocladopyxis peniculata*.

****peniculata*** Morgenroth, 1966a, p.7–8, pl.3, figs.2–3. Emendation: McLean, 1976, p.348, as a revised description. Holotype: Morgenroth, 1966a, pl.3, figs.2–3. Age: early Eocene.

tessellata Liengjareern et al., 1980, p.481–482, pl.53, fig.6. Holotype: Liengjareern et al., 1980, pl.53, fig.6. Age: late Eocene.

EODINIA Eisenack, 1936, p.73. Emendations: Gocht, 1975a, p.27; Berger, 1986, p.344. Type: Eisenack, 1936, text-fig.1, as *Eodinia pachythea*.

"*mosaica*" (Dodekova, 1975, p.18–19, pl.1, figs.1–6; pl.2, figs.1–3,6) Berger, 1986, p.344. Holotype: Dodekova, 1975, pl.1, figs.1–3. **NOW** *Mosaicodinium*. Originally *Ctenidodinium*, subsequently *Ctenidodinium?*, thirdly *Eodinia*, fourthly (and now) *Mosaicodinium*. Age: late Bathonian.

**pachythea* Eisenack, 1936, p.73–75, text-figs.1–6. Emendation: Gocht, 1975a, p.27. Holotype: Eisenack, 1936, text-fig.1; Gocht, 1975a, figs.21a–b. Age: Callovian.

poulsenii Barski, 2002, p.45,48–49, text-figs.4A–B, pl.1, figs.1–6; pl.2, figs.1–5. Holotype: Barski, 2002, pl.1, figs.1–2. Age: Bathonian.

"**EOPSEUDOCERATIUM**" (Neale and Sarjeant, 1962, p.446) Lentin and Williams, 1973, p.54. Originally *Pseudoceratium* subgenus *Eopseudoceratium*, subsequently *Eopseudoceratium*. **Taxonomic senior synonym:** *Pseudoceratium*, according to Stover and Evitt (1978, p.77) and Lentin and Williams (1985, p.127). Type: Neale and Sarjeant, 1962, pl.20, fig.3; text-fig.5, as *Pseudoceratium* subgenus *Eopseudoceratium gochtii*.

"**gochtii*" (Neale and Sarjeant, 1962, p.446–448, pl.20, figs.3–4; text-figs.5a–c) Lentin and Williams, 1973, p.54. Holotype: Neale and Sarjeant, 1962, pl.20, fig.3; text-fig.5a. **NOW** *Pseudoceratium*. Originally *Pseudoceratium* subgenus *Eopseudoceratium*, subsequently *Eopseudoceratium*, thirdly (and now) *Pseudoceratium*. Age: late Hauterivian–mid Barremian.

EPELIDINIUM Williams et al., 2015, p.305. Type: Iakovleva and Heilmann-Clausen, 2007, fig.2, nos.4–5; fig.3, no.1., as *Wilsonidium pechoricum*.

brinkhuisii Iakovleva, 2016, p.5,7–8 (on PDF initially published online), pl.2, figs.3–4; pl.4, figs.7–9,13; pl.5, figs.7–9,10,14; text-fig.4a (part). Holotype: Iakovleva, 2016, pl.5, figs.7–9. Age: earliest Eocene.

?*granulatum* (Wilson, 1967c, p.493, figs.29–30) Williams et al., 2015, p.305. Holotype: Wilson, 1967c, fig.30. Originally *Wetzelia* (*Rhombodinium*) *glabra* var. *granulata*, subsequently *Rhombodinium glabrum* subsp. *granulatum*, thirdly *Dracodinium granulatum*, fourthly (and now) *Epelidinium? granulatum*. Questionable assignment: Williams et al. (2015, p.305). Age: late Eocene.

leptotoichum Iakovleva, 2016, p.8–9 (on PDF initially published online), pl.4, figs.1–6,10–12; pl.5, figs.7–9,13; pl.6, figs.1–6,11–13; pl.6, figs.9–12; text-fig.4a (part). Holotype: Iakovleva, 2016, pl.4, figs.1–6. Age: earliest Eocene.

normandiense Iakovleva, 2016, p.9 (on PDF initially published online), pl.7, figs.4–5; text-fig.4a (part). Holotype: Iakovleva, 2016, pl.7, figs.4–5. Age: earliest Eocene.

**pechoricum* (Iakovleva and Heilmann-Clausen, 2007, p.1024,1025,1027–1031, fig.2, nos.1–5; fig.3, nos.1–12; fig.4, nos.1–6; fig.5, nos.1–4; fig.6, nos.1–4) Williams et al. 2015, p.305. Holotype: Iakovleva and Heilmann-Clausen, 2007, fig.2, nos.4–5, fig.3, no.1. Originally *Wilsonidium*, subsequently (and now) *Epelidinium*. Age: Earliest Eocene.

?*translucidum* (Michoux, 1988, p.31–32, pl.4, figs.1–5,7–8; text-fig.9) Williams et al., 2015, p.305. Holotype: Michoux, 1988, pl.4, fig.4. Originally *Rhombodinium*, subsequently (and now) *Epelidinium?* Questionable assignment: Williams et al. (2015, p.305). Age: early Eocene.

triangulatum (Yu Jingxian, 1989, p.155–156, pl.58, figs.2,5,8) Williams et al., 2015, p.305. Holotype: Yu Jingxian, 1989, pl.58, fig.2. Originally *Gochtodinium*, subsequently *Wetzeliella*, thirdly *Wilsonidium*, fourthly (and now) *Epelidinium*. Age: Eocene.

EPELIDOSPHAERIDIA Davey, 1969a, p.142. Type: Cookson and Hughes, 1964, pl.8, fig.8, as *Epelidosphaeridia spinosa*.

"*aspera*" (Singh, 1971, p.322, pl.50, fig.1) Morgan, 1980, p.23. Holotype: Singh, 1971, pl.50, fig.1; Fauconnier and Masure, 2004, pl.14, fig.1. **NOW** *Circulodinium*. Originally *Canningia*, subsequently *Canningia?*, thirdly *Epelidosphaeridia*, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Age: middle Albian.

colligata (Morgan, 1980, p.32, pl.29, figs.6–11) Lentin and Williams, 1985, p.127. Holotype: Morgan, 1980, pl.29, figs.6–8. Originally *Tenua* Eisenack, subsequently (and now) *Epelidosphaeridia*. Age: Aptian–early Albian.

pentagona Morgan, 1980, p.23, pl.12, figs.11–15. Holotype: Morgan, 1980, pl.12, figs.14–15. Age: early–late Albian.

**spinosa* Cookson and Hughes, 1964, p.49, pl.8, figs.6–8 ex Davey, 1969a, p.143. Holotype: Cookson and Hughes, 1964, pl.8, fig.8. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Epelidosphaeridia*. The name *Palaeoperidinium spinosum* was not validly published in Cookson and Hughes (1964) since the generic name *Palaeoperidinium* was not validly published until 1967. Age: early Cenomanian.

EPIPLOSPHAERA Klement, 1960, p.73. Emendation: Brenner, 1988, p.50. Type: Klement, 1960, pl.8, figs.1–2, as *Epiplosphaera bireticulata*.

?*areolata* Klement, 1960, p.76–77, pl.8, figs.5–9. Holotype: Klement, 1960, pl.8, figs.5–7; Fauconnier and Masure, 2004, pl.26, fig.8; pl.27, fig.1. Originally *Epiplosphaera*, subsequently *Lithodinia?*, thirdly (and now) *Epiplosphaera?*. Brenner (1988, p.50–51) retained this species in *Epiplosphaera*. Questionable assignment: Fauconnier and Masure in Fauconnier and Masure (2004, p.225–226). Age: early Kimmeridgian.

**bireticulata* Klement, 1960, p.74–75, pl.8, figs.1–4. Holotype: Klement, 1960, pl.8, figs.1–2; Fauconnier and Masure, 2004, pl.27, figs.2–5. Taxonomic junior synonym: *Palaeoperidinium* (now *Epiplosphaera*) *reticulatum*, by implication in Courtinat (1989, p.176), who believed *Palaeoperidinium* (as *Epiplosphaera*) *reticulatum* to be the senior name — however, Poulsen (1992a, p.66) retained the two species. Age: early Kimmeridgian.

gochtii (Fensome, 1979, p.20–22, pl.2, figs.8–9,11–12; text-fig.8) Brenner, 1988, p.51. Holotype: Fensome, 1979, pl.2, figs.8–9,11–12; text-fig.8. Originally *Ellipsoidictyum*, subsequently (and now) *Epiplosphaera*. Taxonomic junior synonym: *Sentusidinium* (as *Epiplosphaera*) *ornata*, according to Poulsen (1992a, p.68). Age: early Callovian.

"*ornata*" (Courtinat in Courtinat and Gaillard, 1980, p.61–62, pl.9, figs.2–3,5; text-fig.10a) Brenner, 1988, p.52. Holotype: Courtinat and Gaillard, 1980, pl.9, fig.2; Fauconnier and Masure, 2004, pl.28, figs.5–10. Originally *Sentusidinium*, subsequently *Epiplosphaera*. **Taxonomic senior synonym:** *Epiplosphaera gochtii*, according to Poulsen (1992a, p.68). Taxonomic senior synonym: *Epiplosphaera reticulospinosa*, according to Courtinat (1989, p.176) — however, Poulsen (1992a, p.68) considered *Epiplosphaera ornata* to be a taxonomic junior synonym of *Epiplosphaera gochtii*. Fauconnier and Masure in Fauconnier and Masure (2004, p.226) listed this taxon as a problematic species of *Epiplosphaera*, but did not refer to the proposal by Poulsen. Age: late Oxfordian.

reticulata (Valensi, 1953, p.28, pl.2, figs.4–5,14,19; pl.13, fig.6; text-fig.2d ex Sarjeant, 1968, p.230) Courtinat, 1989, p.176. Holotype: Valensi, 1953, pl.2, figs.4–5; Fauconnier and Masure, 2004, pl.28, figs.1–4. Originally *Palaeoperidinium* (name not validly published), subsequently *Dictyopyxis* (generic name illegitimate), thirdly *Dictyopyxidia*, fourthly *Ellipsoidictyum*, fifthly (and now) *Epiplosphaera*. Taxonomic senior synonym: *Epiplosphaera bireticulata*, by implication in Courtinat (1989, p.176), who believed *Palaeoperidinium* (as

Epiplosphaera) *reticulatum* to be the senior name — however, Poulsen (1992a, p.66) retained the two species. Age: Bajocian.

reticulospinosa Klement, 1960, p.75–76, pl.8, figs.10–12. Holotype: Klement, 1960, pl.8, figs.10–11; Fauconnier and Masure, 2004, pl.27, figs.6–8. Taxonomic junior synonym: *Sentusidinium* (subsequently *Epiplosphaera*) *ornatum*, according to Courtinat (1989, p.176) — however, Poulsen (1992a, p.68) considered *Epiplosphaera ornata* to be a taxonomic junior synonym of *Epiplosphaera gochtii*. Age: early Kimmeridgian.

saturnalis (Brideaux and Fisher, 1976, p.24–25, pl.6, figs.1–10; pl.7, figs.1–13) Dodekova, 1994, p.25. Holotype: Brideaux and Fisher, 1976, pl.6, figs.1–7. Originally *Lanterna*, subsequently *Lanterna?*, thirdly *Pandadinium*, fourthly (and now) *Epiplosphaera*. Age: late Oxfordian–late Kimmeridgian.

EPITRICYSTA Stover and Helby, 1987c, p.234. Type: Stover and Helby, 1987c, figs.8K,9E–G,M–N, as *Epitricysta vinckensis*.

****vinckensis*** Stover and Helby, 1987c, p.234–235,238, figs.7A–B,8A–L,9A–N. Holotype: Stover and Helby, 1987c, figs.8K,9E–G,M–N; Fensome et al., 1996, figs.4–6 — p.2433. Age: Hauterivian–Aptian.

"**ERIKANIA**" Morgenroth, 1966a, p.27. **Taxonomic senior synonym:** *Thalassiphora*, according to Stover and Evitt (1978, p.194). Type: Morgenroth, 1966a, pl.6, fig.8, as *Erikania dynamica*.

****dynamica***" Morgenroth, 1966a, p.27–28, pl.6, figs.7–8. Holotype: Morgenroth, 1966a, pl.6, fig.8. **NOW** *Thalassiphora*. Originally *Erikania*, subsequently (and now) *Thalassiphora*. Taxonomic junior synonym: *Thalassiphora* (as *Disphaeria*) *munda*, according to Yun Hyesu (1981, p.70) — however, Lentin and Williams (1985, p.353) retained *Thalassiphora* (as *Disphaeria*) *munda*. Age: early Eocene.

ERYMNODINIUM Lentin et al., 1994, p.579,581. Type: de Verteuil and Norris, 1992, pl.9, figs.3–4, as *Sumatradinium? delectabile*.

****delectabile*** (de Verteuil and Norris, 1992, p.401–402, pl.9, figs.2–6; text-fig.7) Lentin et al., 1994, p.581. Holotype: de Verteuil and Norris, 1992, pl.9, figs.3–4. Originally *Sumatradinium?*, subsequently (and now) *Erymnodinium*. Age: late Miocene.

ESCHARISPHAERIDIA Erkmen and Sarjeant, 1980, p.62–63. Type: Sarjeant, 1968, pl.3, fig.9, as *Chytroeisphaeridia pocockii*.

dicrypta (Gitmez and Sarjeant, 1972, p.225–226, pl.7, fig.6; text-fig.22) Williams et al., 1993, p.57. Holotype: Gitmez and Sarjeant, 1972, pl.7, fig.6; text-fig.22. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Meiourogonyaulax?*, fourthly *Canningia*, fifthly (and now) *Escharisphaeridia*. Age: early–late Kimmeridgian.

"***dictydia***" (Sarjeant, 1972, p.41, pl.3, fig.3; pl.6, fig.6) Erkmen and Sarjeant, 1980, p.63. Holotype: Sarjeant, 1972, pl.6, fig.6. **NOW** *Valensiella*. Originally *Chytroeisphaeridia*, subsequently *Batiacasphaera*, thirdly *Escharisphaeridia*, fourthly *Cassiculosphaeridia*, fifthly (and now) *Valensiella*. Age: Bathonian–Callovian.

"***enayi***" Courtinat, 1989, p.181, pl.23, fig.6. Holotype: Courtinat, 1989, pl.23, fig.6. Originally *Escharisphaeridia*, subsequently *Omatidium*. **Taxonomic senior synonym:** *Escharisphaeridia psilata*, according to Poulsen (1996, p.80). Age: Oxfordian.

gaillardii Courtinat, 1989, p.178–179, pl.17, fig.7; pl.20, figs.5,8; pl.21, fig.10; pl.22, fig.13; pl.23, figs.2,7–8; text-fig.78A. Holotype: Courtinat, 1989, pl.23, fig.2. Age: Oxfordian–Kimmeridgian.

granulata (Courtinat in Courtinat and Gaillard, 1980, p.13–14, pl.1, figs.4,6; text-fig.2b) Stover and Williams, 1987, p.89. Holotype: Courtinat and Gaillard, 1980, pl.1, fig.6. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia*, thirdly *Sentusidinium*. Courtinat in Fauconnier and Masure (2004, p.488) retained this species in *Escharisphaeridia*. Age: late Oxfordian.

"laevigata" Smelror, 1988b, p.152–153, figs.10G–H. Holotype: Smelror, 1988b, fig.10G. **NOW** *Batiacasphaera*. Originally *Escharisphaeridia*, subsequently (and now) *Batiacasphaera*. Taxonomic senior synonym: *Escharisphaeridia psilata*, according to Poulsen (1996, p.80) — however, Feist-Burkhardt and Monteil (1997, p.40) retained *Escharisphaeridia* (as and now *Batiacasphaera*) *laevigata*. Taxonomic junior synonym: *Escharisphaeridia nuda*, according to Prauss in Lentin and Williams (1993, p.213). Age: late Bathonian–early Oxfordian.

mantellii (Gitmez and Sarjeant, 1972, p.186, pl.1, figs.3–4; pl.12, fig.3) Courtinat, 1989, p.180. Holotype: Gitmez and Sarjeant, 1972, pl.1, fig.3. Originally *Chytroeisphaeridia*, subsequently *Chytroeisphaeridia?*, thirdly (and now) *Escharisphaeridia*. Age: early–late Kimmeridgian.

"nuda" Prauss, 1989, p.33, pl.10, figs.2–3; text-fig.10. Holotype: Prauss, 1989, pl.10, fig.2; text-fig.10. **Taxonomic senior synonym:** *Escharisphaeridia laevigata*, according to Prauss in Lentin and Williams (1993, p.213). Taxonomic senior synonym: *Escharisphaeridia psilata*, according to Poulsen (1996, p.80) — however, Feist-Burkhardt and Monteil (1997, p.40) retained *Escharisphaeridia nuda* as a taxonomic junior synonym of *Escharisphaeridia laevigata*. Age: middle Bajocian–late Callovian.

?ovata (Yu Jingxian and Zhang Wangping, 1980, p.106, pl.1, figs.12–13) He Chengquan et al., 2009, p.224. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.1, fig.13. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia?*. Questionable assignment: He Chengquan et al. (2009, p.224). Age: Late Cretaceous.

"pelionensis" Poulsen, 1993, p.254. **Name not validly published:** no description or illustration.

***pocockii** (Sarjeant, 1968, p.230, pl.3, fig.9) Erkmen and Sarjeant, 1980, p.62. Holotype: Sarjeant, 1968, pl.3, fig.9; Eisenack and Kjellström, 1972, p.185; Davey, 1979d, pl.2, figs.7,10; Fensome et al., 1995, fig.1 — p.1673. Originally *Chytroeisphaeridia*, subsequently *Lithodinia*, thirdly (and now) *Escharisphaeridia*. Age: late Callovian.

psilata Kumar, 1986b, p.383,385, pl.2, fig.2; text-fig.3. Holotype: Kumar, 1986b, pl.2, fig.2; text-fig.3. Taxonomic junior synonyms: *Escharisphaeridia enayi*, *Escharisphaeridia laevigata* and *Escharisphaeridia nuda*, all according to Poulsen (1996, p.80) — however, Feist-Burkhardt and Monteil (1997, p.40) retained *Escharisphaeridia* (as and now *Batiacasphaera*) *laevigata*, and regarded *Escharisphaeridia nuda* as a taxonomic junior synonym of *Escharisphaeridia laevigata*. Age: early Kimmeridgian–Tithonian.

rudis Davies, 1983, p.28, pl.10, figs.7,10–18; text-fig.25. Emendation: Prauss, 1989, p.34. Holotype: Davies, 1983, pl.10, fig.13. Age: late Callovian–Valanginian.

rugosa (Courtinat in Courtinat and Gaillard, 1980, p.15–16, pl.1, fig.12; pl.2, fig.1; text-fig.2d) Courtinat, 1989, p.181. Holotype: Courtinat and Gaillard, 1980, pl.2, fig.1. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia*. Age: late Oxfordian.

senegalensis Jan du Chêne, 1988, p.155, pl.15, figs.1–8. Holotype: Jan du Chêne, 1988, pl.15, figs.5–6. Age: Danian.

shangsica (He Chengquan, 1984b, p.162, pl.8, figs.16–19) He Chengquan et al., 2009, p.225. Holotype: He Chengquan, 1984b, pl.8, fig.16. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia*. Age: Tertiary.

EUCLADINIUM Stover and Evitt, 1978, p.104. Type: Cookson and Eisenack, 1970a, pl.11, fig.3, as *Deflandrea madurensis*.

gambangense (Cookson and Eisenack, 1970a, p.140, pl.11, figs.1–2) Stover and Evitt, 1978, p.104. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.1. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

kaikourense Schiøler and Wilson, 1998, p.332,334, pl.1, figs.1–9. Holotype: Schiøler and Wilson, 1998, pl.1, figs.1–2. Age: middle-late Santonian.

****madurense*** (Cookson and Eisenack, 1970a, p.140, pl.11, figs.3–4) Stover and Evitt, 1978, p.104. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.3; Eisenack and Kjellström, 1975a, page labelled "nach S.194"; Fensome et al., 1996, fig.1 — p.2219. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

spinosissimum (Cookson and Eisenack, 1970a, p.141, pl.11, figs.5–6) Stover and Evitt, 1978, p.104. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.5. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

EURYDINIUM Stover and Evitt, 1978, p.104–105. Type: Cookson and Eisenack, 1970a, pl.12, fig.9, as *Deflandrea ingramii*.

"conoratum" (Stover, 1974, p.171–172, pl.1, figs.8a–b; text-fig.3C) Stover and Evitt, 1978, p.105. Holotype: Stover, 1974, pl.1, figs.8a–b. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly *Eurydinium*, fifthly (and now) *Manumiella*. Age: early-middle Paleocene.

ellipticum Mao Shaozhi and Mohr, 1992, p.318, pl.2, figs.1–2,8–9; pl.10, fig.1. Holotype: Mao Shaozhi and Mohr, 1992, pl.2, fig.9. Age: Maastrichtian.

euthemum (Davey and Verdier, 1971, p.40, pl.3, figs.1–3) Stover and Evitt, 1978, p.105. Holotype: Davey and Verdier, 1971, pl.3, fig.2. Originally *Deflandrea*, subsequently *Subtilisphaera?*, thirdly (and now) *Eurydinium*. Age: middle-late Albian.

eyrense (Cookson and Eisenack, 1971, p.217–218, pl.7, figs.2–3) Stover and Evitt, 1978, p.105. Holotype: Cookson and Eisenack, 1971, pl.7, fig.3. Originally *Deflandrea*, subsequently *Alterbia?* (combination illegitimate), thirdly (and now) *Eurydinium*. Age: Albian–Cenomanian.

glomeratum (Davey, 1970, p.343–344, pl.1, figs.7–9) Stover and Evitt, 1978, p.105. Holotype: Davey, 1970, pl.1, figs.7–8. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eurydinium*. Age: Cenomanian.

****ingramii*** (Cookson and Eisenack, 1970a, p.143, pl.12, figs.7–9) Stover and Evitt, 1978, p.105. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.9; Eisenack and Kjellström, 1975a, figure to left — p.190a; Fensome et al., 1996, fig.3 — p.2167. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*, fourthly (and now) *Eurydinium*. Age: Albian–Cenomanian.

obliquum He Chengquan, 1991, p.85–86, pl.29, figs.25–26. Holotype: He Chengquan, 1991, pl.29, fig.25. Age: Turonian.

"raijae" (Kjellström, 1973, p.20–22, fig.16) Stover and Evitt, 1978, p.105. Holotype: Kjellström, 1973, fig.16. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Eurydinium*, fourthly (and now) *Manumiella*. Age: middle-late Maastrichtian.

saxoniense Marshall and Batten, 1988, p.92,94, pl.1, figs.8,10–12. Holotype: Marshall and Batten, 1988, pl.1, figs.10–11. Age: late Cenomanian–early Turonian.

tempestivum Mao Shaozhi and Norris, 1988, p.44–45, pl.11, figs.15–17; text-fig.15. Holotype: Mao Shaozhi and Norris, 1988, pl.11, fig.17. Age: Turonian–Santonian.

"*EURYSPHAERIDIUM*" Wilson in Slimani, 1994, p.77. **Name not validly published:** no description. See discussion under *Neoeurysphaeridium*.

"*fibratum*" Wilson in Slimani, 2001a, p.192. **Name not validly published:** no description. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Florentinia*?) *flosculus*, according to Slimani (2001a, p.192).

"*glabrum*" Wilson in Slimani, 1994, p.78. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Neoeurysphaeridium glabrum*, according to Slimani (2001a, p.193).

EVANSIA Pocock, 1972, p.95. Emendations: Jansonius, 1986, p.208; Below, 1990, p.72. Taxonomic junior synonyms: *Glomodinium*, according to Jansonius (1986, p.208); *Crussolia*, according to Below (1990, p.73). Type: Pocock, 1972, pl.24, fig.7, as *Evansia granulata*.

alaskensis (Wiggins, 1975, p.104, pl.2, figs.7–8) Below, 1990, p.72. Holotype: Wiggins, 1975, pl.2, fig.7. Originally *Pareodinia*, subsequently *Glomodinium* (combination not validly published), thirdly (and now) *Evansia*. Taxonomic junior synonyms: *Pareodinia minuta* and *Pareodinia robusta*, both according to Below (1990, p.72) — however, Poulsen (1996, p.62) retained *Pareodinia robusta*. Below (1990, p.65) suggested that *Pareodinia arctica* may be a smooth variant of this species. Age: ?Callovian–mid Kimmeridgian.

barentsensis (Smelror, 1988a, p.296, pl.3, figs.4–5; text-fig.11) Below, 1990, p.72. Holotype: Smelror, 1988a, pl.3, fig.5. Originally *Pareodinia*, subsequently (and now) *Evansia*. Age: early Callovian–early Oxfordian.

cerebraloides (Århus et al., 1989, p.45, figs.4a–d) Lentin and Williams, 1993, p.214. Holotype: Århus et al., 1989, fig.4a. Originally *Glomodinium*, subsequently (and now) *Evansia*. Age: late Mid–early late Callovian.

dalei (Smelror and Århus, 1989, p.42, figs.2A–D,3A–D,4A–D) Below, 1990, p.73. Holotype: Smelror and Århus, 1989, figs.3A–B. Originally *Crussolia*, subsequently (and now) *Evansia*. Age: late Callovian.

deflandrei (Wolfard and Van Erve, 1981, p.325–326,328, pl.1, figs.1–2; pl.2, figs.1–4; text-fig.3) Below, 1990, p.73. Holotype: Wolfard and Van Erve, 1981, pl.1, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1103. Originally *Crussolia*, subsequently (and now) *Evansia*. Age: Callovian–early Oxfordian.

"*erregulensis*" Filatoff, 1975, p.90, pl.29, figs.12–14. Emendation: Stover and Helby, 1987a, p.111, as *Phallocysta erregulensis*, as a revised description. Holotype: Filatoff, 1975, pl.29, fig.14; Stover and Helby, 1987a, figs.11L–M. **NOW** *Phallocysta*?. Originally *Evansia*, subsequently *Evansia*?, thirdly *Phallocysta*, fourthly *Andreedinium*, fifthly (and now) *Phallocysta*?. Questionable assignment: Stover and Evitt (1978, p.230). Age: Bajocian.

eschachensis Below, 1990, p.73–74, pl.19, figs.2–5,14–15; pl.20, figs.1,3,6,9–11; text-figs.21a–g. Holotype: Below, 1990, pl.19, figs.2–5,15. Contrary to the opinion of Lentin and Williams (1993, p.215), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Aalenian–Bajocian.

evittii (Pocock, 1972, p.94–95, pl.24, figs.6,8; text-fig.11) Jansonius, 1986, p.208. Holotype: Pocock, 1972, pl.24, fig.8, lost according to Jansonius (1986, p.208). Lectotype: Jansonius, 1986, pl.6, figs.8–9, designated by Jansonius (1986, p.208). Originally *Tenua* Eisenack, subsequently *Pareodinia*, thirdly *Glomodinium*, fourthly (and now) *Evansia*. Taxonomic junior synonyms: *Pareodinia tripartita*, according to Wiggins (1975, p.105) and Lentin and Williams (1989, p.131); (at specific rank) *Pareodinia tripartita* var. *rotunda*, according to Wiggins (1975, p.105) and Below (1990, p.73). Age: late Bajocian–Callovian.

granochagrinata Below, 1990, p.74,76, pl.18, figs.5–12,14–15. Holotype: Below, 1990, pl.18, figs.7–10,14. Contrary to the opinion of Lentin and Williams (1993, p.215), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: late Pliensbachian–Aalenian.

**granulata* Pocock, 1972, p.95, pl.24, fig.7; text-fig.12. Holotype: Pocock, 1972, pl.24, fig.7; Jansonius, 1986, pl.5, figs.1–3; text-figs.10a–b. Originally (and now) *Evansia*, subsequently *Glomodinium*. Lentin and Williams (1993, p.215) retained this species in *Evansia*. Age: late Bajocian.

janeae Piasecki, 2001, p.20,22,24,26, figs.3A–I. Holotype: Piasecki, 2001, fig.3B. Age: middle Bathonian–middle Callovian.

lacryma Mantle, 2005, p.252–254, pl.1, figs.1–9; text-figs.4A–B,5A–I. Holotype: Mantle, 2005, pl.1, figs.1–2. Age: Callovian–early Oxfordian.

?*opeasatos* (Davies, 1983, p.17, pl.3, figs.13–16; text-fig.10) Jansonius, 1986, p.208. Holotype: Davies, 1983, pl.3, fig.13; text-fig.10. Originally *Glomodinium*, subsequently (and now) *Evansia*. Questionable assignment: Below (1990, p.73). N.I.A. Age: late Bathonian–Oxfordian.

perireticulata (Århus et al., 1989, p.46, figs.5a–i) Lentin and Williams, 1993, p.215. Holotype: Århus et al., 1989, fig.5a. Originally *Crussolia*, subsequently (and now) *Evansia*. Age: Callovian.

polyedrica Below, 1990, p.76,78, pl.18, figs.1–4,13; text-figs.22a–e. Holotype: Below, 1990, pl.18, figs.1–4,13. Contrary to the opinion of Lentin and Williams (1993, p.215), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: late Toarcian.

reticulopilosa (Dodekova, 1975, p.26–27, pl.5, figs.1–6) Jansonius, 1986, p.208. Holotype: Dodekova, 1975, pl.5, figs.1–2. Originally *Glomodinium*, subsequently *Pareodinia*, thirdly (and now) *Evansia*. Age: late Bathonian.

spongogranulata Below, 1990, p.78–79, pl.19, figs.6–13; pl.20, figs.2,4–5,7–8; text-figs.23a–d. Holotype: Below, 1990, pl.19, figs.6–9,12. Contrary to the opinion of Lentin and Williams (1993, p.215), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Aalenian–Bajocian.

"*tripartita*" (Johnson and Hills, 1973, p.208, pl.2, figs.12–14,17–18; pl.3, figs.1–2; text-figs.11A–C) Jansonius, 1986, p.208. Holotype: Johnson and Hills, 1973, pl.2, fig.18. Originally *Pareodinia*, subsequently *Glomodinium*, thirdly *Evansia*. **Taxonomic senior synonym:** *Tenua* (as *Pareodinia*, now *Evansia*) *evittii*, according to Wiggins (1975, p.105) and Lentin and Williams (1989, p.132). Age: late Bathonian.

"subsp. *rotunda*" (Johnson and Hills, 1973, p.209, pl.3, figs.1–2; text-figs.11C) Jansonius, 1986, p.208. Holotype: Johnson and Hills, 1973, pl.3, fig.2. Originally *Pareodinia tripartita* var. *rotundus*, subsequently *Pareodinia tripartita* subsp. *rotunda*, thirdly *Evansia tripartita* subsp. *rotunda*. **Taxonomic senior synonym** (at specific rank): *Tenua* (as *Pareodinia*, now *Evansia*) *evittii*, according to Wiggins (1975, p.105) and Lentin and Williams (1989, p.132). Age: late Bathonian.

"subsp. *tripartita*". Autonym. Holotype: Johnson and Hills, 1973, pl.2, fig.18. Originally *Pareodinia tripartita* subsp. *tripartita*, subsequently *Evansia tripartita* subsp. *tripartita*. **Taxonomic senior synonym:** *Tenua* (as *Pareodinia*, now *Evansia*) *evittii*, according to Wiggins (1975, p.105).

wigginsii (Smelror, 1988a, p.296,298, pl.8, figs.1–2; text-fig.12) Below, 1990, p.73. Holotype: Smelror, 1988a, pl.8, fig.2. Originally *Pareodinia*, subsequently (and now) *Evansia*. Age: early Oxfordian.

zabra (Davies, 1983, p.18, pl.3, figs.2–12; text-figs.11A–C) Jansonius, 1986, p.208. Holotype: Davies, 1983, pl.3, fig.12; text-figs.11A–C. Originally *Glomodinium*, subsequently (and now) *Evansia*. Age: Bathonian–Oxfordian.

"**EVITTIA**" Pocock, 1972, p.93. **Name illegitimate** — **senior homonym**: *Evittia* Brito, 1967, p.477 (Appendix A). Substitute name: *Pocockia*. **Taxonomic senior synonym**: *Ovoidinium*, by implication in Lentin and Williams (1976, p.162), who considered *Pocockia* to be a taxonomic junior synonym of *Ovoidinium*. Taxonomic senior synonym: *Ascodinium*, by implication in Helenes (1983, p.258), who considered both *Pocockia* and *Ovoidinium* to be taxonomic junior synonyms of that genus — however, *Ovoidinium* is now generally retained, with *Deflandrea* (as *Ovoidinium*) *cincta* assigned to it. Type: Cookson and Eisenack, 1958, pl.4, fig.3, as *Deflandrea cincta*.

"**cincta*" (Cookson and Eisenack, 1958, p.26, pl.4, figs.1–3) Pocock, 1972, p.93. Holotype: Cookson and Eisenack, 1958, pl.4, fig.3. **Combination illegitimate**: the generic name *Evittia* Pocock, 1972 is illegitimate. **NOW** *Ovoidinium*. Originally *Deflandrea*, subsequently *Evittia* Pocock (combination illegitimate), thirdly *Pocockia*, fourthly (and now) *Ovoidinium*, fifthly *Ascodinium*. Age: late Neocomian–early Aptian.

"*waltonii*" Pocock, 1972, p.93, pl.22, figs.13–14. Holotype: Pocock, 1972, pl.22, fig.13. **NOW** *Ovoidinium*. Originally *Evittia* Pocock (generic name illegitimate), subsequently *Pocockia*, thirdly (and now) *Ovoidinium*, fourthly *Ascodinium*. Following I.C.N. Article 55.1, the species name *Evittia waltonii* is validly published even though the generic name *Evittia* Pocock is illegitimate. Age: ?Toarcian–?Bajocian, according to Jansonius (1986, p.202).

EVITTODINIUM Deflandre, 1964, p.5030. Lentin and Williams (1976, p.159) considered this to be a "nomen dubium". Type: Deflandre, 1964, figs.1–5, as *Evittodinium giselae*.

**giselae* Deflandre, 1964, p.5030, figs.1–5. Holotype: Deflandre, 1964, figs.1–5. Lentin and Williams (1976, p.159) considered this to be a "nomen dubium". Age: Senonian.

EVITTOSPHAERULA Manum, 1979, p.242–243. Emendation: Damassa, 1997, p.161,163. Type: Manum, 1979, pl.2, figs.6–10, as *Evittosphaerula paratabulata*.

**paratabulata* Manum, 1979, p.243,246, pl.2, figs.1–12; text-figs.3–4. Emendation: Damassa, 1997, p.166. Holotype: Manum, 1979, pl.2, figs.6–10; Fensome et al., 1995, fig.1 — p.1643. Age: middle Oligocene–early Miocene.

EXIGUISPHAERA Duxbury, 1979a, p.198–199. Emendation: Jan du Chêne et al., 1986b, p.11. Type: Duxbury, 1979a, pl.2, figs.2–3; text-figs.1A–B, as *Exiguisphaera phragma*.

**phragma* Duxbury, 1979a, p.199, pl.2, figs.2–3,5; text-figs.1A–B,2. Emendation: Jan du Chêne et al., 1986b, p.11. Holotype: Duxbury, 1979a, pl.2, figs.2–3; text-figs.1A–B; Jan du Chêne et al., 1986a, pl.35, figs.1–6; Jan du Chêne et al., 1986b, pl.28, figs.1,3; Fensome et al., 1995, figs.1–4 — p.1667. N.I.A. Age: early Hauterivian.

pectilis Duxbury, 1980, p.118–119, pl.3, figs.5,8,11. Emendation: Jan du Chêne et al., 1986b, p.12. Holotype: Duxbury, 1980, pl.3, figs.5,8; Jan du Chêne et al., 1986a, pl.35, figs.10,12; Jan du Chêne et al., 1986b, pl.28, figs.5–9. Age: middle Barremian.

EXOCHOSPHAERIDIUM Davey et al., 1966, p.165. Emendation: Helenes, 2000, p.137. Type: Davey et al., 1966, pl.2, figs.9–10, as *Exochosphaeridium phragmites*.

"*acuminatum*" Wilson in Masure, 1985, p.205. **Name not validly published:** no description or illustration.
Taxonomic senior synonym: *Exochosphaeridium? masureae*, according to Slimani (2001a, p.192; 2001b, p.2).

alitosense Helenes, 2000, p.140, pl.1, figs.1–14,17–18; pl.2, figs.1–20; text-fig.3a–d. Holotype: Helenes, 2000, pl.1, figs.1–4. Age: late Albian.

arnace Davey and Verdier, 1973, p.184–185, pl.1, figs.3,6. Holotype: Davey and Verdier, 1973, pl.1, figs.3,6. Age: late Albian–early Cenomanian.

"*bifidum*" (Clarke and Verdier, 1967, p.72–73, pl.17, figs.5–6; text-fig.30) Clarke et al., 1968, p.182. Emendation: Davey, 1969b, p.26,28, as *Exochosphaeridium bifidum*. Holotype: Clarke and Verdier, 1967, pl.17, fig.5. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Exochosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Exochosphaeridium*) *majus* according to Peyrot (2011, p.284). The emendation by Davey (1969b) was given under the heading for the species but probably more appropriately applies to the autonym. Davey (1969b, p.27,29) also proposed this combination, considering it to be not validly published in Clarke et al. (1968). Age: Cenomanian–Campanian.

"subsp. *bifidum*". Autonym. Emendation: Marheinecke, 1992, p.51, as *Exochosphaeridium bifidum* subsp. *bifidum*. Holotype: Clarke and Verdier, 1967, pl.17, fig.5. **Now redundant.**

"var. *bifidum*". Autonym. Emendation: Marheinecke, 1992, p.51, as *Exochosphaeridium bifidum* subsp. *bifidum*. Holotype: Clarke and Verdier, 1967, pl.17, fig.5. **Now redundant.**

"subsp. *involutum*" (Davey, 1969c, p.29, pl.2, figs.1–3) Lentin and Williams, 1973, p.56. Emendation: Marheinecke, 1992, p.52, as *Exochosphaeridium bifidum* subsp. *involutum*. Holotype: Davey, 1969c, pl.2, fig.3. Originally *Exochosphaeridium bifidum* var. *involutum*, subsequently *Exochosphaeridium bifidum* subsp. *involutum*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Exochosphaeridium*) *majus* according to Peyrot (2011, p.284). The possibility of this synonymy was earlier postulated by Marheinecke (1992, p.51). Age: Campanian–Maastrichtian.

"var. *involutum*" Davey, 1969c, p.29, pl.2, figs.1–3. Emendation: Marheinecke, 1992, p.52, as *Exochosphaeridium bifidum* subsp. *involutum*. Holotype: Davey, 1969c, pl.2, fig.3. Originally *Exochosphaeridium bifidum* var. *involutum*, subsequently *Exochosphaeridium bifidum* subsp. *involutum*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Exochosphaeridium*) *majus* according to Peyrot (2011, p.284). The possibility of this synonymy was earlier postulated by Marheinecke (1992, p.51). Age: Campanian–Maastrichtian.

brevispinosum Matsuoka, 1984a, p.381, pl.72, figs.6a–b,7a–b,8–9. Holotype: Matsuoka, 1984a, pl.72, fig.7a–b. Age: middle Eocene.

"?*brevispinum*" Norvick, 1976, p.53, pl.4, figs.5–6. Holotype: Norvick, 1976, pl.4, figs.5–6. **NOW** *Pervosphaeridium*. Originally *Exochosphaeridium*, subsequently *Exochosphaeridium?*, thirdly (and now) *Pervosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.154). Age: Cenomanian.

brevitricatum Slimani, 1994, p.72–73, pl.12, figs.15–19. Holotype: Slimani, 1994, pl.12, figs.15–17. Age: early Campanian–late Maastrichtian.

?*caputmedusae* Cookson and Eisenack, 1974, p.68, pl.25, fig.16. Holotype: Cookson and Eisenack, 1974, pl.25, fig.16. Originally *Exochosphaeridium*, subsequently (and now) *Exochosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.154). Age: Senonian.

"?*cenomaniense*" Norvick, 1976, p.52–53, pl.4, figs.4,8. Holotype: Norvick, 1976, pl.4, fig.4. **NOW** *Pervosphaeridium*. Originally *Exochosphaeridium*, subsequently *Exochosphaeridium?*, thirdly (and now) *Pervosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.154). Age: Cenomanian.

elongatum (Jain and Millepied, 1975, p.150–151, pl.5, figs.73–74) Measure in Fauconnier and Masure, 2004, p.163. Holotype: Jain and Millepied, 1975, pl.5, fig.74. Originally *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Exochosphaeridium*. Age: Maastrichtian.

giganteum (Caro, 1973, p.360–361, pl.2, fig.12) Hochuli and Masure in Fauconnier and Masure, 2004, p.345. Holotype: Caro, 1973, pl.2, fig.12; Fauconnier and Masure, 2004, pl.49, figs.13–14. Originally *Polysphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Impletosphaeridium*, fourthly (and now) *Exochosphaeridium*. Age: early Eocene.

granulosum (Jain and Tandon, 1981, p.11, pl.2, figs.30–31; pl.3, fig.50) Measure in Fauconnier and Masure, 2004, p.345. Holotype: Jain and Tandon, 1981, pl.2, fig.30. Originally *Impletosphaeridium*, subsequently (and now) *Exochosphaeridium*. Age: middle Eocene.

?indicum Jain and Taugourdeau-Lantz, 1973, p.63, pl.3, fig.7. Holotype: Jain and Taugourdeau-Lantz, 1973, pl.3, fig.7. Originally *Exochosphaeridium*, subsequently (and now) *Exochosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.154). Age: Early Cretaceous.

insigne de Verteuil and Norris, 1996a, p.116,118, pl.3, figs.1–13; pl.5, figs.1–7. Holotype: de Verteuil and Norris, 1996a, pl.3, figs.5–6,8–10. Age: early Miocene.

longifilum Cookson and Eisenack, 1982, p.44, pl.8, fig.13. Holotype: Cookson and Eisenack, 1982, pl.8, fig.13. Age: latest Turonian–Coniacian.

majus (Lejeune-Carpentier, 1940, p.B220–B221; text-fig.13) Peyrot, 2011, p. 284. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.12, as *Amphorosphaeridium majus*. Holotype: Lejeune-Carpentier, 1940, text-fig.13; Strel et al., 1977, pl.1, fig.7; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.6–7; text-fig.7. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Dapsilidinium?* (combination not validly published), fifthly *Amphorosphaeridium*, sixthly (and now) *Exochosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (as *Exochosphaeridium*) *bifidum* and *Exochosphaeridium bifidum* var. *involutum* (as *Exochosphaeridium bifidum* subsp. *involutum*), both according to Peyrot (2011, p.284). The possibility of the latter synonymy was earlier postulated by Marheinecke (1992, p.51). Age: Late Cretaceous.

?masureae Slimani, 1996, p.373–374, pl.1, figs.H–L ex Slimani, 2001b, p.2–3, pl.1, figs.1–2,4–5; pl.2, fig.10. Holotype: Slimani, 1996, pl.1, figs.I,L; Slimani, 2001b, pl.1, figs.1–2. Questionable assignment: Slimani (1996, p.373; 2001b, p.2). Taxonomic junior synonym: *Exochosphaeridium acuminatum* (name not validly published), according to Slimani (2001a, p.192; 2001b, p.2). This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Age: Campanian.

muelleri Yun Hyesu, 1981, p.25–26, pl.4, figs.12,14–15; pl.5, figs.9,11. Holotype: Yun Hyesu, 1981, pl.4, fig.12; Fensome et al., 1991, fig.1 — p.685. Ziaja (1989, p.214) considered *Hystrichosphaeridium* (as *Exochosphaeridium*) *pseudhystrichodinium* to be the questionable taxonomic senior synonym of this species. Age: early Santonian.

multifurcatum (Deflandre, 1937b, p.76, pl.16 [al. pl.13], figs.1–3) Measure in Fauconnier and Masure, 2004, p.270. Emendation: Measure in Fauconnier and Masure, 2004, p.270, as *Exochosphaeridium multifurcatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), figs.1–2; Fensome et al., 1991, figs.1–2 — p.691; fig.1 — p.693; Fensome et al., 1993a, fig.1 — p.1261; figs.1–2 — p.1265; Fauconnier and Masure, 2004, pl.37, figs.10–11. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Heterosphaeridium*, sixthly (and now) *Exochosphaeridium*. Age: Late Cretaceous.

?palmatum (Deflandre and Courteville, 1939, p.101, pl.3, fig.1) Davey et al., 1969, p.16. Holotype: Deflandre and Courteville, 1939, pl.3, fig.1. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium*, fourthly *Exochosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.154). **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Pervosphaeridium*) *pseudhystrichodinium*, according to Yun Hyesu (1981, p.29). This combination was not validly published in Davey et al. (1966, p.166), since these authors did not fully reference the basionym. Age: Late Cretaceous.

**phragmites* Davey et al., 1966, p.165–166, pl.2, figs.8–10. Holotype: Davey et al., 1966, pl.2, figs.9–10. Age: Cenomanian.

"?*pseudhystrichodinium*" (Deflandre, 1937b, p.73, pl.15 [al. pl.12], figs.3–4) Davey et al., 1969, p.16–17. Emendation: Davey, 1969a, p.163, as *Exochosphaeridium pseudhystrichodinium*. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.3; Eisenack and Kjellström, 1972, p.415; Fensome et al., 1995, fig.1 — p.1705. **NOW** *Pervosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium?*, fourthly (and now) *Pervosphaeridium*. Questionable assignment: Davey et al. (1969, p.16). Taxonomic junior synonym: *Hystrichosphaeridium* (as *Exochosphaeridium?*) *palmatum*, according to Yun Hyesu (1981, p.29). Ziaja (1989, p.214) considered *Exochosphaeridium muelleri* to be a questionable taxonomic junior synonym of this species. This combination was not validly published in Davey et al. (1966, p.166), since these authors did not fully reference the basionym. Age: Late Cretaceous.

?*punctatum* (Jain and Millepied, 1975, p.151, pl.5, figs.71–72) Masure in Fauconnier and Masure, 2004, p.164. Holotype: Jain and Millepied, 1975, pl.5, fig.72. Originally *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Exochosphaeridium?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.164). Age: Maastrichtian.

reticulatum Matsuoka, 1984a, p.380–381, pl.72, figs.1a–b,2a–b,3–5. Holotype: Matsuoka, 1984a, pl.72, fig.1a–b. Age: middle Eocene.

rhabdophorum (Valensi, 1955b, p.593, pl.3, fig.7) Masure in Fauconnier and Masure, 2004, p.164. Holotype: Valensi, 1955b, pl.3, fig.7; Fauconnier and Masure, 2004, pl.20, figs.10–11. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Exochosphaeridium*. Age: Late Cretaceous.

rhopalophorum (Valensi, 1955a, p.36, fig.1C) Lentin and Williams, 1985, p.131. Holotype: Valensi, 1955a, fig.1C. Originally *Hystrichosphaeridium*, subsequently (and now) *Exochosphaeridium*. Age: Late Cretaceous.

robustum Backhouse, 1988, p.85, pl.26, figs.9a–b,10a–b; pl.28, fig.7; pl.48, fig.1. Holotype: Backhouse, 1988, pl.26, figs.10a–b; Fensome et al., 1996, figs.3–4 — p.2331. Age: late Valanginian–early Barremian.

scitulum Singh, 1971, p.346–347, pl.57, figs.8–9. Holotype: Singh, 1971, pl.57, fig.8. Age: middle Albian.

?*solaster* (Morgenroth, 1966a, p.25, pl.5, figs.8–9) Stover and Evitt, 1978, p.154. Holotype: Morgenroth, 1966a, pl.5, figs.8–9. Originally *Cordosphaeridium*, subsequently (and now) *Exochosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.154). Age: early Eocene.

?*spinosum* (White, 1842, p.37, pl.4, fig.6) Davey 1969a, p.166. Holotype: White, 1842, pl.4, fig.6; lost according to Sarjeant (1966b, p.141). Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Cordosphaeridium* (combination not validly published), fifthly *Exochosphaeridium*, sixthly (and now) *Exochosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.154). Sarjeant (1966b, p.141) speculated that this species might be the senior synonym of *Hystrichodinium pulchrum*. Age: Late Cretaceous.

"subsp. *deflandrei*" (Lejeune-Carpentier, 1941, p.B84, fig.6) Lentin and Williams, 1973, p.56. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.14, as *Fibrocysta deflandrei*. Holotype: Lejeune-Carpentier, 1941, fig.6; Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.5–6; text-fig.8. **NOW** *Fibrocysta? deflandrei*. Originally *Hystrichosphaeridium spinosum* var. *deflandrei*, subsequently *Baltisphaeridium spinosum* var. *deflandrei* (Appendix A), thirdly *Cordosphaeridium spinosum* var. *deflandrei* (combination not validly published), fourthly *Exochosphaeridium spinosum* var. *deflandrei*, fifthly *Exochosphaeridium spinosum* subsp. *deflandrei*, sixthly *Exochosphaeridium? spinosum* subsp. *deflandrei*, seventhly (and now) *Fibrocysta? deflandrei*. Age: Late Cretaceous.

"var. *deflandrei*" (Lejeune-Carpentier, 1941, p.B84, fig.6) Davey, 1969a, p.166. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.14, as *Fibrocysta deflandrei*. Holotype: Lejeune-Carpentier, 1941, fig.6;

Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.5–6; text-fig.8. **NOW** *Fibrocysta? deflandrei*. Originally *Hystrichosphaeridium spinosum* var. *deflandrei*, subsequently *Baltisphaeridium spinosum* var. *deflandrei* (Appendix A), thirdly *Exochosphaeridium spinosum* var. *deflandrei*, fourthly *Exochosphaeridium spinosum* subsp. *deflandrei*, fifthly *Exochosphaeridium? spinosum* subsp. *deflandrei*, sixthly (and now) *Fibrocysta? deflandrei*. Age: Late Cretaceous.

"subsp. *spinosum*". Autonym. Holotype: White, 1842, pl.4, fig.6. **Now redundant**. Originally *Exochosphaeridium spinosum* subsp. *spinosum*, subsequently *Exochosphaeridium? spinosum* subsp. *spinosum*.

"var. *spinosum*". Autonym. Holotype: White, 1842, pl.4, fig.6. **Now redundant**. Originally *Hystrichosphaeridium spinosum* var. *spinosum*, subsequently *Baltisphaeridium spinosum* var. *spinosum* (Appendix A), thirdly *Exochosphaeridium spinosum* var. *spinosum*.

"*striolatum*" (Deflandre, 1937b, p.72–73, pl.15 [al. pl.12], figs.1–2) Davey, 1969a, p.164. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.1. **NOW** *Coronifera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium*, fourthly (and now) *Coronifera*. This combination was not validly published in Davey et al. (1966, p.166), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"subsp. *striolatum*". Autonym. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.1. **NOW** *Coronifera striolata* subsp. *striolata*. Originally *Exochosphaeridium striolatum* subsp. *striolatum*, subsequently (and now) *Coronifera striolata* subsp. *striolata*. Age: Late Cretaceous.

"var. *striolatum*". Autonym. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.1. **Now redundant**.

"subsp. *truncatum*" (Davey, 1969a, p.164–166, pl.7, figs.1–3) Lentin and Williams, 1973, p.56. Emendations: Masure, 1988b, p.129 and Harker and Sarjeant in Harker et al., 1990, p.73–74, both as *Pervosphaeridium truncatum*. Holotype: Davey, 1969a, pl.7, fig.2; Masure, 1988b, pl.4, figs.6A–B; text-fig.5, nos.1–2. **NOW** *Pervosphaeridium truncatum*. Originally *Exochosphaeridium striolatum* var. *truncatum*, subsequently *Exochosphaeridium striolatum* subsp. *truncatum*, thirdly *Exochosphaeridium? truncatum*, fourthly (and now) *Pervosphaeridium truncatum*. Age: Cenomanian.

"var. *truncatum*" Davey, 1969a, p.164–166, pl.7, figs.1–3. Emendations: Masure, 1988b, p.129 and Harker and Sarjeant in Harker et al., 1990, p.73–74, both as *Pervosphaeridium truncatum*. Holotype: Davey, 1969a, pl.7, fig.2; Masure, 1988b, pl.4, figs.6A–B; text-fig.5, nos.1–2. **NOW** *Pervosphaeridium truncatum*. Originally *Exochosphaeridium striolatum* var. *truncatum*, subsequently *Exochosphaeridium striolatum* subsp. *truncatum*, thirdly *Exochosphaeridium? truncatum*, fourthly (and now) *Pervosphaeridium truncatum*. Age: Cenomanian.

"*truncatum*" (Davey, 1969a, p.164–166, pl.7, figs.1–3) Stover and Evitt, 1978, p.154. Emendations: Masure, 1988b, p.129 and Harker and Sarjeant in Harker et al., 1990, p.73–74, both as *Pervosphaeridium truncatum*. Holotype: Davey, 1969a, pl.7, fig.2; Masure, 1988b, pl.4, figs.6A–B; text-fig.5, nos.1–2. **NOW** *Pervosphaeridium truncatum*. Originally *Exochosphaeridium striolatum* var. *truncatum*, subsequently *Exochosphaeridium striolatum* subsp. *truncatum*, thirdly *Exochosphaeridium? truncatum*, fourthly (and now) *Pervosphaeridium truncatum*. Questionable assignment: Stover and Evitt (1978, p.154). Age: Cenomanian.

"*truncigerum*" (Deflandre, 1937b, p.71–72, pl.13 [al. pl.10], figs.6–7) Davey, 1978, p.894. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. **NOW** *Raetiaedinium*. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium?*, seventhly *Florentinia*, eighthly *Pervosphaeridium?*, ninthly (and now) *Raetiaedinium*. Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes* Reade, 1839, by implication in Yun Hyesu (1981, p.27), who considered *Exochosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior synonym — however, Lentin and Williams (1985, p.282) retained *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

"**EYACHIA**" Gocht, 1979, p.307–308. **Taxonomic senior synonym:** *Scriniocassis*, according to Prauss (1989, p.29) and Below (1990, p.30). Type: Gocht, 1979, figs.9a–c, as *Eyachia priscus*.

"***priscus**" Gocht, 1979, p.308,310,312–317, figs.1a–d,2a–b,3a–e,4a–d,5–6,7a–d,8a–b,9a–c,10. Emendation: Below, 1990, p.32, as *Eyachia priscus*. Holotype: Gocht, 1979, figs.9a–c; Fensome et al., 1995, figs.1–2 — p.1687. **NOW** *Scriniocassis*. Originally *Eyachia*, subsequently (and now) *Scriniocassis*. N.I.A. Age: Aalenian.

"**FACETODINIUM**" Bjaerke, 1980, p.69. **Taxonomic senior synonym:** *Susadinium*, according to Lentin and Williams (1985, p.133) and Lentin and Williams (1989, p.135). Taxonomic senior synonym: *Reutlingia*, according to Below (1987a, p.133) — however, Lentin and Williams (1989, p.135) retained *Facetodinium* as a junior synonym of *Susadinium*. Type: Bjaerke, 1980, pl.2, figs.1–3, as *Facetodinium faustum*.

"***faustum**" Bjaerke, 1980, p.69, pl.2, figs.1–6; text-figs.4A–D. Emendation: Below, 1987a, p.136–137, as *Reutlingia fausta*. Holotype: Bjaerke, 1980, pl.2, figs.1–3; Fensome et al., 1993a, figs.1–3 — p.1175. **NOW** *Susadinium*. Originally *Facetodinium*, subsequently (and now) *Susadinium*, thirdly *Reutlingia*. Age: Toarcian.

"**inflatum**" Bjaerke, 1980, p.69–71, pl.3, figs.1–13; text-fig.5. Holotype: Bjaerke, 1980, pl.3, figs.1–6. Originally *Facetodinium*, subsequently *Susadinium*. **Taxonomic senior synonym:** *Susadinium scrofoides*, according to Below (1987a, p.120) and Stover and Williams (1987, p.97). Age: Toarcian.

FALLACIODINIUM Harding, 1998, p.91. Type: Harding, 1998, pl.1, figs.1–2, as *Fallaciodinium minutum*.

***minutum** Harding, 1998, p.91,93,95–97, pl.1, figs.1–3,5–8,10–11; pl.2, figs.1–13; text-figs.1a–c. Holotype: Harding, 1998, pl.1, figs.1–2. Age: late Barremian.

"**FARRAGODINIUM**" Stevens and Helby in Riding and Helby, 2001g, p.212. **Name not validly published:** based on an unpublished manuscript, listed in synonymy. **Taxonomic senior synonym:** *Stanfordella*, by implication in Riding and Helby (2001g, p.212).

"**curiosum**" Stevens and Helby in Riding and Helby, 2001g, p.212. **Name not validly published:** based on an unpublished manuscript, listed in synonymy. **Taxonomic senior synonym:** *Stanfordella granulosa*, by implication in Riding and Helby (2001g, p.212).

"**FAVILARNAX**" Sarjeant, 1963a, p.720. **Name illegitimate — nomenclatural senior synonym:** *Valensiella*, which has the same type. Type: Deflandre, 1947d, text-fig.22, as *Membranilarnax ovulum*.

"**amandopolitana**" (Valensi, 1955b, p.590, pl.2, fig.7; pl.5, fig.2) Sarjeant, 1963a, p.720. Holotype: Valensi, 1955b, pl.2, fig.7. **NOW** *Valensiella*?. Originally *Membranilarnax*, subsequently *Favilarnax*, thirdly *Valensiella*, fourthly (and now) *Valensiella*?. Age: Middle Jurassic.

"***ovulum**" (Deflandre, 1947d, p.9–10; text-figs.22–23) Sarjeant, 1963a, p.720. Emendation: Courtinat, 1989, p.183, as *Valensiella ovulum*. Holotype: Deflandre, 1947d, text-fig.22; Eisenack and Kjellström, 1972, p.1095, figure to left; Fensome et al., 1995, fig.1 — p.1633. **NOW** *Valensiella*. Originally *Membranilarnax*, subsequently *Favilarnax*, thirdly (and now) *Valensiella*. N.I.A. Age: Bajocian.

FIBRADINIUM Morgenroth, 1968, p.537–538. Taxonomic senior synonym: *Phanerodinium*, according to Below (1987b, p.36) — however, Lentin and Williams (1993, p.221) retained *Fibradinium*. Type: Morgenroth, 1968, pl.42, fig.4, as *Fibradinium annetorpense*.

***annetorpense** Morgenroth, 1968, p.538, pl.42, figs.4–7; text-figs.1–2. Holotype: Morgenroth, 1968, pl.42, fig.4. Originally (and now) *Fibradinium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.135) retained this species in *Fibradinium*. Age: Danian.

?densibaculatum (Below, 1987b, p.44, pl.12, figs.4,9) Lentin and Williams, 1989, p.135. Holotype: Below, 1987b, pl.12, figs.4,9; Fensome et al., 1993a, figs.1–2 — p.1115. Originally *Phanerodinium*, subsequently (and now) *Fibradinium*?. Questionable assignment: Lentin and Williams (1989, p.135). Age: middle-late Albian.

?diatretiforme (Below, 1987b, p.46–47, pl.12, figs.2,7) Lentin and Williams, 1989, p.135. Holotype: Below, 1987b, pl.12, figs.2,7; Fensome et al., 1993a, figs.1–2 — p.1123. Originally *Phanerodinium*, subsequently (and now) *Fibradinium*?. Questionable assignment: Lentin and Williams (1989, p.135). Age: Oligocene.

?follis (Below, 1987b, p.47–48, pl.9, figs.1–6) Lentin and Williams, 1989, p.135. Holotype: Below, 1987b, pl.9, figs.1–5; Fensome et al., 1993a, figs.1–5 — p.1197. Originally *Phanerodinium*, subsequently (and now) *Fibradinium*?. Questionable assignment: Lentin and Williams (1989, p.135). N.I.A. Age: late Bajocian–middle Callovian.

?lacertum (Below, 1987b, p.50–51, pl.9, figs.7–10; pl.12, fig.5) Lentin and Williams, 1989, p.136. Holotype: Below, 1987b, pl.9, figs.7–10; pl.12, fig.5; Fensome et al., 1993a, figs.1–5 — p.1247. Originally *Phanerodinium*, subsequently (and now) *Fibradinium*?. Questionable assignment: Lentin and Williams (1989, p.136). Age: middle Albian.

?squamosum (Below, 1987b, p.54–56, pl.11, figs.1–15; pl.12, figs.1,6,11; pl.16, fig.13) Lentin and Williams, 1989, p.136. Holotype: Below, 1987b, pl.11, figs.1,3–6; Fensome et al., 1993a, figs.1,3–6 — p.1355. Originally *Phanerodinium*, subsequently (and now) *Fibradinium*?. Lentin and Williams (1993, p.222) retained this species in *Fibradinium*. Questionable assignment: Lentin and Williams (1989, p.136). Age: early Oligocene.

variculum Stover and Helby, 1987d, p.267, figs.7A–K. Holotype: Stover and Helby, 1987d, figs.7A–C; Fensome et al., 1996, figs.1–3 — p.2423. Age: Barremian–early Aptian.

"FIBROAESPHAERAE" Colom 1935, p.12. Possible calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1299). **Name not validly published** (see Elbrächter et al., 2008, p.1299). Type: not designated.

"*minutissima" Colom, 1935, p.12, pl.2, fig.8; text-fig.4a [four specimens]). Holotype not designated. **NOW** *Colomisphaera*. Originally *Fibroaesphaerae* (generic name not validly published), subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*, fourthly *Schizosphaerella*. See Elbrächter et al. (2008, p.1298) for a discussion of the status of this species name. Age: Late Early Jurassic.

FIBROCYSTA Stover and Evitt, 1978, p.155. Type: Cookson and Eisenack, 1965b, pl.16, fig.8, as *Cordosphaeridium bipolare*.

acornuta Norris and Jux, 1984, p.161–162, pl.1, figs.17–20; pl.2, figs.1–4; pl.3, fig.5; pl.5, figs.1–6. Holotype: Norris and Jux, 1984, pl.2, figs.1–3. Age: late Kimmeridgian–late Tithonian.

axialis (Eisenack, 1965b, p.150, pl.15, figs.1–4) Stover and Evitt, 1978, p.155. Holotype: Eisenack, 1965b, pl.15, fig.2. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocysta*. Age: late Eocene–early Oligocene.

baculata He Chengquan, 1991, p.168–169, pl.21, fig.1. Holotype: He Chengquan, 1991, pl.21, fig.1. Age: Paleocene.

***bipolaris** (Cookson and Eisenack, 1965b, p.135, pl.16, figs.7–8) Stover and Evitt, 1978, p.155. Holotype: Cookson and Eisenack, 1965b, pl.16, fig.8. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocysta*. Age: early Eocene.

- brevispinosa* Slimani et al., 2012, p.346–347, fig.6A–F. Holotype: Slimani et al., 2012, figs.6A–C. Age: early Danian.
- capitata* Hultberg, 1985c, p.123–124, pl.4, fig.D. Holotype: Hultberg, 1985c, pl.4, fig.D. Age: early Danian.
- ?*ciliata* (Khanna and Singh, 1981b, p.402, fig.4, nos.7–8; text-fig.12) Lentin and Williams, 1993, p.222. Holotype: Khanna and Singh, 1981b, fig.4, no.8. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Questionable assignment: Lentin and Williams (1993, p.222). Age: middle Eocene.
- ?*cincta* (Cookson and Eisenack, 1982, p.45, pl.2, fig.22) Lentin and Williams, 1985, p.133. Holotype: Cookson and Eisenack, 1982, pl.2, fig.22. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*?. Questionable assignment: Lentin and Williams (1985, p.133). Age: Albian–Cenomanian.
- ?*deflandrei* (Lejeune-Carpentier, 1941, p.B84, fig.6) Lejeune-Carpentier and Sarjeant, 1981, p.14. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.14, as *Fibrocysta? deflandrei*. Holotype: Lejeune-Carpentier, 1941, fig.6; Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.5–6; text-fig.8. Originally *Hystrichosphaeridium spinosum* var. *deflandrei*, subsequently *Baltisphaeridium spinosum* var. *deflandrei* (Appendix A), thirdly *Cordosphaeridium spinosum* var. *deflandrei* (combination not validly published), fourthly *Exochosphaeridium spinosum* subsp. *deflandrei*, fifthly *Exochosphaeridium spinosum* subsp. *deflandrei*, sixthly *Exochosphaeridium? spinosum* subsp. *deflandrei*, seventhly (and now) *Fibrocysta? deflandrei*. Questionable assignment: Lejeune-Carpentier and Sarjeant (1981, p.14). Age: Late Cretaceous.
- donghaiensis* Yu Jingxian, 1989, p.131, pl.40, figs.2,4,4a,5,11. Holotype: Yu Jingxian, 1989, pl.40, fig.2. Age: Eocene.
- dongyingensis* Xu Jinli et al., 1997, p.109–110, pl.27, fig.10 ex He Chengquan et al., 2009, p.655–656. Holotype: Xu Jinli et al., 1997, pl.27, fig.10. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided: He Chengquan et al. (2009, p.655–656) validated the name by publishing an English diagnosis. Age: middle-late Eocene.
- essentialis* (de Coninck, 1969, p.38, pl.11, figs.7–8) Brinkhuis and Zachariasse, 1988, p.187. Holotype: de Coninck, 1969, pl.11, figs.7–8. Originally *Lanternosphaeridium*, subsequently *Kenleyia?*, thirdly (and now) *Fibrocysta*. Age: early Eocene.
- exiguapicis* Islam, 1983b, p.338–339, pl.2, figs.10–11. Holotype: Islam, 1983b, pl.2, fig.10. Age: early Eocene.
- ?*fusiforma* Edwards, 1984, p.585, pl.4, figs.2–3a–b. Holotype: Edwards, 1984, pl.4, fig.2. Questionable assignment: Edwards (1984, p.585). Age: late Miocene.
- klumppiae* (Corradini, 1973, p.152, pl.22, figs.2a–c) Stover and Evitt, 1978, p.155. Holotype: Corradini, 1973, pl.22, figs.2a–c. Originally *Cordosphaeridium*, subsequently (and now) *Fibrocysta*. Age: Late Cretaceous–Paleocene.
- "*lappacea*" (Drugg, 1970b, p.812–813, figs.4A–D,5A–D) Stover and Evitt, 1978, p.155. Holotype: Drugg, 1970b, figs.4A–D. **NOW** *Ifecysta*. Originally *Lanternosphaeridium*, subsequently *Fibrocysta*, thirdly (and now) *Ifecysta*. Age: early Eocene.
- licia* (Jain et al., 1975, p.10, pl.4, figs.51–53) Stover and Evitt, 1978, p.155. Holotype: Jain et al., 1975, pl.4, fig.51. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: Danian.
- mirabilis* He Chengquan, 1991, p.169–170, pl.21, fig.2; text-fig.41. Holotype: He Chengquan, 1991, pl.21, fig.2; text-fig.41. Age: Paleocene.

"*morgenrothii*" (Corradini, 1973, p.155, pl.23, fig.1) Stover and Evitt, 1978, p.155. Holotype: Corradini, 1973, pl.23, fig.1. **NOW** *Pervosphaeridium*. Originally *Lanternosphaeridium*, subsequently *Fibrocysta*, thirdly (and now) *Pervosphaeridium*. Age: Senonian.

mutabilis Yu Jingxian, 1989, p.131–132, pl.40, figs.6–10. Holotype: Yu Jingxian, 1989, pl.40, fig.7. Age: Paleocene.

"?*mutinensis*" (Corradini, 1973, p.155–156, pl.23, figs.2,9; pl.34, figs.2,3a–b) Stover and Evitt, 1978, p.155. Holotype: Corradini, 1973, pl.23, fig.2. Originally *Lanternosphaeridium*, subsequently *Fibrocysta*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Corradinisphaeridium*) *horridum*, according to Masure (1986, p.112). Questionable assignment: Stover and Evitt (1978, p.155). Age: Senonian.

ovalis (Hansen, 1977, p.17, figs.19F–G) Lentin and Williams, 1981, p.103. Holotype: Hansen, 1977, figs.19F–G. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: Maastrichtian–Danian.

paleocenica Yu Jingxian, 1989, p.131, pl.38, figs.2–3. Holotype: Yu Jingxian, 1989, pl.38, fig.3. Age: Paleocene.

prolixa Harker and Sarjeant in Harker et al., 1990, p.78–79, pl.3, figs.15–17; pl.4, figs.1–2; text-fig.18 ex Harker and Sarjeant, 1991, p.708. Holotype: Harker et al., 1990, pl.3, fig.15; pl.4, figs.1–2; text-fig.18. This name was not validly published in Harker et al. (1990), since the lodgement of the holotype was not cited (I.C.N. Article 40.7). Age: early Campanian.

radiata (Morgenroth, 1966a, p.37–38, pl.10, figs.7–9) Stover and Evitt, 1978, p.155. Holotype: Morgenroth, 1966a, pl.10, figs.7–8. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: early Eocene.

tarimensis He Chengquan, 1991, p.170, pl.20, fig.8. Holotype: He Chengquan, 1991, pl.20, fig.8. Age: middle Eocene.

variabilis Mehrotra and Sarjeant, 1987, p.155–156, pl.4, fig.2; pl.5, figs.1–2,5–6; pl.6, fig.5. Holotype: Mehrotra and Sarjeant, 1987, pl.4, fig.2; Mehrotra and Singh, 2003, pl.15, fig.1. Taxonomic senior synonym: *Wetzeliella* (now *Apectodinium*) *paniculatum*, according to Garg et al. (1995, p.364) — however, Mehrotra and Singh (2003, p.40–41) retained this species. Age: Maastrichtian–Paleocene.

vectensis (Eaton, 1976, p.275–276, pl.12, figs.4–6) Stover and Evitt, 1978, p.155. Holotype: Eaton, 1976, pl.12, fig.4; Bujak et al., 1980, pl.7, fig.10. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: middle-late Eocene (see Aubry, 1986).

subsp. *cyomosapicis* Islam, 1983c, p.85–86, pl.3, figs.6–7. Holotype: Islam, 1983c, pl.3, fig.7. Age: middle Eocene.

subsp. *vectensis*. Autonym. Holotype: Eaton, 1976, pl.12, fig.4 and Bujak et al., 1980, pl.7, fig.10.

FILISPHAERA Bujak, 1984, p.185. Emendation: Head, 1994b, p.234–235. Taxonomic junior synonym: *Muraticysta*, according to Head (1994b, p.234). Type: Bujak, 1984, pl.1, figs.7–8, as *Filisphaera filifera*.

**filifera* Bujak, 1984, p.185, pl.1, figs.7–12. Emendation: Head, 1994b, p.235. Holotype: Bujak, 1984, pl.1, figs.7–8; Head, 1994b, pl.3, figs.1–3; Fensome et al., 1993a, figs.1–2 — p.1193. Age: late Miocene–early Pleistocene.

subsp. *filifera*. Autonym. Holotype: Bujak, 1984, pl.1, figs.7–8; Head, 1994b, pl.3, figs.1–3; Fensome et al., 1993a, figs.1–2 — p.1193. Head (1994b, p.236) provided an emended diagnosis for the autonym.

subsp. *pilosa* (Matsuoka and Bujak, 1988, p.44–45, pl.3, figs.5–6,7a–b,8,9a–b) Head, 1994b, p.234. Emendation: Head, 1994b, p.237, as *Filisphaera filifera* subsp. *pilosa*. Holotype: Matsuoka and Bujak, 1988, pl.3, figs.7a–b; Head, 1994b, pl.4, figs.7–9. Originally *Filisphaera pilosa*, subsequently (and now) *Filisphaera filifera* subsp. *pilosa*. Age: Pliocene.

microornata (Head et al., 1989b, p.458, pl.5, figs.1–3,5–7) Head, 1994b, p.235. Holotype: Head et al., 1989b, pl.5, figs.1–3,5; Head, 1994b, pl.5, figs.1–3. Originally *Muraticysta*, subsequently (and now) *Filisphaera*. Age: early Pliocene.

?**minuta** Strauss and Lund, 1992, p.162–163, pl.1, figs.4–7. Holotype: Strauss and Lund, 1992, pl.1, figs.5–6. Questionable assignment: Head (1994b, p.235). Head (1996a, p.551) considered *Habibacysta tectata* to be the possible taxonomic senior synonym of this species.

pachyderma Schiøler, 2005, p.29, pl.6, figs.16–21. Holotype: Schiøler, 2005, pl.6, figs.17–20. Age: Chattian–early Aquitanian.

"**pilosa**" Matsuoka and Bujak, 1988, p.44–45, pl.3, figs.5–6,7a–b,8,9a–b. Emendation: Head, 1994b, p.237, as *Filisphaera filifera* subsp. *pilosa*. Holotype: Matsuoka and Bujak, 1988, pl.3, figs.7a–b; Head, 1994b, pl.4, figs.7,9. **NOW** *Filisphaera filifera* subsp. *pilosa*. Originally *Filisphaera pilosa*, subsequently (and now) *Filisphaera filifera* subsp. *pilosa*. Age: Pliocene.

FISTULACYSTA Davey, 1988, p.37. Type: Davey, 1988, pl.8, fig.3, as *Fistulacysta simplex*.

***simplex** Davey, 1988, p.37, pl.8, figs.1–3. Holotype: Davey, 1988, pl.8, fig.3; Fensome et al., 1996, fig.3 — p.2359. Age: late Oxfordian–early Kimmeridgian.

FLAMINGOIA Stevens and Helby, 1987, p.172,174–175. Type: Stevens and Helby, 1987, figs.9A–C, as *Flamingoia cometa*.

***cometa** Stevens and Helby, 1987, p.175–178, figs.8A–C,9A–J. Holotype: Stevens and Helby, 1987, figs.9A–C; Fensome et al., 1993a, figs.1–3 — p.1063. N.I.A. Age: early Berriasian.

"**compta**" Lentin and Williams, 1989, p.137. **Name not validly published:** typographic error for *Flamingoia cometa*.

FLANDRECYSTA Slimani, 1994, p.53. Type: Slimani, 1994, pl.8, figs.15–18; text-figs.6A–B, as *Flandrecysta furcata*.

***furcata** Slimani, 1994, p.53–55, pl.8, figs.15–18; text-figs.6A–B. Holotype: Slimani, 1994, pl.8, figs.15–18; text-figs.6A–B. Age: early Campanian–early Maastrichtian.

"**inflata**" (Heilmann-Clausen in Thomsen and Heilmann-Clausen, 1985, p.355,361, pl.7, figs.3–8; text-figs.11A–F) Slimani, 1994, p.53. Holotype: Thomsen and Heilmann-Clausen, 1985, pl.7, figs.5–6; text-figs.11C–D.

Combination not validly published: basionym not fully referenced. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Flandrecysta* (combination not validly published). Age: Danian–early Seelandian.

tubulosa Slimani, 1994, p.55–57, pl.8, figs.19–21; pl.9, fig.17; pl.10, figs.13–14; text-figs.7A–B. Holotype: Slimani, 1994, pl.8, figs.19–21; text-figs.7A–B. Age: latest early Maastrichtian–Danian.

FLORENTINIA Davey and Verdier, 1973, p.185–186. Emendation: Duxbury, 1980, p.119. Taxonomic junior synonyms: *Silicisphaera* and *Achilleodinium*, both according to Duxbury (1980, p.119) — however, Lentin and Williams (1981, p.1) and Lentin and Williams (1985, p.2) retained *Achilleodinium*. Type: Davey and Verdier, 1973, pl.2, figs.1,3, as *Florentinia laciniata*.

abjuncta Duxbury, 1983, p.46–47, pl.6, figs.9–10. Holotype: Duxbury, 1983, pl.6, figs.9–10. Age: early Aptian.

"aculeata" Kirsch, 1991, p.85, pl.13, figs.1–4,12–13; pl.39, fig.8; text-fig.42. Holotype: Kirsch, 1991, pl.13, figs.3–4; text-fig.42. **Taxonomic senior synonym:** *Kleithriasphaeridium loffrense*, according to Fensome et al., (2009, p.42). Age: Coniacian–Maastrichtian.

berran Below, 1982c, p.7, pl.5, figs.1–4. Holotype: Below, 1982c, pl.5, fig.4. N.I.A. Age: Cenomanian.

"biformoides" (Eisenack, 1954b, p.68, pl.11, figs.16–20) Duxbury, 1980, p.121. Holotype: Eisenack, 1954b, pl.11, fig.18. **NOW** *Achilleodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Achilleodinium*, fifthly *Florentinia*. Age: late Eocene–early Oligocene.

buspina (Davey and Verdier, 1976, p.321–322, pl.2, figs.1–6; text-fig.3) Duxbury, 1980, p.121. Holotype: Davey and Verdier, 1976, pl.2, figs.1–3. Originally *Silicisphaera*, subsequently (and now) *Florentinia*. Age: Senonian.

causea Yu Jingxian and Zhang Wangping, 1980, p.113, pl.4, figs.9–10. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.4, fig.9. Age: Late Cretaceous.

clavigera (Deflandre, 1937b, p.71, pl.14 [al. pl.11], figs.1–2) Davey and Verdier, 1973, p.192. Emendation: Davey and Verdier, 1976, p.315, as *Florentinia clavigera*. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.1–2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Florentinia*, fifthly *Hystrichosphaera*. Lentin and Williams (1993, p.224) retained this species in *Florentinia*. Age: Senonian.

"cooksoniae" (Singh, 1971, p.329–330, pl.51, figs.7–8; pl.52, figs.1–4) Duxbury, 1980, p.120. Emendation: Duxbury, 1980, p.120, as *Florentinia cooksoniae*. Holotype: Singh, 1971, pl.51, fig.7. **NOW** *Kleithriasphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Florentinia*, thirdly *Litosphaeridium*, fourthly (and now) *Kleithriasphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Florentinia mantellii*, according to Below (1982c, p.8) — however, Lentin and Williams (1985, p.135) retained *Florentinia cooksoniae*. Taxonomic junior synonym: *Hystrichosphaeridium cylindratum*, according to Harker and Sarjeant (1975, p.225–226). Age: late Albian.

deanei (Davey and Williams, 1966b, p.58–59, pl.6, figs.4,8) Davey and Verdier, 1973, p.187. Holotype: Davey and Williams, 1966b, pl.6, fig.8; Davey and Verdier, 1973, pl.1, fig.9. Originally *Hystrichosphaeridium*, subsequently (and now) *Florentinia*. Davey and Verdier (1976, p.316) considered that this species may be a taxonomic synonym of *Hystrichokolpoma unispinum*, the type material of the latter representing possibly reworked Cretaceous specimens. Age: Cenomanian.

ferox (Deflandre, 1937b, p.72, pl.14 [al. pl.11], figs.3–4) Duxbury, 1980, p.121. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.3–4. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly *Silicisphaera*, fifthly (and now) *Florentinia*. Age: Senonian.

?flosculus (Deflandre, 1937b, p.75, pl.15 [al. pl.12], figs.5–6) Lentin and Williams, 1981, p.104. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.5. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published; Appendix A), thirdly *Litosphaeridium?*, fourthly *Silicisphaera?*, fifthly (and now) *Florentinia?*. Questionable assignment: Lentin and Williams (1981, p.104). Taxonomic junior synonym: *Eurysphaeridium fibratum* (name not validly published), according to Slimani (2001a, p.192). See also *Areoligera tenuicapillata* subsp. *pinopollina*. N.I.A. Age: Senonian.

hypomagna Yun Hyesu, 1981, p.51–52, pl.6, figs.6,9–10; text-figs.14a–b. Holotype: Yun Hyesu, 1981, pl.6, fig.10; text-figs.14a–b; Fensome et al., 1991, figs.2–4 — p.653. Age: early Santonian.

interrupta Duxbury, 1980, p.121, pl.12, fig.3; text-figs.8A–B. Holotype: Duxbury, 1980, pl.12, fig.3. Age: middle Barremian.

kaldunii Below, 1982c, p.7–8, pl.4, figs.11,12a–b. Holotype: Below, 1982c, pl.4, fig.11. Age: Aptian–Albian.

**laciniata* Davey and Verdier, 1973, p.186–187, pl.2, figs.1,3–4,6–7,9. Holotype: Davey and Verdier, 1973, pl.2, figs.1,3. Age: late Albian–early Cenomanian.

subsp. *laciniata*. Autonym. Holotype: Davey and Verdier, 1973, pl.2, figs.1,3.

subsp. *propria* Mao Shaozhi and Norris, 1988, p.39–40, pl.8, figs.2–5; text-fig.11, nos.1–2. Holotype: Mao Shaozhi and Norris, 1988, pl.8, fig.2; text-fig.11, no.1. Age: late Eocene–early Oligocene.

subsp. *seghiris* Below, 1982c, p.8, pl.4, figs.5a–b,7a–b. Holotype: Below, 1982c, pl.4, figs.5a–b. Age: Cenomanian.

mantellii (Davey and Williams, 1966b, p.66, pl.6, fig.6) Davey and Verdier, 1973, p.191. Holotype: Davey and Williams, 1966b, pl.6, fig.6; Davey and Verdier, 1973, pl.4, figs.1,3. Originally *Hystrichosphaeridium*, subsequently (and now) *Florentinia*. Age: late Cenomanian.

mayi Kirsch, 1991, p.87, pl.13, figs.5–9. Holotype: Kirsch, 1991, pl.13, figs.7–8. Age: early Maastrichtian.

miscella Yun Hyesu, 1981, p.49–51, pl.6, figs.7,13–14; pl.8, fig.15; text-figs.13a–d. Holotype: Yun Hyesu, 1981, pl.6, fig.7; text-figs.13a–b; Fensome et al., 1991, figs.1,3–4 — p.677. Age: early Santonian.

"*neptuni*" (Eisenack, 1958a, p.399, pl.26, figs.7–8; text-fig.8) Sarjeant, 1985a, p.89–90,92–93. Emendations: Duxbury, 1983, p.55, as *Spiniferites neptuni*; Sarjeant, 1985a, p.89–90,92, as *Florentinia? neptuni*. Holotype: Eisenack, 1958a, pl.26, fig.7. **NOW** *Achomosphaera*. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Achomosphaera*, thirdly *Achomosphaera?*, fourthly *Spiniferites*, fifthly *Florentinia?*. Questionable assignment: Sarjeant (1985a, p.89). For etymology see under *Achomosphaera*. Age: Early Cretaceous.

"*perforata*" Firth, 1993, p.193,195, pl.2, figs.1–7. Holotype: Firth, 1993, pl.2, figs.1–4. **NOW** *Kleithriasphaeridium*. Originally *Florentinia*, subsequently (and now) *Kleithriasphaeridium*. Age: early–late Maastrichtian.

radiculata (Davey and Williams, 1966b, p.65, pl.7, fig.9; pl.8, fig.6) Davey and Verdier, 1973, p.191. Emendation: Davey and Verdier, 1976, p.318, as *Florentinia radiculata*. Holotype: Davey and Williams, 1966b, pl.8, fig.6; Davey and Verdier, 1973, pl.4, fig.7. Originally *Hystrichosphaeridium*, subsequently (and now) *Florentinia*. Taxonomic junior synonym: *Coronifera kaisereri*, according to Below (1982c, p.9). Age: late Cenomanian.

ramulus (May, 1980, p.66–67, pl.2, figs.13–16) Lentin and Williams, 1981, p.105. Holotype: May, 1980, pl.2, figs.13–14. Originally *Silicisphaera*, subsequently (and now) *Florentinia*. N.I.A. (Williams et al., 1998, p.230, incorrectly cited the epithet as "*ramula*"). Age: Maastrichtian.

reichartii Sluijs and Brinkhuis, 2009, p.1765–1766, pl.3, figs.F–L; pl.4, figs.A–C. Holotype: Sluijs and Brinkhuis, 2009, pl.4, figs.A–C. Age: latest Paleocene–earliest Eocene.

resex Davey and Verdier, 1976, p.319–320, pl.4, figs.1–3; text-fig.2. Holotype: Davey and Verdier, 1976, pl.4, fig.1. N.I.A. Age: Turonian.

stellata (Maier, 1959, p.320–321, pl.33, figs.3–4) Below, 1982a, p.10. Holotype: Maier, 1959, pl.33, fig.3; Sarjeant, 1983, pl.7, figs.1–2. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Florentinia*, fourthly *Hystrichokolpoma*. Srivastava (1995, p.306) retained this species in *Florentinia*. Taxonomic senior synonym: *Hystrichokolpoma rigaudiae*, according to Sarjeant (1983, p.104) — however, Srivastava (1995, p.306) retained *Florentinia stellata*. Age: middle Oligocene–middle Miocene.

tenera (Davey and Verdier, 1976, p.326–327, pl.3, figs.8–12; text-fig.6) Duxbury, 1980, p.122. Holotype: Davey and Verdier, 1976, pl.3, figs.8–11. Originally *Silicisphaera*, subsequently (and now) *Florentinia*. Age: Senonian.

?*torulosa* (Davey and Verdier, 1976, p.328, pl.4, figs.10–12) Lentin and Williams, 1981, p.105. Holotype: Davey and Verdier, 1976, pl.4, figs.10–11. Originally *Silicisphaera*?, subsequently (and now) *Florentinia*?. Questionable assignment: Lentin and Williams (1981, p.105). Age: Turonian.

tridactylites (Valensi, 1955a, p.37–38, fig.1D) Duxbury, 1980, p.122. Holotype: Valensi, 1955a, fig.1D. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma* (combination not validly published), fourthly *Achomosphaera*, fifthly *Silicisphaera*, sixthly (and now) *Florentinia*. Age: Cretaceous.

"*truncigera*" (Deflandre, 1937b, p.71–72, pl.13 [al. pl.10], figs.6–7) Below, 1982c, p.10. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. **NOW** *Raetiaedinium*. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium*?, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium*?, seventhly *Florentinia*, eighthly *Pervosphaeridium*?, ninthly (and now) *Raetiaedinium*. Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes*, by implication in Yun Hyesu (1981, p.27), who considered *Florentinia* (as *Pervosphaeridium*) *truncigera* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Florentinia* (as *Pervosphaeridium*) *truncigera*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

verdieri Singh, 1983, p.149, pl.53, figs.5–10; pl.54, figs.1–2. Holotype: Singh, 1983, pl.53, figs.5–6. Lentin and Williams (1985, p.71) considered *Cordosphaeridium fibroferum* to be the questionable taxonomic senior synonym of this species. Age: Cenomanian.

FOLIACTINISCUS Dumitrică, 1973, p.823. Siliceous dinoflagellate genus. Type: Hovasse, 1943, fig.1, as *Gymnaster folia*.

**folia* (Hovasse, 1943, p.278, fig.1) Dumitrică, 1973, p.823. Holotype: Hovasse, 1943, fig.1. Originally *Gymnaster*, subsequently (and now) *Foliactiniscus*. Age: early Miocene.

"*mirabilis*" Dumitrică, 1973, p.823, pl.1, figs.12–13,20; pl.2, figs.4,12–13. **Name not validly published**: holotype not designated. Age: Oligocene–Quaternary.

"*pannosus*" Dumitrică, 1973, p.823, pl.1, figs.18–19,21–23; pl.2, figs.1,5. **Name not validly published**: holotype not designated. Age: early Oligocene–early Miocene.

"*pyramis*" Dumitrică, 1973, p.823, pl.1, figs.14–17. **Name not validly published**: holotype not designated. Age: early Oligocene–early Miocene.

FOLLISDINELLUM Versteegh, 1993, p.367. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Type: Versteegh, 1993, pl.5, figs.6,8–11, as *Follisdinellum splendidum*.

**splendidum* Versteegh, 1993, p.367,369,371, pl.5, figs.1–11. Holotype: Versteegh, 1993, pl.5, figs.6,8–11. Age: late Pleistocene.

"**FOSTERIA**" Riding and Helby, 2001e, p.114–115. **Name illegitimate** — **senior homonym** *Fosteria* Molseed, 1968. **Substitute name**: *Fostericysta*. Type: Riding and Helby, 2001e, fig.3I as *Fosteria eclipsiana*.

"**eclipsiana*" Riding and Helby, 2001e, p.115,117, figs.2A–B,3A–P. Holotype: Riding and Helby, 2001e, fig.3I. **NOW** *Fostericysta*. Originally *Fosteria* (generic name illegitimate), subsequently (and now) *Fostericysta*. Taxonomic junior synonym: *Horologinella eclipsiana* (name not validly published), according to Riding and Helby (2001e, p.115). Age: Callovian–Oxfordian.

FOSTERICYSTA Riding, 2005b, p.1091. Substitute name for *Fosteria* Riding and Helby, 2001e (an illegitimate name). Type: Riding and Helby, 2001e, fig.3I as *Fosteria eclipsiana*.

**eclipsiana* (Riding and Helby, 2001e, p.115,117, figs.2A–B,3A–P) Riding, 2005b, p.1091. Holotype: Riding and Helby, 2001e, fig.3I. Originally *Fosteria* (generic name illegitimate), subsequently (and now) *Fostericysta*. Taxonomic junior synonym: *Horologinella eclipsiana* (name not validly published), according to Riding and Helby (2001e, p.115). Age: Callovian–Oxfordian.

scarffei (Tykoezinski et al., 2001, p.84,86, pl.1, figs.1a–c,2a–c,3a–b,4a–c,5a–c; pl.4, figs.10–13) Mantel and Riding, 2012, p.55. Holotype: Tykoezinski et al., 2001, pl.1, figs.1a–c. Originally *Jansonia*, subsequently (and now) *Fostericysta*. Age: late Bathonian.

FOUCHERIA Monteil, 1992a, p.277–278. Type: Monteil, 1992a, pl.3, figs.1–4, as *Foucheria modesta*.

**modesta* Monteil, 1992a, p.278, pl.3, figs.1–7; pl.4, figs.1–7. Holotype: Monteil, 1992a, pl.3, figs.1–4; Fauconnier and Masure, 2004, pl.27, figs.9–10. Age: late Berriasian–early Valanginian.

FREBOLDINIUM Below, 1990, p.14. Contrary to the opinion of Lentin and Williams (1993, p.227), this name is validly published since the name of the "type species" is validly published. Type: Below, 1990, pl.1, figs.1–6, as *Freboldinium regulum*.

arcticum Below, 1990, p.15–16, pl.1, figs.13–15; pl.2, figs.1–15; text-figs.3a–b. Holotype: Below, 1990, pl.2, figs.1,6–11,15. Contrary to the opinion of Lentin and Williams (1993, p.227), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Toarcian.

**regulum* Below, 1990, p.16–20, pl.1, figs.1–12; text-figs.4a–k. Holotype: Below, 1990, pl.1, figs.1–6. Contrary to the opinion of Lentin and Williams (1993, p.227), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Toarcian.

serrulatum (Davies, 1983, p.26, pl.9, figs.1–6; text-figs.21A–B) Below, 1990, p.14. Holotype: Davies, 1983, pl.9, figs.3–4; text-figs.21A–B. Contrary to the opinion of Lentin and Williams (1993, p.227), this combination is validly published, since the generic name *Freboldinium* is validly published. Originally *Lithodinia*, subsequently (and now) *Freboldinium*. Age: Toarcian–early Bajocian.

FRIGATADINIUM Riding, 2004, p.237–238. Type: Riding, 2004, figs.3G–H, as *Frigatadinium frigatense*.

**frigatense* Riding, 2004, p.238–239,241–242, figs.2A–B,3A–I. Holotype: Riding, 2004, figs.3G–H. Age: early Oxfordian–mid Berriasian.

FUETTERERELLA Kohring, 1993a, p.88. Emendation: Streng et al. 2004, p.468–469. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Type: Kohring, 1993a, pl.12, figs.g–m, as *Fuettererella conforma*.

belliata Streng et al. 2004, p.469, fig.11, nos.1–11. Holotype: Streng et al., 2004, fig.11, no.1. Age: early Eocene.

**conforma* Kohring, 1993a, p.88,91–92, pl.12, figs.g–m; text-fig.12. Holotype: Kohring, 1993a, pl.12, figs.g–m. Age: late Eocene.

deflandrei (Kamptner, 1956, p.448–455, figs.1–4) Hildebrand-Habel and Streng, 2003, p.315. Holotype: Kamptner, 1956, fig.1. Originally *Thoracosphaera*, subsequently *Orthopithonella*, thirdly (and now) *Fuettererella*. Taxonomic junior synonyms: *Thoracosphaera* (now *Orthopithonella*) *johnstonei* and *Orthopithonella?* *minuta*, according to Kohring (1993a, p.30) — however, Streng et al. (2004, p.482) retained *Pithonella* (as *Pirumella*) *johnstonei* and *Orthopithonella?* *minuta*. Age: Eocene.

elliptica Kohring, 1993a, p.93–94, pl.14, figs.a–l; pl.34, figs.k–l. Holotype: Kohring, 1993a, pl.14, fig.a. Age: late Eocene–Oligocene.

flora (Fütterer, 1990, p.538, pl.3, figs.1–7) Hildebrand-Habel and Streng, 2003, p.315. Holotype: Fütterer, 1990, pl.3, figs.1,3. Originally *Orthopithonella*, subsequently (and now) *Fuettererella*. N.I.A. Age: late Maastrichtian–Danian.

fungiforma Hildebrand-Habel and Willems, 1999, p.93–94, pl.2, figs.7–12. Holotype: Hildebrand-Habel and Willems, 1999, pl.2, figs.7–8. Age: middle Eocene to late Oligocene.

tesserula (Fütterer, 1978, p.715, pl.3, figs.1–8,10–11) Kohring, 1993a, p.92. Holotype: Fütterer, 1978, pl.3, figs.1,4,7,10. Originally *Thoracosphaera*, subsequently *Orthopithonella* (combination not validly published), thirdly (and now) *Fuettererella*. N.I.A. Age: Paleocene–late Oligocene.

FURZIDINIUM Stancliffe, 1991, p.188. Type: Stancliffe, 1991, pl.4, fig.5; text-figs.6A–B, as *Furzidinium sentum*.

***sentum** Stancliffe, 1991, p.188,190, pl.1, fig.4; pl.3, figs.4–5,9; pl.4, fig.5; text-figs.6A–B,7A–C. Holotype: Stancliffe, 1991, pl.4, fig.5; text-figs.6A–B. Age: Oxfordian.

FUSIFORMACYSTA Morgan, 1975, p.161. Emendation: Riding and Helby, 2001d, p.75. Taxonomic junior synonym: *Helbycysta* (name not validly published), by implication in Riding and Helby (2001d, p.79), who included the only species name, *Helbycysta psilata* (name not validly published) in synonymy with *Fusiformacysta terniana*. Type: Morgan, 1975, pl.2, figs.4a–c, as *Fusiformacysta salasii*.

challisiana Riding and Helby, 2001e, p.117,119, figs.4A–L. Holotype: Riding and Helby, 2001e, fig.4A. Taxonomic junior synonyms: *Helbycysta verrucosa* and *Komewuia challisiana* (names not validly published), both according to Riding and Helby (2001e, p.119). Age: Callovian–Oxfordian.

***salasii** Morgan, 1975, p.161, pl.2, figs.4a–c,5a–b. Holotype: Morgan, 1975, pl.2, figs.4a–c; Fensome et al., 1996, figs.1–3 — p.2337. Age: early Neocomian.

terniana Riding and Helby, 2001d, p.77,79,81, figs.8A–L,9A–D. Holotype: Riding and Helby, 2001d, fig.8J. Taxonomic junior synonym: *Helbycysta psilata* (name not validly published), according to Riding and Helby (2001d, p.79). Age: Bathonian–Callovian.

tumida Backhouse, 1988, p.86, pl.29, figs.1–6. Holotype: Backhouse, 1988, pl.29, fig.5; Fensome et al., 1996, fig.5 — p.2411. Age: late Tithonian–?earliest Valanginian.

GAGIELLA Backhouse, 1988, p.86. Type: Backhouse, 1988, pl.27, figs.1a–b; text-figs.23D,25G, as *Gagiella mutabilis*.

***mutabilis** Backhouse, 1988, p.86,88–89, pl.27, figs.1a–b,2–15; pl.28, figs.1–6; text-figs.23A–D,24D,25A–B,D–G. Holotype: Backhouse, 1988, pl.27, figs.1a–b; text-figs.23D,25G; Fensome et al., 1996, figs.1–2 — p.2239. Age: Valanginian.

tuberculata (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.54, pl.12, fig.13) He Chengquan et al., 2009, p.348. Holotype: Liu Zhili et al., 1992, pl.12, fig.13. Originally *Bipolaribucina*?, subsequently *Distatodinium*, thirdly (and now) *Gagiella*. Age: Early Tertiary.

"*GALEA*" Maier, 1959, p.305. **Name illegitimate** — **senior homonyms**: *Galea*, Meuschen, 1787; *Galea* Cuvier, 1817; *Galea* Smith, 1817; *Galea* Meyen, 1833; *Galea* Moerch, 1852; *Galea* Kristan, 1957 (following Gerlach, 1961, p.198, who did not provide further information on the references except Kristan, 1957). **Taxonomic senior synonym**: *Chiropteridium*, by implication in Sarjeant (1983, p.108), who transferred the "type species" of *Galea*, *Galea galea*, to *Chiropteridium*. Type: Maier, 1959, pl.29, fig.4, as *Galea galea*.

"*densicomata*" Maier, 1959, p.307–308, pl.29, figs.7–8. Emendation: Sarjeant, 1983, p.111–113, as *Sentusidinium densicomatum*. Holotype: Maier, 1959, pl.29, fig.7. **NOW** *Pilosidinium*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Impletosphaeridium*?, fifthly *Sentusidinium*, sixthly (and now) *Pilosidinium*. Following I.C.N. Article 55.1, the species name *Galea densicomata* is validly published even though the generic name *Galea* is illegitimate. Age: middle Oligocene–middle Miocene.

"**galea*" Maier, 1959, p.306, pl.29, fig.4; text-fig.2. Emendation: Sarjeant, 1983, p.110, as *Chiropteridium galea*. Holotype: Maier, 1959, pl.29, fig.4; Eisenack and Kjellström, 1975b, p.88a; Fensome et al., 1995, fig.1 — p.1495. **NOW** *Chiropteridium*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*, fourthly *Areoligera*?, fifthly (and now) *Chiropteridium*. Taxonomic junior synonyms: *Chiropteridium dispersum*, *Galea mespilanum* and *Galea levis*, all according to Sarjeant (1983, p.108–109); *Membranophoridium multispinatum*, according to Brosius (1963, p.48); *Membranophoridium* (al. *Chiropteridium*) *partispinatum*, by implication in Matsuoka and Bujak (1988, p.40), who considered *Chiropteridium mespilanum* to be the correct name. Following I.C.N. Article 55.1, the species name *Galea galea* is validly published even though the generic name *Galea* is illegitimate. N.I.A. Age: Oligocene.

"*korykos*" Maier, 1959, p.310–311, pl.30, figs.7–8. Holotype: Maier, 1959, pl.30, fig.7. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Chiropteridium*?, fourthly *Hytrichosphaeridium*?. **Taxonomic senior synonym**: *Xanthidium* (as *Spiniferites*) *ramosum*, according to Sarjeant (1983, p.91–92). Following I.C.N. Article 55.1, the species name *Galea korykos* is validly published even though the generic name *Galea* is illegitimate. N.I.A. Age: middle Miocene.

"*levis*" Maier, 1959, p.308, pl.30, figs.1–2. Holotype: Maier, 1959, pl.30, fig.1; Sarjeant, 1983, pl.2, fig.3; pl.5, fig.1; text-fig.2. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*. **Taxonomic senior synonym**: *Galea* (as *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). Following I.C.N. Article 55.1, the species name *Galea levis* is validly published even though the generic name *Galea* is illegitimate. Age: late Oligocene–middle Miocene.

"*lychnea*" Maier, 1959, p.310, pl.30, fig.6. Holotype: Maier, 1959, pl.30, fig.6. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*. **Taxonomic senior synonym**: *Hytrichosphaeridium* (as *Achomosphaera*) *alcicornu*, according to Sarjeant (1983, p.100–101). Following I.C.N. Article 55.1, the species name *Galea lychnea* is validly published even though the generic name *Galea* is illegitimate. Age: Miocene.

"*mespilana*" Maier, 1959, p.306–307, pl.29, figs.5–6. Holotype: Maier, 1959, pl.29, fig.5. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Chiropteridium*, fourthly *Hytrichosphaeridium*. **Taxonomic senior synonym**: *Galea* (as *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). Following I.C.N. Article 55.1, the species name *Galea mespilana* is validly published even though the generic name *Galea* is illegitimate. Age: middle Oligocene–middle Miocene.

"*twistringiensis*" Maier, 1959, p.308–309, pl.30, figs.3–4. Holotype: Maier, 1959, pl.30, fig.3; Sarjeant, 1983, pl.5, fig.3. **NOW** *Spiniferites*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*, fourthly (and now) *Spiniferites*. Taxonomic junior synonyms: *Hytrichosphaera ramosa* var. *multibrevis* (now *Spiniferites multibrevis*), according to Sarjeant (1983, p.94–95), who correctly believed the epithet

"*multibrevis*" to be senior at the rank of variety; *Achomosphaera* (as *Spiniferites*) *cambra*, by implication in Jain (1982, p.51), who considered this species to be a taxonomic junior synonym of *Hystrichosphaera ramosa* var. *multibrevis* (as *Spiniferites ramosus* subsp. *multibrevis*). Following I.C.N. Article 55.1, the species name *Galea twistringiensis* is validly published even though the generic name *Galea* is illegitimate. According to Fensome et al. (1990, p.639) "Lentin and Williams (1985, p.140,333) and Lentin and Williams (1989, p.347) brought together the synonymies proposed by Jain (1982) and Sarjeant (1983), but also accepted the elevation of the variety (and later subspecies) '*multibrevis*' to specific rank as *Spiniferites multibrevis*. Lentin and Williams (1985, 1989) considered the epithet '*multibrevis*' to be senior. Since the latter epithet was not raised to specific rank until Below (1982c, p.35) did so, the epithets '*twistringiensis*' (validly published in 1964) and '*cambrus*' (erected in 1970) are both senior to '*multibrevis*' at specific rank. Thus, following the synonymies cited above and considering this taxon at specific rank, the correct name is *Spiniferites twistringiensis*.... The specific epithet has commonly been misspelled '*twistringense*'." Age: late Oligocene–middle Miocene.

"*xiphea*" Maier, 1959, p.309, pl.30, fig.5. Holotype: Maier, 1959, pl.30, fig.5. Originally *Galea* (generic name illegitimate), subsequently *Hystrichosphaeridium*, thirdly *Hystrichokolpoma*?. **Taxonomic senior synonym:** *Hystrichokolpoma rigaudiae*, according to Sarjeant (1983, p.104). Following I.C.N. Article 55.1, the species name *Galea xiphea* is validly published even though the generic name *Galea* is illegitimate. Age: middle Miocene.

GALEACYSTA Corradini and Biffi, 1988, p.225. Type: Corradini and Biffi, 1988, pl.1, figs.4–5, as *Galeacysta etrusca*.

**etrusca* Corradini and Biffi, 1988, p.225–226, pl.1, figs.1–12; pl.2, figs.1–7. Holotype: Corradini and Biffi, 1988, pl.1, figs.4–5; Fensome et al., 1993a, figs.1–2 — p.1151. Age: late Miocene (Messinian).

GARDODINIUM Alberti, 1961, p.18. Emendation: Harding, 1996, p.358. Taxonomic senior synonym: *Chlamydophorella*, by implication in Davey (1978, p.893), who transferred the "type species" of *Gardodinium*, *Gardodinium trabeculosum*, to *Chlamydophorella* — however, Lentin and Williams (1981, p.108; 1989, p.143) retained *Gardodinium*. Type: Alberti, 1961, pl.3, fig.11, as *Gardodinium eisenackii*.

"*albertii*" Neale and Sarjeant, 1962, p.445–446, pl.19, fig.8; text-figs.4a–b (not fig.6). Holotype: Neale and Sarjeant, 1962, pl.19, fig.8; text-figs.4a–b. Originally (and now) *Gardodinium*, subsequently *Chlamydophorella*. **Taxonomic senior synonym:** *Scriniodinium* (as and now *Gardodinium*) *trabeculosum*, according to Harding (1996, p.359). Lentin and Williams (1989, p.143) retained this species in *Gardodinium*. Age: Hauterivian.

angustum Riding, Helby and Stevens in Riding and Helby, 2001g, p.204,206, figs.12A–P,13A–P. Holotype: Riding and Helby, 2001g, figs.12E–H. Age: Tithonian–earliest Berriasian.

attenuatum Stover and Helby, 1987a, p.107–109, figs.5A–J,6B. Holotype: Stover and Helby, 1987a, figs.5A–C; Helby et al., 1987, figs.27F–G; Fensome et al., 1996, figs.1–3 — p.2051. Age: Valanginian.

"*deflandrei*" Clarke and Verdier, 1967, p.26–28, pl.3, figs.10–12; text-fig.10. Emendation: Lucas-Clark, 1987, p.172–173, as *Apteodinium deflandrei*. Holotype: Clarke and Verdier, 1967, pl.3, fig.10; Jan du Chêne et al., 1986a, pl.8, figs.10–11. **NOW** *Apteodinium*. Originally *Gardodinium*, subsequently *Aldorfia*, thirdly (and now) *Apteodinium*. Age: Cenomanian–Santonian.

"**eisenackii*" Alberti, 1961, p.18, pl.3, figs.8–13. Holotype: Alberti, 1961, pl.3, fig.11. **Taxonomic senior synonym:** *Scriniodinium* (as and now *Gardodinium*) *trabeculosum*, according to Davey (1974, p.51). Taxonomic junior synonym: *Gardodinium elongatum*, according to Brideaux and McIntyre (1975, p.33). The nomenclatural type of the genus *Gardodinium* remains the holotype of *Gardodinium eisenackii*. Age: Hauterivian–Aptian.

"*elongatum*" Singh, 1971, p.381–383, pl.68, figs.3–4. Holotype: Singh, 1971, pl.68, fig.3. **Taxonomic senior synonym:** *Gardodinium trabeculosum*, by implication in Brideaux and McIntyre (1975, p.33), who considered *Gardodinium elongatum* to be a taxonomic junior synonym of *Gardodinium eisenackii*, which is now a taxonomic junior synonym of *Gardodinium trabeculosum*. Age: middle Albian.

lowii Backhouse, 1987, p.215–216, figs.10G–J. Holotype: Backhouse, 1987, fig.10G; Fensome et al., 1996, fig.1 — p.2209. Age: middle Hauterivian.

ordinale Davey, 1974, p.51, pl.3, figs.5–6. Holotype: Davey, 1974, pl.3, fig.6. Originally (and now) *Gardodinium*, subsequently *Chlamydothorella*. Lentin and Williams (1989, p.143) retained this species in *Gardodinium*. Age: middle-late Barremian.

"pyriforme" Vozzhennikova, 1967, p.179, pl.100, figs.1,4. Holotype: Vozzhennikova, 1967, pl.100, fig.4; Lentin and Vozzhennikova, 1990, text-fig.57; lost according to Lentin and Vozzhennikova (1990, p.101). Neotype: Lentin and Vozzhennikova, 1990, pl.12, figs.8–10, designated by Lentin and Vozzhennikova (1990, p.101). Originally *Gardodinium*, subsequently *Chlamydothorella*. **Taxonomic senior synonym:** *Scriniodinium* (as and now *Gardodinium*) *trabeculosum*, according to Harding (1996, p.359). Lentin and Williams (1989, p.143) retained this species in *Gardodinium*. Lentin and Vozzhennikova (1990, p.102) provided an "expanded description" for this species. Age: Barremian.

+trabeculosum (Gocht, 1959, p.62, pl.4, fig.5) Alberti, 1961, p.18. Emendation: Harding, 1996, p.359,361,363, as *Gardodinium trabeculosum*. Holotype: Gocht, 1959, pl.4, fig.5; Harding, 1996, pl.3, figs.1,6–7. Originally *Scriniodinium*, subsequently (and now) *Gardodinium*, thirdly *Chlamydothorella*. Lentin and Williams (1989, p.143) retained this species in *Gardodinium*. Taxonomic junior synonyms: *Gardodinium eisenackii*, according to Davey (1974, p.51); *Gardodinium albertii* and *Gardodinium pyriforme*, both according to Harding (1996, p.359); *Gardodinium elongatum*, by implication in Brideaux and McIntyre (1975, p.33), who considered *Gardodinium elongatum* to be a taxonomic junior synonym of *Gardodinium eisenackii*. The nomenclatural type of the genus *Gardodinium* remains the holotype of *Gardodinium eisenackii*. Age: Hauterivian.

GEISELODINIUM Krutzsch, 1962, p.42. Taxonomic junior synonyms: *Cubiculosphaera*, according to Stover and Evitt (1978, p.230–231); *Sanshuia*, according to Chen et al. (1988, p.27) — however, Mao Shaozhi et al. (1995, p.50) retained *Sanshuia*. Type: Krutzsch, 1962, pl.11, figs.8–13, as *Geiselodinium geiseltalense*.

apicidentatum (Jiabo, 1978, p.81, pl.2, fig.11) Song Zhichen and He Chengquan, 1982, p.735. Holotype: Jiabo, 1978, pl.2, fig.11. Originally *Deflandrea?*, subsequently (and now) *Geiselodinium*. Age: Early Tertiary.

cenomanicum Lebedeva in Ilyina et al., 1994, p.55,60, pl.9, figs.1–7; text-fig.7. Holotype: Ilyina et al., 1994, pl.9, fig.1. Age: late Cenomanian.

"dalongshanense" (Yu Jingxian et al., 1981, p.259, pl.1, figs.7–10,15–16) Chen et al., 1988, p.27. Holotype: Yu Jingxian et al., 1981, pl.1, fig.7. **NOW** *Morkallacysta*. Originally *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*, fourthly (and now) *Morkallacysta*. Age: Late Cretaceous.

eocenicum Krutzsch, 1962, p.44, pl.11, figs.17–19; text-fig.1d. Holotype: Krutzsch, 1962, pl.11, figs.17–19. Age: middle Eocene.

"fibrirugulare" (Yu Jingxian et al., 1981, p.260, pl.1, figs.11–12) Chen et al., 1988, p.27. Holotype: Yu Jingxian et al., 1981, pl.1, fig.11. **NOW** *Saeptodinium*. Originally *Sanshuia*, subsequently *Geiselodinium*, thirdly (and now) *Saeptodinium*. Age: Late Cretaceous.

***geiseltalense** Krutzsch, 1962, p.43, pl.11, figs.8–13; text-fig.1b. Holotype: Krutzsch, 1962, pl.11, figs.8–13. Age: middle Eocene.

hallense Krutzsch, 1962, p.44, pl.11, figs.14–16; text-fig.1c. Holotype: Krutzsch, 1962, pl.11, figs.14–16. Age: middle Eocene.

"inaffectum" Drugg, 1978, p.68, pl.3, figs.10–12. Holotype: Drugg, 1978, pl.3, fig.10. **NOW** *Corculodinium*. Originally *Geiselodinium*, subsequently *Subtilisphaera*, thirdly *Subtilisphaera?*, fourthly (and now) *Corculodinium*.

Taxonomic junior synonym: *Geiselodinium paeminosum*, according to Courtinat (2000, p.173). Age: early Kimmeridgian.

maslinense (Harris, 1974, p.164, pl.2, fig.10) Stover and Evitt, 1978, p.231. Holotype: Harris, 1974, pl.2, fig.10. Originally *Cubiculosphaera*, subsequently (and now) *Geiselodinium*. Age: middle Eocene.

"micropodum" (Yu Jingxian et al., 1981, p.259–260, pl.1, figs.3–4) Chen et al., 1988, p.28. Emendation: Mao Shaozhi et al., 1995, p.50–51, as *Sanshuia micropoda*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.3. **NOW** *Sanshuia*. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Age: Late Cretaceous.

"minus" (Yu Jingxian et al., 1981, p.260, pl.1, figs.13–14) Chen et al., 1988, p.28. Emendation: Mao Shaozhi et al., 1995, p.50, as *Sanshuia minor*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.13. **NOW** *Sanshuia*. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Age: Late Cretaceous.

"minutum" (Jiabo, 1978, p.83, pl.3, figs.10–11) Chen et al., 1988, p.28. Holotype: Jiabo, 1978, pl.3, fig.11. **NOW** *Saeptodinium*. Originally *Deflandrea*, subsequently *Sanshuia*, thirdly *Geiselodinium*, fourthly (and now) *Saeptodinium*. Age: Early Tertiary.

?miocenicum Nagy, 1965, p.201, pl.1, fig.3; pl.2, fig.11. Holotype: Nagy, 1965, pl.1, fig.3; pl.2, fig.11. Questionable assignment: Stover and Evitt (1978, p.231). Age: middle Miocene.

"ovatum" (Jiabo, 1978, p.84, pl.4, figs.1–3) Chen et al., 1988, p.28. Emendation: Mao Shaozhi et al., 1995, p.51, as *Sanshuia ovata*. Holotype: Jiabo, 1978, pl.4, fig.2. **NOW** *Sanshuia*. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Sanshuia*, fourthly *Geiselodinium*, fifthly *Saeptodinium*. Age: Early Tertiary.

"paeminosum" Drugg, 1978, p.68–69, pl.3, figs.5–9. Holotype: Drugg, 1978, pl.3, fig.8. Originally *Geiselodinium*, subsequently *Subtilisphaera*, thirdly *Subtilisphaera?*. **Taxonomic senior synonym:** *Geiselodinium* (now *Corculodinium*) *inaffectum*, according to Courtinat (2000, p.173). Age: middle Kimmeridgian.

?psilatum Jain and Millepied, 1973, p.29–30, pl.2, figs.20–21. Holotype: Jain and Millepied, 1973, pl.2, fig.21. Originally *Geiselodinium*, subsequently (and now) *Geiselodinium?*. Questionable assignment: Stover and Evitt (1978, p.231) as a problematic species. Age: Campanian–Maastrichtian.

qingongense He Chengquan in Zheng Yahui and He Chengquan, 1984, p.91, pl.6, figs.7–9. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.7. Age: Late Cretaceous.

"sphaericum" (Yu Jingxian et al., 1981, p.259, pl.1, figs.1–2,6) Chen et al., 1988, p.28. Emendation: Mao Shaozhi et al., 1995, p.52, as *Sanshuia sphaerica*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.1. **NOW** *Sanshuia*. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Age: Late Cretaceous.

tenerum (Krutzsch, 1962, p.44, pl.11, figs.20–22; text-fig.1e) Stover and Evitt, 1978, p.231. Holotype: Krutzsch, 1962, pl.11, figs.20–22. Originally *Deflandrea?*, subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Geiselodinium*. Age: middle Eocene.

tyonekense Engelhardt, 1976, p.122, pl.1, figs.1–14. Holotype: Engelhardt, 1976, pl.1, fig.14. Age: Miocene.

GELATIA Bujak, 1984, p.185. Type: Bujak, 1984, pl.1, fig.16, as *Gelatia inflata*.

***inflata** Bujak, 1984, p.185–186, pl.1, figs.13–20; text-figs.2A–B. Holotype: Bujak, 1984, pl.1, fig.16; Fensome et al., 1995, fig.2 — p.1563. Age: late Eocene–late Oligocene.

GEONETTIA de Verteuil and Norris, 1996b, p.265–267. The name *Geonettia* was not validly published in de Verteuil and Norris (1996a, p.171) since these authors did not give a description. Type: de Verteuil and Norris, 1996b, pl.1, figs.1A–B,2A–B, as *Geonettia clineae*.

**clineae* de Verteuil and Norris, 1996b, p.267–268, pl.1, figs.1A–B,2A–B,3–4; pl.2, figs.1A–B,2A–B,3A–B,4A–B; pl.3, figs.1A–B,2A–B,3A–B,4A–B; pl.4, figs.1A–B,2A–B,3A–B,4A–B; pl.5, figs.1–12; pl.6, figs.1–12; text-fig.2 (not 1). Holotype: de Verteuil and Norris, 1996b, pl.1, figs.1A–B,2A–B. The name *Geonettia clineae* was not validly published in de Verteuil and Norris (1996a, p.171) since these authors did not give a description or provide any illustrations. Age: late Miocene.

waltonensis Head, 2000, p.819,821–825, fig.2; fig.3 (part), fig.4 (part), fig.6, nos.1–2; fig.7, nos.1–4; fig.8, nos.1–4; fig.9,nos.1–8; fig.10, nos.1–2. Holotype: Head, 2000, fig.6, nos.1–2; fig.7, nos.1–3. Age: late late Pliocene.

GERDIOCYSTA Liengjarearn et al., 1980, p.482. Type: Liengjarearn et al., 1980, pl.53, fig.2, as *Gerdiocysta conopeum*.

aciculata Châteauneuf, 1980, p.139, pl.24, figs.2,5. Holotype: Châteauneuf, 1980, pl.24, fig.5. Age: middle Eocene–Oligocene (Lutetian–Stampian).

cassiculus (Drugg, 1970b, p.811, figs.2B,3A–B) Liengjarearn et al., 1980, p.483. Holotype: Drugg, 1970b, fig.3A. Originally *Areoligera*, subsequently (and now) *Gerdiocysta*. N.I.A. Age: early Eocene.

**conopeum* Liengjarearn et al., 1980, p.483, pl.53, figs.1–2. Holotype: Liengjarearn et al., 1980, pl.53, fig.2; Fensome et al., 1993a, fig.2 — p.1073. N.I.A. Age: early Oligocene.

GERLACHIDIUM Benedek and Sarjeant, 1981, p.338,340. Type: Benedek, 1972, pl.5, fig.7; text-fig.17, as *Lejeunia aechmophora*.

**aechmophorum* (Benedek, 1972, p.41, pl.5, figs.7,11; text-fig.17) Benedek and Sarjeant, 1981, p.340. Emendation: Benedek and Sarjeant, 1981, p.340–341, as *Gerlachidium aechmophorum*. Holotype: Benedek, 1972, pl.5, fig.7; text-fig.17; Benedek and Sarjeant, 1981, figs.7,9, nos.1–2; Fensome et al., 1993a, figs.1–2 — p.887. Originally *Lejeunia* (generic name illegitimate), subsequently *Wilsonidium?*, thirdly *Lejeunecysta*, fourthly (and now) *Gerlachidium*. Lentin and Williams (1985, p.143) retained this species in *Gerlachidium*. Age: middle-late Oligocene.

"**GEULHEMMEBERGIA**" Willems, 1996, p.228. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1300). **Name not validly published:** no description.

"*turboformis*" Willems, 1996, p.228, pl.2, fig.12. Holotype: not designated. **Name not validly published:** no description. Age: Danian.

GILLINIA Cookson and Eisenack, 1960a, p.11–12. Type: Cookson and Eisenack, 1960a, pl.3, fig.4, as *Gillinia hymenophora*.

denticulata Slimani and Louwye, 2011, p.44,46,48, pl.2, figs.6–11. Holotype: Slimani and Louwye, 2011, pl.2, figs.6–8. Age: Campanian–Maastrichtian.

**hymenophora* Cookson and Eisenack, 1960a, p.12, pl.3, figs.4–6; text-fig.5. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.4. Age: ?Turonian–Maastrichtian.

pyriformis Marshall, 1990a, p.14,16, figs.7A–H,17D–O. Holotype: Marshall, 1990a, figs.7G,17F–H; Fensome et al., 1996, figs.1–3,14 — p.2311. Age: Campanian.

GINGINODINIUM Cookson and Eisenack, 1960a, p.7. Emendation: Lentin and Williams, 1976, p.95–96. Type: Cookson and Eisenack, 1960a, pl.2, fig.9, as *Ginginodinium spinulosum*.

?*claustrum* Islam, 1983b, p.339, pl.2, figs.12–14; text-fig.6. Holotype: Islam, 1983b, pl.2, figs.12–13; text-fig.6. Questionable assignment: Islam (1983b, p.339). Age: early Eocene.

"*evittii*" Singh, 1983, p.135–136, pl.46, figs.7–10. Holotype: Singh, 1983, pl.46, fig.7. **NOW** *Trithyrodinium singhii*. Originally *Ginginodinium evittii*, subsequently (and now) *Trithyrodinium singhii*. Age: early Cenomanian.

ornatum (Felix and Burbridge, 1973, p.23–24, pl.4, fig.12) Lentin and Williams, 1976, p.97. Holotype: Felix and Burbridge, 1973, pl.4, fig.12. Originally *Trithyrodinium*, subsequently (and now) *Ginginodinium*. Age: Maastrichtian.

paleocenicum (Cookson and Eisenack, 1965c, p.142–143, pl.19, figs.1–4; text-figs.2a–b) Stover and Evitt, 1978, p.106. Holotype: Cookson and Eisenack, 1965c, pl.19, figs.2–3. Originally *Peridinium* (Appendix B), subsequently *Cooksoniella?*, thirdly *Palaeoperidinium*, fourthly (and now) *Ginginodinium*. Age: middle Paleocene.

**spinulosum* Cookson and Eisenack, 1960a, p.7, pl.2, fig.9. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.9. Age: late Albian–Cenomanian.

tabulatum Cookson and Eisenack, 1965c, p.143–144, pl.19, figs.5–8; text-fig.3. Holotype: Cookson and Eisenack, 1965c, pl.19, figs.6–7. Originally (and now) *Ginginodinium*, subsequently *Palaeoperidinium*. Stover and Evitt (1978, p.218) retained this species in *Ginginodinium*. Age: middle Paleocene.

GIPPSLANDIA Stover and Williams, 1987, p.107–108. Emendation: Sluijs et al., 2009, p.50. Nomenclatural junior synonym: *Neogippslandia*, which has the same type. Özdikmen (2009, p.235) considered *Gippslandia* Stover and Williams, 1987 to be illegitimate because it is a junior homonym of *Gippslandia* Bayly and Arnott 1969; however, *Gippslandia* Bayly and Arnott is an animal and under the I.C.N. it does not pre-empt *Gippslandia* Stover and Williams. Type: Stover, 1974, pl.5, figs.4a–c, as *Deflandrea extensa*.

**extensa* (Stover, 1974, p.178–179, pl.5, figs.4a–c, 5a–d, 6) Stover and Williams, 1987, p.107. Holotype: Stover, 1974, pl.5, figs.4a–c; Fensome et al., 1993a, figs.1–3 — p.1167. Originally *Deflandrea*, subsequently *Vozzhennikovia?*, thirdly *Dioxya?*, fourthly *Lentinia*, fifthly (and now) *Gippslandia*, sixthly *Neogippslandia* (generic name illegitimate). Age: middle-late Eocene.

"**GLABRIDINIUM**" Brideaux, 1977, p.35. **Taxonomic senior synonym:** *Tubotuberella*, according to Sarjeant (1982b, p.41). Type: Cookson and Eisenack, 1960b, pl.37, fig.12, as *Scriniodinium apatelum*.

apatelum*" (Cookson and Eisenack, 1960b, p.249, pl.37, figs.12–13) Brideaux, 1977, p.35. Emendation: Sarjeant, 1982b, p.42, as *Tubotuberella apatela*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.12; Jan du Chêne et al., 1986a, pl.124, figs.1–2; Fensome et al., 1993a, fig.1 — p.921. **NOW *Tubotuberella*. Originally *Scriniodinium*, subsequently *Psaligonyaulax*, thirdly (and now) *Tubotuberella*, fourthly *Glabridinium*. Age: Late Jurassic.

GLAPHYROCYSTA Stover and Evitt, 1978, p.49–50. Emendation: Fensome et al., 2009, p.32. Type: Cookson, 1965a, pl.11, fig.4, as *Cyclonephelium retiintextum*.

?*assamica* (Jain et al., 1975, p.11, pl.5, figs.61–62; pl.6, fig.73) Jain, 1982, p.52. Holotype: Jain et al., 1975, pl.5, fig.61; Fauconnier and Masure, 2004, pl.30, figs.1–2. Originally *Cyclonephelium*, subsequently *Cyclonephelium?*, thirdly *Glaphyrocysta*, fourthly (and now) *Glaphyrocysta?* Questionable assignment: Michoux and Soncini in Fauconnier and Masure (2004, p.249–250) as a problematic species. Age: Danian.

castelcasiensis (Corradini, 1973, p.161, pl.24, figs.2,5a–b; pl.35, figs.1–2) Michoux and Soncini in Fauconnier and Masure, 2004, p.245. Holotype: Corradini, 1973, pl.24, fig.2; Fauconnier and Masure, 2004, pl.30, figs.3–7. Originally *Cyclonephelium*, subsequently *Cyclonephelium?*, thirdly (and now) *Glaphyrocysta*. Age: Late Cretaceous–Paleocene.

subsp. *castelcasiensis*. Autonym. Holotype: Corradini, 1973, pl.24, fig.2; Fauconnier and Masure, 2004, pl.30, figs.3–7. Originally *Cyclonephelium?* *castelcasiense* subsp. *castelcasiense*, subsequently (and now) *Glaphyrocysta castelcasiensis* subsp. *castelcasiensis*.

subsp. *prominenta* (Marheinecke, 1992, p.73–74, pl.15, figs.1–4) Michoux and Soncini in Fauconnier and Masure, 2004, p.245. Holotype: Marheinecke, 1992, pl.15, figs.1–4; Fauconnier and Masure, 2004, pl.30, figs.8–10. Originally *Cyclonephelium?* *castelcasiense* subsp. *prominentum*, subsequently (and now) *Glaphyrocysta castelcasiensis* subsp. *prominenta*. Age: late Maastrichtian.

circularis Matsuoka, 1984a, p.378, pl.71, figs.2a–b,3,4a–b,5. Holotype: Matsuoka, 1984a, pl.71, fig.2a–b; Fauconnier and Masure, 2004, pl.32, fig.2. Age: middle Eocene.

"*combinata*" He Chengquan and Li Peng, 1981, p.63, pl.33, figs.5–6. Holotype: He Chengquan and Li Peng, 1981, pl.33, fig.6. **Name illegitimate** — **senior homonym**: *Glaphyrocysta combinata* (Jiabo, 1978) Lentin and Williams, 1981. **Substitute name**: *Glaphyrocysta heliana*. Originally *Glaphyrocysta combinata* (name illegitimate), subsequently (and now) *Glaphyrocysta heliana*. Age: late Oligocene.

combinata (Jiabo, 1978, p.78, pl.27, fig.3) Lentin and Williams, 1981, p.110. Holotype: Jiabo, 1978, pl.27, fig.3; Fauconnier and Masure, 2004, pl.32, fig.5. Junior homonym: *Glaphyrocysta combinata* He Chengquan and Li Peng, 1981. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: Early Tertiary.

delicata Wilson, 1988, p.20, pl.9, figs.5,6a–b. Holotype: Wilson, 1988, pl.9, figs.6a–b; Fensome et al., 1996, figs.2–3 — p.2101. Age: early Eocene.

dentata Matsuoka, 1984a, p.378–379, pl.71, figs.1a–c. Holotype: Matsuoka, 1984a, pl.71, figs.1a–c; Fauconnier and Masure, 2004, pl.32, fig.1. Age: middle Eocene.

divaricata (Williams and Downie, 1966c, p.223–224, pl.25, fig.1; text-fig.60) Stover and Evitt, 1978, p.50. Holotype: Williams and Downie, 1966c, pl.25, fig.1; text-fig.60. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: early Eocene.

espiritasantensis (Regali et al., 1974, p.290, pl.24, fig.3) Arai in Fauconnier and Masure, 2004, p.246. Holotype: Regali et al., 1974, pl.24, fig.3; irretrievably damaged according to Arai in Fauconnier and Masure (2004, p.246). Lectotype: Fauconnier and Masure, 2004, pl.31, figs.1–3, designated by Arai in Fauconnier and Masure (2004, p.246). Originally *Hystrichosphaeridium*, subsequently *Areoligera*, thirdly (and now) *Glaphyrocysta*. Age: Maastrichtian.

expansa (Corradini, 1973, p.161–162, pl.24, figs.8a–b; text-fig.7) Roncaglia and Corradini, 1997, p.187. Emendation: Roncaglia and Corradini, 1997, p.187–188, as *Glaphyrocysta expansa*. Holotype: Corradini, 1973, pl.24, figs.8a–b; Fauconnier and Masure, 2004, pl.32, figs.3–4. Originally *Cyclonephelium*, subsequently *Cyclonephelium?*, thirdly (and now) *Glaphyrocysta*. Age: Late Cretaceous–Paleocene.

extensa Fensome et al., 2009, p.32, pl.4, figs.c–h. Holotype: Fensome et al., 2009, pl.4, figs.c–d. Age: youngest occurrence, middle Priabonian.

exuberans (Deflandre and Cookson, 1955, p.285 ex Eaton, 1976, p.255–256) Stover and Evitt, 1978, p.50. Emendation: Sarjeant, 1986, p.29–31, as *Glaphyrocysta exuberans*. Holotype: Pasiels, 1948, pl.5, figs.11,13, as *Membranilarnax pterospermoides*, designated by Eaton (1976, p.255); lost according to Sarjeant (1986, p.30). Neotype: Eaton, 1976, pl.8, fig.2, designated by Sarjeant (1986, p.30). Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. The name *Cyclonephelium exuberans* was not validly published in Deflandre and Cookson (1955, p.255) since no description was provided or a direct reference to one (as required after 1952 by

ICBN Article 32.3), and in Williams and Downie (1966c, p.225) since no holotype was designated. In originally proposing the name *Cyclonephelium exuberans*, Deflandre and Cookson (1955, p.285) included several specimens illustrated by Pastsiels (1948, pl.5, figs.11–14) but did not designate a holotype. Contrary to the indication by Eaton (1976, p.256), this was not against ICBN rules in 1955, but was when Williams and Downie (1966c) used the name *Cyclonephelium exuberans*. Hence, Eaton (1976) was first to validate the name by providing a description and designating a holotype. Age: early Eocene.

heliana Lentin and Williams, 1985, p.144. Holotype: He Chengquan and Li Peng, 1981, pl.33, fig.6. Originally *Glaphyrocysta combinata* (name illegitimate), subsequently (and now) *Glaphyrocysta heliana*. Substitute name for *Glaphyrocysta combinata* He Chengquan and Li Peng, 1981, p.63, pl.33, figs.5–6 (an illegitimate name). Age: late Oligocene.

inculta (Morgenroth, 1966b, p.9, pl.2, fig.5) Stover and Evitt, 1978, p.50. Holotype: Morgenroth, 1966b, pl.2, fig.5. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: early Oligocene.

indica Jain and Garg, 1991, p.74,76; pl.4, figs.1–3,7–8,13–16. Holotype: Jain and Garg, 1991, pl.4, figs.14–16; Fauconnier and Masure, 2004, pl.32, figs.8–9. Age: Miocene.

intricata (Eaton, 1971, p.365, pl.4, figs.8–10) Stover and Evitt, 1978, p.50. Holotype: Eaton, 1971, pl.4, fig.8; Eaton, 1976, pl.8, fig.6. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle Eocene (see Aubry, 1986).

jabliensis Lentin and Williams, 1993, p.237. Holotype: Khanna and Singh, 1981b, fig.4, no.1, as *Cyclonephelium indicum*. Originally *Cyclonephelium indicum*, subsequently (and now) *Glaphyrocysta jabliensis*. This is the substitute name for *Cyclonephelium indicum*; the name *Glaphyrocysta indica* is preoccupied. Age: middle Eocene.

kachchhensis Jain and Tandon, 1981, p.9, pl.1, figs.17–19. Holotype: Jain and Tandon, 1981, pl.1, figs.17–18; Fauconnier and Masure, 2004, pl.32, figs.10–11. Age: middle Eocene.

laciniiformis (Gerlach, 1961, p.206, pl.29, fig.4) Stover and Evitt, 1978, p.50. Holotype: Gerlach, 1961, pl.29, fig.4; Fauconnier and Masure, 2004, pl.33, fig.1. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle-late Oligocene.

longicornis He Chengquan, 1991, p.138, pl.15, figs.1–3. Holotype: He Chengquan, 1991, pl.15, fig.3. Age: Paleocene–early Eocene.

marlboroughensis Schiøler and Wilson, 1998, p.336,338, pl.5, figs.1–6. Holotype: Schiøler and Wilson, 1998, pl.5, fig.5. Age: Santonian.

microfenestrata (Bujak, 1976, p.112, pl.3, fig.12; pl.4, figs.1–7; text-fig.31) Stover and Evitt, 1978, p.50. Holotype: Bujak, 1976, pl.4, figs.4–5; Bujak et al., 1980, pl.14, fig.1; Fauconnier and Masure, 2004, pl.33, figs.2–3. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle Eocene (see Aubry, 1986).

multi perforata He Chengquan and Li Peng, 1981, p.63–64, pl.33, figs.7–9. Holotype: He Chengquan and Li Peng, 1981, pl.33, fig.7. Age: late Oligocene.

ordinata (Williams and Downie, 1966c, p.225–227, pl.25, fig.3; text-fig.62) Stover and Evitt, 1978, p.50. Holotype: Williams and Downie, 1966c, pl.25, fig.3; text-fig.62. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: early Eocene.

paradoxa He Chengquan and Li Peng, 1981, p.64, pl.33, figs.1–2. Holotype: He Chengquan and Li Peng, 1981, pl.33, fig.1. Age: late Oligocene.

pastsielsii (Deflandre and Cookson, 1955, p.285 ex de Coninck, 1965, p.44) Stover and Evitt, 1978, p.50. Emendation: Sarjeant, 1986, p.27–29, as *Glaphyrocysta pastielsii*. Holotype: Pastsiels, 1948, pl.5, fig.15, as *Membranilarnax cf. liradiscoidea*; Fauconnier and Masure, 2004, pl.33, fig.9. Originally *Cyclonephelium*,

subsequently (and now) *Glaphyrocysta*. The name *Cyclonephelium pastielsii* was not validly published in Deflandre and Cookson (1955, p.285) since these authors did not provide a description or a direct reference to one (as required after 1952 by ICBN Article 32.3). Age: early Eocene.

paupercula Liengjarearn et al., 1980, p.483–484,486, pl.53, figs.3,5. Holotype: Liengjarearn et al., 1980, pl.53, fig.3. Age: early Oligocene.

?*pectinata* He Chengquan, 1991, p.139, pl.14, figs.7–9. Holotype: He Chengquan, 1991, pl.14, fig.8. Questionable assignment: He Chengquan (1991, p.139). Age: early Eocene.

perforata Hultberg and Malmgren, 1985, p.48–49, figs.11A–D. Holotype: Hultberg and Malmgren, 1985, fig.11A. Hultberg (1985b, p.63) and Hultberg (1985c, p.126) also indicated this species to be new. Hultberg (1985b, p.63) attributed this name to an unpublished thesis by Wilson. Age: late Maastrichtian–Danian.

priabonensis Brinkhuis, 1994, p.158–159, pl.1, fig.8; pl.2, figs.1–8; text-fig.16. Holotype: Brinkhuis, 1994, pl.2, figs.1–5. This name was not validly published in Brinkhuis (1992, p.98), since that author specified it to be a manuscript name. Age: late Eocene.

radiata Levy and Harwood, 2000, p.230–231, pl.5, figs.e–h. Holotype: Levy and Harwood, 2000, pl.5, fig.e. Age: middle-late Eocene.

reticulosa (Gerlach, 1961, p.204, pl.29, fig.2) Stover and Evitt, 1978, p.50. Holotype: Gerlach, 1961, pl.29, fig.2. Originally *Cyclonephelium*, subsequently *Glaphyrocysta*?, thirdly (and now) *Glaphyrocysta*. Questionable assignment: Stover and Evitt (1978, p.50) — however, Michoux and Soncini in Fauconnier and Masure (2004, p.249) retained this species in *Glaphyrocysta* without question. Age: middle-late Oligocene.

****retiintexta*** (Cookson, 1965a, p.88, pl.11, fig.4) Stover and Evitt, 1978, p.50. Holotype: Cookson, 1965a, pl.11, fig.4; Eisenack and Kjellström, 1972, p.325; Fensome et al., 1996, fig.1 — p.2329. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: ?Senonian.

semitecta (Bujak in Bujak et al., 1980, p.46,48,50, pl.14, figs.2–9; text-fig.13) Lentin and Williams, 1981, p.111. Holotype: Bujak et al., 1980, pl.14, figs.4–6; Fauconnier and Masure, 2004, pl.33, figs.10–11. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*, thirdly *Riculacysta* (combination not validly published). Lentin and Williams (1993, p.238) retained this species in *Glaphyrocysta*. Taxonomic senior synonym: *Riculacysta perforata*, according to Köthe (1990, p.50) — however, Kirsch (1991, p.129), retained *Cyclonephelium* (as *Riculacysta*, now *Glaphyrocysta*) *semitectum*. Age: middle Eocene (see Aubry, 1986).

spineta (Eaton, 1976, p.259–260, pl.8, fig.3; text-fig.12) Stover and Evitt, 1978, p.50. Holotype: Eaton, 1976, pl.8, fig.3; text-fig.12; Bujak et al., 1980, pl.9, figs.10–11; Fauconnier and Masure, 2004, pl.34, fig.1. Originally *Cyclonephelium*, subsequently *Glaphyrocysta*?, thirdly (and now) *Glaphyrocysta*. Questionable assignment: Stover and Evitt (1978, p.50) — however, Michoux and Soncini in Fauconnier and Masure (2004, p.249) retained this species in *Glaphyrocysta* without question. Age: early-middle Eocene.

texta (Bujak, 1976, p.110, pl.3, figs.6–11; text-figs.3G–H) Stover and Evitt, 1978, p.50. Holotype: Bujak, 1976, pl.3, fig.7; Fauconnier and Masure, 2004, pl.34, figs.2–3. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*. Age: middle Eocene (see Aubry, 1986).

"?*undulata*" (Eaton, 1976, p.248, pl.4, figs.4,6; pl.5, figs.2,4; text-figs.8c,9) Stover and Evitt, 1978, p.50. Holotype: Eaton, 1976, pl.4, figs.4,6; text-fig.9; Bujak et al., 1980, pl.9, figs.7–8; Fauconnier and Masure, 2004, pl.5, figs.1–3. **NOW** *Areoligera*. Originally (and now) *Areoligera*, subsequently *Glaphyrocysta*?. Questionable assignment: Stover and Evitt (1978, p.50). Age: middle Eocene (see Aubry, 1986).

?*vicina* (Eaton, 1976, p.260–261, pl.8, figs.4–5; text-fig.13) Stover and Evitt, 1978, p.50. Holotype: Eaton, 1976, pl.8, fig.4; text-fig.13; Bujak et al., 1980, pl.9, figs.9,12; Fauconnier and Masure, 2004, pl.34, figs.11–14. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*?. Questionable assignment: Stover and Evitt (1978, p.50). Age: early-middle Eocene (see Bujak et al., 1980, p.19 and Aubry, 1986).

wilsonii Kirsch, 1991, p.92–93, pl.16, figs.2–3,5–8,10–11; pl.43, figs.10–12; text-fig.43. Holotype: Kirsch, 1991, pl.16, figs.10–11. Taxonomic junior synonym: *Cyclonephelium perforatum* (name not validly published), according to Slimani (2001a, p.192). Age: early-middle Maastrichtian.

?**xinjiangensis** He Chengquan, 1991, p.139–140, pl.15, figs.8–9; pl.60, figs.1–2; text-figs.24a–f. Holotype: He Chengquan, 1991, pl.15, figs.8–9. Originally *Glaphyrocysta*, subsequently *Glaphyrocysta*? Questionable assignment: Michoux and Soncini in Fauconnier and Masure (2004, p.250) as a problematic species. Age: late Eocene.

?**yinggehaica** He Chengquan and Li Peng, 1981, p.64, pl.32, figs.1–6; text-fig.5. Holotype: He Chengquan and Li Peng, 1981, pl.32, fig.1; text-fig.5. Originally *Glaphyrocysta*, subsequently *Glaphyrocysta*? Questionable assignment: Michoux and Soncini in Fauconnier and Masure (2004, p.250) as a problematic species. Age: late Oligocene.

"**GLAPHYROSPHAERA**" Schiøler and Wilson, 1994, p.140,142. **Taxonomic senior synonym:** *Wilsonisphaera*, according to Schiøler and Wilson (1995, p.511). The name *Glaphyrosphaera* was not validly published in Slimani (1994, p.68), who cited it in synonymy as an unpublished thesis name. Type: Schiøler and Wilson, 1994, figs.2B,6A–B, as *Glaphyrosphaera glabra*.

"***glabra**" Schiøler and Wilson, 1994, p.142–144, figs.2A–J,3A–D,4A–B,5,6A–B. Holotype: Schiøler and Wilson, 1994, figs.2B,6A–B. **Taxonomic senior synonym:** *Thalassiphora* (as and now *Wilsonisphaera*) *petila*, according to Schiøler and Wilson (1995, p.511). The name *Glaphyrosphaera glabra* was not validly published in Slimani (1994, p.68), who cited it in synonymy as an unpublished thesis name. Age: Maastrichtian.

"**GLOMODINIUM**" Dodekova, 1975, p.26. **Taxonomic senior synonym:** *Evansia*, according to Jansonius (1986, p.208) and Lentin and Williams (1993, p.214). Taxonomic senior synonym: *Pareodinia*, according to Stover and Evitt (1978, p.116–117) — however, Dörhöfer and Davies (1980, p.12) retained *Glomodinium*. Type: Dodekova, 1975, pl.5, figs.1–2, as *Glomodinium reticulopilosum*.

"**alaskense**" (Wiggins, 1975, p.104, pl.2, figs.7–8) Below, 1990, p.65. Holotype: Wiggins, 1975, pl.2, fig.7. **Combination not validly published:** basionym not fully referenced and combination not intended. **NOW** *Evansia*. Originally *Pareodinia*, subsequently *Glomodinium* (combination not validly published), thirdly (and now) *Evansia*. Taxonomic junior synonyms: *Pareodinia minuta* and *Pareodinia robusta*, both according to Below (1990, p.72). Age: ?Callovian–mid Kimmeridgian.

"**cerebraloides**" Århus et al., 1989, p.45, figs.4a–d. Holotype: Århus et al., 1989, fig.4a. **NOW** *Evansia*. Originally *Glomodinium*, subsequently (and now) *Evansia*. Age: late Mid–early late Callovian.

"**evittii**" (Pocock, 1972, p.94–95, pl.24, figs.6,8; text-fig.11) Davies, 1983, p.17. Holotype: Pocock, 1972, pl.24, fig.8, lost according to Jansonius (1986, p.208). Lectotype: Jansonius, 1986, pl.6, figs.8–9, designated by Jansonius (1986, p.208). **NOW** *Evansia*. Originally *Tenua* Eisenack, subsequently *Pareodinia*, thirdly *Glomodinium*, fourthly (and now) *Evansia*. Taxonomic junior synonym (at specific rank): *Pareodinia tripartita* (including *Pareodinia tripartita* var. *rotunda*), according to Wiggins (1975, p.105) and Below (1990, p.73). This combination was not validly published by Dodekova (1975, p.27), since that author did not fully reference the basionym. Age: late Bajocian–Callovian.

"**granulatum**" (Pocock, 1972, p.95, pl.24, fig.7; text-fig.12) Århus et al., 1989, p.45. Holotype: Pocock, 1972, pl.24, fig.7; Jansonius, 1986, pl.5, figs.1–3; text-figs.10a–b. **NOW** *Evansia*. Originally (and now) *Evansia*, subsequently *Glomodinium*. Age: late Bajocian.

"**opeasatos**" Davies, 1983, p.17, pl.3, figs.13–16; text-fig.10. Holotype: Davies, 1983, pl.3, fig.13; text-fig.10. **NOW** *Evansia*. Originally *Glomodinium*, subsequently (and now) *Evansia*. N.I.A. Age: late Bathonian–Oxfordian.

"**reticulopilosum*" Dodekova, 1975, p.26–27, pl.5, figs.1–6. Holotype: Dodekova, 1975, pl.5, figs.1–2. **NOW** *Evansia*. Originally *Glomodinium*, subsequently *Pareodinia*, thirdly (and now) *Evansia*. Age: late Bathonian.

"*tripartitum*" (Johnson and Hills, 1973, p.208, pl.2, figs.12–14,17–18; pl.3, figs.1–2; text-figs.11A–C) Davies, 1983, p.17. Holotype: Johnson and Hills, 1973, pl.2, fig.18. Originally *Pareodinia*, subsequently *Glomodinium*, thirdly *Evansia*. **Taxonomic senior synonym:** *Tenua* (now *Evansia*) *evittii*, according to Wiggins (1975, p.105). Age: late Bathonian.

"*zabrum*" Davies, 1983, p.18, pl.3, figs.2–12; text-figs.11A–C. Holotype: Davies, 1983, pl.3, fig.12; text-figs.11A–C. **NOW** *Evansia*. Originally *Glomodinium*, subsequently (and now) *Evansia*. Age: Bathonian–Oxfordian.

GLOSSODINIUM Ioannides et al., 1977, p.452–453. Emendation: Courtinat in Courtinat and Gaillard, 1980, p.30. Taxonomic senior synonym: *Dinopterygium*, by implication in Drugg (1978, p.67), who transferred the "type species" of *Glossodinium*, *Glossodinium dimorphum*, to *Dinopterygium* — however, Courtinat in Courtinat and Gaillard (1980, p.30) and Poulsen (1992b, p.45) retained *Glossodinium*. Type: Ioannides et al., 1977, pl.2, fig.13, as *Glossodinium dimorphum*.

"*bicuneatum*" (Deflandre, 1939a, p.180, pl.8, fig.7 ex Sarjeant, 1967b, p.248) Ioannides et al., 1977. Holotype: Deflandre, 1939a, pl.8, fig.7. **NOW** *Cornudinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Scrinioidinium*, thirdly *Glossodinium*, fourthly *Dinopterygium*, fifthly (and now) *Cornudinium*. Age: Oxfordian.

**dimorphum* Ioannides et al., 1977, p.453, pl.2, figs.13–14; text-fig.8. Holotype: Ioannides et al., 1977, pl.2, fig.13. Originally (and now) *Glossodinium*, subsequently *Dinopterygium*. Courtinat in Courtinat and Gaillard (1980, p.30) and Poulsen (1992b, p.45) retained this species in *Glossodinium*. Age: Kimmeridgian.

shihebeiense Yu Jingxian, 1982, p.246, pl.3, figs.1,5–7. Holotype: Yu Jingxian, 1982, pl.3, fig.6. Age: Late Jurassic–Early Cretaceous.

GLYPHANODINIUM Drugg, 1964, p.237–238. Type: Drugg, 1964, figs.1–2, as *Glyphanodinium facetum*.

**facetum* Drugg, 1964, p.238–239, figs.1–6. Holotype: Drugg, 1964, figs.1–2. Age: Danian.

GOCHTEODINIA Norris, 1978, p.7. Emendation: Below, 1990, p.47. Type: Vozzhennikova, 1967, pl.12, figs.3a–b; pl.15, fig.1, as *Imbatodinium villosum*.

antennata (Gitmez and Sarjeant, 1972, p.232–233, pl.11, figs.2–3) Below, 1990, p.48. Holotype: Gitmez and Sarjeant, 1972, pl.11, fig.3. Originally *Imbatodinium*, subsequently *Pareodinia*, thirdly (and now) *Gochteodinia*. Age: early–late Kimmeridgian.

"*imbatodinensis*" (Vozzhennikova, 1967, p.55, pl.12, figs.4a–c) Below, 1990, p.48. Emendation: Lentin and Vozzhennikova, 1990, p.91–92, as *Protobatioladinium imbatodinense*. Holotype: Vozzhennikova, 1967, pl.12, fig.4a; Lentin and Vozzhennikova, 1990, pl.11, figs.9–11; text-fig.50. **NOW** *Protobatioladinium*. Originally *Imbatodinium*, subsequently *Necrobroomea?*, thirdly *Pareodinia*, fourthly *Pareodinia?*, fifthly *Batioladinium*, sixthly (and now) *Protobatioladinium*, seventhly *Gochteodinia*. Age: Late Jurassic.

judilentiniae McIntyre and Brideaux, 1980, p.23–24, pl.11, figs.4–9. Holotype: McIntyre and Brideaux, 1980, pl.11, figs.4–5,7–8. Age: Valanginian.

mutabilis (Riley in Fisher and Riley, 1980, p.324–325, pl.3, figs.1–3) Fisher and Riley, 1982 (July), p.53. Emendation: Below, 1990, p.49, as *Gochteodinia mutabilis*. Holotype: Gitmez and Sarjeant, 1972, pl.11, fig.1. Originally *Pareodinia*, subsequently (and now) *Gochteodinia*. Davey (1982b, p.24; dated July 30th) also proposed

this combination. *Gochteodinia mutabilis* was not validly published in Fisher and Riley (1976, p.52), since no description or illustration was provided. Age: Volgian.

procera Riding in Abbink et al., 2001, p.300–301, figs.9L–O. Holotype: Abbink et al., 2001, fig.9L. Age: late Volgian.

tuberculata Below, 1990, p.49–50, pl.15, figs.7–10,23,24. Holotype: Below, 1990, pl.15, figs.7,9–10,23. Contrary to the opinion of Lentin and Williams (1993, p.240), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Kimmeridgian.

verrucosa (Vozzhennikova, 1967, p.56, pl.12, fig.6) Dörrhöfer and Davies, 1980, p.30. Emendation: Lentin and Vozzhennikova, 1990, p.83–84, as *Gochteodinia verrucosa*. Holotype: Vozzhennikova, 1967, pl.12, fig.6; Lentin and Vozzhennikova, 1990, pl.11, fig.5; text-fig.46. Originally *Imbatodinium*, subsequently *Pareodinia*, thirdly (and now) *Gochteodinia*. Age: Late Jurassic.

***villosa** (Vozzhennikova, 1967, p.56, pl.12, figs.1a–b,2a–b,3a–b; pl.13, figs.1a–e,2,3a–d; pl.14, figs.1a–e,2a–i; pl.15, figs.1–2) Norris, 1978, p.7. Emendations: Lentin and Vozzhennikova, 1990, p.85 and Below, 1990, p.50, both as *Gochteodinia villosa*. Holotype: Vozzhennikova, 1967, pl.12, figs.3a–b; pl.15, fig.1; Eisenack and Kjellström, 1975b, figure to right — p.726f; Lentin and Vozzhennikova, 1990, pl.11, figs.7–8; text-fig.47; Fensome et al., 1995, fig.1 — p.1903; Fensome et al., 1996, figs.1–3 — p.2431. Originally *Imbatodinium villosum*, subsequently *Pareodinia villosa* (Vozzhennikova) (combination not validly published), thirdly *Pareodinia dasyforma*, fourthly (and now) *Gochteodinia villosa*. Age: Late Jurassic.

subsp. **multifurcata** Davey, 1982b, p.23, pl.6, fig.13. Holotype: Davey, 1982b, pl.6, fig.13; Fensome et al., 1996, fig.1 — p.2235. Age: late Ryazanian–Valanginian.

subsp. **villosa**. Autonym. Holotype: Vozzhennikova, 1967, pl.12, figs.3a–b; pl.15, fig.1; Eisenack and Kjellström, 1975b, figure to right — p.726f; Lentin and Vozzhennikova, 1990, pl.11, figs.7–8; text-fig.47; Fensome et al., 1995, fig.1 — p.1903; Fensome et al., 1996, figs.1–3 — p.2431.

virgula Davey, 1982b, p.23–24, pl.6, figs.2–3,7–8,10–11. Holotype: Davey, 1982b, pl.6, figs.2,7,10. Age: Portlandian.

"**GOCHTODINIUM**" Bujak, 1979, p.310–312. **Taxonomic senior synonym:** *Wetzeliiella*, according to Lentin and Vozzhennikova (1989, p.219 and 228). Type: Bujak, 1979, pl.3, figs.7–12, as *Gochtodinium simplex*.

"fornicale" Yu Jingxian, 1989, p.155, pl.58, figs.1,3. Holotype: Yu Jingxian, 1989, pl.58, fig.1. **NOW** *Rhombodinium*? Originally *Gochtodinium*, subsequently *Wetzeliiella*, thirdly (and now) *Rhombodinium*? Age: Eocene.

***simplex**" Bujak, 1979, p.312–313, pl.2, fig.10; pl.3, figs.1–12; text-figs.4B,8F. Holotype: Bujak, 1979, pl.3, figs.7–12; Bujak et al., 1980, pl.15, fig.5; Fensome et al., 1995, figs.1–5 — p.1793. **NOW** *Wetzeliiella*. Originally *Gochtodinium*, subsequently (and now) *Wetzeliiella*. Age: middle Eocene (see Aubry, 1986).

"spinula" (Bujak, 1979, p.313, pl.2, figs.3–9; text-fig.8E) Lentin and Vozzhennikova, 1989, p.228. Holotype: Bujak, 1979, pl.2, figs.3–5; Bujak et al., 1980, pl.15, fig.6. **NOW** *Rhombodinium*. Originally *Gochtodinium*, subsequently *Wetzeliiella*, thirdly (and now) *Rhombodinium*. N.I.A. Age: middle Eocene (see Aubry, 1986).

"triangulatum" Yu Jingxian, 1989, p.155–156, pl.58, figs.2,5,8. Holotype: Yu Jingxian, 1989, pl.58, fig.2. **NOW** *Epelidinium*. Originally *Gochtodinium*, subsequently *Wetzeliiella*, thirdly *Wilsonidium*, fourthly (and now) *Epelidinium*. Age: Eocene.

GODAVARIELLA Mehrotra and Sarjeant, 1987, p.166–167. Type: Mehrotra and Sarjeant, 1987, pl.1, fig.3; text-fig.3, as *Godavariella venkatachala*.

**venkatachala* Mehrotra and Sarjeant, 1987, p.167–168, pl.1, figs.2–6; text-fig.3. Holotype: Mehrotra and Sarjeant, 1987, pl.1, fig.3; text-fig.3; Fensome et al., 1995, figs.2,6 — p.1891; Mehrotra and Aswal, 2003, pl.28, fig.3. Age: Maastrichtian.

GONELLUM Keupp, 1987, p.45. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Type: Keupp, 1987, pl.11, figs.1–2, as *Gonellum kurtii*.

calcipterelloides Keupp, 1987, p.46, pl.11, figs.11–15. Holotype: Keupp, 1987, pl.11, figs.11–12,15. Age: middle Albian–early Cenomanian.

**kurtii* Keupp, 1987, p.45–46, pl.11, figs.1–10; text-fig.6. Emendation: Keupp and Kowalski, 1992, p.220. Holotype: Keupp, 1987, pl.11, figs.1–2. Age: middle Albian–early Cenomanian.

prismaticum Keupp, 1991b, p.130–131, pl.2, figs.2–8. Holotype: Keupp, 1991b, pl.2, figs.2–5. Age: late Cenomanian.

GONGYLODINIUM Fenton et al., 1980, p.158. Emendation: Feist-Burkhardt and Monteil, 1997, p.43. Taxonomic senior synonym: *Dissiliodinium*, by implication in Prauss (1989, p.38), who transferred the "type species" of *Gongylostinium*, *Gongylostinium erymnoteichon*, to *Dissiliodinium* — however, Feist-Burkhardt and Monteil (1997, p.43; 2001, p.58) retained *Gongylostinium*. Type: Fenton et al., 1980, pl.14, figs.8–9, as *Gongylostinium erymnoteichon*.

"*acmeum*" Århus, 1992, p.312–313, figs.5E–F,H–I. Holotype: Århus, 1992, fig.5I. **NOW** *Dissiliodinium*. Originally *Gongylostinium*, subsequently (and now) *Dissiliodinium*. Age: Valanginian.

**erymnoteichon* Fenton et al., 1980, p.158–159, pl.14, figs.6–9. Emendation: Feist-Burkhardt and Monteil, 1997, p.43. Holotype: Fenton et al., 1980, pl.14, figs.8–9; Fensome et al., 1993a, figs.2–3 — p.1149. Originally (and now) *Gongylostinium*, subsequently *Dissiliodinium*. Feist-Burkhardt and Monteil (1997, p.43; 2001, p.64) retained this species in *Gongylostinium*. Age: late Bajocian–early Bathonian.

"*hocneratum*" Fenton et al., 1980, p.159–160, pl.16, fig.2. Holotype: Fenton et al., 1980, pl.16, fig.2. **NOW** *Dissiliodinium*?. Originally *Gongylostinium*, subsequently *Dissiliodinium*, thirdly (and now) *Dissiliodinium*?. Age: late Bajocian–early Bathonian.

"*pauliae*" Heilmann-Clausen in Heilmann-Clausen and Thomsen, 1995, p.294–295, pl.5, figs.7–10,13; text-fig.14. Holotype: Heilmann-Clausen and Thomsen, 1995, pl.5, fig.13; text-fig.14. **NOW** *Dissiliodinium*. Originally *Gongylostinium*, subsequently (and now) *Dissiliodinium*. Age: early–late Barremian.

"*serratum*" Head et al., 1989b, p.457, pl.3, figs.14–16. Holotype: Head et al., 1989b, pl.3, fig.14–16. **NOW** *Bitectatodinium*?. Originally *Gongylostinium*, subsequently (and now) *Bitectatodinium*?. Age: late Miocene.

GONYAULACYSTA Deflandre, 1964, p.5030. Emendations: Sarjeant, 1969, p.7–8; Stover and Evitt, 1978, p.157–158; Sarjeant, 1982b, p.27–28; Helenes and Lucas-Clark, 1997, p.175–176. Taxonomic senior synonym: *Rhynchodiniopsis*, by implication in Millioud (1969, p.428) who transferred the "type species" of *Rhynchodiniopsis*, *Rhynchodiniopsis aptiana*, to *Gonyaulacysta* — however, Lentin and Williams (1973, p.58,121) retained *Gonyaulacysta*. Taxonomic junior synonyms: *Nelchinopsis*, according to Duxbury (1977, p.37) — however, Stover and Williams (1987, p.11) retained *Nelchinopsis*; *Psaligonyaulax*, according to Below (1981a, p.52) — however, Lentin and Williams (1981, p.235) retained *Psaligonyaulax*. Although the "type species", *Gonyaulacysta jurassica*, was not validly transferred to *Gonyaulacysta* by Deflandre (1964), the generic name *Gonyaulacysta* was validly

published by that author since it is based on a previously validly published species name. Type: Deflandre, 1939a, pl.6, figs.2–3; text-figs.1–2, as *Gonyaulax jurassica*.

"*aceras*" (Eisenack, 1958a, p.391, pl.21, figs.1–2) Sarjeant, 1966b, p.131. Emendation: Sarjeant, 1985a, p.57,59, as *Cribroperidinium aceras*. Holotype: Eisenack, 1958a, pl.21, fig.1; Sarjeant, 1985a, pl.4, figs.1–2; Jan du Chêne et al., 1986a, pl.2, figs.6–7. **Combination not validly published:** basionym not fully referenced. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Leptodinium*, fourthly *Acanthaulax?*, fifthly (and now) *Cribroperidinium*. Questionable assignment: Sarjeant (1966b, p.131). Age: Aptian.

"*aculeata*" (Klement, 1960, p.42, pl.5, figs.6–9; text-fig.21) Sarjeant, 1969, p.8. Holotype: Klement, 1960, pl.5, figs.6–7. **NOW** *Tehamadinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Acanthaulax*, fourthly *Occisucysta*, fifthly (and now) *Tehamadinium*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: early Kimmeridgian.

"*aichmetes*" Sarjeant, 1966b, p.123–124, pl.13, figs.5–6; text-fig.30. Holotype: Sarjeant, 1966b, pl.13, figs.5–6; text-fig.30; Jan du Chêne et al., 1986a, pl.20, figs.5–7. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*. Age: late Barremian.

"*aldorfensis*" Gocht, 1970b, p.136–138, pl.30, figs.1–2,3a–d; pl.31, figs.9a–b,10a–c,11; pl.32, figs.1–2,3a–b; text-figs.5,9a–b. Holotype: Gocht, 1970b, pl.31, figs.10a–c; Jan du Chêne et al., 1986a, pl.6, figs.1–3; Fensome et al., 1993a, figs.1–3 — p.897. **NOW** *Aldorfia*. Originally *Gonyaulacysta*, subsequently (and now) *Aldorfia*. Age: early Bathonian.

"*amabilis*" (Deflandre, 1939b, p.143, pl.6, fig.8) Dodekova, 1971, p.7. Emendation: Kunz, 1990, p.18–19, as *Leptodinium amabile*. Holotype: Deflandre, 1939b, pl.6, fig.8; Jan du Chêne et al., 1986a, pl.69, figs.1–3. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Leptodinium*, thirdly *Gonyaulacysta*, fourthly *Leptodinium?*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: Kimmeridgian.

"*ambigua*" (Deflandre, 1939b, p.144, pl.6, fig.2) Sarjeant, 1969, p.8. Holotype: Deflandre, 1939b, pl.6, fig.2; Jan du Chêne et al., 1986a, pl.68, figs.1–3. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Leptodinium*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: Kimmeridgian.

"*anglese*" Zahiri, 1981, p.15, pl.3, figs.1–2; text-fig. — p.16. Holotype: Zahiri, 1981, pl.3, fig.2; text-fig. — p.16. Age: early Barremian.

"*angulosa*" Gitmez, 1970, p.252, pl.2, figs.4–5; text-figs.7A–B. Holotype: Gitmez, 1970, pl.2, figs.4–5; text-figs.7A–B; Jan du Chêne et al., 1986a, pl.2, figs.11–15. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Acanthaulax*, thirdly *Meristaulax* Sarjeant, fourthly *Acanthaulax?*, fifthly *Rhynchodiniopsis*, sixthly (and now) *Cribroperidinium*. Taxonomic senior synonym: *Gonyaulax* (as and now *Cribroperidinium*) *granulatum*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*) *angulosa*. Age: early Kimmeridgian.

"*apionis*" (Cookson and Eisenack, 1958, p.36, pl.3, fig.7; text-figs.3–4) Sarjeant, 1969, p.8. Holotype: Cookson and Eisenack, 1958, text-figs.3–4; Jan du Chêne et al., 1986a, pl.33, fig.6. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribroperidinium*. Taxonomic senior synonym: *Gonyaulax* (now *Cribroperidinium*) *edwardsii*, according to Burger (1980a, p.82) — however, Jan du Chêne et al. (1986a, p.76) retained *Gonyaulacysta* (as *Cribroperidinium*) *apione*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: Albanian.

"*aptiana*" (Deflandre, 1935, p.231, pl.5, fig.10; pl.8, figs.7–10) Millioud, 1969, p.428. Emendation: Sarjeant, 1982b, p.36–37, as *Rhynchodiniopsis aptiana*. Holotype: Deflandre, 1935, pl.5, fig.10; pl.8, figs.7–9; Deflandre,

1936b, pl.7, figs.2–4. **Combination illegitimate**: this is the "type species" of the earlier generic name *Rhynchodiniopsis*. **NOW** *Rhynchodiniopsis*. Originally (and now) *Rhynchodiniopsis*, subsequently *Gonyaulacysta*. Taxonomic junior synonym: *Gonyaulacysta fimbriata*, according to Below (1981a, p.118) — however, Sarjeant (1982b, p.35) retained *Gonyaulacysta* (as *Rhynchodiniopsis*) *fimbriata*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: Senonian.

"*areolata*" (Sarjeant, 1961a, p.95–96, pl.13, fig.13; text-fig.5) Lentin and Williams, 1973, p.59. Holotype: Sarjeant, 1961a, pl.13, fig.13; text-fig.5; Jan du Chêne et al., 1986a, pl.3, figs.1–2. **Combination illegitimate** — **nomenclatural senior synonym**: *Gonyaulacysta scarburghensis*, which has the same type. **NOW** *Trichodinium scarburghense*. Originally *Gonyaulax areolata* (name illegitimate; Appendix B), subsequently *Gonyaulacysta scarburghensis*, thirdly *Gonyaulacysta areolata* (combination illegitimate), fourthly *Acanthaulax areolata* (combination illegitimate), fifthly *Acanthaulax scarburghensis*, sixthly *Liesbergia scarburghensis*, seventhly (and now) *Trichodinium scarburghense*. Taxonomic junior synonym: *Acanthaulax senta*, according to Berger (1986, p.343). Age: late Callovian–early Oxfordian.

"*auctifica*" Brideaux, 1971, p.82–83, pl.23, figs.40–41; text-figs.9a–b. Holotype: Brideaux, 1971, pl.23, figs.40–41; text-figs.9a–b; Jan du Chêne et al., 1986a, pl.30, figs.7–8. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently (and now) *Cribroperidinium*. Age: late Albian.

axicerastes Sarjeant, 1966b, p.114–116, pl.13, figs.11–12; text-fig.25. Holotype: Sarjeant, 1966b, pl.13, figs.11–12; Jan du Chêne et al., 1986a, pl.45, figs.6–12. Age: middle Barremian.

"*birkelundiae*" Fensome, 1979, p.38–40, pl.5, figs.5,8,11; text-figs.14A–C. Holotype: Fensome, 1979, pl.5, figs.5,8,11; text-figs.14A–B; Jan du Chêne et al., 1986a, pl.24, figs.1–3. **NOW** *Cribroperidinium*?. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*?. Age: Portlandian.

"*boreas*" Davey, 1974, p.52–53, pl.4, figs.1–4; pl.7, fig.5. Holotype: Davey, 1974, pl.4, figs.1–4; Jan du Chêne et al., 1986a, pl.21, figs.1–4. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*?, thirdly (and now) *Cribroperidinium*. N.I.A. Age: late Barremian.

"*canadensis*" Pocock, 1972, p.89, pl.24, figs.1–2; text-fig.4. Holotype: Pocock, 1972, pl.24, fig.1; Jan du Chêne et al., 1986a, pl.97, figs.1–4. Originally *Gonyaulacysta*, subsequently *Hystrihogonyaulax*, thirdly *Rhynchodiniopsis*. **Taxonomic senior synonym**: *Gonyaulax* (as *Gonyaulacysta* now *Rhynchodiniopsis*) *cladophora*, according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: Oxfordian–Kimmeridgian.

"*cassidata*" (Eisenack and Cookson, 1960, p.3, pl.1, figs.5–6) Sarjeant, 1966b, p.125–126. Emendations: Sarjeant, 1966b, p.125, as *Gonyaulacysta cassidata*; Helenes and Lucas-Clark, 1997, p.190, as *Wrevittia cassidata*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.5; Jan du Chêne et al., 1986a, pl.40, figs.6–7. **NOW** *Wrevittia cassidata*. Originally *Gonyaulax helicoidea* subsp. *cassidata*, subsequently *Gonyaulax cassidata*, thirdly *Gonyaulacysta cassidata*, fourthly (and now) *Wrevittia cassidata*. Age: Aptian–Cenomanian.

"*cauda*" Gitmez and Sarjeant, 1972, p.193–194, pl.2, figs.1–2,4–5. Holotype: Gitmez and Sarjeant, 1972, pl.2, figs.1–2. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribroperidinium*?. **Taxonomic senior synonym**: *Gonyaulacysta* (as and now *Cribroperidinium*) *globata*, according to Poulsen (1996, p.72). N.I.A. Age: early–late Kimmeridgian.

centriconnata Riding, 1983, p.197–200,202, pl.1, pl.2, figs.1–8; text-figs.2–3. Holotype: Riding, 1983, pl.1, figs.1–3; Jan du Chêne et al., 1986a, pl.40, figs.10–11. Age: middle Callovian–early Oxfordian.

ceratophora (Cookson and Eisenack, 1960b, p.249, pl.37, fig.7) Riding, 2005b, p.14. Emendation: Riding, 2005a, p.14,16,18, as *Gonyaulacysta ceratophora*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.7; Jan du Chêne et al., 1986a, pl.112, fig.1; Helby et al., 1987, fig.18C; Riding, 2005a, text-figs.2A–B. Originally *Scriniodinium*, subsequently *Scriniodinium*?, thirdly (and now) *Gonyaulacysta*. Taxonomic junior synonym: *Psaligonyaulax australica*, according to Jan du Chêne et al. (1986a, p.266) — however, *Psaligonyaulax australica* is now considered a taxonomic junior synonym of *Psaligonyaulax* (as *Gonyaulacysta*) *dualis*. Age: Oxfordian–early Kimmeridgian.

?*circumfoveolata* Prössl, 1990, p.103, pl.10, figs.6–10 ex Prössl, 1992b, p.113–115. Holotype: Prössl, 1990, pl.10, figs.8–10. This name was not validly published in Prössl (1990, p.103), since that author did not specify the lodgment of the holotype. Questionable assignment: Prössl (1990, p.103). Age: late Aptian.

"*cladophora*" (Deflandre, 1939a, p.173–176, pl.7, figs.1–5; text-figs.5–6) Dodekova, 1967, p.17–18. Holotype: Deflandre, 1939a, pl.7, fig.1; Jan du Chêne et al., 1986a, pl.94, fig.6. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. Taxonomic junior synonyms: *Gonyaulacysta gottisii*, according to Jan du Chêne et al. (1986a, p.48) and Jan du Chêne and Fauconnier (1986, p.55); *Gonyaulacysta downiei* and *Gonyaulacysta* (as *Hystrichogonyaulax*) *canadensis*, both according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: early Oxfordian.

"subsp. *cladophora*". Autonym. Holotype: Deflandre, 1939a, pl.7, fig.1; Jan du Chêne et al., 1986a, pl.94, fig.6. **NOW** *Rhynchodiniopsis cladophora* subsp. *cladophora*. Originally *Gonyaulax cladophora* subsp. *cladophora* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *cladophora*, thirdly *Hystrichogonyaulax cladophora* subsp. *cladophora*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *cladophora*. Taxonomic junior synonyms: *Gonyaulax* (as *Rhynchidiniopsis*) *cladophora* subsp. *extensa*, *Gonyaulax* (as *Rhynchidiniopsis*) *cladophora* subsp. *hemipolyedrica* and *Gonyaulax* (as *Rhynchidiniopsis*) *cladophora* subsp. *isovalvata*, all by implication in Brenner (1988, p.72), who listed these subspecies as taxonomic junior synonyms of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained all three subspecies.

"subsp. *extensa*" (Klement, 1960, p.36–37, pl.4, figs.1–4; text-fig.16) Lentin and Williams, 1973, p.60. Holotype: Klement, 1960, pl.4, figs.1–3; Jan du Chêne et al., 1986a, pl.95, figs.4–5. **NOW** *Rhynchodiniopsis cladophora* subsp. *extensa*. Originally *Gonyaulax cladophora* subsp. *extensa* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *extensa*, thirdly *Hystrichogonyaulax cladophora* subsp. *extensa*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *extensa*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed the subspecies as a taxonomic junior synonym of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulacysta* (as *Rhynchodiniopsis*) *cladophora* subsp. *extensa*. Age: early Kimmeridgian.

"subsp. *hemipolyedrica*" (Klement, 1960, p.36, pl.3, figs.10–12; text-figs.14–15) Lentin and Williams, 1973, p.60. Holotype: Klement, 1960, pl.3, figs.10–11. **NOW** *Rhynchodiniopsis cladophora* subsp. *hemipolyedrica*. Originally *Gonyaulax cladophora* subsp. *hemipolyedrica* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *hemipolyedrica*, thirdly *Hystrichogonyaulax cladophora* subsp. *hemipolyedrica*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *hemipolyedrica*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed the subspecies as a taxonomic junior synonym of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulacysta* (as *Rhynchodiniopsis*) *cladophora* subsp. *hemipolyedrica*. Age: early Kimmeridgian.

"subsp. *isovalvata*" (Klement, 1960, p.37–38, pl.4, figs.5–9; text-fig.17) Lentin and Williams, 1973, p.60. Holotype: Klement, 1960, pl.4, figs.5–6. **NOW** *Rhynchodiniopsis cladophora* subsp. *isovalvata*. Originally *Gonyaulax cladophora* subsp. *isovalvata* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *isovalvata*, thirdly *Hystrichogonyaulax cladophora* subsp. *isovalvata*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *isovalvata*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulacysta* (as *Rhynchodiniopsis*) *cladophora* subsp. *isovalvata*. Age: early Kimmeridgian.

"*clathrata*" (Cookson and Eisenack, 1960b, p.246–247, pl.37, fig.5; text-fig.2) Dodekova, 1971, p.10. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.5; text-fig.2; Jan du Chêne et al., 1986a, pl.71, figs.10–12. **NOW**

Leptodinium. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Leptodinium*, thirdly *Gonyaulacysta*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: ?Tithonian.

"*compta*" Duxbury, 1980, p.122–123, pl.2, figs.1–2,4. Holotype: Duxbury, 1980, pl.2, figs.1–2,4; Jan du Chêne et al., 1986a, pl.10, figs.9–10. Originally *Gonyaulacysta*, subsequently *Cribroperidinium*, thirdly *Acanthaulax*, fourthly *Apteodinium*. **Taxonomic senior synonym:** *Millioudodinium* (now *Cribroperidinium*) *spinoreticulatum*, according to Lucas-Clark (1987, p.178). Age: middle-late Barremian.

"*confossa*" Duxbury, 1977, p.33, pl.2, figs.2–4. Holotype: Duxbury, 1977, pl.2, figs.3–4; Jan du Chêne et al., 1986a, pl.19, fig.5. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Cribroperidinium?*, fourthly (and now) *Cribroperidinium*. Age: late Hauterivian.

"*confusa*" (Vozzhennikova, 1967, p.80, pl.17, figs.1a–b; pl.25, figs.4–5; pl.27, figs.3–4) Sarjeant, 1969, p.9. Holotype: Vozzhennikova, 1967, pl.25, fig.5, lost according to Lentin and Vozzhennikova (1990, p.93). **NOW** *Apteodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Apteodinium*. Age: Late Jurassic.

"?*cornigera*" (Valensi, 1953, p.27, pl.1, figs.4,8,10; pl.2, figs.1–2; pl.13, fig.5; text-fig.2a) Sarjeant, 1966b, p.131. Emendation: Jan du Chêne et al., 1985b, p.110, as *Ctenidodinium cornigerum*. Holotype: Valensi, 1953, pl.1, fig.8. **Combination not validly published:** basionym not fully referenced. **NOW** *Ctenidodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Hystrichogonyaulax*, fourthly (and now) *Ctenidodinium*. Questionable assignment: Sarjeant (1966b, p.131). Age: Bathonian.

"*cornuta*" (Cookson and Eisenack, 1962b, p.490, pl.3, figs.1–6) Yun Hyesu, 1981, p.10. Holotype: Cookson and Eisenack, 1962b, pl.3, figs.1–3; Jan du Chêne et al., 1986a, pl.90, fig.1. **NOW** *Pterodinium?*. Originally *Pterodinium*, subsequently (and now) *Pterodinium?*, thirdly *Gonyaulacysta*. Age: Albian–?Aptian.

?*crassicornuta* (Klement, 1960, p.38–39, pl.5, figs.1–3) Sarjeant, 1969, p.9. Emendation: Sarjeant, 1984a, p.158–160, as *Rhynchodiniopsis crassicornuta*. Holotype: Klement, 1960, pl.5, fig.1; Sarjeant, 1984a, pl.2, figs.1–2; text-fig.2; Jan du Chêne et al., 1986a, pl.45, figs.1–4. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly (and now) *Gonyaulacysta?*, fourthly *Rhynchodiniopsis*. Questionable assignment: Stover and Evitt (1978, p.158). This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: early Kimmeridgian.

"*crassinerva*" Deflandre, 1939b, p.144, pl.6, fig.5 ex Sarjeant, 1967b, p.248–249. Emendation: Nøhr-Hansen, 1986, p.33, as *Cribroperidinium crassinervum*. Holotype: Deflandre, 1939b, pl.6, fig.5; Jan du Chêne et al., 1986a, pl.70, figs.1–4. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Leptodinium*, fourthly *Leptodinium?*, fifthly (and now) *Cribroperidinium*. The name *Palaeoperidinium crassinervum* was not validly published in Deflandre (1939b) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.246) accepted Sarjeant's (1967b) indirect reference to Deflandre (1939b) as indication of a type (I.C.N. Article 40.3). Age: Kimmeridgian.

"*cretacea*" (Neale and Sarjeant, 1962, p.441–443, pl.19, figs.1–2; text-figs.2a–b) Sarjeant, 1969, p.9. Holotype: Neale and Sarjeant, 1962, pl.19, figs.1–2; text-figs.2a–b. **NOW** *Stanfordella?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Stanfordella?*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: Hauterivian.

"*crispa*" (Wetzel, 1967a, p.870, pl.15, figs.4a–b) Sarjeant, 1969, p.9. Emendations: Sarjeant, 1980b, p.119–120, as *Hystrichogonyaulax crispa*; Fenton, 1981, p.255,257, as *Cribroperidinium crispum*. Holotype: Wetzel, 1967a, pl.15, figs.4a–b; Dietz et al., 1999, text-fig.5a. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Hystrichogonyaulax*, fifthly (and now) *Cribroperidinium*, sixthly *Acanthaulax*. Age: Middle Jurassic.

"*cristata*" Riley in Fisher and Riley, 1980, p.320, pl.1, figs.8,12. Holotype: Fisher and Riley, 1980, pl.1, figs.8,12; Jan du Chêne et al., 1986a, pl.67, fig.20. **NOW** *Leptodinium volgense*. Originally *Gonyaulacysta cristata*,

subsequently *Leptodinium cristatum* (combination illegitimate), thirdly (and now) *Leptodinium volgense*, fourthly *Millioudodinium cristatum*, fifthly *Cribroperidinium cristatum* (combination not validly published). Age: Volgian.

"*cypraea*" (Ioannides et al., 1977, p.460, pl.4, figs.5–8; text-fig.12) Sarjeant, 1982b, p.28. Holotype: Ioannides et al., 1977, pl.4, fig.5; text-fig.12; Jan du Chêne et al., 1986a, pl.85, figs.1–2; pl.86, figs.9–11. **NOW** *Psaligonyaulax*?. Originally *Psaligonyaulax*, subsequently (and now) *Psaligonyaulax*?, thirdly *Gonyaulacysta*?. Questionable assignment: Sarjeant (1982b, p.28). Age: Kimmeridgian.

"*dangeardii*" Sarjeant, 1968, p.226–227, pl.1, fig.21; pl.3, figs.8,15; text-fig.3. Emendation: Sarjeant, 1982b, p.42–43, as *Tubotuberella dangeardii*. Holotype: Sarjeant, 1968, pl.3, fig.8; text-fig.3; Sarjeant, 1982b, text-figs.5c–d; Jan du Chêne et al., 1986a, pl.127, figs.4–7; Fensome et al., 1993a, figs.1,3–4 — p.1089; figs.1,4–5 — p.1093. **NOW** *Tubotuberella*. Originally *Gonyaulacysta*, subsequently *Dimidiadinium*, thirdly (and now) *Tubotuberella*. Age: Oxfordian.

"*deflandrei*" Riley in Fisher and Riley, 1980, p.320–321, pl.1, figs.1–2. Holotype: Fisher and Riley, 1980, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.75, fig.7. **NOW** *Leptodinium*. Originally *Gonyaulacysta*, subsequently (and now) *Leptodinium*, thirdly *Millioudodinium*. Junior homonym: *Gonyaulacysta deflandrei* (Sarjeant, 1966b) Below, 1981a. This name was not validly published in Fisher and Riley (1976, p.52) since no description or illustration was provided. Age: Volgian.

"*deflandrei*" (Sarjeant, 1966b, p.137–138, pl.14, figs.7–8; text-fig.35) Below, 1981a, p.53. Emendation: Sarjeant, 1982b, p.45–46, as *Psaligonyaulax deflandrei*. Holotype: Sarjeant, 1966b, pl.14, figs.7–8; text-fig.35; Jan du Chêne et al., 1986a, pl.85, figs.3–4; pl.86, figs.1–3. **Combination illegitimate** — **senior homonym:** *Gonyaulacysta deflandrei* Riley in Fisher and Riley, 1980. **NOW** *Psaligonyaulax*. Originally (and now) *Psaligonyaulax*, subsequently *Gonyaulacysta* (combination illegitimate). Taxonomic junior synonym: *Gonyaulacysta extensa*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"*delicata*" Davey, 1969a, p.123–124, pl.1, figs.7–8; text-figs.10A–B. Holotype: Davey, 1969a, pl.1, fig.7; text-figs.10A–B; Jan du Chêne et al., 1986a, pl.75, figs.1–3. **NOW** *Leptodinium*?. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly (and now) *Leptodinium*?. Age: Cenomanian.

"*dentata*" (Raynaud, 1978, p.395, pl.2, fig.13) Lentin and Vozzhennikova, 1990, p.116. Emendation: Riding, 2012, p.70,72, as *Gonyaulacysta dentata*. Holotype: Raynaud, 1978, pl.2, fig.13; Jan du Chêne et al., 1986a, pl.126, figs.1–3, lost according to Riding and Michoux (2013, p.51). Neotype: Fensome et al., 1996, pl.1, fig.20; Riding, 2012, pl.2, figs.1–2; Riding and Michoux, 2013, pl.1, figs.1–3; designated by Riding and Michoux (2013, p.51–52). Originally *Tubotuberella*, subsequently (and now) *Gonyaulacysta*. Age: middle-late Callovian.

"*diamanta*" (Churchill and Sarjeant, 1962, p.34–36, pl.1, fig.19; text-fig.3) Lentin and Williams, 1976, p.76. Holotype: Churchill and Sarjeant, 1962, pl.1, fig.19; text-fig.3. Originally *Peridinium*? (Appendix B), subsequently *Phthanoperidinium*?, thirdly (and now) *Gonyaulacysta*. Age: Holocene.

"*diaphana*" (Cookson and Eisenack, 1958, p.36, pl.3, figs.13–14; text-figs.10–11) Sarjeant, 1969, p.9. Holotype: Cookson and Eisenack, 1958, pl.3, figs.13–14; text-figs.10–11; Jan du Chêne et al., 1986a, pl.32, fig.6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Cribroperidinium*. **Taxonomic senior synonym:** *Gonyaulax* (now *Cribroperidinium*) *muderongense*, according to Backhouse (1988, p.80). This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: Aptian.

"*dictyophora*" Deflandre, 1939a, p.178, pl.8, figs.1–3 ex Sarjeant, 1967b, p.249–250. Holotype: Deflandre, 1939a, pl.8, fig.1; Jan du Chêne et al., 1986a, pl.7, figs.1–5. **NOW** *Scriniodinium*?. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Aldorfia*, fourthly *Scriniodinium*, fifthly (and now) *Scriniodinium*?. The name *Palaeoperidinium dictyophorum* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. In validating this name, Sarjeant (1967b, p.249–250) provided an "emended diagnosis". Age: Oxfordian.

"*diutina*" Duxbury, 1977, p.34–35, pl.1, figs.3–4; text-fig.9. Holotype: Duxbury, 1977, pl.1, fig.3; text-fig.9; Jan du Chêne et al., 1986a, pl.41, figs.3–4. **NOW** *Wrevittia*?. Originally *Gonyaulacysta*, subsequently *Millioudodinium*?, thirdly (and now) *Wrevittia*?. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*, now *Wrevittia*) *helicoidea*, according to Stover and Helby (1987d, p.287) — however, Jan du Chêne et al. (1986a, p.130) and Lentin and Williams (1989, p.152) retained *Gonyaulacysta* (now *Wrevittia*?) *diutina*. Age: Berriasian–Hauterivian.

"subsp. *diutina*". Autonym. Holotype: Duxbury, 1977, pl.1, fig.3; text-fig.9; Jan du Chêne et al., 1986a, pl.41, figs.3–4. **NOW** *Wrevittia*? *diutina* subsp. *diutina*. Originally *Gonyaulacysta diutina* subsp. *diutina*, subsequently (and now) *Wrevittia*? *diutina* subsp. *diutina*.

"subsp. *tabulacornuta*" Prössl, 1990, p.102–103, pl.8, figs.1–2,4–5 ex Prössl, 1992b, p.113,115. Holotype: Prössl, 1990, pl.8, figs.1–2,4–5. **NOW** *Wrevittia*? *diutina* subsp. *tabulacornuta*. Originally *Gonyaulacysta diutina* subsp. *tabulacornuta*, subsequently (and now) *Wrevittia*? *diutina* subsp. *tabulacornuta*. This name was not validly published in Prössl (1990, p.102–103), since that author did not specify the lodgment of the holotype. Age: early Barremian.

"*downiei*" Pocock, 1972, p.87, pl.22, figs.1–2; text-fig.2. Holotype: Pocock, 1972, pl.22, figs.1–2; Jan du Chêne et al., 1986a, pl.97, figs.7–12. Originally *Gonyaulacysta*, subsequently *Hystrichosphaeropsis*, thirdly *Rhynchodiniopsis*?, fourthly *Rhynchodiniopsis*. **Taxonomic senior synonym:** *Gonyaulax* (as *Hystrichogonyaulax* now *Rhynchodiniopsis*) *cladophora*, according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: Oxfordian–Kimmeridgian.

dualis (Brideaux and Fisher, 1976, p.18–20, pl.1, figs.4–6,8–12; pl.2, figs.1–2) Stover and Evitt, 1978, p.158. Holotype: Brideaux and Fisher, 1976, pl.1, figs.4–5; Jan du Chêne et al., 1986a, pl.37, figs.11–12. Originally *Psaligonyaulax*, subsequently (and now) *Gonyaulacysta*. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*) *jurassica*, according to Sarjeant (1982b, p.29) — however, Jan du Chêne et al. (1986a, p.131) retained *Gonyaulacysta dualis*. Taxonomic junior synonym: *Psaligonyaulax australica*, according to Brenner (1988, p.54). Age: late Oxfordian–late Kimmeridgian.

"*edwardsii*" (Cookson and Eisenack, 1958, p.32, pl.3, figs.5–6; text-fig.7) Clarke and Verdier, 1967, p.31. Holotype: Cookson and Eisenack, 1958, pl.3, fig.6; text-fig.7; Jan du Chêne et al., 1986a, pl.32, fig.4; pl.33, fig.3. **NOW** *Cribroperidinium*?. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Cribroperidinium*, fourthly (and now) *Cribroperidinium*?. Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *apione*, according to Burger (1980a, p.82) — however, Jan du Chêne et al. (1986a, p.76) retained *Cribroperidinium apione*; *Gonyaulax* (as *Cribroperidinium*) *orthoceras*, according to Davey and Verdier (1971, p.17) — however, Below (1981a, p.39–40) and Lentin and Williams (1985, p.79) retained *Cribroperidinium orthoceras*. This combination was not validly published in Sarjeant (1966b, p.130), since that author did not fully reference the basionym. Age: Albian–early Turonian.

"*ehrenbergii*" Gitmez, 1970, p.252–254, pl.2, figs.8–9; text-fig.8. Holotype: Gitmez, 1970, pl.2, figs.8–9; text-fig.8. **NOW** *Cribroperidinium*?. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*?. Age: early Kimmeridgian.

eisenackii (Deflandre, 1939a, p.171, pl.6, figs.7–10; text-figs.3–4) Górka, 1965, p.299. Emendation: Sarjeant, 1982b, p.32–33, as *Gonyaulacysta eisenackii*. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Gonyaulacysta*, thirdly *Endoscrinium*, fourthly *Tubotuberella*. Lentin and Williams (1989, p.152) retained this species in *Gonyaulacysta*. Taxonomic junior synonym: *Tubotuberella sphaerocephala*, according to Sarjeant (1982b, p.32). Dodekova (1967, p.18) and Sarjeant (1968, p.227) also proposed this combination. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Oxfordian.

"subsp. *eisenackii*". Autonym. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. **Now redundant.** Originally *Gonyaulax eisenackii* subsp. *eisenackii* (Appendix B), subsequently *Endoscrinium eisenackii* subsp. *eisenackii*, thirdly *Gonyaulacysta eisenackii*

subsp. *eisenackii*, fourthly *Tubotuberella eisenackii* subsp. *eisenackii*. Taxonomic junior synonym: *Gonyaulax* (as *Gonyaulacysta*) *eisenackii* subsp. *oligodentata*, according to Sarjeant (1982b, p.32).

"subsp. ***oligodentata***" (Cookson and Eisenack, 1958, p.30, pl.2, fig.11) Sarjeant, 1972, p.17. Holotype: Cookson and Eisenack, 1958, pl.2, fig.11; Jan du Chêne et al., 1986a, pl.125, figs.10–11. Originally *Gonyaulax eisenackii* subsp. *oligodentata* (Appendix B), subsequently *Gonyaulacysta eisenackii* subsp. *oligodentata*, thirdly *Endoscrinium eisenackii* subsp. *oligodentatum*, fourthly *Tubotuberella eisenackii* subsp. *oligodentata*. **Taxonomic senior synonym:** *Gonyaulax* (as *Gonyaulacysta*) *eisenackii* subsp. *eisenackii*, according to Sarjeant (1982b, p.32). Age: Late Jurassic.

?*elamii* Horowitz, 1975, p.25–26, pl.1, fig.9. Holotype: Horowitz, 1975, pl.1, fig.9. Originally *Gonyaulacysta*, subsequently (and now) *Gonyaulacysta*?. Questionable assignment: Stover and Evitt (1978, p.158) as a problematic species. Age: Late Triassic (probably not in place).

"***episoma***" Sarjeant, 1966b, p.118–119, pl.13, figs.9–10; text-fig.27. Holotype: Sarjeant, 1966b, pl.13, figs.9–10; text-fig.27; Jan du Chêne et al., 1986a, pl.67, figs.15–16. **NOW** *Leptodinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium*. Age: late Barremian.

"***eumorpha***" (Cookson and Eisenack, 1960b, p.246, pl.37, figs.1–3; text-fig.3) Sarjeant, 1966b, p.131. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.1; Jan du Chêne et al., 1986a, pl.75, fig.4. **Combination not validly published:** basionym not fully referenced. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*. Age: Late Jurassic.

"***evittii***" Dodekova, 1969, p.14–15, pl.1, figs.1–6; pl.2, figs.1–12; text-figs.Aa–b. Emendation: Jan du Chêne et al., 1986b, p.26–27, as *Tehamadinium evittii*. Holotype: Dodekova, 1969, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.117, figs.1–2; Jan du Chêne et al., 1986b, pl.20, figs.1–4. **NOW** *Tehamadinium*. Originally *Gonyaulacysta*, subsequently *Occisucysta*, thirdly (and now) *Tehamadinium*. Taxonomic junior synonym: *Diacanthum hollisteri*, according to Below (1982a, p.32–33) — however, Jan du Chêne et al. (1986b, p.122) and Habib and Drugg (1987, p.762–763) retained *Diacanthum hollisteri*. Age: Tithonian.

"***exilicristata***" Davey, 1969a, p.121, pl.1, figs.1–2; text-figs.9A–B. Holotype: Davey, 1969a, pl.1, fig.1; text-figs.9A–B; Jan du Chêne et al., 1986a, pl.26, figs.1–4. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently (and now) *Cribroperidinium*. Age: Cenomanian.

"***exsanguia***" Duxbury, 1977, p.35–36, pl.1, figs.6–7; text-fig.10. Emendation: Harding, 1990b, p.31–32, as *Gonyaulacysta exsanguia*. Holotype: Duxbury, 1977, pl.1, fig.6; text-fig.10b; Jan du Chêne et al., 1986a, pl.40, figs.1–3. **NOW** *Stanfordella*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*?, thirdly (and now) *Stanfordella*. Age: Hauterivian–Barremian.

"***extensa***" Clarke and Verdier, 1967, p.30, pl.4, figs.7–9; text-fig.11. Holotype: Clarke and Verdier, 1967, pl.4, figs.8–9. **Taxonomic senior synonym:** *Psaligonyaulax deflandrei*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"***fallax***" Morgenroth, 1968, p.535–536, pl.41, figs.4–6. Holotype: Morgenroth, 1968, pl.41, figs.4–5. **NOW** *Apteodinium*. Originally *Gonyaulacysta*, subsequently (and now) *Apteodinium*. Age: Danian.

"***fastigiata***" Duxbury, 1977, p.36–37, pl.1, figs.8–9,12; text-fig.11. Emendation: Helenes and Lucas-Clark, 1997, p.184, as *Stanfordella fastigiata*. Holotype: Duxbury, 1977, pl.1, figs.8,12; text-fig.11; Jan du Chêne et al., 1986a, pl.43, figs.1–6. **NOW** *Stanfordella*. Originally *Gonyaulacysta*, subsequently (and now) *Stanfordella*. Questionable assignment: Sarjeant (1982b, p.28) — however, Jan du Chêne et al. (1986a, p.131) included the species in *Gonyaulacysta* without question. Age: early Hauterivian–early Barremian.

fenestrata Riding and Helby, 2001f, p.150–153, figs.5A–I,6A–B. Holotype: Riding and Helby, 2001f, fig.5D. See also the discussion under *Gonyaulacysta oligodentata* (name not validly published). Age: Kimmeridgian–Tithonian.

"*fetchamensis*" Sarjeant, 1966b, p.128,130, pl.15, figs.1–2; text-fig.33. Holotype: Sarjeant, 1966b, pl.15, figs.1–2; text-fig.33; Helenes, 1984, text-figs.4A–B; Jan du Chêne et al., 1986a, pl.20, figs.1–4; Fensome et al., 1993a, figs.1–2 — p.1189. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*. Age: early Cenomanian.

"*filapicata*" Gocht, 1970b, p.134–135, pl.26, figs.4,6–9; pl.27, figs.1–3,7; pl.28, fig.3; pl.31, figs.1–5; text-figs.2a,3–4. Emendation: Riding and Bailey, 1991, p.100–101, as *Durotrigia filapicata*. Holotype: Gocht, 1970b, pl.31, fig.1. **NOW** *Durotrigia*. Originally *Gonyaulacysta*, subsequently *Diacanthum*, thirdly *Dichadogonyaulax?*, fourthly *Diacanthum?*, fifthly (and now) *Durotrigia*. Age: early Bathonian.

"*filosa*" Wilson in Schiøler et al., 1997, p.81. **Name not validly published**: no description. **Taxonomic senior synonym**: *Apteodinium wilsonii* (now *Cribroperidinium graemei*), according to Schiøler et al. (1997, p.81).

"*fimbriata*" Duxbury, 1980, p.123, pl.1, figs.1–3. Holotype: Duxbury, 1980, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.98, figs.1–2. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulacysta*, subsequently (and now) *Rhynchodiniopsis*. Taxonomic senior synonym: *Rhynchodiniopsis aptiana*, according to Below (1981a, p.118) — however, Sarjeant (1982b, p.36) and Jan du Chêne et al. (1986a, p.287) retained *Gonyaulacysta* (as *Rhynchodiniopsis*) *fimbriata*. Age: middle Barremian.

"*forulata*" Yu Jingxian, 1982, p.241, pl.2, figs.3–4,6–8. Holotype: Yu Jingxian, 1982, pl.2, fig.8. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently (and now) *Cribroperidinium?*. Age: Late Jurassic–Early Cretaceous.

"*fragosa*" Brideaux, 1971, p.83, pl.23, fig.42; pl.24, figs.44–45; text-figs.8c–d. Holotype: Brideaux, 1971, pl.24, figs.44–45; text-figs.8c–d. **Taxonomic senior synonym**: *Scriniodinium* (as *Endoscrinium*) *campanula*, according to Harker and Sarjeant (1975, p.224) and Brideaux and McIntyre (1975, p.33). Age: middle-late Albian.

"?*freakei*" (Sarjeant, 1963c, p.85–86, pl.1, figs.1–3) Sarjeant, 1966b, p.131. Holotype: Sarjeant, 1963c, pl.1, figs.1–3; Jan du Chêne et al., 1986a, pl.67, figs.13–14. **Combination not validly published**: basionym not fully referenced. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Leptodinium*. **Taxonomic senior synonym**: *Leptodinium subtile*, according to Brenner (1988, p.60). Questionable assignment: Sarjeant (1966b, p.131). Age: early Oxfordian.

?*giga* Horowitz, 1970, p.178, pl.4, fig.20. Holotype: Horowitz, 1970, pl.4, fig.20. Originally *Gonyaulacysta*, subsequently *Gonyaulacysta?*. Questionable assignment: Stover and Evitt (1978, p.158) as a problematic species. N.I.A. Age: Late Jurassic–Early Cretaceous.

"*gigas*" Raynaud, 1978, p.392–393, pl.2, fig.16. Holotype: Raynaud, 1978, pl.2, fig.16; Jan du Chêne et al., 1986a, pl.30, fig.6. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium?*. N.I.A. Age: late Kimmeridgian–Portlandian.

"*giuseppei*" (Morgenroth, 1966a, p.5, pl.2, figs.3–6) Sarjeant, 1969, p.9. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Cribroperidinium*. Age: early Eocene.

"subsp. *giuseppei*". Autonym. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **Now redundant**. Originally *Gonyaulax giuseppei* subsp. *giuseppei* (Appendix B), subsequently *Gonyaulacysta giuseppei* subsp. *giuseppei*, thirdly *Millioudodinium? giuseppei* subsp. *giuseppei*, fourthly *Rhynchodiniopsis? giuseppei* subsp. *giuseppei*, fifthly *Cribroperidinium giuseppei* subsp. *giuseppei*. Taxonomic junior synonym: *Gonyaulax* (as *Cribroperidinium*) *giuseppei* subsp. *majus*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81). Age: early Eocene.

"subsp. *major*" (Morgenroth, 1966a, p.6, pl.2, figs.5–6) Lentin and Williams, 1973, p.61. Holotype: Morgenroth, 1966a, pl.2, figs.5–6. Originally *Gonyaulax giuseppei* subsp. *major* (Appendix B), subsequently *Gonyaulacysta giuseppei* subsp. *major*, thirdly *Millioudodinium? giuseppei* subsp. *majus*, fourthly *Rhynchodiniopsis? giuseppei* subsp. *major*, fifthly *Cribroperidinium giuseppei* subsp. *majus*.

Taxonomic senior synonym: *Gonyaulax* (as *Cribroperidinium*) *giuseppeii* subsp. *giuseppeii*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81). Age: early Eocene.

"*globata*" Gitmez and Sarjeant, 1972, p.195,197, pl.3, figs.1–2; text-figs.5A–B. Holotype: Gitmez and Sarjeant, 1972, pl.3, fig.1; text-fig.5A; Jan du Chêne et al., 1986a, pl.29, fig.3. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribroperidinium?*, fifthly (and now) *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulacysta cauda* and *Gonyaulacysta systremmata*, both according to Poulsen (1996, p.72). Age: middle-late Kimmeridgian.

"*globosa*" Brideaux, 1971, p.81, pl.23, figs.37–38; text-figs.7g–h. Holotype: Brideaux, 1971, pl.23, figs.37–38; text-fig.7g; Jan du Chêne et al., 1986a, pl.28, figs.10–11. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly (and now) *Cribroperidinium?*. Age: middle-late Albanian.

"*gongylos*" Sarjeant, 1966b, p.111–113, pl.13, figs.1–2; text-fig.23. Holotype: Sarjeant, 1966b, pl.13, figs.1–2; text-fig.23; Jan du Chêne et al., 1986a, pl.93, figs.10–13. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulacysta*, subsequently *Leptodinium?*, thirdly (and now) *Rhynchodiniopsis*. N.I.A. Age: early Oxfordian.

"*gottisii*" Dupin, 1968, p.4, pl.1, figs.7–12. Holotype: Dupin, 1968, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.12, fig.11; pl.94, figs.9–10. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly *Apteodinium*.

Taxonomic senior synonym: *Gonyaulax* (now *Rhynchodiniopsis*) *cladophora*, according to Jan du Chêne et al. (1986a, p.48) and Jan du Chêne and Fauconnier (1986, p.55). Age: Late Jurassic.

"*granulata*" (Klement, 1960, p.39–41, pl.4, figs.10–13; text-figs.18–20) Sarjeant, 1969, p.9. Emendation: Sarjeant, 1984a, p.161–162, as *Meristaulax granulata*. Holotype: Klement, 1960, pl.4, figs.10–11; text-figs.18–20; Fensome et al., 1995, figs.1–2 — p.1525; disintegrated according to Sarjeant (1984a, p.162). Lectotype (designated by Sarjeant, 1984a, p.162): Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2a–b; Fensome et al., 1995, figs.5–6 — p.1525 — however, Brenner (1988, p.35) argued that this specimen is not conspecific with the holotype. Lectotype (designated by Brenner, 1988, p.35): Brenner, 1988, pl.1, figs.3a–c; Fensome et al., 1995, figs.7–9 — p.1525. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Meristaulax* Sarjeant, sixthly *Acanthaulax*. Poulsen (1996, p.73) retained this species in *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *venusta*, according to Schrank (2005, p.56); *Gonyaulax* (now *Cribroperidinium*) *granuligera*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156–158) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*; *Gonyaulacysta* (as *Acanthaulax?*, now *Cribroperidinium*) *angulosa*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*) *angulosa*. For further discussion, see *Cribroperidinium granulatum*. Age: middle Oxfordian–early Kimmeridgian.

"*granuligera*" (Klement, 1960, p.41–42, pl.5, figs.4–5) Sarjeant, 1969, p.10. Emendation: Sarjeant, 1984a, p.156, as *Cryptarchaeodinium granuligerum*. Holotype: Klement, 1960, pl.5, figs.4–5; Sarjeant, 1984a, pl.1, figs.3–4; text-fig.1; Jan du Chêne et al., 1986a, pl.27, figs.11–14. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Cryptarchaeodinium*, sixthly *Acanthaulax*. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156) retained *Gonyaulacysta* (as *Cribroperidinium*) *granuligera*. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: middle Oxfordian–early Kimmeridgian.

"*hadra*" Sarjeant, 1966b, p.119–121, pl.14, fig.1; text-fig.28. Holotype: Sarjeant, 1966b, pl.14, fig.1. **NOW** *Leptodinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium?*. Age: late Barremian.

"*helicoidea*" (Eisenack and Cookson, 1960, p.2–3, pl.1, figs.4–6,9 [figs.5–6 are now *Gonyaulacysta cassidata*]) Sarjeant, 1966b, p.116–117. Emendations: Sarjeant, 1966b, p.116, as *Gonyaulacysta helicoidea*; Helenes and Lucas-Clark, 1997, p.187–188, as *Wrevittia helicoidea*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.4–5. **NOW** *Wrevittia*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Wrevittia*. Taxonomic junior synonym: *Gonyaulacysta* (now *Wrevittia*) *diutina*,

according to Stover and Helby (1987d, p.287) — however, Jan du Chêne et al. (1986a, p.131) and Lentin and Williams (1989, p.152) retained *Gonyaulacysta* (now *Wrevittia?*) *diutina*. Age: Neocomian–Aptian.

"subsp. *helicoidea*". Autonym. Holotype: Eisenack and Cookson, 1960, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.4–5. **Now redundant.**

"var. *helicoidea*". Autonym. Holotype: Eisenack and Cookson, 1960, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.4–5. **Now redundant.** Originally *Gonyaulax helicoidea* var. *helicoidea* (Appendix B), subsequently *Gonyaulacysta helicoidea* var. *helicoidea*.

"subsp. *tuberculata*" (Vozzhennikova, 1967, p.83, pl.41, figs.3a–b) Lentin and Williams, 1973, p.62. Emendation: Lentin and Vozzhennikova, 1990, p.100, as *Gonyaulacysta? tuberculata*. Holotype: Vozzhennikova, 1967, pl.41, figs.3a–b; Lentin and Vozzhennikova, 1990, text-fig.56; lost according to Lentin and Vozzhennikova (1990, p.99). Neotype: Lentin and Vozzhennikova, 1990, pl.14, figs.7–8, designated by Lentin and Vozzhennikova (1990, p.99). **NOW** *Gonyaulacysta? tuberculata*. Originally *Gonyaulax helicoidea* var. *tuberculata* (Appendix B), subsequently *Gonyaulacysta helicoidea* var. *tuberculata*, thirdly *Gonyaulacysta helicoidea* subsp. *tuberculata*, fourthly (and now) *Gonyaulacysta? tuberculata*. Age: Tithonian.

"var. *tuberculata*" (Vozzhennikova, 1967, p.83, pl.41, figs.3a–b) Dodekova, 1971, p.10. Emendation: Lentin and Vozzhennikova, 1990, p.100, as *Gonyaulacysta? tuberculata*. Holotype: Vozzhennikova, 1967, pl.41, figs.3a–b; Lentin and Vozzhennikova, 1990, text-fig.56; lost according to Lentin and Vozzhennikova (1990, p.99). Neotype: Lentin and Vozzhennikova, 1990, pl.14, figs.7–8, designated by Lentin and Vozzhennikova (1990, p.99). **NOW** *Gonyaulacysta? tuberculata*. Originally *Gonyaulax helicoidea* var. *tuberculata* (Appendix B), subsequently *Gonyaulacysta helicoidea* var. *tuberculata*, thirdly *Gonyaulacysta helicoidea* subsp. *tuberculata*, fourthly (and now) *Gonyaulacysta? tuberculata*. Age: Tithonian.

"?*hyaloderma*" Deflandre, 1939b, p.144, pl.6, figs.3–4 ex Sarjeant, 1967b, p.252. Holotype: Deflandre, 1939b, pl.6, figs.3–4; Jan du Chêne et al., 1986a, pl.58, figs.1–5. **NOW** *Impagidinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Impagidinium?*. Questionable assignment: Stover and Evitt (1978, p.158) as a problematic species. The name *Palaeoperidinium hyalodermum* was not validly published in Deflandre (1939b) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.251) accepted Sarjeant's (1967b) indirect reference to Deflandre (1939b) as indication of a type (I.C.N. Article 40.3). Age: Kimmeridgian.

"*hyalodermopsis*" (Cookson and Eisenack, 1958, p.34, pl.3, figs.11–12; text-figs.5–6) Sarjeant, 1969, p.10. Holotype: Cookson and Eisenack, 1958, pl.3, figs.11–12; text-figs.5–6; Jan du Chêne et al., 1986a, pl.74, figs.9–10. **NOW** *Leptodinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Leptodinium?*, fourthly *Rhynchodiniopsis*. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Neocomian–Aptian.

"*incomposita*" Drugg, 1970b, p.810–811, figs.1E–O,2A. Holotype: Drugg, 1970b, figs.11–J; Eisenack and Kjellström, 1975a, page labelled "nach S.306d"; Jan du Chêne et al., 1986a, pl.17, figs.1–2; Fensome et al., 1995, figs.1–2 — p.1561. **NOW** *Corrudinium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly (and now) *Corrudinium*. Age: Oligocene.

"*indicosa*" Brideaux, 1971, p.83. Holotype: Singh, 1964, pl.18, figs.2–3, as *Palaeoperidinium granulatum*. **NOW** *Apteodinium? indicosum*. Originally *Palaeoperidinium granulatum* Singh (name not validly published), subsequently *Gonyaulacysta indicosa*, thirdly (and now) *Apteodinium? indicosum*. Substitute name for *Palaeoperidinium granulatum* Singh, 1964, p.135, pl.18, figs.2–3 (an invalid name); the name *Gonyaulacysta granulata* is preoccupied. The name *Palaeoperidinium granulatum* Singh 1964 was not validly published since the generic name *Palaeoperidinium* was not validly published until 1967. Age: middle-late Albian.

"*irmoechinata*" (Heisecke, 1970, p.230, pl.1, fig.3; pl.2, figs.2–3) Lentin and Williams, 1976, p.41. Holotype: Heisecke, 1970, pl.1, fig.3; pl.2, figs.2–3. **NOW** *Spinidinium?* Originally *Deflandrea*, subsequently *Gonyaulacysta*, thirdly (and now) *Spinidinium?*, fourthly *Volkheimeridium*. Age: early Paleocene.

"*italica*" Corradini, 1973, p.132–133, pl.19, figs.8a–b; pl.33, figs.5a–b; text-figs.3a–d. Holotype: Corradini, 1973, pl.19, figs.8a–b; text-figs.3a–d; Jan du Chêne et al., 1986a, pl.98, fig.11. **NOW** *Rhynchodiniopsis*?. Originally *Gonyaulacysta*, subsequently *Millioudodinium*?, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*?. Age: Late Cretaceous–Paleocene.

**jurassica* (Deflandre, 1939a, p.168, pl.6, figs.2–5; text-figs.1–2) Norris and Sarjeant, 1965, p.65. Emendation: Sarjeant, 1982b, p.28–30, as *Gonyaulacysta jurassica*. Holotype: Deflandre, 1939a, pl.6, figs.2–3; text-figs.1–2; Jan du Chêne et al., 1986a, pl.37, figs.1–3. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Gonyaulacysta*. Taxonomic junior synonym: *Psaligonyaulax* (as and now *Gonyaulacysta*) *dualis*, according to Sarjeant (1982b, p.29) — however, Jan du Chêne et al. (1986a, p.131) retained *Gonyaulacysta dualis*. Górka (1965, p.298) also proposed this combination. Age: Oxfordian.

subsp. *adecta* Sarjeant, 1982b, p.30–31, pls.1–3; pl.4, figs.1–4,9; pl.6, figs.4–5,9. Holotype: Sarjeant, 1982b, pl.1, fig.2. Age: Callovian.

var. *adecta* (1982). Autonym. Holotype: Sarjeant, 1982b, pl.1, fig.2. Age: Callovian.

var. *longicornis* (Deflandre, 1938, p.171, pl.6, fig.6) Downie and Sarjeant, 1965, p.115. Emendation: Sarjeant, 1982b, p.31, as *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Holotype: Deflandre, 1938, pl.6, fig.6; Jan du Chêne et al., 1986a, pl.37, figs.7–8. Originally *Gonyaulax jurassica* var. *longicornis* (Appendix B), subsequently *Gonyaulacysta jurassica* var. *longicornis*, thirdly *Gonyaulacysta jurassica* subsp. *longicornis*, fourthly (and now) *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Taxonomic junior synonym: *Gonyaulax* (as *Gonyaulacysta*) *jurassica* subsp. *brevis*, according to Sarjeant (1982b, p.31). Age: Oxfordian.

"subsp. *brevis*" (Johnson and Hills, 1973, p.206, pl.1, figs.11,14) Lentin and Williams, 1975, p.2151. Holotype: Johnson and Hills, 1973, pl.1, fig.14. Originally *Gonyaulacysta jurassica* var. *brevis*, subsequently *Gonyaulacysta jurassica* subsp. *brevis*. **Taxonomic senior synonym:** *Gonyaulax* (now *Gonyaulacysta*) *jurassica* subsp. *adecta* var. *longicornis*, according to Sarjeant (1982b, p.31). Age: ?late Callovian–early Oxfordian.

"var. *brevis*" Johnson and Hills, 1973, p.206, pl.1, figs.11,14. Holotype: Johnson and Hills, 1973, pl.1, fig.14. Originally *Gonyaulacysta jurassica* var. *brevis*, subsequently *Gonyaulacysta jurassica* subsp. *brevis*. **Taxonomic senior synonym:** *Gonyaulax* (now *Gonyaulacysta*) *jurassica* subsp. *adecta* var. *longicornis*, according to Sarjeant (1982b, p.31). Age: ?late Callovian–early Oxfordian.

subsp. *desmos* Poulsen, 1991, p.213–214, pl.1, figs.3–6. Holotype: Poulsen, 1991, pl.1, fig.3. Age: early Oxfordian.

subsp. *jurassica*. Autonym. Holotype: Deflandre, 1939a, pl.6, figs.2–3; text-figs.1–2; Jan du Chêne et al., 1986a, pl.37, figs.1–3. Emendation: Poulsen, 1991, p.212–213.

var. *jurassica*. Autonym. Holotype: Deflandre, 1939a, pl.6, figs.2–3; text-figs.1–2; Jan du Chêne et al., 1986a, pl.37, figs.1–3. Originally *Gonyaulax jurassica* var. *jurassica* (Appendix B), subsequently (and now) *Gonyaulacysta jurassica* var. *jurassica*.

var. *longicornuta* Sarjeant, 1982b, p.31–32, pl.5, figs.5–6. Holotype: Sarjeant, 1982b, pl.5, figs.5–6. Age: early-middle Kimmeridgian.

"subsp. *longicornis*" (Deflandre, 1939a, p.171, pl.6, fig.6) Lentin and Williams, 1973, p.62. Emendation: Sarjeant, 1982b, p.31, as *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Holotype: Deflandre, 1939a, pl.6, fig.6; Jan du Chêne et al., 1986a, pl.37, figs.7–8. **NOW** *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Originally *Gonyaulax jurassica* var. *longicornis* (Appendix B), subsequently *Gonyaulacysta jurassica* var. *longicornis*, thirdly *Gonyaulacysta jurassica* subsp. *longicornis*, fourthly (and

now) *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Taxonomic junior synonym: *Gonyaulax* (as *Gonyaulacysta*) *jurassica* subsp. *brevis*, according to Sarjeant (1982b, p.31). Age: Oxfordian.

var. ***longicornis*** (Deflandre, 1939a, p.171, pl.6, fig.6) Downie and Sarjeant, 1965, p.115. Emendation: Sarjeant, 1982b, p.31, as *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Holotype: Deflandre, 1939a, pl.6, fig.6; Jan du Chêne et al., 1986a, pl.37, figs.7–8. Originally *Gonyaulax jurassica* var. *longicornis* (Appendix B), subsequently *Gonyaulacysta jurassica* var. *longicornis*, thirdly *Gonyaulacysta jurassica* subsp. *longicornis*, fourthly (and now) *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Taxonomic junior synonym: *Gonyaulax* (as *Gonyaulacysta*) *jurassica* subsp. *brevis*, according to Sarjeant (1982b, p.31). Age: Oxfordian.

var. ***quadrata*** Kumar, 1986b, p.386,388, pl.1, fig.6; pl.3, fig.1; text-fig. 4. Holotype: Kumar, 1986b, pl.1, fig.6. Kumar (1987b, p.598) also cited this taxon as new. Age: Kimmeridgian–Tithonian.

?***kleithria*** Duxbury, 1983, p.47–48, pl.5, figs.1–2; text-fig.22. Holotype: Duxbury, 1983, text-fig.22. Questionable assignment: Duxbury (1983, p.47). Age: early Aptian.

"***kostroniensis***" (Vozzhennikova, 1967, p.85, pl.26, figs.1–6; pl.27, figs.1–2) Sarjeant, 1969, p.10. Emendation: Harding, 1996, p.353,355, as *Nelchinopsis kostroniensis*. Holotype: Vozzhennikova, 1967, pl.26, figs.1–6; Jan du Chêne et al., 1986a, pl.44, figs.7–8; Lentin and Vozzhennikova, 1990, text-fig.64; lost according to Lentin and Vozzhennikova (1990, p.109). Lectotype: Lentin and Vozzhennikova, 1990, pl.15, figs.5–6, designated by Lentin and Vozzhennikova (1990, p.109) and Harding, 1996, pl.1, fig.1. **NOW** *Nelchinopsis*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Nelchinopsis*. Taxonomic junior synonym: *Alaskadinium wigginsii*, according to Stover and Williams (1987, p.11). Age: Neocomian, ?Valanginian or early Hauterivian.

"***kunzeviensis***" (Vozzhennikova, 1967, p.87, pl.27, fig.6; pl.30, fig.2; pl.33, fig.6) Davies, 1983, p.18. Holotype: Vozzhennikova, 1967, pl.30, fig.2, lost according to Lentin and Vozzhennikova (1990, p.94). **NOW** *Cribroperidinium?* *perforans* subsp. *kunzeviense*. Originally *Gonyaulax perforans* var. *kunzeviensis* (Appendix B), subsequently *Gonyaulacysta kunzeviensis*, thirdly *Gonyaulacysta perforans* var. *kunzeviensis* (combination not validly published), fourthly (and now) *Cribroperidinium?* *perforans* subsp. *kunzeviensis*. Age: Valanginian.

?***lagenoides*** Olaru, 1978a, p.80–81, pl.14, fig.7. Questionable assignment: Jan du Chêne et al. (1986a, p.132), as a problematic species. Holotype: Olaru, 1978a, pl.14, fig.7. Age: middle Oligocene.

"***latisepta***" Beju, 1978, p.4. **Name not validly published**: no description or illustration.

"?***longicornis***" (Downie, 1957, p.420, pl.20, fig.8; text-figs.2a–b) Sarjeant, 1969, p.10. Holotype: Downie, 1957, pl.20, fig.8; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.30, fig.1. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly *Millioudodinium*, fifthly (and now) *Cribroperidinium?*. Questionable assignment: Stover and Evitt (1978, p.158). This combination, as a questionable assignment, was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: late Kimmeridgian.

"***magnoserrata***" (Cookson and Eisenack, 1962b, p.490, pl.3, figs.7–8) Yun Hyesu, 1981, p.10. Holotype: Cookson and Eisenack, 1962b, pl.3, figs.7–8. **NOW** *Spiniferites?*. Originally *Pterodinium*, subsequently (and now) *Spiniferites?*, thirdly *Gonyaulacysta*. Age: Aptian–?Albian.

"?***mamillifera***" (Deflandre, 1939b, p.143, pl.6, fig.1) Sarjeant, 1969, p.10. Holotype: Deflandre, 1939b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.72, figs.1–8. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Leptodinium*. Questionable assignment: Sarjeant (1969, p.10). This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Kimmeridgian.

"***margaritifera***" (Cookson and Eisenack, 1960a, p.5–6, pl.2, figs.1–2; text-fig.1) Sarjeant, 1966b, p.131. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.54, fig.6. **Combination not validly**

published: basionym not fully referenced. **NOW** *Impagidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Leptodinium*, fourthly (and now) *Impagidinium*. Age: Campanian.

"?*mecsekensis*" (Nagy, 1969, p.292, pl.1, figs.6,8) Lentin and Williams, 1976, p.110. Holotype: Nagy, 1969, pl.1, figs.6,8; Jan du Chêne et al., 1986a, pl.11, figs.10–12. **NOW** *Apteodinium*. Originally *Palaeoperidinium*, subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly (and now) *Apteodinium*. Questionable assignment: Lentin and Williams (1976, p.110). Age: late Miocene.

?*membranea* Yu Jingxian, 1982, p.241, pl.3, figs.9,11. Holotype: Yu Jingxian, 1982, pl.3, fig.9. Originally *Gonyaulacysta*, subsequently *Gonyaulacysta?*. Questionable assignment: Lentin and Williams (1985, p.154). Age: Late Jurassic–Early Cretaceous.

"*microceras*" (Eisenack, 1958a, p.391, pl.21, fig.13) Clarke and Verdier, 1967, p.31. Emendation: Sarjeant, 1985a, p.67, as *Rhynchodiniopsis microceras*. Holotype: Eisenack, 1958a, pl.21, fig.13; Sarjeant, 1985a, pl.6, figs.5–6; pl.7, fig.6; text-fig.4; Jan du Chêne et al., 1986a, pl.99, figs.5–6. **NOW** *Rhynchodiniopsis?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Rhynchodiniopsis?*. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: late Aptian.

"*millioudii*" (Sarjeant, 1963c, p.87–88, pl.1, figs.4–7) Sarjeant, 1966b, p.131. Holotype: Sarjeant, 1963c, pl.1, figs.4–7; Jan du Chêne et al., 1986a, pl.71, figs.4–7. **Combination not validly published:** basionym not fully referenced. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*. Age: early Oxfordian.

"*mirabilis*" (Klement, 1960, p.48–50, pl.6, figs.7–10; text-figs.25–27) Dodekova, 1967, p.19. Emendation: Sarjeant, 1984a, p.164–166, as *Leptodinium mirabile*. Holotype: Klement, 1960, pl.6, figs.7–8; text-figs.25–26; Sarjeant, 1984a, pl.4, figs.1–2; text-fig.5; Jan du Chêne et al., 1986a, pl.67, figs.5–8. **NOW** *Leptodinium*. Originally (and now) *Leptodinium*, subsequently *Gonyaulacysta*. Age: middle Oxfordian.

"*monacantha*" Deflandre, 1936b, p.176–177, pl.5, fig.10 ex Sarjeant, 1967b, p.252. Holotype: Deflandre, 1935, pl.6, fig.1; Deflandre, 1936b, pl.5, fig.10; lost according to Jan du Chêne et al. (1986a, p.48). **NOW** *Apteodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Apteodinium*, fifthly (and now) *Apteodinium?*. The name *Palaeoperidinium monacanthum* was not validly published in Deflandre (1936b) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.253) accepted Sarjeant's (1967b) indirect reference to Deflandre (1935) as indication of a type (I.C.N. Article 40.3). Age: Late Cretaceous.

"*mosaicum*" Downie, 1957, p.424, pl.20, fig.7; text-fig.2f ex Sarjeant, 1967b, p.253. Emendation: Sarjeant, 1976c, p.6–7, as *Leptodinium mosaicum*. Holotype: Downie, 1957, pl.20, fig.7; text-fig.2f; Sarjeant, 1976c, pl.2, figs.3,5; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.70, figs.5–6. **NOW** *Leptodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Leptodinium*, fourthly (and now) *Leptodinium?*. The name *Palaeoperidinium mosaicum* was not validly published in Downie (1957) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.253) accepted Sarjeant's (1967b) indirect reference to Downie (1957) as indication of a type (I.C.N. Article 40.3). N.I.A. Age: late Kimmeridgian.

"*muderongensis*" (Cookson and Eisenack, 1958, p.32, pl.3, figs.3–4; text-fig.15) Sarjeant, 1966b, p.131. Holotype: Cookson and Eisenack, 1958, pl.3, fig.3; text-fig.15. **Combination not validly published:** basionym not fully referenced. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Cribroperidinium*, fourthly (and now) *Cribroperidinium?*. Taxonomic junior synonym: *Gonyaulax* (as *Cribroperidinium*) *diaphana*, according to Backhouse (1988, p.80). Age: Aptian.

"?*nannotrix*" (Deflandre, 1939b, p.143, pl.6, fig.7) Sarjeant, 1969, p.10. Holotype: Deflandre, 1939b, pl.6, fig.7; Jan du Chêne et al., 1986a, pl.69, figs.4–6. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Leptodinium*. Questionable

assignment: Stover and Evitt (1978, p.159) as a problematic species. This combination was not validly published in Sarjeant (1966b, p.132), since that author did not fully reference the basionym. Age: Kimmeridgian.

"*nealei*" (Sarjeant, 1962a, p.480–481, pl.69, fig.1; text-fig.2) Sarjeant, 1966b, p.132. Holotype: Sarjeant, 1962a, pl.69, fig.1; text-fig.2. **Combination not validly published:** basionym not fully referenced. **NOW** *Rhynchodiniopsis?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Hystrichogonyaulax*, fourthly *Hystrichogonyaulax?*, fifthly *Rhynchodiniopsis*, sixthly (and now) *Rhynchodiniopsis?*. Questionable assignment: Sarjeant (1966b, p.132). Age: Oxfordian.

"*nuciformis*" (Deflandre, 1939a, p.180, pl.8, figs.4–6 ex Sarjeant, 1962a, p.482–483) Sarjeant, 1968, p.227. Holotype: Deflandre, 1939a, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.11, figs.1–3. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulax* (Appendix B), thirdly *Gonyaulacysta*, fourthly *Apteodinium*, fifthly *Millioudodinium*, sixthly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Palaeoperidinium nuciformoides*, according to Sarjeant (1968, p.227). This combination, as a questionable assignment, was not validly published in Sarjeant (1966b, p.132), since that author did not fully reference the basionym. Age: Oxfordian.

"*nuda*" (Nagy, 1969, p.291, pl.1, fig.1) Lentin and Williams, 1976, p.110. Holotype: Nagy, 1969, pl.1, fig.1. **NOW** *Pyxidinospis? nuda*. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta? nuda*, fifthly *Tectatodinium nudum*, sixthly *Tectatodinium? pannonium* (name illegitimate), seventhly *Pyxidinospis? pannonia* (name illegitimate), eighthly *Pyxidinospis? nuda*. Questionable assignment: Lentin and Williams (1976, p.110). Nomenclatural junior synonym: *Palaeoperidinium* (subsequently *Phthanoperidinium*, *Tectatodinium?* and *Pyxidinospis?*) *pannonium*, which has the same holotype. See also the discussion under *Pyxidinospis? nuda*. Age: late Miocene.

"*obesa*" Brideaux, 1971, p.82, pl.23, fig.39; text-figs.8a–b. Holotype: Brideaux, 1971, pl.23, fig.39; text-figs.8a–b; Jan du Chêne et al., 1986a, pl.30, fig.9. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Cribroperidinium?*. Age: late Albian.

?obscura (Lejeune-Carpentier, 1946, p.B191, figs.3–5) Sarjeant, 1969, p.10. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.4, as *Gonyaulacysta obscura*. Holotype: Lejeune-Carpentier, 1946, figs.3–4; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.3–4; text-fig.2. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Gonyaulacysta?*, fourthly *Millioudodinium*. Questionable assignment: Stover and Evitt (1978, p.158). This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Senonian.

"*oligodentata*" Helby in Riding and Helby, 2001f, p.150. **Name not validly published:** no description. This name was cited by Riding and Helby as a manuscript name and partial synonym of *Gonyaulacysta fenestrata*.

"*ordocava*" Duxbury, 1977, p.37–38, pl.1, figs.10–11; text-fig.12. Holotype: Duxbury, 1977, pl.1, figs.10–11; text-fig.12; Jan du Chêne et al., 1986a, pl.41, figs.1–2. **NOW** *Stanfordella*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Stanfordella*. Age: early–late Hauterivian.

"*ornata*" (Eisenack, 1935, p.176, pl.4, figs.9–10; text-figs.1–4) Pocock, 1972, p.87–88. Holotype: Eisenack, 1935, pl.4, fig.9. **NOW** *Ctenidodinium ornatum*. Originally *Lithodinia jurassica* var. *ornata*, subsequently (and now) *Ctenidodinium ornatum*, thirdly *Gonyaulacysta ornata*. Taxonomic junior synonym: *Brotzenia* (as *Ctenidodinium?*) *cristatum*, according to Woollam (1983, p.190). Age: Oxfordian.

"**orthoceras*" (Eisenack, 1958a, p.388, pl.21, figs.3–11; pl.24, fig.1) Sarjeant, 1966b, p.121. Emendation: Sarjeant, 1985a, p.51,53, as *Cribroperidinium orthoceras*. Holotype: Eisenack, 1958a, pl.21, fig.5; Sarjeant, 1985a, pl.1, figs.1,4; text-fig.1; Jan du Chêne et al., 1986a, pl.24, figs.7–8. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Cribroperidinium?*. Taxonomic senior synonym: *Gonyaulax* (as *Cribroperidinium*) *edwardsii*, according to Davey and Verdier (1971, p.17) — however, Lentin and Williams (1985, p.79) retained *Gonyaulacysta* (as *Cribroperidinium*) *orthoceras*. Age: Aptian.

"*pachyderma*" (Deflandre, 1939a, p.176–178, pl.7, figs.6–10; text-figs.7–10) Sarjeant, 1969, p.10. Holotype: Deflandre, 1939a, pl.7, figs.6–7. **NOW** *Korystocysta*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Ctenidodinium*, fourthly *Ctenidodinium?*, fifthly (and now) *Korystocysta*, sixthly *Dichadogonyaulax*. Taxonomic junior synonyms: *Leptodinium norrisii*, according to Benson (1985, p.154); *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *kettonensis*. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Oxfordian.

"*palla*" Sarjeant, 1966b, p.113–114, pl.13, figs.3–4; text-fig.24. Holotype: Sarjeant, 1966b, pl.13, figs.3–4; Jan du Chêne et al., 1986a, pl.27, figs.15–17. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Cribroperidinium*. Age: early Barremian.

"*pannonica*" (Nagy, 1965, p.200–201, pl.1, figs.1–2; pl.2, fig.10; text-figs.1–2) Lentin and Williams, 1973, p.63. Holotype: Nagy, 1965, pl.1, figs.1–2; pl.2, fig.10; Jan du Chêne et al., 1986a, pl.31, figs.1–4. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. Age: early Pliocene.

"*parorthoceras*" Davey, 1968, p.1. Holotype: Sarjeant, 1966b, pl.14, figs.5–6; text-fig.29, as *Gonyaulacysta orthoceras*; Jan du Chêne et al., 1986a, pl.26, figs.6–8. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium?*. Age: late Barremian.

pectinigera (Gocht, 1970b, p.138–139, pl.33, figs.1–4; text-fig.11) Fensome, 1979, p.43. Emendation: Fensome, 1979, p.43, as *Gonyaulacysta pectinigera*. Holotype: Gocht, 1970b, pl.33, fig.1. Originally *Leptodinium subtile* subsp. *pectinigerum*, subsequently *Hystrichogonyaulax pectinigera*, thirdly (and now) *Gonyaulacysta pectinigera*, fourthly *Leptodinium pectinigerum*. Jan du Chêne et al. (1986a, p.131) retained this species in *Gonyaulacysta*. Age: early Bathonian.

"*pennata*" Riley in Fisher and Riley, 1980, p.321–322, pl.1, figs.10–11. Holotype: Fisher and Riley, 1980, pl.1, figs.10–11; Jan du Chêne et al., 1986a, pl.98, fig.5. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulacysta*, subsequently *Hystrichogonyaulax*, thirdly *Millioudodinium*, fourthly (and now) *Rhynchodiniopsis*. This name was not validly published in Fisher and Riley (1976, p.52), who did not provide a description or illustration. Age: late Kimmeridgian.

"*perforans*" (Cookson and Eisenack, 1958, p.30–32, pl.2, figs.1–4, 7–8; text-figs.8–9) Sarjeant, 1969, p.10. Holotype: Cookson and Eisenack, 1958, pl.2, fig.1; text-figs.8–9; Jan du Chêne et al., 1986a, pl.32, fig.2. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Leptodinium?*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium*, sixthly (and now) *Cribroperidinium?*. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Late Jurassic.

"var. *kunzeviensis*" (Vozzhennikova, 1967, p.87, pl.27, fig.6; pl.30, fig.2; pl.33, fig.6) Lentin and Williams, 1985, p.156. Holotype: Vozzhennikova, 1967, pl.30, fig.2, lost according to Lentin and Vozzhennikova (1990, p.94). **Combination not validly published:** basionym not fully referenced. **NOW** *Cribroperidinium?* *perforans* subsp. *kunzeviense*. Originally *Gonyaulax perforans* var. *kunzeviensis* (Appendix B), subsequently *Gonyaulacysta kunzeviensis*, thirdly *Gonyaulacysta perforans* var. *kunzeviensis* (combination not validly published), fourthly (and now) *Cribroperidinium?* *perforans* subsp. *kunzeviense*. Age: Valanginian.

"*perforobtusa*" Duxbury, 1977, p.39, pl.1, fig.1; text-fig.13. Holotype: Duxbury, 1977, pl.1, fig.1; text-fig.13; Jan du Chêne et al., 1986a, pl.44, figs.1–2. **NOW** *Wrevittia?*. Originally *Gonyaulacysta*, subsequently *Gonyaulacysta?*, thirdly *Wrevittia?*. Questionable assignment: Sarjeant (1982b, p.28) — however, Jan du Chêne et al. (1986a, p.131) included the species in *Gonyaulacysta* without question. Age: Hauterivian.

"*pilum*" Gocht, 1959, p.56, pl.6, fig.14; pl.8, fig.8 ex Sarjeant, 1967b, p.254. Holotype: Gocht, 1959, pl.6, fig.14; Jan du Chêne et al., 1986a, pl.73, figs.7–8. **NOW** *Leptodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta?*, thirdly (and now) *Leptodinium?*. Questionable assignment: Sarjeant (1967b, p.254). The name *Palaeoperidinium pilum* was not validly published in Gocht (1959) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.255) accepted Sarjeant's (1967b) indirect reference to Gocht (1959) as indication of a type (I.C.N. Article 40.3). N.I.A. Age: Valanginian.

piriformis Conrad, 1941, p.9, pl.1, fig.G ex Sarjeant, 1967b, p.255. Holotype: Conrad, 1941, pl.1, fig.G. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta?*, thirdly (and now) *Gonyaulacysta*, fourthly *Palaeoperidinium?* (combination not validly published). Questionable assignment: Sarjeant (1967b, p.255) — however, Lentin and Williams (1976, p.111) included this species in *Gonyaulacysta* without question. The name *Palaeoperidinium piriforme* was not validly published in Conrad (1941) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.255) accepted Sarjeant's (1967b) indirect reference to Conrad (1941) as indication of a type (I.C.N. Article 40.3). Lentin and Williams (1976, p.111) also proposed this name as a "comb. nov.". Jan du Chêne et al. (1986a, p.132) recommended that this name be restricted to the holotype. Age: Maastrichtian.

"*plea*" (Tasch in Tasch et al., 1964, p.196, pl.1, fig.15) Lentin and Williams, 1976, p.43. Holotype: Tasch et al., 1964, pl.1, fig.15. **NOW** *Deflandrea?*. Originally *Peridinium* (Appendix B), subsequently (and now) *Deflandrea?*, thirdly *Gonyaulacysta?*. Questionable assignment: Lentin and Williams (1976, p.43). Age: Albanian.

polythyris Davey, 1979b, p.556, pl.3, figs.1–3. Holotype: Davey, 1979b, pl.3, figs.1–3; Jan du Chêne et al., 1986a, pl.39, figs.8–9. Age: Albanian.

"*porosa*" (Lejeune-Carpentier, 1946, p.B193,B196; text-fig.6) Sarjeant, 1966b, p.132. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.7–8, as *Leptodinium porosum*. Holotype: Lejeune-Carpentier, 1946, text-fig.6; Streel et al., 1977, pl.2, fig.4; Lejeune-Carpentier and Sarjeant, 1981, pl.3, figs.1–2; text-fig.4. **Combination not validly published**: basionym not fully referenced. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*, fourthly *Leptodinium?*. Questionable assignment: Sarjeant (1966b, p.132). Age: Late Cretaceous.

"*prominoseptata*" Wilson in Slimani, 2001a, p.194. **Name not validly published**: no description.

"*pyrum*" (Drugg, 1967, p.14, pl.1, fig.17; pl.9, figs.6a–b) Eisenack, 1967, p.97 (al. 306d). Holotype: Drugg, 1967, pl.1, fig.17; Jan du Chêne et al., 1986a, pl.27, figs.3–5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium?*. N.I.A. Age: Maastrichtian–Danian.

?*rara* Kar et al., 1972, p.147, pl.1, figs.4–5. Holotype: Kar et al., 1972, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.12–13. Originally *Gonyaulacysta*, subsequently (and now) *Gonyaulacysta?*. Questionable assignment: Stover and Evitt (1978, p.159) as a problematic species. Jain (1982, p.52) recommended that this name be restricted to the holotype. Age: Tertiary.

"*sarjeantii*" (Vozzhennikova, 1967, p.87–89, pl.25, figs.1–2; pl.28, fig.4; pl.31, figs.1a–b,2a–b,3; pl.32, figs.1,2a–c,3,4a–b) Sarjeant, 1969, p.11. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium?*, sixthly (and now) *Cribroperidinium*. Age: Tithonian.

"subsp. *sarjeantii*". Autonym. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **NOW** *Cribroperidinium sarjeantii* subsp. *sarjeantii*. Originally *Gonyaulacysta sarjeantii* subsp. *sarjeantii*, subsequently *Millioudodinium sarjeantii* subsp. *sarjeantii*, thirdly *Rhynchodiniopsis sarjeantii* subsp. *sarjeantii*, fourthly *Cribroperidinium? sarjeantii* subsp. *sarjeantii*, fifthly (and now) *Cribroperidinium sarjeantii* subsp. *sarjeantii*.

- "subsp. *sphaerica*" (Vozzhennikova, 1967, p.89, pl.25, figs.1–2; pl.28, fig.4; pl.32, figs.1–4) Lentin and Williams, 1973, p.63. Holotype: Vozzhennikova, 1967, pl.28, fig.4; Jan du Chêne et al., 1986a, pl.20, fig.9; lost according to Lentin and Vozzhennikova (1990, p.97). Lectotype: Lentin and Vozzhennikova, 1990, pl.16, fig.1–2, designated by Lentin and Vozzhennikova (1990, p.97). **NOW** *Cribroperidinium sarjeantii* subsp. *sphaericum*. Originally *Gonyaulax sarjeantii* var. *sphaerica* (Appendix B), subsequently *Gonyaulacysta sarjeantii* subsp. *sphaerica*, thirdly *Millioudodinium sarjeantii* subsp. *sphaericum*, fourthly *Rhynchodiniopsis sarjeantii* subsp. *sphaerica*, fifthly *Cribroperidinium?* *sarjeantii* subsp. *sphaericum*, sixthly (and now) *Cribroperidinium sarjeantii* subsp. *sphaericum*. Age: Tithonian.
- "*scarburghensis*" Sarjeant, 1964b, p.472–473. Holotype: Sarjeant, 1961a, pl.13, fig.13; text-fig.5; Jan du Chêne et al., 1986a, pl.3, figs.1–2. **NOW** *Trichodinium scarburghense*. Originally *Gonyaulax areolata* (name illegitimate; Appendix B), subsequently *Gonyaulacysta scarburghensis*, thirdly *Gonyaulacysta areolata* (combination illegitimate), fourthly *Acanthaulax areolata* (combination illegitimate), fifthly *Acanthaulax scarburghensis*, sixthly *Liesbergia scarburghensis*, seventhly (and now) *Trichodinium scarburghense*. Substitute name for *Gonyaulax areolata* Sarjeant, 1961a, p.95–96, pl.13, fig.13; text-fig.5 (an illegitimate name). Taxonomic junior synonym: *Acanthaulax senta*, according to Berger (1986, p.343). Age: late Callovian–early Oxfordian.
- "*scottii*" (Cookson and Eisenack, 1958, p.30, pl.2, figs.5–6) Sarjeant, 1969, p.11. Holotype: Cookson and Eisenack, 1958, pl.2, fig.5; Jan du Chêne et al., 1986a, pl.33, fig.5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: early-middle Kimmeridgian.
- "*serrata*" (Cookson and Eisenack, 1958, p.34, pl.3, fig.2; text-figs.12–14) Sarjeant, 1969, p.11. Holotype: Cookson and Eisenack, 1958, pl.3, fig.2; Jan du Chêne et al., 1986a, pl.99, figs.3–4. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Late Jurassic–Neocomian.
- "*setcheyensis*" Sarjeant, 1976c, p.4–6, pl.1, fig.7; text-fig.1. Holotype: Sarjeant, 1976c, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.74, figs.1–4. **NOW** *Impagidinium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Impagidinium*. Age: Kimmeridgian.
- "*solaris*" Davey, 1988, p.38, pl.4, figs.7–9. Holotype: Davey, 1988, pl.4, figs.7–9; Fensome et al., 1996, figs.1–3 — p.2367. **NOW** *Daveya*. Originally *Gonyaulacysta*, subsequently (and now) *Daveya*. N.I.A. Age: late Berriasian.
- speciosa* Harding, 1990b, p.33, pl.14, figs.1–15; pl.15, figs.12–14; text-fig.14 ex Harding in Williams et al., 1998, p.257. Holotype: Harding, 1990b, pl.14, fig.1. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: early Barremian.
- "*striata*" Clarke and Verdier, 1967, p.31, pl.4, figs.11–13; pl.5, fig.15; text-fig.12. Holotype: Clarke and Verdier, 1967, pl.4, figs.11–13; Jan du Chêne et al., 1986a, pl.88, figs.9–11. **NOW** *Pterodinium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Impagidinium*, fourthly (and now) *Pterodinium*. Age: Santonian.
- "*strigosa*" Yu Jingxian, 1982, p.240–241, pl.2, figs.1–2; pl.3, fig.3. Holotype: Yu Jingxian, 1982, pl.2, fig.2. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently (and now) *Cribroperidinium?*. Age: Late Jurassic–Early Cretaceous.
- "*?superornata*" (Wetzel, 1967a, p.869, pl.16, figs.8a–b) Eisenack and Kjellström, 1971, p.306g. Emendation: Sarjeant, 1980b, p.124–125, as *Meiourogononyaulax superornata*. Holotype: Wetzel, 1967a, pl.16, figs.8a–b. **NOW** *Meiourogononyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogononyaulax*, thirdly *Gonyaulacysta?*, fourthly *Lithodinia*, fifthly *Lithodinia?*. Questionable assignment: Eisenack and Kjellström (1971, p.306g). Age: early Bathonian.

"*systemmata*" Gitmez and Sarjeant, 1972, p.204–205, pl.5, figs.7–8. Holotype: Gitmez and Sarjeant, 1972, pl.5, figs.7–8; Jan du Chêne et al., 1986a, pl.29, figs.4–7. Originally *Gonyaulacysta*, subsequently *Cribroperidinium*, thirdly *Millioudodinium*, fourthly *Cribroperidinium?*, fifthly *Acanthaulax*. **Taxonomic senior synonym:** *Gonyaulacysta* (as and now *Cribroperidinium*) *globata*, according to Poulsen (1996, p.72). Age: early Kimmeridgian.

teichos Davey, 1974, p.53–54, pl.4, figs.5–7. Emendation: Harding, 1990b, p.34. Holotype: Davey, 1974, pl.4, fig.5; Jan du Chêne et al., 1986a, pl.39, fig.4. N.I.A. Age: early Barremian.

"?*tenuiceras*" (Eisenack, 1958a, p.389–391, pl.21, figs.14–15; pl.22, figs.1–3; pl.24, fig.2; text-figs.4a–c,5) Sarjeant, 1969, p.11. Emendations: Sarjeant, 1985a, p.63,65–66, as *Acanthaulax? tenuiceras*; Jan du Chêne et al., 1986b, p.29–30, as *Tehamadinium tenuiceras*. Holotype: Eisenack, 1958a, pl.21, fig.15; Sarjeant, 1985a, pl.6, figs.1–2; text-fig.3; Jan du Chêne et al., 1986a, pl.118, fig.1; Jan du Chêne et al., 1986b, pl.24, fig.5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly *Diacanthum*, fourthly *Occisucysta*, fifthly *Acanthaulax?*, sixthly *Tehamadinium*, seventhly (and now) *Cribroperidinium?*. Questionable assignment: Sarjeant (1969, p.11). Taxonomic junior synonym: *Occisucysta victorii*, according to Pöthe de Baldis and Ramos (1988, p.33). This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: late Barremian–Aptian.

"*tenuicornuta*" (Cookson and Eisenack, 1962b, p.478, pl.3, figs.12–13; text-figs.1a–b) Sarjeant, 1969, p.11. Holotype: Cookson and Eisenack, 1962b, pl.3, figs.12–13; text-figs.1a–b. **NOW** *Leptodinium?*. Originally *Leptodinium*, subsequently *Gonyaulacysta*, thirdly (and now) *Leptodinium?*. Age: Albanian.

"*tenuitabulata*" (Gerlach, 1961, p.159, pl.25, figs.10–11; text-figs.1–3) de Coninck, 1969, p.23. Emendation: Sarjeant, 1984b, p.76, as *Rhynchodiniopsis tenuitabulata*. Holotype: Gerlach, 1961, pl.25, figs.10–11. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribroperidinium*, fifthly *Rhynchodiniopsis*. Age: middle Oligocene–middle Miocene.

tianjianense Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.68–69, pl.1, figs.1–2. Holotype: Liu Zhili et al., 1992, pl.1, fig.1. Age: Early Tertiary.

?*transparens* (Sarjeant, 1959, p.334, pl.13, fig.3; text-fig.3) Sarjeant, 1969, p.11. Holotype: Sarjeant, 1959, pl.13, fig.3. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Gonyaulacysta?*. Questionable assignment: Stover and Evitt (1978, p.159) as a problematic species. This combination, as a questionable assignment, was not validly published in Sarjeant (1966b, p.132), since that author did not fully reference the basionym. Age: early Callovian.

?*tuberculata* (Vozzhennikova, 1967, p.83, pl.41, figs.3a–b) Lentin and Vozzhennikova, 1990, p.99. Emendation: Lentin and Vozzhennikova, 1990, p.99, as *Gonyaulacysta? tuberculata*. Holotype: Vozzhennikova, 1967, pl.41, figs.3a–b; Lentin and Vozzhennikova, 1990, text-fig.56; lost according to Lentin and Vozzhennikova (1990, p.99). Neotype: Lentin and Vozzhennikova, 1990, pl.14, figs.7–8, designated by Lentin and Vozzhennikova (1990, p.99). Originally *Gonyaulax helicoidea* var. *tuberculata* (Appendix B), subsequently *Gonyaulacysta helicoidea* var. *tuberculata*, thirdly *Gonyaulacysta helicoidea* subsp. *tuberculata*, fourthly (and now) *Gonyaulacysta? tuberculata*. Questionable assignment: Lentin and Vozzhennikova (1990, p.99–101). Age: Early Cretaceous.

"?*variabilis*" (Pocock, 1972, p.100, pl.23, figs.14–16) Davey, 1979d, p.217. Holotype: Pocock, 1972, pl.23, fig.15; Jansonius, 1986, pl.3, figs.15–17; text-fig.8; Jan du Chêne et al., 1986a, pl.39, figs.5–7. **NOW** *Endoscrinium?*. Originally *Chytroeisphaeridia*, subsequently *Chytroeisphaeridia?*, thirdly *Gonyaulacysta*, fourthly *Gonyaulacysta?*, fifthly (and now) *Endoscrinium?*. Questionable assignment: Jan du Chêne et al. (1986a, p.133) as a problematic species. Age: late Bajocian.

"*venusta*" (Klement, 1960, p.44–45, pl.5, figs.10–13; text-fig.22) Dodekova, 1971, p.11. Holotype: Klement, 1960, pl.5, figs.10–11. **Taxonomic senior synonym:** *Gonyaulax* (as *Cribroperidinium*) *granulata*, according to Schrank (2005, p.56). Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Gonyaulacysta*, fifthly *Cribroperidinium*. Age: middle Oxfordian–Kimmeridgian.

vesicula Dodekova, 1994, p.38–39, pl.10, figs.14–19; text-figs.5a–c. Holotype: Dodekova, 1994, pl.10, figs.15–16. Age: late Tithonian–earliest Berriasian.

"**vozhennikovae**" Sarjeant, 1982b, p.33–34, pl.7, fig.8; pl.8, fig.9. Holotype: Sarjeant, 1982b, pl.8, fig.9. **NOW** *Tubotuberella*. Originally *Gonyaulacysta*, subsequently (and now) *Tubotuberella*. Age: early Oxfordian.

"**wetzelii**" (Lejeune-Carpentier, 1939, p.B526; text-figs.1–2) Sarjeant, 1969, p.11. Emendations: Lejeune-Carpentier, 1946, p.B189–B190, as *Gonyaulax wetzelii*; Lejeune-Carpentier and Sarjeant, 1981, p.2–3, as *Gonyaulacysta wetzelii*. Holotype: Lejeune-Carpentier, 1939, text-figs.1–2; Lejeune-Carpentier and Sarjeant, 1981, pl.5, figs.5–6. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly (and now) *Cribroperidinium*, fifthly *Millioudodinium*. Questionable assignment: Stover and Evitt (1978, p.159). This combination was not validly published in Sarjeant (1966b, p.131), since that author did not fully reference the basionym. Age: Senonian.

"**whatleyi**" Sarjeant, 1972, p.19–21, pl.7, fig.1; text-fig.4. Holotype: Sarjeant, 1972, pl.7, fig.1; text-fig.4; Jan du Chêne et al., 1986a, pl.124, figs.10–11. **NOW** *Tubotuberella*. Originally *Gonyaulacysta*, subsequently (and now) *Tubotuberella*. Age: Bathonian–middle Callovian.

"**whitei**" Sarjeant, 1966b, p.126–128, pl.14, fig.2; text-fig.32. Holotype: Sarjeant, 1966b, pl.14, fig.2. **NOW** *Impagidinium?*. Originally *Gonyaulacysta*, subsequently (and now) *Impagidinium?*, thirdly *Rhynchodiniopsis*. Age: Cenomanian.

GORDIACYSTA Miles, 1990, p.84,86,88. Type: Miles, 1990, pl.3, figs.1–2, as *Gordiacysta coronata*.

***coronata** Miles, 1990, p.88, pl.3, figs.1–7. Holotype: Miles, 1990, pl.3, figs.1–2. Age: late Albian.

GORKADINIUM Loeblich Jr. and Loeblich III, 1966, p.93. Substitute name for *Tetrasphaera* Górká, 1965, p.307 (an illegitimate name). Type: Górká, 1965, pl.2, figs.6a–b, as *Gorkadinium rarum*.

***rarum** (Górká, 1965, p.307, pl.2, figs.6a–b) Loeblich Jr. and Loeblich III, 1966, p.93. Holotype: Górká, 1965, pl.2, figs.6a–b. Originally *Tetrasphaera* (generic name illegitimate), subsequently (and now) *Gorkadinium*. Age: early Kimmeridgian.

GRAMOCYSTA Lund and Lund-Christensen in Daniels et al., 1990, p.34. Type: Piasecki, 1980, pl.1, figs.7–8, as *Dinopterygium verricula*.

***verricula** (Piasecki, 1980, p.66–67, pl.1, figs.4–8; pl.5, figs.5–6) Lund and Lund-Christensen in Daniels et al., 1990, p.34. Holotype: Piasecki, 1980, pl.1, figs.7–8. Originally *Dinopterygium*, subsequently *Heteraulacacysta*, thirdly (and now) *Gramocysta*. Age: late Miocene.

GRANORETICELLA Jiabo, 1978, p.113–114. Emendation: Xu Jinli et al., 1997, p.68. Jiabo included this genus among the acritarchs, but Xu Jinli et al. considered it a dinoflagellate. Type: Jiabo, 1978, pl.42, figs.7a–b, as *Granoreticella conspicuis*.

aspera Jiabo, 1978, p.113–114, pl.43, figs.15–18. Holotype: Jiabo, 1978, pl.43, fig.18. Taxonomic junior synonym: *Granoreticella microreticulata*, according to He Chengquan et al. (2009, p.230). Age: late Oligocene.

***conspicuis** Jiabo, 1978, p.113, pl.42, figs.7a–b,8. Holotype: Jiabo, 1978, pl.42, figs.7a–b. Age: late Oligocene.

"*microgranulata*" Pan Zhaoren in Xu Jinli et al., 1997, p.68–69, pl.38, figs.17–19. Holotype: Xu Jinli et al., 1997, pl.38, fig.17. **Name not validly published**: no English or Latin description. **NOW** *Pyxidinospis*. Originally *Granoreticella* (name not validly published), subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*microreticulata*" Pan Zhaoren in Xu Jinli et al., 1997, p.69, pl.37, figs.21–23, Holotype: Xu Jinli et al., 1997, pl.37, fig.21. **Name not validly published**: no English or Latin description. **Taxonomic senior synonym**: *Granoreticella aspera*, according to He Chengquan et al. (2009, p.230). Age: Oligocene.

"*pseudospinea*" Pan Zhaoren in Xu Jinli et al., 1997, p.69, pl.38, figs.4–5,7. Holotype: Xu Jinli et al., 1997, pl.38, fig.7. **Name not validly published**: no English or Latin description. **Taxonomic senior synonym**: *Granoreticella tenuis*, according to He Chengquan et al. (2009, p. 231). Age: Oligocene.

stabilis Lu Mengning and Wang Ruoshan, 1980, p.375, pl.3, fig.29. Holotype: Lu Mengning and Wang Ruoshan, 1980, pl.3, fig.29. Age: Late Triassic.

tenuis Jiabo, 1978, p.114, pl.43, fig.19. Holotype: Jiabo, 1978, pl.43, fig.19. Taxonomic junior synonym: *Granoreticella pseudospinea*, according to He Chengquan et al. (2009, p. 231). Age: late Oligocene.

variabilis Jiabo, 1978, p.114, pl.14, figs.9–16. Holotype: Jiabo, 1978, pl.42, fig.9. Age: Oligocene.

GRAPTODINIUM Clowes, 2013, p.316–318. Type: Clowes, 2013, pl.1, figs.1–3, as *Graptodinium inconditum*.

**inconditum* Clowes, 2013, p.318,321, pl.1, figs.1–6, pl.2, figs.1–12. Holotype: Clowes, 2013, pl.1, figs.1–3. Age: Lutetian–Chattian.

omnireticulatum Clowes, 2013, p.321–322, pl.1, figs.10–12. Holotype: Clowes, 2013, pl.1, figs.10–12. Age: Lutetian–Priabonian.

GRESSLYODINIUM Below, 1990, p.50–51. Contrary to the opinion of Lentin and Williams (1993, p.268), this name is validly published since the name of the "type species" is validly published. Type: Below, 1990, pl.11, figs.2,4–7,10–11,14, as *Gresslyodinium mirabile*.

**mirabile* Below, 1990, p.51–52, pl.11, figs.1–16; text-fig.14. Holotype: Below, 1990, pl.11, figs.2,4–7,10–11,14. Contrary to the opinion of Lentin and Williams (1993, p.269), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Bajocian.

"**GYMMASTER**" Schütt, 1891, p.19. Siliceous dinoflagellate genus. **Taxonomic senior synonym**: *Actiniscus*, according to Fensome et al. (1993b, p.50–51). Type: not designated.

"*cinctus*" Hovasse, 1943, p.279, fig.3. Holotype: Hovasse, 1943, fig.3. **NOW** *Cinctactiniscus*. Originally *Gymmaster*, subsequently (and now) *Cinctactiniscus*. Age: early Miocene.

"*pentasterias*" (Ehrenberg, 1841, p.111,149) Schütt, 1891, p.19. Holotype: not designated. **NOW** *Actiniscus*. Originally *Dictyochoa* subgenus *Actiniscus* (Appendix A), subsequently (and now) *Actiniscus*, thirdly *Gymmaster*. Downie and Sarjeant (1965, p.82) retained this species in *Actiniscus*. Age: Pliocene.

"*sirius*" (Ehrenberg, 1841, p.150) Schütt, 1891, p.20. Holotype: not designated **NOW** *Actiniscus*. Originally *Dictyochoa* subgenus *Actiniscus*, subsequently (and now) *Actiniscus*, thirdly *Distephanus* (name not validly published; Appendix A), fourthly *Gymmaster*. Dumitrică (1973, p.822) considered *Dictyochoa* (now *Actiniscus*) *pentasterius* to be the questionable taxonomic senior synonym of this species. N.I.A. Age: Miocene.

tetrasterias (Ehrenberg, 1844a, p.68,76) Schütt, 1891, p.19. Holotype: Ehrenberg, 1854, pl.18, fig.62. **NOW** *Actiniscus*. Originally (and now) *Actiniscus*, subsequently *Gymnaster*. Age: Miocene.

HABIBACYSTA Head et al., 1989b, p.457–458. Type: Head et al., 1989b, pl.4, figs.1–2,5–6, as *Habibacysta tectata*.

**tectata* Head et al., 1989b, p.458, pl.4, figs.1–6,9–10. Holotype: Head et al., 1989b, pl.4, figs.1–2,5–6; Head, 1994a, pl.5, figs.1–6. Head (1996a, p.551) considered *Filisphaera? minuta* to be a possible taxonomic junior synonym of this species. Age: late Miocene–early Pliocene.

HADRIANA Riding and Helby, 2001f, p.153–155. Type: Riding and Helby, 2001f, figs.8G–I, as *Hadriana cinctum*.

**cinctum* Riding and Helby, 2001f, p.155,157, figs.8A–I,9A–L. Holotype: Riding and Helby, 2001f, figs.8G–I. The epithet is avowedly based on the Latin noun *cinctum* (girdle or zone) and thus should be cited as "*cinctum*", not "*cincta*" as indicated in Riding and Helby. N.I.A. Age: Kimmeridgian–Tithonian.

HAFNIASPHAERA Hansen, 1977, p.13–14. Emendation: Fensome et al., 2009, p.34. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites* subgenus *Hafniasphaera*. Taxonomic senior synonym: *Spiniferites*, according to Stover and Williams (1987, p.117) — however, Edwards (1996, p.989) retained *Hafniasphaera*. Taxonomic junior synonym: *Rivernookia*, according to Lentin and Williams (1985, p.311). Fensome et al. (2009, p.34) retained *Hafniasphaera* at generic rank. Type: Hansen, 1977, fig.18A, as *Hafniasphaera hyalospinosa*.

australis Guler et al., 2005, p.425,427, figs.5M–T,6A–E. Holotype: Guler et al., 2005, figs.5S–T. Age: Maastrichtian.

cryptovesiculata Hansen, 1977, p.14–15, figs.9–10,18C,E–F,19A–B. Holotype: Hansen, 1977, figs.18C,E–F. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Williams et al. (1998, p.261) retained this species in *Hafniasphaera*. Age: Danian.

delicata Fensome et al., 2009, p.34,35, pl.4, figs.1–p. Holotype: Fensome et al., 2009, pl.4, figs.1,p. Age: youngest occurrence, late Ypresian.

fluens Hansen, 1977, p.16, figs.13–14,19C–D. Holotype: Hansen, 1977, figs.19C–D. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Williams et al. (1998, p.261) retained this species in *Hafniasphaera*. Age: late Maastrichtian–Danian.

goodmanii Edwards, 1982, p.110,112–113, pl.1, figs.1–3,5–6,8–9. Holotype: Edwards, 1982, pl.1, figs.1–3. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Williams et al. (1998, p.261) retained this species in *Hafniasphaera*. Age: early Eocene.

graciosa Hansen, 1977, p.15, figs.11–12,18B,D. Holotype: Hansen, 1977, fig.18B. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Williams et al. (1998, p.261) retained this species in *Hafniasphaera*. Age: Danian.

**hyalospinosa* Hansen, 1977, p.14, figs.7–8,18A. Holotype: Hansen, 1977, fig.18A. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Williams et al. (1998, p.261) retained this species in *Hafniasphaera*. Age: Danian.

septata (Cookson and Eisenack, 1967b, p.253–254, pl.42, figs.6–10; text-fig.1) Hansen, 1977, p.16. Emendation: McLean, 1971, p.730, as *Spiniferites septatus*. Holotype: Cookson and Eisenack, 1967b, pl.42, fig.6; Eisenack and Kjellström, 1975b, uppermost figure — p.984w; Fensome et al., 1996, fig.1 — p.2356. Originally *Baltisphaeridium*

(Appendix A), subsequently *Spiniferites*, thirdly (and now) *Hafniasphaera*, fourthly *Achomosphaera*, fifthly *Rivernookia*. Williams et al. (1998, p.261) retained this species in *Hafniasphaera*. Age: late Paleocene.

HAPSIDAULAX Sarjeant, 1975b, p.143–144. Type: Sarjeant, 1975b, pl.1, figs.c–d; text-figs.1A–D, as *Hapsidaulax margarethae*.

**margarethae* Sarjeant, 1975b, p.144–147, pl.1, figs.a–d, pl.2, figs.a–d; text-figs.1A–D,2A–D,3A–D. Emendation: Stancliffe and Sarjeant, 1990, p.203. Holotype: Sarjeant, 1975b, pl.1, figs.c–d; text-figs.1A–D; Stancliffe and Sarjeant, 1990, text-fig.4, nos.1–3. Age: Bathonian.

HAPSOCYSTA Davey, 1979b, p.556. Emendation: Heilmann-Clausen and Van Simaey, 2005, p.166. Taxonomic junior synonym: *Piccoladinium*, by implication in Heilmann-Clausen and Van Simaey (2005, p.166), who transferred the "type species" of *Piccoladinium* to *Hapsocysta*. Type: Eisenack and Cookson, 1960, pl.3, fig.6, as *Cannosphaeropsis peridictya*.

?*benteae* Nøhr-Hansen, 1993, p.71–72, pl.25, figs.11–12; text-figs.10a–b,11a–b. Holotype: Nøhr-Hansen, 1993, pl.25, fig.11; text-figs.10a–b. Questionable assignment: Nøhr-Hansen (1993, p.71). Age: early–late Albian.

dictyota Davey, 1979b, p.557, pl.3, figs.5–10,13–14. Holotype: Davey, 1979b, pl.3, figs.5–6. Age: late Albian.

fenestrata (Versteegh and Zevenboom in Versteegh, 1995, p.91–92, pl.4, figs.1–7) Heilmann-Clausen and Van Simaey, 2005, p.166. Holotype: Versteegh, 1995, pl.4, figs.1,4. Originally *Piccoladinium*, subsequently (and now) *Hapsocysta*. Age: early Chattian–mid Piacenzian.

kysingensis Heilmann-Clausen and Van Simaey, 2005, p.166,168–170, pl.5, figs.1–6; text-fig.7A–C. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.5, figs.1–2; text-fig.7A. Age: late Eocene.

**peridictya* (Eisenack and Cookson, 1960, p.8, pl.3, figs.5–6) Davey, 1979b, p.556. Emendation: Davey, 1979b, p.556, as *Hapsocysta peridictya*. Holotype: Eisenack and Cookson, 1960, pl.3 fig.6; Fensome et al., 1995, fig.2 — p.1661; Heilmann-Clausen and Van Simaey, 2005, text-figs.6A–B. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Hapsocysta*. Age: late Albian–Cenomanian.

"*spinosa*" Robertson Research International in Riding and Helby, 2001h, p.227. **Name not validly published:** no description. **Taxonomic senior synonym:** *Cannosphaeropsis australis*, according to Riding and Helby (2001h, p.227).

susanae Duxbury, 2002, p.78–80, pl.1, figs.1–6,9; text-figs.3–5. Holotype: Duxbury, 2002, pl.1, figs.1–2; text-fig.3. Age: early-middle Albian.

"**HASHENIA**" Yu Jingxian and Zhang Wangping, 1980, p.107. **Taxonomic senior synonym:** *Canningia*, according to Chen et al. (1988, p.16). Type: Yu Jingxian and Zhang Wangping, 1980, pl.2, fig.1, as *Hashenia reticulata*.

reticulata* Yu Jingxian and Zhang Wangping, 1980, p.107, pl.1, fig.17; pl.2, figs.1–2. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.2, fig.1. **Substitute name: *Canningia xinjiangensis*. Originally *Hashenia reticulata*, subsequently (and now) *Canningia xinjiangensis*. Age: Turonian–Maastrichtian.

"**HEADINIUM**" Zevenboom and Santarelli in Zevenboom, 1995, p.152. **Name not validly published:** considered a manuscript name. Type: Zevenboom, 1995, pl.3, figs.7–9, as *Headinium miocenicum*.

"**miocenicum*" Zevenboom and Santarelli in Zevenboom, 1995, p.152–153, pl.3, figs.7–12. Holotype: Zevenboom, 1995, pl.3, figs.7–9. **Name not validly published:** considered a manuscript name. Age: late middle Miocene–late Miocene.

HEBECYSTA Bujak and Fisher, 1976, p.64. Type: Bujak and Fisher, 1976, pl.9, fig.11, as *Hebecysta brevicornuta*.

balmei (Stover and Helby, 1987a, p.109–110, figs.7A–H) Below, 1987a, p.126. Emendation: Below, 1987a, p.126, as *Hebecysta balmei*. Holotype: Stover and Helby, 1987a, figs.7A–B; Fensome et al., 1996, figs.1–2 — p.2061. Originally *Heibergella*, subsequently (and now) *Hebecysta*. Age: Norian.

**brevicornuta* Bujak and Fisher, 1976, p.64, pl.9, figs.11–15; text-figs.6A–B. Holotype: Bujak and Fisher, 1976, pl.9, fig.11. Age: Norian.

HEIBERGELLA Bujak and Fisher, 1976, p.52,54. Type: Bujak and Fisher, 1976, pl.8, figs.1–2, as *Heibergella asymmetrica*.

aculeata Bujak and Fisher, 1976, p.56,58, pl.8, figs.14–20; text-fig.4D. Holotype: Bujak and Fisher, 1976, pl.8, figs.14–16. Age: Norian.

**asymmetrica* Bujak and Fisher, 1976, p.54,56, pl.8, figs.1–8; text-figs.4A–B. Holotype: Bujak and Fisher, 1976, pl.8, figs.1–2. Age: Norian.

"*balmei*" Stover and Helby, 1987a, p.109–110, figs.7A–H. Emendation: Below, 1987a, p.126, as *Hebecysta balmei*. Holotype: Stover and Helby, 1987a, figs.7A–B; Fensome et al., 1996, figs.1–2 — p.2061. **NOW** *Hebecysta*. Originally *Heibergella*, subsequently (and now) *Hebecysta*. Age: Norian.

circularis He Chengquan and Li Peng, 1981, p.65, pl.31, figs.1–2. Holotype: He Chengquan and Li Peng, 1981, pl.31, fig.1. Age: late Oligocene.

kendelbachia (Morbey, 1975, p.38, pl.14, figs.1–4; pl.17, figs.1–3) Lentin and Williams, 1981, p.127. Holotype: Morbey, 1975, pl.14, fig.1; pl.17, fig.1. Originally *Rhombodella* (Appendix A), subsequently *Chytroeisphaeridia*, thirdly (and now) *Heibergella*. Below (1987a, p.94) considered *Suessia swabiana* to be the questionable taxonomic senior synonym of this species. Age: Rhaetian.

salebrosacea Bujak and Fisher, 1976, p.56, pl.8, figs.9–13; text-fig.4C. Holotype: Bujak and Fisher, 1976, pl.8, figs.9–10. Age: Norian.

"**HELBYCYSTA**" Morgan in Riding and Helby, 2001d, p.79. **Name not validly published:** no description. **Taxonomic senior synonym:** *Fusiformacysta*, by implication in Riding and Helby (2001d, p.79), who included the two species names, *Helbycysta psilata* and *Helbycysta verrucosa* (both names not validly published), in synonymy with *Fusiformacysta terniana* and *Fusiformacysta challisiana* respectively.

"*psilata*" Morgan in Riding and Helby, 2001d, p.79. **Name not validly published:** no description. **Taxonomic senior synonym:** *Fusiformacysta terniana*, according to Riding and Helby (2001d, p.79).

"*verrucosa*" Morgan in Riding and Helby, 2001e, p.119. **Name not validly published:** no description. **Taxonomic senior synonym:** *Fusiformacysta challisiana*, according to Riding and Helby (2001e, p.119).

HELBYDINIUM Snape, 1992, p.273. Type: Snape, 1992, figs.6a,e, as *Helbydinium scabratum*.

**scabratum* Snape, 1992, p.273,275, figs.6a–b,e. Holotype: Snape, 1992, figs.6a,e. Age: Tithonian.

"**HELIODINIUM**" Alberti, 1961, p.33. Emendation: Sarjeant, 1966b, p.142. **Taxonomic senior synonym:** *Hystrichodinium*, according to Clarke and Verdier (1967, p.37–38) and Lentin and Williams (1977b, p.72). Type: Alberti, 1961, pl.8, fig.2, as *Heliodium voigtii*.

"**patriciae**" Neale and Sarjeant, 1962, p.451–452, pl.19, fig.3; text-fig.7. Holotype: Neale and Sarjeant, 1962, pl.19, fig.3; text-fig.7. **NOW** *Hystrichodinium*. Originally *Heliodium*, subsequently (and now) *Hystrichodinium*. Age: Hauterivian.

"***voigtii**" Alberti, 1961, p.33, pl.8, figs.1–5. Emendation: Sarjeant, 1966b, p.142–144, as *Heliodium voigtii*. Holotype: Alberti, 1961, pl.8, fig.2. **NOW** *Hystrichodinium*. Originally *Heliodium*, subsequently (and now) *Hystrichodinium*. Age: Barremian–early Aptian.

"**HEMICYSTODINIUM**" Wall, 1967, p.110. **Taxonomic senior synonym:** *Polysphaeridium*, according to Bujak et al. (1980, p.34). Type: Rossignol, 1962, pl.2, fig.10, as *Hystrichosphaeridium zoharyi*.

"**congregatum**" Stover, 1977, p.79, pl.3, figs.39–44. Holotype: Stover, 1977, pl.3, figs.39–42. **NOW** *Polysphaeridium*. Originally *Hemicystodinium*, subsequently (and now) *Polysphaeridium*. Age: middle Oligocene.

"**parvum**" Huang Tsengchieng, 1981, p.50, pl.2, figs.1–2. Holotype: Huang Tsengchieng, 1981, pl.2, figs.1–2. **NOW** *Polysphaeridium*. Originally *Hemicystodinium*, subsequently (and now) *Polysphaeridium*. Age: Miocene.

"**taiwanianum**" Huang Tsengchieng, 1981, p.50, pl.2, figs.3–4. Holotype: listed but illustration not specified. **NOW** *Polysphaeridium*. Originally *Hemicystodinium*, subsequently (and now) *Polysphaeridium*. Age: Miocene.

"**?taugourdeau**" (Varma and Dangwal, 1964, p.68, pl.2, fig.9) Sarjeant and Stover, 1978, p.51. Holotype: Varma and Dangwal, 1964, pl.2, fig.9. Originally *Tenua* Eisenack, subsequently *Hemicystodinium?*, thirdly *Batiacasphaera*. **Taxonomic senior synonym:** *Polysphaeridium subtile*, according to Lentin and Williams (1993, p.275). Taxonomic senior synonym: *Hystrichosphaeridium* (now *Polysphaeridium*) *zoharyi*, according to Lentin and Williams (1981, p.26,127) — however, *Tenua taugourdeau* is now considered a taxonomic junior synonym of *Polysphaeridium subtile*. Questionable assignment: Sarjeant and Stover (1978, p.51). Age: Eocene–Oligocene.

"***zoharyi**" (Rossignol, 1962, p.132, pl.2, fig.10) Wall, 1967, p.110. Holotype: Rossignol, 1962, pl.2, fig.10. **NOW** *Polysphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?* (combination not validly published), thirdly *Hemicystodinium*, fourthly (and now) *Polysphaeridium*. Taxonomic junior synonyms: *Polysphaeridium subtile*, according to Islam (1983b, p.343) — however, Lentin and Williams (1989, p.300) retained *Polysphaeridium subtile*; *Tenua* (as *Hemicystodinium?*) *taugourdeau*, according to Lentin and Williams (1981, p.26,127) — however, *Tenua taugourdeau* is now considered a taxonomic junior synonym of *Polysphaeridium subtile*; *Membranilarnacia delicata*, according to Jain and Garg (1991, p.82). Motile equivalent: *Pyrodinium bahamense* Plate, 1906, according to Wall and Dale (1969, p.140); *Pyrodinium bahamense* var. *compressum* Böhm, 1931, according to Matsuoka (1989, p.220). Age: Pleistocene.

"subsp. **ktana**" (Rossignol, 1964, p.88, pl.2, figs.6–7,10; pl.3, fig.11) Lentin and Williams, 1973, p.67. Holotype: Rossignol, 1964, pl.2, fig.7. **NOW** *Polysphaeridium zoharyi* subsp. *ktana*. Originally *Hystrichosphaeridium zoharyi* var. *ktana*, subsequently *Hemicystodinium zoharyi* var. *ktana* (combination not validly published), thirdly *Hemicystodinium zoharyi* subsp. *ktana*, fourthly (and now) *Polysphaeridium zoharyi* subsp. *ktana*, fifthly *Polysphaeridium subtile* subsp. *ktana*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium?* *breviatum*, according to Islam (1983b, p.343) — however, Masure and Foucher in Fauconnier and Masure (2004, p.309–310) retained *Hystrichosphaeridium?* *breviatum*. Age: Pleistocene.

"var. **ktana**" (Rossignol, 1964, p.88, pl.2, figs.6–7,10; pl.3, fig.11) Harland and Downie, 1969, p.232. Holotype: Rossignol, 1964, pl.2, fig.7. **Combination not validly published:** basionym not fully referenced. **NOW** *Polysphaeridium zoharyi* subsp. *ktana*. Originally *Hystrichosphaeridium zoharyi* var. *ktana*, subsequently *Hemicystodinium zoharyi* var. *ktana* (combination not validly published), thirdly

Hemicystodinium zoharyi subsp. *ktana*, fourthly *Polysphaeridium zoharyi* subsp. *ktana*, fifthly *Polysphaeridium subtile* subsp. *ktana*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium? breviatum*, according to Islam (1983b, p.343) — however, Masure and Foucher in Fauconnier and Masure (2004, p.309–310) retained *Hystrichosphaeridium? breviatum*. Age: Pleistocene.

"subsp. *zoharyi*". Autonym. Holotype: Rossignol, 1962, pl.2, fig.10. **NOW** *Polysphaeridium zoharyi* subsp. *zoharyi*. Originally *Hemicystodinium zoharyi* subsp. *zoharyi*, subsequently (and now) *Polysphaeridium zoharyi* subsp. *zoharyi*. Age: Pleistocene.

HEMIPLACOPHORA Cookson and Eisenack, 1965a, p.125. Type: Cookson and Eisenack, 1965a, pl.14, figs.4–5, as *Hemiplacophora semilunifera*.

**semilunifera* Cookson and Eisenack, 1965a, p.126, pl.14, figs.4–9,16. Holotype: Cookson and Eisenack, 1965a, pl.14, figs.4–5; Fauconnier and Masure, 2004, pl.29, figs.6–9. Age: late Eocene.

HEMISPHAERIDIUM Bujak in Bujak et al., 1980, p.56. Type: Bujak et al., 1980, pl.15, fig.7, as *Hemisphaeridium fenestratum*.

**fenestratum* Bujak in Bujak et al., 1980, p.56,58, pl.15, figs.7–9. Holotype: Bujak et al., 1980, pl.15, fig.7; Fensome et al., 1993a, fig.1 — p.1187. Age: middle Eocene (see Aubry, 1986).

"**HEMISTOMIOSPHAERA**" Nowak, 1968, p.311–312. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1300). **Taxonomic senior synonym:** *Cadosina*, according to Řehánek and Cecca (1993, p.155). Type: I. Nagy, 1966, pl.5, fig.17, as *Cadosina parvula*.

"**parvula*" (I. Nagy, 1966, p.93, pl.5, fig.17) Nowak, 1968, p.312. Holotype: I. Nagy, 1966, pl.5, fig.17. **NOW** *Cadosina*. Originally (and now) *Cadosina*, subsequently *Hemistomiosphaera*. This species is retained in *Cadosina* since *Hemistomiosphaera* is now considered a taxonomic junior synonym of that genus. Age: Kimmeridgian.

HEPTASPHAERA Keupp, 1979a, p.41–42. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Type: Keupp, 1979a, pl.11, fig.6, as *Heptasphaera michaelii*.

**michaelii* Keupp, 1979a, p.42–43, pl.11, figs.6–12. Holotype: Keupp, 1979a, pl.11, fig.6. Age: early Barremian.

paulaworstelliae (Bolli, 1978b, p.912, pl.1, figs.1–12) Lentin and Williams, 1985, p.379. Holotype: Bolli, 1978b, pl.1, figs.7–9. Originally *Bonetocardiella*, subsequently (and now) *Heptasphaera*. This combination was not validly published in Keupp (1981, p.57), since that author did not fully reference the basionym. Fensome and Williams (2004) were incorrect in considering this name to be not validly published; see discussion under *Bonetocardiella*. Age: Oxfordian–Kimmeridgian.

HERENDEENIA Wiggins, 1969, p.145–146. Taxonomic senior synonym: *Omatia*, according to Stover and Evitt (1978, p.280) — however, Stover and Helby (1987b, p.153–154) retained *Herendeenia*. Stover and Helby (1987b, p.153–154) gave a "redescription" of this genus. Type: Cookson and Eisenack, 1958, pl.8, fig.6, as *Omatia pisciformis*.

alaskaensis (Stover and Evitt, 1978, p.178) Stover and Helby, 1987b, p.155. Holotype: Wiggins, 1969, pl.1, figs.1–3, as *Herendeenia pisciformis*. Originally *Omatia*, subsequently (and now) *Herendeenia*. Stover and Helby (1987b, p.155–156) provided a revised description for this species. Age: Neocomian, ?late Hauterivian–Barremian.

**pisciformis* (Cookson and Eisenack, 1958, p.61, pl.8, fig.6) Wiggins, 1969, p.146. Emendation: Stover and Helby, 1987b, p.154, as *Herendeenia pisciformis*, as a revised description. Holotype: Cookson and Eisenack, 1958, pl.8,

fig.6. Originally *Omatia*, subsequently (and now) *Herendeenia*. Stover and Helby (1987b, p.154) retained this species in *Herendeenia*. Age: Late Jurassic.

postprojecta Stover and Helby, 1987c, p.238–241, figs.10A–D,11A–N,12A–L. Holotype: Stover and Helby, 1987c, figs.11A–E; Fensome et al., 1996, figs.1–5 — p.2295. Age: Hauterivian–Aptian.

HESLERTONIA Sarjeant, 1966b, p.133. Emendation: Duxbury, 1980, p.123. Type: Neale and Sarjeant, 1962, pl.19, fig.5; text-fig.1, as *Gonyaulax heslertonensis*.

cylindrata Yun Hyesu, 1981, p.72, pl.8, figs.3a–b,11; text-figs.15a–b. Holotype: Yun Hyesu, 1981, pl.8, figs.3a–b; text-figs.15a–b; Fensome et al., 1991, figs.1–4 — p.637. Age: early Santonian.

**heslertonensis* (Neale and Sarjeant, 1962, p.440–441, pl.19, fig.5; pl.20, fig.5; text-figs.1a–b) Sarjeant, 1966b, p.133. Emendation: Duxbury, 1980, p.124, as *Heslertonia heslertonensis*. Holotype: Neale and Sarjeant, 1962, pl.19, fig.5; text-figs.1a–b. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Heslertonia*. Age: Hauterivian.

?*pellucida* Gitmez, 1970, p.297–299, pl.4, fig.12; pl.14, fig.2; text-fig.26. Holotype: Gitmez, 1970, pl.14, fig.2; text-fig.26. Questionable assignment: Poulsen (1996, p.84). Age: early Kimmeridgian.

regula Yun Hyesu, 1981, p.72–73, pl.5, fig.12; pl.8, figs.1,2a–b,4,8. Holotype: Yun Hyesu, 1981, pl.8, figs.2a–b; Fensome et al., 1991, figs.2–3 — p.727. N.I.A. Age: early Santonian.

senecta Harding, 1990b, p.27, pl.8, figs.1–11; text-fig.10 ex Harding in Williams et al. 1998, p.265. Holotype: Harding, 1990b, pl.8, fig.1. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Barremian.

striata (Eisenack and Cookson, 1960, p.9, pl.3, figs.10–11) Norvick, 1976, p.47. Holotype: Eisenack and Cookson, 1960, pl.3, fig.11. Originally *Cymatiosphaera* (Appendix A), subsequently (and now) *Heslertonia*. Age: Cenomanian.

"*teichophera*" (Sarjeant, 1961a, p.107–108, pl.15, fig.9; text-figs.9a–b) Sarjeant, 1976c, p.8. Emendation: Below, 1990, p.42–43, as *Arkellea teichophera*. Holotype: Sarjeant, 1961a, pl.15, fig.9; text-figs.9a–b; Sarjeant, 1976c, pl.6, fig.3. **NOW** *Arkellea*. Originally *Cymatiosphaera* (Appendix A), subsequently *Heslertonia*, thirdly (and now) *Arkellea*. Age: early Oxfordian.

HETERAULACACYSTA Drugg and Loeblich Jr., 1967, p.183. Emendation: Bujak in Bujak et al., 1980, p.58. Type: Drugg and Loeblich Jr., 1967, pl.1, figs.8a–c, as *Heteraulacacysta campanula*.

**campanula* Drugg and Loeblich Jr., 1967, p.183–184, pl.1, figs.6–7,8a–c; text-fig.2. Holotype: Drugg and Loeblich Jr., 1967, pl.1, figs.8a–c. N.I.A. Age: middle Eocene.

everriculata Islam, 1983a, p.237, pl.2, figs.9–10. Holotype: Islam, 1983a, pl.2, fig.9. Age: early Eocene.

fehmarrensis Lentin and Williams, 1973, p.67 ex Williams et al., 1998, p.265. Holotype: Morgenroth, 1966a, pl.2, fig.8, as *Goniodoma polyedrica*, designated by Williams et al., 1998, p.265. Originally *Heteraulacacysta* (name not validly published), subsequently *Dinopterygium* (name not validly published), thirdly (and now) *Heteraulacacysta*. Jan du Chêne and Adediran (1985, p.17) proposed the retention of this species in *Heteraulacacysta*. This name was not validly published in Lentin and Williams (1973, p.67) since effectively no holotype was designated. Lentin and Williams cited Morgenroth, 1966a, pl.2, figs.7–8 as holotype; however, these figures represent separate specimens. Age: early Eocene.

granulata Jan du Chêne and Adediran, 1985, p.14–15, pl.19, fig.8; text-figs.3h–3i. Holotype: Jan du Chêne and Adediran, 1985, pl.19, fig.8. Age: late Paleocene–early Eocene.

leptalea Eaton, 1976, p.305–306, pl.21, figs.1–2. Holotype: Eaton, 1976, pl.21, fig.1; Bujak et al., 1980, pl.10, fig.7. Questionable assignment: Eaton (1976, p.305); however, Bujak in Bujak et al. (1980, p.60) assigned the species to *Heteraulacacysta* without question. Age: middle-late Eocene.

"**polyedrica**" (Pouchet, 1883, p.42, fig.34) Eisenack and Kjellström, 1972, p.445. Holotype: Pouchet, 1883, fig.34. **NOW** *Goniodoma* (Appendix B). Originally *Peridinium* (Appendix B), subsequently (and now) *Goniodoma* (Appendix B), thirdly *Heteraulacacysta*. Age: extant.

porosa Bujak in Bujak et al., 1980, p.62, pl.15, figs.10–13; text-figs.14B–C. Holotype: Bujak et al., 1980, pl.15, fig.10. Age: middle Eocene (see Aubry, 1986).

pustulata Jan du Chêne and Adediran, 1985, p.15, pl.19, figs.1–7,9–10; text-figs.3d–3g. Holotype: Jan du Chêne and Adediran, 1985, pl.19, fig.1. Age: late Paleocene–early Eocene.

"**verricula**" (Piasecki, 1980, p.66–67, pl.1, figs.4–8; pl.5, figs.5–6) Lentin and Williams, 1981, p.128. Holotype: Piasecki, 1980, pl.1, figs.7–8. **NOW** *Gramocysta*. Originally *Dinopterygium*, subsequently *Heteraulacacysta*, thirdly (and now) *Gramocysta*. Age: late Miocene.

HETEROSPHAERIDIUM Cookson and Eisenack, 1968, p.115. Emendation: Yun Hyesu, 1981, p.45–46. Type: Cookson and Eisenack, 1968, text-fig.4H, as *Heterosphaeridium conjunctum*.

"**araneosum**" (Brideaux, 1977, p.22–23, pl.9, figs.1–3) Islam, 1993, p.84. Holotype: Brideaux, 1977, pl.9, figs.1–2. **NOW** *Circulodinium*?. Originally *Cleistosphaeridium*, subsequently *Heterosphaeridium*, thirdly (and now) *Circulodinium*?. Islam (1993, p.84) cited the basionym as *Hystrichosphaeridium araneosum*. Age: Aptian–Albian.

bellii Radmacher et al., 2014, p.31–33, pl.1, figs.1–9. Holotype: Radmacher et al., 2014, pl.1, figs.1–3,9. Age: late Campanian–Maastrichtian.

***conjunctum** Cookson and Eisenack, 1968, p.115; text-figs.4G–H. Holotype: Cookson and Eisenack, 1968, text-fig.4H; Fauconnier and Masure, 2004, pl.36, fig.1. Age: Santonian–early Campanian.

cordiforme Yun Hyesu, 1981, p.46–47, pl.3, figs.4,7,10,15. Holotype: Yun Hyesu, 1981, pl.3, fig.15; Fensome et al., 1991, fig.4 — p.629; Fauconnier and Masure, 2004, pl.35, figs.1–3. Age: early Santonian.

difficile (Manum and Cookson, 1964, p.12–14, pl.3, figs.1–3,7) Ioannides, 1986, p.24. Holotype: Manum and Cookson, 1964, pl.3, fig.1; Fauconnier and Masure, 2004, pl.36, figs.2–4. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*? (combination not validly published), thirdly (and now) *Heterosphaeridium*. Age: Cenomanian.

?**galiciae** Masure, 1988c, p.439, pl.2, figs.5A–C,6A–B,7. Holotype: Masure, 1988c, pl.2, figs.5A–C; Fauconnier and Masure, 2004, pl.37, figs.7–9. Questionable assignment: Masure (1988c, p.439). Age: early Valanginian–mid Barremian.

heteracanthum (Deflandre and Cookson, 1955, p.276, pl.2, figs.5–6; text-figs.40–41) Eisenack and Kjellström, 1972, p.451. Emendation: Radmacher et al., 2014, p.33,36, as *Heterosphaeridium heteracanthum*. Holotype: Deflandre and Cookson, 1955, pl.2, fig.5; Fauconnier and Masure, 2004, pl.35, figs.7–8. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Heterosphaeridium*, fifthly *Heterosphaeridium*? Questionable assignment: Stover and Evitt (1978, p.52); however, Fauconnier and Begouën in Fauconnier and Masure (2004, p.269) considered that this species should be assigned to *Heterosphaeridium* without question. Age: ?Late Cretaceous–early Eocene.

subsp. **heteracanthum**. Autonym. Holotype: Deflandre and Cookson, 1955, pl.2, fig.5; Fauconnier and Masure, 2004, pl.35, figs.7–8. Originally *Hystrichosphaeridium heteracanthum* subsp. *heteracanthum*,

subsequently (and now) *Heterosphaeridium heteracanthum* subsp. *heteracanthum*, thirdly *Heterosphaeridium? heteracanthum* subsp. *heteracanthum*.

?subsp. *sparsiprocessum* (Varma and Dangwal, 1964, p.64, pl.1, fig.7) Eisenack and Kjellström, 1972, p.453. Holotype: Varma and Dangwal, 1964, pl.1, fig.7. Originally *Hystrichosphaeridium heteracanthum* subsp. *sparsiprocessum*, subsequently *Heterosphaeridium heteracanthum* subsp. *sparsiprocessum*, thirdly *Heterosphaeridium? heteracanthum* subsp. *sparsiprocessum*, fourthly (and now) *Heterosphaeridium heteracanthum? subsp. sparsiprocessum*. Questionable assignment: Fauconnier and Begouën in Fauconnier and Masure (2004, p.270) as a problematic taxon, suggesting that the name be restricted to the holotype. Age: Eocene–Oligocene.

"*latoaculeum*" (Yun Hyesu, 1981, p.42–43, pl.11, figs.17–19) Islam, 1993, p.84. Holotype: Yun Hyesu, 1981, pl.11, fig.18; Fensome et al., 1991, fig.2 — p.657; fig.2 — p.693 (mislabelled as *Cleistosphaeridium multifurcatum* subsp. *multifurcatum*); Fensome et al., 1993a, fig.2 — p.1261; Fauconnier and Masure, 2004, pl.35, figs.9–10. **NOW** *Circulodinium latoaculeum*. Originally *Cleistosphaeridium multifurcatum* subsp. *latoaculeum*, subsequently *Heterosphaeridium latoaculeum*, thirdly (and now) *Circulodinium latoaculeum*. Age: early Santonian.

"*multifurcatum*" (Deflandre, 1937b, p.76, pl.16 [al. pl.13], figs.1–3) Islam, 1993, p.84. Emendation: Masure in Fauconnier and Masure, 2004, p.270, as *Exochosphaeridium multifurcatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), figs.1–2; Fensome et al., 1991, figs.1–2 — p.691; fig.1 — p.693; Fensome et al., 1993a, fig.1 — p.1261; figs.1–2 — p.1265; Fauconnier and Masure, 2004, pl.37, figs.10–11. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Heterosphaeridium*, sixthly (and now) *Exochosphaeridium*. Age: Late Cretaceous.

spinaconjunctum Yun Hyesu, 1981, p.47, pl.3, figs.8,11–12. Holotype: Yun Hyesu, 1981, pl.3, fig.11; Fensome et al., 1991, fig.2 — p.749; Fauconnier and Masure, 2004, pl.37, figs.1–2. Age: early Santonian.

verdiei Yun Hyesu, 1981, p.48, pl.3, figs.3,5. Holotype: Yun Hyesu, 1981, pl.3, fig.5; Fensome et al., 1991, fig.2 — p.767; Fauconnier and Masure, 2004, pl.37, figs.4–5. Age: early Santonian.

HEXAGONIFERA Cookson and Eisenack, 1961a, p.73. Emendations: Cookson and Eisenack, 1962b, p.496; Stover and Evitt, 1978, p.107–108. Type: Cookson and Eisenack, 1961a, pl.12, fig.11, as *Hexagonifera glabra*.

"?*chlamydata*" Cookson and Eisenack, 1962b, p.496, pl.7, figs.1–3,5–8. Emendations: Fechner, 1985, p.119 and Marheinecke, 1992, p.88, both as *Leberidocysta chlamydata*. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.2; Fensome et al., 1993a, fig.2 — p.1049. **NOW** *Leberidocysta*. Originally *Hexagonifera*, subsequently *Hexagonifera?*, thirdly (and now) *Leberidocysta*, fourthly *Polygonifera*. Questionable assignment: Lentin and Williams (1976, p.84). Age: Albian–Cenomanian.

"*cylindrica*" (Habib, 1970, p.374, pl.10, fig.2) Habib, 1972, p.378. Emendations: Prauss, 1989, p.47–48, Riding, 1994, p.18 and Feist-Burkhardt and Monteil, 1994, p.7, all as *Wallodinium cylindricum*. Holotype: Habib, 1970, pl.10, fig.2. **NOW** *Wallodinium*. Originally *Prismatocystis* (Appendix A), subsequently *Hexagonifera*, thirdly (and now) *Wallodinium*. Taxonomic junior synonym: *Fromea* (now *Andreedinium*) *elongata*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Fromea* (as *Andreedinium*) *elongata*. Age: Albian–Cenomanian.

"*defloccata*" Davey and Verdier, 1973, p.198, pl.3, figs.6,8. Holotype: Davey and Verdier, 1973, pl.3, fig.8. **NOW** *Leberidocysta*. Originally *Hexagonifera*, subsequently *Thalassiphora*, thirdly (and now) *Leberidocysta*, fourthly *Disphaeria*, fifthly *Craspedodinium*. Age: late Albian–early Cenomanian.

**glabra* Cookson and Eisenack, 1961a, p.74, pl.12, figs.9–13. Holotype: Cookson and Eisenack, 1961a, pl.12, fig.11. Age: Senonian.

"*jurassica*" Gitmez and Sarjeant, 1972, p.240–241, pl.14, figs.5,8. Emendation: Poulsen and Riding, 1992, p.28, as *Senoniasphaera jurassica*. Holotype: Gitmez and Sarjeant, 1972, pl.14, fig.5; Poulsen and Riding, 1992, text-

figs.3C–D. **NOW** *Senoniasphaera*. Originally *Hexagonifera*, subsequently (and now) *Senoniasphaera*, thirdly *Ambonosphaera*. Taxonomic senior synonym: *Meiourogonyaulax* (now *Lithodinia?*) *staffinensis*, according to Williams et al. (1993, p.32) — however, in the same publication, Williams et al. (1993, p.56) retained *Hexagonifera* (now *Senoniasphaera*) *jurassica*. Age: Kimmeridgian.

"?*laticaudata*" Vozzhennikova, 1967, p.125–126, pl.54, fig.1. Holotype: Vozzhennikova, 1967, pl.54, fig.1; Lentin and Vozzhennikova, 1990, text-fig.30; lost according to Lentin and Vozzhennikova (1990, p.59). **NOW** *Leberidocysta?*. Originally *Hexagonifera*, subsequently *Hexagonifera?*, thirdly (and now) *Leberidocysta?*. Questionable assignment: Lentin and Williams (1976, p.85). Age: Santonian.

"*perforata*" Wilson in Slimani, 2001a, p.194. **Name not validly published**: no description. **Taxonomic senior synonym**: *Pterospermopsis* (now *Thalassiphora?*) *spinosa*, according to Slimani (2001a, p.194).

"*reticulata*" Khanna and Singh, 1981b, p.391, fig.1, nos.4,6; text-fig.3. Holotype: Khanna and Singh, 1981b, fig.1, no.4. **NOW** *Senoniasphaera?*. Originally *Hexagonifera*, subsequently (and now) *Senoniasphaera?*. This name was not validly published in Singh et al. (1979, p.35–36), Khanna (1979, p.216) and Khanna et al. (1981, p.261) since no description was provided. Age: early-middle Eocene.

"*sahii*" Khanna and Singh, 1981b, p.391,393, fig.2, nos.1–3; fig.4, no.4; text-figs.4–5. Holotype: Khanna and Singh, 1981b, fig.2, no.2. **NOW** *Batiacasphaera?*. Originally *Hexagonifera*, subsequently (and now) *Batiacasphaera?*. This name was not validly published in Singh et al. (1979, p.35–36), Khanna (1979, p.216) and Khanna et al. (1981, p.261) since no description was provided. Age: early-middle Eocene.

"?*scabrata*" Jain and Taugourdeau-Lantz, 1973, p.64, pl.4, figs.11–12. Holotype: Jain and Taugourdeau-Lantz, 1973, pl.4, fig.11. **NOW** *Ovoidinium*. Originally *Hexagonifera*, subsequently *Leberidocysta?*, thirdly *Hexagonifera?*, fourthly (and now) *Ovoidinium*. Questionable assignment: Mehrotra and Sarjeant (1984c, p.50). Age: Early Cretaceous.

"*suspecta*" Manum and Cookson, 1964, p.9–10, pl.1, figs.9–13. Holotype: Manum and Cookson, 1964, pl.1, fig.9. **NOW** *Trithyrodinium*. Originally *Hexagonifera*, subsequently (and now) *Trithyrodinium*, thirdly *Deflandrea*. Age: Cenomanian.

"*vermiculata*" Cookson and Eisenack, 1961a, p.74, pl.12, figs.6–8. Holotype: Cookson and Eisenack, 1961a, pl.12, fig.6. **NOW** *Trithyrodinium*. Originally *Hexagonifera*, subsequently (and now) *Trithyrodinium*. Age: Senonian.

"*verrucosa*" Wilson in Slimani, 1994, p.111. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Leberidocysta?* *microverrucosa*, according to Slimani (2001a, p.193).

"**HEXASPHAERA**" Clarke and Verdier, 1967, p.42. **Name illegitimate** — **nomenclatural senior synonym**: *Callaiosphaeridium* Davey and Williams, 1966b, which has the same type. Junior homonym: *Hexasphaera* Keupp, 1987. Type: Deflandre and Courteville, 1939, pl.4, fig.1, as *Hystrichosphaeridium asymmetricum*.

"**asymmetrica*" (Deflandre and Courteville, 1939, p.100–101, pl.4, figs.1–2) Clarke and Verdier, 1967, p.43. Emendation: Clarke and Verdier, 1967, p.43, as *Hexasphaera asymmetrica*. Holotype: Deflandre and Courteville, 1939, pl.4, fig.1; Fensome et al., 1993a, fig.1 — p.949. **Combination illegitimate**: the generic name is illegitimate. **NOW** *Callaiosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Callaiosphaeridium*, thirdly *Hexasphaera* (combination illegitimate). Age: Senonian.

"**HEXASPHAERA**" Keupp, 1987, p.41. Emendation: Keupp and Kowalski, 1992, p.216, as *Keuppisphaera*. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1300). **Name illegitimate** — **senior homonym**: *Hexasphaera* Clarke and Verdier, 1967, p.42. **Substitute name**: *Keuppisphaera*. Keupp (1987, p.41) gave two additional spellings for *Hexasphaera*, *Hexasphaerae* and *Hexasphaera*. Type: Keupp, 1987, pl.6, figs.8–12, as *Hexasphaera radiata*.

"**radiata*" Keupp, 1987, p.41, pl.6, figs.8–12; text-fig.4. Emendation: Keupp and Kowalski, 1992, p.216–217, as *Keuppisphaera radiata*. Holotype: Keupp, 1987, pl.6, figs.8–12. **NOW** *Keuppisphaera*. Originally *Hexasphaera* (generic name illegitimate), subsequently (and now) *Keuppisphaera*. Following I.C.N. Article 55.1, the species name *Hexasphaera radiata* is validly published even though the generic name *Hexasphaera* is illegitimate. Age: Albian–early Cenomanian.

HISTIOCYSTA Davey, 1969a, p.138. Type: Davey, 1969a, pl.1, fig.5; text-figs.14A–B, as *Histiocysta palla*.

muendensis Kunz, 1990, p.30, pl.8, figs.20a–b,21; text-fig.10. Holotype: Kunz, 1990, pl.8, figs.20a–b; text-fig.10. Age: Tithonian.

outananensis Below, 1981a, p.55–56, pl.10, figs.18,19a–b,20a–b; pl.15, figs.8,9a–b; text-figs.55–58. Holotype: Below, 1981a, pl.10, figs.20a–b; text-fig.57; Fensome et al., 1991, figs.1–2 — p.703. Age: Hauterivian.

**palla* Davey, 1969a, p.138–140, pl.1, figs.5–6; text-figs.14A–B. Holotype: Davey, 1969a, pl.1, fig.5; text-figs.14A–B. Age: Cenomanian.

?*variornata* Slimani, 1994, p.18–19, pl.2, figs.19–20,24–33. Holotype: Slimani, 1994, pl.2, figs.19–20,30–33. Questionable assignment: Slimani (1994, p.18). Taxonomic junior synonym: *Chlamydophorella inconscripta* (name not validly published), according to Slimani (2001a, p.192). Age: late Campanian–early Maastrichtian.

HISTIOPHORA Klement, 1960, p.51. Type: Klement, 1960, pl.6, figs.11–13, as *Histiophora ornata*.

**ornata* Klement, 1960, p.51–53, pl.6, figs.11–14; text-figs.28–30. Holotype: Klement, 1960, pl.6, figs.11–13; Fauconnier and Masure, 2004, pl.37, figs.12–13. Age: Late Jurassic.

HOLMWOODINIUM Batten, 1985, p.432. Type: Batten, 1985, text-figs.3D,5K–L, as *Holmwoodinium notatum*.

**notatum* Batten, 1985, p.432,434, text-figs.3D–H,4M–O,5G–O. Holotype: Batten, 1985, text-figs.3D,5K–L; Fensome et al., 1995, figs.1–2,5 — p.1623. Age: late Barremian.

ovatum (He Chengquan and Li Peng, 1981, p.66, pl.31, fig.13) He Chengquan et al., 2009, p.441. Holotype: He Chengquan and Li Peng, 1981, pl.31, fig.13. Originally *Laciniadinium?*, subsequently (and now) *Holmwoodinium*. Age: late Oligocene.

HOMOTRYBLIUM Davey and Williams, 1966b, p.100. Type: Davey and Williams, 1966b, pl.12, fig.5, as *Homotryblium tenuispinosum*.

abbreviatum Eaton, 1976, p.267–268, pl.10, figs.2–4. Holotype: Eaton, 1976, pl.10, fig.3; Bujak et al., 1980, pl.1, figs.7–9. Age: early-middle Eocene (see Aubry, 1986).

aculeatum Williams, 1978, p.797, pl.4, figs.5–6,8–9. Holotype: Williams, 1978, pl.4, fig.9. Age: Eocene.

additense Dybkjær, 2004, p.52,55, pl.1, figs.1a–d,2a–b; pl.2, figs.1a–b,3a–b,4a–d,5a–b. Holotype: Dybkjær, 2004, pl.1, figs.1a–d. Age: latest Chattian and/or earliest Aquitanian.

?*bifurcatum* Caro, 1973, p.354,357, pl.2, fig.6. Holotype: Caro, 1973, pl.2, fig.6. Originally *Homotryblium*, subsequently (and now) *Homotryblium?*. Questionable assignment: Stover and Evitt (1978, p.210) as a problematic species. Age: middle Paleocene.

caliculum Bujak in Bujak et al., 1980, p.62,64, pl.16, fig.1. Holotype: Bujak et al., 1980, pl.16, fig.1. Age: middle Eocene (see Aubry, 1986).

conicum Gedl, 1995, p.202–203, pl.6, figs.1–4. Holotype: Gedl, 1995, pl.6, figs.3–4. Age: middle Eocene.

constrictum Islam, 1983c, p.86,88, pl.3, figs.1–2. Holotype: Islam, 1983c, pl.3, fig.1. Age: early Eocene.

deconinckii Islam, 1983b, p.340, pl.3, figs.1–3. Holotype: Islam, 1983b, pl.3, figs.1–2. Age: middle Eocene.

"**distinctum**" Salujha and Kindra, 1981, p.51, pl.2, fig.45–46. Holotype: Salujha and Kindra, 1981, pl.2, fig.45. **Taxonomic senior synonym:** *Xanthidium* (as and now *Spiniferites*) *ramosum*, according to Jain and Garg (1982, p.69), who considered *Homotryblium distinctum* to be a taxonomic junior synonym of *Spiniferites ramosus* subsp. *ramosus*. Age: Danian.

floripes (Deflandre and Cookson, 1955, p.276, pl.7, figs.1–2,7) Stover, 1975, p.36. Holotype: Deflandre and Cookson, 1955, pl.7, fig.1. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Homotryblium*. Taxonomic junior synonym: *Homotryblium plectilum*, according to Bujak in Bujak et al. (1980, p.64) — however, Stover in Lentin and Williams (1985, p.168) retained *Homotryblium plectilum*. Age: Early Tertiary.

subsp. **breviradiatum** (Cookson and Eisenack, 1961b, p.44, pl.2, figs.10–11) Lentin and Williams, 1977b, p.75. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.10–11. Originally *Hystrichosphaeridium floripes* subsp. *breviradiatum*, subsequently *Cordosphaeridium floripes* subsp. *breviradiatum*, thirdly (and now) *Homotryblium floripes* subsp. *breviradiatum*. Age: late Eocene.

subsp. **floripes**. Autonym. Holotype: Deflandre and Cookson, 1955, pl.7, fig.1. Originally *Hystrichosphaeridium floripes* subsp. *floripes*, subsequently *Cordosphaeridium floripes* subsp. *floripes*, thirdly (and now) *Homotryblium floripes* subsp. *floripes*.

giganteum Salujha and Kindra, 1981, p.50–51, pl.2, fig.42. Holotype: Salujha and Kindra, 1981, pl.2, fig.42. Jain and Garg (1982, p.69) recommended that this name be restricted to the holotype. Age: Danian.

meghalayense Saxena and Rao, 1984, p.57, pl.2, figs.21–23. Holotype: Saxena and Rao, 1984, pl.2, fig.23. Age: early Miocene.

oceanicum Eaton, 1976, p.268, pl.10, figs.5–8. Holotype: Eaton, 1976, pl.10, fig.5; Bujak et al., 1980, pl.1, figs.10–12. Age: middle Eocene (see Aubry, 1986).

oujiangense Yu Jingxian, 1989, p.144, pl.47, figs.7–10,12,15–17. Holotype: Yu Jingxian, 1989, pl.47, fig.7. Age: Pleistocene.

"**pallidum**" Davey and Williams, 1966b, p.102–103, pl.12, figs.4,6; text-fig.22. Holotype: Davey and Williams, 1966b, pl.12, fig.6; Bujak et al., 1980, pl.1, figs.1–3. **Taxonomic senior synonym:** *Homotryblium tenuispinosum*, according to Edwards (1996, p.989). Age: early Eocene.

"subsp. **pallidum**". Autonym. Holotype: Davey and Williams, 1966b, pl.12, fig.6; Bujak et al., 1980, pl.1, figs.1–3. **Now redundant.**

"subsp. **variabile**" Yu Jingxian 1989, p.143–144, pl.47, figs.11,14. Holotype: Yu Jingxian 1989, pl.47, fig.11. **NOW** *Homotryblium tenuispinosum* subsp. *variabile*. Originally *Homotryblium pallidum* subsp. *variabile*, subsequently (and now) *Homotryblium tenuispinosum* subsp. *variabile*. Age: Pleistocene.

plectilum Drugg and Loeblich Jr., 1967, p.184–186, pl.2, figs.1–9; text-fig.3. Holotype: Drugg and Loeblich Jr., 1967, pl.2, fig.1. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Homotryblium*) *floripes*, according to Bujak in Bujak et al. (1980, p.64) — however, Stover in Lentin and Williams (1985, p.168) retained *Homotryblium plectilum*. Taxonomic junior synonym: *Areoligera digitata*, according to Jain and Garg (1991, p.77). Age: Oligocene.

suggestatum Islam, 1983a, p.237–238, pl.2, figs.1,5. Holotype: Islam, 1983a, pl.2, fig.5. Age: early Eocene.

taiwanianum Shaw Chenglong, 1999b, p.186, figs.96–98. Holotype: Shaw Chenglong, 1999b, figs.96–98. Age: Eocene.

tasmaniense Cookson and Eisenack, 1967a, p.133–134, pl.20, figs.1–2. Holotype: Cookson and Eisenack, 1967a, pl.20, figs.1–2. Age: Paleocene.

**tenuispinosum* Davey and Williams, 1966b, p.101–102, pl.4, fig.11; pl.12, figs.1,5,7; text-fig.21. Holotype: Davey and Williams, 1966b, pl.12, fig.5. Taxonomic junior synonym: *Homotryblium pallidum*, according to Edwards (1996, p.989). Age: early Eocene.

subsp. *tenuispinosum*. Autonym. Holotype: Davey and Williams, 1966b, pl.12, fig.5.

subsp. *variabile* (Yu Jingxian, 1989, p.143–144, pl.47, figs.11,14) Williams et al. 1998, p.269. Holotype: Yu Jingxian, 1989, pl.47, fig.11. Originally *Homotryblium pallidum* subsp. *variabile*, subsequently (and now) *Homotryblium tenuispinosum* subsp. *variabile*. Age: Pleistocene.

terminale He Chengquan, 1991, p.128, pl.24, figs.7–8; text-fig.20. Holotype: He Chengquan, 1991, pl.24, fig.7; text-fig.20. Age: Paleocene.

umbellatum Islam, 1983b, p.340, pl.3, figs.7–8. Holotype: Islam, 1983b, pl.3, fig.7. Age: early Eocene.

vallum Stover, 1977, p.79–80, pl.3, figs.45–53. Holotype: Stover, 1977, pl.3, figs.45–48. Age: early Oligocene–early Miocene.

variabile Bujak in Bujak et al., 1980, p.64,66, pl.16, figs.4–9. Holotype: Bujak et al., 1980, pl.16, figs.4–5. Age: middle Eocene (see Aubry, 1986).

HOROLOGINELLA Cookson and Eisenack, 1962a, p.271. Emendations: Stover and Evitt, 1978, p.53–54; Backhouse, 1988, p.90; Pestchevitskaya, 2006, p. S635. Stover and Evitt (1978, p.54) considered that, of the species of *Horologinella* described to that date, only the "type species", *Horologinella lineata*, was a dinoflagellate. Pestchevitskaya (2006, p. S635) considered only *Horologinella lineata* and *Horologinella anabarensis* to be dinoflagellates. Type: Cookson and Eisenack, 1962a, pl.37, figs.1–2, as *Horologinella lineata*.

anabarensis Pestchevitskaya, 2001, p.96–100; text-figs.3–6; pl.I, figs.1–11; pl.II, figs.1–7. Holotype: Pestchevitskaya, 2001, pl.II, fig.2. Age: late Berriasian–Hauterivian.

angulata de Coninck, 1985, p.67–68, pl.1, figs.11–12. Holotype: de Coninck, 1985, pl.1, fig.11. Age: middle Eocene.

"*apiculata*" Cookson and Eisenack, 1962a, p.272, pl.37, fig.4. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.4; Pestchevitskaya, 2001, pl.2, fig.13; Pestchevitskaya, 2003, pl.2, fig.6. **NOW** *Paucilobimorpha*? (Appendix A). Originally *Horologinella*, subsequently (and now) *Paucilobimorpha*?. Pestchevitskaya (2001, p.106; 2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: Campanian.

"*biconvexa*" Jiabo, 1978, p.95, pl.29, figs.20–21. Holotype: Jiabo, 1978, pl.29, fig.21. **NOW** *Tetrachacysta*. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

"subsp. *biconvexa*". Autonym. Holotype: Jiabo, 1978, pl.29, fig.21. **NOW** *Tetrachacysta biconvexa* subsp. *biconvexa*. Originally *Horologinella biconvexa* subsp. *biconvexa*, subsequently (and now) *Tetrachacysta biconvexa* subsp. *biconvexa*.

"subsp. *granulata*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.70, pl.10, figs.3–8. Holotype: Liu Zhili et al., 1992, pl.10, fig.7. **NOW** *Tetrachacysta biconvexa* subsp. *granulata*. Originally

Horologinella biconvexa subsp. *granulata*, subsequently (and now) *Tetrachacysta biconvexa* subsp. *granulata*. Taxonomic senior synonym: *Tetrachacysta allenii*, according to Xu Jinli et al. (1997, p.42) — however, He Chengquan et al., 2009, p.374) retained this taxon. Age: Early Tertiary.

"subsp. *laevigata*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.69–70, pl.10, figs.1–2. Holotype: Liu Zhili et al., 1992, pl.10, fig.2. **NOW** *Tetrachacysta biconvexa* subsp. *laevigata*. Originally *Horologinella biconvexa* subsp. *laevigata*, subsequently (and now) *Tetrachacysta biconvexa* subsp. *laevigata*. Age: Early Tertiary.

coninckii Slimani, 1994, p.103, pl.14, figs.12–15. Holotype: Slimani, 1994, pl.14, figs.12–13. Age: latest Maastrichtian–Danian.

?*corrugata* de Coninck, 1986b, p.13, pl.2, figs.11–14,17–19. Holotype: de Coninck, 1986b, pl.2, figs.11–12; Pestchevitskaya, 2001, pl.2, fig.11; Pestchevitskaya, 2003, pl.2, fig.18. Questionable assignment: de Coninck (1986b, p.13). Age: middle Eocene–early Oligocene (Bartonian–Tongrian).

"*dawanensis*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.70, pl.10, figs.13–14. Holotype: Liu Zhili et al., 1992, pl.10, fig.13. **NOW** *Tetrachacysta*. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

disparilis He Chengquan, 1984b, p.162–163, pl.8, fig.22. Holotype: He Chengquan, 1984b, pl.8, fig.22; Pestchevitskaya, 2001, pl.2, fig.18; Pestchevitskaya, 2003, pl.2, fig.13. Age: Oligocene–early Miocene (according to Pestchevitskaya, 2001, p.106).

"*eclipsiana*" Helby in Riding and Helby, 2001e, p.115. **Name not validly published**: no description. **Taxonomic senior synonym**: *Fosteria eclipsiana*, according to Riding and Helby (2001e, p.115). This is an unpublished manuscript name.

"?*extrema*" Cookson and Eisenack, 1962a, p.272–273, pl.37, fig.10. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.10; Pestchevitskaya, 2001, pl.2, fig.16; Pestchevitskaya, 2003, pl.2, fig.4. **NOW** *Paucilobimorpha* (Appendix A). Originally *Horologinella*?, subsequently (and now) *Paucilobimorpha* (Appendix A). Questionable assignment: Cookson and Eisenack (1962a, p.272). Pestchevitskaya (2001, p.106; 2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: Cenomanian.

horologia (Staplin, 1960, p.6, pl.1, figs.4,6 ex Playford, 1963, p.659) Jardiné et al., 1972, p.296. Holotype: Staplin, 1960, pl.1, fig.4; Pestchevitskaya, 2003, pl.2, fig.16. Originally *Azonotetraporina* (name not validly published, Appendix A), subsequently *Tetraporina* (Appendix A), thirdly (and now) *Horologinella*. This species probably represents acritarchs. The name *Azonotetraporina horologia* was not validly published in Staplin (1960) since the generic name *Azonotetraporina* was not validly published. Age: Carboniferous (late Mississippian).

"*incurvata*" Cookson and Eisenack, 1962a, p.272, pl.37, fig.5. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.5; Pestchevitskaya, 2001, pl.2, fig.14; Pestchevitskaya, 2003, pl.2, fig.5. **NOW** *Paucilobimorpha* (Appendix A). Originally *Horologinella*, subsequently (and now) *Paucilobimorpha* (Appendix A). Pestchevitskaya (2001, p.106; 2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: early Eocene.

**lineata* Cookson and Eisenack, 1962a, p.272, pl.37, figs.1–3. Holotype: Cookson and Eisenack, 1962a, pl.37, figs.1–2; Pestchevitskaya, 2001, pl.2, figs.17a–b; Pestchevitskaya, 2003, pl.2, fig.9 (not fig.8). Age: Aptian–?Albian.

"*magnusa*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.70–71, pl.10, fig.11; text-fig.4. Holotype: Liu Zhili et al., 1992, pl.10, fig.11; text-fig.4. **NOW** *Tetrachacysta*. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

micirugis He Chengquan, 1984b, p.163, pl.10, figs.12–14; text-fig.2. Holotype: He Chengquan, 1984b, pl.10, fig.14; Pestchevitskaya, 2001, pl.2, fig.20; Pestchevitskaya, 2003, pl.2, fig.12. Age: Oligocene–early Miocene (according to Pestchevitskaya, 2001, p.106).

"*minuta*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.70, pl.10, figs.9–10,12 (not text-fig.4). **NOW** *Tetrachacysta*. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Holotype: Liu Zhili et al., 1992, pl.10, fig.9. Age: Early Tertiary.

?*obliqua* Cookson and Eisenack, 1962a, p.273, pl.37, fig.9. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.9; Pestchevitskaya, 2001, pl.2, fig.15; Pestchevitskaya, 2003, pl.2, fig.7. Questionable assignment: Cookson and Eisenack (1962a, p.273). Age: ?late Albian–Cenomanian.

?*pentagonalis* Heilmann-Clausen and Van Simaey, 2005, p.170, pl.5, figs.10–13. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.5, fig.10. Questionable assignment: Heilmann-Clausen and Van Simaey (2005, p.170); the authors noted that "... none of the specimens ... exhibit diagnostic dinoflagellate cyst features" Age: late Eocene.

quadriscipina Jardiné et al., 1972, p.296, pl.1, figs.5–6. Holotype: Jardiné et al., 1972, pl.1, fig.5. This species probably represents acritarchs. Age: Late Devonian (Famennian–Strunian).

scabrosa He Chengquan, 1984b, p.162, pl.8, figs.20–21. Holotype: He Chengquan, 1984b, pl.8, fig.20; Pestchevitskaya, 2001, pl.2, fig.9; Pestchevitskaya, 2003, pl.2, fig.15. Age: Oligocene–early Miocene (according to Pestchevitskaya, 2001, p.106).

sichuanensis Zhang Lujin, 1984, p.64, pl.19, figs.18–19. Holotype: Zhang Lujin, 1984, pl.19, figs.18–19. This species probably represents acritarchs. Age: Late Triassic.

"?*spinosa*" Cookson, 1965a, p.89, pl.10, figs.10–12; pl.11, fig.10. Holotype: Cookson, 1965a, pl.10, fig.11; Pestchevitskaya, 2003, pl.2, fig.14. **NOW** *Paucilobimorpha* (Appendix A). Originally *Horologinella*?, subsequently (and now) *Paucilobimorpha* (Appendix A). Questionable assignment: Cookson (1965a, p.89). Pestchevitskaya (2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: late Eocene.

"*spinosigibberosa*" Brideaux and Fisher, 1976, p.22–24, pl.4, fig.9; pl.5, figs.1–16. Holotype: Brideaux and Fisher, 1976, pl.5, figs.1,5–8. **NOW** *Tetrachacysta*. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: late Oxfordian–?Portlandian.

tenuissima He Chengquan, 1991, p.52, pl.5, fig.10; text-fig.6. Holotype: He Chengquan, 1991, pl.5, fig.10; text-fig.6; Pestchevitskaya, 2001, pl.2, fig.12; Pestchevitskaya, 2003, pl.2, fig.17. Age: Paleocene.

?*wicanderi* Martin, 1984, p.22–23, pl.4, figs.4–5,8. Holotype: Martin, 1984, pl.4, fig.4; Pestchevitskaya, 2001, pl.2, fig.8; Pestchevitskaya, 2003, pl.2, fig.11. Questionable assignment: Martin (1984, p.22–23). This species probably represents acritarchs. Age: Devonian (early Famennian).

HUANGHEDINIUM Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.46. Type: He Chengquan et al., 1989, pl.2, fig.5; text-fig.3a, as *Huanghedinium granorugosum*.

**granorugosum* Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.46–47, pl.2, figs.1–15; pl.29, fig.4; text-figs.3a–b. Holotype: He Chengquan et al., 1989, pl.2, fig.5; text-fig.3a. Age: Early Tertiary.

magnum Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.47, pl.2, figs.19–20. Holotype: He Chengquan et al., 1989, pl.2, fig.20. Age: Early Tertiary.

HURLANDSIA Lister and Batten, 1988a, p.507. Type: Piasecki, 1984, pl.4, fig.1; text-fig.5, as *Mendicodinium rugarum*.

***rugara** (Piasecki, 1984, p.150–151, pl.4, figs.1–5,7–8; text-fig.5) Lister and Batten, 1988a, p.507. Holotype: Piasecki, 1984, pl.4, fig.1; text-fig.5; Fensome et al., 1995, figs.1,4–5 — p.1751. Originally *Mendicodinium*, subsequently (and now) *Hurlandsia*. Age: late Ryazanian–early Valanginian.

HURUNUIA Wilson, 1984a, p.215–216. Type: Wilson, 1984a, figs.2A–B,3–5, as *Hurunuia maxwellii*.

***maxwellii** Wilson, 1984a, p.216–217, figs.2A–B,3–11. Holotype: Wilson, 1984a, figs.2A–B,3–5; Fensome et al., 1996, figs.1–3 — p.2221. Age: Neocomian, according to Wilson and Helby (1988).

"**HYALOSPHERA**" Prauss, 1989, p.23. **Name illegitimate: senior homonym:** *Hyalosphaera* Volkheimer and Salas, 1976, an acritarch genus. **Substitute name:** *Praussia*. Type: Prauss, 1989, pl.5, fig.11; text-fig.6, as *Hyalosphaera ephemera*.

***ephemera**" Prauss, 1989, p.23–24, pl.5, figs.11–12,15–18; text-fig.6. Holotype: Prauss, 1989, pl.5, fig.11; text-fig.6. **NOW** *Praussia*. Originally *Hyalosphaera* (generic name illegitimate), subsequently (and now) *Praussia*. Following I.C.N. Article 55.1, the species name *Hyalosphaera ephemera* is validly published, even though the generic name *Hyalosphaera* Prauss is illegitimate. Age: late Toarcian–early Aalenian.

HYSTRICHODINIUM Deflandre, 1935, p.229–230. Emendations: Sarjeant, 1966b, p.140; Clarke and Verdier, 1967, p.37–38; Pestchevitskaya, 2009, p.111. Taxonomic junior synonyms: *Heliodinium*, according to Clarke and Verdier (1967, p.37–38) and Lentin and Williams (1977b, p.72); *Cauca*, according to Below (1981b, p.120–121) — however, Lentin and Williams (1985, p.48) retained *Cauca*. Type: Deflandre, 1935, pl.5, fig.1; text-figs.9–11, as *Hystrichodinium pulchrum*.

"**alatum**" Cookson and Eisenack, 1962b, p.487–488, pl.2, figs.1–4. Emendation: Sarjeant, 1966b, p.147, as *Xiphophoridium alatum*. Holotype: Cookson and Eisenack, 1962b, pl.2, fig.1; Fensome et al., 1993a, fig.1 — p.893; Fauconnier and Masure, 2004, pl.80, fig.6. **NOW** *Dinopterygium*. Originally *Hystrichodinium*, subsequently *Xiphophoridium*, thirdly *Pyramidium* (combination illegitimate, since the generic name is illegitimate), fourthly *Oodnadattia*, fifthly (and now) *Dinopterygium*. Age: Albian–Cenomanian.

"**?amphiacanthum**" Cookson and Eisenack, 1958, p.37, pl.5, fig.9. Holotype: Cookson and Eisenack, 1958, pl.5, fig.9; Fensome et al., 1993a, fig.1 — p.911. **NOW** *Omatidium*. Originally *Hystrichodinium*, subsequently *Hystrichodinium?*, thirdly (and now) *Omatidium*. Questionable assignment: Stover and Evitt (1978, p.161–162). Age: Late Jurassic or Neocomian.

compactum Alberti, 1961, p.15, pl.9, figs.5–6. Holotype: Alberti, 1961, pl.9, fig.5. Age: Valanginian.

?dasum Davey, 1969a, p.175–176, pl.10, figs.8–9. Holotype: Davey, 1969a, pl.10, fig.8. Originally *Hystrichodinium*, subsequently (and now) *Hystrichodinium?*. Questionable assignment: Stover and Evitt (1978, p.162). Principle 5 of the I.C.N. states that "... names of taxonomic groups are treated as Latin regardless of their origin." Thus, the epithet "*dasys*" should be Latinized to "*dasus*", with the neuter form being "*dasum*". Age: Cenomanian.

furcatum Alberti, 1961, p.16, pl.9, figs.7–8. Holotype: Alberti, 1961, pl.9, fig.8. Age: Hauterivian.

?infundibulum Jain et al., 1975, p.11–12, pl.3, fig.35. Holotype: Jain et al., 1975, pl.3, fig.35. Originally *Hystrichodinium*, subsequently (and now) *Hystrichodinium?*. Questionable assignment: Stover and Evitt (1978, p.162). N.I.A. Age: Maastrichtian.

isodiametricum (Cookson and Eisenack, 1958, p.38, pl.12, figs.11–12) Stover and Evitt, 1978, p.161. Holotype: Cookson and Eisenack, 1958, pl.12, figs.11–12. Originally *Palaeohystrichophora*, subsequently (and now) *Hystrichodinium*. Age: Campanian–early Maastrichtian.

?*lanceatum* Davies, 1983, p.22–23, pl.7, figs.1–12; text-fig.18. Holotype: Davies, 1983, pl.7, figs.1–2; text-fig.18B. Questionable assignment: Davies (1983, p.22). Age: late Callovian–Tithonian.

minusculum Prössl, 1990, p.103–104, pl.3, figs.4–6 ex Prössl, 1992b, p.113,115. Holotype: Prössl, 1990, pl.3, figs.4–6. This name was not validly published in Prössl (1990, p.103–104), since that author did not specify the lodgment of the holotype. Age: early–early late Hauterivian.

oligacanthum Deflandre and Cookson, 1955, p.255–257, pl.1, fig.1; text-figs.2–3. Holotype: Deflandre and Cookson, 1955, text-fig.2. Backhouse (1988, p.92) considered *Heliodinium* (as *Hystrichodinium*) *patriciae* and *Heliodinium* (as *Hystrichodinium*) *voigtii* to be possible taxonomic junior synonyms of this species. *Hystrichodinium oligacanthum* was not validly published in Deflandre and Cookson (1954, p.1236) since no description was provided. Age: Albian.

"*parvum*" Alberti, 1961, p.16, pl.9, figs.1–4. Holotype: Alberti, 1961, pl.9, fig.4. **NOW** *Cauca*. Originally *Hystrichodinium*, subsequently (and now) *Cauca*. Age: early Aptian–Albian.

patriciae (Neale and Sarjeant, 1962, p.451–452, pl.19, fig.3; text-fig.7) Lentin and Williams, 1975, p.2151. Holotype: Neale and Sarjeant, 1962, pl.19, fig.3; text-fig.7. Originally *Heliodinium*, subsequently (and now) *Hystrichodinium*. Backhouse (1988, p.92) considered *Hystrichodinium oligacanthum* to be a possible taxonomic junior synonym of this species. Age: Hauterivian.

polycheirum Heilmann-Clausen in Heilmann-Clausen and Thomsen, 1995, p.297–298, pl.11, figs.6–12; text-fig.16. Holotype: Heilmann-Clausen and Thomsen, 1995, pl.11, figs.7–8; text-fig.16. Age: late Barremian.

**pulchrum* Deflandre, 1935, p.229–230, pl.5, fig.1; text-figs.9–11. Holotype: Deflandre, 1935, pl.5, fig.1; text-figs.9–11; Deflandre, 1936b, pl.8, figs.3–4,7. A full description was given in Deflandre (1936b, p.182–184). Sarjeant (1966b, p.141) speculated that this species might be a junior synonym of *Xanthidium* (now *Exochosphaeridium*?) *spinosum*. Age: Late Cretaceous.

subsp. *areatum* Marheinecke, 1992, p.44, pl.6, figs.8–11. Holotype: Marheinecke, 1992, pl.6, figs.9–10. Contrary to the opinion of Lentin and Williams (1993, p.284), Williams et al. (1998, p.272) considered this name to be validly published. Age: early Maastrichtian.

subsp. *densispinum* (Deflandre, 1936a, p.183–184, pl.9, fig.3) Lentin and Williams, 1973, p.70. Holotype: Deflandre, 1936a, pl.9, fig.3. Originally *Hystrichodinium pulchrum* var. *densispinum*, subsequently (and now) *Hystrichodinium pulchrum* subsp. *densispinum*. Age: Senonian.

"var. *densispinum*" Deflandre, 1936b, p.183–184, pl.9, fig.3. Holotype: Deflandre, 1936b, pl.9, fig.3. **NOW** *Hystrichodinium pulchrum* subsp. *densispinum*. Originally *Hystrichodinium pulchrum* var. *densispinum*, subsequently (and now) *Hystrichodinium pulchrum* subsp. *densispinum*. Age: Senonian.

subsp. *globosum* (Deflandre, 1936a, p.183, pl.9, figs.1–2) Lentin and Williams, 1973, p.70. Holotype: Deflandre, 1936a, pl.9, fig.2. Originally *Hystrichodinium pulchrum* var. *globosum*, subsequently (and now) *Hystrichodinium pulchrum* subsp. *globosum*. Age: Senonian.

"var. *globosum*" Deflandre, 1936b, p.183, pl.9, figs.1–2. Holotype: Deflandre, 1936b, pl.9, fig.2. **NOW** *Hystrichodinium pulchrum* subsp. *globosum*. Originally *Hystrichodinium pulchrum* var. *globosum*, subsequently (and now) *Hystrichodinium pulchrum* subsp. *globosum*. Age: Senonian.

subsp. *pulchrum*. Autonym. Holotype: Deflandre, 1935, pl.5, fig.1; text-figs.9–11; Deflandre, 1936b, pl.8, figs.3–4.

"var. *pulchrum*". Autonym. Holotype: Deflandre, 1935, pl.5, fig.1; text-figs.9–11; Deflandre, 1936b, pl.8, figs.3–4. **Now redundant.**

?*qoimacoense* He Chengquan et al., 2005a, p.61–62, 248–249, pl.20, figs.10–11; text-fig.1.3. Holotype: He Chengquan et al., 2005a, pl.20, fig.10. Age: Middle Jurassic.

ramoides Alberti, 1961, p.15–16, pl.8, figs.11–13. Holotype: Alberti, 1961, pl.8, fig.13. Age: late Barremian.

solare Pestchevitskaya, 2009, p.111–112, pl.1, figs.6,10; text-fig.2D. Holotype: Pestchevitskaya, 2009, pl.1, fig.10. Age: Hauterivian.

"?*telaspinosum*" Fisher and Riley, 1980, p.322, pl.1, fig.5. Holotype: Fisher and Riley, 1980, pl.1, fig.5. **NOW** *Kleithriasphaeridium*. Originally *Hystrichodinium*?, subsequently (and now) *Kleithriasphaeridium*. Questionable assignment: Fisher and Riley (1980, p.322). Age: Volgian.

voigtii (Alberti, 1961, p.33, pl.8, figs.1–5) Davey, 1974, p.54. Emendation: Sarjeant, 1966b, p.142, as *Heliodinium voigtii*. Holotype: Alberti, 1961, pl.8, fig.2. Originally *Heliodinium*, subsequently (and now) *Hystrichodinium*. Backhouse (1988, p.92) considered *Hystrichodinium oligacanthum* to be the possible taxonomic senior synonym of this species. Age: Barremian–early Aptian.

"**HYSTRICHOGONYAULAX**" Sarjeant, 1969, p.13–14. **Taxonomic senior synonym:** *Ctenidodinium*, by implication in Jan du Chêne et al. (1985b, p.110), who transferred the "type species" of *Hystrichogonyaulax*, *Hystrichogonyaulax cornigera*, to *Ctenidodinium*. Type: Valensi, 1953, pl.1, fig.8, as *Gonyaulax cornigera*.

"*canadensis*" (Pocock, 1972, p.89, pl.24, figs.1–2; text-fig.4) Stover and Evitt, 1978, p.162. Holotype: Pocock, 1972, pl.24, fig.1; Jan du Chêne et al., 1986a, pl.97, figs.1–4. Originally *Gonyaulacysta*, subsequently *Hystrichogonyaulax*, thirdly *Rhynchodiniopsis*. **Taxonomic senior synonym:** *Gonyaulax* (as *Gonyaulacysta*) *cladophora*, according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: Oxfordian–Kimmeridgian.

"*cladophora*" (Deflandre, 1939a, p.173–176, pl.7, figs.1–5; text-figs.5–6) Stover and Evitt, 1978, p.162. Holotype: Deflandre, 1939a, pl.7, fig.1; Jan du Chêne et al., 1986a, pl.94, fig.6. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. Taxonomic junior synonyms: *Gonyaulacysta gottisii*, according to Jan du Chêne et al. (1986a, p.48) and Jan du Chêne and Fauconnier (1986, p.55); *Gonyaulacysta downiei* and *Gonyaulacysta canadensis*, both according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: early Oxfordian.

"subsp. *cladophora*". Autonym. Holotype: Deflandre, 1939a, pl.7, fig.1; Jan du Chêne et al., 1986a, pl.94, fig.6. **NOW** *Rhynchodiniopsis cladophora* subsp. *cladophora*. Originally *Gonyaulax cladophora* subsp. *cladophora* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *cladophora*, thirdly *Hystrichogonyaulax cladophora* subsp. *cladophora*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *cladophora*. Taxonomic junior synonyms: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *extensa*, *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *hemipolyedrica* and *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *isovalvata*, all by implication in Brenner (1988, p.72), who listed these subspecies as taxonomic junior synonyms of *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained all three taxa.

"subsp. *extensa*" (Klement, 1960, p.36–37, pl.4, figs.1–4; text-fig.16) Stover and Evitt, 1978, p.162. Holotype: Klement, 1960, pl.4, figs.1–3; Jan du Chêne et al., 1986a, pl.95, figs.4–5. **NOW** *Rhynchodiniopsis cladophora* subsp. *extensa*. Originally *Gonyaulax cladophora* subsp. *extensa* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *extensa*, thirdly *Hystrichogonyaulax cladophora* subsp. *extensa*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *extensa*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Hystrichogonyaulax* (as *Rhynchodiniopsis*) *extensa*. Age: early Kimmeridgian.

"subsp. *hemipolyedrica*" (Klement, 1960, p.36, pl.3, figs.10–12; text-figs.14–15) Stover and Evitt, 1978, p.162. Holotype: Klement, 1960, pl.3, figs.10–11. **NOW** *Rhynchodiniopsis cladophora* subsp. *hemipolyedrica*. Originally *Gonyaulax cladophora* subsp. *hemipolyedrica* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *hemipolyedrica*, thirdly *Hystrichogonyaulax cladophora* subsp. *hemipolyedrica*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *hemipolyedrica*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Hystrichogonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *hemipolyedrica*. Age: early Kimmeridgian.

"subsp. *isovalvata*" (Klement, 1960, p.37–38, pl.4, figs.5–9; text-fig.17) Stover and Evitt, 1978, p.163. Holotype: Klement, 1960, pl.4, figs.5–6. **NOW** *Rhynchodiniopsis cladophora* subsp. *isovalvata*. Originally *Gonyaulax cladophora* subsp. *isovalvata* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *isovalvata*, thirdly *Hystrichogonyaulax cladophora* subsp. *isovalvata*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *isovalvata*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Hystrichogonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *isovalvata*. Age: early Kimmeridgian.

"*coreoides*" Benedek, 1972, p.20, pl.9, figs.4a–c. Emendation: Benedek and Sarjeant, 1981, p.328–330, as *Phthanoperidinium coreoides*. Holotype: Benedek, 1972, pl.9, figs.4a–c; Benedek and Sarjeant, 1981, fig.3, nos.2,4; fig.5. **NOW** *Phthanoperidinium*. Originally *Hystrichogonyaulax*, subsequently (and now) *Phthanoperidinium*. Taxonomic senior synonym: *Peridinium* (now *Phthanoperidinium*) *comatum*, according to Stover and Evitt (1978, p.118) — however, Benedek and Sarjeant (1981, p.328–330) retained *Phthanoperidinium coreoides*. Taxonomic junior synonym *Phthanoperidinium tritonium*, according to Fensome et al. (2009, p.54–55), which species had previously been considered a taxonomic junior synonym of *Phthanoperidinium comatum* by Bujak in Bujak et al. (1980, p.72). Age: middle Oligocene.

"**cornigera*" (Valensi, 1953, p.27, pl.1, figs.4,8,10; pl.2, figs.1–2; pl.13, fig.5; text-fig.2a) Sarjeant, 1969, p.14. Emendation: Jan du Chêne et al., 1985b, p.110, as *Ctenidodinium cornigerum*. Holotype: Valensi, 1953, pl.1, fig.8. **NOW** *Ctenidodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*? (combination not validly published), thirdly *Hystrichogonyaulax*, fourthly (and now) *Ctenidodinium*. Age: Bathonian.

"*crispa*" (Wetzel, 1967a, p.870, pl.15, figs.4a–b) Sarjeant, 1980b, p.119. Emendations: Sarjeant, 1980b, p.119, as *Hystrichogonyaulax crispa*; Fenton, 1981, p.255,257, as *Cribroperidinium crispum*. Holotype: Wetzel, 1967a, pl.15, figs.4a–b; Dietz et al., 1999, text-fig.5a. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Hystrichogonyaulax*, fifthly (and now) *Cribroperidinium*, sixthly *Acanthaulax*. Age: Middle Jurassic.

"*italica*" (Corradini, 1973, p.132–133, pl.19, figs.8a–b; pl.33, figs.5a–b; text-figs.3a–d) Helenes, 1984, p.132. Holotype: Corradini, 1973, pl.19, figs.8a–b; text-figs.3a–d; Jan du Chêne et al., 1986a, pl.98, fig.11. **NOW** *Rhynchodiniopsis*?. Originally *Gonyaulacysta*, subsequently *Millioudodinium*?, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*?. Age: Late Cretaceous–Paleocene.

"**nealei*" (Sarjeant, 1962a, p.480–481, pl.69, fig.1; text-fig.2) Sarjeant, 1969, p.14. Holotype: Sarjeant, 1962a, pl.69, fig.1; text-fig.2. **NOW** *Rhynchodiniopsis*?. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*? (combination not validly published), thirdly *Hystrichogonyaulax*, fourthly *Hystrichogonyaulax*?, fifthly *Rhynchodiniopsis*, sixthly (and now) *Rhynchodiniopsis*?. Questionable assignment: Stover and Evitt (1978, p.163). Age: Oxfordian.

"*pectinigera*" (Gocht, 1970b, p.138–139, pl.33, figs.1–4; text-fig.11) Stover and Evitt, 1978, p.163. Emendation: Fensome, 1979, p.43, as *Gonyaulacysta pectinigera*. Holotype: Gocht, 1970b, pl.33, fig.1. **NOW** *Gonyaulacysta pectinigera*. Originally *Leptodinium subtile* subsp. *pectinigerum*, subsequently *Hystrichogonyaulax pectinigera*, thirdly (and now) *Gonyaulacysta pectinigera*, fourthly *Leptodinium pectinigerum*. Age: early Bathonian.

"*pennata*" (Riley in Fisher and Riley, 1980, p.321–322, pl.1, figs.10–11) Lentin and Williams, 1981, p.133. Holotype: Fisher and Riley, 1980, pl.1, figs.10–11; Jan du Chêne et al., 1986a, pl.98, fig.5. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulacysta*, subsequently *Hystrichogonyaulax*, thirdly *Millioudodinium*, fourthly (and now) *Rhynchodiniopsis*. Age: late Kimmeridgian.

"*polytrix*" Benedek, 1972, p.20, pl.6, figs.1a–b. Emendation: Benedek and Sarjeant, 1981, p.330–333, as *Phthanoperidinium polytrix*. Holotype: Benedek, 1972, pl.6, figs.1a–b; Benedek and Sarjeant, 1981, fig.2, nos.4,6, fig.6. **NOW** *Phthanoperidinium*. Originally *Hystrichogonyaulax*, subsequently *Phthanoperidinium?*, thirdly (and now) *Phthanoperidinium*. Age: middle Oligocene.

"*regalis*" (Gocht, 1970b, p.139–140, pl.33, figs.5–7; text-fig.10) Stover and Evitt, 1978, p.163. Holotype: Gocht, 1970b, pl.33, fig.6; text-fig.10; Jan du Chêne et al., 1986a, pl.98, figs.6–10. **NOW** *Rhynchodiniopsis?*. Originally *Leptodinium*, subsequently *Hystrichogonyaulax*, thirdly (and now) *Rhynchodiniopsis?*. Age: early Bathonian.

"*saepita*" (Ashraf, 1979, p.128, pl.2, fig.27; pl.3, figs.1–3,5) Lentin and Williams, 1981, p.134. Holotype: Ashraf, 1979, pl.3, fig.2. **NOW** *Leptodinium*. Originally (and now) *Leptodinium*, subsequently *Hystrichogonyaulax*, thirdly *Rhynchodiniopsis*, fourthly *Ctenidodinium*. Age: Late Jurassic (Malm).

"*serrata*" (Cookson and Eisenack, 1958, p.34, pl.3, fig.2; text-figs.12–14) Stover and Evitt, 1978, p.163. Holotype: Cookson and Eisenack, 1958, pl.3, fig.2; Jan du Chêne et al., 1986a, pl.99, figs.3–4. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. Age: Late Jurassic–Neocomian.

"**HYSTRICHOKIBOTIUM**" Klumpp, 1953, p.387. **Taxonomic senior synonym:** *Spiniferites*, by implication in Norris and Sarjeant (1965, p.33), who considered *Hystrichokibotium* to be a taxonomic junior synonym of *Hystrichosphaera*, which is now a taxonomic junior synonym of *Spiniferites*. Type: Klumpp, 1953, pl.16, figs.12,14, as *Hystrichokibotium pseudofurcatum*.

"**pseudofurcatum*" Klumpp, 1953, p.388, pl.16, figs.12–14. Emendation: Sarjeant, 1981, p.108–109, as *Spiniferites pseudofurcatus*. Holotype: Klumpp, 1953, pl.16, figs.12,14; Sarjeant, 1981, pl.3, figs.1–2; text-fig.2; Fensome et al., 1995, figs.1–2 — p.1709. **NOW** *Spiniferites*. Originally *Hystrichokibotium*, subsequently *Hystrichosphaera* (combination illegitimate), thirdly (and now) *Spiniferites*. Taxonomic senior synonym: *Areoligera* (as *Hystrichosphaera*, now *Spiniferites*) *incerta*, according to Morgenroth (1966a, p.15) — however, Sarjeant (1981, p.108–109) retained *Hystrichokibotium* (as and now *Spiniferites*) *pseudofurcatum*. Taxonomic junior synonyms: *Hystrichosphaera buccina*, according to Lentin and Williams (1973, p.126); *Hystrichosphaera tertiaria*, according to Gocht (1969, p.32) and Sarjeant (1970, p.76). Age: late Eocene.

"*trabeculiferum*" Deflandre and Cookson, 1955, p.269, pl.8, fig.6. Holotype: Deflandre and Cookson, 1955, pl.8, fig.6. **NOW** *Spiniferites?*. Originally *Hystrichokibotium*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. Age: middle Miocene.

HYSTRICHOKOLPOMA Klumpp, 1953, p.388. Emendations: Williams and Downie, 1966a, p.176; Zevenboom and Santarelli in Zevenboom, 1995, p.136; Foucher in Fauconnier and Masure, 2004, p.281. Type: Klumpp, 1953, pl.17, figs.3,5a, as *Hystrichokolpoma cinctum*.

"*biformoides*" (Eisenack, 1954b, p.68, pl.11, figs.16–20) Rozen, 1965, p.308. Holotype: Eisenack, 1954b, pl.11, fig.18. **NOW** *Achilleodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Achilleodinium*, fifthly *Florentinia*. Morgenroth (1966a, p.28) also proposed this combination. Age: late Eocene–early Oligocene.

bulbosum (Ehrenberg, 1837b, pl.1, fig.17) Morgenroth, 1968, p.546. Emendation: Morgenroth, 1968, p.546–547, as *Hystrichokolpoma bulbosum*. Holotype: Ehrenberg, 1837b, pl.1, fig.17. Neotype: Morgenroth, 1968, pl.44, fig.6, designated by Morgenroth (1968, p.546). Originally *Xanthidium bulbosum* (Appendix A), subsequently

Hystrichosphaera bulbosa (combination not validly published), thirdly *Hystrichosphaeridium bulbosum*, fourthly *Ovum hispidum* subsp. *bulbosum* (combination not validly published, Appendix A), fifthly (and now) *Hystrichokolpoma bulbosum*, sixthly *Baltisphaeridium bulbosum* (combination not validly published, Appendix A). Lentin and Williams (1977b, p.77) retained this species in *Hystrichokolpoma*. Taxonomic senior synonym: *Xanthidium* (as *Hystrichosphaeridium*) *tubiferum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1981, p.134) retained *Hystrichokolpoma bulbosum*. The name *Xanthidium bulbosum* may not have been validly published in Ehrenberg (1837b) since no description in that publication has been referenced or found. Age: Danian.

"subsp. *bulbosum*". Autonym. Holotype: Ehrenberg, 1837b, pl.1, fig.17. **Now redundant.**

"subsp. *turgidum*" (Williams and Downie, 1966a, p.178–179, pl.17, fig.5) Lentin and Williams, 1981, p.134. Holotype: Williams and Downie, 1966a, pl.17, fig.5. **NOW** *Hystrichokolpoma cinctum* subsp. *turgidum*. Originally *Hystrichokolpoma eisenackii* var. *turgidum*, subsequently *Hystrichokolpoma eisenackii* subsp. *turgidum*, thirdly *Hystrichokolpoma bulbosum* subsp. *turgidum*, fourthly (and now) *Hystrichokolpoma cinctum* subsp. *turgidum*. This combination was erroneously made by Lentin and Williams (1981, p.134), when the subspecies should have been placed under *Hystrichokolpoma cinctum* Klumpp, 1953. Age: early Eocene.

bullatum Wilson, 1988, p.21–22, pl.10, figs.1,5a–b,6a–b. Holotype: Wilson, 1988, pl.10, figs.5a–b; Fensome et al., 1996, figs.1–2 — p.2071; Fauconnier and Masure, 2004, pl.38, fig.1. Age: early Eocene.

***cinctum** Klumpp, 1953, p.389, pl.17, figs.3–4,5a–d. Holotype: Klumpp, 1953, pl.17, figs.3,5a; Damassa, 1979a, text-fig.4. Taxonomic junior synonym: *Hystrichokolpoma eisenackii*, according to Damassa (1979a, p.823–824). Age: late Eocene.

subsp. **cinctum**. Autonym. Holotype: Klumpp, 1953, pl.17, figs.3,5a; Damassa, 1979a, text-fig.4.

subsp. **turgidum** (Williams and Downie, 1966a, p.178–179, pl.17, fig.5) Lentin and Williams, 1985, p.173. Holotype: Williams and Downie, 1966a, pl.17, fig.5. Originally *Hystrichokolpoma eisenackii* var. *turgidum*, subsequently *Hystrichokolpoma eisenackii* subsp. *turgidum*, thirdly *Hystrichokolpoma bulbosum* subsp. *turgidum*, fourthly (and now) *Hystrichokolpoma cinctum* subsp. *turgidum*. Age: early Eocene.

"**circumtabulatum**" (Drugg, 1967, p.15, pl.1, figs.12–13) Schumacker-Lambry, 1978, p.42. Holotype: Drugg, 1967, pl.1, fig.12; Damassa, 1979b, pl.3, figs.14–16; Fensome et al., 1993a, fig.1 — p.1061. **NOW** *Alisocysta*. Originally *Eisenackia*, subsequently *Hystrichokolpoma*, thirdly (and now) *Alisocysta*, fourthly *Agerasphaera* (generic name illegitimate). Taxonomic junior synonym: *Hystrichokolpoma mentitum*, according to Schumacker-Lambry (1978, p.42) — however, Lentin and Williams (1981, p.135) retained *Hystrichokolpoma mentitum*. Age: Danian.

"**clavigerum**" (Deflandre, 1937b, p.71, pl.14 [al. pl.11], figs.1–2) Williams and Downie, 1969, p.17. Emendation: Davey and Verdier, 1976, p.315, as *Florentinia clavigera*. Holotype: Deflandre, 1937b, pl.14 [al. pl.11], figs.1–2. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Florentinia*, fifthly *Hystrichosphaera*. This combination was not validly published in Williams and Downie (1966a, p.181), since these authors did not fully reference the basionym. Age: Senonian.

?**crassipes** (Reade, 1839, pl.9, figs.2–5) Lejeune-Carpentier and Sarjeant, 1981, p.10. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.10, as *Hystrichokolpoma? crassipes*. Holotype: Reade, 1839, pl.9, fig.2, lost according to Lejeune-Carpentier and Sarjeant (1981, p.11). Neotype: Lejeune-Carpentier, 1941, fig.9; Lejeune-Carpentier and Sarjeant, 1981, pl.3, fig.3; text-fig.6; designated by Lejeune-Carpentier and Sarjeant (1981, p.11). Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Litosphaeridium?*, fourthly (and now) *Hystrichokolpoma?*. Questionable assignment: Lejeune-Carpentier and Sarjeant (1981, p.10). Taxonomic junior synonym: *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*, by implication in Yun Hyesu (1981, p.27), who considered *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior synonym — however, Lentin and Williams (1985, p.282) retained *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*. Age: Late Cretaceous.

denticulatum Matsuoka, 1974, p.330–331, pl.44, figs.3–5. Holotype: Matsuoka, 1974, pl.44, fig.3; Fauconnier and Masure, 2004, pl.38, fig.2. Age: early-middle Miocene.

"*eisenackii*" Williams and Downie, 1966a, p.176–178, pl.17, figs.1–3; text-fig.46. Holotype: Williams and Downie, 1966a, pl.17, fig.2; text-fig.46. **Taxonomic senior synonym:** *Hystrichokolpoma cinctum*, according to Damassa (1979a, p.823–824). Age: early Eocene.

"subsp. *eisenackii*". Autonym. Holotype: Williams and Downie, 1966a, pl.17, fig.2; text-fig.46. **Now redundant.**

"var. *eisenackii*". Autonym. Holotype: Williams and Downie, 1966a, pl.17, fig.2; text-fig.46. **Now redundant.**

"subsp. *turgidum*" (Williams and Downie, 1966a, p.178–179, pl.17, fig.5) Lentin and Williams, 1973, p.71. Holotype: Williams and Downie, 1966a, pl.17, fig.5. **NOW** *Hystrichokolpoma cinctum* subsp. *turgidum*. Originally *Hystrichokolpoma eisenackii* var. *turgidum*, subsequently *Hystrichokolpoma eisenackii* subsp. *turgidum*, thirdly *Hystrichokolpoma bulbosum* subsp. *turgidum*, fourthly (and now) *Hystrichokolpoma cinctum* subsp. *turgidum*. Age: late Eocene.

"var. *turgidum*" Williams and Downie, 1966a, p.178–179, pl.17, fig.5. Holotype: Williams and Downie, 1966a, pl.17, fig.5. **NOW** *Hystrichokolpoma cinctum* subsp. *turgidum*. Originally *Hystrichokolpoma eisenackii* var. *turgidum*, subsequently *Hystrichokolpoma eisenackii* subsp. *turgidum*, thirdly *Hystrichokolpoma bulbosum* subsp. *turgidum*, fourthly (and now) *Hystrichokolpoma cinctum* subsp. *turgidum*. Age: late Eocene.

ellipticum Matsuoka, 1974, p.330, pl.44, fig.2. Holotype: Matsuoka, 1974, pl.44, fig.2; Fauconnier and Masure, 2004, pl.38, fig.3. Age: early-middle Miocene.

?*fenestratum* Jan du Chêne and Adediran, 1985, p.18, pl.16, figs.8–12; text-fig.5. Holotype: Jan du Chêne and Adediran, 1985, pl.16, figs.9–10. Questionable assignment: Jan du Chêne and Adediran (1985, p.18). Age: late Paleocene–early Eocene.

"*fenestreconum*" May, 1980, p.54–55, pl.3, figs.6–11. Holotype: May, 1980, pl.3, figs.6–8. **NOW** *Litosphaeridium*. Originally *Hystrichokolpoma*, subsequently (and now) *Litosphaeridium*. Age: Maastrichtian.

"*ferox*" (Deflandre, 1937b, p.72, pl.14 [al. pl.11], figs.3–4) Davey, 1969a, p.159. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.3–4. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly *Silicisphaera*, fifthly (and now) *Florentinia*. This combination was not validly published in Williams and Downie (1966a, p.181), since these authors did not fully reference the basonym. Age: Senonian.

"?*fimbriatum*" Morgenroth, 1968, p.547–548, pl.45, figs.7–8. Emendations: May, 1980, p.46 and Marheinecke, 1992, p.112–113, both as *Conneximura fimbriata*. Holotype: Morgenroth, 1968, pl.45, figs.7–8; Eisenack and Kjellström, 1972, p.515; Fensome et al., 1995, figs.1–2 — p.1483. **NOW** *Conneximura*. Originally *Hystrichokolpoma*?, subsequently *Danea* (combination illegitimate), thirdly (and now) *Conneximura*. Questionable assignment: Morgenroth (1968, p.547). Age: Danian.

?*gamospinum* Slimani, 1994, p.74–75, pl.11, figs.7–12. Holotype: Slimani, 1994, pl.11, figs.10–12; Fauconnier and Masure, 2004, pl.42, figs.10–11. Questionable assignment: Foucher in Fauconnier and Masure (2004, p.285). Age: late Campanian.

globulus Michoux, 1985, p.143, pl.1, figs.1–4,12; text-figs.2A–B. Holotype: Michoux, 1985, pl.1, figs.1–4; text-figs.2A–B; Fauconnier and Masure, 2004, pl.38, figs.4–5. N.I.A. Age: early Eocene.

granulatum Eaton, 1976, p.269–270, pl.10, figs.11–13; text-fig.15. Holotype: Eaton, 1976, pl.10, fig.11; text-fig.15; Bujak et al., 1980, pl.3, figs.4–6; Fauconnier and Masure, 2004, pl.38, figs.1–3. Age: early-middle Eocene.

grimmertingenense de Coninck, 2001, p.14–15, pl.6, figs.10–12. Holotype: de Coninck, 2001, p.14–15, pl.6, figs.10–12. Age: early Rupelian.

?incertum Michoux, 1985, p.143–144, pl.2, figs.5–7,9,12,13–15; pl.3, figs.11–12; text-figs.3A–B. Holotype: Michoux, 1985, pl.2, figs.5–7; text-figs.3A–B; Fauconnier and Masure, 2004, pl.42, figs.13–15. Questionable assignment: Michoux (1985, p.143). Age: early-middle Eocene.

"indicum" Khanna and Singh, 1981b, p.397–398, fig.2, nos.4,9; text-fig.9. Holotype: Khanna and Singh, 1981b, fig.2, no.4. **Name illegitimate** — **senior homonym**: *Hystrichokolpoma indicum* Salujha and Kindra, 1981. **Substitute name**: *Hystrichokolpoma kutharensis*. Originally *Hystrichokolpoma indicum* Khanna and Singh (name illegitimate), subsequently (and now) *Hystrichokolpoma kutharensis*. This name was not validly published in Singh et al. (1979, p.35–36), Khanna (1979, p.217) and Khanna and Singh (1981a, pl.4, fig.9), since no description was provided. Age: late Paleocene–early Eocene.

?indicum Salujha and Kindra, 1981, p.52, pl.3, figs.53–54. Holotype: Salujha and Kindra, 1981, pl.3, figs.53–54. Questionable assignment: Foucher in Fauconnier and Masure (2004, p.286). Junior homonym: *Hystrichokolpoma indicum* Khanna and Singh, 1981b. Jain and Garg (1982, p.69) recommended that the name be restricted to the holotype. Age: early Paleocene.

kutharensis Jain et al., 1991, p.75. Holotype: Khanna and Singh, 1981b, fig.2, no.4. Originally *Hystrichokolpoma indicum* Khanna and Singh (name illegitimate), subsequently (and now) *Hystrichokolpoma kutharensis*. Substitute name for *Hystrichokolpoma indicum* Khanna and Singh, 1981b, p.397–398, fig.2, nos.4,9; text-fig.9 (an illegitimate name). Age: late Paleocene–early Eocene.

manipulatum Islam, 1983a, p.238, pl.3, figs.1–2. Holotype: Islam, 1983a, pl.3, fig.1. Age: early Eocene.

mentitum McLean, 1974, p.68–69, pl.8, figs.1–5; text-fig.1B. Holotype: McLean, 1974, pl.8, figs.1–5. Taxonomic senior synonym: *Eisenackia* (as *Alisocysta*) *circumtabulata*, according to Schumacker-Lambry (1978, p.42) — however, Lentin and Williams (1981, p.135) retained *Hystrichokolpoma mentitum*. Age: late Paleocene.

minor He Chengquan, 1991, p.131–132, pl.15, fig.10; text-fig.22. Holotype: He Chengquan, 1991, pl.15, fig.10; text-fig.22. Age: Late Cretaceous.

okinawaium Matsuoka, 1979, p.54,56–57, pl.1, fig.6; pl.2, figs.1–4; text-figs.4,5B. Holotype: Matsuoka, 1979, pl.2, figs.3–4; Fauconnier and Masure, 2004, pl.39, fig.4. Age: early Pleistocene.

pacificum Matsuoka, 1979, p.51,53–54, pl.1, figs.1–5; text-figs.3,5A. Holotype: Matsuoka, 1979, pl.1, figs.1–3; Fauconnier and Masure, 2004, pl.39, fig.5. Age: early Pleistocene.

palaeocenicum Khanna and Singh, 1981b, p.396–397, fig.2, nos.7,10; text-fig.8. Holotype: Khanna and Singh, 1981b, fig.2, no.7. The name was not validly published in Singh et al. (1979, p.35–36) and Khanna (1979, p.217), since no description was provided. Age: late Paleocene–early Eocene.

?petasatum Islam, 1983b, p.340–341, pl.3, figs.4–5. Holotype: Islam, 1983b, pl.3, fig.5. Questionable assignment: Islam (1983b, p.340). Age: early-middle Eocene.

poculum Maier, 1959, p.312–313, pl.31, fig.3. Emendation: Sarjeant, 1983, p.104–105. Holotype: Maier, 1959, pl.31, fig.3; Sarjeant, 1983, pl.2, fig.4; text-fig.1. Age: middle Miocene.

proprium (Marheinecke, 1992, p.60–61, pl.11, figs.4–8) Foucher in Fauconnier and Masure, 2004, p.283. Holotype: Marheinecke, 1992, pl.11, figs.4–6; Fauconnier and Masure, 2004, pl.40, figs.1–3. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichokolpoma*. Contrary to the opinion of Lentin and Williams (1993, p.327), Williams

et al. (1998, p.310) considered the name *Hystrichosphaeridium proprium* to be validly published. Age: late Maastrichtian.

"*pseudooceanicum*" Zevenboom and Santarelli in Zevenboom, 1995, p.137–138, pl.4, figs.2–6. Holotype: Zevenboom, 1995, pl.4, figs.2–3. **Name not validly published:** considered a manuscript name. Age: middle early Oligocene–earliest Miocene.

pusillum Biffi and Manum, 1988, p.186,188, pl.5, figs.10–11,13–14,16–17. Holotype: Biffi and Manum, 1988, pl.5, figs.10–11,13; Fauconnier and Masure, 2004, pl.39, figs.6–8. Age: late Eocene–late Oligocene.

"*reductum*" Zevenboom and Santarelli in Zevenboom, 1995, p.138, pl.4, figs.7–12. Holotype: Zevenboom, 1995, pl.4, figs.7–9. **Name not validly published:** considered a manuscript name. Age: latest early Miocene.

reticulatum Hultberg, 1985c, p.132–133, pl.6, fig.I. Holotype: Hultberg, 1985c, pl.6, fig.I. Age: late Maastrichtian.

rigaudiae Deflandre and Cookson, 1955, p.279–281, pl.6, figs.6,10; text-fig.42. Holotype: Deflandre and Cookson, 1955, pl.6, fig.6. Taxonomic junior synonyms: *Galea xiphea* and *Hystrichosphaeridium stellatum*, both according to Sarjeant (1983, p.104) — however, Srivastava (1995, p.306) retained *Hystrichosphaeridium* (as and now *Florentinia*) *stellatum*; *Hystrichosphaeridium perifurcatum*, according to Jain (1982, p.53). This name was not validly published in Deflandre and Cookson (1954, p.1236), who did not give a description. Age: Eocene–Miocene.

subsp. *granulosa* Jain and Tandon, 1981, p.11, pl.1, fig.5. Holotype: Jain and Tandon, 1981, pl.1, fig.5; Fauconnier and Masure, 2004, pl.41, fig.1. Age: middle Eocene.

subsp. *rigaudiae*. Autonym. Holotype: Deflandre and Cookson, 1955, pl.6, fig.6.

"*robustum*" Salujha and Kindra, 1981, p.52, pl.3, figs.55–56. Holotype: Salujha and Kindra, 1981, pl.3, fig.55. **NOW** *Amphorosphaeridium*?. Originally *Hystrichokolpoma*, subsequently (and now) *Amphorosphaeridium*?. Age: early Paleocene.

salacia Eaton, 1976, p.271–272, pl.11, figs.1–3; text-figs.16A–B. Holotype: Eaton, 1976, pl.11, fig.1; text-figs.16A–B; Bujak et al., 1980, pl.3, figs.7–8; Fauconnier and Masure, 2004, pl.41, figs.2–3. N.I.A. Age: early-middle Eocene (see Aubry, 1986).

subsp. *furcatum* Yu Jingxian, 1989, p.138, pl.46, fig.7. Holotype: Yu Jingxian, 1989, pl.46, fig.7. Age: Eocene.

subsp. *salacia*. Autonym. Holotype: Eaton, 1976, pl.11, fig.1; text-figs.16A–B; Bujak et al., 1980, pl.3, figs.7–8; Fauconnier and Masure, 2004, pl.41, figs.2–3. N.I.A.

sequanaportum Deflandre and Deflandre-Rigaud, 1958, cards 1352–1353, 4 figs. ex Masure in Fauconnier and Masure, 2004, p.284–285, pl.42, fig.9; Fauconnier and Masure, 2004, pl.42, fig.9. Holotype: Fauconnier and Masure, pl.42, fig.9. This name was not validly published in Deflandre and Deflandre-Rigaud (1958) since no description was provided nor type designated. Age: Late Cretaceous.

spinosum Wilson, 1988, p.22, pl.10, figs.7a–b,8. Holotype: Wilson, 1988, pl.10, figs.7a–b; Fensome et al., 1996, figs.1–2 — p.2375; Fauconnier and Masure, 2004, pl.41, fig.4. Age: early-middle Eocene; see Fensome et al. (1996, p.2376).

"*stellatum*" (Maier, 1959, p.320–321, pl.33, figs.3–4) Truswell et al., 1985, p.290. Holotype: Maier, 1959, pl.33, fig.3; Sarjeant, 1983, pl.7, figs.1–2. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium*?, thirdly (and now) *Florentinia*, fourthly *Hystrichokolpoma*. Taxonomic senior synonym: *Hystrichokolpoma rigaudiae*, according to Sarjeant (1983, p.104) — however, Srivastava (1995, p.306) retained *Hystrichokolpoma* (as and now *Florentinia*) *stellatum*. Age: middle Oligocene–middle Miocene.

taperinum Shaw Chenglong, 1999b, p.188, figs.108–113. Holotype: Shaw Chenglong, 1999b, figs.108–110. Age: Eocene.

torquatum Damassa, 1979a, p.825–826, pl.3, figs.1–8; pl.4, figs.9–11; text-fig.7. Holotype: Damassa, 1979a, pl.3, fig.1; Fauconnier and Masure, 2004, pl.41, figs.5–6 (not 8–10). Age: early-middle Eocene.

"*tridactylites*" (Valensi, 1955a, p.37–38, fig.1D) Williams and Downie, 1966a, p.181. Holotype: Valensi, 1955a, fig.1D. **Combination not validly published:** basionym not fully referenced. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma* (combination not validly published), fourthly *Achomosphaera*, fifthly *Silicisphaera*, sixthly (and now) *Florentinia*. Age: Cretaceous.

truncatum Biffi and Manum, 1988, p.188, pl.6, figs.1–9. Holotype: Biffi and Manum, 1988, pl.6, figs.7–9; Fauconnier and Masure, 2004, pl.42, figs.1–3. Junior homonym: *Hystrichokolpoma truncatum* Wilson, 1988. Age: early Miocene.

"*truncatum*" Wilson, 1988 (December), p.22, pl.11, figs.1a–c, 2, 3a–b, 4a–b. Holotype: Wilson, 1988, pl.11, figs.1a–c; Fensome et al., 1996, figs.1–3 — p.2449. **Name illegitimate — senior homonym:** *Hystrichokolpoma truncatum* Biffi and Manum, 1988 (September). **Substitute name:** *Hystrichokolpoma wilsonii*. Originally *Hystrichokolpoma truncatum* Wilson, 1988 (name illegitimate), subsequently (and now) *Hystrichokolpoma wilsonii*. Age: middle Eocene.

tumescens McLean, 1974, p.66,68, pl.8, figs.6–9; text-fig.1A. Holotype: McLean, 1974, pl.8, figs.7–8. Age: late Paleocene.

unispinum Williams and Downie, 1966a, p.179–180, pl.17, figs.6–7. Holotype: Williams and Downie, 1966a, pl.17, fig.7; Bujak et al., 1980, pl.3, figs.1–3; Fauconnier and Masure, 2004, pl.42, figs.4–6. Davey and Verdier (1976, p.316) considered this species to be a possible taxonomic synonym of *Hystrichosphaeridium* (now *Florentinia*) *deanei*, the type material of *Hystrichokolpoma unispinum* representing possibly reworked Cretaceous specimens. Age: early Eocene.

wenzhouense He Chengquan and Wang Kede, 1990, p.413,423, pl.2, figs.10–13. Holotype: He Chengquan and Wang Kede, 1990, pl.2, fig.11. Age: Eocene.

wilsonii Lentin and Williams, 1993, p.291. Holotype: Wilson, 1988, pl.11, figs.1a–c; Fensome et al., 1996, figs.1–3 — p.2449. Originally *Hystrichokolpoma truncatum* Wilson (name illegitimate), subsequently (and now) *Hystrichokolpoma wilsonii*. Substitute name for *Hystrichokolpoma truncatum* Wilson, 1988, p.22, pl.11, figs.1a–c, 2, 3a–b, 4a–b (an illegitimate name). Age: middle Eocene.

"*xipheum*" (Maier, 1959, p.309, pl.30, fig.5) Davey and Williams, 1969, p.5. Holotype: Maier, 1959, pl.30, fig.5. Originally *Galea* (generic name illegitimate), subsequently *Hystrichosphaeridium*, thirdly *Hystrichokolpoma*?. Questionable assignment: Davey and Williams (1969, p.5). **Taxonomic senior synonym:** *Hystrichokolpoma rigaudiae*, according to Sarjeant (1983, p.104). This combination was not validly published in Davey and Williams (1966b, p.104), since these authors did not fully reference the basionym. Age: middle Miocene.

"**HYSTRICHOSPHAERA**" Wetzel, 1933b, p.33 ex Deflandre, 1937b, p.61. Emendation: Davey and Williams, 1966a, p.29. **Taxonomic senior synonym:** *Spiniferites*, according to Sarjeant (1970, p.75). Taxonomic junior synonym: *Hystrichokibotium*, according to Gocht (1969, p.32). The name *Hystrichosphaera* was not validly published in Wetzel (1932, p.136; 1933b, p.33), since no type was designated — this contravened the I.C.Z.N. (Article 13b), which is in effect in this case since Wetzel treated his microfossils as "protozoans" and used zoological classification. Deflandre (1937b) considered that he was emending *Hystrichosphaera*. Type: not designated; "type species" — *Hystrichosphaera furcata*, designated by Deflandre (1937b, p.61).

"*assamica*" Kar et al., 1972, p.147, pl.1, figs.6–7. Holotype: Kar et al., 1972, pl.1, fig.6. **NOW** *Spiniferites*?. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites*?. Age: Tertiary.

"*asteroidea*" Maslov, 1956, p.262, pl.86, fig.13. Holotype: Maslov, 1956, pl.86, fig.13. **NOW** *Baltisphaeridium asteroideum* (Appendix A). Originally *Hystrichosphaera asteroidea*, subsequently *Hystrichosphaeridium asteroideum*, thirdly *Baltisphaeridium hirsutoides* forma *asteroideum* (Appendix A), fourthly (and now) *Baltisphaeridium asteroideum* (Appendix A). Age: Late Cretaceous.

"*bentorii*" Rossignol, 1964, p.84–85, pl.1, figs.3,3bis,5–8; pl.3, figs.2–3; text-figs.A–F. Holotype: Rossignol, 1964, pl.1, figs.3,7–8. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Taxonomic junior synonym: *Hystrichosphaera* (as *Spiniferites*) *nodosa*, according to Reid (1974, p.598) and Harland (1977b, p.98–99) — however, Lentin and Williams (1981, p.264) retained *Hystrichosphaera* (as *Spiniferites*) *nodosa*; and *Leptodinium churchillii*, according to Harland (1977b, p.98–99) — however, the latter is now generally considered a taxonomic junior synonym of *Hystrichosphaera* (now *Spiniferites*) *nodosa*. Motile equivalent: *Gonyaulax digitalis* (Pouchet, 1883) Kofoid, 1911, according to Wall and Dale (1967, p.352) and Dodge (1989, p.283). This name was not validly published in Rossignol (1961, pl.1, figs.7–8), since no description was given, and in Rossignol (1962, p.132), who did not illustrate this taxon or provide a reference to an illustration. Age: Pleistocene–Holocene.

"var. *bentorii*". Autonym. Holotype: Rossignol, 1964, pl.1, figs.3,7–8. **Now redundant.**

"var. *truncata*" Rossignol, 1964, p.85, pl.1, figs.5–6; pl.3, fig.1. Holotype: Rossignol, 1964, pl.1, figs.5–6. **NOW** *Spiniferites bentorii* subsp. *truncatus*. Originally *Hystrichosphaera bentorii* var. *truncata*, subsequently (and now) *Spiniferites bentorii* subsp. *truncatus*. Age: Quaternary.

"*biformis*" Wiesner, 1936, p.154, pl.7, fig.9. Holotype: Wiesner, 1936, pl.7, fig.9. **Name not validly published:** generic name not validly published until 1937. **NOW** *Hystrichosphaeridium?*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly (and now) *Hystrichosphaeridium?*. Age: Late Cretaceous.

"*borussica*" Eisenack, 1954b, p.62, pl.9, figs.5a–b,6–7. Holotype: Eisenack, 1954b, pl.9, fig.5a–b. **NOW** *Rottnestia*. Originally *Hystrichosphaera*, subsequently (and now) *Rottnestia*, thirdly *Triblastula*, fourthly *Hystrichosphaeropsis* (combination not validly published). Taxonomic junior synonym: *Hystrichosphaeropsis jubata* (name not validly published), according to May (1980, p.24). Age: early Oligocene.

"*buccina*" Davey and Williams, 1966a, p.42–43, pl.4, fig.1; text-figs.10–11. Holotype: Davey and Williams, 1966a, pl.4, fig.1; text-fig.10. Originally *Hystrichosphaera*, subsequently *Spiniferites*. **Taxonomic senior synonym:** *Hystrichokibotium* (as *Spiniferites*) *pseudofurcatus*, according to Lentin and Williams (1973, p.126). N.I.A. Age: Eocene.

"*bulbosa*" (Ehrenberg, 1837b, pl.1, fig.17) Wetzel, 1933b, p.40. Emendation: Morgenroth, 1968, p.546–547, as *Hystrichokolpoma bulbosum*. Holotype: Ehrenberg, 1837b, pl.1, fig.17. Neotype: Morgenroth, 1968, pl.44, fig.6, designated by Morgenroth (1968, p.546). **Combination not validly published:** generic name not validly published until 1937. **NOW** *Hystrichokolpoma bulbosum*. Originally *Xanthidium bulbosum* (Appendix A), subsequently *Hystrichosphaera bulbosa* (combination not validly published), thirdly *Hystrichosphaeridium bulbosum*, fourthly *Ovum hispidum* subsp. *bulbosum* (combination not validly published, Appendix A), fifthly (and now) *Hystrichokolpoma bulbosum*, sixthly *Baltisphaeridium bulbosum* (combination not validly published, Appendix A). Taxonomic senior synonym: *Xanthidium* (as *Hystrichosphaeridium*) *tubiferum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1981, p.134) retained *Hystrichosphaera* (as *Hystrichokolpoma*) *bulbosa*. Age: Danian.

"*bulloidea*" Deflandre and Cookson, 1955, p.264, pl.5, figs.3–4. Holotype: Deflandre and Cookson, 1955, pl.5, figs.3–4. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Taxonomic senior synonym: *Xanthidium* (as *Spiniferites*) *ramosum*, according to Harland (1977b, p.101–102) — however, Lentin and Williams (1981, p.259) retained *Hystrichosphaera* (as *Spiniferites*) *bulloidea*. Taxonomic junior synonym: *Spiniferites nanus*, according to Matsuoka (1983a, p.23) — however, Matsuoka (1991, table 2 — p.8) retained *Spiniferites nanus*. Motile equivalent: *Gonyaulax scrippsiae* Kofoid, 1911, according to Wall and Dale (1967, p.352; 1968c, p.270) — however, see Head (1996b, p.1205). Age: Eocene–Miocene.

"*ceratioides*" Deflandre, 1937b, p.66–67, pl.12 (al. pl.9), figs.7–8. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), figs.7–8; Fensome et al., 1991, fig.1 — p.601; fig.1 — p.605. **NOW** *Xenascus*. Originally *Hystrichosphaera*, subsequently *Pseudoceratium*, thirdly *Spiniferites*, fourthly *Phoberocysta*, fifthly (and now) *Xenascus*. Taxonomic junior synonyms: *Endoceratium* (now *Xenascus*) *perforatum*, according to Davey and Verdier (1971, p.27) — however, Yun Hyesu (1981, p.62) retained *Xenascus perforatus*; *Xenascus australiensis*, according to Davey and Verdier (1971, p.26) — however, Lentin and Williams (1985, p.374) retained *Xenascus australiensis*; *Odontochitina blastema*, according to Davey and Verdier (1971, p.27) — however, Stover and Helby (1987a, p.128) retained *Odontochitina* (as *Xenascus*) *blastema*. Age: Senonian.

"*cingulata*" (Wetzel, 1933b, p.28, pl.4, fig.10) Deflandre and Cookson, 1955, p.267. Holotype: Wetzel, 1933b, pl.4, fig.10. **NOW** *Pterodinium*. Originally *Cymatiosphaera* (Appendix A), subsequently *Hystrichosphaera*, thirdly *Spiniferites*, fourthly *Spiniferites?*, fifthly (and now) *Pterodinium*. Taxonomic junior synonym: *Cymatiosphaera* (subsequently *Spiniferites?*) *pterota*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *pterota*. Age: Senonian.

"var. *cingulata*". Autonym. Holotype: Wetzel, 1933b, pl.4, fig.10. **Now redundant**. Originally *Hystrichosphaera cingulata* var. *cingulata*, subsequently *Spiniferites cingulatus* var. *cingulatus*.

"var. *granulata*" Clarke and Verdier, 1967, p.45–46, pl.9, figs.5–6; text-fig.18. Holotype: Clarke and Verdier, 1967, pl.9, fig.5; Jan du Chêne et al., 1986a, pl.88, figs.5–8. **NOW** *Pterodinium cingulatum* subsp. *granulatum*. Originally *Hystrichosphaera cingulata* var. *granulata*, subsequently *Spiniferites cingulatus* subsp. *granulatus*, thirdly *Spiniferites? cingulatus* subsp. *granulatus*, fourthly (and now) *Pterodinium cingulatum* subsp. *granulatum*. Age: Cenomanian.

"var. *perforata*" Clarke and Verdier, 1967, p.46–47, pl.9, figs.2–4; text-fig.19. Holotype: Clarke and Verdier, 1967, pl.9, figs.2–3; Jan du Chêne et al., 1986a, pl.89, figs.1–3. Originally *Hystrichosphaera cingulata* var. *perforata*, subsequently *Spiniferites cingulatus* subsp. *perforatus*, thirdly *Spiniferites? cingulatus* subsp. *perforatus*. **Taxonomic senior synonym:** *Hystrichosphaera cingulata* var. *reticulata* (now *Pterodinium cingulatum* subsp. *reticulatum*), according to Clarke et al. (1968, p.181). Age: Cenomanian.

"var. *polygonalis*" Clarke and Verdier, 1967, p.47, pl.8, figs.7–8; text-fig.20. Holotype: Clarke and Verdier, 1967, pl.8, fig.7; Jan du Chêne et al., 1986a, pl.89, figs.7–9. **NOW** *Pterodinium cingulatum* subsp. *polygonale*. Originally *Hystrichosphaera cingulata* var. *polygonalis*, subsequently *Spiniferites cingulatus* subsp. *polygonalis*, thirdly *Spiniferites? cingulatus* subsp. *polygonalis*, fourthly (and now) *Pterodinium cingulatum* subsp. *polygonale*. Taxonomic senior synonyms (at specific rank): *Hystrichosphaera* (now *Spiniferites*) *crassimurata*, according to Clarke et al. (1968, p.181) and *Cymatiosphaera* (now *Pterodinium?*) *pterota*, according to Pavlishina (1990, p.95) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* subsp. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: late Cenomanian–early Turonian.

"var. *reticulata*" Davey and Williams, 1966a, p.39, pl.1, fig.10; pl.2, fig.4. Holotype: Davey and Williams, 1966a, pl.1, figs.1–10; pl.2, fig.4. **NOW** *Pterodinium cingulatum* subsp. *reticulatum*. Originally *Hystrichosphaera cingulata* var. *reticulata*, subsequently *Spiniferites cingulatus* subsp. *reticulatus*, thirdly *Spiniferites? cingulatus* subsp. *reticulatus*, fourthly (and now) *Pterodinium cingulatum* subsp. *reticulatum*. Taxonomic junior synonym: *Hystrichosphaera cingulata* var. *perforata*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"*clavigera*" (Deflandre, 1937b, p.71, pl.14 [al. pl.11], figs.1–2) Lentin and Williams, 1989, p.176. Emendation: Davey and Verdier, 1976, p.315, as *Florentinia clavigera*. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.1–2. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Florentinia*, fifthly *Hystrichosphaera*. Age: Senonian.

"*cornigera*" Wetzel, 1933b, p.39, pl.5, fig.6 ex Deflandre, 1937b, p.66. Holotype: Wetzel, 1933b, pl.5, fig.6. **NOW** *Spiniferites?*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. This name

was not validly published in Wetzel (1933b) since the generic name was not validly published until 1937. Age: Late Cretaceous.

"*cornuta*" Gerlach, 1961, p.180, pl.27, figs.10–12. Emendation: Stover and Hardenbol, 1994, p.38–39, as *Spiniferella cornuta*. Holotype: Gerlach, 1961, pl.27, figs.10–12. **NOW** *Spiniferella*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferella*. Age: middle Oligocene–middle Miocene.

"var. *cornuta*". Autonym. Holotype: Gerlach, 1961, pl.27, figs.10–12. **Now redundant**. Originally *Hystrichosphaera cornuta* var. *cornuta*, subsequently *Spiniferites cornutus* var. *cornutus*.

"var. *laevimura*" Davey and Williams, 1966a, p.44–45, pl.4, fig.5. Holotype: Davey and Williams, 1966a, pl.4, fig.5; Bujak et al., 1980, pl.4, figs.9,12. **NOW** *Spiniferella cornuta* subsp. *laevimura*. Originally *Hystrichosphaera cornuta* var. *laevimura*, subsequently *Spiniferites cornutus* subsp. *laevimurus*, thirdly (and now) *Spiniferella cornuta* subsp. *laevimura*. Taxonomic senior synonym: *Spiniferites cornutus* subsp. *cornutus* (now *Spiniferella cornuta* subsp. *cornuta*), according to Cookson and Eisenack (1974, p.62) — however, Below (1982c, p.33) retained *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*). Taxonomic junior synonyms: *Spiniferites cornutus* var. *crassifurcatus* and *Spiniferites cornutus* var. *normalis*, both according to Below (1982c, p.33). Age: early Eocene.

"*crassimurata*" Davey and Williams, 1966a, p.39, pl.1, fig.11. Holotype: Davey and Williams, 1966a, pl.1, fig.11. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly *Pterodinium*. **Taxonomic senior synonym:** *Cymatiosphaera* (as *Spiniferites?*, now *Pterodinium pterota*, according to Kjellström (1973, p.44) and Pavlishina (1990, p.95). Taxonomic junior synonym (at specific rank): *Hystrichosphaera cingulata* var. *polygonalis*, according to Clarke et al. (1968, p.181) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* var. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Cenomanian.

"*crassipellis*" Deflandre and Cookson, 1955, p.265, pl.6, figs.2–3; text-fig.20. Holotype: Deflandre and Cookson, 1955, pl.6, figs.2–3. **NOW** *Achomosphaera*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Achomosphaera*. Taxonomic junior synonyms: *Achomosphaera recurvata* and *Hystrichosphaera* (subsequently *Spiniferites*) *membranosa*, according to Quattrocchio and Sarjeant (1996, p.116). *Hystrichosphaera crassipellis* was not validly published in Deflandre and Cookson (1954, p.1236), who did not give a description. Age: early Eocene.

"*cristata*" Conrad, 1941, p.4–5, pl.1, fig.D; text-fig.2D. Holotype: Conrad, 1941, pl.1, fig.D; text-fig.2D. **NOW** *Spiniferites?*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. Age: Maastrichtian.

"*cruciata*" Wetzel, 1933b, p.48, pl.4, fig.30. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.22–23, as *Veryhachium cruciatum*. Holotype: Wetzel, 1933b, pl.4, fig.30. **Name not validly published:** generic name not validly published until 1937. **NOW** *Multiplicisphaeridium?* (Appendix A). Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Veryhachium* (Appendix A), fifthly (and now) *Multiplicisphaeridium?* (Appendix A). Age: Late Cretaceous.

"*dentata*" Gocht, 1959, p.75–76, pl.4, fig.11; pl.7, fig.19. Emendation: Duxbury, 1977, p.49–50, as *Spiniferites dentatus*. Holotype: Gocht, 1959, pl.4, fig.11. **NOW** *Spiniferites*. Originally *Hystrichosphaera?*, subsequently *Spiniferites?*, thirdly (and now) *Spiniferites*. Questionable assignment: Gocht (1959, p.75). Age: late Hauterivian.

"**furcata*" (Ehrenberg, 1837b, pl.1, figs.12,14) Deflandre, 1937b, p.61. Holotype: not designated. Originally *Xanthidium furcatum* (Appendix A), subsequently *Hystrichosphaera furcata*, thirdly *Ovum hispidum* subsp. *furcatum* (Appendix A), fourthly *Spiniferites furcatus* (combination not validly published). **Taxonomic senior synonym:** *Xanthidium* (as *Hystrichosphaera*, now *Spiniferites*) *ramosum*, according to Davey and Williams (1966a, p.29–33). Taxonomic junior synonym: *Geodia? tripunctata* (Appendix A), according to Sarjeant (1964b, p.175). The nomenclatural type of the genus *Hystrichosphaera* remains *Hystrichosphaera furcata* (although no holotype has been designated). This combination was not validly published in Wetzel (1933b, p.34) since the generic name *Hystrichosphaera* was not validly published until 1937. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous.

"subsp. *angusta*" Wetzel, 1952, p.394, pl.A, fig.2; text-fig.2. Emendation: Sarjeant, 1984c, p.125–126, as *Spiniferites ramosus* var. *angustus*. Holotype: Wetzel, 1952, pl.A, fig.2; text-fig.2; Sarjeant, 1984c, pl.8, figs.3–4. **NOW** *Spiniferites ramosus*? subsp. *angustus*. Originally *Hystrichosphaera furcata* subsp. *angusta*, subsequently (and now) *Spiniferites ramosus*? subsp. *angustus*, thirdly *Spiniferites ramosus* var. *angustus*. Age: Danian.

"forma *aulosphaeropsis*" Wetzel, 1933b, p.35, pl.5, fig.5 ex Downie and Sarjeant, 1965, p.118. Holotype: Wetzel, 1933b, pl.5, fig.5. Originally *Hystrichosphaera furcata* forma *aulosphaeropsis*, subsequently *Spiniferites ramosus*? subsp. *aulosphaeropsis*. **Taxonomic senior synonym** (at specific rank): *Avellodinium falsificum*, according to Sarjeant (1985b, p.156–157). The name *Hystrichosphaera furcata* forma *aulosphaeropsis* was not validly published in Wetzel (1933b), since the species combination, *Hystrichosphaera furcata*, was not validly published until 1937. Age: Late Cretaceous.

"forma *furcata*". Autonym. Holotype: not designated. **Now redundant**.

"var. *furcata*". Autonym. Holotype: not designated. **Now redundant**.

"var. *membranacea*" Rossignol, 1964, p.86, pl.1, figs.4,9–10; pl.3, figs.7,12. Holotype: Rossignol, 1964, pl.1, figs.4, 9–10. **NOW** *Spiniferites membranaceus*. Originally *Hystrichosphaera furcata* var. *membranacea*, subsequently *Hystrichosphaera ramosa* var. *membranacea*, thirdly *Hystrichosphaera membranacea*, fourthly (and now) *Spiniferites membranaceus*, fifthly *Gonyaulax membranacea*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45) and Dodge (1989, p.289). Age: Pleistocene–Holocene.

"forma *multibrachiata*" de Wit, 1943, p.376; text-fig.3f. Holotype: de Wit, 1943, text-fig.3f. **NOW** *Spiniferites ramosus* subsp. *multibrachiatus*. Originally *Hystrichosphaera furcata* forma *multibrachiata*, subsequently (and now) *Spiniferites ramosus* subsp. *multibrachiatus*. Age: Late Cretaceous.

"var. *multiplicata*" Rossignol, 1964, p.86, pl.1, fig.14; pl.3, fig.16. Holotype: Rossignol, 1964, pl.1, fig.14. **NOW** *Spiniferites ramosus* subsp. *multiplicatus*. Originally *Hystrichosphaera furcata* var. *multiplicata*, subsequently *Hystrichosphaera ramosa* var. *multiplicata* (combination not validly published), thirdly (and now) *Spiniferites ramosus* subsp. *multiplicatus*. Taxonomic senior synonym (at specific rank): *Hystrichosphaera* (as *Spiniferites*) *hyperacantha*, according to Matsuoka (1985a, p.35) — however, Londeix et al. (2009, p.66) retained the latter taxon. Age: Pleistocene–Holocene.

"var. *pachyderma*" Rossignol, 1964, p.86, pl.1, figs.1–2; pl.3, fig.6. Holotype: Rossignol, 1964, pl.1, figs.1–2. **NOW** *Spiniferites pachydermus*. Originally *Hystrichosphaera furcata* var. *pachyderma*, subsequently *Hystrichosphaera ramosa* var. *pachyderma* (combination not validly published), thirdly *Spiniferites ramosus* subsp. *pachydermus*, fourthly (and now) *Spiniferites pachydermus*. N.I.A. Age: Pleistocene–Holocene.

"*granulata*" Davey, 1969b, p.4–5, pl.1, fig.4–7. Holotype: Davey, 1969b, pl.1, figs.4–7. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: Maastrichtian–?Danian.

"*heterostyla*" Heisecke, 1970, p.238,240, pl.5, figs.1–4; pl.6, figs.4–5. Holotype: Heisecke, 1970, pl.5, figs.3–4; pl.6, fig.4. **NOW** *Achomosphaera*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Achomosphaera*. Age: Danian.

"*hirsuta*" (Ehrenberg, 1837b, pl.1, figs.10,?13) Wetzel, 1933b, p.47. **Name not validly published**: Ehrenberg (1837b) did not intend to introduce a new species. Originally *Xanthidium hirsutum* (name not validly published; Appendix A), subsequently *Ovum hispidum* subsp. *hirsutum* (name not validly published; Appendix A), thirdly *Hystrichosphaera hirsuta* (name not validly published), fourthly *Hystrichosphaeridium hirsutum* (name not validly published), fifthly *Baltisphaeridium hirsutum* (name not validly published; Appendix A), sixthly *Operculodinium hirsutum* (name not validly published), seventhly *Operculodinium?* *hirsutum* (name not validly published). See

discussion under *Operculodinium? hirsutum*. This name was not validly published in Wetzel (1933b), additionally since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous.

"forma *minor*" Wetzel, 1933b, p.45–46, pl.4, fig.26. Holotype: Wetzel, 1933b, pl.4, fig.26. **Name not validly published**: the species name *Hystrichosphaera hirsuta* is not validly published. **NOW** *Coronifera striolata?* subsp. *minor*. Originally *Hystrichosphaera hirsuta* forma *minor* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *minus* (name not validly published; Appendix A), thirdly *Operculodinium? hirsutum* subsp. *minus* (name not validly published), fourthly (and now) *Coronifera striolata?* subsp. *minor*. This name was also cited by Wetzel (1932, caption to pl.3, fig.13 — p.144). Age: Late Cretaceous.

"forma *varians*" Wetzel, 1933b, p.47–48, pl.4, figs.27–29. Holotype: not designated. Lectotype: Wetzel, 1933b, pl.4, fig.29, designated by Lentin and Williams (1989, p.78)). **Name not validly published**: the species name *Hystrichosphaera hirsuta* is not validly published. **NOW** *Coronifera striolata?* subsp. *varians*. Originally *Hystrichosphaera hirsuta* forma *varians* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *varians* (name not validly published; Appendix A), thirdly *Operculodinium? hirsutum* subsp. *varians* (name not validly published), fourthly (and now) *Coronifera striolata* subsp. *varians?*. This name (as *Hystrichosphaera hirsuta* forma *rarians*) was also cited in Wetzel (1932, caption to pl.3, fig.11 — p.144). Age: Late Cretaceous.

"*hyperacantha*" Deflandre and Cookson, 1955, p.264–265, pl.6, fig.7. Holotype: Deflandre and Cookson, 1955, pl.6, fig.7. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently *Achomosphaera*, thirdly (and now) *Spiniferites*. Taxonomic junior synonym (at specific rank): *Hystrichosphaera furcata* var. *multiplicata*, according to Matsuoka (1985a, p.35) — however, Londeix et al. (2009, p.66) retained the latter taxon. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Matsuoka et al. (1989, p.94). Age: Miocene.

"*incerta*" (Klumpp, 1953, p.389–390, pl.17, figs.1–2) Morgenroth, 1966a, p.15. Emendations: Morgenroth, 1966a, p.15, as *Hystrichosphaera incerta*; Sarjeant, 1981, p.109–110, as *Spiniferites incertus*. Holotype: Klumpp, 1953, pl.17, figs.1–2. **NOW** *Spiniferites*. Originally *Areoligera*, subsequently *Hystrichosphaera*, thirdly (and now) *Spiniferites*. Taxonomic junior synonym: *Hystrichokibotium* (now *Spiniferites*) *pseudofurcatum*, according to Morgenroth (1966a, p.15) — however, Sarjeant (1981, p.108–109) retained *Hystrichokibotium* (as and now *Spiniferites*) *pseudofurcatum*. Age: late Eocene.

"*inconspicua*" Deflandre, 1935, p.233, pl.9, figs.11–12. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), fig.11. **Name not validly published**: generic name not validly published until 1937. **NOW** *Micrhystridium* (Appendix A). Originally *Hystrichosphaera* (name not validly published), subsequently (and now) *Micrhystridium* (Appendix A). Age: Late Cretaceous.

"*intermedia*" Wetzel, 1933b, p.46; text-fig.14. Holotype: Wetzel, 1933b, text-fig.14. **Name not validly published**: generic name not validly published until 1937. **NOW** *Hystrichosphaeridium?*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly (and now) *Hystrichosphaeridium?*. Age: ?Late Cretaceous.

"*leptoderma*" (Maier, 1959, p.321–322, pl.33, figs.5–6) Davey and Williams, 1969, p.5. Holotype: Maier, 1959, pl.33, fig.5; Sarjeant, 1983, pl.1, fig.2; pl.6, figs.1–2; pl.7, fig.4. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaera*, thirdly *Spiniferites*. **Taxonomic senior synonym**: *Hystrichosphaeridium* (as *Achomosphaera*) *alcicornu*, according to Sarjeant (1983, p.100–101). This combination was not validly published in Davey and Williams (1966b, p.104), since these authors did not fully reference the basionym. Age: middle Oligocene–late Miocene.

"*longispinosa*" (Eisenack, 1931, p.110–111, pl.5, figs.6–17) Wetzel, 1932, caption to pl.3, fig.12 — p.144. Holotype: Eisenack, 1931, pl.5, fig.10 (as *Ovum hispidum* subsp. *longispinosum*), lost according to Eisenack (1959, p.194). Neotype: Eisenack, 1959, pl.15, fig.1, designated by Eisenack (1959, p.194)). **Name not validly published**: generic name not validly published until 1937. **NOW** *Baltisphaeridium longispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *longispinosum* (name not validly published, Appendix A), subsequently

Hystrichosphaera longispinosa (name not validly published), thirdly *Hystrichosphaeridium longispinosum*, fourthly (and now) *Baltisphaeridium longispinosum* (Appendix A), fifthly *Micrhystridium longispinosum* (combination not validly published, Appendix A). The name *Hystrichosphaera longispinosa* was not validly published also in Wetzel (1933b, p.44) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Ordovician (erratic).

"forma *longispinosa*". Autonym. Holotype: Eisenack, 1931, pl.5, fig.10 (as *Ovum hispidum* subsp. *longispinosum*), lost according to Eisenack (1959, p.194). Neotype: Eisenack, 1959, pl.15, fig.1, designated by Eisenack (1959, p.194)). **Now redundant.**

"forma *pumilis*" Wetzel, 1933b, p.44, pl.4, fig.24. Emendation: Sarjeant, 1985b, p.162, as *Diacrocanthidium pumile*. Holotype: Wetzel, 1933b, pl.4, fig.24; Sarjeant, 1985b, pl.7, fig.5; designated by Sarjeant (1985b, p.162). **Name not validly published:** species name not validly published until 1938. **NOW** *Diacrocanthidium? pumile* (Appendix A). Originally *Hystrichosphaera longispinosa* forma *pumilis* (name not validly published), subsequently *Hystrichosphaeridium pumile*, thirdly *Baltisphaeridium pumile* (combination not validly published; Appendix A), fourthly *Micrhystridium pumile* (Appendix A), fifthly (and now) *Diacrocanthidium? pumile* (Appendix A). In proposing this taxon, Wetzel (1933b, p.44) included in synonymy the holotype of the species. This name was also cited in Wetzel (1932, caption to pl.3, fig.12). Age: Late Cretaceous (erratic).

"*membranacea*" (Rossignol, 1964, p.86, pl.1, figs.4,9–10; pl.3, figs.7,12) Wall, 1967, p.102. Holotype: Rossignol, 1964, pl.1, figs.4,9–10. **NOW** *Spiniferites membranaceus*. Originally *Hystrichosphaera furcata* var. *membranacea*, subsequently *Hystrichosphaera ramosa* var. *membranacea*, thirdly *Hystrichosphaera membranacea*, fourthly (and now) *Spiniferites membranaceus*, fifthly *Gonyaulax membranacea*. This is a cyst equivalent of *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45) and Dodge (1989, p.289). Age: Pleistocene–Holocene.

"*membranosa*" Archangelsky, 1969b, p.197,199, pl.3, figs.1–4. Holotype: Archangelsky, 1969b, pl.3, figs.1–3. Originally *Hystrichosphaera*, subsequently *Spiniferites*. **Taxonomic senior synonym:** *Hystrichosphaera* (as and now *Achomosphaera*) *crassipellis*, according to Quattrocchio and Sarjeant (1996, p.116). Age: late Eocene.

"*mensula*" Wetzel, 1933b, p.49–50, pl.4, fig.32. Holotype: Wetzel, 1933b, pl.4, fig.32. **Name not validly published:** generic name not validly published until 1937. **NOW** *Veryhachium* (Appendix A). Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium* (name not validly published), thirdly (and now) *Veryhachium* (Appendix A). N.I.A. Age: Late Cretaceous.

"*mirabilis*" Rossignol, 1964, p.86–87, pl.2, figs.1–3; pl.3, figs.4–5. Holotype: Rossignol, 1964, pl.2, figs.1–2. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Wall and Dale (1967, p.352; 1968c, p.270) and Dodge (1989, p.289). This name was not validly published in Rossignol (1962, p.131), since no illustration was given, and Rossignol (1963, p.207–208), since no holotype was designated. Age: Pleistocene.

"*monilis*" Davey and Williams, 1966a, p.45, pl.5, fig.2. Emendation: Eaton, 1976, p.282, as *Spiniferites monilis*. Holotype: Davey and Williams, 1966a, pl.5, fig.2; Bujak et al., 1980, pl.4, figs.7–8. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: early Eocene.

"*nodosa*" Wall, 1967, p.101, pl.14, figs.7–9; text-fig.2. Holotype: Wall, 1967, pl.14, figs.7–9. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Taxonomic senior synonym: *Hystrichosphaera* (as *Spiniferites*) *bentorii*, according to Reid (1974, p.598) and Harland (1977b, p.98–99) — however, Lentin and Williams (1981, p.264) retained *Hystrichosphaera* (as *Spiniferites*) *nodosa*. Taxonomic junior synonym: *Leptodinium churchillii*, according to Reid (1974, p.599). Motile equivalent: *Gonyaulax digitalis* (Pouchet, 1883) Kofoid, 1911, according to Wall and Dale (1967, p.352). Age: Quaternary.

"*ovum*" (Deflandre, 1935, p.232, pl.8, fig.11) Deflandre, 1937b, p.67. Holotype: Deflandre, 1935, pl.8, fig.11; Jan du Chêne et al., 1986a, pl.46, fig.1. **NOW** *Hystrichosphaeropsis*. Originally (and now) *Hystrichosphaeropsis*, subsequently *Hystrichosphaera*. N.I.A. Age: Senonian.

"*paradoxa*" Cookson and Eisenack, 1968, p.114; text-figs.2G,3. Holotype: Cookson and Eisenack, 1968, text-figs.2G,3. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: Senonian.

"?*pedata*" Wetzel, 1933b, p.55–56, pl.4, fig.35 ex Downie and Sarjeant, 1965, p.119. Emendation: Sarjeant, 1985b, p.145–146, as *Coronifera pedata*. Holotype: Wetzel, 1933b, pl.4, fig.35; Sarjeant, 1985b, pl.4, fig.5. **NOW** *Coronifera*. Originally *Hystrichosphaera*?, subsequently *Spiniferites*?, thirdly (and now) *Coronifera*. Questionable assignment: Wetzel (1933b, p.55). Taxonomic senior synonym: *Coronifera oceanica*, by implication in Sarjeant (1985b, p.145–147), who believed *Hystrichosphaera* (as *Coronifera*) *pedata* to be the senior name — however, Kirsch (1991, p.71) retained the two species. The name *Hystrichosphaera pedata* was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous.

"*penicillata*" (Ehrenberg, 1843b, p.62 ex Ehrenberg, 1854, pl.37, section 8, fig.3) Wetzel, 1933b, p.41. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.3. **Combination not validly published**: generic name not validly published until 1937. **NOW** *Systematophora penicillata*. Originally *Xanthidium penicillatum* (Appendix A), subsequently *Hystrichosphaera penicillata* (combination not validly published), thirdly *Hystrichosphaeridium penicillatum*, fourthly *Ovum hispidum* subsp. *penicillatum* (combination not validly published; Appendix A), fifthly *Hystrichosphaeridium?* *penicillatum*, sixthly (and now) *Systematophora penicillata*. Taxonomic junior synonym: *Systematophora fasciculigera*, according to Sarjeant (1980a, p.282). The name *Xanthidium penicillatum* was not validly published in Ehrenberg (1843b) since neither description nor illustration was presented. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1854) did not provide a description. Age: late Oxfordian.

"forma *coronata*" Wetzel, 1933b, caption to pl.4, fig.17 — p.41, pl.4, fig.17. Holotype: Wetzel, 1933b, pl.4, fig.17; Lejeune-Carpentier, 1938a, fig.6. **Name not validly published**: species combination not validly published. **NOW** *Areoligera coronata*. Originally *Hystrichosphaera penicillata* forma *coronata* (name not validly published), subsequently *Hystrichosphaeridium penicillatum* forma *coronatum*, thirdly (and now) *Areoligera coronata*. Taxonomic junior synonyms: *Hystrichosphaera penicillata* forma *medusettiformis* and *Hystrichosphaera penicillata* forma *rhizopodiphora*, both according to Morgenroth (1968, p.551) — however, Eaton (1976, p.245) retained *Hystrichosphaera penicillata* forma *medusettiformis* (as *Areoligera medusettiformis*). Age: Senonian.

"forma *medusettiformis*" Wetzel, 1933b, caption to pl.4, fig.19 — p.41, pl.4, fig.19. Holotype: Wetzel, 1933b, pl.4, fig.19; Lejeune-Carpentier, 1938a, fig.7. **Name not validly published**: species combination not validly published. **NOW** *Areoligera medusettiformis*. Originally *Hystrichosphaera penicillata* forma *medusettiformis* (name not validly published), subsequently (and now) *Areoligera medusettiformis*. Taxonomic senior synonym: *Hystrichosphaera penicillata* forma *coronata* (now *Areoligera coronata*), according to Morgenroth (1968, p.551) — however, Eaton (1976, p.245) retained *Hystrichosphaera penicillata* forma *medusettiformis* (as *Areoligera medusettiformis*). This name (as *Hystrichosphaera penicillata* forma *medusettiformis*), was also cited by Wetzel (1932, caption to pl.3, fig.7 — p.144). Age: Senonian.

"forma *penicillata*". Autonym. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.3. **Now redundant**.

"forma *rhizopodiphora*" Wetzel, 1933b, caption to pl.4, fig.18 — p.41, pl.4, fig.18. Holotype: Wetzel, 1933b, pl.4, fig.18. **Name not validly published**: species combination not validly published. Originally *Hystrichosphaera penicillata* forma *rhizopodiphora*, subsequently *Areoligera rhizopodiphora*. **Taxonomic senior synonym**: *Hystrichosphaera penicillata* forma *coronata* (now *Areoligera coronata*), according to Morgenroth (1968, p.551). Age: Senonian.

"*perforata*" Davey and Williams, 1966a, p.41, pl.5, fig.7. Holotype: Davey and Williams, 1966a, pl.5, fig.7; Bujak et al., 1980, pl.5, figs.2–3. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: early Eocene.

"*pilosa*" (Ehrenberg, 1854, pl.37, section 8, fig. 4) Wetzel, 1933b, p.43. Emendation: Erkmen and Sarjeant, 1980, p.50, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, fig.8, no.4. **Combination not validly published**: generic name not validly published until 1937. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium?* *pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1854) did not provide a description. Age: Oxfordian.

"forma *nanus*" Wetzel, 1933b, p.43, pl.4, fig.23; text-fig.13. Emendation: Sarjeant, 1985b, p.145, as *Prolixosphaeridium nanus*. Holotype: Wetzel, 1933b, pl.4, fig.23; Sarjeant, 1985b, pl.2, figs.6–7. **Name not validly published**: species combination not validly published. **NOW** *Prolixosphaeridium?* *nanus*. Originally *Hystrichosphaera pilosa* forma *nanus* (name not validly published), subsequently *Sentusidinium pilosum?* subsp. *nanus*, thirdly *Prolixosphaeridium nanus*, fourthly (and now) *Prolixosphaeridium?* *nanus*. N.I.A. Age: Late Cretaceous.

"forma *pilosa*". Autonym. Holotype: Ehrenberg, 1854, pl.37, section 8, no.4. **Now redundant**. Originally *Hystrichosphaera pilosa* forma *pilosa*, subsequently *Sentusidinium pilosum* forma *pilosum*.

"*porosa*" Manum and Cookson, 1964, p.11–12, pl.2, figs.1–5; text-fig.2. Holotype: Manum and Cookson, 1964, pl.2, figs.2–3; text-fig.2. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: Late Cretaceous.

"*pseudofurcata*" (Klumpp, 1953, p.388, pl.16, figs.12–14) Gocht, 1969, p.32. Emendation: Sarjeant, 1981, p.108–109, as *Spiniferites pseudofurcatus*. Holotype: Klumpp, 1953, pl.16, figs.12,14; Sarjeant, 1981, pl.3, figs.1–2; text-fig.2; Fensome et al., 1995, figs.1–2 — p.1709. **Combination illegitimate** — **senior homonym**: *Hystrichosphaera pseudofurcata* Varma and Dangwal, 1964. **NOW** *Spiniferites*. Originally *Hystrichokibotium*, subsequently *Hystrichosphaera* (combination illegitimate), thirdly (and now) *Spiniferites*. Taxonomic senior synonym: *Areoligera* (as *Hystrichosphaera*, now *Spiniferites*) *incerta*, according to Morgenroth (1966a, p.15) — however, Sarjeant (1981, p.108–109) retained *Hystrichokibotium* (as and now *Spiniferites*) *pseudofurcatum*. Taxonomic junior synonyms: *Hystrichosphaera buccina*, according to Lentin and Williams (1973, p.126); *Hystrichosphaera tertiaria*, according to Gocht (1969, p.32) and Sarjeant (1970, p.76). Age: late Eocene.

"*pseudofurcata*" Varma and Dangwal, 1964, p.66, pl.2, figs.7–8. Holotype: Varma and Dangwal, 1964, pl.2, figs.7–8. **Substitute name**: *Spiniferites varmae*. Originally *Hystrichosphaera pseudofurcata*, subsequently *Spiniferites?* *varmae*, thirdly (and now) *Spiniferites varmae*. Junior homonym: *Hystrichosphaera* (originally *Hystrichokibotium*) *pseudofurcata* (Klumpp, 1953) Gocht, 1969. Age: Eocene–Oligocene.

"*ptero*" (Cookson and Eisenack, 1958, p.50, pl.11, fig.7) Eisenack and Kjellström, 1972, p.575. Emendation: Pavlishina, 1990, p.95, as *Pterodinium?* *pterotum*. Holotype: Cookson and Eisenack, 1958, pl.11, fig.7. **NOW** *Pterodinium?* Originally *Cymatiosphaera* (Appendix A), subsequently *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Spiniferites?*, fifthly (and now) *Pterodinium?*. Taxonomic senior synonym: *Cymatiosphaera* (as and now *Pterodinium*) *cingulata*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *ptero*. Taxonomic junior synonyms: *Hystrichosphaera* (as *Spiniferites*) *crassimurata*, according to Kjellström (1973, p.44) and Pavlishina (1990, p.95); (at specific rank) *Hystrichosphaera cingulata* var. *polygonalis*, according to Pavlishina (1990, p.95) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* subsp. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Maastrichtian.

"*+ramosa*" (Ehrenberg, 1837b, pl.1, fig.15) Deflandre 1937b, p.64. Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). **NOW** *Spiniferites*. Originally *Xanthidium ramosum* (Appendix A), subsequently (and now) *Spiniferites ramosus*, thirdly *Hystrichosphaera ramosa*, fourthly *Ovum hispidum* subsp. *ramosum* (combination not validly published, Appendix A), fifthly *Bion ramosum* (Appendix A). Taxonomic junior synonyms: *Xanthidium* (as *Hystrichosphaera*) *furcatum*, according to Davey and Williams (1966a, p.29–33); *Galea korykos* and *Hystrichosphaeridium echinoides*, both according to Sarjeant (1983, p.91–92); *Areoligera birama*, according to Morgenroth (1968, p.550); *Geodia?* *tripunctata*, by

implication in Sarjeant (1964b, p.175), who considered *Geodia? tripunctata* to be a taxonomic junior synonym of *Hystrichosphaera furcata*; *Hystrichosphaera* (now *Spiniferites*) *bulloidea*, according to Harland (1977b, p.101–102) — however, Lentin and Williams (1981, p.259) retained *Hystrichosphaera* (as and now *Spiniferites*) *bulloideus*; *Homotryblium distinctum*, according to Jain and Garg (1982, p.69), who considered *Homotryblium distinctum* to be a taxonomic junior synonym of *Spiniferites ramosus* subsp. *ramosus*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). The nomenclatural type of the genus *Hystrichosphaera* remains the holotype of *Hystrichosphaera furcata*. This combination was not validly published in Wetzel (1933b, p.35) since the generic name was not validly published until 1937. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous.

"var. *gracilis*" Davey and Williams, 1966a, p.34–35, pl.1, fig.5; pl.5, fig.6. Holotype: Davey and Williams, 1966a, pl.5, fig.6; Bujak et al., 1980, pl.4, figs.1–2. **NOW** *Spiniferites ramosus* subsp. *gracilis*. Originally *Hystrichosphaera ramosa* var. *gracilis*, subsequently *Spiniferites ramosus* var. *gracilis*, thirdly (and now) *Spiniferites ramosus* subsp. *gracilis*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium plicatum*, according to Sarjeant (1983, p.93). Age: Cenomanian–Eocene.

"var. *granomembranacea*" Davey and Williams, 1966a, p.37–38, pl.4, fig.4. Holotype: Davey and Williams, 1966a, pl.4, fig.4; Bujak et al., 1980, pl.4, figs.10–11. **NOW** *Spiniferites ramosus* subsp. *granomembranaceus*. Originally *Hystrichosphaera ramosa* var. *granomembranacea*, subsequently *Spiniferites ramosus* var. *granomembranaceus*, thirdly (and now) *Spiniferites ramosus* subsp. *granomembranaceus*. Age: early Eocene.

"var. *granosa*" Davey and Williams, 1966a, p.35, pl.4, fig.9. Holotype: Davey and Williams, 1966a, pl.4, fig.9; Bujak et al., 1980, pl.4, figs.4–5. **NOW** *Spiniferites ramosus* subsp. *granosus*. Originally *Hystrichosphaera ramosa* var. *granosa*, subsequently *Spiniferites ramosus* var. *granosus*, thirdly (and now) *Spiniferites ramosus* subsp. *granosus*. Age: early Eocene.

"var. *membranacea*" (Rossignol, 1964, p.86, pl.1, figs.4,9–10; pl.3, figs.7,12) Davey and Williams, 1966b, p.37. Holotype: Rossignol, 1964, pl.1, figs.4,9–10. **NOW** *Spiniferites membranaceus*. Originally *Hystrichosphaera furcata* var. *membranacea*, subsequently *Hystrichosphaera ramosa* var. *membranacea*, thirdly *Hystrichosphaera membranacea*, fourthly (and now) *Spiniferites membranaceus*, fifthly *Gonyaulax membranacea*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45) and Dodge (1989, p.289). Age: Pleistocene–Holocene.

"var. *multibrevis*" Davey and Williams, 1966a, p.35–36, pl.1, fig.4; pl.4, fig.6; text-fig.9. Holotype: Davey and Williams, 1966a, pl.4, fig.6; Bujak et al., 1980, pl.4, figs.3,6. Originally *Hystrichosphaera ramosa* var. *multibrevis*, subsequently *Spiniferites ramosus* var. *multibrevis*, thirdly *Spiniferites ramosus* subsp. *multibrevis*, fourthly *Spiniferites multibrevis*. **Taxonomic senior synonym** (at specific rank): *Galea twistringiensis*, according to Sarjeant (1983, p.95–96). Taxonomic junior synonym (at subspecific rank): *Achomosphaera* (as *Spiniferites*) *cambra*, according to Jain (1982, p.51). Age: Hauterivian.

"var. *multiplicata*" (Rossignol, 1964, p.86, pl.1, fig.14; pl.3, fig.16) Harland and Downie, 1969, p.232. Holotype: Rossignol, 1964, pl.1, fig.14. **Combination not validly published**: basionym not fully referenced. **NOW** *Spiniferites ramosus* subsp. *multiplicatus*. Originally *Hystrichosphaera furcata* var. *multiplicata*, subsequently *Hystrichosphaera ramosa* var. *multiplicata* (combination not validly published), thirdly (and now) *Spiniferites ramosus* subsp. *multiplicatus*. Taxonomic senior synonym (at specific rank): *Hystrichosphaera* (as *Spiniferites*) *hyperacantha*, according to Matsuoka (1985a, p.35) — however, Londeix et al. (2009, p.66) retained the latter taxon. Age: Pleistocene–Holocene.

"var. *pachyderma*" (Rossignol, 1964, p.86, pl.1, figs.1–2; pl.3, fig.6) Harland and Downie, 1969, p.232. Holotype: Rossignol, 1964, pl.1, figs.1–2. **Combination not validly published**: basionym not fully referenced. **NOW** *Spiniferites pachydermus*. Originally *Hystrichosphaera furcata* var. *pachyderma*, subsequently *Hystrichosphaera ramosa* var. *pachyderma* (combination not validly published), thirdly *Spiniferites ramosus* subsp. *pachydermus*, fourthly (and now) *Spiniferites pachydermus*. Age: Pleistocene–Holocene.

- "var. *ramosa*". Autonym. Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). **Now redundant**. Originally *Hystrichosphaera ramosa* var. *ramosa*, subsequently *Spiniferites ramosus* var. *ramosus*.
- "var. *reticulata*" Davey and Williams, 1966a, p.38, pl.1, figs.2–3. Holotype: Davey and Williams, 1966a, pl.1, figs.2–3. **NOW** *Spiniferites ramosus* subsp. *reticulatus*. Originally *Hystrichosphaera ramosa* var. *reticulata*, subsequently *Spiniferites ramosus* var. *reticulatus*, thirdly (and now) *Spiniferites ramosus* subsp. *reticulatus*. Age: Cenomanian.
- "*reginaldii*" (Mantell, 1844, p.240; text-fig.53, no.5) Sarjeant, 1967c, p.244–245. Emendation: Sarjeant, 1967c, p.244–245, as *Hystrichosphaera reginaldii*. Holotype: Mantell, 1844, text-fig.53, no.5; Sarjeant, 1967c, figs.3A–B,4–5; Sarjeant, 1992a, figs.2,4a–b. **NOW** *Spiniferites?*. Originally *Xanthidium* (Appendix A), subsequently *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Baltisphaeridium* (Appendix A), fifthly (and now) *Spiniferites?*. Age: Late Cretaceous.
- "*rubina*" Rossignol, 1962, p.134 ex Rossignol, 1964, p.87–88, pl.1, figs.12–13; pl.3, figs.22–23. Holotype: Rossignol, 1964, pl.1, figs.12–13. **NOW** *Spiniferites*. Originally *Hystrichosphaeridium* (name not validly published), subsequently *Hystrichosphaera*, thirdly (and now) *Spiniferites*. This name was not validly published in Rossignol (1962) since no illustration was provided. Age: Quaternary.
- "*salpingophora*" Deflandre, 1935, p.232, pl.9, fig.1. Emendation: Davey and Williams, 1966b, p.61–62, as *Hystrichosphaeridium salpingophorum*. Holotype: Deflandre, 1935, pl.9, fig.1; Deflandre, 1937b, pl.13 (al. pl.10), figs.1,3; Fauconnier and Masure, 2004, pl.46, figs.1–6. **Name not validly published**: generic name not validly published until 1937. **NOW** *Hystrichosphaeridium*. Originally *Hystrichosphaera* (name not validly published), subsequently (and now) *Hystrichosphaeridium*. Age: Senonian.
- "*scabrata*" Wall, 1967, p.102, pl.14, figs.10–13; text-fig.2. Holotype: Wall, 1967, pl.14, figs.10–13. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. This is a cyst equivalent of *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). Age: Pleistocene–Holocene.
- "*scabrosa*" Clarke and Verdier, 1967, p.49–50, pl.9, figs.7–10; text-fig.21. Holotype: Clarke and Verdier, 1967, pl.9, fig.10. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: Cenomanian–Santonian.
- "*sergipensis*" Regali et al., 1974, p.291, pl.24, fig.1. Holotype: Regali et al., 1974, pl.24, fig.1. **NOW** *Hystrichosphaeridium?*. Originally *Hystrichosphaera*, subsequently (and now) *Hystrichosphaeridium?*. Age: early Eocene.
- "*setosa*" Philippot, 1949, p.56; text-fig.1. Holotype: Philippot, 1949, text-fig.1. **NOW** *Spiniferites?*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. Age: Senonian.
- "*speciosa*" Deflandre, 1937b, p.65, pl.11 (al. pl.8), fig.2. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), fig.2. **NOW** *Spiniferites?*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. This name was not validly published in Deflandre (1934, caption to fig.4 — p.967; 1935, p.232; 1936a, p.63), since the generic name *Hystrichosphaera* was not validly published until 1937 and, additionally, since no description was given. Age: Late Cretaceous.
- "*supparus*" Drugg, 1967, p.24, pl.4, figs.5–6. Holotype: Drugg, 1967, pl.4, fig.5. **NOW** *Spiniferites*. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. N.I.A. Age: Maastrichtian–Danian.
- "*tenuicapillata*" Wetzel, 1933b, p.42, pl.4, figs.20–22. Holotype: Wetzel, 1933b, pl.4, fig.20. **Name not validly published**: generic name not validly published until 1937. **NOW** *Areoligera*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly (and now) *Areoligera*. Age: Senonian.

"forma *irregularis*" Wetzel, 1933b, p.42–43, pl.4, fig.20. Holotype: Wetzel, 1933b, pl.4, fig.20. **Name not validly published**: specific name not validly published until 1937. **Nomenclatural senior synonym**: *Hystrichosphaera tenuicapillata* forma *tenuicapillata* (now *Areoligera tenuicapillata* subsp. *tenuicapillata*), which has the same holotype. Originally *Hystrichosphaera tenuicapillata* forma *irregularis* (name not validly published), subsequently *Areoligera tenuicapillata* subsp. *irregularis* (name illegitimate). Age: Senonian.

"forma *pinopollina*" Wetzel, 1933b, p.42–43, pl.4, fig.22. Holotype: Wetzel, 1933b, pl.4, fig.22. **Name not validly published**: specific name not validly published until 1937. **NOW** *Areoligera tenuicapillata* subsp. *pinopollina*. Originally *Hystrichosphaera tenuicapillata* forma *pinopollina* (name not validly published), subsequently *Areoligera tenuicapillata* forma *pinopollina*, thirdly (and now) *Areoligera tenuicapillata* subsp. *pinopollina*. Age: Senonian.

"forma *turbilineata*" Wetzel, 1933b, p.42, pl.4, fig.21. Holotype: Wetzel, 1933b, pl.4, fig.21; Sarjeant, 1985b, pl.4, fig.2. **Name not validly published**: specific name not validly published until 1937. **NOW** *Areoligera tenuicapillata* subsp. *turbilineata*. Originally *Hystrichosphaera tenuicapillata* forma *turbilineata* (name not validly published), subsequently *Areoligera turbilineata*, thirdly (and now) *Areoligera tenuicapillata* subsp. *turbilineata*. Age: Senonian.

"*tertiaria*" Eisenack and Gocht, 1960, p.515; text-fig.4. Holotype: Eisenack and Gocht, 1960, text-fig.4. Originally *Hystrichosphaera*, subsequently *Spiniferites*. **Taxonomic senior synonym**: *Hystrichokibotium* (now *Spiniferites*) *pseudofurcatum*, according to Gocht (1969, p.32) and Sarjeant (1970, p.76). Age: Oligocene.

"var. *obliqua*" Wall, 1967, p.103, pl.14, fig.16; text-fig.2. Holotype: Wall, 1967, pl.14, fig.16. **NOW** *Spiniferites pseudofurcatus* subsp. *obliquus*. Originally *Hystrichosphaera tertiariorum* var. *obliqua*, subsequently (and now) *Spiniferites pseudofurcatus* subsp. *obliquus*. Age: late Pleistocene–Holocene.

"var. *tertiaria*". Autonym. Holotype: Eisenack and Gocht, 1960, text-fig.4. **Now redundant**.

"*tubifera*" (Ehrenberg, 1837b, pl.1, fig.16) Wetzel, 1933b, p.40. Emendation: Davey and Williams, 1966b, p.56–58, as *Hystrichosphaeridium tubiferum*. Holotype: Ehrenberg, 1837b, pl.1, fig.16. **Combination not validly published**: generic name not validly published until 1937. **NOW** *Hystrichosphaeridium tubiferum*. Originally *Xanthidium tubiferum* (Appendix A), subsequently *Hystrichosphaera tubifera* (combination not validly published), thirdly (and now) *Hystrichosphaeridium tubiferum*, fourthly *Ovum hispidum tubiferum* (combination not validly published; Appendix A). Taxonomic junior synonym: *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1989, p.134) retained *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*. Age: ?Late Cretaceous.

"*wetzelii*" Deflandre, 1937b, p.65, pl.11 (al. pl.8), figs.6,8. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), figs.6,8. **NOW** *Rottnestia*. Originally *Hystrichosphaera*, subsequently *Hystrichosphaeropsis* (combination not validly published), thirdly *Spiniferites*, fourthly (and now) *Rottnestia*. This name was not validly published in Deflandre (1935, p.232; 1936a, p.63) since the generic name *Hystrichosphaera* was not validly published until 1937 and, additionally, since no description was given. Age: Senonian.

"*xanthiopyxides*" Wetzel, 1933b, p.44–45, pl.4, fig.25. Emendations: Morgenroth, 1968, p.556, as *Hystrichosphaeridium? xanthiopyxides*; Sarjeant, 1985b, p.142–144, as *Tanyosphaeridium xanthiopyxides*. Holotype: Wetzel, 1933b, pl.4, fig.25, Morgenroth, 1968, pl.48, fig.5; Sarjeant, 1985b, pl.3, figs.2–3; Dietz et al., 1999, fig.10, no.8. **Name not validly published**: generic name not validly published until 1937. **NOW** *Tanyosphaeridium*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Baltisphaeridium* (Appendix A), fifthly *Prolixosphaeridium?*, sixthly (and now) *Tanyosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Tanyosphaeridium*) *magdali*, according to Stover and Evitt (1978, p.85). Age: Late Cretaceous (?Maastrichtian, according to Sarjeant, 1985b, p.143).

"**HYSTRICHOSPHAERA** subgenus **HYSTRICHOSPHAERA**". Autonym. **Now redundant**. Deflandre (1937b, p.61–67) included the following species in this subgenus: *Hystrichosphaera ceratioides*, *Hystrichosphaera cornigera*, *Hystrichosphaera furcata*, *Hystrichosphaera ramosa*, *Hystrichosphaera speciosa* and *Hystrichosphaera wetzelii*. Entries for these species are included under the genus *Hystrichosphaera*. Type: not designated; "type species" — *Hystrichosphaera furcata*, designated by Deflandre (1937b, p.61).

"**HYSTRICHOSPHAERA** subgenus **HYSTRICHOSPHAEROPSIS**" (Deflandre, 1935, p.232) Deflandre, 1937b, p.67. **NOW** *Hystrichosphaeropsis*. Originally (and now) *Hystrichosphaeropsis*, subsequently *Hystrichosphaera* subgenus *Hystrichosphaeropsis*. Deflandre (1937b, p.67) assigned *Hystrichosphaera ovum* to this subgenus: an entry for this species is included under the genus *Hystrichosphaera*. Type: Deflandre, 1935, pl.8, fig.11, as *Hystrichosphaeropsis ovum*.

HYSTRICHOSPHAERIDIUM Deflandre, 1937b, p.68. Emendation: Davey and Williams, 1966b, p.55–56. Taxonomic junior synonym: *Dilatysphaera* (Appendix A), according to Eisenack et al. (1973, p.407) — however, Cramer and Diez (1979, p.76) retained *Dilatysphaera*. Type: Ehrenberg, 1837b, pl.1, fig.16, as *Xanthidium tubiferum*.

"**aculeatum**" Timofeev, 1959, p.54, pl.4, fig.21. Holotype: Timofeev, 1959, pl.4, fig.21. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"**aemulum**" Deflandre, 1939a, p.187–189, pl.9, fig.12; pl.10, figs.5–8; pl.11, figs.1,7. Emendation: Below, 1982b, p.139–140, as *Rigaudella aemula*. Holotype: Deflandre, 1939a, pl.11, fig.1; Eisenack and Kjellström, 1972, figure to left on p.43; Fensome et al., 1995, fig.1 — p.473; fig.2 — p.1477. **NOW** *Rigaudella*. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly *Adnatosphaeridium*, fourthly (and now) *Rigaudella*. Taxonomic junior synonym: *Cannosphaeropsis paucispina*, according to Below (1982b, p.139). Age: Oxfordian.

"**alagoense**" Regali et al., 1974, p.290, pl.24, fig.2. Holotype: Regali et al., 1974, pl.24, fig.2. **NOW** *Surculosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently (and now) *Surculosphaeridium?*. Age: middle Eocene–Miocene.

"**albertense**" Pocock, 1962, p.82, pl.15, figs.226–227. Holotype: Pocock, 1962, pl.15, fig.226; Brideaux, 1977, pl.11, figs.3–4; Jansonius, 1986, pl.4, figs.4–5; Fauconnier and Masure, 2004, pl.55, figs.1–6. **NOW** *Oligosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. Taxonomic junior synonyms: *Hystrichosphaeridium* (as *Oligosphaeridium*) *irregulare*, according to Jansonius (1986, p.213); *Hystrichosphaeridium* (as *Oligosphaeridium?*) *coelenteratum*, *Hystrichosphaeridium* (as *Oligosphaeridium?*) *dispare* and *Hystrichosphaeridium* (as *Oligosphaeridium*) *reniforme*, by implication in Stover and Evitt (1978, p.68–69), who considered these species to be taxonomic junior synonyms of *Hystrichosphaeridium* (as *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. Age: Barremian.

"**albicornu**" Eisenack, 1954b, p.65, pl.10, figs.1–2; text-fig.5. Holotype: Eisenack, 1954b, pl.10, fig.2. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently (and now) *Achomosphaera*. Taxonomic junior synonyms: *Galea lychnea* and *Hystrichosphaeridium leptodermum*, both according to Sarjeant (1983, p.100–101). Age: Oligocene.

"**amalthei**" Wetzel, 1966, p.317, pl.31, figs.2,2a–b. Holotype: Wetzel, 1966, pl.31, figs.2,2a. **NOW** *Dapsilidinium?*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*, thirdly *Polysphaeridium?*, fourthly (and now) *Dapsilidinium?*. Age: late Toarcian.

"**ancoriferum**" Cookson and Eisenack, 1960a, p.8, pl.2, fig.11. Emendation: Cookson and Eisenack, 1968, p.119–120, as *Cleistosphaeridium ancoriferum*. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.11. **NOW** *Sepispinula*. Originally *Hystrichosphaeridium*, subsequently *Cleistosphaeridium*, thirdly (and now) *Sepispinula*. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula?*) *ambiguum*, according to Yun Hyesu

(1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula ancorifera*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula ancorifera*. Age: Albian–Cenomanian.

"**annulatum**" Timofeev, 1959, p.56, pl.4, fig.22. Holotype: Timofeev, 1959, pl.4, fig.22. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"**anthophorum**" Cookson and Eisenack, 1958, p.43, pl.11, figs.12–13; text-figs.16–18. Holotype: Cookson and Eisenack, 1958, pl.11, fig.12; Fauconnier and Masure, 2004, pl.73, figs.5–6. **NOW** *Stiphrosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly *Polystephanephorus*, fourthly *Hystrichosphaerina*, fifthly (and now) *Stiphrosphaeridium*. Taxonomic junior synonym: *Hystrichosphaerina schindewolfii*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Hystrichosphaerina schindewolfii*. Age: Aptian–Albian.

"**apiculatum**" Timofeev, 1959, p.52, pl.4, fig.3. Holotype: Timofeev, 1959, pl.4, fig.3. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Goniosphaeridium* (combination not validly published; Appendix A). Age: Early Ordovician.

"**aquitanicum**" Deunff, 1961a, p.39–40, pl.2, figs.12–13. Holotype: Deunff, 1961a, pl.2, figs.12–13. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Davey and Williams (1966b, p.70); and Masure and Foucher in Fauconnier and Masure (2004, p.310) as a problematic species. Age: Cretaceous.

"**aracajuense**" Regali et al., 1974, p.291, pl.24, fig.6. Holotype: Regali et al., 1974, pl.24, fig.6. **NOW** *Spiniferites*. Originally *Hystrichosphaeridium*, subsequently (and now) *Spiniferites*. Age: Paleocene–early Eocene.

"**arborispinum**" Davey and Williams, 1966b, p.61, pl.9, figs.5,10. Holotype: Davey and Williams, 1966b, pl.9, fig.10. Age: early-middle Barremian.

"**armatum**" Deflandre, 1937b, p.76–77, pl.16 (al. pl.13), figs.6–7. Emendation: Davey, 1969a, p.153, as *Cleistosphaeridium armatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.6; Fauconnier and Masure, 2004, pl.23, figs.1–3. **NOW** *Downiesphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Age: late Senonian.

"**arrectum**" Timofeev, 1959, p.53, pl.4, fig.8. Holotype: Timofeev, 1959, pl.4, fig.8. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early–Mid Ordovician.

"**articulatum**" (Wetzel in Eisenack, 1938b, p.187; text-fig.4) Pastiels, 1948, p.42. Holotype: Eisenack, 1938b, fig.4; Eisenack, 1954b, pl.7, fig.3 (not pl.7, fig.1 as indicated in Eisenack, 1954b, p.90). **NOW** *Wetziella*. Originally (and now) *Wetziella*, subsequently *Palaeoperidinium* (name not validly published), thirdly *Hystrichosphaeridium*, fourthly *Wetziella* subgenus *Wetziella*. Taxonomic junior synonyms: *Wetziella echinulata*, according to Costa and Downie (1979, p.40); *Wetziella horrida*, according to Stover and Evitt (1978, p.131); *Rhombodinium* (as *Wetziella*) *coronatum*, according to Costa and Downie (1979, p.43) — however, Iakovleva and Heilmann-Clausen (2010, p. 211,226) retained *Rhombodinium* (as *Wetziella*) *coronatum*; *Rhombodinium pentagonum*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.244) retained *Rhombodinium pentagonum*; *Wetziella hampdenensis*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.290) retained *Wetziella hampdenensis*; *Wetziella* (now *Charlesdowniea*) *clathrata*, according to Pastiels (1948, p.42) — however, this synonymy has not been generally accepted. Age: late Eocene–early Oligocene.

"**aruncium**" Tasch in Tasch et al., 1964, p.193, pl.3, fig.12. Holotype: Tasch et al., 1964, pl.3, fig.12. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*arundum*" Eisenack and Cookson, 1960, p.8, pl.3, figs.7–9. Emendation: Lucas-Clark, 1984, p.188, as *Litosphaeridium arundum*. Holotype: Eisenack and Cookson, 1960, pl.3, fig.7; Helby et al., 1987, figs.29J–K. **NOW** *Litosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Litosphaeridium*. Taxonomic senior synonym: *Micrhystridium* (as *Dapsilidinium?*, now *Litosphaeridium*) *fucosum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.227) retained *Hystrichosphaeridium* (as *Litosphaeridium*) *arundum*. Questionable assignment: Davey and Williams (1966b, p.70). Age: Albian.

"*ashdodense*" Rossignol, 1962, p.132, pl.2, fig.2. Holotype: Rossignol, 1962, pl.2, fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Lingulodinium*) *machaerophorum*, according to Wall (1967, p.109). Age: Pleistocene.

"*asperum*" Maier, 1959, p.319, pl.33, fig.2. Emendation: Sarjeant, 1983, p.113–114, as *Polysphaeridium asperum*. Holotype: Maier, 1959, pl.33, fig.2. **NOW** *Polysphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium*, fourthly (and now) *Polysphaeridium*. Age: middle Miocene.

"*assamicum*" Sah et al., 1970, p.146–147, pl.2, figs.20–21. Holotype: Sah et al., 1970, pl.2, fig.20. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Jain (1982, p.52) recommended that this name be restricted to the holotype. Age: Late Cretaceous.

"*astarte*" Sannemann, 1955, p.325, pl.4, fig.1; text-figs.1a–b. Holotype: Sannemann, 1955, pl.4, fig.1. **NOW** *Buedingiisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Buedingiisphaeridium* (Appendix A). N.I.A. Age: Devonian (late Givetian).

"*asterigerum*" Gocht, 1959, p.67, pl.3, fig.1; pl.7, figs.1–4. Holotype: Gocht, 1959, pl.3, fig.1; Fauconnier and Masure, 2004, pl.57, figs.1–6. **NOW** *Oligosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium?*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium*) *vasiformum*, according to Duxbury (1977, p.45) — however, McIntyre and Brideaux (1980, p.21) retained *Hystrichosphaeridium* (as *Oligosphaeridium*) *vasiformum*. Age: late Valanginian–late Hauterivian.

"*asterium*" Eaton, 1976, p.273, pl.11, figs.7–10. Holotype: Eaton, 1976, pl.11, figs.7–8. **NOW** *Melitasphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Melitasphaeridium*. Age: middle Eocene (see Aubry, 1986).

"*asteroideum*" (Maslov, 1956, p.262, pl.86, fig.13) Deflandre and Deflandre-Rigaud, 1958, card 1359. Holotype: Maslov, 1956, pl.86, fig.13. **NOW** *Baltisphaeridium asteroideum* (Appendix A). Originally *Hystrichosphaera asteroidea*, subsequently *Hystrichosphaeridium asteroideum*, thirdly *Baltisphaeridium hirsutoides* forma *asteroideum* (Appendix A), fourthly (and now) *Baltisphaeridium asteroideum* (Appendix A). Age: Late Cretaceous.

"*asymmetricum*" Deflandre and Courteville, 1939, p.100–101, pl.4, figs.1–2. Emendation: Clarke and Verdier, 1967, p.43, as *Hexasphaera asymmetrica* (combination illegitimate). Holotype: Deflandre and Courteville, 1939, pl.4, fig.1; Fensome et al., 1993a, fig.1 — p.949. **NOW** *Callaiosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Callaiosphaeridium*, thirdly *Hexasphaera*. Age: Senonian.

"*atavum*" Naumova, 1968, p.38, pl.2, fig.11. Holotype: Naumova, 1968, pl.2, fig.11. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Cambrian.

"*atlasienne*" Below, 1982c, p.12, pl.3, figs.2a–c; text-figs.2a–c. Holotype: Below, 1982c, pl.3, figs.2a–c; Fauconnier and Masure, 2004, pl.43, figs.1–4. **NOW** *Kleithriasphaeridium*. Originally *Hystrichosphaeridium?*, subsequently (and now) *Kleithriasphaeridium*. Questionable assignment: Below (1982c, p.12). Age: Albian.

"*attadalense*" Cookson and Eisenack, 1982, p.45, pl.4, fig.20. Holotype: Cookson and Eisenack, 1982, pl.4, fig.20. Questionable assignment: Cookson and Eisenack (1982, p.45). Age: early Cenomanian.

"**baciferum**" (Eisenack, 1934, p.66, pl.4, figs.20–21) Eisenack, 1938b, p.189. Holotype: Eisenack, 1934, pl.4, fig.20, lost according to Eisenack (1962, p.356). Neotype: Eisenack, 1962, pl.44, fig.3, designated by Eisenack (1962, p.356). **NOW** *Bacisphaeridium* (Appendix A). Originally *Bion* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Veryhachium* (combination not validly published; Appendix A), fourthly (and now) *Bacisphaeridium* (Appendix A), fifthly *Baltisphaeridium* (combination not validly published; Appendix A). Age: Late Ordovician.

"**bahiaense**" Regali et al., 1974, p.289–290, pl.23, fig.5. Holotype: Regali et al., 1974, pl.23, fig.5. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Cleistosphaeridium?*, thirdly *Impletosphaeridium?*, fourthly (and now) *Operculodinium*. Age: Eocene–Oligocene.

"**balticum**" Eisenack, 1951, p.190, pl.3, figs.10–11. Holotype: Eisenack, 1951, pl.3, fig.10. **NOW** *Pachysphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Pulvinosphaeridium* (combination not validly published; Appendix A), thirdly *Veryhachium* (Appendix A), fourthly *Goniosphaeridium* (Appendix A), fifthly *Baltisphaeridium* (Appendix A), sixthly *Estiastra* (Appendix A), seventhly (and now) *Pachysphaeridium* (Appendix A). Age: Early Ordovician.

?**biforme** Wiesner, 1936, p.154, pl.7, fig.9 ex Deflandre, 1946a, card 881. Holotype: Wiesner, 1936, pl.7, fig.9. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. The name *Hystrichosphaera biformis* was not validly published in Wiesner (1936), since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous.

"**biformoides**" Eisenack, 1954b, p.68, pl.11, figs.16–20. Holotype: Eisenack, 1954b, pl.11, fig.18. **NOW** *Achilleodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Achilleodinium*, fifthly *Florentinia*. Age: late Eocene–early Oligocene.

"**bimarginatum**" Timofeev, 1959, p.54, pl.4, fig.12. Holotype: Timofeev, 1959, pl.4, fig.12. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"**bohemicum**" Eisenack, 1934, p.70–71, pl.5, fig.31 ex Eisenack, 1938a, p.12. Holotype: Eisenack, 1934, pl.5, fig.31. **NOW** *Baltisphaeridium bohemicum* (Appendix A). Originally *Ovum hispidum* subsp. *bohemicum* (combination not validly published, Appendix A), subsequently *Hystrichosphaeridium bohemicum*, thirdly (and now) *Baltisphaeridium bohemicum* (Appendix A). The name *Ovum hispidum* subsp. *bohemicum* was not validly published in Eisenack (1934) since the specific name *Ovum hispidum* was not validly published. Age: Silurian.

"**borracherosum**" (Cramer, 1964, p.289, pl.1, fig.11; text-fig.16, no.6) Andreeva, 1973, p.192. Holotype: Cramer, 1964, pl.1, fig.11. **Combination not validly published:** basionym not fully referenced. **NOW** *Petaloferidium* (Appendix A). Originally *Baltisphaeridium* (Appendix A), subsequently *Multiplicisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published), fourthly (and now) *Petaloferidium* (Appendix A). Age: Silurian (Ludlow).

"**bowerbankii**" Davey and Williams, 1966b, p.69–70, pl.8, figs.1,4. Holotype: Davey and Williams, 1966b, pl.8, fig.4; Fauconnier and Masure, 2004, pl.43, fig.8. Age: Cenomanian.

?**breviatum** Morgenroth, 1966a, p.29, pl.7, figs.11–12. Holotype: Morgenroth, 1966a, pl.7, figs.11–12; Fauconnier and Masure, 2004, pl.43, figs.5–7. Taxonomic senior synonym (at subspecific rank): *Hystrichosphaeridium zoharyi* subsp. *ktana* (as *Polysphaeridium subtile* subsp. *ktana*), according to Islam (1983b, p.343) — however, Masure and Foucher in Fauconnier and Masure (2004, p.309–310) retained this taxon as a questionable species of *Hystrichosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.56). Age: early Eocene.

"**brevifurcatum**" Eisenack, 1954a, p.207–208, pl.1, fig.2; text-fig.2. Holotype: Eisenack, 1954a, pl.1, fig.2. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A),

thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium* (Appendix A). Age: Silurian (late Llandovery).

"*brevispinosum*" Eisenack, 1931, p.111, pl.5, figs.3–5 ex Eisenack, 1938a, p.12. Holotype: Eisenack, 1931, pl.5, fig.3, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197), lost according to Ribecai and Tongiorgi (1999, p.124). New Neotype: Eisenack, 1959, pl.15, fig.16, designated by Ribecai and Tongiorgi (1999, p.124). **NOW** *Pachysphaeridium brevispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *brevispinosum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium brevispinosum*, thirdly *Baltisphaeridium brevispinosum* (Appendix A), fourthly *Buedingiisphaeridium brevispinosum* (combination not validly published; Appendix A), fifthly (and now) *Pachysphaeridium brevispinosum* (Appendix A). The name *Ovum hispidum* subsp. *brevispinosum* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Silurian.

"subsp. *brevispinosum*". Autonym. Holotype: Eisenack, 1931, pl.5, fig.3, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197), lost according to Ribecai and Tongiorgi (1999, p.124). New Neotype: Eisenack, 1959, pl.15, fig.16, designated by Ribecai and Tongiorgi (1999, p.124). **NOW** *Baltisphaeridium brevispinosum* subsp. *brevispinosum* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* subsp. *brevispinosum*, subsequently (and now) *Baltisphaeridium brevispinosum* subsp. *brevispinosum* (Appendix A).

"var. *brevispinosum*". Autonym. Holotype: Eisenack, 1931, pl.5, fig.3, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197). **Now redundant**. Originally *Hystrichosphaeridium brevispinosum* var. *brevispinosum*, subsequently *Baltisphaeridium brevispinosum* var. *brevispinosum* (Appendix A).

"subsp. *callosum*" Sannemann, 1955, p.325–326, pl.1, figs.1–4,7; pl.3, figs.2–5,10; pl.4, figs.3–9; pl.6, figs.11–12; text-figs.2a–d. Holotype: Sannemann, 1955, pl.4, fig.3. **NOW** *Baltisphaeridium brevispinosum* subsp. *callosum* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* subsp. *callosum*, subsequently *Buedingiisphaeridium brevispinosum* subsp. *callosum* (combination not validly published; Appendix A), thirdly (and now) *Baltisphaeridium brevispinosum* subsp. *callosum* (Appendix A). Age: Devonian (late Givetian).

"subsp. *castaneoides*" Sannemann, 1955, p.326, pl.4, figs.13–14; text-fig.3. Holotype: Sannemann, 1955, pl.4, fig.13. **NOW** *Baltisphaeridium brevispinosum* subsp. *castaneoides* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* subsp. *castaneoides*, subsequently (and now) *Baltisphaeridium brevispinosum* subsp. *castaneoides* (Appendix A). Age: Devonian (late Givetian).

"var. *nanus*" Deflandre, 1945a, p.62–63, pl.1, figs.5–7. Holotype: Deflandre, 1945a, pl.1, figs.5–6. **NOW** *Polygonium nanus* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* var. *nanus*, subsequently *Baltisphaeridium brevispinosum* var. *nanus* (combination not validly published; Appendix A), thirdly *Baltisphaeridium nanus* (Appendix A), fourthly *Micrhystridium nanus* (Appendix A), fifthly (and now) *Polygonium nanus* (Appendix A), sixthly *Solisphaeridium nanus* (Appendix A). Taxonomic junior synonym: *Baltisphaeridium brevispinosum* var. *wenlockense* (subsequently *Salopidium wenlockense*) Downie, 1959, an acritarch taxon, according to Lister (1970, p.54). This name was not validly published in Deflandre (1942, fig.1 — p.476), who did not give a description. N.I.A. Age: Silurian.

"*brideauxii*" Lentin and Williams, 1973, p.74. Holotype: Brideaux, 1971, pl.26, figs.69–70; text-fig.9c. Originally *Hystrichosphaeridium cylindratum* (name illegitimate), subsequently *Hystrichosphaeridium brideauxii*. Substitute name for *Hystrichosphaeridium cylindratum* Brideaux, 1971, p.91–92, pl.26, figs.69–70; pl.27, fig.74; text-fig.9c (an illegitimate name). **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Florentinia*) *cooksoniae*, according to Harker and Sarjeant (1975, p.225–226). Age: Albian.

"*bulbosum*" (Ehrenberg, 1837b, pl.1, fig.17) Deflandre, 1937b, p.70. Emendation: Morgenroth, 1968, p.46–47, as *Hystrichokolpoma bulbosum*. Holotype: Ehrenberg, 1837b, pl.1, fig.17. Neotype: Morgenroth, 1968, pl.44, fig.6, designated by Morgenroth (1968, p.546). **NOW** *Hystrichokolpoma bulbosum*. Originally *Xanthidium bulbosum* (Appendix A), subsequently *Hystrichosphaera bulbosa* (combination not validly published), thirdly

Hystrichosphaeridium bulbosum, fourthly *Ovum hispidum* subsp. *bulbosum* (combination not validly published, Appendix A), fifthly (and now) *Hystrichokolpoma bulbosum*, sixthly *Baltisphaeridium bulbosum* (combination not validly published, Appendix A). Taxonomic senior synonym: *Xanthidium* (as *Hystrichosphaeridium*) *tubiferum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1981, p.134) retained *Hystrichosphaeridium* (as *Hystrichokolpoma*) *bulbosum*. Age: Danian.

"*caibense*" Regali et al., 1974, p.290, pl.24, fig.4. Holotype: Regali et al., 1974, pl.24, fig.4. Originally *Hystrichosphaeridium*, subsequently *Apectodinium*. **Taxonomic senior synonym:** *Wetzeliella* (as *Apectodinium*) *homomorpha*, according to Williams et al. (1993, p.57). Age: Paleocene.

calospinum He Chengquan, Zhu Shenzhao and Jin Guangxian in He Chengquan et al., 1989, p.47–48, pl.20, fig.15. Holotype: He Chengquan et al., 1989, pl.20, fig.15. Mao Shaozhi et al. (1995, p.99) indicated that this name should be restricted to the holotype. Age: Early Tertiary.

?*calvum* Tasch in Tasch et al., 1964, p.193, pl.1, fig.21. Holotype: Tasch et al., 1964, pl.1, fig.21; Fauconnier and Masure, 2004, pl.43, figs.9–10. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium*?. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Albian.

?*campayense* Varma and Dangwal, 1964, p.63, pl.1, figs.1–2. Holotype: Varma and Dangwal, 1964, pl.1, fig.1. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium*?. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Eocene–Oligocene.

"*caminuspinum*" Wall, 1965a, p.165, pl.9, fig.4. Holotype: Wall, 1965a, pl.9, fig.4. **NOW** *Beaumontella*?. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?, fourthly (and now) *Beaumontella*?. Taxonomic junior synonym: *Cleistosphaeridium mojsisovicsii*, according to Below (1987a, p.70). Age: early Sinemurian.

"*cantharellus*" Brosius, 1963, p.40–41, pl.6, fig.1; text-fig.2, nos.11a–c. Holotype: Brosius, 1963, pl.6, fig.1; Fensome et al., 1993a, fig.1 — p.1021. **NOW** *Cordosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Cordosphaeridium*, thirdly *Tityrosphaeridium*. N.I.A. Age: late Oligocene.

"*capillare*" Li Wenben, 1974, p.370, pl.196, fig.15. Holotype: Li Wenben, 1974, pl.196, fig.15. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Late Triassic.

"*capitatum*" Cookson and Eisenack, 1960b, p.252, pl.39, fig.9. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.9; Fauconnier and Masure, 2004, pl.66, fig.1. **NOW** *Barbatocysta*. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium*, thirdly *Tenua* Eisenack, fourthly *Batiacasphaera*, fifthly (and now) *Barbatocysta*. Age: Oxfordian–Kimmeridgian.

"*castanea*" Eisenack, 1934, p.71, pl.5, fig.32 ex Eisenack, 1938a, p.12. Holotype: Eisenack, 1934, pl.5, fig.32. **NOW** *Baltisphaeridium castanea* (Appendix A). Originally *Ovum hispidum* subsp. *castanea* (name not validly published; Appendix A), subsequently *Hystrichosphaeridium castanea*, thirdly (and now) *Baltisphaeridium castanea* (Appendix A). The name *Ovum hispidum* subsp. *castanea* was not validly published in Eisenack (1934) since the specific name *Ovum hispidum* was not validly published. N.I.A. Age: Silurian.

"*caulleryi*" Deflandre, 1939a, p.189, pl.11, figs.2–3. Emendation: Stancliffe and Sarjeant, 1990, p.200, as *Adnatosphaeridium caulleryi*. Holotype: Deflandre, 1939a, pl.11, fig.2; Stancliffe and Sarjeant, 1990, pl.1, figs.3,5; Fauconnier and Masure, 2004, pl.1, figs.7–8. **NOW** *Adnatosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly (and now) *Adnatosphaeridium*, fourthly *Polystephanephorus*. Age: early Oxfordian.

"*centrocarpum*" Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6. **NOW** *Operculodinium centrocarpum*. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum* (Appendix A), thirdly *Cordosphaeridium centrocarpum*, fourthly *Cordosphaeridium tiara* subsp. *centrocarpum*, fifthly (and now)

Operculodinium centrocarpum, sixthly *Cordosphaeridium microtriainum* subsp. *centrocarpum*, seventhly *Cleistosphaeridium centrocarpum*. Taxonomic junior synonyms: *Operculodinium? echigoense*, according to Matsuoka et al. (1997, p.22); *Membranilarnacia delicata*, according to Jain (1980, p.140). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Age: Miocene.

"var. *centrocarpum*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4. **Now redundant.**

"var. *teokides*" Srivastava and Banerjee, 1969, p.103, pl.1, figs.6–8. Holotype: Srivastava and Banerjee, 1969, pl.1, figs.6–7. **NOW** *Operculodinium centrocarpum* subsp. *teokides*. Originally *Hystrichosphaeridium centrocarpum* var. *teokides*, subsequently (and now) *Operculodinium centrocarpum* subsp. *teokides*. Age: Eocene.

"*choanophorum*" Deflandre and Cookson, 1955, p.271–272; text-figs.23–29. Emendation: Harland and Hill, 1979, p.39,41, as *Melitasphaeridium choanophorum*. Holotype: Deflandre and Cookson, 1955, text-figs.23–26; Fensome et al., 1993a, figs.1–4 — p.1055. **NOW** *Melitasphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Melitasphaeridium*. Taxonomic junior synonym: *Melitasphaeridium aequabile*, according to Harland, Head and Wrenn in Head and Wrenn (1992, p.10). This name was not validly published in Deflandre and Cookson (1954, p.1236), since these authors did not provide a description. Age: Pliocene.

"*circumscissum*" Timofeev, 1959, p.53, pl.4, fig.9. Holotype: Timofeev, 1959, pl.4, fig.9. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*classicum*" Deunff, 1967, p.25. **Name not validly published:** no description.

"*clavicularum*" Deflandre, 1939a, p.191–192, pl.10, fig.4. Emendation: Sarjeant, 1968, p.233, as *Solisphaeridium clavicularum*. Holotype: Deflandre, 1939a, pl.10, fig.4. **NOW** *Solisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Solisphaeridium* (Appendix A). Questionable assignment: Stover and Evitt (1978, p.56). Age: Late Jurassic.

"*claviferum*" (Wilkinson, 1849, p.89–92, pl.13, fig.1) Deflandre, 1946a, card 887. Holotype: Wilkinson, 1849, pl.13, fig.1. **NOW** *Baltisphaeridium* (Appendix A). Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly (and now) *Baltisphaeridium* (Appendix A). Age: Late Cretaceous.

"*clavigerum*" Deflandre, 1937b, p.71, pl.14 (al. pl.11), figs.1–2. Emendation: Davey and Verdier, 1976, p.315, as *Florentinia clavigera*. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.1–2. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly (and now) *Florentinia*, fifthly *Hystrichosphaera*. Age: Senonian.

"*coelenteratum*" Tasch in Tasch et al., 1964, p.195, pl.2, fig.11. Holotype: Tasch et al., 1964, pl.2, fig.11. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium?*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*, by implication in Stover and Evitt (1978, p.69), who considered *Hystrichosphaeridium coelenteratum* to be a taxonomic junior synonym of *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. Age: Albian.

"*cognitum*" Timofeev, 1959, p.54–55, pl.4, fig.15. Holotype: Timofeev, 1959, pl.4, fig.15. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early-Mid Ordovician.

"*colligerum*" Deflandre and Cookson, 1955, p.278–279, pl.7, fig.3. Emendations: Cookson, 1965a, p.86 and Goodman and Witmer, 1985, p.77–78, both as *Diphyes colligerum*. Holotype: Deflandre and Cookson, 1955, pl.7, fig.3. **NOW** *Diphyes*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and

now) *Diphyes*. Taxonomic junior synonym: *Diphyes pseudoficusoides* according to Fensome et al. (2009, p.30). Age: early Eocene.

?*collum* Tasch in Tasch et al., 1964, p.194, pl.2, figs.7,16. Holotype: Tasch et al., 1964, pl.2, figs.7,16; Fauconnier and Masure, 2004, pl.43, figs.11–12. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium*?. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Albian.

"*complex*" (White, 1842, p.39, pl.4, fig.11) Deflandre, 1946b, p.111. Holotype: White, 1842, pl.4, fig.11, lost according to Davey and Williams (1966b, p.74). Neotype: Davey and Williams, 1966b, pl.7, fig.1, designated by Davey and Williams (1966b, p.71). **NOW** *Oligosphaeridium complex*. Originally *Xanthidium tubiferum* var. *complex* (Appendix A), subsequently *Xanthidium complex* (Appendix A), thirdly *Hystrichosphaeridium complex*, fourthly (and now) *Oligosphaeridium complex*. Taxonomic junior synonyms: *Hystrichosphaeridium elegantulum*, according to Deflandre (1946b, p.111); *Hystrichosphaeridium himalayense*, according to Jain and Garg (1986b, p.64); *Oligosphaeridium cephalum*, according to Lejeune-Carpentier and Sarjeant (1981, p.9) and Jain (1982, p.52); *Geodia? irregularis* (Appendix A; subsequently *Hystrichosphaeridium speciale*), according to Harker and Sarjeant in Harker et al. (1990, p.59). Age: Senonian.

"*coniferum*" Sannemann, 1955, p.327, pl.4, fig.2; text-figs.4a–b. Holotype: Sannemann, 1955, pl.4, fig.2. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Multiplicisphaeridium* (Appendix A). Age: Devonian (late Givetian).

conispiniferum Yun Hyesu, 1981, p.30–31, pl.2, figs.4–6,9. Holotype: Yun Hyesu, 1981, pl.2, fig.4; Fensome et al., 1991, fig.1 — p.625. Age: early Santonian.

"*conspicuum*" Timofeev, 1959, p.54, pl.4, fig.14. Holotype: Timofeev, 1959, pl.4, fig.14. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Late Cambrian.

"*cooksoniae*" Singh, 1971, p.329–330, pl.51, figs.7–8; pl.52, figs.1–4. Emendation: Duxbury, 1980, p.120, as *Florentinia cooksoniae*. Holotype: Singh, 1971, pl.51, fig.7. **NOW** *Kleithriasphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Florentinia*, thirdly *Litosphaeridium*, fourthly (and now) *Kleithriasphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Florentinia*) *mantellii*, according to Below (1982c, p.8) — however, Lentin and Williams (1985, p.135) retained *Florentinia cooksoniae*. Taxonomic junior synonym: *Hystrichosphaeridium cylindratum*, according to Harker and Sarjeant (1975, p.225–226). Age: late Albian.

"*corollatum*" Timofeev, 1959, p.54, pl.4, fig.11. Holotype: Timofeev, 1959, pl.4, fig.11. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*costatum*" Davey and Williams, 1966b, p.62, pl.10, fig.4. Holotype: Davey and Williams, 1966b, pl.10, fig.4; Stancliffe and Sarjeant, 1990, pl.3, fig.1. **NOW** *Compositosphaeridium* Dodekova. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Compositosphaeridium* Dodekova. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Compositosphaeridium*?) *polonicum*, according to Beju (1971, p.292) — however, Masure in Fauconnier and Masure (2004, p.137) retained *Compositosphaeridium costatum*. Age: Oxfordian.

"*crassipes*" (Reade, 1839, pl.9, figs.2–5) Lejeune-Carpentier, 1941, p.B79–B80. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.10, as *Hystrichokolpoma? crassipes*. Holotype: Reade, 1839, pl.9, fig.2, lost according to Lejeune-Carpentier and Sarjeant (1981, p.11). Neotype: Lejeune-Carpentier, 1941, fig.9; Lejeune-Carpentier and Sarjeant, 1981, pl.3, fig.3; text-fig.6; designated by Lejeune-Carpentier and Sarjeant (1981, p.11). **NOW** *Hystrichokolpoma?*. Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Litosphaeridium?*, fourthly (and now) *Hystrichokolpoma?*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*, by implication in Yun Hyesu (1981, p.27), who considered *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior synonym — however, Lentin and Williams (1985, p.282) retained *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*. Age: Late Cretaceous.

"**cribrotubiferum**" Sarjeant, 1960a, p.137, pl.6, figs.2–3; text-fig.1. Emendations: Davey et al., 1966, p.161 and Stancliffe and Sarjeant, 1990, p.207, both as *Surculosphaeridium cribrotubiferum*. Holotype: Sarjeant, 1960a, pl.6, fig.2; text-fig.1; Stancliffe and Sarjeant, 1990, text-fig.3, nos.4,6; Fauconnier and Masure, 2004, pl.73, figs.9–10. **NOW** *Surculosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Surculosphaeridium*. Age: early Oxfordian.

"**cristatum**" Downie, 1958, p.338–339, pl.16, fig.4; text-fig.4f. Holotype: Downie, 1958, pl.16, fig.4. **NOW** *Cymatiogalea* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Priscogalea* (Appendix A), fourthly (and now) *Cymatiogalea* (Appendix A). Taxonomic junior synonym: *Cymatiogalea polygonomorpha* Górka, 1967, an acritarch species, according to Rasul (1974, p.56). Age: Early Ordovician.

"**cruciatum**" Wetzel, 1933b, p.48–49, pl.4, fig.30 ex Lejeune-Carpentier, 1940, p.B222. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.22–23, as *Veryhachium cruciatum*. Holotype: Wetzel, 1933b, pl.4, fig.30. **NOW** *Multiplicisphaeridium?* (Appendix A). Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Veryhachium* (Appendix A), fifthly (and now) *Multiplicisphaeridium?* (Appendix A). Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. The name *Hystrichosphaera cruciata* was not validly published in Wetzel (1933b), since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous.

"**cylindratum**" Brideaux, 1971, p.91–92, pl.26, figs.69–70; pl.27, fig.74; text-fig.9c. Holotype: Brideaux, 1971, pl.26, figs.69–70; text-fig.9c. **Name illegitimate** — **senior homonym**: *Hystrichosphaeridium cylindratum* Morgenroth, 1966a. Substitute name: *Hystrichosphaeridium brideauxii*. Originally *Hystrichosphaeridium cylindratum* (name illegitimate), subsequently *Hystrichosphaeridium brideauxii*. **Taxonomic senior synonym**: *Hystrichosphaeridium* (now *Florentinia*) *cooksoniae*, according to Harker and Sarjeant (1975, p.225–226). Age: Albian.

cylindratum Morgenroth, 1966a, p.30, pl.8, figs.3–4. Holotype: Morgenroth, 1966a, pl.8, figs.3–4. Junior homonym: *Hystrichosphaeridium cylindratum* Brideaux, 1971. Age: early Eocene.

"**danicum**" (Wetzel, 1952, p.396–397, pl.A, figs.5–6; text-fig.8) Wetzel, 1955, p.34. Emendation: Sarjeant, 1984c, p.129–130, as *Achomosphaera danica*. Holotype: Wetzel, 1952, pl.A, fig.6; Dietz et al., 1999, text-fig.6b. **NOW** *Achomosphaera*. Originally *Areoligera*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Achomosphaera*. Taxonomic senior synonym: *Areoligera senonensis*, according to Lejeune-Carpentier and Sarjeant (1981, p.15) — however, Sarjeant (1984c, p.130) retained *Hystrichosphaeridium* (as *Achomosphaera*) *danicum*. Age: Paleocene.

"**deanei**" Davey and Williams, 1966b, p.58–59, pl.6, figs.4,8. Holotype: Davey and Williams, 1966b, pl.6, fig.8; Davey and Verdier, 1973, pl.1, fig.9. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently (and now) *Florentinia*. Age: Cenomanian.

"**deflandrei**" Valensi, 1947, p.817; text-fig.3. Holotype: Valensi, 1947, text-fig.3; Fauconnier and Masure, 2004, pl.21, figs.1–4. **NOW** *Dapsilidinium?*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly (and now) *Dapsilidinium?*. Age: Middle Jurassic.

"**denticulatum**" Courteville in Deflandre, 1946a, card 895. **Name not validly published**: no description. Originally *Hystrichosphaeridium* (name not validly published), subsequently *Baltisphaeridium* (name not validly published; Appendix A).

"**dictyophorum**" Cookson and Eisenack, 1958, p.44, pl.11, fig.14. Holotype: Cookson and Eisenack, 1958, pl.11, fig.14; Fensome et al., 1993a, fig.1 — p.1125. **NOW** *Stiphrosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly (and now) *Stiphrosphaeridium*. Age: Late Jurassic.

"**dictyostilum**" Menéndez, 1965, p.11–12, pl.2, fig.6; pl.3, figs.18–22. Emendations: Sarjeant, 1981, p.115, as *Areosphaeridium dictyostilum*; Fensome et al., 2007, p.396–397, as *Enneadocysta dictyostila*. Holotype: Menéndez,

1965, pl.2, fig.6; pl.3, figs.18–20. **NOW** *Enneadocysta*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*?, thirdly *Areosphaeridium*, fourthly *Enneadocysta*?, fifthly (and now) *Enneadocysta*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Areosphaeridium*) *diktyoplokum*, according to Eaton (1971, p.359) — however, Sarjeant (1981, p.115) retained *Areosphaeridium* (now *Enneadocysta*) *dictyostilum*. Taxonomic junior synonyms: *Enneadocysta partridgei*, according to Fensome et al. (2007, p.396), *Areosphaeridium* (now *Enneadocysta*) *arcuatum* and *Cordosphaeridium* (now *Cooksonidium*) *capricornum*, both according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Enneadocysta*) *arcuatum* and *Cordosphaeridium* (now *Cooksonidium*) *capricornum*. Age: Tertiary.

"*differtum*" Sannemann, 1955, p.327, pl.4, fig.15; text-figs.5a–c. Holotype: Sannemann, 1955, pl.4, fig.15. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Devonian (late Givetian).

"*difficile*" Manum and Cookson, 1964, p.12–14, pl.3, figs.1–3,7. Holotype: Manum and Cookson, 1964, pl.3, fig.1; Fauconnier and Masure, 2004, pl.36, figs.2–4. **NOW** *Heterosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*? (combination not validly published), thirdly (and now) *Heterosphaeridium*. Age: Cenomanian.

"*digitatum*" Eisenack, 1938a, p.20–22, pl.4, figs.3–5; text-fig.7. Holotype: Eisenack, 1938a, pl.4, fig.3. **NOW** *Hoegklintia* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Hoegklintia* (Appendix A). Age: Ordovician (erratic).

"*dignum*" Sannemann, 1955, p.327, pl.1, fig.5; pl.4, fig.11; text-fig.7. Holotype: Sannemann, 1955, pl.4, fig.11. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Devonian (late Givetian).

"*diktyoplokum*" Klumpp, 1953, p.392, pl.18, figs.3–7 (not pl.18, figs.8–10, which are now *Cordosphaeridium latum*). Emendation: Eaton, 1971, p.358–359, as *Areosphaeridium diktyoplokum*. Holotype: Klumpp, 1953, pl.18, figs.3–4. **NOW** *Areosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Areosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (now *Areosphaeridium*) *dictyostilum*, according to Eaton (1971, p.359) — however, Sarjeant (1981, p.115) retained *Hystrichosphaeridium* (as *Areosphaeridium*) *dictyostilum*. Age: middle-late Eocene.

"subsp. *diktyoplokum*". Autonym. Holotype: Klumpp, 1953, pl.18, figs.3–4. **Now redundant**. Originally *Hystrichosphaeridium diktyoplokum* subsp. *diktyoplokum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *diktyoplokum*, thirdly *Areosphaeridium diktyoplokum* subsp. *diktyoplokum*.

"subsp. *latum*" Klumpp, 1953, p.392, pl.18, figs.8–10. Emendation: Sarjeant, 1981, p.106–107, as *Plethysyrinx lata* — however, see Lentin and Williams (1985, p.72). Holotype: Klumpp, 1953, pl.18, figs.8–9. **NOW** *Cordosphaeridium latum*. Originally *Hystrichosphaeridium diktyoplokum* subsp. *latum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *latum*, thirdly *Areosphaeridium diktyoplokum* subsp. *latum*, fourthly *Plethysyrinx lata*, fifthly (and now) *Cordosphaeridium latum*. Age: Eocene.

"*diploporum*" Eisenack, 1951, p.190–191, pl.2, fig.6. Holotype: Eisenack, 1951, pl.2, fig.6. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Micrhystridium* (name not validly published; Appendix A), thirdly (and now) *Baltisphaeridium* (Appendix A). Age: Ordovician (erratic).

"*dispare*" Tasch in Tasch et al., 1964, p.195, pl.2, fig.8. Holotype: Tasch et al., 1964, pl.2, fig.8. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *albertense*, by implication in Stover and Evitt (1978, p.69), who considered *Hystrichosphaeridium dispare* to be a taxonomic junior synonym of *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. Age: Albian.

"*dissimilare*" Isagulova, 1963, p.1157, pl.1, fig.17. **Name not validly published:** no description.

"*divergens*" Eisenack, 1954b, p.67, pl.9, figs.13–16. Holotype: Eisenack, 1954b, pl.9, fig.14. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published; Appendix A), thirdly *Cordosphaeridium*, fourthly (and now) *Operculodinium*. Age: early Oxfordian.

"forma *areolatum*" Eisenack 1954b, p.67, pl.9, fig.16. Holotype: Eisenack 1954b, pl.9, fig.16. **Taxonomic senior synonym** (at specific rank): *Operculodinium eisenackii*, according to Heilmann-Clausen and Van Simaey (2005, p.176). Age: Oligocene.

"forma *divergens*". Autonym. Holotype: Eisenack, 1954b, pl.9, fig.14. **Now redundant**.

dowlingii Harland, 1973, p.681, pl.85, fig.1; text-fig.10. Holotype: Harland, 1973, pl.85, fig.1; Fauconnier and Masure, 2004, pl.44, fig.7. Age: late Campanian.

"*duplum*" Lentin and Williams, 1989, p.181. Holotype: White, 1842, pl.4, fig.12. **Name illegitimate** — **nomenclatural senior synonym**: *Xanthidium tubiferum* var. *recurvatum* (now *Hystrichosphaeridium recurvatum*). Originally *Xanthidium tubiferum* var. *palmatum* (Appendix A), subsequently *Xanthidium palmatum* (Appendix A), thirdly *Spiniferites palmatus*, fourthly *Cordosphaeridium palmatum*, fifthly *Hystrichosphaeridium palmatum* (combination illegitimate), sixthly *Hystrichosphaeridium duplum* (name illegitimate). Substitute name for *Hystrichosphaeridium palmatum* (White, 1842, p.39–40, pl.4, fig.12) Downie and Sarjeant, 1965, p.121 (an illegitimate name). Nomenclatural junior synonym (at specific rank): *Xanthidium tubiferum* var. *palmaforme*, which has the same holotype. See *Hystrichosphaeridium recurvatum* for a full discussion. Age: Senonian.

"subsp. *duplum*". Autonym. Holotype: White, 1842, pl.4, fig.12. **Name illegitimate**: the species name is illegitimate. Originally *Hystrichosphaeridium palmatum* subsp. *palmatum* (combination illegitimate), subsequently *Hystrichosphaeridium duplum* subsp. *duplum* (name illegitimate). Age: Senonian.

"subsp. *parvum*" (Rozen, 1965, p.303–304, pl.4, fig.6; text-fig.13) Lentin and Williams, 1989, p.181. Holotype: Rozen, 1965, pl.4, fig.6; text-fig.13. **Name illegitimate**: the species name is illegitimate. **NOW** *Hystrichosphaeridium recurvatum* subsp. *parvum*. Originally *Hystrichosphaeridium recurvatum* var. *parvum*, subsequently (and now) *Hystrichosphaeridium recurvatum* subsp. *parvum*, thirdly *Hystrichosphaeridium palmatum* subsp. *parvum* (combination illegitimate), fourthly (and now) *Hystrichosphaeridium duplum* subsp. *parvum* (combination illegitimate). Age: late Eocene.

"*eccentrum*" Tasch in Tasch et al., 1964, p.194, pl.1, fig.6; pl.2, fig.9. Holotype: Tasch et al., 1964, pl.2, fig.9. **Taxonomic senior synonym**: *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albanian.

"?*echinatum*" Menéndez, 1965, p.12–13, pl.2, fig.9. Emendation: Guerstein et al., 2008, p.79, as *Lingulodinium echinatum*. Holotype: Menéndez, 1965, pl.2, fig.9, lost according to Guerstein et al. (2008, p.79). Neotype: Guerstein et al., 2008, pl.1, figs.11–12, designated by Guerstein et al. (2008, p.79). **NOW** *Lingulodinium*. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Lingulodinium*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Late Cretaceous.

"*echinoides*" Maier, 1959, p.318–319, pl.32, figs.5–6. Holotype: Maier, 1959, pl.32, fig.6. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*. **Taxonomic senior synonym**: *Xanthidium* (now *Spiniferites*) *ramosum*, according to Sarjeant (1983, p.91–92). Age: middle Oligocene–middle Miocene.

"*ehrenbergii*" Deflandre, 1947c, fig.1, no.5. Emendation: Masure in Fauconnier and Masure, 2004, p.337–338, as *Impletosphaeridium ehrenbergii*. Holotype: Deflandre, 1939a, pl.10, fig.9, as *Hystrichosphaeridium* cf. *hirsutum*; Deflandre, 1947a, fig.1, no.5; Fauconnier and Masure, 2004, pl.48, figs.9,11. **NOW** *Impletosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Impletosphaeridium*. Nomenclatural junior synonym: *Cleistosphaeridium deflandrei*, which has the same holotype. For a full discussion see *Impletosphaeridium ehrenbergii*. Age: Oxfordian.

"*eisenackianum*" Deunff, 1959, p.23–24, pl.2, figs.26,30–31. Holotype: Deunff, 1959, pl.2, fig.26. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Middle Ordovician.

"var. *crozonense*" Deunff, 1959, p.24, pl.2, figs.25,27–29,32. Holotype: Deunff, 1959, pl.2, fig.28. **NOW** *Baltisphaeridium eisenackianum* var. *crozonense* (Appendix A). Originally *Hystrichosphaeridium eisenackianum* var. *crozonense*, subsequently (and now) *Baltisphaeridium eisenackianum* var. *crozonense* (Appendix A). Age: Ordovician (Caradoc).

"var. *eisenackianum*". Autonym. Holotype: Deunff, 1959, pl.2, fig.26. **NOW** *Baltisphaeridium eisenackianum* var. *eisenackianum* (Appendix A). Originally *Hystrichosphaeridium eisenackianum* var. *eisenackianum*, subsequently (and now) *Baltisphaeridium eisenackianum* var. *eisenackianum* (Appendix A).

"*eisenackii*" Sannemann, 1955, p.327–328, pl.4, figs.10,12; text-figs.8a–d. Holotype: Sannemann, 1955, pl.4, fig.10. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Multiplicisphaeridium* (Appendix A). Age: Devonian (late Givetian).

"*elegantulum*" Lejeune-Carpentier, 1940, p.B222; text-figs.11–12. Holotype: Lejeune-Carpentier, 1940, text-fig.11; Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.3–4. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?* (combination not validly published). **Taxonomic senior synonym:** *Xanthidium tubiferum* var. *complex* (as *Hystrichosphaeridium*, now *Oligosphaeridium*) *complex*, according to Deflandre (1946b, p.111). Age: Turonian–Senonian.

"*ellipticum*" Cookson, 1965a, p.87–88, pl.11, figs.1–3,3a. Holotype: Cookson, 1965a, pl.11, figs.1–3,3a. **NOW** *Distatodinium*. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly (and now) *Distatodinium*. Age: late Eocene.

"*entomium*" Tasch in Tasch et al., 1964, p.193, pl.3, fig.15. Holotype: Tasch et al., 1964, pl.3, fig.15. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*eoinodes*" Eisenack, 1958a, p.402, pl.27, figs.3–4. Emendation: Sarjeant, 1985a, p.74–75, as *Kleithriasphaeridium eoinodes*. Holotype: Eisenack, 1958a, pl.27, fig.3; Sarjeant, 1985a, pl.5, figs.3–4. **NOW** *Kleithriasphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Kleithriasphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Kleithriasphaeridium*) *simplicispinum*, according to Below (1982c, p.17). Age: late Albian.

"*eoplanctonicum*" Eisenack, 1955, p.178–179, pl.4, fig.14. Holotype: Eisenack, 1955, pl.4, fig.14. **NOW** *Oppilatala* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Oppilatala* (Appendix A). Taxonomic junior synonym: *Multiplicisphaeridium septispinosum* Lister, 1970, an acritarch species, according to Eisenack et al. (1973, p.617). Age: Silurian (late Ludlow).

"*equispinosum*" Tasch, 1963, p.336, pl.1, fig.12. Holotype: Tasch, 1963, pl.1, fig.12. The specimen illustrated is assignable to the spore *Raistrickia* Schopf et al., 1944, according to Stover and Evitt (1978, p.265). Age: Early Permian.

"*erectum*" Manum and Cookson, 1964, p.14, pl.3, figs.5–6. Holotype: Manum and Cookson, 1964, pl.3, fig.5. **NOW** *Kiokansium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium?*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Kiokansium?*. Age: Albian–Turonian.

"*erraticum*" Eisenack, 1954a, p.209, pl.1, figs.6–7; text-fig.7. Holotype: Eisenack, 1954a, pl.1, fig.6. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A),

thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium* (Appendix A). Age: Silurian (late Ludlow).

"*espiritasantense*" Regali et al., 1974, p.290, pl.24, fig.3. Holotype: Regali et al., 1974, pl.24, fig.3; irretrievably damaged according to Arai in Fauconnier and Masure (2004, p.246). Lectotype: Fauconnier and Masure, 2004, pl.31, figs.1–3, designated by Arai in Fauconnier and Masure (2004, p.246). **NOW** *Glaphyrocysta*. Originally *Hystrichosphaeridium*, subsequently *Areoligera*, thirdly (and now) *Glaphyrocysta*. Age: Maastrichtian.

"*fabium*" Tasch in Tasch et al., 1964, p.195, pl.2, fig.5. Holotype: Tasch et al., 1964, pl.2, fig.5. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*ferox*" Deflandre, 1937b, p.72, pl.14 (al. pl.11), figs.3–4. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.3–4. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly *Silicisphaera*, fifthly (and now) *Florentinia*. Age: Senonian.

"*fimbriatum*" (White, 1842, p.36, pl.4, div.3, fig.3) Deflandre, 1946a, card 899. Holotype: White, 1842, pl.4, div.3, fig.3; Sarjeant, 1991, fig.4.2. **NOW** *Filisphaeridium* (Appendix A). Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Comasphaeridium* (Appendix A), fifthly (and now) *Filisphaeridium* (Appendix A). Age: Late Cretaceous.

"*floripes*" Deflandre and Cookson, 1955, p.276, pl.7, figs.1–2,7. Holotype: Deflandre and Cookson, 1955, pl.7, fig.1. **NOW** *Homotryblium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Homotryblium*. Taxonomic junior synonym: *Homotryblium plectilum*, according to Bujak in Bujak et al. (1980, p.64) — however, Lentin and Williams (1985, p.168) retained *Homotryblium plectilum*. Age: Early Tertiary.

"subsp. *breviradiatum*" Cookson and Eisenack, 1961b, p.44, pl.2, figs.10–11. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.10–11. **NOW** *Homotryblium floripes* subsp. *breviradiatum*. Originally *Hystrichosphaeridium floripes* subsp. *breviradiatum*, subsequently *Cordosphaeridium floripes* subsp. *breviradiatum*, thirdly (and now) *Homotryblium floripes* subsp. *breviradiatum*. Age: late Eocene.

"subsp. *floripes*". Autonym. Deflandre and Cookson, 1955, pl.7, fig.1. **NOW** *Homotryblium floripes* subsp. *floripes*. Originally *Hystrichosphaeridium floripes* subsp. *floripes*, subsequently *Cordosphaeridium floripes* subsp. *floripes*, thirdly (and now) *Homotryblium floripes* subsp. *floripes*.

"*flosculus*" Deflandre, 1937b, p.75, pl.15 (al. pl.12), figs.5–6. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.5. **NOW** *Florentinia*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published; Appendix A), thirdly *Litosphaeridium*?, fourthly *Silicisphaera*?, fifthly (and now) *Florentinia*?. Taxonomic junior synonym: *Eurysphaeridium fibratum* (name not validly published), according to Slimani (2001a, p.192). N.I.A. Age: Senonian.

"*fluctuans*" (Eisenack, 1938c, p.230–231, pl.16, figs.1–3) PASTIELS, 1948, p.40. Holotype: Eisenack, 1938c, pl.16, fig.3. **NOW** *Baltisphaeridium* (Appendix A). Originally *Bion* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium*? (combination not validly published), fourthly (and now) *Baltisphaeridium* (Appendix A). Age: Silurian.

"*follium*" Tasch in Tasch et al., 1964, p.195, pl.1, fig.8. Holotype: Tasch et al., 1964, pl.1, fig.8. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*franconium*" Sannemann, 1955, p.328, pl.3, fig.1; pl.5, figs.1–2. Holotype: Sannemann, 1955, pl.5, fig.1. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Devonian (late Givetian).

"*fucosum*" (Valensi, 1955a, p.40; text-fig.2b) Downie and Sarjeant, 1965, p.120. Holotype: Valensi, 1955a, text-fig.2b; Fauconnier and Masure, 2004, pl.52, figs.8–11. **NOW** *Litosphaeridium*. Originally *Micrhystridium*,

subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?*, fourthly *Dapsilidinium?*, fifthly (and now) *Litosphaeridium*. Taxonomic junior synonyms: *Hystrichosphaeridium tubiferum* var. *brevispinum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.190) retained *Hystrichosphaeridium tubiferum* subsp. *brevispinum*; *Hystrichosphaeridium* (as *Litosphaeridium*) *arundum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.227) retained *Litosphaeridium arundum*. Age: Late Cretaceous.

"*fusoides*" Courteville 1948, p.10. **Name not validly published**: no description, diagnosis or illustration. Age: Cretaceous.

"*galericulatum*" Courteville 1948, p.10. **Name not validly published**: no description, diagnosis or illustration. Age: Cretaceous.

"*geometricum*" Deflandre, 1945a, p.64–65, pl.2, figs.2–5. Holotype: Deflandre, 1945a, pl.2, fig.2. Junior homonym: *Hystrichosphaeridium geometricum* Pastiels, 1948. **NOW** *Striatotheca geometrica* (Appendix A). Originally *Hystrichosphaeridium geometricum*, subsequently *Veryhachium geometricum* (Appendix A), thirdly *Veryhachium trispinosum* subsp. *geometricum* (combination not validly published; Appendix A), fourthly (and now) *Striatotheca geometrica* (Appendix A). Age: Middle Silurian.

"*geometricum*" Pastiels, 1948, p.41, pl.4, figs.1–11. Holotype: Pastiels, 1948, pl.4, fig.4. **Name illegitimate** — **senior homonym**: *Hystrichosphaeridium geometricum* Deflandre, 1945a. Substitute name: *Apectodinium pastielsii* (name illegitimate). **NOW** *Apectodinium geometricum*. Originally *Hystrichosphaeridium geometricum* (name illegitimate), subsequently *Baltisphaeridium geometricum* (Appendix A), thirdly *Apectodinium pastielsii* (name illegitimate), fourthly (and now) *Apectodinium geometricum*. Taxonomic junior synonym (at specific rank): *Wetziella homomorpha* var. *quinquelata* (as *Wetziella quinquelata*, now *Apectodinium quinquelatum*), by implication in Harland (1979c, p.67), who considered the latter to be the senior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. Age: Eocene.

?*gliwicense* Macko, 1957, p.113, pl.71, figs.11–15; pl.72, fig.1. Holotype: not designated. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Davey and Williams (1966b, p.70). Age: Miocene.

"*globosum*" Salujha et al., 1973, p.112,114,116. **Name not validly published**: no description.

"*gotlandicum*" Eisenack, 1954a, p.209, pl.1, fig.5; text-fig.6. Holotype: Eisenack, 1954a, pl.1, fig.5. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Visbysphaera* (Appendix A). Taxonomic junior synonym: *Baltisphaeridium peltatum* Cramer, 1966, an acritarch species, according to Cramer (1970, p.157). Age: Silurian (late Llandovery).

"*grallaeforme*" Brosius, 1963, p.42, pl.5, fig.3; text-fig.2. Holotype: Brosius, 1963, pl.5, fig.3. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently (and now) *Achomosphaera*, thirdly *Spiniferites* (combination not validly published). Taxonomic junior synonym: *Spiniferites solidago*, according to Strauss et al. (2001, p.412). Age: Oligocene.

?*grande* Salujha et al., 1969, p.37, pl.4, figs.59–60. Holotype: Salujha et al., 1969, pl.4, fig.59. Questionable assignment: Masure and Foucher in Fauconnier and Masure (2004, p.311). Age: early Eocene.

granulatum Khanna and Singh, 1981b, p.394,396, fig.3, nos.3–4; text-fig.6. Holotype: Khanna and Singh, 1981b, fig.3, no.4. This name was not validly published in Khanna (1979, p.217) and Singh et al. (1979, p.35–36), since no description was provided. Age: early-middle Eocene.

"*heteracanthum*" Deflandre and Cookson, 1955, p.276, pl.2, figs.5–6; text-figs.40–41. Emendation: Radmacher et al., 2014, p.33,36, as *Heterosphaeridium heteracanthum*. Holotype: Deflandre and Cookson, 1955, pl.2, fig.5; Fauconnier and Masure, 2004, pl.35, figs.7–8. **NOW** *Heterosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Heterosphaeridium*, fifthly *Heterosphaeridium?* Age: Late Cretaceous–early Eocene.

"subsp. *heteracanthum*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.2, fig.5; Fauconnier and Masure, 2004, pl.35, figs.7–8. **NOW** *Heterosphaeridium heteracanthum* subsp. *heteracanthum*. Originally *Hystrichosphaeridium heteracanthum* subsp. *heteracanthum*, subsequently (and now) *Heterosphaeridium heteracanthum* subsp. *heteracanthum*, thirdly *Heterosphaeridium? heteracanthum* subsp. *heteracanthum*.

"subsp. *sparsiprocessum*" Varma and Dangwal, 1964, p.64, pl.1, fig.7. Holotype: Varma and Dangwal, 1964, pl.1, fig.7. **NOW** *Heterosphaeridium heteracanthum?* subsp. *sparsiprocessum*. Originally *Hystrichosphaeridium heteracanthum* subsp. *sparsiprocessum*, subsequently *Heterosphaeridium heteracanthum* subsp. *sparsiprocessum*, thirdly *Heterosphaeridium? heterocanthum* subsp. *sparsiprocessum*, fourthly (and now) *Heterosphaeridium heteracanthum?* subsp. *sparsiprocessum*. Age: Eocene–Oligocene.

?*hillii* (Merrill, 1895, p.17; text-fig.21) Sarjeant, 1964b, p.175. Holotype: Merrill, 1895, text-fig.21. Originally *Geodia* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly (and now) *Hystrichosphaeridium?*. Questionable assignment: Davey and Williams (1966b, p.70); and Masure and Foucher in Fauconnier and Masure (2004, p.311–312) as a problematic species. Age: Early Cretaceous.

"*himalayense*" Mehrotra and Sinha, 1981, p.152, pl.1, figs.7–9. Holotype: Mehrotra and Sinha, 1981, pl.1, fig.7. **Taxonomic senior synonym:** *Xanthidium tubiferum* var. *complex* (as *Oligosphaeridium*) *complex*, according to Jain and Garg (1986b, p.64). Age: Late Cretaceous.

"*hippocrepicum*" Timofeev, 1959, p.52, pl.4, fig.2. Holotype: Timofeev, 1959, pl.4, fig.2. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*hirsutoides*" Eisenack, 1951, p.189–190, pl.3, fig.8. Holotype: Eisenack, 1951, pl.5, fig.19, as "*Ovum hispidum* cf. *hirsutum* Ehrenb.", lost according to Eisenack et al. (1973, p.125). Neotype: Eisenack, 1951, pl.3, fig.8, designated by Eisenack et al. (1973, p.125). **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Late Ordovician.

"var. *hamatum*" Downie, 1958, p.335, pl.16, fig.1; text-figs.2j–k. Holotype: Downie, 1958, pl.16, fig.1. **NOW** *Baltisphaeridium hamatum* (Appendix A). Originally *Hystrichosphaeridium hirsutoides* var. *hamatum*, subsequently *Baltisphaeridium hirsutoides* var. *hamatum* (Appendix A), thirdly *Micrhystridium hamatum* (Appendix A), fourthly *Acanthodiacrodium hamatum* (Appendix A), fifthly (and now) *Baltisphaeridium hamatum* (Appendix A). Age: Early Ordovician.

"var. *hirsutoides*". Autonym. Holotype: Eisenack, 1951, pl.5, fig.19, as "*Ovum hispidum* cf. *hirsutum* Ehrenb." **Now redundant.** Originally *Hystrichosphaeridium hirsutoides* var. *hirsutoides*, subsequently *Baltisphaeridium hirsutoides* var. *hirsutoides* (Appendix A).

"*hirsutum*" (Ehrenberg, 1837b, pl.1, figs.10,?13) Deflandre, 1939a, p.78. **Name not validly published:** Ehrenberg (1837b) did not intend to introduce a new species. Originally *Xanthidium hirsutum* (name not validly published; Appendix A), subsequently *Ovum hispidum* subsp. *hirsutum* (name not validly published; Appendix A), thirdly *Hystrichosphaera hirsuta* (name not validly published), fourthly *Hystrichosphaeridium hirsutum* (name not validly published), fifthly *Baltisphaeridium hirsutum* (name not validly published; Appendix A), sixthly *Operculodinium hirsutum* (name not validly published), seventhly *Operculodinium? hirsutum* (name not validly published). See discussion under *Operculodinium? hirsutum*. Age: Late Cretaceous.

"subsp. *amplum*" Wetzel, 1955, p.38; text-fig.11. Emendation: Sarjeant, 1984c, p.131, as *Operculodinium centrocarpum* subsp. *amplum*. Holotype: Wetzel, 1955, text-fig.11; Sarjeant, 1984c, pl.3, figs.1–3; text-fig.4. **Name not validly published:** species name not validly published. **NOW** *Operculodinium centrocarpum* subsp. *amplum*. Originally *Hystrichosphaeridium hirsutum* subsp. *amplum* (name not validly published), subsequently *Baltisphaeridium hirsutum* subsp. *amplum* (name not validly published; Appendix A), thirdly *Operculodinium? hirsutum* subsp. *amplum* (name not validly published), fourthly (and now) *Operculodinium centrocarpum* subsp. *amplum*. Age: Danian.

"*hirundo*" Eisenack, 1958a, p.404–405, pl.24, fig.12. Emendation: Sarjeant, 1985a, p.76–77, as *Achomosphaera hirundo*. Holotype: Eisenack, 1958a, pl.24, fig.12. **NOW** *Cordosphaeridium*?. Originally *Hystrichosphaeridium*, subsequently *Achomosphaera*, thirdly *Lanternosphaeridium*, fourthly (and now) *Cordosphaeridium*?, fifthly *Spiniferites*?. N.I.A. Age: Early Cretaceous.

"*horridum*" Deflandre, 1937b, p.74, pl.15 (al. pl.12), figs.7–8. Emendation: Masure, 1986, p.112–113, as *Corradinisphaeridium horridum*. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), figs.7–8; Masure, 1986, pl.1, figs.4–6; text-fig.2. **NOW** *Corradinisphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Corradinisphaeridium*. Taxonomic junior synonym: *Lanternosphaeridium* (as *Fibrocysta*?) *mutinense*, according to Masure (1986, p.112). Age: Senonian.

"?*huecospinosum*" Cramer, 1964, p.331, pl.6, fig.2; text-fig.36, no.7. Holotype: Cramer, 1964, pl.6, fig.2. **NOW** *Umbellasphaeridium* (Appendix A). Originally *Hystrichosphaeridium*?, subsequently *Baltisphaeridium*? (combination not validly published; Appendix A), thirdly *Florisphaeridium* (Appendix A), fourthly (and now) *Umbellasphaeridium* (Appendix A). Questionable assignment: Cramer (1964, p.331). Age: Devonian (Emsian).

"*huguoniotii*" Valensi, 1955a, p.38–39; text-fig.2a. Holotype: Valensi, 1955a, text-fig.2a. **NOW** *Sepispinula*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium*?, fifthly *Chlamydochorella*, sixthly *Sepispinula*, seventhly (and now) *Sepispinula*?. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula*) *ambiguum*, according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.500) retained *Hystrichosphaeridium* (as and now *Sepispinula*?) *huguoniotii*. Taxonomic junior synonym: *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Hystrichosphaeridium* (as and now *Sepispinula*) *ancoriferum*. Age: Late Cretaceous.

"*hymeniferum*" Eisenack, 1938a, p.19, pl.3, figs.2–5. Holotype: Eisenack, 1938a, pl.3, fig.2. **NOW** *Peteinosphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Peteinosphaeridium* (Appendix A). Age: Ordovician (erratic).

?*hymenohystrichum* Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.71, pl.14, figs.3–5. Holotype: Liu Zhili et al., 1992, pl.14, fig.5. Questionable assignment: Zheng Yuefang and Liu Xuexian in Liu Zhili et al. (1992, p.71). Age: Early Tertiary.

"*hystrichoreticulatum*" Eisenack, 1938a, p.20, pl.3, figs.6A–B. Holotype: Eisenack, 1938a, pl.3, figs.6A–B. **NOW** *Peteinosphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Peteinosphaeridium* (Appendix A). Age: Ordovician (erratic).

"*ichikawaii*" Fuji in Ichikawa et al., 1964, pl.10, fig.4. **Name not validly published**: no description.

"*inconspicuum*" Timofeev, 1959, p.54, pl.4, fig.13. Holotype: Timofeev, 1959, pl.4, fig.13. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*inodes*" Klumpp, 1953, p.391, pl.18, figs.1–2. Emendations: Morgenroth, 1968, p.549–550, as *Cordosphaeridium inodes*; Sarjeant, 1981, p.102–105, as *Cordosphaeridium inodes* — however, see Lentin and Williams (1985, p.72). Holotype: Klumpp, 1953, pl.18, figs.1–2. **NOW** *Cordosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Cordosphaeridium*. Age: late Eocene.

"forma *areolatum*" Eisenack, 1954b, p.67, pl.12, fig.21. Holotype: Eisenack, 1954b, p.67, pl.12, fig.21. **NOW** *Cordosphaeridium gracile* forma *areolatum*. Originally *Hystrichosphaeridium inodes* subsp. *gracile* forma *areolatum*, subsequently (and now) *Cordosphaeridium gracile* forma *areolatum*. See discussion under *Cordosphaeridium gracile* forma *areolatum*. Age: Oligocene.

"subsp. *gracile*" Eisenack, 1954b, p.66–67, pl.8, fig.17; pl.10, figs.3–8; pl.12, figs.7,21. Emendation: Davey and Williams, 1966b, p.84–85, as *Cordosphaeridium gracile*. Holotype: Eisenack, 1954b, pl.10, fig.5. **NOW** *Cordosphaeridium gracile*. Originally *Hystrichosphaeridium inodes* subsp. *gracile*, subsequently *Cordosphaeridium inodes* subsp. *gracile*, thirdly (and now) *Cordosphaeridium gracile*, fourthly *Tityrosphaeridium gracile*. Age: Oligocene.

"forma *gracile*". Autonym. Holotype: Eisenack, 1954b, pl.10, fig.5. **NOW** *Cordosphaeridium gracile* forma *gracile*. Originally *Hystrichosphaeridium inodes* subsp. *gracile* forma *gracile*, subsequently (and now) *Cordosphaeridium gracile* forma *gracile*.

"subsp. *inodes*". Autonym. Holotype: Klumpp, 1953, pl.18, figs.1–2. **NOW** *Cordosphaeridium inodes* subsp. *inodes*. Originally *Hystrichosphaeridium inodes* subsp. *inodes*, subsequently (and now) *Cordosphaeridium inodes* subsp. *inodes*.

"?*insigne*" Fridriksone, 1971, p.14–16, pl.2, figs.10–22. Holotype: Fridriksone, 1971, pl.2, fig.10. **NOW** *Skiagia* (Appendix A). Originally *Hystrichosphaeridium?*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Skiagia* (Appendix A). Questionable assignment: Fridriksone (1971, p.14). Age: Early-Mid Cambrian.

"*integrum*" Sannemann, 1955, p.329, pl.5, fig.12; text-fig.12. Holotype: Sannemann, 1955, pl.5, fig.12. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Multiplicisphaeridium* (Appendix A). Age: Devonian (late Givetian).

"*intermedium*" Eisenack, 1954a, p.208, pl.1, figs.3,9; text-figs.3–4. Holotype: Eisenack, 1954a, pl.1, fig.3. **Name illegitimate** — **senior homonym:** *Hystrichosphaeridium intermedium* (Wetzel, 1933b) Deflandre, 1937a. Substitute name: *Hystrichosphaeridium meson*. **NOW** *Visbysphaera mesa* (Appendix A). Originally *Hystrichosphaeridium intermedium* (name illegitimate), subsequently *Hystrichosphaeridium meson*, thirdly *Baltisphaeridium meson* (Appendix A), fourthly (and now) *Visbysphaera mesa* (Appendix A), fifthly *Multiplicisphaeridium meson* (Appendix A). Taxonomic junior synonym: *Baltisphaeridium* (subsequently *Multiplicisphaeridium*) *micropilare* Cramer, 1970, an acritarch species, according to Ye Xiaorong (1984, p.42). Age: Silurian (late Llandovery–late Ludlow).

?*intermedium* Wetzel, 1933b, p.46; text-fig.14 ex Deflandre, 1937b, p.77. Holotype: Wetzel, 1933b, text-fig.14. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Junior homonym: *Hystrichosphaeridium intermedium* Eisenack, 1954a. Matsuoka (1983a, p.16) considered *Hystrichosphaeridium* (as *Polysphaeridium*) *zoharyi* to be a possible taxonomic junior synonym of this species. This name was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: ?Late Cretaceous.

"?*irregulare*" (Merrill, 1895, p.16; text-fig.14) Sarjeant, 1964b, p.175. Holotype: Merrill, 1895, text-fig.14. **Combination illegitimate** — **senior homonym:** *Hystrichosphaeridium irregulare* Pocock, 1962. Substitute name: *Hystrichosphaeridium speciale*. Originally *Geodia? irregularis* (Appendix A), subsequently *Hystrichosphaeridium irregulare* (combination illegitimate), thirdly *Hystrichosphaeridium? irregulare* (combination illegitimate), fourthly *Hystrichosphaeridium speciale*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. **Taxonomic senior synonym:** *Xanthidium tubiferum* var. *complex* (now *Oligosphaeridium complex*), according to Harker and Sarjeant in Harker et al. (1990, p.59). Age: Early Cretaceous.

"*irregulare*" Pocock, 1962, p.82, pl.15, figs.228–229. Holotype: Pocock, 1962, pl.15, figs.228–229, lost according to Jansonius (1986, p.220). Lectotype: Jansonius, 1986, pl.4, fig.3, designated by Jansonius (1986, p.214 — caption to pl.4); Fauconnier and Masure, 2004, pl.55, fig.9. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*, according to Jansonius (1986, p.213). Taxonomic junior synonyms: *Hystrichosphaeridium* (as *Oligosphaeridium?*) *coelenteratum*, *Hystrichosphaeridium* (as *Oligosphaeridium?*) *dispare*, and *Hystrichosphaeridium* (as *Oligosphaeridium*) *reniforme*, all according to Stover and Evitt (1978, p.69). Junior homonym: *Hystrichosphaeridium irregulare* (Merrill, 1895) Sarjeant, 1964b. Age: late Barremian–Aptian.

"*isocalamum*" Deflandre and Cookson, 1955, p.272, pl.2, figs.7–8; text-figs.30–35. Holotype: Deflandre and Cookson, 1955, pl.2, figs.7–8; Fauconnier and Masure, 2004, pl.78, figs.5–8. **NOW** *Tanyosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Tanyosphaeridium*. Age: Early Cretaceous.

"*israelianum*" Rossignol, 1962, p.132, pl.2, fig.3. Holotype: Rossignol, 1962, pl.2, fig.3. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Operculodinium*, fifthly *Cordosphaeridium* (combination not validly published). Taxonomic junior synonyms: *Cleistosphaeridium cephalum*, according to Jain and Garg (1991, p.78); *Operculodinium crassum*, according to Edwards and Andrieu (1992, p.262) — however, Head (1996b, p.1231) retained *Operculodinium crassum*; and *Hystrichosphaeridium westii* (name not validly published), by implication in Wall and Dale (1968a, p.315, as "hystrichosphere type x of West"). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859, questionably according to Wall and Dale (1968c, p.272), and without question according to Matsuoka (1989, p.224). Age: Pleistocene.

"*kiowanum*" Tasch in Tasch et al., 1964, p.193, pl.2, fig.1. Holotype: Tasch et al., 1964, pl.2, fig.1. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*?korykos*" (Maier, 1959, p.310–311, pl.30, figs.7–8) Eisenack and Kjellström, 1975b, p.225 (al. p.652a). Holotype: Maier, 1959, pl.30, fig.7. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Chiropteridium*, fourthly *Hystrichosphaeridium*. Questionable assignment: Eisenack and Kjellström (1975b, p.225). **Taxonomic senior synonym:** *Xanthidium* (as *Spiniferites*) *ramosum*, according to Sarjeant (1983, p.91–92). N.I.A. Age: middle Miocene.

"*lacunosum*" Isagulova, 1963, p.1157, pl.1, fig.3. **Name not validly published:** no description.

"*laevigatum*" (Lister, 1970, p.66, pl.6, figs.10–12; text-figs.18,20d) Eisenack and Kjellström, 1975b, p.652b. Holotype: Lister, 1970, pl.6, fig.10. **NOW** *Dilatitphaera* (Appendix A). Originally (and now) *Dilatitphaera* (Appendix A), subsequently *Hystrichosphaeridium*. Age: Silurian (Wenlock).

"*lairdii*" Deflandre, 1946c, card 1112. **Name not validly published:** no description. Originally *Hystrichosphaeridium* (name not validly published), subsequently *Veryhachium* (Appendix A). **Taxonomic senior synonym:** *Veryhachium valiente* Cramer, 1964, an acritarch species, by implication in Martin (1969, p.95), who believed *Veryhachium lairdii* to be the senior name. Age: Middle Silurian.

"*langii*" Wall, 1965a, p.165, pl.6, figs.9–11; pl.9, fig.9. Emendations: Morbey, 1975, p.41–42, as *Hystrichosphaeridium langii*; Below, 1987a, p.70–71, as *Beaumontella langii*. Holotype: Wall, 1965a, pl.6, fig.9; pl.9, fig.9; Fensome et al., 1995, figs.1–2 — p.1595. **NOW** *Beaumontella*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Beaumontella*. Age: Hettangian–early Sinemurian.

"*lateraliprocessum*" Srivastava and Banerjee, 1969, p.102, pl.1, figs.1–3. Holotype: Srivastava and Banerjee, 1969, pl.1, figs.1–3. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Eocene.

"*?latirictum*" Davey and Williams, 1966b, p.66–67, pl.10, fig.8. Holotype: Davey and Williams, 1966b, pl.10, fig.8; Bujak et al., 1980, pl.8, figs.4–5. **NOW** *Minisphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Minisphaeridium*. Questionable assignment: Bujak et al. (1980, p.46). Taxonomic junior synonyms: *Cordosphaeridium minimum* (al. *Cordosphaeridium inodes* subsp. *minimum*) according to Fensome et al. (2009, p.44) — the epithet *latirictum* has priority at specific rank over the epithet *minimum*; *Litosphaeridium?* *parvum*, according to Fensome et al. (2009, p.44). Age: early Eocene.

"*leonardianum*" Tasch, 1963, p.336, pl.1, figs.10–11. Holotype: Tasch, 1963, pl.1, figs.10–11. The specimen illustrated is assignable to the spore genus *Raistrickia* Schopf et al., 1944, according to Stover and Evitt (1978, p.265). Age: Early Permian.

"*leptodermum*" Maier, 1959, p.321–322, pl.33, figs.5–6. Holotype: Maier, 1959, pl.33, fig.5; Sarjeant, 1983, pl.1, fig.2; pl.6, figs.1–2; pl.7, fig.4. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaera*, thirdly *Spiniferites*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Achomosphaera*) *alcicornu*, according to Sarjeant (1983, p.100–101). Age: middle Oligocene–late Miocene.

"*lewisii*" Deunff, 1954a, p.240, fig.3. Holotype: Deunff, 1954a, fig.3. **NOW** *Gorgonisphaeridium?* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Ammonidium* (combination not validly published; Appendix A), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Gorgonisphaeridium?* (Appendix A). Age: Middle Devonian.

"*lobospinosum*" Gocht in Weiler, 1956, p.138, pl.12, figs.1–3; text-fig.8. Holotype: not designated. **Name not validly published:** holotype not designated and name used in anticipation of future acceptance (I.C.N. Article 36.1b). **NOW** *Chiropteridium*. Originally *Hystrichosphaeridium* (name not validly published), subsequently (and now) *Chiropteridium*, thirdly *Baltisphaeridium* (name not validly published; Appendix A). This name was also not validly published in Maier (1959, p.314), since it too was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1b). Age: middle Oligocene.

"*longifurcatum*" Firtion, 1952, p.157–158, pl.9, fig.1; text-figs.1H–M. Holotype: Firtion, 1952, pl.9, fig.1; lost according to Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.517). Neotype: Foucher, 1976, pl.5, figs.7–8, designated by Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.518); Fauconnier and Masure, 2004, pl.74, figs.2–3. **NOW** *Surculosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Surculosphaeridium*, fourthly *Surculosphaeridium?*. Age: Cenomanian.

"*longispinosoides*" Sannemann, 1955, p.329–330; pl.1, fig.10; pl.2, figs.1–4; pl.3, figs.6,8; pl.6, figs.1–6; text-figs.9a–b. Holotype: Sannemann, 1955, pl.6, fig.1. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Devonian (late Givetian).

"*longispinosum*" Eisenack, 1931, p.110–111, pl.5, figs.6–17 ex Eisenack, 1938a, p.12–14. Holotype: Eisenack, 1931, pl.5, fig.10, as *Ovum hispidum* subsp. *longispinosum*, lost according to Eisenack (1959, p.194). Neotype: Eisenack, 1959, pl.15, fig.1, designated by Eisenack (1959, p.194). **NOW** *Baltisphaeridium longispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *longispinosum* (name not validly published; Appendix A), subsequently *Hystrichosphaera longispinosa* (name not validly published), thirdly *Hystrichosphaeridium longispinosum*, fourthly (and now) *Baltisphaeridium longispinosum* (Appendix A), fifthly *Micrhystridium longispinosum* (combination not validly published; Appendix A). The name *Ovum hispidum* subsp. *longispinosum* was not validly published in Eisenack (1931) since the species name *Ovum hispidum* was not validly published. Age: Ordovician (erratic).

"var. *longispinosum*". Autonym. Holotype: Eisenack, 1931, pl.5, fig.10, as *Ovum hispidum* subsp. *longispinosum*, lost according to Eisenack (1959, p.194). Neotype: Eisenack, 1959, pl.15, fig.1, designated by Eisenack (1959, p.194). **NOW** *Baltisphaeridium longispinosum* var. *longispinosum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *longispinosum*, subsequently (and now) *Baltisphaeridium longispinosum* var. *longispinosum* (Appendix A).

"var. *uncinatum*" Downie, 1958, p.337; text-fig.2a. Holotype: Downie, 1958, text-fig.2a. **NOW** *Stellechinatum uncinatum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum* (Appendix A), thirdly *Baltisphaeridium uncinatum* (Appendix A), fourthly *Micrhystridium uncinatum* (Appendix A), fifthly *Goniosphaeridium uncinatum* (Appendix A), sixthly *Polygonium uncinatum* (Appendix A), seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published; Appendix A), eighthly (and now) *Stellechinatum uncinatum* (Appendix A). Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

"*longofilum*" Maier, 1959, p.317, pl.32, fig.7. Holotype: Maier, 1959, pl.32, fig.7. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: middle Oligocene.

"*lucidum*" Deunff, 1959, p.25–26, pl.9, figs.80,82–83,85–89. Holotype: Deunff, 1959, pl.9, fig.82. **NOW** *Micrhystridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium* (Appendix A), fourthly (and now) *Micrhystridium* (Appendix A). Age: Ordovician (Caradoc).

"*machaerophorum*" Deflandre and Cookson, 1955, p.274, pl.9, figs.4,8. Holotype: Deflandre and Cookson, 1955, pl.9, fig.4. **NOW** *Lingulodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Cleistosphaeridium disjunctum*, according to Reid (1974, p.591); *Hystrichosphaeridium ashdodense*, according to Wall (1967, p.109); *Baltisphaeridium* (subsequently *Lingulodinium*) *funginum*, *Lingulodinium brevispinosum* and *Lingulodinium sadoense*, all according to Kokinos and Anderson (1995, p.162); *Hystrichosphaeridium redonense*, questionably according to Harland (1977b, p.94) and according to Rochon et al. (1999, p.20). Motile equivalent: *Gonyaulax polyedra* Stein, 1883, according to Wall and Dale (1968c, p.271). Age: Miocene.

"*macrotubulum*" Neale and Sarjeant, 1962, p.452–455, pl.20, fig.7; text-fig.8a. Holotype: Neale and Sarjeant, 1962, pl.20, fig.7; text-fig.8a; Fauconnier and Masure, 2004, pl.57, fig.7. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly *Oligosphaeridium?*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Oligosphaeridium*) *vasiformum*, according to McIntyre and Brideaux (1980, p.21). Age: Hauterivian.

"*magdali*" Drugg, 1967, p.26–27, pl.4, figs.8–10; pl.9, fig.7. Holotype: Drugg, 1967, pl.4, fig.9. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaera* (as *Tanyosphaeridium*) *xanthiopyxides*, according to Stover and Evitt (1978, p.85). Age: Danian.

"*magnarmatum*" Tasch in Tasch et al., 1964, p.192, pl.1, fig.22. Holotype: Tasch et al., 1964, pl.1, fig.22. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*majus*" Lejeune-Carpentier, 1940, p.B220–B221; text-fig.13. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.12, as *Amphorosphaeridium majus*. Holotype: Lejeune-Carpentier, 1940, text-fig.13; Strel et al., 1977, pl.1, fig.7; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.6–7; text-fig.7. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Dapsilidinium?* (combination not validly published), fifthly *Amphorosphaeridium*, sixthly (and now) *Exochosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (as *Exochosphaeridium*) *bifidum* and *Exochosphaeridium bifidum* var. *involutum* (as *Exochosphaeridium bifidum* subsp. *involutum*), both according to Peyrot (2011, p.284). Age: Late Cretaceous.

"*malleoferum*" (White, 1842, p.37, pl.4, div.3, fig.7) Lentin and Williams, 1993, p.321. Holotype: White, 1842, pl.4, fig.7; Sarjeant, 1991, fig.4.6. **Combination not validly published:** transfer not intended. **NOW** *Achomosphaera?*. Originally *Xanthidium* (Appendix A), subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Achomosphaera?*, fourthly *Hystrichosphaeridium* (combination not validly published). Although Deflandre (1937b, p.79) indicated this to be a species of *Hystrichosphaeridium*, he did not definitely associate the epithet and generic name (see I.C.N. Article 35.2). Thus, in contradiction to the informal treatment of Sarjeant (1991, p.88) and the formal treatment of Lentin and Williams (1993), this combination is not attributable to Deflandre (1937b) (pending assessment under the I.C.Z.N.). Both Sarjeant (1991) and Lentin and Williams (1993) accepted this as a provisional species of *Achomosphaera*. Age: Late Cretaceous.

"*malum*" (Cramer, 1964, p.297, pl.1, figs.6,8,10; text-fig.19, nos.10–12) Andreeva, 1973, p.192. Holotype: Cramer, 1964, pl.1, fig.8. **Combination not validly published:** basionym not fully referenced. **NOW** *Rhacobrachion* (Appendix A). Originally *Baltisphaeridium* (Appendix A), subsequently *Evittia* Brito (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Rhacobrachion* (Appendix A). Age: Silurian (Ludlow).

"*mantellii*" Davey and Williams, 1966b, p.66, pl.6, fig.6. Holotype: Davey and Williams, 1966b, pl.6, fig.6; Davey and Verdier, 1973, pl.4, figs.1,3. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently (and now) *Florentinia*. Age: late Cenomanian.

"*maranhense*" Regali et al., 1974, p.291, pl.23, fig.3. Holotype: Regali et al., 1974, pl.23, fig.3. **NOW** *Spiniferites?*. Originally *Hystrichosphaeridium*, subsequently (and now) *Spiniferites?*. Age: Albian–Cenomanian.

"*marginatum*" Andreeva, 1973, p.192; text-fig.136. **Name not validly published**: no description.

"*mariannae*" Philippot, 1949, p.56–57; text-fig.2. Holotype: Philippot, 1949, text-fig.2. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Achomosphaera*. Age: Late Cretaceous.

"*marsupium*" Tasch in Tasch et al., 1964, p.193, pl.3, fig.16. Holotype: Tasch et al., 1964, pl.3, fig.16. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*. **Taxonomic senior synonym**: *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*maslovii*" Timofeev, 1963, fig.1, no.11. **Name not validly published**: no description.

"*membranaceum*" Philippot, 1949, p.57–58; text-fig.3. Holotype: Philippot, 1949, text-fig.3. **NOW** *Cymatiosphaera philippotii* (Appendix A). Originally *Hystrichosphaeridium membranaceum*, subsequently *Cymatiosphaera membranacea* (name illegitimate; Appendix A), thirdly (and now) *Cymatiosphaera philippotii* (Appendix A). Age: Late Cretaceous.

"*mensula*" (Wetzel, 1933b, p.49–50, pl.4, fig.32) Downie and Sarjeant, 1965, p.151. Holotype: Wetzel, 1933b, pl.4, fig.32. **Name not validly published**: name not intended. **NOW** *Veryhachium* (Appendix A). Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium* (name not validly published), thirdly (and now) *Veryhachium* (Appendix A). The name *Hystrichosphaera mensula* was not validly published in Wetzel (1933b), since the generic name *Hystrichosphaera* was not validly published until 1937. The name *Hystrichosphaeridium mensula* was attributed to Deflandre (1937b) by Downie and Sarjeant (1965); however, Deflandre (1937b) did not formally propose or use this name. N.I.A. Age: Late Cretaceous.

"*meson*" Eisenack, 1955, p.179. Holotype: Eisenack, 1954a, pl.1, fig.3. **NOW** *Visbysphaera mesa* (Appendix A). Originally *Hystrichosphaeridium intermedium* (name illegitimate), subsequently *Hystrichosphaeridium meson*, thirdly *Baltisphaeridium meson* (Appendix A), fourthly (and now) *Visbysphaera mesa* (Appendix A), fifthly *Multiplicisphaeridium meson* (Appendix A). Substitute name for *Hystrichosphaeridium intermedium* Eisenack, 1954a, p.208, pl.1, figs.3,9; text-figs.3–4 (an illegitimate name). Taxonomic junior synonym: *Baltisphaeridium* (subsequently *Multiplicisphaeridium*) *micropilare* Cramer, 1970, an acritarch species, according to Ye Xiaorong (1984, p.42). Age: Silurian (late Llandovery–late Ludlow).

"*mespilatum*" (Maier, 1959, p.306–307, pl.29, figs.5–6) Eisenack and Kjellström, 1975b, p.233–234. Holotype: Maier, 1959, pl.29, fig.5. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Chiropteridium*, fourthly *Hystrichosphaeridium*. **Taxonomic senior synonym**: *Galea* (now *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). Age: middle Oligocene–middle Miocene.

"*microfurcatum*" Deunff, 1957, p.6, fig.2 — p.13; fig.3 — p.14. Holotype: Deunff, 1957, fig.2 — p.13. **NOW** *Ammonidium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly (and now) *Ammonidium* (Appendix A). Age: Middle Devonian.

"*microspinosum*" Eisenack, 1954a, p.209–210, pl.1, fig.8. Holotype: Eisenack, 1954a, pl.1, fig.8. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Lophosphaeridium* (Appendix A), fourthly *Visbysphaera* (Appendix A), fifthly *Buedingiisphaeridium* (combination not validly published; Appendix A). Taxonomic junior synonym:

Baltisphaeridium listeri Kiryanov, 1978, an acritarch species, according to Le Hérisse (1989, p.210). Age: Silurian (late Llandovery).

"*microtriainum*" Klumpp, 1953, p.390, pl.17, figs.6–7. Emendation: Sarjeant, 1981, p.110–112, as *Achomosphaera microtriaina*. Holotype: Klumpp, 1953, pl.17, figs.6–7; Sarjeant, 1981, pl.2, figs.1–2; text-fig.2. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly *Cordosphaeridium?*, fourthly *Polysphaeridium*, fifthly *Achomosphaera*, sixthly (and now) *Operculodinium*. Age: late Eocene.

?*mineralosum* Varma and Dangwal, 1964, p.64–65, pl.1, figs.8–12; pl.2, fig.1. Holotype: Varma and Dangwal, 1964, pl.1, fig.9. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Eocene–Oligocene.

subsp. *jekhowskyi* Varma and Dangwal, 1964, p.65, pl.1, fig.12; pl.2, fig.1. Holotype: Varma and Dangwal, 1964, pl.2, fig.1. Age: Eocene–Oligocene.

subsp. *labiatum* Varma and Dangwal, 1964, p.64–65, pl.1, figs.10–11. Holotype: Varma and Dangwal, 1964, pl.1, fig.10. Age: Eocene–Oligocene.

subsp. *mineralosum*. Autonym. Holotype: Varma and Dangwal, 1964, pl.1, fig.9.

minus He Chengquan, 1991, p.131–132, pl.15, fig.10; text-fig.22. Holotype: He Chengquan, 1991, pl.15, fig.10; text-fig.22. Age: late Turonian–early Senonian.

"*molodovense*" Timofeev, 1962, pl.9, figs.2,2a–b. **Name not validly published**: no description.

"*monacanthum*" Deunff, 1951, p.323; text-fig.4. Holotype: Deunff, 1951, text-fig.4. **NOW** *Deunffia* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium?* (combination not validly published; Appendix A), thirdly (and now) *Deunffia* (Appendix A). Age: Middle Ordovician.

"*monstruosum*" Tasch in Tasch et al., 1964, p.195, pl.1, fig.12. Holotype: Tasch et al., 1964, pl.1, fig.12. Originally *Hystrichosphaeridium*, subsequently (and now) *Diphyes?*, thirdly *Coronifera*. Taxonomic senior synonym: *Coronifera oceanica*, according to Below (1982c, p.5) — however, Fauconnier in Fauconnier and Masure (2004, p.176) retained *Hystrichosphaeridium* (as *Diphyes?*) *monstruosum*. Age: Albanian.

?*multicornutum* Kimyai, 1966, p.471, pl.2, fig.20. Holotype: Kimyai, 1966, pl.2, fig.20. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Cenomanian.

"*multifurcatum*" Deflandre, 1937b, p.76, pl.16 (al. pl.13), figs.1–3. Emendation: Masure in Fauconnier and Masure, 2004, p.270, as *Exochosphaeridium multifurcatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), figs.1–2; Fensome et al., 1991, figs.1–2 — p.691; fig.1 — p.693; Fensome et al., 1993a, fig.1 — p.1261; figs.1–2 — p.1265; Fauconnier and Masure, 2004, pl.37, figs.10–11. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Heterosphaeridium*, sixthly (and now) *Exochosphaeridium*. Age: Late Cretaceous.

"*multipilosum*" Eisenack, 1931, p.111, pl.5, figs.20–22 ex Eisenack, 1938a, p.12. Holotype: Eisenack, 1931, pl.5, fig.22, as *Ovum hispidum* subsp. *multipilosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.11, designated by Eisenack (1959, p.197). **NOW** *Baltisphaeridium multipilosum* (Appendix A). Originally *Ovum hispidum* subsp. *multipilosum* (name not validly published; Appendix A), subsequently *Hystrichosphaeridium multipilosum*, thirdly (and now) *Baltisphaeridium multipilosum* (Appendix A). The name *Ovum hispidum* subsp. *multipilosum* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Silurian.

"subsp. *multipilosum*". Autonym. Holotype: Eisenack, 1931, pl.5, fig.22, as *Ovum hispidum* subsp. *multipilosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.11, designated by Eisenack (1959, p.197). **NOW** *Baltisphaeridium multipilosum* subsp. *multipilosum* (Appendix A).

Originally *Hystrichosphaeridium multipilosum* subsp. *multipilosum*, subsequently (and now) *Baltisphaeridium multipilosum* subsp. *multipilosum* (Appendix A).

"subsp. **validum**" Sannemann, 1955, p.330, pl.5, figs.9–10; text-fig.10. Holotype: Sannemann, 1955, pl.5, fig.9. **NOW** *Baltisphaeridium multipilosum* subsp. *validum* (Appendix A). Originally *Hystrichosphaeridium multipilosum* subsp. *validum*, subsequently (and now) *Baltisphaeridium multipilosum* subsp. *validum* (Appendix A). Age: Devonian (late Givetian).

"**mutabile**" Sannemann, 1955, p.331, pl.5, figs.5–6; text-figs.17a–d. Holotype: Sannemann, 1955, pl.5, fig.5. **NOW** *Aldridgeisphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium?* (Appendix A), fourthly (and now) *Aldridgeisphaera* (Appendix A). Age: Devonian (late Givetian).

"**notoense**" Fuji in Ichikawa et al., 1964, pl.10, fig.3. **Name not validly published:** no description.

"**nudatum**" Timofeev, 1959, p.53, pl.4, fig.10. Holotype: Timofeev, 1959, pl.4, fig.10. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"**ohioense**" Winslow, 1962, p.77, pl.19, figs.1,22; pl.22, fig.9. Holotype: Winslow, 1962, pl.22, fig.9. **NOW** *Gorgonisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Gorgonisphaeridium* (Appendix A). Age: Late Devonian.

"**oligacanthum**" Wetzel, 1952, p.402–405, pl.A, figs.4,7–8,11a–b; text-figs.21–25. Emendation: Wilson and Sarjeant in Sarjeant, 1984c, p.128, as *Laticavodinium oligacanthum*. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625; Dietz et al., 1999, text-fig.6g. **NOW** *Impletosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium?*, fourthly *Laticavodinium*, fifthly (and now) *Impletosphaeridium?*. Age: Danian.

"subsp. **complanatum**" Wetzel, 1952, p.404–405, pl.A, figs.11a–b. Emendation: Sarjeant, 1984c, p.142, as *Solisphaeridium stimulfiferum* subsp. *complanatum*. Holotype: Wetzel, 1952, pl.A, figs.11a–b; Sarjeant, 1984c, pl.4, fig.6; text-fig.13. **NOW** *Micrhystridium stimulfiferum?* subsp. *complanatum* (Appendix A). Originally *Hystrichosphaeridium oligacanthum* subsp. *complanatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *complanatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *complanatum*, fourthly *Solisphaeridium stimulfiferum* subsp. *complanatum* (Appendix A), fifthly (and now) *Micrhystridium stimulfiferum?* subsp. *complanatum* (Appendix A). Age: Paleocene.

"subsp. **granulatum**" Wetzel, 1952, p.404; text-fig.25. Emendation: Sarjeant, 1984c, p.136, as *Surculosphaeridium? granulatum*. Holotype: Wetzel, 1952, text-fig.25; Sarjeant, 1984c, pl.5, figs.1–3; text-fig.8. **NOW** *Surculosphaeridium? granulatum*. Originally *Hystrichosphaeridium oligacanthum* subsp. *granulatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *granulatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *granulatum*, fourthly (and now) *Surculosphaeridium? granulatum*. Age: Paleocene.

"subsp. **oligacanthum**". Autonym. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625. **Now redundant.** Originally *Hystrichosphaeridium oligacanthum* subsp. *oligacanthum*, subsequently *Baltisphaeridium oligacanthum* subsp. *oligacanthum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *oligacanthum*.

"subsp. **stella**" Wetzel, 1952, p.403, pl.A, fig.4; text-fig.23. Emendation: Sarjeant, 1984c, p.135, as *Surculosphaeridium phoenix* subsp. *stella*. Holotype: Wetzel, 1952, pl.A, fig.4; Dietz et al. 1999, text-fig.6f. **NOW** *Surculosphaeridium? stella*. Originally *Hystrichosphaeridium oligacanthum* subsp. *stella*, subsequently *Baltisphaeridium oligacanthum* subsp. *stella* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *stella*, fourthly *Surculosphaeridium? phoenix* subsp. *stella*, fifthly (and now) *Surculosphaeridium? stella*. N.I.A. Age: Paleocene.

"subsp. *velatum*" Wetzel, 1952, p.403–404, pl.A, fig.7; text-fig.24. Emendation: Sarjeant, 1984c, p.133, as *Cauca? velata*. Holotype: Wetzel, 1952, pl.A, fig.7; text-fig.24; Sarjeant, 1984c, pl.3, figs.4–6; text-fig.6. **NOW** *Cauca? velata*. Originally *Hystrichosphaeridium oligacanthum* subsp. *velatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *velatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *velatum*, fourthly (and now) *Cauca? velata*. Age: Paleocene.

"*oligofurcatum*" Eisenack, 1954a, p.208, pl.1, fig.4; text-fig.5. Holotype: Eisenack, 1954a, pl.1, fig.4; text-fig.5. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium* (Appendix A). Age: Silurian (late Llandovery).

"*oligospinosum*" Eisenack, 1934, p.64–65, pl.4, figs.15–18 ex Eisenack, 1938a, p.12. Holotype: Eisenack, 1934, pl.4, fig.18, lost according to Eisenack et al. (1973, p.494). **NOW** *Estiastra? oligospinosa* (Appendix A). Originally *Ovum hispidum* subsp. *oligospinosum* (combination not validly published; Appendix A), subsequently *Hystrichosphaeridium oligospinosum*, thirdly *Pulvinosphaeridium oligospinosum* (Appendix A), fourthly *Veryhachium oligospinosum* (Appendix A), fifthly *Goniosphaeridium oligospinosum* (Appendix A), sixthly (and now) *Estiastra? oligospinosa* (Appendix A). The name *Ovum hispidum* subsp. *oligospinosum* was not validly published in Eisenack (1934) since the specific name *Ovum hispidum* was not validly published. Age: Silurian (erratic).

"*ordovicum*" Timofeev, 1959, p.56, pl.4, fig.20. Holotype: Timofeev, 1959, pl.4, fig.20. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*pachydermum*" Cookson and Eisenack, 1960b, p.251–252, pl.38, fig.5; text-fig.5. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.5; Fauconnier and Masure, 2004, pl.48, fig.10. **NOW** *Impletosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Dapsilidinium*, fifthly (and now) *Impletosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Oxfordian–Tithonian.

"*palmatum*" Deflandre and Courteville, 1939, p.101, pl.3, fig.1. Holotype: Deflandre and Courteville, 1939, pl.3, fig.1. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium*, fourthly *Exochosphaeridium?*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Pervosphaeridium*) *pseudhystrichodinium*, according to Yun Hyesu (1981, p.29). Junior homonym: *Hystrichosphaeridium palmatum* (White, 1842) Downie and Sarjeant, 1965. Age: Late Cretaceous.

"*palmatum*" (White, 1842, p.39–40, pl.4, fig.12) Downie and Sarjeant, 1965, p.121. Holotype: White, 1842, pl.4, fig.12. **Combination illegitimate** — **senior homonym:** *Hystrichosphaeridium palmatum* Deflandre and Courteville, 1939. **Nomenclatural senior synonym:** *Xanthidium tubiferum* var. *recurvatum* (as *Hystrichosphaeridium recurvatum*), which has the same holotype. Substitute name: *Hystrichosphaeridium duplum*. Originally *Xanthidium tubiferum* var. *palmatum* (Appendix A), subsequently *Xanthidium palmatum* (Appendix A), thirdly *Spiniferites palmatus*, fourthly *Cordosphaeridium palmatum*, fifthly *Hystrichosphaeridium palmatum* (combination illegitimate), sixthly *Hystrichosphaeridium duplum* (name illegitimate). Nomenclatural junior synonyms: *Xanthidium tubiferum* var. *palmaforme* and *Hystrichosphaeridium duplum*, both of which have the same holotype as *Hystrichosphaeridium palmatum*. See *Hystrichosphaeridium recurvatum* for a full discussion. Age: Senonian.

"subsp. *palmatum*". Autonym. Holotype: White, 1842, pl.4, fig.12. **Name illegitimate:** the species name *Hystrichosphaeridium palmatum* is illegitimate. Originally *Hystrichosphaeridium palmatum* subsp. *palmatum* (combination illegitimate), subsequently *Hystrichosphaeridium duplum* subsp. *duplum* (name illegitimate).

"subsp. *parvum*" (Rozen, 1965, p.303–304, pl.4, fig.6; text-fig.13) Lentin and Williams, 1981, p.144. Holotype: Rozen, 1965, pl.4, fig.6; text-fig.13. **Combination illegitimate:** species name illegitimate. **NOW** *Hystrichosphaeridium recurvatum* subsp. *parvum*. Originally *Hystrichosphaeridium recurvatum* var. *parvum*, subsequently (and now) *Hystrichosphaeridium recurvatum* subsp. *parvum*, thirdly

Hystrichosphaeridium palmatum subsp. *parvum* (combination illegitimate), fourthly (and now)
Hystrichosphaeridium duplum subsp. *parvum* (combination illegitimate). Age: late Eocene.

?*paracostatum* Cookson and Eisenack, 1974, p.65–66, pl.25, figs.11–13. Holotype: Cookson and Eisenack, 1974, pl.25, fig.12. Questionable assignment: Masure and Foucher in Fauconnier and Masure (2004, p.310). Age: Albian–Senonian.

"*paradoxum*" Brosius, 1963, p.41–42, pl.4, figs.1,6; text-fig.2, nos.1a–c. Holotype: Brosius, 1963, pl.4, fig.6; Fensome et al., 1995, fig.2 — p.1639. **NOW** *Distatodinium*. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly *Oligosphaeridium?*, fourthly (and now) *Distatodinium*, fifthly *Bipolaribucina*. Taxonomic junior synonym: *Distatodinium craterum*, according to Fensome et al. (2009, p.31). Age: late Oligocene.

"*paraense*" Regali et al., 1974, p.289, pl.23, fig.6. Holotype: Regali et al., 1974, pl.23, fig.6. **NOW** *Tuberculodinium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Tuberculodinium*. Age: early Miocene.

"*parvispinum*" (Deflandre, 1937b, p.77, pl.16 [al. pl.13], fig.5) Cookson and Eisenack, 1958, p.45. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.5; Fauconnier and Masure, 2004, pl.66, figs.5–6. **NOW** *Prolixosphaeridium parvispinum*. Originally *Hystrichosphaeridium?* *xanthiopyxides* var. *parvispinum*, subsequently *Hystrichosphaeridium parvispinum*, thirdly *Baltisphaeridium parvispinum* (Appendix A), fourthly (and now) *Prolixosphaeridium parvispinum*. Taxonomic junior synonyms (at specific and varietal ranks): *Prolixosphaeridium elongatum*, according to Lentin and Williams (1985, p.294); *Prolixosphaeridium deirense*, according to Davey and Verdier (1974, p.636–637) — however, Harding (1990b, p.46) retained *Prolixosphaeridium deirense*. Age: late Aptian.

parvum Davey, 1969b, p.5, pl.1, fig.8; pl.2, fig.1. Holotype: Davey, 1969b, pl.2, fig.1. Age: ?Campanian–Maastrichtian.

"*pateum*" Timofeev, 1959, p.52, pl.4, fig.4. Holotype: Timofeev, 1959, pl.4, fig.4. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*patriarchum*" Deunff, 1967, p.25. **Name not validly published**: no description or illustration.

pattei Valensi, 1949, p.539–540, fig.1. Holotype: Valensi, 1949, fig.1; Fauconnier and Masure, 2004, pl.62, figs.8–9. Originally (and now) *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Lanterna*, fourthly *Lanterna?*, fifthly *Pandadinium*. Dodekova (1994, p.25) retained this species in *Hystrichosphaeridium*. Age: Bathonian.

patulum Davey and Williams, 1966b, p.60, pl.10, fig.5. Holotype: Davey and Williams, 1966b, pl.10, fig.5. Age: early Eocene.

subsp. *majus* Yu Jingxian, 1989, p.139, pl.45, figs.7,11. Holotype: Yu Jingxian, 1989, pl.45, fig.7. Age: Eocene.

subsp. *patulum*. Autonym. Holotype: Davey and Williams, 1966b, pl.10, fig.5.

?*paucifurcatum* Cookson and Eisenack, 1961b, p.44, pl.2, fig.15. Holotype: Cookson and Eisenack, 1961b, pl.2, fig.15. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Eocene.

"*paulinae*" (Valensi, 1953, p.48, pl.12, fig.6) Downie and Sarjeant, 1965, p.121. Holotype: Valensi, 1953, pl.12, fig.6. **NOW** *Dapsilidinium?*. Originally *Micrhystridium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?*, fourthly (and now) *Dapsilidinium?*. Age: Middle Jurassic.

"?*penicillatum*" (Ehrenberg, 1843b, p.62 ex Ehrenberg, 1854, pl.37, section 8, fig.3) Deflandre, 1937b, p.75. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.3. **NOW** *Systematophora penicillata*. Originally *Xanthidium penicillatum* (Appendix A), subsequently *Hystrichosphaera penicillata* (combination not validly published), thirdly *Hystrichosphaeridium penicillatum*, fourthly *Ovum hispidum penicillatum* (combination not validly published; Appendix A), fifthly *Hystrichosphaeridium? penicillatum*, sixthly (and now) *Systematophora penicillata*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Taxonomic junior synonym: *Systematophora fasciculigera*, according to Sarjeant (1980a, p.282). Age: late Oxfordian.

"forma *coronatum*" Wetzel, 1933b, caption to pl.4, fig.17 — p.41, pl.4, fig.17 ex Deflandre, 1937b, p.75. Holotype: Wetzel, 1933b, pl.4, fig.17; Lejeune-Carpentier, 1938a, fig.6. **NOW** *Areoligera coronata*. Originally *Hystrichosphaera penicillata* forma *coronata* (name not validly published), subsequently *Hystrichosphaeridium penicillatum* forma *coronatum*, thirdly (and now) *Areoligera coronata*. Taxonomic junior synonyms: *Hystrichosphaera penicillata* forma *medusettiformis* and *Hystrichosphaera penicillata* forma *rhizopodiphora*, both according to Morgenroth (1968, p.551) — however, Eaton (1976, p.245) retained *Hystrichosphaera penicillata* forma *medusettiformis* (as *Areoligera medusettiformis*). The name *Hystrichosphaera penicillata* forma *coronata* was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Senonian.

"forma *penicillatum*". Autonym. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.3. **Now redundant.**

"*perceptibile*" Isagulova, 1963, p.1157, pl.1, fig.5. **Name not validly published:** no description.

"*perforatum*" Gocht, 1959, p.68–69, pl.3, fig.7; pl.7, figs.13–16. Holotype: Gocht, 1959, pl.3, fig.7; pl.7, fig.13; Fauconnier and Masure, 2004, pl.59, figs.3–11. **NOW** *Oligosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. Age: Hauterivian–Barremian.

"*perifurcatum*" Salujha et al., 1969, p.35–36, pl.4, figs.51–52,55,62. Holotype: Salujha et al., 1969, pl.4, fig.51. **Taxonomic senior synonym:** *Hystrichokolpoma rigaudiae*, according to Jain (1982, p.53). Age: early Eocene.

"*perovatum*" Tasch in Tasch et al., 1964, p.194, pl.3, fig.13. Holotype: Tasch et al., 1964, pl.3, fig.13. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

?*perplexum* Varma and Dangwal, 1964, p.64, pl.1, figs.5–6. Holotype: Varma and Dangwal, 1964, pl.1, figs.5–6. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Eocene–Oligocene.

petilum Gitmez, 1970, p.289–290, pl.9, figs.1,6; text-fig.24. Holotype: Gitmez, 1970, pl.9, fig.1; text-fig.24; Fauconnier and Masure, 2004, pl.45, fig.1. Age: early Kimmeridgian.

"?*phoenix*" Duxbury, 1980, p.124–125, pl.13, figs.5–6; text-fig.9. Holotype: Duxbury, 1980, pl.13, figs.5–6; text-fig.9; Fauconnier and Masure, 2004, pl.19, figs.4–11. **NOW** *Cymososphaeridium?*. Originally *Hystrichosphaeridium?*, subsequently *Surculosphaeridium?*, thirdly (and now) *Cymososphaeridium?*. Questionable assignment: Duxbury (1980, p.124). N.I.A. Age: Barremian.

"*picoricum*" (Cramer, 1964, p.303–304, pl.11, figs.1–3; text-fig.24) Andreeva, 1973, p.192. Holotype: Cramer, 1964, pl.11, fig.2. **Combination not validly published:** basionym not fully referenced. Originally *Micrhystridium* (Appendix A), subsequently *Multiplicisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published). **Taxonomic senior synonym:** *Baltisphaeridium* (now *Multiplicisphaeridium*) *cladum* Downie, 1963, an acritarch species, according to Colbath (1979, p.20–21). Age: Devonian (middle Siegenian–Emsian).

"?*pilosum*" (Ehrenberg, 1854, pl.37, section 8, fig. 4) Deflandre, 1937b, p.79. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig. 4. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium*

pilosum (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. Questionable assignment: Deflandre (1937b, p.79). Age: Oxfordian.

"**piriferum**" Eisenack, 1954a, p.206–207, pl.1, figs.1a–b; text-fig.1. Holotype: Eisenack, 1954a, pl.1, figs.1a–b. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Visbysphaera* (Appendix A). Taxonomic junior synonyms: *Baltisphaeridium hermosum* Cramer and Diez, 1968 (name not validly published), an acritarch species, according to Cramer (1970, p.148); *Baltisphaeridium* (now *Visbysphaera*) *dilatispinosum* Downie, 1963, an acritarch species, according to Eisenack (1965c, p.263) — however, Fensome et al. (1990, p.530) retained *Baltisphaeridium* (now *Visbysphaera*) *dilatispinosum*. Age: Silurian (late Llandovery).

"**placacanthum**" Deflandre and Cookson, 1955, p.276–277, pl.9, figs.1–3. Emendation: May, 1980, p.68, as *Systematophora placacantha*. Holotype: Deflandre and Cookson, 1955, pl.9, figs.1–2; Fauconnier and Masure, 2004, pl.76, figs.14–16. **NOW** *Cleistosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Systematophora*, fifthly (and now) *Cleistosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (now *Impletosphaeridium*) *panniforme*, according to Sarjeant (1984b, p.86–87) — however, Eaton et al. (2001, p.191) retained *Baltisphaeridium panniforme*; *Systematophora ancyrea*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: Miocene.

"**plicatum**" Maier, 1959, p.318, pl.33, fig.1. Holotype: Maier, 1959, pl.33, fig.1. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera* (as *Spiniferites*) *ramosa* subsp. *gracilis*, according to Sarjeant (1983, p.93). Age: middle Oligocene.

"**podolicum**" Timofeev, 1960, pl.1, fig.12. **Name not validly published**: no description.

"**polonicum**" Górka, 1965, p.306–307, pl.3, figs.5–6. Emendations: Erkmén and Sarjeant, 1980, p.68, as *Compositosphaeridium polonicum*; Courtinat, 1989, p.164, as *Compositosphaeridium polonicum* — however, see Stancliffe and Sarjeant (1990, p.203). Holotype: Górka, 1965, pl.3, fig.5. **NOW** *Compositosphaeridium?* Dodekova. Originally *Hystrichosphaeridium*, subsequently *Compositosphaeridium* Erkmén and Sarjeant (combination illegitimate), thirdly *Compositosphaeridium* Dodekova, fourthly (and now) *Compositosphaeridium?* Dodekova. Taxonomic junior synonyms: *Hystrichosphaeridium* (subsequently *Compositosphaeridium*) *costatum*, according to Beju (1971, p.292); *Compositosphaeridium bulgaricum*, according to Dodekova (1990, p.9) — however, Stancliffe and Sarjeant (1990, p.203) retained *Compositosphaeridium bulgaricum* and Masure in Fauconnier and Masure (2004, p.137) retained *Compositosphaeridium costatum*. Age: Oxfordian.

"**polygonale**" Eisenack, 1931, p.113, pl.4, figs.16–20; pl.5, fig.18 ex Eisenack, 1938a, p.12. Holotype: Eisenack, 1931, pl.4, fig.19 (as *Ovum hispidum* subsp. *polygonale*), lost according to Eisenack (1959, p.199). Neotype: Paris and Deunff, 1970, pl.1, fig.4 (as *Veryhachium splendens*), designated by Fensome et al. (1990, p.235), which see. **NOW** *Polygonium polygonale* (Appendix A). Originally *Ovum hispidum* subsp. *polygonale* (combination not validly published; Appendix A), subsequently *Hystrichosphaeridium polygonale*, thirdly *Baltisphaeridium polygonale* (Appendix A), fourthly *Veryhachium polygonale* (combination not validly published; Appendix A), fifthly *Goniosphaeridium polygonale* (Appendix A), sixthly (and now) *Polygonium polygonale* (Appendix A). Taxonomic junior synonyms: *Impletosphaeridium?* *primordiale*, according to Eisenack et al. (1973, p.497–498); *Veryhachium* (al. *Goniosphaeridium*) *splendens* Paris and Deunff, 1970, an acritarch species, by implication in Turner (1984, p.113–114), who believed *Goniosphaeridium splendens* to be the senior name; *Hystrichosphaeridium* (al. *Baltisphaeridium*) *sexradiatum* Timofeev, 1959, an acritarch species, according to Eisenack (1965c, p.261). The name *Ovum hispidum* subsp. *polygonale* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Silurian (erratic).

"**?polyplasiium**" Maier, 1959, p.322–323, pl.33, figs.7–8. Emendation: Sarjeant, 1983, p.96–97, as *Spiniferites polyplasius*. Holotype: Maier, 1959, pl.33, fig.7; Sarjeant, 1983, pl.1, fig.3; pl.2, fig.2. **NOW** *Spiniferites*. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Spiniferites*. Questionable assignment: Davey and Williams (1966b, p.70). Age: Miocene.

polyradiatum Andreeva, 1966, p.131, pl.20, fig.2. Holotype: Andreeva, 1966, pl.20, fig.2. This is probably an acritarch species. Age: Middle Ordovician.

polytrichum Valensi, 1947, p.818; text-fig.4. Holotype: Valensi, 1947, text-fig.4; Fauconnier and Masure, 2004, pl.24, figs.1–6. **NOW** *Impletosphaeridium*? Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Impletosphaeridium*, fifthly *Downiesphaeridium*, sixthly (and now) *Impletosphaeridium*?. Taxonomic junior synonym: *Cleistosphaeridium* (as *Downiesphaeridium*) *polyacanthum*, according to Masure in Fauconnier and Masure (2004, p.196). Age: late Bathonian.

proprium Marheinecke, 1992, p.60–61, pl.11, figs.4–8. Holotype: Marheinecke, 1992, pl.11, figs.4–6; Fauconnier and Masure, 2004, pl.40, figs.1–3. **NOW** *Hystrichokolpoma*. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichokolpoma*. Contrary to the opinion of Lentin and Williams (1993, p.327), Williams et al. (1998, p.310) considered this name to be validly published. Age: late Maastrichtian.

"subsp. ***brevispinum***" (Davey and Williams, 1966b, p.58, pl.10, fig.10) Marheinecke, 1992, p.61. Emendation: Marheinecke, 1992, p.61, as *Hystrichosphaeridium proprium* subsp. *brevispinum*. Holotype: Davey and Williams, 1966b, pl.10, fig.10; Bujak et al., 1980, pl.8, figs.10–12; Fauconnier and Masure, 2004, pl.47, figs.1–4. **NOW** *Hystrichosphaeridium tubiferum* subsp. *brevispinum*. Originally *Hystrichosphaeridium tubiferum* var. *brevispinum*, subsequently (and now) *Hystrichosphaeridium tubiferum* subsp. *brevispinum*, thirdly *Hystrichosphaeridium proprium* subsp. *brevispinum*. Taxonomic senior synonym: *Micrhystridium* (as *Dapsilidium*?, now *Litosphaeridium*) *fucosum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.190) retained *Hystrichosphaeridium tubiferum* subsp. *brevispinum*. Age: early Eocene.

"subsp. ***proprium***". Autonym. Holotype: Marheinecke, 1992, pl.11, figs.4–6. **Now redundant.**

protellipticum Tasch in Tasch et al., 1964, p.194, pl.2, fig.2. Holotype: Tasch et al., 1964, pl.2, fig.2. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

pseudhystrichodinium Deflandre, 1937b, p.73, pl.15 (al. pl.12), figs.3–4. Emendation: Davey, 1969a, p.163, as *Exochosphaeridium pseudhystrichodinium*. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.3; Eisenack and Kjellström, 1972, p.415; Fensome et al., 1995, fig.1 — p.1705. **NOW** *Pervosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium*?, fourthly (and now) *Pervosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Exochosphaeridium*?) *palmatum* Deflandre and Courteville, according to Yun Hyesu (1981, p.29). Age: Late Cretaceous.

"subsp. ***magnum***" Wetzel, 1955, p.35,38, figs.9–10,14. Emendation: Sarjeant, 1984c, p.138–139, as *Coronifera oceanica* subsp. *magna*. Holotype: Wetzel, 1955, fig.9; Sarjeant, 1984c, pl.5, figs.4–5; text-fig.11 (two illustrations); Fensome et al., 1991, p.663, figs.1–3; p.697, fig.1. **NOW** *Coronifera oceanica* subsp. *magna*. Originally *Hystrichosphaeridium pseudhystrichodinium* subsp. *magnum*, subsequently *Baltisphaeridium pseudhystrichodinium* subsp. *magnum* (Appendix A), thirdly (and now) *Coronifera oceanica* subsp. *magna*, fourthly *Coronifera pedata* subsp. *magna*. Age: Paleocene.

"subsp. ***pseudhystrichodinium***". Autonym. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.3. **Now redundant.** Originally *Hystrichosphaeridium pseudhystrichodinium* subsp. *pseudhystrichodinium*, subsequently *Baltisphaeridium pseudhystrichodinium* subsp. *pseudhystrichodinium* (Appendix A).

pseudorecurvatum Morgenroth, 1966a, p.30–31, pl.8, figs.5–6. Holotype: Morgenroth, 1966a, pl.8, fig.5. **NOW** *Melitasphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Operculodinium*, thirdly (and now) *Melitasphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium sheppeyense*, according to Stover and Evitt (1978, p.179). Age: early Eocene.

"*pterophorum*" Deflandre and Courteville, 1939, p.102, pl.2, figs.4–5. Holotype: Deflandre and Courteville, 1939, pl.2, figs.4–5. **NOW** *Dinopterygium*. Originally *Hystrichosphaeridium*, subsequently *Cymatiosphaera* (Appendix A), thirdly *Oodnadattia*, fourthly (and now) *Dinopterygium*. Age: Senonian.

"*pulcherrimum*" Deflandre and Cookson, 1955, p.270–271, pl.1, fig.8; text-figs.21–22. Holotype: Deflandre and Cookson, 1955, pl.1, fig.8; text-figs.21–22; Fauconnier and Masure, 2004, pl.60, figs.8–11. **NOW** *Oligosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. This name was not validly published in Deflandre and Cookson (1954, p.1236), who did not provide a description. Age: Albian.

"*pumile*" Wetzel, 1933b, p.44, pl.4, fig.24 ex Deflandre, 1937b, p.78. Emendation: Sarjeant, 1985b, p.162, as *Diacrocanthidium?* *pumile*. Holotype: Wetzel, 1933b, pl.4, fig.24. **NOW** *Diacrocanthidium?* *pumile* (Appendix A) Originally *Hystrichosphaera longispinosa* forma *pumilis* (name not validly published), subsequently *Hystrichosphaeridium pumile*, thirdly *Baltisphaeridium pumile* (combination not validly published; Appendix A), fourthly *Micrhystridium pumile* (Appendix A), fifthly (and now) *Diacrocanthidium?* *pumile* (Appendix A). The name *Hystrichosphaera longispinosa* forma *pumilis* was not validly published in Wetzel (1933b), since the species name *Hystrichosphaera longispinosa* was not validly published. Age: Late Cretaceous (erratic).

"*quadridactylites*" Stockmans and Willièrè, 1962a, p.67–68, pl.1, fig.18; text-fig.29. Holotype: Stockmans and Willièrè, 1962a, pl.1, fig.18. Originally *Hystrichosphaeridium*, subsequently *Daillydium* (Appendix A).

Taxonomic senior synonym: *Cymatiosphaera* (now *Daillydium*) *pentaster* Staplin, 1961, an acritarch species, according to Playford in Playford and Dring (1981, p.17–18). Age: Devonian (Frasnian).

"*quadriradiatum*" Timofeev, 1959, p.57; pl.4, fig.25. Holotype: Timofeev, 1959, pl.4, fig.25. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*radiculatum*" Davey and Williams, 1966b, p.65, pl.7, fig.9; pl.8, fig.6. Emendation: Davey and Verdier, 1976, p.318, as *Florentinia radiculata*. Holotype: Davey and Williams, 1966b, pl.8, fig.6; Davey and Verdier, 1973, pl.4, fig.7. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently (and now) *Florentinia*. Taxonomic junior synonym: *Coronifera kaiseri*, according to Below (1982c, p.9). Age: late Cenomanian.

"*ramuliferum*" Deflandre, 1937b, p.74, pl.14 (al. pl.11), figs.5–6; pl.17 (al. pl.14), fig.10. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), fig.5; Fensome et al., 1991, fig.1 — p.721; fig.1 — p.725. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published; Appendix A), thirdly (and now) *Achomosphaera*, fourthly *Spiniferites*. Taxonomic junior synonym: *Hystrichosphaeridium rehdense*, according to Sarjeant (1983, p.97,99). Age: Late Cretaceous.

"*ramusculosum*" Deflandre, 1945a, p.63, pl.1, figs.8–16; text-figs.38–39. Emendation: Lister, 1970, p.92–93, as *Multiplicisphaeridium ramusculosum*. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Evittia Brito* (combination not validly published; Appendix A), fourthly (and now) *Multiplicisphaeridium* (Appendix A), fifthly *Peteinosphaeridium* (combination not validly published; Appendix A), sixthly *Oppilatala* (Appendix A). This name was not validly published in Deflandre (1942, figs.2–6 — p.476). Age: Silurian.

"var. *macrocladum*" Deunff, 1955, p.146; text-fig.21. Holotype: Deunff, 1955, text-fig.21. **NOW** *Multiplicisphaeridium ramusculosum* var. *macrocladum* (Appendix A). Originally *Hystrichosphaeridium ramusculosum* var. *macrocladum*, subsequently *Baltisphaeridium ramusculosum* var. *macrocladum* (Appendix A), thirdly *Multiplicisphaeridium ramusculosum* var. *macrocladum* (combination not validly published; Appendix A), fourthly *Oppilatala ramusculosa* var. *macroclada* (Appendix A), fifthly (and now) *Multiplicisphaeridium ramusculosum* var. *macrocladum*. Age: Middle Devonian.

"var. *ramusculosum*". Autonym. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **NOW** *Multiplicisphaeridium ramusculosum* var. *ramusculosum* (Appendix A). Originally *Hystrichosphaeridium ramusculosum* var. *ramusculosum*, subsequently *Baltisphaeridium ramusculosum* var. *ramusculosum* (Appendix A), thirdly *Oppilatala ramusculosa* var. *ramusculosa* (Appendix A), fourthly (and now) *Multiplicisphaeridium ramusculosum* var. *ramusculosum*.

?*raritanianum* Kimyai, 1966, p.471, pl.2, fig.19. Holotype: Kimyai, 1966, pl.2, fig.19. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium*?. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Cenomanian.

"*readei*" Davey and Williams, 1966b, p.64–65, pl.6, fig.3. Emendation: Davey and Verdier, 1976, p.314, as *Kleithriasphaeridium readei*. Holotype: Davey and Williams, 1966b, pl.6, fig.3. **NOW** *Kleithriasphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Kleithriasphaeridium*. Age: Cenomanian.

recurvatum (White, 1842, p.39, pl.4, fig.12) Lejeune-Carpentier, 1940, p.B221–B222. Holotype: White, 1842, pl.4, fig.12. Originally *Xanthidium tubiferum* var. *recurvatum* (Appendix A), subsequently (and now) *Hystrichosphaeridium recurvatum*. Nomenclatural junior synonyms: *Xanthidium tubiferum* var. *palmatum* [subsequently *Hystrichosphaeridium palmatum* (White), an illegitimate name], *Xanthidium tubiferum* var. *palmaforme* and *Hystrichosphaeridium duplum*, since they all have the same holotype as *Hystrichosphaeridium recurvatum*. White (1842, p.39) named "The twelfth ... species of the genus *Xanthidium* ... the *Tubiferum recurvatum* or *palmaforme* — the curved or palm-formed *Tubiferum*", thus presenting two epithets in his text. To compound matters, the single illustration was labelled "*X. tubiferum palmatum*". Since prior to 1953 alternative names were allowed under the I.C.N., and since White (1842) provided a description and illustration, the taxon was validly published. The correct name would be that chosen by the first subsequent author to make such a choice, and this was Bronn (1848, p.1375), who used the name *Xanthidium palmatum*, at species rank. When Downie and Sarjeant (1965, p.121) transferred *Xanthidium palmatum* to *Hystrichosphaeridium*, they created an illegitimate combination — a junior homonym of *Hystrichosphaeridium palmatum* Deflandre and Courteville. Hence, since *Xanthidium tubiferum* var. *recurvatum* had been raised to specific rank, as *Hystrichosphaeridium recurvatum*, by Lejeune-Carpentier (1940), "*recurvatum*" becomes the correct epithet as long as the epithet "*palmatum*" remains unavailable. Age: Late Cretaceous.

subsp. *parvum* (Rozen, 1965, p.303–304, pl.4, fig.6; text-fig.13) Lentin and Williams, 1973, p.79. Holotype: Rozen, 1965, pl.4, fig.6; text-fig.13. Originally *Hystrichosphaeridium recurvatum* var. *parvum*, subsequently (and now) *Hystrichosphaeridium recurvatum* subsp. *parvum*, thirdly *Hystrichosphaeridium palmatum* subsp. *parvum* (combination illegitimate), fourthly *Hystrichosphaeridium duplum* subsp. *parvum* (combination illegitimate). Age: late Eocene.

"var. *parvum*" Rozen, 1965, p.303–304, pl.4, fig.6; text-fig.13. Holotype: Rozen, 1965, pl.4, fig.6; text-fig.13. **NOW** *Hystrichosphaeridium recurvatum* subsp. *parvum*. Originally *Hystrichosphaeridium recurvatum* var. *parvum*, subsequently (and now) *Hystrichosphaeridium recurvatum* subsp. *parvum*, thirdly *Hystrichosphaeridium palmatum* subsp. *parvum* (combination illegitimate), fourthly *Hystrichosphaeridium duplum* subsp. *parvum* (combination illegitimate). Age: late Eocene.

"subsp. *polypes*" Cookson and Eisenack, 1962b, p.491–492, pl.4, figs.11–13. Emendation: Duxbury, 1983, p.49, as *Kiokansium polypes*. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. Originally *Hystrichosphaeridium recurvatum* subsp. *polypes*, subsequently *Polysphaeridium?* *polypes* (combination not validly published), thirdly *Cleistosphaeridium polypes*, fourthly *Bacchidinium polypes*, fifthly *Impletosphaeridium polypes*, sixthly *Kiokansium polypes*. **Taxonomic senior synonym** (at specific rank): *Hystrichosphaeridium* (as and now *Kiokansium*) *unituberculatum*, by implication in Duxbury (1983, p.49), who considered *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*) to be the senior name. Taxonomic junior synonym: *Cleistosphaeridium?* *solidum*, according to Below (1982c, p.16). Age: Albian–Cenomanian.

subsp. *recurvatum*. Autonym. Holotype: White, 1842, pl.4, fig.12.

"var. *recurvatum*". Autonym. Holotype: White, 1842, pl.4, fig.12. **Now redundant**.

"*redonense*" Morzadec-Kerfourn, 1966, p.139, pl.2, fig.3; text-fig.1. Holotype: Morzadec-Kerfourn, 1966, pl.2, fig.3. **Taxonomic senior synonym**: *Hystrichosphaeridium* (now *Lingulodinium*) *machaerophorum*, questionably according to Harland (1977b, p.94) and according to Rochon et al. (1999, p.20). Age: Holocene.

"*rehdense*" Maier, 1959, p.317–318, pl.32, figs.3–4. Holotype: Maier, 1959, pl.32, fig.4; Sarjeant, 1983, pl.1, fig.1. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Achomosphaera*) *ramuliferum*, according to Sarjeant (1983, p.97–99). Age: middle Miocene.

"*reniforme*" Tasch in Tasch et al., 1964, p.193, pl.2, fig.6. Holotype: Tasch et al., 1964, pl.2, fig.6. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*, by implication in Stover and Evitt (1978, p.69), who considered *Hystrichosphaeridium reniforme* to be a taxonomic junior synonym of *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. Age: Albian.

"*replexum*" Tasch in Tasch et al., 1964, p.193, pl.3, fig.14. Holotype: Tasch et al., 1964, pl.3, fig.14. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*rhabdophorum*" Valensi, 1955b, p.593, pl.3, fig.7. Holotype: Valensi, 1955b, pl.3, fig.7; Fauconnier and Masure, 2004, pl.20, figs.10–11. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Exochosphaeridium*. Age: Late Cretaceous.

"*rhopalophorum*" Valensi, 1955a, p.36, fig.1C. Holotype: Valensi, 1955a, fig.1C. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Exochosphaeridium*. Age: Late Cretaceous.

"*rigens*" Timofeev, 1959, p.55, pl.4, fig.18. Holotype: Timofeev, 1959, pl.4, fig.18. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*rjabiniini*" Timofeev, 1959, p.56, pl.4, fig.24. Holotype: Timofeev, 1959, pl.4, fig.24. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*robustum*" Sah et al., 1970, p.146, pl.2, figs.16–17. Holotype: Sah et al., 1970, pl.2, fig.16. **Name illegitimate — senior homonym:** *Hystrichosphaeridium robustum* Sannemann, 1955. **Substitute name:** *Hystrichosphaeridium sahi*. Originally *Hystrichosphaeridium robustum* (name illegitimate), subsequently (and now) *Hystrichosphaeridium sahi*. Age: Late Cretaceous.

"*robustum*" Sannemann, 1955, p.331, pl.1, figs.6,8–9; pl.6, figs.7–9; text-figs.13,14a–c. Holotype: Sannemann, 1955, pl.6, fig.7. **NOW** *Aldridgeisphaera?* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination illegitimate; Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Aldridgeisphaera?* (Appendix A). Junior homonym: *Hystrichosphaeridium robustum* Sah et al., 1970. Age: Devonian (late Givetian).

"subsp. *fissum*" Sannemann, 1955, p.331, pl.1, figs.6–9; pl.6, figs.7–8; text-fig.13. Holotype: Sannemann, 1955, pl.6, fig.7. **NOW** *Aldridgeisphaera?* *robusta* subsp. *fissa* (Appendix A). Originally *Hystrichosphaeridium robustum* subsp. *fissum*, subsequently *Baltisphaeridium robustum* subsp. *fissum* (combination illegitimate; Appendix A), thirdly *Multiplicisphaeridium robustum* subsp. *fissum* (Appendix A), fourthly (and now) *Aldridgeisphaera?* *robusta* subsp. *fissa* (Appendix A). Age: Devonian (late Givetian).

"subsp. *robustum*". Autonym. Holotype: Sannemann, 1955, pl.6, fig.7. **NOW** *Aldridgeisphaera?* *robusta* subsp. *robusta* (Appendix A). Originally *Hystrichosphaeridium robustum* subsp. *robustum*, subsequently *Multiplicisphaeridium robustum* subsp. *robustum* (Appendix A), thirdly (and now) *Aldridgeisphaera?* *robusta* subsp. *robusta* (Appendix A).

"*rubinum*" Banerjee, 1972, p.135. **Name not validly published:** no description or illustration.

"**rubinum**" Rossignol, 1962, p.134. **Name not validly published**: no illustration. **NOW** *Spiniferites*. Originally *Hystrichosphaeridium* (name not validly published), subsequently *Hystrichosphaera*, thirdly (and now) *Spiniferites*. Age: Quaternary.

?**sahii** Lentin and Williams, 1993, p.331. Holotype: Sah et al., 1970, pl.2, fig.16. Originally *Hystrichosphaeridium robustum* (name illegitimate), subsequently (and now) *Hystrichosphaeridium sahi*. Questionable assignment: Masure and Foucher in Fauconnier and Masure (2004, p.313) as a problematic species. This is the substitute name for *Hystrichosphaeridium robustum* Sah et al., 1970, p.146, pl.2, figs.16–17 (an illegitimate name). Jain (1982, p.52) recommended that this species be restricted to the holotype. Age: Late Cretaceous.

salpingophorum Deflandre, 1935, p.232, pl.9, fig.1 ex Deflandre, 1937b, p.70 (not 80). Emendation: Davey and Williams, 1966b, p.61–62, as *Hystrichosphaeridium salpingophorum*. Holotype: Deflandre, 1935, pl.9, fig.1; Deflandre, 1937b, pl.13 (al pl.10), figs.1,3; Fauconnier and Masure, 2004, pl.46, figs.1–6. Originally *Hystrichosphaera* (name not validly published), subsequently (and now) *Hystrichosphaeridium*. The name *Hystrichosphaera salpingophora* was not validly published in Deflandre (1935) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Senonian.

"**salvadorensis**" Regali et al., 1974, p.290, pl.23, fig.1. Holotype: Regali et al., 1974, pl.23, fig.1. **NOW** *Thalassiphora*. Originally *Hystrichosphaeridium*, subsequently (and now) *Thalassiphora*. Age: Eocene.

"**saturnium**" Maier, 1959, p.319–320, pl.32, fig.8. Holotype: Maier, 1959, pl.32, fig.8; Sarjeant, 1983, pl.4, figs.3–4. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A). **Taxonomic senior synonym**: *Wetzeliella symmetrica*, according to Sarjeant (1983, p.107–108). Age: middle Miocene.

"**scaffoldii**" Baksi, 1962, p.17, pl.2, fig.25. Holotype: Baksi, 1962, pl.2, fig.25. **NOW** *Cannosphaeropsis*?. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly (and now) *Cannosphaeropsis*?. Age: Eocene.

"**scissospinum**" Yun Hyesu, 1981, p.32–33, pl.16, figs.3,7–8,10; text-figs.8a–b. Holotype: Yun Hyesu, 1981, pl.16, fig.10; text-figs.8a–b; Fensome et al., 1991, figs.3–5 — p.731; Fauconnier and Masure, 2004, pl.74, figs.4–6. **NOW** *Surculosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Surculosphaeridium*. Age: early Santonian.

"**scoriaceum**" Raynaud, 1978, p.393, pl.1, figs.4–5. Holotype: Raynaud, 1978, pl.1, fig.4; Fauconnier and Masure, 2004, pl.7, figs.1–2. **NOW** *Systematophora*. Originally *Hystrichosphaeridium*, subsequently (and now) *Systematophora*. Age: Berriasian–mid Valanginian.

semanticum Chibrikova, 1972, p.195–196, pl.16, figs.8–9. Holotype: Chibrikova, 1972, pl.16, fig.8. This is probably an acritarch species. Age: Silurian.

"**seminudum**" Wetzel, 1952, p.405; text-fig.26. Holotype: Wetzel, 1952, text-fig.26. **NOW** *Solisphaeridium*? (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Solisphaeridium*? (Appendix A). Age: Danian.

?**senii** Srivastava and Banerjee, 1969, p.104, pl.1, fig.12. Holotype: Srivastava and Banerjee, 1969, pl.1, fig.12. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Eocene.

?**sergipense** (Regali et al., 1974, p.291, pl.24, fig.1) Lentin and Williams, 1981, p.147. Holotype: Regali et al., 1974, pl.24, fig.1. Originally *Hystrichosphaera*, subsequently (and now) *Hystrichosphaeridium*?. Questionable assignment: Lentin and Williams (1981, p.147); and Masure and Foucher in Fauconnier and Masure (2004, p.313) as a problematic species. Age: early Eocene.

"**setigerfurcatum**" Timofeev, 1959, p.52–53, pl.4, fig.6. Holotype: Timofeev, 1959, pl.4, fig.6. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Archaeohystrichosphaeridium* (combination not validly published; Appendix A). Age: Early Ordovician.

- "*sexradiatum*" Timofeev, 1959, p.53, pl.4, fig.7. Holotype: Timofeev, 1959, pl.4, fig.7. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A). **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Polygonium*) *polygonale* Eisenack, 1931 ex Eisenack, 1938a, an acritarch species, according to Eisenack (1965c, p.261). Age: Early Ordovician.
- "*sheppeyense*" Davey and Williams, 1966b, p.68–69, pl.11, fig.3. Holotype: Davey and Williams, 1966b, pl.11, fig.3; Bujak et al., 1980, pl.2, figs.1–2. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Melitasphaeridium*) *pseudorecurvatum*, according to Stover and Evitt (1978, p.179). Age: early Eocene.
- "*shimizui*" Fuji in Ichikawa et al., 1964, pl.10, fig.1. **Name not validly published:** no description.
- shuangense* Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.71, pl.12, figs.15–17. Holotype: Liu Zhili et al., 1992, pl.12, fig.16. Age: Early Tertiary.
- "*sibiricum*" Timofeev, 1966, p.46–47, pl.9, fig.3. Holotype: Timofeev, 1966, pl.9, fig.3. **NOW** *Peteinosphaeridium?* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Peteinosphaeridium?* (Appendix A). This name was not validly published in Timofeev (1963, fig.1, no.12) since no description was provided. Age: Late Ordovician.
- siluricum* Pöthe de Baldis, 1981, p.243–244, pl.4, fig.2. Holotype: Pöthe de Baldis, 1981, pl.4, fig.2. This is probably an acritarch species. Age: Silurian (Ludlow).
- "*simplex*" (White, 1842, p.38, pl.4, fig.10) Deflandre, 1946a, card 934. Holotype: White, 1842, pl.4, fig.10. **NOW** *Dapsilidinium simplex*. Originally *Xanthidium tubiferum* var. *simplex* (Appendix A), subsequently *Xanthidium simplex* (Appendix A), thirdly *Hystrichosphaeridium simplex*, fourthly *Polysphaeridium? simplex*, fifthly (and now) *Dapsilidinium simplex*. Age: Late Cretaceous.
- "*simplicispinum*" Davey and Williams, 1966b, p.59–60, pl.9, fig.3. Holotype: Davey and Williams, 1966b, pl.9, fig.3. Originally *Hystrichosphaeridium*, subsequently *Kleithriasphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kleithriasphaeridium*) *eoinodes*, according to Below (1982c, p.17). Age: Barremian.
- "*siphoniphorum*" Cookson and Eisenack, 1958, p.44, pl.11, figs.8–10. Emendation: Lucas-Clark, 1984, p.186, as *Litosphaeridium siphoniphorum*. Holotype: Cookson and Eisenack, 1958, pl.11, fig.8; Helby et al., 1987, figs.380–P. **NOW** *Litosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Litosphaeridium*. Age: Albian–Cenomanian.
- "*speciale*" Lentin and Williams, 1981, p.147. Holotype: Merrill, 1895, text-fig.14. Originally *Geodia? irregularis* (Appendix A), subsequently *Hystrichosphaeridium irregulare* (combination illegitimate), thirdly *Hystrichosphaeridium? irregulare* (combination illegitimate), fourthly *Hystrichosphaeridium speciale*. This is the substitute name for *Hystrichosphaeridium? irregulare* (Merrill, 1895, p.16; text-fig.14) Sarjeant, 1964b, p.175 (an illegitimate name). **Taxonomic senior synonym:** *Xanthidium tubiferum* var. *complex* (now *Oligosphaeridium complex*), according to Harker and Sarjeant in Harker et al. (1990, p.59). Age: Early Cretaceous.
- "*spectabile*" Salujha et al., 1973, p.112. **Name not validly published:** no description.
- "*spiciferum*" Deunff, 1955, p.146, pl.3, fig.1; text-fig.26. Holotype: Deunff, 1955, pl.3, fig.1. **NOW** *Stellechinatum* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published; Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly *Evittia Brito* (combination not validly published; Appendix A), fifthly *Multiplicisphaeridium* (Appendix A), sixthly (and now) *Stellechinatum* (Appendix A). Age: Middle Devonian.
- spiculare* Jagielska, 1962a, p.62, pl.5, figs.6a–b. Holotype: Jagielska, 1962a, pl.5, fig.6a. This is probably an acritarch species. Jagielska (1962b, table 2 — p.337) also cited this species as new, but no description was provided. Age: Ordovician (Arenig–Caradoc).

"*spiculatum*" (White, 1844, p.87, pl.9, fig.4) Deflandre, 1937b, p.79. Holotype: White, 1844, pl.9, fig.4. **NOW** *Baltisphaeridium spiculatum* (Appendix A). Originally *Xanthidium tubiferum* var. *spiculatum* (Appendix A), subsequently *Hystrichosphaeridium spiculatum*, thirdly (and now) *Baltisphaeridium spiculatum* (Appendix A). Age: Late Cretaceous.

"*spinescens*" Timofeev, 1959, p.56, pl.4, fig.23. Holotype: Timofeev, 1959, pl.4, fig.23. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

?*spinipansatum* (Merrill, 1895, p.17; text-fig.20) Sarjeant, 1964b, p.175. Holotype: Merrill, 1895, text-fig.20. Originally *Geodia*? (Appendix A), subsequently *Hystrichosphaeridium*, thirdly (and now) *Hystrichosphaeridium*?. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Early Cretaceous.

"*spinosum*" (White, 1842, p.37, pl.4, fig.6) Lejeune-Carpentier, 1941, p.B76. Holotype: White, 1842, pl.4, fig.6; lost according to Sarjeant (1966b, p.141). **NOW** *Exochosphaeridium*?. Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Cordosphaeridium* (combination not validly published), fifthly *Exochosphaeridium*, sixthly (and now) *Exochosphaeridium*?. Age: Late Cretaceous.

"var. *deflandrei*" Lejeune-Carpentier, 1941, p.B84, fig.6. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.14, as *Fibrocysta? deflandrei*. Holotype: Lejeune-Carpentier, 1941, fig.6; Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.5–6; text-fig.8. **NOW** *Fibrocysta? deflandrei*. Originally *Hystrichosphaeridium spinosum* var. *deflandrei*, subsequently *Baltisphaeridium spinosum* var. *deflandrei* (Appendix A), thirdly *Cordosphaeridium spinosum* var. *deflandrei* (combination not validly published), fourthly *Exochosphaeridium spinosum* var. *deflandrei*, fifthly *Exochosphaeridium spinosum* subsp. *deflandrei*, sixthly *Exochosphaeridium? spinosum* subsp. *deflandrei*, seventhly (and now) *Fibrocysta? deflandrei*. Age: Late Cretaceous.

"var. *spinosum*". Autonym. Holotype: White, 1842, pl.4, fig.6. **Now redundant**. Originally *Hystrichosphaeridium spinosum* var. *spinosum*, subsequently *Baltisphaeridium spinosum* var. *spinosum* (Appendix A), thirdly *Exochosphaeridium spinosum* var. *spinosum*.

"*spiralisetum*" de Wit, 1943, p.383; text-figs.2,11. Holotype: de Wit, 1943, text-figs.2,11, lost according to de Wit (personal communication to GLW). **NOW** *Impletosphaeridium*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*?, fourthly (and now) *Impletosphaeridium*?. Age: Late Cretaceous.

"*staurasteroides*" Deflandre, 1945a, p.63–64, pl.2, figs.7–9. Emendation: Stancliffe and Sarjeant, 1994, p.234, as *Veryhachium staurasteroides*. Holotype: Deflandre, 1945a, pl.2, fig.7. **NOW** *Veryhachium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Veryhachium* (Appendix A). This name was not validly published in Deflandre (1942, fig.10 — p.476). Age: Middle Silurian.

"*stellaeforme*" Timofeev, 1959, p.57, pl.4, fig.26. Holotype: Timofeev, 1959, pl.4, fig.26. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"?*stellatum*" Maier, 1959, p.320–321, pl.33, figs.3–4. Holotype: Maier, 1959, pl.33, fig.3; Sarjeant, 1983, pl.7, figs.1–2. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium*?, thirdly (and now) *Florentinia*, fourthly *Hystrichokolpoma*. Taxonomic senior synonym: *Hystrichokolpoma rigaudiae*, according to Sarjeant (1983, p.104) — however, Srivastava (1995, p.306) retained *Hystrichosphaeridium*? (as and now *Florentinia*) *stellatum*. Questionable assignment: Stover and Evitt (1978, p.56). Age: middle Oligocene–middle Miocene.

"?*stephanophorum*" Benedek, 1972, p.30–31, pl.9, fig.6; text-fig.10. Emendation: Benedek and Sarjeant, 1981, p.349–350, as *Araneosphaera stephanophora*. Holotype: Benedek, 1972, pl.9, fig.6. **NOW** *Araneosphaera*.

Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Araneosphaera*. Questionable assignment: Stover and Evitt (1978, p.56). Age: middle-late Oligocene.

"*stimuliferum*" Deflandre, 1939a, p.192, pl.10, fig.10. Holotype: Deflandre, 1939a, pl.10, fig.10. **NOW** *Solisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Solisphaeridium* (Appendix A), fourthly *Filisphaeridium* (combination not validly published; Appendix A), fifthly *Micrhystridium* (Appendix A). Age: Late Jurassic.

"*striatoconum*" Deflandre and Cookson, 1955, p.275, pl.2, fig.10; text-fig.36. Holotype: Deflandre and Cookson, 1955, text-fig.36. **NOW** *Conosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Litosphaeridium?*, fourthly (and now) *Conosphaeridium*. This name was not validly published in Deflandre and Cookson (1954, p.1236), who did not provide a description. Age: middle Senonian.

"*striolatum*" Deflandre, 1937b, p.72, pl.15 (al. pl.12), figs.1–2. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.1. **NOW** *Coronifera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium*, fourthly (and now) *Coronifera*. Age: Late Cretaceous.

"*stylhetii*" Baksi, 1962, p.17, fig.26. Holotype: Baksi, 1962, fig.26. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Eocene.

"*tenuicapillata*" Wetzel, 1933b, p.42, pl.4, figs.20–22 ex Deflandre, 1937b, p.78. Holotype: Wetzel, 1933b, pl.4, fig.20. **NOW** *Areoligera*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly (and now) *Areoligera*. The name *Hystrichosphaera tenuicapillata* was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Senonian.

tenuitubatum Marheinecke, 1992, p.61–62, pl.11, figs.10–11. Holotype: Marheinecke, 1986, pl.17, figs.5–6, as *Hystrichosphaeridium* sp.; Marheinecke, 1992, pl.11, figs.10–11; Fauconnier and Masure, 2004, pl.45, figs.4–5. Contrary to the opinion of Lentin and Williams (1993, p.334), Williams et al. (1998, p.316) considered this name to be validly published. Age: early Maastrichtian.

"*tiara*" Klumpp, 1953, p.390–391, pl.17, figs.8–10. Holotype: Klumpp, 1953, pl.17, figs.8–9. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium*, fourthly *Cleistosphaeridium*, fifthly (and now) *Operculodinium*. N.I.A. Age: Eocene.

"*toryna*" Cookson and Eisenack, 1960b, p.252, pl.38, figs.6,15. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.15. **NOW** *Egmontodinium*. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium?*, thirdly *Tanyosphaeridium*, fourthly (and now) *Egmontodinium*. N.I.A. Age: Tithonian–Neocomian.

"*toyetae*" (Cramer, 1964, p.302, pl.1, figs.14–15; text-fig.22, nos.7,7a) Lardeux, 1976, p.75. Holotype: Cramer, 1964, pl.1, fig.15. **NOW** *Florisphaeridium* (Appendix A). Originally *Baltisphaeridium* (Appendix A), subsequently *Multiplicisphaeridium?* (Appendix A), thirdly *Hystrichosphaeridium*, fourthly (and now) *Florisphaeridium* (Appendix A). Age: Devonian (middle Siegenian–Emsian).

"*transculentum*" Sah et al., 1970, p.147, pl.2, figs.18–19. Holotype: Sah et al., 1970, pl.2, fig.18. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Achomosphaera*. Questionable assignment: Stover and Evitt (1978, p.56) as a problematic species. Age: Late Cretaceous.

"*tribrachiosum*" Tasch in Tasch et al., 1964, p.195, pl.1, fig.3. Holotype: Tasch et al., 1964, pl.1, fig.3. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albian.

"*tridactylites*" Valensi, 1955a, p.37–38, fig.1D. Holotype: Valensi, 1955a, fig.1D. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma* (combination not validly published), fourthly *Achomosphaera*, fifthly *Silicisphaera*, sixthly (and now) *Florentinia*. Age: Cretaceous.

"*trifurcatum*" Eisenack, 1931, p.112, pl.4, figs.21–23 ex Eisenack, 1938a, p.12,16–19. Holotype: Eisenack, 1931, pl.4, fig.21, as *Ovum hispidum* subsp. *trifurcatum* (Appendix A); Eisenack, 1938a, pl.2, fig.2, lost according to Eisenack (1959, p.202). Neotype: Eisenack, 1959, pl.17, fig.3, designated by Eisenack (1959, p.202). **NOW** *Peteinosphaeridium trifurcatum* (Appendix A). Originally *Ovum hispidum* subsp. *trifurcatum* (combination not validly published; Appendix A), subsequently *Hystrichosphaeridium trifurcatum*, thirdly *Baltisphaeridium trifurcatum* (Appendix A), fourthly (and now) *Peteinosphaeridium trifurcatum* (Appendix A). Taxonomic junior synonyms: *Peteinosphaeridium bergstroemii* Staplin et al., 1965, an acritarch species, according to Eisenack (1969b, p.254–255); *Baltisphaeridium trifurcatum* subsp. *breviradiatum* (subsequently *Peteinosphaeridium breviradiatum*), by implication in Eisenack (1969a, p.255), who considered *Baltisphaeridium trifurcatum* subsp. *breviradiatum* to have priority over *Baltisphaeridium trifurcatum* subsp. *trifurcatum*. The name *Ovum hispidum* subsp. *trifurcatum* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Ordovician (erratic).

"subsp. *consonum*" Sannemann, 1955, p.332, pl.5, fig.7. Holotype: Sannemann, 1955, pl.5, fig.7. **NOW** *Multiplicisphaeridium consonum* (Appendix A). Originally *Hystrichosphaeridium trifurcatum* subsp. *consonum*, subsequently *Baltisphaeridium trifurcatum* subsp. *consonum* (Appendix A), thirdly (and now) *Multiplicisphaeridium consonum* (Appendix A). Age: Devonian (late Givetian).

"subsp. *procerum*" Sannemann, 1955, p.332, pl.5, fig.8; text-fig.18. Holotype: Sannemann, 1955, pl.5, fig.8. **NOW** *Multiplicisphaeridium procerum* (Appendix A). Originally *Hystrichosphaeridium trifurcatum* subsp. *procerum*, subsequently *Baltisphaeridium trifurcatum* subsp. *procerum* (Appendix A), thirdly (and now) *Multiplicisphaeridium procerum* (Appendix A). Age: Devonian (late Givetian).

"subsp. *trifurcatum*". Autonym. Holotype: Eisenack, 1931, pl.4, fig.21, as *Ovum hispidum* subsp. *trifurcatum* (Appendix A); Eisenack, 1938a, pl.2, fig.2, lost according to Eisenack (1959, p.202). Neotype: Eisenack, 1959, pl.17, fig.3, designated by Eisenack (1959, p.202). **NOW** *Peteinosphaeridium trifurcatum* subsp. *trifurcatum* (Appendix A). Originally *Hystrichosphaeridium trifurcatum* subsp. *trifurcatum*, subsequently *Baltisphaeridium trifurcatum* subsp. *trifurcatum* (Appendix A), thirdly (and now) *Peteinosphaeridium trifurcatum* subsp. *trifurcatum* (Appendix A).

"*triplicativum*" Timofeev, 1959, p.55, pl.4, fig.16. Holotype: Timofeev, 1959, pl.4, fig.16. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

"*triradicosum*" Tasch in Tasch et al., 1964, p.194, pl.2, figs.4,14. Holotype: Tasch et al., 1964, pl.2, figs.4,14. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albanian.

trispiculare Jagielska, 1962a, p.62, pl.5, fig.5. Holotype: Jagielska, 1962a, pl.5, fig.5. This is probably an acritarch species. Age: Ordovician (Arenig–Caradoc).

"*trispinosum*" Eisenack, 1938a, p.14,16; text-figs.2–3. Emendation: Stancliffe and Sarjeant, 1994, p.233, as *Veryhachium trispinosum*. Holotype: Eisenack, 1938a, text-fig.2, lost according to Eisenack et al. (1979, p.499). Neotype: Deunff, 1980, pl.1, fig.7, designated by Stancliffe and Sarjeant (1994, p.233). **NOW** *Veryhachium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Veryhachium* (Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly *Micrhystridium* (combination not validly published; Appendix A). Taxonomic junior synonyms: *Veryhachium cucruse* Timofeev, 1962, an acritarch species, according to Martin (1969, p.106) and *Veryhachium arctatum* Deunff, 1981, *Veryhachium concavum* Piskun, 1974a, *Veryhachium edenense* Colbath, 1979, *Veryhachium microgranuliferum* Piskun, 1974a and *Hystrichosphaeridium* (subsequently *Veryhachium*) *trisulcum*, all acritarch species, and all according to Stancliffe and Sarjeant (1994, p.233). Age: Silurian (erratic).

"*trisolcum*" Deunff, 1951, p.323, caption to text-fig.3. **Name not validly published**: no description. Originally *Hystrichosphaeridium trisolcum* (name not validly published), subsequently *Veryhachium trisolcum* (name not validly published, Appendix A), thirdly *Veryhachium trisolcum* (Appendix A), fourthly *Veryhachium trispinosum* subsp. *trisolcum* (combination not validly published; Appendix A). **Taxonomic senior synonym**: *Hystrichosphaeridium* (now *Veryhachium*) *trispinosum*, according to Stancliffe and Sarjeant (1994, p.233). Age: Middle Ordovician.

"*truncigerum*" Deflandre, 1937b, p.71–72, pl.13 (al. pl.10), figs.6–7. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. **NOW** *Raetiaedinium*. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium?*, seventhly *Florentinia*, eighthly *Pervosphaeridium?*, ninthly (and now) *Raetiaedinium*. Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes*, by implication in Yun Hyesu (1981, p.27), who considered *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior synonym — however, Lentin and Williams (1985, p.282) retained *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

truswelliae Wrenn and Hart, 1988, p.355, fig.25, nos.1–4, fig.39, no.1. Holotype: Wrenn and Hart, 1988, fig.25, nos.1–3. Age: early Eocene.

"*tshunense*" Timofeev, 1962 — caption to pl.11, fig.1. Holotype: Timofeev, 1962 pl.11, fig.1. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Middle Ordovician.

"*tuberatum*" Downie, 1958, p.338, pl.17, fig.3; text-fig.3f. Holotype: Downie, 1958, pl.17, fig.3. **NOW** *Acanthodiacrodium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Acanthodiacrodium* (Appendix A), fourthly *Vulcanisphaera* (Appendix A), fifthly *Goniosphaeridium* (Appendix A). Age: Early Ordovician.

"*tuberosum*" Sannemann, 1955, p.345, pl.4, fig.17; text-fig.16. Holotype: Sannemann, 1955, pl.4, fig.17. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Devonian (late Givetian).

**tubiferum* (Ehrenberg, 1837b, pl.1, fig.16) Deflandre, 1937b, p.68. Emendation: Davey and Williams, 1966b, p.56–58, as *Hystrichosphaeridium tubiferum*. Holotype: Ehrenberg, 1837b, pl.1, fig.16. Originally *Xanthidium tubiferum* (Appendix A), subsequently *Hystrichosphaera tubifera* (combination not validly published), thirdly (and now) *Hystrichosphaeridium tubiferum*, fourthly *Ovum hispidum* subsp. *tubiferum* (combination not validly published; Appendix A). Taxonomic junior synonym: *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1989, p.134) retained *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous?.

subsp. *brevispinum* (Davey and Williams, 1966b, p.58, pl.10, fig.10) Lentin and Williams, 1973, p.80. Emendation: Marheinecke, 1992, p.61, as *Hystrichosphaeridium proprium* subsp. *brevispinum*. Holotype: Davey and Williams, 1966b, pl.10, fig.10; Bujak et al., 1980, pl.8, figs.10–12; Fauconnier and Masure, 2004, pl.47, figs.1–4. Originally *Hystrichosphaeridium tubiferum* var. *brevispinum*, subsequently (and now) *Hystrichosphaeridium tubiferum* subsp. *brevispinum*, thirdly *Hystrichosphaeridium proprium* subsp. *brevispinum*. Lentin and Williams (1993, p.336) retained this taxon as a subspecies of *Hystrichosphaeridium tubiferum*. Taxonomic senior synonym: *Micrhystridium* (as *Dapsilidium?*, now *Litosphaeridium*) *fucosum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.190) retained *Hystrichosphaeridium tubiferum* subsp. *brevispinum*. Age: early Eocene.

"var. *brevispinum*" Davey and Williams, 1966b, p.58, pl.10, fig.10. Emendation: Marheinecke, 1992, p.61, as *Hystrichosphaeridium proprium* subsp. *brevispinum*. Holotype: Davey and Williams, 1966b, pl.10, fig.10; Bujak et al., 1980, pl.8, figs.10–12; Fauconnier and Masure, 2004, pl.47, figs.1–4. **NOW** *Hystrichosphaeridium tubiferum* subsp. *brevispinum*. Originally *Hystrichosphaeridium tubiferum* var.

brevispinum, subsequently (and now) *Hystrichosphaeridium tubiferum* subsp. *brevispinum*, thirdly *Hystrichosphaeridium proprium* subsp. *brevispinum*. Taxonomic senior synonym: *Micrhystridium* (as *Dapsilidinium?*, now *Litosphaeridium*) *fucosum*, according to Below (1982c, p.29) — however, Lentin and Williams (1993, p.336) retained *Hystrichosphaeridium tubiferum* subsp. *brevispinum*. Age: early Eocene.

subsp. *ovale* Marheinecke, 1992, p.59–60, pl.10, figs.11,13–14. Holotype: Marheinecke, 1986, pl.6, figs.2–3, as *Hystrichosphaeridium tubiferum*; Marheinecke, 1992, pl.10, figs.13–14; Fauconnier and Masure, 2004, pl.47, figs.8–10. Contrary to the opinion of Lentin and Williams (1993, p.337), Williams et al. (1998, p.318) considered this name to be validly published. Age: early Maastrichtian.

subsp. *tubiferum*. Autonym. Holotype: Ehrenberg, 1837b, pl.1, fig.16.

"var. *tubiferum*". Autonym. Holotype: Ehrenberg, 1837b, pl.1, fig.16. **Now redundant.**

"*ukaiense*" Fuji in Ichikawa et al., 1964, pl.10, fig.2. **Name not validly published:** no description.

"*unituberculatum*" Tasch in Tasch et al., 1964, p.194, pl.3, fig.8. Holotype: Tasch et al., 1964, pl.3, fig.8; Eisenack and Kjellström, 1972, p.713; Fensome et al., 1995, fig.1 — p.1861. **NOW** *Kiokansium*. Originally *Hystrichosphaeridium*, subsequently *Kiokansium*. Taxonomic junior synonyms (at specific rank): *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*), by implication in Duxbury (1983, p.49), who considered *Kiokansium polypes* to be the senior name; *Hystrichosphaeridium aruncium*, *Hystrichosphaeridium eccentricum*, *Hystrichosphaeridium entomium*, *Hystrichosphaeridium fabium*, *Hystrichosphaeridium follium*, *Hystrichosphaeridium kiowanum*, *Hystrichosphaeridium magnarmatum*, *Hystrichosphaeridium marsupium*, *Hystrichosphaeridium perovatum*, *Hystrichosphaeridium protellipticum*, *Hystrichosphaeridium replexum*, *Hystrichosphaeridium tribrachiosum*, *Hystrichosphaeridium triradicosum*, and *Hystrichosphaeridium valgum*, all according to Stover and Evitt (1978, p.267). Age: Albanian.

"*valgum*" Tasch in Tasch et al., 1964, p.192–193, pl.2, fig.10. Holotype: Tasch et al., 1964, pl.2, fig.10.

Taxonomic senior synonym: *Hystrichosphaeridium* (now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.267). Age: Albanian.

"*vasiformum*" Neale and Sarjeant, 1962, p.452, pl.20, fig.1; text-fig.8b. Holotype: Neale and Sarjeant, 1962, pl.20, fig.1; text-fig.8b; Fauconnier and Masure, 2004, pl.62, fig.4. **NOW** *Oligosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium?*) *asterigerum*, according to Duxbury (1977, p.45) — however, McIntyre and Brideaux (1980, p.21) retained *Hystrichosphaeridium* (as *Oligosphaeridium*) *vasiforme*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium*) *macrotubulum*, according to McIntyre and Brideaux (1980, p.21). Age: middle Hauterivian–early Eocene.

"*veliferum*" Downie, 1958, p.340, pl.17, fig.2. Holotype: Downie, 1958, pl.17, fig.2. **NOW** *Cymatiogalea* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Cymatiogalea* (Appendix A). Age: Ordovician (Tremadoc).

"*venustum*" Sannemann, 1955, p.345, pl.5, fig.11; text-fig.15. Holotype: Sannemann, 1955, pl.5, fig.11. **NOW** *Hapsidopalla* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Hapsidopalla* (Appendix A). Age: Devonian (late Givetian).

?*verbinense* Courteville in Deflandre, 1946a, card 945. Holotype: Courteville in Deflandre, 1946a, card 945. Originally *Hystrichosphaeridium*, subsequently (and now) *Hystrichosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.57) as a problematic species. Age: Late Cretaceous.

"*vestitum*" Deflandre, 1939a, p.189, pl.11, figs.4–6. Emendation: Sarjeant, 1960b, p.397, as *Baltisphaeridium vestitum*. Holotype: Deflandre, 1939a, pl.11, fig.5; Fauconnier and Masure, 2004, pl.74, figs.11–12. **NOW** *Surculosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Surculosphaeridium*, fourthly (and now) *Surculosphaeridium?*, fifthly *Multiplicisphaeridium?* (Appendix A), sixthly

Systematophora. Taxonomic junior synonym: *Polystephanosphaera valensii*, according to Courtinat (1989, p.173) — however, Stancliffe and Sarjeant (1990, p.209) retained *Polystephanosphaera* (as and now *Systematophora*) *valensii*. Age: Oxfordian.

viticulosum Andreeva, 1966, p.131–132, pl.21, fig.1. Holotype: Andreeva, 1966, pl.21, fig.1. This is probably an acritarch species. Age: Middle Ordovician.

vitile Andreeva, 1966, p.132, pl.23, fig.1. Holotype: Andreeva, 1966, pl.23, fig.1. This is probably an acritarch species. Age: Middle Ordovician.

"westii" Deflandre in West, 1961, p.452. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Operculodinium*) *israelianum*, according to Wall and Dale (1968a, p.315, as hystrichosphere type "x" of West). Head (1998a, p.216) considered this to be equivalent to the "*Operculodinium centrocarpum/israelianum* complex". Age: early Pleistocene.

"whitei" Deflandre and Courteville, 1939, p.103, pl.3, figs.5–6. Emendation: Monteil, 1991a, p.444, as *Cometodinium? whitei*. Holotype: Deflandre and Courteville, 1939, pl.3, fig.5, lost according to Monteil (1991a, p.439). Neotype: Monteil, 1991a, pl.2, figs.1a–c; pl.3, fig.9, designated by Monteil (1991a, p.444); Fauconnier and Masure, 2004, pl.16, figs.7–8. **NOW** *Cometodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Comasphaeridium* (Appendix A), fifthly *Cometodinium?*, sixthly (and now) *Cometodinium*. Age: Senonian.

"williereae" Martin, 1966a, p.389–391, pl.1, fig.23; text-figs.33–34. Holotype: Martin, 1966a, pl.1, fig.23. **NOW** *Dilatisphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Dilatisphaera* (combination not validly published; Appendix A), thirdly *Palaeohystrichosphaeridium* (Appendix A), fourthly (and now) *Dilatisphaera*. Taxonomic junior synonym: *Ozotobrachion? podolicus* Sheshegova, 1973, an acritarch species, according to Kiryanov (1978, p.90). Age: Silurian (Llandovery).

"wimanii" Eisenack, 1968, p.92, pl.24, figs.1–3. Holotype: Eisenack, 1968, pl.24, fig.2. **NOW** *Palaeohystrichosphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Palaeohystrichosphaeridium* (Appendix A). Age: Silurian (Llandovery).

"?xanthiopyxides" Wetzel, 1933b, p.44–45; pl.4, fig.25 ex Deflandre, 1937b, p.77. Emendations: Morgenroth, 1968, p.556, as *Hystrichosphaeridium? xanthiopyxides*; Sarjeant, 1985b, p.142–144, as *Tanyosphaeridium xanthiopyxides*. Holotype: Wetzel, 1933b, pl.4, fig.25, Morgenroth, 1968, pl.48, fig.5; Sarjeant, 1985b, pl.3, figs.2–3; Dietz et al., 1999, fig.10, no.8. **NOW** *Tanyosphaeridium*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Baltisphaeridium* (Appendix A), fifthly *Prolixosphaeridium?*, sixthly (and now) *Tanyosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Tanyosphaeridium*) *magdali*, according to Stover and Evitt (1978, p.85). Questionable assignment: Morgenroth (1968, p.556). This name was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous (?Maastrichtian, according to Sarjeant, 1985b, p.143).

"var. **granulosum**" Deflandre, 1937b, p.77, pl.16 (al. pl.13), fig.4. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.4; Fauconnier and Masure, 2004, pl.66, fig.4. **NOW** *Prolixosphaeridium granulosum*. Originally *Hystrichosphaeridium xanthiopyxides* var. *granulosum*, subsequently *Baltisphaeridium xanthiopyxides* var. *granulosum* (combination not validly published; Appendix A), thirdly *Baltisphaeridium granulosum* (Appendix A), fourthly (and now) *Prolixosphaeridium granulosum*. Taxonomic junior synonyms (at specific rank): *Baltisphaeridium pilosum* var. *longispinosum* (as *Tenua pilosa* subsp. *longispinosa*), according to Sarjeant (1976c, p.19) — however, Erkmen and Sarjeant (1980, p.64–65) considered *Baltisphaeridium pilosum* var. *longispinosum* to be a taxonomic junior synonym (at specific rank) of *Prolixosphaeridium anasillum*, not of *Hystrichosphaeridium xanthiopyxides* var. *granulosum* (as *Prolixosphaeridium granulosum*); *Prolixosphaeridium anasillum*, according to Lentin and Williams (1993, p.539) — however, this synonymy was based on a mis-reading of Erkmen and Sarjeant (1980). Age: Senonian.

"var. *parvispinum*" Deflandre, 1937b, p.77, pl.16 (al. pl.13), fig.5. Holotype: pl.16 (al. pl.13), fig.5; Fauconnier and Masure, 2004, pl.66, figs.5–6. **NOW** *Prolixosphaeridium parvispinum*. Originally *Hystrichosphaeridium? xanthiopyxides* var. *parvispinum*, subsequently *Hystrichosphaeridium parvispinum*, thirdly *Baltisphaeridium parvispinum* (Appendix A), fourthly (and now) *Prolixosphaeridium parvispinum*. Taxonomic junior synonyms (at specific and varietal ranks): *Prolixosphaeridium elongatum*, according to Lentin and Williams (1985, p.294); *Prolixosphaeridium deirense*, according to Davey and Verdier (1974, p.636–637) — however, Harding (1990b, p.46) retained *Prolixosphaeridium deirense*. Age: late Aptian.

"var. *xanthiopyxides*". Autonym. Holotype: Wetzel, 1933b, pl.4, fig.25; Morgenroth, 1968, pl.48, fig.5; Sarjeant, 1985b, pl.3, figs.2–3. **Now redundant.**

"*xipheum*" (Maier, 1959, p.309, pl.30, fig.5) Sarjeant, 1964b, p.176. Holotype: Maier, 1959, pl.30, fig.5. Originally *Galea* (generic name illegitimate), subsequently *Hystrichosphaeridium*, thirdly *Hystrichokolpoma?*. **Taxonomic senior synonym:** *Hystrichokolpoma rigaudiae*, according to Sarjeant (1983, p.104). Age: middle Miocene.

"*zoharyi*" Rossignol, 1962, p.132, pl.2, fig.10. Holotype: Rossignol, 1962, pl.2, fig.10. **NOW** *Polysphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?* (combination not validly published), thirdly *Hemicystodinium*, fourthly (and now) *Polysphaeridium*. Taxonomic junior synonyms: *Polysphaeridium subtile*, according to Islam (1983b, p.343) — however, Lentin and Williams (1989, p.300) retained *Polysphaeridium subtile*; *Tenua* (as *Hemicystodinium?*) *taugourdeau*, according to Lentin and Williams (1981, p.26,127) — however, *Tenua taugourdeau* is now considered a taxonomic junior synonym of *Polysphaeridium subtile*; *Membranilarnacia delicata*, according to Jain and Garg (1991, p.82). Motile equivalents: *Pyrodinium bahamense* Plate, 1906, according to Wall and Dale (1969, p.140); *Pyrodinium bahamense* forma *compressum* Böhm, 1931, according to Matsuoka (1989, p.220). Age: Pleistocene.

"var. *ktana*" Rossignol, 1964, p.88, pl.2, figs.6–7,10; pl.3, fig.11. Holotype: Rossignol, 1964, pl.2, fig.7. **NOW** *Polysphaeridium zoharyi* subsp. *ktana*. Originally *Hystrichosphaeridium zoharyi* var. *ktana*, subsequently *Hemicystodinium zoharyi* var. *ktana* (combination not validly published), thirdly *Hemicystodinium zoharyi* subsp. *ktana*, fourthly (and now) *Polysphaeridium zoharyi* subsp. *ktana*, fifthly *Polysphaeridium subtile* subsp. *ktana*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium? breviatum*, according to Islam (1983b, p.343) — however, Masure and Foucher in Fauconnier and Masure (2004, p.309–310) retained *Hystrichosphaeridium? breviatum*. Age: Pleistocene.

"var. *zoharyi*". Autonym. Holotype: Rossignol, 1962, pl.2, fig.10. **Now redundant.**

"*zonale*" Timofeev, 1959, p.55, pl.4, fig.19. Holotype: Timofeev, 1959, pl.4, fig.19. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A). Age: Early Ordovician.

HYSTRICHOSPHAERINA Alberti, 1961, p.38. Emendation: Stancliffe and Sarjeant, 1990, p.204. Taxonomic senior synonym: *Systematophora*, by implication in Downie and Sarjeant (1965, p.146) who transferred the "type species" of *Hystrichosphaerina*, *Hystrichosphaerina schindewolfii*, to *Systematophora* — however, Stover and Evitt (1978, p.57–58) and Stancliffe and Sarjeant (1990, p.204) retained *Hystrichosphaerina*. Taxonomic junior synonym: *Polystephanephorus*, according to Duxbury (1980, p.125–126) — however, Lentin and Williams (1981, p.232) retained *Polystephanephorus*. Type: Alberti, 1961, pl.10, figs.2–3, as *Hystrichosphaerina schindewolfii*.

"*anthophora*" (Cookson and Eisenack, 1958, p.43, pl.11, figs.12–13; text-figs.16–18) Duxbury, 1980, p.126. Holotype: Cookson and Eisenack, 1958, pl.11, fig.12. **NOW** *Stiphrosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly *Polystephanephorus*, fourthly *Hystrichosphaerina*, fifthly (and now) *Stiphrosphaeridium*. Taxonomic junior synonym: *Hystrichosphaerina schindewolfii*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Hystrichosphaerina schindewolfii*. Age: Aptian–Albian.

"*calatha*" (Sarjeant, 1961a, p.104, pl.14, fig.7; text-fig.7) Duxbury, 1980, p.126. Emendation: Stancliffe and Sarjeant, 1990, p.205, as *Polystephanephorus calathus*. Holotype: Sarjeant, 1961a, pl.14, fig.7; text-fig.7; Stancliffe

and Sarjeant, 1990, pl.2, figs.1,4; text-fig.1. **NOW** *Polystephanephorus*. Originally *Polystephanosphaera*, subsequently (and now) *Polystephanephorus*, thirdly *Hystrichosphaerina*. Age: early Oxfordian.

crusta Dodekova, 1992, p.43, pl.3, figs.1–3,6,9. Holotype: Dodekova, 1992, pl.3, figs.1–3. Age: early–late Kimmeridgian.

"**exilimura**" (Davey and Williams, 1966b, p.87, pl.11, fig.2) Sarjeant, 1981, p.122. Holotype: Davey and Williams, 1966b, pl.11, fig.2; Bujak et al., 1980, pl.7, figs.4–5. Originally *Cordosphaeridium*, subsequently *Hystrichosphaerina*?, thirdly *Tityrosphaeridium*?. Questionable assignment: Sarjeant (1981, p.122). **Taxonomic senior synonym:** *Cordosphaeridium fibrospinosum*, according to Fensome et al. (2009, p.23). Taxonomic junior synonym: *Achomosphaera* (subsequently *Cordosphaeridium*) *valianta*, according to Jain (1982, p.52). Age: early Eocene.

neuquina Quattrocchio and Volkheimer, 1983, p.40,42, pl.B, figs.11–12; pl.G, figs.37–40. Emendation: Quattrocchio and Sarjeant, 1992, p.77 (al. 2–229). Holotype: Quattrocchio and Volkheimer, 1983, pl.B, fig.11; pl.G, figs.37–38. Age: Late Jurassic.

?**orbifera** (Klement, 1960, p.66–67, pl.9, figs.9–10; pl.10, fig.7) Stover and Evitt, 1978, p.58. Holotype: Klement, 1960, pl.9, fig.9; Stancliffe and Sarjeant, 1990, pl.5, fig.2; Fauconnier and Masure, 2004, pl.48, figs.1–2. Originally *Systematophora*, subsequently *Hystrichosphaerina*, thirdly (and now) *Hystrichosphaerina*?. Questionable assignment: Courtinat in Fauconnier and Masure (2004, p.333–334). Age: middle Oxfordian.

"**paracalatha**" (Sarjeant, 1960a, p.143–144, pl.6, fig.4; text-fig.3b) Duxbury, 1980, p.126. Emendation: Stancliffe and Sarjeant, 1990, p.206, as *Polystephanephorus paracalathus*. Holotype: Sarjeant, 1960a, pl.6, fig.4; text-fig.3b; Stancliffe and Sarjeant, 1990, pl.2, figs.2,3,5; text-fig.2. **NOW** *Polystephanephorus*. Originally *Polystephanosphaera*, subsequently (and now) *Polystephanephorus*, thirdly *Hystrichosphaerina*. Age: middle Callovian.

"**sarjeantii**" (Gitmez, 1970, p.291–292, pl.11, fig.4; text-fig.25) Duxbury, 1980, p.126. Holotype: Gitmez, 1970, pl.11, fig.4; text-fig.25; Fauconnier and Masure, 2004, pl.26, fig.7. **NOW** *Emmetrocyta*. Originally *Polystephanephorus*, subsequently (and now) *Emmetrocyta*, thirdly *Hystrichosphaerina*, fourthly *Stiphrosphaeridium*. Age: early Kimmeridgian.

***schindewolfii** Alberti, 1961, p.38–39, pl.10, figs.1–3,6–7. Holotype: Alberti, 1961, pl.10, figs.2–3; Eisenack and Kjellström, 1972, p.1009; Fensome et al., 1995, figs.2–3 — p.1765. Originally (and now) *Hystrichosphaerina*, subsequently *Systematophora*, thirdly *Polystephanephorus*. Lentin and Williams (1985, p.191) retained this species in *Hystrichosphaerina*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium*) *anthophorum*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Hystrichosphaerina schindewolfii*. Taxonomic junior synonym: *Perisseiasphaeridium eisenackii*, according to Davey and Verdier (1974, p.640). Age: late Barremian–Turonian.

turonica Alberti, 1961, p.39, pl.10, figs.4a–b. Holotype: Alberti, 1961, pl.10, figs.4a–b. Originally (and now) *Hystrichosphaerina*, subsequently *Systematophora*, thirdly *Polystephanephorus*. Stancliffe and Sarjeant (1990, p.204) retained this species in *Hystrichosphaerina*. Age: Turonian.

varians (May, 1980, p.68–69, pl.7, figs.12–16) Lentin and Williams, 1981, p.150. Holotype: May, 1980, pl.7, figs.12–14. Originally *Systematophora*, subsequently (and now) *Hystrichosphaerina*. Age: Campanian.

?**varispinosa** (Brenner, 1988, p.87–88, pl.16, figs.2a–c,5a–b) Stancliffe and Sarjeant, 1990, p.204. Holotype: Brenner, 1988, pl.16, figs.2a–c. Originally *Systematophora*, subsequently (and now) *Hystrichosphaerina*?. Questionable assignment: Stancliffe and Sarjeant (1990, p.204); and Courtinat in Fauconnier and Masure (2004, p.334) as a problematic species. Age: Oxfordian–early Kimmeridgian.

HYSTRICHOSPHAEROPSIS Deflandre, 1935, p.232. Emendations: Sarjeant, 1966b, p.138; Gocht, 1976, p.331–333; Sarjeant, 1982b, p.47. Originally (and now) *Hystrichosphaeropsis*, subsequently *Hystrichosphaera* subgenus

Hystrichosphaeropsis. Eisenack (1963c, p.118) retained *Hystrichosphaeropsis* at generic rank. Taxonomic senior synonym: *Triblastula*, according to Yun Hyesu (1981, p.22) — however, Jan du Chêne et al. (1986a, p.158) retained *Hystrichosphaeropsis*. Taxonomic junior synonym: *Rottnestia*, according to Sarjeant (1966b, p.139) — however, Jan du Chêne et al. (1986a, p.309) retained *Rottnestia*. Type: Deflandre, 1935, pl.8, fig.11, as *Hystrichosphaeropsis ovum*.

arctica Matsuoka and Bujak, 1988, p.47–48, pl.5, figs.1a–b,2a–b,3,4a–b. Holotype: Matsuoka and Bujak, 1988, pl.5, figs.1a–b. Age: late Miocene.

"*borussica*" (Eisenack, 1954b, p.62, pl.9, figs.5a–b,6–7) Sarjeant, 1966b, p.139. Holotype: Eisenack, 1954b, pl.9, fig.5a–b. **Combination not validly published:** basionym not fully referenced. **NOW** *Rottnestia*. Originally *Hystrichosphaera*, subsequently (and now) *Rottnestia*, thirdly *Triblastula*, fourthly *Hystrichosphaeropsis* (combination not validly published). Taxonomic junior synonym: *Hystrichosphaeropsis jubata* (name not validly published), according to May (1980, p.24). Age: early Oligocene.

complanata Eisenack, 1965b, p.153–154, pl.14, figs.5a–b,6–7; pl.15, figs.5a–b; text-figs.2a–b,3. Holotype: Eisenack, 1965b, pl.14, figs.5a–b; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.46, figs.2–3 and pl.48, figs.1–3. Age: late Eocene–early Oligocene.

costae Bujak, 1994, p.125, pl.3, figs.1–4. Holotype: Bujak, 1994, pl.3, figs.1–3. Age: Ypresian–Lutetian.

"*downiei*" (Pocock, 1972, p.87, pl.22, figs.1–2; text-fig.2) Stover and Evitt, 1978, p.164. Holotype: Pocock, 1972, pl.22, figs.1–2; Jan du Chêne et al., 1986a, pl.97, figs.7–12. Originally *Gonyaulacysta*, subsequently *Hystrichosphaeropsis*, thirdly *Rhynchodiniopsis?*, fourthly *Rhynchodiniopsis*. **Taxonomic senior synonym:** *Gonyaulax* (as *Hystrichogonyaulax cladophora*, according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23)). Age: Oxfordian–Kimmeridgian.

"*forficata*" Wilson in Slimani, 1994, p.59. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Hystrichosphaera* (now *Rottnestia*) *wetzeli*, according to Slimani (2001a, p.194).

galeata (Cookson and Eisenack, 1960a, p.3–4, pl.1, figs.16–18) Gocht, 1976, p.332. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.16; Jan du Chêne et al., 1986a, pl.48, figs.11–13; Helby et al., 1987, fig.38L. Originally *Scriniodinium*, subsequently *Psaligonyaulax*, thirdly (and now) *Hystrichosphaeropsis*. Age: Albian–Cenomanian.

irisiae (Kjellström, 1973, p.40–42, fig.34) Gocht, 1976, p.333. Holotype: Kjellström, 1973, fig.34; Jan du Chêne et al., 1986a, pl.46, fig.8. Originally *Scriniodinium?*, subsequently (and now) *Hystrichosphaeropsis*. Age: middle-late Maastrichtian.

"*jubata*" Wilson in May, 1980, p.24. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Hystrichosphaera* (as *Triblastula*, now *Rottnestia*) *borussica*, according to May (1980, p.24). Taxonomic senior synonym (at subspecific rank): *Rottnestia wetzeli* subsp. *brevispinosa*, according to Slimani (1994, p.58) — however, Slimani did not acknowledge the synonymy of *Hystrichosphaeropsis jubata* with *Hystrichosphaera* (now *Rottnestia*) *borussica* by May (1980).

"*minimum*" Zevenboom and Santarelli in Zevenboom, 1995, p.144, pl.5, figs.5,7,9. Holotype: Zevenboom, 1995, pl.5, figs.5,7,9. **Name not validly published:** considered a manuscript name. Age: latest late Oligocene–early Miocene.

"*nuda*" (Wetzel, 1961, p.340, pl.2, fig.2) Sarjeant, 1985b, p.140. Holotype: Wetzel, 1961, pl.2, fig.2. Originally *Triblastula*, subsequently *Hystrichosphaeropsis*. **Taxonomic senior synonym:** *Triblastula* (as *Hystrichosphaeropsis*) *quasicribrata*, according to Marheinecke (1992, p.44). Age: ?Late Cretaceous (erratic).

obscura Habib, 1972, p.379–380, pl.21, figs.1–3. Holotype: Habib, 1972, pl.21, fig.1. Age: late Miocene.

***ovum** Deflandre, 1935, p.232, pl.8, fig.11. Holotype: Deflandre, 1935, pl.8, fig.11; Jan du Chêne et al., 1986a, pl.46, fig.1. Originally (and now) *Hystrichosphaeropsis*, subsequently *Hystrichosphaera*. Lentin and Williams (1973, p.81) retained this species in *Hystrichosphaeropsis*. N.I.A. Age: Senonian.

perforata Schiøler, 1993, p.106, pl.2, figs.4–8; text-fig.3. Holotype: Schiøler, 1993, pl.2, fig.4; text-fig.3. Age: late Maastrichtian.

pontiana (Balteş, 1969, p.35–36, pl.3, fig.15 ex Lentin and Williams, 1973, p.123) Stover and Evitt, 1978, p.164. Holotype: Balteş, 1969, pl.3, fig.15, designated by Lentin and Williams (1973, p.123). Originally *Scriniodinium*, subsequently (and now) *Hystrichosphaeropsis*. The name *Scriniodinium pontianum* was not validly published in Balteş (1969, p.35), since that author considered the name to be a provisional designation. Age: early Pliocene.

quasicribrata (Wetzel, 1961, p.340, pl.2, fig.3) Gocht, 1976, p.322. Holotype: Wetzel, 1961, pl.2, fig.3; Sarjeant, 1985b, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.46, figs.9–10; Dietz et al., 1999, fig.10, no.9. Originally *Triblastula*, subsequently (and now) *Hystrichosphaeropsis*. Taxonomic junior synonyms: *Deflandrea rectangularis* var. *samuelsonii* (as *Amphidiadema rectangularis* subsp. *samuelsonii*), according to Gocht (1976, p.322); *Triblastula nuda* and *Triblastula tubulata*, both according to Marheinecke (1992, p.44). Contrary to the opinion of Stover and Evitt (1978, p.94), Gocht (1976, p.322) did not consider this species to be the taxonomic senior synonym of *Amphidiadema rectangularis*, but only the specimen identified by Kjellström (1973, fig.17). Age: ?Late Cretaceous (erratic).

rectangularis Bujak in Bujak et al., 1980, p.66, pl.16, figs.10–12; text-fig.15. Holotype: Bujak et al., 1980, pl.16, figs.10–12; Jan du Chêne et al., 1986a, pl.48, figs.8–10. Age: middle Eocene (see Aubry, 1986).

somphosa Warny and Wrenn, 1997, p.284,286–287, pl.1, figs.1–6; pl.2, figs.5–10. Holotype: Warny and Wrenn, 1997, pl.1, figs.1–4. Age: late Miocene (Messinian).

"tubulata" (Wetzel, 1961, p.340, pl.2, fig.4) Sarjeant, 1985b, p.140. Holotype: Wetzel, 1961, pl.2, fig.4. Originally *Triblastula*, subsequently *Hystrichosphaeropsis*. **Taxonomic senior synonym:** *Triblastula* (as *Hystrichosphaeropsis*) *quasicribrata*, according to Marheinecke (1992, p.44). Age: ?Late Cretaceous (erratic).

variabilis Matsuoka and Bujak, 1988, p.49–50, pl.5, figs.5a–b,6–8; text-fig.8. Holotype: Matsuoka and Bujak, 1988, pl.5, figs.5a–b; text-fig.8. Age: late Miocene.

"wetzelii" (Deflandre, 1937b, p.65, pl.11 [al. pl.8], figs.6,8) Sarjeant, 1966b, p.139. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), figs.6,8. **Combination not validly published:** basionym not fully referenced. **NOW** *Rottnestia*. Originally *Hystrichosphaera*, subsequently *Hystrichosphaeropsis* (combination not validly published), thirdly *Spiniferites*, fourthly (and now) *Rottnestia*. Taxonomic junior synonym: *Hystrichosphaeropsis forficata* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

HYSTRICHOSTROGYLON Agelopoulos, 1964, p.673–674. Emendation: Stover and Evitt, 1978, p.164. Taxonomic senior synonym: *Achomosphaera*, by implication in Eaton (1976, p.237), who transferred the "type species" of *Hystrichostrogylon*, *Hystrichostrogylon membraniphorum*, to *Achomosphaera* — however, Stover and Evitt (1978, p.165) retained *Hystrichostrogylon*. Taxonomic junior synonym: *Diphasiosphaera*, according to Stover and Williams (1987, p.81). Type: Agelopoulos, 1964, text-fig.1, as *Hystrichostrogylon membraniphorum*.

borisii Schiøler, 1993, p.106,108, pl.1, figs.7–9; pl.2, figs.1–3. Holotype: Schiøler, 1993, pl.1, fig.7. Age: latest Maastrichtian–early Danian.

clausenii Bujak, 1994, p.125,127, pl.1, figs.4–6. Holotype: Bujak, 1994, pl.1, figs.4–6. Age: Ypresian–Lutetian.

coninckii Heilmann-Clausen in Thomsen and Heilmann-Clausen, 1985, p.353,355, pl.7, figs.9–12; text-figs.10A–F. Holotype: Thomsen and Heilmann-Clausen, 1985, pl.7, figs.9–10; text-figs.10C–D. Taxonomic junior synonyms: *Hystrichostrogylon palliatum*, according to Marheinecke (1992, p.37); *Spiniferites palliatus* (name not validly published), according to Slimani (2001a, p.193). Age: Maastrichtian–Paleocene.

holohyemenium Islam, 1983a, p.238,240, pl.3, figs.5–7 (not 4–6 as indicated by Islam, 1983a, p.238); text-fig.3. Holotype: Islam, 1983a, pl.3, fig.5 (not 4 as indicated by Islam, 1983a, p.238). Age: early Eocene.

***membraniphorum** Agelopoulos, 1964, p.674; text-figs.1–2. Emendation: Eaton, 1976, p.237, as *Achomosphaera membraniphora*. Holotype: Agelopoulos, 1964, text-fig.1. Originally (and now) *Hystrichostrogylon*, subsequently *Achomosphaera*. Stover and Evitt (1978, p.165) retained this species in *Hystrichostrogylon*. Age: late Eocene.

subsp. **granulatum** Heilmann-Clausen in Heilmann-Clausen and Costa, 1989, p.468, pl.18, figs.1–3. Holotype: Heilmann-Clausen and Costa, 1989, pl.18, fig.3. Age: early Eocene.

subsp. **membraniphorum**. Autonym. Holotype: Agelopoulos, 1964, text-fig.1.

"**palliatum**" Hultberg, 1985c, p.131–132, pl.7, figs.I–J. Holotype: Hultberg, 1985c, pl.7, fig.I. **Taxonomic senior synonym:** *Hystrichostrogylon coninckii*, according to Marheinecke (1992, p.37). Age: late Maastrichtian–Danian.

robustum Pearce, 2010, p.52–53, pl. 5, figs.4–7. Holotype: Pearce, 2010, pl.5, figs.4–7. Age: late Turonian to mid–early Campanian.

stolidotum (Duxbury, 1980, p.116–117, pl.1, figs.5–9; text-fig.6) Stover and Williams, 1987, p.81. Emendation: Harding, 1990b, p.29, as *Hystrichostrogylon stolidotum*. Holotype: Duxbury, 1980, pl.1, fig.5; text-fig.6; Fensome et al., 1995, figs.1,3 — p.1803. Originally *Diphasiosphaera*, subsequently (and now) *Hystrichostrogylon*. Age: middle Barremian.

sulcatum Guerstein et al., 2004, p.332,336, figs.4a–f,5a–1,6a–c. Holotype: Guerstein et al., 2004, figs.4a–b,5a–c. Age: late Oligocene to early Miocene.

IFECYSTA Jan du Chêne and Adediran, 1985, p.20. Emendation: Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.55. Type: Jan du Chêne and Adediran, 1985, pl.15, figs.1–2; text-figs.6a–b, as *Ifecysta pachyderma*.

fusiforma Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.58, pl.1, figs.1–3. Holotype: Antolinez-Delgado and Oboh-Ikuenobe, 2007, pl.1, fig.1. Age: Paleocene–?earliest Eocene.

heterospinosa Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.58–60, pl.1, fig.7; pl.2, fig.5. Holotype: Antolinez-Delgado and Oboh-Ikuenobe, 2007, pl.1, fig.7. Age: Paleocene–?earliest Eocene.

lappacea (Drugg, 1970b, p.812–813, figs.4A–D,5A–D) Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.60. Holotype: Drugg, 1970b, figs.4A–D. Originally *Lanternosphaeridium*, subsequently *Fibrocysta*, thirdly (and now) *Ifecysta*. Age: early Eocene.

***pachyderma** Jan du Chêne and Adediran, 1985, p.20, pl.15, figs.1–11; text-figs.6a–6i. Holotype: Jan du Chêne and Adediran, 1985, pl.15, figs.1–2; text-figs.6a–b; Fensome et al., 1995, figs.1–2,6–7 — p.1637. Age: late Paleocene–early Eocene.

IMBATODINIUM Vozzhennikova, 1967, p.52–53. Emendations: Dörhöfer and Davies, 1980, p.36–37; Mehrotra and Sarjeant, 1984a, p.215; Lentin and Vozzhennikova, 1990, p.86–87. Taxonomic senior synonym: *Pareodinia*, according to Wiggins (1975, p.103) and Below (1990, p.64) — however, Dörhöfer and Davies (1980, p.36) and Lentin and Williams (1993, p.345) retained *Imbatodinium*. Taxonomic junior synonyms: *Batioladinium*, according to Dörhöfer and Davies (1980, p.36) — however, Lentin and Williams (1985, p.35) retained *Batioladinium*; *Necrobroomea*, according to Dörhöfer and Davies (1980, p.36) and by implication in Below (1990, p.52), who considered *Necrobroomea* to be the taxonomic senior synonym (see discussion under *Necrobroomea*). Type: Vozzhennikova, 1967, pl.9, figs.4–5; pl.10, figs.1a–b, as *Imbatodinium kondratjevii*.

"antennatum" Gitmez and Sarjeant, 1972, p.232–233, pl.11, figs.2–3. Holotype: Gitmez and Sarjeant, 1972, pl.11, figs.2–3. **NOW** *Gochteodinia*. Originally *Imbatodinium*, subsequently *Pareodinia*, thirdly (and now) *Gochteodinia*. Age: early–late Kimmeridgian.

"exiguum" (Alberti, 1961, p.26–27, pl.5, fig.14) Dörhöfer and Davies, 1980, p.37. Holotype: Alberti, 1961, pl.5, fig.14. **NOW** *Batioladinium?*. Originally *Broomea*, subsequently (and now) *Batioladinium?*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Below (1990, p.53) suggested that this species may be simply a smooth variant of *Batioladinium?* (as *Necrobroomea*) *pelliferum* (Alberti, 1961) Brideaux, 1975. Age: early Hauterivian.

"fractum" Mehrotra and Sarjeant, 1984a, p.217–218, pl.1, figs.1–7; pl.2, figs.1–7; text-figs.1a–e. Holotype: Mehrotra and Sarjeant, 1984a, pl.1, fig.1; pl.2, fig.7; text-figs.1a–e. Originally *Imbatodinium*, subsequently *Batioladinium*. **Taxonomic senior synonym:** *Broomea* (as *Necrobroomea*) *micropoda*, according to Below (1990, p.56). Age: Aptian.

"gochtii" (Alberti, 1961, p.27, pl.5, figs.8–10,?16) Dörhöfer and Davies, 1980, p.37. Holotype: Alberti, 1961, pl.5, fig.8. **NOW** *Batioladinium?*. Originally *Broomea*, subsequently (and now) *Batioladinium?*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonyms: *Batioladinium pomum* and *Aprobolocysta* (as *Batioladinium varigranosa*, both according to Below (1990, p.53). Age: Valanginian–?Hauterivian.

"imbatodinense" Vozzhennikova, 1967, p.55, pl.12, figs.4a–c. Emendation: Lentin and Vozzhennikova, 1990, p.91–92, as *Protobatioladinium imbatodinense*. Holotype: Vozzhennikova, 1967, pl.12, fig.4a; Lentin and Vozzhennikova, 1990, pl.11, figs.9–11; text-fig.50. **NOW** *Protobatioladinium*. Originally *Imbatodinium*, subsequently *Necrobroomea?*, thirdly *Pareodinia*, fourthly *Pareodinia?*, fifthly *Batioladinium*, sixthly (and now) *Protobatioladinium*, seventhly *Gochteodinia*. Age: Late Jurassic.

?inflatum Harker and Sarjeant in Harker et al., 1990, p.36–37, pl.2, figs.3–4; text-fig.17 ex Harker and Sarjeant, 1991, p.708. Holotype: Harker et al., 1990, pl.2, fig.4; text-fig.17. Questionable assignment: Harker and Sarjeant in Harker et al. (1990, p.36). This name was not validly published in Harker et al. (1990) since the lodgement of the holotype was not cited (I.C.N. Article 40.7). Age: Campanian.

"jaegeri" (Alberti, 1961, p.26, pl.5, figs.1–7) Dörhöfer and Davies, 1980, p.37. Emendation: Below, 1990, p.53–54, as *Necrobroomea jaegeri*. Holotype: Alberti, 1961, pl.5, fig.2; Eisenack and Klement, 1964, p.67; Fensome et al., 1995, fig.2 — p.1571. **NOW** *Batioladinium*. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonym: *Pseudoceratium gochtii* Pocock (subsequently *Pseudoceratium hansgochtii*), according to Singh (1971, p.320). Age: late Barremian.

***kondratjevii** Vozzhennikova, 1967, p.55, pl.9, figs.1,2a–c,3–9; pl.10, figs.1a–b,2a–b,3a–b,4–6; pl.11, figs.1a–e,2a–b,3; pl.15, figs.3–4. Emendations: Dörhöfer and Davies, 1980, p.37 and Lentin and Vozzhennikova, 1990, p.88–89, both as *Imbatodinium kondratjevii*; Below, 1990, p.68, as *Pareodinia kondratjevii*. Holotype: Vozzhennikova, 1967, pl.9, figs.4–5; pl.10, figs.1a–b; Lentin and Vozzhennikova, 1990, pl.11, figs.1–2; text-figs.48a–b. Originally (and now) *Imbatodinium*, subsequently *Pareodinia*. Lentin and Williams (1993, p.346) retained this species in *Imbatodinium*. Age: Late Jurassic.

"longicornutum" (Alberti, 1961, p.27–28, pl.5, figs.18–21; pl.6, figs.1–2) Dörhöfer and Davies, 1980, p.37. Emendation: Below, 1990, p.56, as *Necrobroomea longicornuta*. Holotype: Alberti, 1961, pl.5, fig.19; Eisenack and Klement, 1964, p.69; Fensome et al., 1996, fig.1 — p.2205. **NOW** *Batioladinium*. Originally *Broomea?*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonym: *Batioladinium radiculatum*, according to Below (1990, p.53). Age: late Hauterivian–late Barremian.

"micropodum" (Eisenack and Cookson, 1960, p.7–8, pl.2, figs.8–9) Dörhöfer and Davies, 1980, p.37. Emendation: Below, 1990, p.56, as *Necrobroomea micropoda*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.9. **NOW** *Batioladinium*. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonyms: *Imbatodinium fractum*, according to Below (1990, p.56); *Broomea* (now *Batioladinium?*) *pellifera*, according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Broomea* (as *Batioladinium?*) *pellifera*. Age: Aptian–Albian.

"**pelliferum**" (Alberti, 1961, p.26, pl.5, figs.11–13) Dörhöfer and Davies, 1980, p.38. Holotype: Alberti, 1961, pl.5, fig.11. **NOW** *Batioladinium?*. Originally *Broomea*, subsequently (and now) *Batioladinium?*, thirdly *Imbatodinium*, fourthly *Necrobroomea*. Taxonomic senior synonym: *Broomea* (as *Necrobroomea*, now *Batioladinium*) *micropoda*, according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Broomea* (as *Batioladinium?*) *pellifera*. Age: late Barremian–early Aptian.

"**pomum**" (Davey, 1982b, p.21, pl.5, figs.2–4) Mehrotra and Sarjeant, 1984a, p.220. Holotype: Davey, 1982b, pl.5, fig.3. Originally *Batioladinium*, subsequently *Imbatodinium*. **Taxonomic senior synonym:** *Broomea* (as *Necrobroomea*, now *Batioladinium?*) *gochtii*, according to Below (1990, p.53). Age: late Portlandian–early Valanginian.

"**radiculatum**" (Davey, 1982b, p.21–22, pl.5, figs.1,7–9) Mehrotra and Sarjeant, 1984a, p.153. Holotype: Davey, 1982b, pl.5, fig.8. Originally *Batioladinium*, subsequently *Imbatodinium*. **Taxonomic senior synonym:** *Broomea* (as *Necrobroomea*, now *Batioladinium*) *longicornuta*, according to Below (1990, p.53). Age: early–late Ryazanian.

"**?tricornoides**" (Alberti, 1961, p.28, pl.5, fig.17) Lentin and Williams, 1981, p.153. Holotype: Alberti, 1961, pl.5, fig.17. **NOW** *Batioladinium?*. Originally *Broomea?*, subsequently (and now) *Batioladinium?*, thirdly *Necrobroomea?*, fourthly *Imbatodinium?*. Questionable assignment: Lentin and Williams (1981, p.153). Age: late Hauterivian.

"**verrucosum**" Vozzhennikova, 1967, p.56, pl.12, fig.6. Emendation: Lentin and Vozzhennikova, 1990, p.83–84, as *Gochteodinia verrucosa*. Holotype: Vozzhennikova, 1967, pl.12, fig.6; Lentin and Vozzhennikova, 1990, pl.11, fig.5; text-fig.46. **NOW** *Gochteodinia*. Originally *Imbatodinium*, subsequently *Pareodinia*, thirdly (and now) *Gochteodinia*. Age: Late Jurassic.

"**villosum**" Vozzhennikova, 1967, p.56, pl.12, figs.1a–b,2a–b,3a–b; pl.13, figs.1a–e,2,3a–d; pl.14, figs.1a–e,2a–i; pl.15, figs.1–2. Emendations: Lentin and Vozzhennikova, 1990, p.85 and Below, 1990, p.50, both as *Gochteodinia villosa*. Holotype: Vozzhennikova, 1967, pl.12, figs.3a–b; pl.15, fig.1; Eisenack and Kjellström, 1975b, figure to right — p.726f; Lentin and Vozzhennikova, 1990, pl.11, figs.7–8; text-fig.47; Fensome et al., 1995, fig.1 — p.1903; Fensome et al., 1996, figs.1–3 — p.2431. **NOW** *Gochteodinia villosa*. Originally *Imbatodinium villosum*, subsequently *Pareodinia villosa* (Vozzhennikova) (combination not validly published), thirdly *Pareodinia dasyforma*, fourthly (and now) *Gochteodinia villosa*. Age: Late Jurassic.

IMPAGIDINIUM Stover and Evitt, 1978, p.165–166. Type: Cookson and Eisenack, 1965a, pl.12, figs.5–6, as *Leptodinium dispertitum*.

aculeatum (Wall, 1967, p.104–105, pl.14, figs.18–19; text-figs.3C–D) Lentin and Williams, 1981, p.153. Holotype: Wall, 1967, pl.14, fig.18; Jan du Chêne et al., 1986a, pl.53, figs.1–3. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: Pleistocene–Holocene.

agremon Willumsen, 2011, p.219–220, figs.9F,H,L; figs.10C–E. Holotype: Willumsen, 2011, fig.9L. N.I.A. Age: latest Maastrichtian–early Paleocene.

alectrolophum (Sarjeant, 1966b, p.134–135, pl.15, figs.3–6; text-fig.34) Stover and Evitt, 1978, p.165. Holotype: Sarjeant, 1966b, pl.15, figs.5–6; Jan du Chêne et al., 1986a, pl.54, figs.15–16. Originally *Leptodinium*, subsequently (and now) *Impagidinium*, thirdly *Pterodinium*. Lentin and Williams (1985, p.194) retained this species in *Impagidinium*. Age: middle Barremian.

aliferum Mudie, 1987, p.803, pl.4, figs.1a–b. Holotype: Mudie, 1987, pl.4, figs.1a–b. Age: late Miocene–late Pliocene.

antecarcereum de Verteuil and Norris, 1996a, p.136,138,140, pl.8, figs.7–14; pl.9, figs.1–8; text-fig.34. Holotype: de Verteuil and Norris, 1996a, pl.8, figs.7–10; text-fig.34. Age: latest Miocene.

- "aquaeductus"** (Piasecki, 1980, p.70, pl.1, figs.1–3; pl.5, figs.1–2) Lentin and Williams, 1985, p.194. Holotype: Piasecki, 1980, pl.1, figs.1–3. **NOW** *Unipontidinium*. Originally *Nematosphaeropsis*, subsequently *Nematosphaeropsis*?, thirdly *Impagidinium*, fourthly (and now) *Unipontidinium*. N.I.A. Age: middle Miocene.
- arachnion** de Verteuil and Norris, 1996a, p.140,142,144, pl.9, figs.9–20; pl.10, figs.1–5; pl.18, figs.4–6. Holotype: de Verteuil and Norris, 1996a, pl.9, figs.9–12. N.I.A. Age: middle-late Miocene.
- aspinatum** (Cookson and Eisenack, 1974, p.63, pl.23, fig.6) Damassa, 1979a, p.826. Holotype: Cookson and Eisenack, 1974, pl.23, fig.6. Originally *Spiniferites cornutus* var. *aspinatus*, subsequently *Spiniferites cornutus* subsp. *aspinatus*, thirdly (and now) *Impagidinium aspinatum*. Age: Paleocene.
- bacatum** Londeix et al., 1992, p.696,698,700, pl.1, figs.1a–b,2–3,4a–c,5–8,9a–b; text-figs.3a–b. Holotype: Londeix et al., 1992, pl.1, figs.1a–b,9a–b. Age: early–late Pliocene.
- "brevisulcatum"** Michoux, 1985, p.144–145, pl.1, figs.9–11; text-fig.4. Holotype: Michoux, 1985, pl.1, fig.10; Jan du Chêne et al., 1986a, pl.56, figs.4–6. **NOW** *Ynezidinium*. Originally *Impagidinium*, subsequently (and now) *Ynezidinium*. Age: middle Eocene.
- caecopapillatum** Prössl, 1992b, p.104–106, pl.1, figs.6–7,9–10,12–13; pl.3, figs.2–3,5–6,8–11; text-fig.2. Holotype: Prössl, 1992b, pl.3, figs.3,6,9. Age: middle Eocene.
- californiense** Damassa, 1979a, p.829–830, pl.5, figs.1–13; text-fig.8. Holotype: Damassa, 1979a, pl.5, figs.3–6; Jan du Chêne et al., 1986a, pl.52, fig.18. Age: early-middle Eocene.
- cantabrigiense** De Schepper and Head, 2008, p.106–107, pl.2, figs.1–16. Holotype: De Schepper and Head, pl.2, figs.1–3. Age: latest Pliocene–mid Pleistocene.
- caspienense** Marret in Marret et al., 2004, p.11,13; pl.2, figs.1–7; text-fig.3D–E. Holotype: Marret et al., 2004, pl.2, figs.1–4. Age: late Holocene.
- cassiculus** Wilson, 1988, p.23, pl.13, figs.2a–b,3,5a–b. Holotype: Wilson, 1988, pl.13, fig.3; Fensome et al., 1996, fig.3 — p.2085. N.I.A. Age: early Eocene.
- cavea** Willumsen, 2011, p.219, figs.9G,J,K; figs.10F–H. Holotype: Willumsen, 2011, fig.9K. N.I.A. Age: latest Maastrichtian–early Paleocene.
- celineae** Jan du Chêne, 1988, p.159, pl.19, figs.1–6; pl.20, figs.1–5; pl.26, figs.1–4; text-fig.3. Holotype: Jan du Chêne, 1988, pl.19, figs.1–2. Age: Danian.
- "churchillii"** (Harland, 1968, p.548,550–551, figs.12–13,22–24) Matsuoka, 1983a, p.7. Holotype: Harland, 1968, figs.12–13,22–24. Originally *Leptodinium*, subsequently *Impagidinium*. **Taxonomic senior synonym:** *Hystrichosphaera* (now *Spiniferites*) *nodosa*, according to Reid (1974, p.599). Taxonomic senior synonym: *Hystrichosphaera* (now *Spiniferites*) *bentorii* according to Harland (1977b, p.98–99) — however, *Leptodinium churchillii* is now generally considered to be a taxonomic junior synonym of *Hystrichosphaera* (now *Spiniferites*) *nodosa*. Age: Holocene.
- cornutum** Matsuoka and Bujak, 1988, p.51–53, pl.5, fig.10; pl.6, figs.1a–c,2; text-fig.9. Holotype: Matsuoka and Bujak, 1988, pl.6, figs.1a–c; text-fig.9. Age: late Miocene.
- crassimuratum** Wilson, 1988, p.23, pl.12, figs.5a–b,6a–b,7a–c. Holotype: Wilson, 1988, pl.12, figs.5a–b; Fensome et al., 1996, figs.1–2 — p.2099. Age: early Eocene.
- cristatum** (May, 1980, p.57, pl.5, figs.16–20) Lentin and Williams, 1981, p.153. Holotype: May, 1980, pl.5, figs.16–20. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: late Campanian–early Maastrichtian.

crouchiae Willumsen, 2011, p.220,222, figs.9A,D. Holotype: Willumsen, 2011, fig.9A. Age: late Maastrichtian–early Paleocene.

"*densiverrucosum*" Zevenboom and Santarelli in Zevenboom, 1995, p.145, pl.5, figs.1–3. Holotype: Zevenboom, 1995, pl.5, figs.1–3. **Name not validly published:** considered a manuscript name. Age: middle Miocene.

**dispertitum* (Cookson and Eisenack, 1965a, p.122–123, pl.12, figs.5–7) Stover and Evitt, 1978, p.165. Holotype: Cookson and Eisenack, 1965a, pl.12, figs.5–6; Jan du Chêne et al., 1986a, pl.149, figs.11–16; Fensome et al., 1993a, figs.1–2 — p.1127. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: late Eocene.

diversum Duxbury, 2001, p.107–108, fig.9, nos.1–6. Holotype: Duxbury, 2001, fig.9, no.5. Age: late Barremian (holotype caved into middle Barremian according to Duxbury, 2001, p.107).

elegans (Cookson and Eisenack, 1965a, p.123–124, pl.12, figs.10–13) Stover and Evitt, 1978, p.165. Holotype: Cookson and Eisenack, 1965a, pl.12, figs.10,12; Jan du Chêne et al., 1986a, pl.149, figs.5–10. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: late Eocene.

elongatum Schreck et al., 2012, p.89–90, pl.2, figs.6–20; text-figs.6–7. Holotype: Schreck et al., 2012, pl.2, figs.6–10. Age: Langhian–early Tortonian.

eugubinum Biffi and Manum, 1988, p.206, pl.12, figs.16,18–20. Holotype: Biffi and Manum, 1988, pl.12, fig.18. Age: early Miocene.

fenestroseptatum Head et al., 1989b, p.458, pl.2, figs.5–7,10–14. Holotype: Head et al., 1989b, pl.2, figs.11–13. Age: early Pliocene.

gibreuse Michoux, 1985, p.145, pl.1, figs.5–8,13–14; pl.2, fig.10; text-fig.5. Holotype: Michoux, 1985, pl.1, figs.5–6; Jan du Chêne et al., 1986a, pl.57, figs.1–5. Age: early-middle Eocene.

globosum Sütő-Szentai, 1985, p.518–519, pl.81, fig.3. Holotype: Sütő-Szentai, 1985, pl.81, fig.3. This name was not validly published in Sütő-Szentai (1982a, pl.5, fig.4), who did not give a description. Sütő-Szentai (1990, pl.4, fig.4 — p.864) cited this species as new. Age: late Miocene.

gracilium Shaw Chenglong, 1999b, p.170, figs.37–42. Holotype: Shaw Chenglong, 1999b, figs.37–39. Age: Eocene.

"*grande*" (Davey, 1975, p.153–154, pl.1, fig.9) Jan du Chêne et al., 1986a, p.168. Holotype: Davey, 1975, pl.1, fig.9; Jan du Chêne et al., 1986a, pl.55, figs.1–8. **NOW** *Unipontidinium*. Originally *Nematosphaeropsis*, subsequently *Impagidinium*, thirdly (and now) *Unipontidinium*. Age: Senonian, ?Campanian.

hannahii Willumsen, 2011, p.222,224, figs.9B–C; figs.10A–B,E. Holotype: Willumsen, 2011, fig.9B. Age: late Maastrichtian–early Paleocene.

?*hyalodermum* (Deflandre, 1939b, p.144, pl.6, figs.3–4 ex Sarjeant, 1967b, p.252) Jan du Chêne et al., 1986a, p.169. Holotype: Deflandre, 1939b, pl.6, figs.3–4; Jan du Chêne et al., 1986a, pl.58, figs.1–5. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Impagidinium*. Questionable assignment: Jan du Chêne et al. (1986a, p.169). The name *Palaeoperidinium hyalodermum* was not validly published in Deflandre (1939b) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.328) accepted Sarjeant's (1967b) indirect reference to Deflandre (1939b) as indication of a type (I.C.N. Article 40.3). Age: Kimmeridgian.

inaequalis (Wall and Dale in Wall et al., 1973, p.22, pl.1, figs.7–8) Londeix et al., 2009, p.68. Holotype: Wall et al., 1973, pl.1, figs.7–8. Originally *Spiniferites*, subsequently (and now) *Impagidinium*. Londeix et al. (2010, p.204) corrected an error to the basionym citation in Londeix et al. (2009), but the combination was still validated in the latter reference. Age: Holocene.

japonicum Matsuoka, 1983b, p.120–121, pl.6, figs.2a–c,3a–b,4–5; text-figs.13A–B. Holotype: Matsuoka, 1983b, pl.6, figs.2a–c; Jan du Chêne et al., 1986a, pl.59, figs.1–3. Taxonomic junior synonym: *Impagidinium pacificum*, according to Bujak and Matsuoka (1986, p.236). Age: Pliocene or younger.

maculatum (Cookson and Eisenack, 1961b, p.40, pl.2, figs.5–6) Stover and Evitt, 1978, p.166. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.5–6. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: Eocene.

maghribensis Slimani et al. 2008, p.331–332, 334, figs.4G–L. Holotype: Slimani et al. 2008, figs.4G–K. Age: early Danian.

manumii Matsuoka and Bujak, 1988, p.54–56, pl.6, figs.5a–b,6–7; text-fig.10. Holotype: Matsuoka and Bujak, 1988, pl.6, figs.5a–b; text-fig.10. Age: late Miocene.

margaritifera (Cookson and Eisenack, 1960a, p.5–6, pl.2, figs.1–2; text-fig.1) Stover and Evitt, 1978, p.166. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.54, fig.6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Leptodinium*, fourthly (and now) *Impagidinium*. Age: Campanian.

"?**membranigerum**" (Gerlach, 1961, p.162–164, pl.26, figs.1–4,7; text-figs.4–5) Stover and Evitt, 1978, p.166. Emendation: Sarjeant, 1984b, p.75–76, as *Leptodinium membranigerum*. Holotype: Gerlach, 1961, pl.26, figs.1–3, lost according to Sarjeant (1984b, p.75). Lectotype: Gerlach, 1961, pl.26, fig.7; text-fig.5; Sarjeant, 1984b, pl.1, figs.1,3; text-figs.1A–B; Jan du Chêne et al., 1986a, pl.67, figs.17–18; designated by Sarjeant (1984b, p.75). **NOW** *Leptodinium*. Originally (and now) *Leptodinium*, subsequently *Impagidinium*?. Questionable assignment: Stover and Evitt (1978, p.166). Age: late Oligocene.

minus Biffi and Manum, 1988, p.206–207, pl.12, figs.9–15,17. Holotype: Biffi and Manum, 1988, pl.12, figs.9–11. Age: late Oligocene–early Miocene.

modicum (Brideaux and McIntyre, 1975, p.22, pl.5, figs.10–15) Jan du Chêne et al., 1986a, p.168. Holotype: Brideaux and McIntyre, 1975, pl.5, figs.10–13; Jan du Chêne et al., 1986a, pl.59, figs.4–6. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Albian.

subsp. **denticulatum** (Brideaux, 1977, p.8, pl.1, figs.10–11) Jan du Chêne et al., 1986a, p.168. Holotype: Brideaux, 1977, pl.1, figs.10–11. Originally *Leptodinium modicum* subsp. *denticulatum*, subsequently (and now) *Impagidinium modicum* subsp. *denticulatum*. Age: Barremian.

subsp. **modicum**. Autonym. Holotype: Brideaux and McIntyre, 1975, pl.5, figs.10–13; Jan du Chêne et al., 1986a, pl.59, figs.4–6. Originally *Leptodinium modicum* subsp. *modicum*, subsequently (and now) *Impagidinium modicum* subsp. *modicum*.

multiplex (Wall and Dale, 1968a, p.318, pl.1, figs.1–7; text-fig.1) Lentin and Williams, 1981, p.154. Holotype: Wall and Dale, 1968a, pl.1, figs.1–6; Jan du Chêne et al., 1986a, pl.54, figs.7–9. Originally *Anhystrichosphaera* (name not validly published), subsequently *Leptodinium*, thirdly (and now) *Impagidinium*. Wall and Dale (1968a, p.315,318) expressly based this species and name on the invalid name *Anhystrichosphaera multiplex* Deflandre in West, 1961 (West's hystrichosphere type "z"). Age: early Pleistocene.

?obesum (Sütő-Szentai, 1982a, p.210–211,218–219, pl.4, figs.1 [two illustrations]-2 [three illustrations]; text-fig.5) Lentin and Williams, 1989, p.196. Holotype: Sütő-Szentai, 1982a, pl.4, fig.2 (three illustrations); text-fig.5. Originally *Pontiadinium*, subsequently (and now) *Impagidinium*?. Questionable assignment: Lentin and Williams (1989, p.196). Age: late Miocene.

ordocaviopse Iosifova, 1996, p.219,221, pl.1, figs.1a–c,2a–c,4a–c,5a–c; text-figs.7A–D. Holotype: Iosifova, 1996, pl.1, figs.2a–c; text-figs.7C–D. Age: ?Hauterivian.

?*ovum* (Sah et al., 1970, p.147–148, pl.2, fig.25) Stover and Evitt, 1978, p.166. Holotype: Sah et al., 1970, pl.2, fig.25. Originally *Leptodinium*, subsequently (and now) *Impagidinium*?. Questionable assignment: Stover and Evitt (1978, p.166). N.I.A. Age: Late Cretaceous.

"*pacificum*" Bujak, 1984, p.187, pl.2, figs.3–8. Holotype: Bujak, 1984, pl.2, figs.3–4; Jan du Chêne et al., 1986a, pl.60, figs.9–11. **Taxonomic senior synonym:** *Impagidinium japonicum*, according to Bujak and Matsuoka (1986, p.236). Age: early–late Pliocene.

pallidum Bujak, 1984, p.187, pl.2, figs.9–12. Holotype: Bujak, 1984, pl.2, figs.11–12; Jan du Chêne et al., 1986a, pl.58, figs.7–9. Originally (and now) *Impagidinium*, subsequently *Impagidinium*?. Questionable assignment: Mudie (1987, p.803) — however, Manum et al. (1989, p.618) retained this species in *Impagidinium* without question. Age: late Eocene–early Pleistocene.

paradoxum (Wall, 1967, p.106–107, pl.15, figs.5–8; text-figs.2–3A,B) Stover and Evitt, 1978, p.166. Holotype: Wall, 1967, pl.15, fig.5. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Miocene–Holocene.

subsp. *granulatum* Mao Shaozhi, 1989, p.134–135, pl.26, figs.12,18,19; text-figs.3A–B. Holotype: Mao Shaozhi, 1989, pl.26, figs.12,18. Age: Quaternary.

subsp. *paradoxum*. Autonym. Holotype: Wall, 1967, pl.15, fig.5.

parvireticulatum Wilson, 1988, p.24, pl.13, figs.4a–c,6a–b. Holotype: Wilson, 1988, pl.13, figs.4a–c; Fensome et al., 1996, figs.1–3 — p.2263. Age: middle Eocene; see Fensome et al. (1996, p.2264).

patulum (Wall, 1967, p.105–106, pl.14, fig.20; pl.15, figs.1–4; text-fig.4) Stover and Evitt, 1978, p.166. Holotype: Wall, 1967, pl.14, fig.20; pl.15, figs.1–2. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Miocene–Holocene.

?*pecsvaradense* (Sütő-Szentai, 1982a, p.209–210,218, pl.3, figs.1–3; text-fig.4) Lentin and Williams, 1989, p.196. Holotype: Sütő-Szentai, 1982a, pl.3, figs.1a–b; text-fig.4. Originally *Pontiadinium*, subsequently (and now) *Impagidinium*?. Questionable assignment: Lentin and Williams (1989, p.196). Age: late Miocene.

pengchiahsun Shaw Chenglong, 1999b, p.173–174, figs.22–27. Holotype: Shaw Chenglong, 1999b, figs.22–23. Age: Eocene.

"*pentahedrias*" Damassa, 1979b, p.202,204, pl.3, figs.22,24–26,28–29; pl.4, figs.1–3,6; text-fig.4. Holotype: Damassa, 1979b, pl.3, fig.25; Jan du Chêne et al., 1986a, pl.59, figs.7–8. **NOW** *Ynezidinium*. Originally *Impagidinium*, subsequently (and now) *Ynezidinium*. N.I.A. Age: early Paleocene.

phlyctaena Stover and Helby, 1987d, p.268,271, figs.8A–P. Holotype: Stover and Helby, 1987d, figs.8A–H; Fensome et al., 1996, figs.1–6 — p.2273. Age: Barremian–early Aptian.

plicatum Versteegh and Zevenboom in Versteegh, 1995, p.88–90, pl.3, figs.1–8. Holotype: Versteegh, 1995, pl.3, figs.1–3; Versteegh and Zevenboom, 1995, pl.3, figs.1–3. Versteegh and Zevenboom (1995, p.221,223) also proposed this name. Age: earliest Pliocene–Holocene (earliest Zanclean–Versilian).

reductum Stover and Helby, 1987c, p.241–242,244, figs.13A–C,14A–D,15A–Q. Holotype: Stover and Helby, 1987c, figs.15I–K; Fensome et al., 1996, figs.1–3 — p.2319. Age: Hauterivian.

rigidaseptatum Slimani, 1994, p.104–105, pl.17, figs.1–9; text-fig.13A. Holotype: Slimani, 1994, pl.17, figs.1–7. Taxonomic junior synonym: *Spiniferites cingulatus* var. *prominoseptatus* (name not validly published), according to Slimani (2001a, p.193). Age: late Campanian–Danian.

scabrosum Slimani, 1994, p.105–107, pl.17, figs.10–15; text-fig.13B. Holotype: Slimani, 1994, pl.17, figs.10–11. Age: late Campanian–earliest Maastrichtian.

setcheyense (Sarjeant, 1976c, p.4–6, pl.1, fig.7; text-fig.1) Courtinat, 1989, p.205. Holotype: Sarjeant, 1976c, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.74, figs.1–4. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Impagidinium*. Age: Kimmeridgian.

"*siliciense*" Zevenboom and Santarelli in Zevenboom, 1995, p.145–146, pl.5, figs.4,6,8. Holotype: Zevenboom, 1995, pl.5, figs.4,6,8. **Name not validly published:** considered a manuscript name. Age: middle Miocene.

simplex Mao Shaozhi, 1989, p.136, pl.26, figs.1–3,5–8; text-figs.5A–D. Holotype: Mao Shaozhi, 1989, pl.26, figs.1,3. Age: Quaternary.

?*simplicium* (Cookson and Eisenack, 1961b, p.42, pl.2, figs.3–4; text-figs.1e–f) Stover and Evitt, 1978, p.166. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.3–4; text-figs.1e–f; Jan du Chêne et al., 1986a, pl.54, figs.1–5. Originally *Rottmestia*, subsequently *Psaligonyaulax*, thirdly (and now) *Impagidinium*?. Questionable assignment: Stover and Evitt (1978, p.166). Age: Eocene.

solidum Versteegh and Zevenboom in Versteegh, 1995, p.90–91, pl.2, figs.5–12. Holotype: Versteegh, 1995, pl.2, figs.5–6,9; Versteegh and Zevenboom, 1995, pl.2, figs.5–6,9. Versteegh and Zevenboom (1995, p.223) also proposed this name. Age: late early–early late Pliocene (late Zanclean–early Piacenzian).

sphaericum (Wall, 1967, p.108, pl.15, figs.11–15; text-figs.2a–c) Lentin and Williams, 1981, p.154. Holotype: Wall, 1967, pl.15, figs.11–12. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: Pleistocene–Holocene.

spongianum Sütő-Szentai, 1985, p.519, pl.81, fig.6 (non 5 — see below). Holotype: Sütő-Szentai, 1982a, pl.5, fig.3; Sütő-Szentai, 1985, p.519, pl.81, fig.6 (non 5 — see below). This name was not validly published in Sütő-Szentai (1982a, pl.5, fig.3), who did not give a description. Sütő-Szentai (1990, pl.2, fig.3 — p.860) also cited this species as new. The nomenclatural status of this species is in question because Sütő-Szentai (1985, p.519 and caption to pl.81) indicated her pl.81, fig.5 as the holotype; however, as L. Londeix (pers. comm.) has pointed out, this specimen had been previously designated as a paratype of *Millioudodinium* (now *Apteodinium*?) *foveolatum*, and does not accord in morphology with the genus *Impagidinium*. It appears that the holotype was thus incorrectly indicated and should have been cited as pl.81, fig.6 in Sütő-Szentai (1985) (the same specimen as the single illustration labelled as *Impagidinium spongiosum* in Sütő-Szentai, 1982a, pl.5, fig.3). This is an unusual situation and it is unclear how ICN rules might apply, although generally typographic errors are not reasons for invalidating a name. We thus provisionally accept that *Impagidinium spongianum* was validly published in Sütő-Szentai (1985) despite the apparently incorrect indication of the holotype. Age: late Miocene.

striatum (Wall, 1967, p.107–108, pl.15, figs.9–10; text-fig.5) Stover and Evitt, 1978, p.166. Holotype: Wall, 1967, pl.15, fig.9. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Miocene–Holocene.

"*striatum*" (Clarke and Verdier, 1967, p.31, pl.4, figs.11–13; pl.5, fig.15; text-fig.12) Stover and Evitt, 1978, p.166. Holotype: Clarke and Verdier, 1967, pl.4, figs.11–13; Jan du Chêne et al., 1986a, pl.88, figs.9–11. **NOW** *Dimidium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Impagidinium*, fourthly *Pterodinium*, fifthly (and now) *Dimidium*. Age: Santonian.

taiwanianum Shaw Chenglong, 1999b, p.170–172, figs.28–36. Holotype: Shaw Chenglong, 1999b, figs.28–30. Age: Eocene.

tectum Biffi and Manum, 1988, p.207, pl.12, figs.3–8. Holotype: Biffi and Manum, 1988, pl.12, figs.3–4. Age: late Oligocene–early Miocene.

torsium Stover and Hardenbol, 1994, p.36, pl.7, figs.47a–c; pl.8, figs.49a–c. Holotype: Stover and Hardenbol, 1994, pl.7, figs.47a–c. Age: Rupelian.

variaseptum Marret and de Vernal, 1997, p.385,387, pl.3, figs.1–5. Holotype: Marret and de Vernal, 1997, pl.3, figs.3–5. Age: Holocene.

velorum Bujak, 1984, p.187–188, pl.2, figs.13–16. Holotype: Bujak, 1984, pl.2, fig.13; Jan du Chêne et al., 1986a, pl.58, fig.10. Age: middle to late Eocene–late Pliocene.

verrucosum (Brideaux and McIntyre, 1975, p.30, pl.9, figs.1–8) Stover and Evitt, 1978, p.166. Holotype: Brideaux and McIntyre, 1975, pl.9, figs.1–4; Jan du Chêne et al., 1986a, pl.64, figs.16–19. Originally *Pterodinium*, subsequently (and now) *Impagidinium*. Age: middle Albian.

victorianum (Cookson and Eisenack, 1965a, p.123, pl.12, figs.8–9) Stover and Evitt, 1978, p.166. Holotype: Cookson and Eisenack, 1965a, pl.12, figs.8–9; Jan du Chêne et al., 1986a, pl.149, figs.1–4. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: late Eocene.

"**waipawaense**" Wilson, 1988, p.24, pl.13, figs.1a–b; pl.14, figs.1a–c,2a–b. Holotype: Wilson, 1988, pl.14, figs.1a–c; Fensome et al., 1996, figs.1–3 — p.2439. **NOW** *Ynezidinium*. Originally *Impagidinium*, subsequently (and now) *Ynezidinium*. Age: early-middle Eocene.

?**whitei** (Sarjeant, 1966b, p.126–128, pl.14, fig.2; text-fig.32) Stover and Evitt, 1978, p.166. Holotype: Sarjeant, 1966b, pl.14, fig.2. Originally *Gonyaulacysta*, subsequently (and now) *Impagidinium*?, thirdly *Rhynchodiniopsis*. Jan du Chêne et al. (1986a, p.169) questionably retained this species in *Impagidinium*. Questionable assignment: Stover and Evitt (1978, p.166). Age: Cenomanian.

wuqiaense He Chengquan, 1991, p.107–108, pl.5, fig.28; text-fig.14. Holotype: He Chengquan, 1991, pl.5, fig.28; text-fig.14. Age: middle Eocene.

"**IMPERFECTODINIUM**" Zevenboom and Santarelli in Zevenboom, 1995, p.146. **Name not validly published:** considered a manuscript name. This name was also not validly published in Gedl (1996, p.198), since no description was provided. Type: Zevenboom, 1995, pl.6, figs.1–4, as *Imperfectodinium bulbosum*.

"***bulbosum**" Zevenboom and Santarelli in Zevenboom, 1995, p.147, pl.5, figs.10–12; pl.6, figs.1–4. Holotype: Zevenboom, 1995, pl.6, figs.1–4. **Name not validly published:** considered a manuscript name. This name was also not validly published in Gedl (1996, p.198), since no description was provided. Age: latest early Miocene–late Miocene.

"**septatum**" Zevenboom and Santarelli in Zevenboom, 1995, p.148, pl.6, figs.5–10. Holotype: Zevenboom, 1995, pl.6, figs.5–7. **Name not validly published:** considered a manuscript name. This name was also not validly published in Gedl (1996, p.198), since no description was provided. Age: latest early Miocene–earliest late Miocene.

IMPLETOSPHAERIDIUM Morgenroth, 1966a, p.32. Emendation: Islam, 1993, p.84–85. Taxonomic junior synonyms: *Ciliosphaeridium*, according to Stover and Evitt (1978, p.232–233); *Laticavodinium*, by implication in Islam (1993, p.86), who questionably transferred the "type species", *Laticavodinium oligacanthum*, to *Impletosphaeridium* and by Masure in Fauconnier and Masure (2004, p.337). This genus was considered problematic by Masure in Fauconnier and Masure (2004, p.337). Type: Morgenroth, 1966a, pl.10, fig.5, as *Impletosphaeridium transfodum*.

"**acropora**" Warny and Wrenn, 1997, p.302,304, pl.10, figs.1–6. Holotype: Warny and Wrenn, 1997, pl.10, figs.4,6. **Taxonomic senior synonym:** *Nannobarbophora walldalei* (Appendix A), according to Head and Westphal (1999, p.20). Masure in Fauconnier and Masure (2004, p.341) independently also considered that this may be an acritarch species. N.I.A. Age: Miocene–Pleistocene.

baculatum (He Chengquan and Li Peng, 1981, p.62, pl.34, figs.21–22) Islam, 1993, p.85. Holotype: He Chengquan and Li Peng, 1981, pl.34, fig.21; Fauconnier and Masure, 2004, pl.48, fig.7. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: late Oligocene.

"?**bahiaense**" (Regali et al., 1974, p.289–290, pl.23, fig.5) Islam, 1993, p.85. Holotype: Regali et al., 1974, pl.23, fig.5. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Cleistosphaeridium?*, thirdly *Impletosphaeridium?*, fourthly (and now) *Operculodinium*. Questionable assignment: Islam (1993, p.85). Age: Eocene–Oligocene.

bifurcatum (Jiabo, 1978, p.60–61, pl.20, figs.11–12) Islam, 1993, p.85. Holotype: Jiabo, 1978, pl.20, fig.11. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

brevibaculum (Song Zhichen in Song Zhichen et al., 1985, p.31, pl.4, fig.10) Islam, 1993, p.85. Holotype: Song Zhichen et al., 1985, pl.4, fig.10. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Cenozoic.

capillaceum Morgenroth, 1966a, p.33, pl.9, fig.12. Holotype: Morgenroth, 1966a, pl.9, fig.12. Age: early Eocene.

capillare He Chengquan et al. 2005b, p.386,390–391, pl.2, figs.14,17. Holotype: He Chengquan et al. 2005b, p.390–391, pl.2, fig.17. Age: Miocene to early Pliocene.

capitatum Fensome et al., 2009, p.38,39, pl.5, figs.m–p. Holotype: Fensome et al., 2009, pl.5, fig.m. Age: youngest occurrence, middle Campanian.

"**charrieri**" Troncoso and Doubinger, 1980, p.102, pl.2, figs.7–8. Holotype: Troncoso and Doubinger, 1980, pl.2, fig.7. Originally *Impletosphaeridium*, subsequently *Operculodinium*. **Taxonomic senior synonym:** *Cleistosphaeridium* (now *Lingulodinium*) *bergmannii*, according to Quattrocchio and Sarjeant, 2003, p.142. Age: Maastrichtian–Danian.

cingulatum (Grigorovich, 1971, p.94, pl.2, fig.1) Stover and Evitt, 1978, p.232–233. Holotype: Grigorovich, 1971, pl.2, fig.1; Fensome et al., 1993a, fig.1 — p.1059. Originally *Ciliosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Paleocene.

?**clavulum** (Davey, 1969a, p.154–155, pl.6, figs.9–10) Islam, 1993, p.85. Holotype: Davey, 1969a, pl.6, fig.9; Fauconnier and Masure, 2004, pl.50, fig.1. Originally *Cleistosphaeridium polypes* var. *clavulum*, subsequently *Cleistosphaeridium polypes* subsp. *clavulum*, thirdly *Impletosphaeridium polypes* subsp. *clavulum*, fourthly *Bacchidinium polypes* subsp. *clavulum*, fifthly *Cleistosphaeridium clavulum*, sixthly *Impletosphaeridium clavulum*, seventhly (and now) *Impletosphaeridium? clavulum*. Questionable assignment: Peyrot (2011, p.293). Age: Cenomanian.

clavus Wrenn and Hart, 1988, p.356–357, fig.27, nos.10–11,13. Emendation: Bowman et al., 2013, p.155,157. Holotype: Wrenn and Hart, 1988, fig.27, nos.11,13. N.I.A. Age: late Paleocene–Eocene.

commixtum (Jiabo, 1978, p.61–62, pl.21, figs.3–5) Islam, 1993, p.85–86. Holotype: Jiabo, 1978, pl.21, fig.3. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

"**conicosum**" (Jiabo, 1978, p.57, pl.29, figs.4–5) Chen et al., 1988, p.7. Holotype: Jiabo, 1978, pl.29, fig.4. **NOW** *Palaeohystrichodinium*. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Palaeohystrichodinium*. Age: Early Tertiary.

cracens Eaton, 1976, p.306, pl.21, fig.6; text-fig.25E. Holotype: Eaton, 1976, pl.21, fig.6; Bujak et al., 1980, pl.5, fig.4. Age: early-middle Eocene (see Aubry, 1986).

"?**densicomatum**" (Maier, 1959, p.307–308, pl.29, figs.7–8) Morgenroth, 1966a, p.33. Emendation: Sarjeant, 1983, p.111–113, as *Sentusidinium densicomatum*. Holotype: Maier, 1959, pl.29, fig.7. **NOW** *Pilosidinium*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*,

fourthly *Impletosphaeridium?*, fifthly *Sentusidinium*, sixthly (and now) *Pilosidinium*. Questionable assignment: Lentin and Williams (1973, p.82). Age: middle Oligocene–middle Miocene.

densum (He Chengquan and Li Peng, 1981, p.65, pl.31, figs.14–17; text-fig.6) He Chengquan and Wang Kede, 1990, p.413. Holotype: He Chengquan and Li Peng, 1981, pl.31, fig.14; text-fig.6. Originally *Impletosphaeridium polypes* subsp. *densum*, subsequently *Kiokansium polypes* subsp. *densum*, thirdly (and now) *Impletosphaeridium densum*. He Chengquan (1991, p.142) also proposed this combination. Age: late Oligocene.

digitale (He Chengquan, 1991, p.141, pl.25, figs.14–16; text-fig.26) Williams et al., 1998, p.332. Holotype: He Chengquan, 1991, pl.25, fig.14. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: early Eocene.

ehrenbergii (Deflandre, 1947c, fig.1, no.5) Islam, 1993, p.86. Emendation: Masure in Fauconnier and Masure, 2004, p.337–338, as *Impletosphaeridium ehrenbergii*. Holotype: Deflandre, 1939a, pl.10, fig.9, as *Hystrichosphaeridium* cf. *hirsutum*; Deflandre, 1947c, fig.1, no.5; Fauconnier and Masure, 2004, pl.48, figs.9,11. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Impletosphaeridium*. Nomenclatural junior synonym: *Cleistosphaeridium deflandrei* Courtinat, 1989, which has the same holotype. This combination was not validly published in Davey et al. (1966, p.170), since these authors did not fully reference the basionym. Courtinat (1989, p.166) erected the species *Cleistosphaeridium deflandrei* and designated as holotype the specimen illustrated in Deflandre (1939a, pl.10, fig.9) and Deflandre (1947c, fig.1, no.5). This is the only specimen of *Hystrichosphaeridium ehrenbergii* illustrated by Deflandre (1947c) when he erected that species, and which thus must be considered its holotype. Courtinat (1989, p.166) considered *Hystrichosphaeridium ehrenbergii* to be not validly published, since Deflandre (1947c) did not give a diagnosis or designate a holotype. I.C.N. Article 40.1 implies that designation of a holotype was not required before 1958. Also, according to I.C.N. Article 38.1, "In order to be validly published, a name of a new taxon ... must ... be accompanied by a description or diagnosis ... or ... by a reference to a previously and effectively published description or diagnosis ...". Deflandre (1947c, caption to fig.1, no.5) referred to "*H. cf. hirsutum* (Ehr.) Defl. 1938", this reference including a description by Deflandre (1939a, p.191). Hence, *Hystrichosphaeridium ehrenbergii* must be regarded as having been validly published by Deflandre (1947c); consequently *Cleistosphaeridium deflandrei* is an illegitimate name for the same taxon. Age: Oxfordian.

elegans (He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.43, pl.18, figs.1–4) Williams et al., 1998, p.332. Holotype: He Chengquan et al., 1989, pl.18, fig.1. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

"elongatum" Lentin and Williams, 1989, p.197. Holotype: Jiabo, 1978, pl.29, fig.2. **NOW** *Peltiphoridium oblongatum*. Originally *Bipolaribucina oblongatum*, subsequently *Impletosphaeridium oblongatum* (combination illegitimate), thirdly *Impletosphaeridium elongatum*, fourthly (and now) *Peltiphoridium oblongatum*. Substitute name for *Impletosphaeridium oblongatum* (Jiabo, 1978, p.58, pl.29, figs.1–3) Chen et al., 1988, p.7 (an illegitimate name). Age: Early Tertiary.

"erinaceum" Morgenroth, 1966a, p.33–34, pl.8, figs.10–12. Holotype: Morgenroth, 1966a, pl.8, fig.10. **NOW** *Operculodinium*. Originally *Impletosphaeridium*, subsequently (and now) *Operculodinium*. Age: early-middle Miocene.

furcillatum (Prössl, 1990, p.100, pl.7, figs.12,14 ex Prössl, 1992b, p.113–114) Williams et al. 1998, p.332. Holotype: Prössl, 1990, pl.7, figs.12,14; Fauconnier and Masure, 2004, pl.49, figs.1–2. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. The name *Cleistosphaeridium furcillatum* was not validly published in Prössl (1990) since that author did not specify the lodgement of the holotype, Age: Hauterivian–early Barremian.

"giganteum" (Caro, 1973, p.360–361, pl.2, fig.12) Islam, 1993, p.86. Holotype: Caro, 1973, pl.2, fig.12; Fauconnier and Masure, 2004, pl.49, figs.13–14. **NOW** *Exochosphaeridium*. Originally *Polysphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Impletosphaeridium*, fourthly (and now) *Exochosphaeridium*. Age: early Eocene.

granulatum (Burger, 1980a, p.77, pl.33, figs.2–4,6–10) Islam, 1993, p.86. Holotype: Burger, 1980a, pl.33, fig.2; Fauconnier and Masure, 2004, pl.49, figs.3–4. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Albian.

"granulosum" Jain and Tandon, 1981, p.11, pl.2, figs.30–31; pl.3, fig.50. Holotype: Jain and Tandon, 1981, pl.2, fig.30. **NOW** *Exochosphaeridium*. Originally *Impletosphaeridium*, subsequently (and now) *Exochosphaeridium*. Age: middle Eocene.

"huanghuaense" (Jiabo, 1978, p.57, pl.29, figs.9–10) Chen et al., 1988, p.7. Holotype: Jiabo, 1978, pl.29, fig.9. **NOW** *Songiella*. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Songiella*. Age: Early Tertiary.

implicatum Morgenroth, 1966a, p.34, pl.9, figs.1–3. Holotype: Morgenroth, 1966a, pl.9, figs.1–2, lost, according to Sarjeant in Islam (1993, p.86). Neotype: Islam, 1993, pl.1, fig.12, designated by Islam (1993, p.86). Taxonomic junior synonym: *Adnatosphaeridium capilatatum*, according to Eaton (1976, p.306). Age: early Eocene.

insolitum Eaton, 1976, p.308, pl.21, figs.5,8; text-fig.25B. Holotype: Eaton, 1976, pl.21, fig.5; Bujak et al., 1980, pl.5, fig.5; Fauconnier and Masure, 2004, pl.49, figs.5–6. Originally (and now) *Impletosphaeridium*, subsequently *Cleistosphaeridium?*. This species was retained in *Impletosphaeridium* by Islam (1993, p.86). Age: early-middle Eocene (see Aubry, 1986).

kroemmelbeinii Morgenroth, 1966a, p.34–35, pl.9, figs.4–5. Holotype: Morgenroth, 1966a, pl.9, fig.5. Age: early Eocene.

labyrinthus Morgenroth, 1966a, p.35, pl.9, figs.6–7. Holotype: Morgenroth, 1966a, pl.9, figs.6–7. N.I.A. Age: early Eocene.

laxabaculum (Song Zhichen in Song Zhichen et al., 1985, p.31–32, pl.4, fig.11) Islam, 1993, p.86. Holotype: Song Zhichen et al., 1985, pl.4, fig.11. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: ?early Pleistocene.

"liaoningense" (Jiabo, 1978, p.58, pl.29, figs.6–8) Chen et al., 1988, p.7. Holotype: Jiabo, 1978, pl.29, fig.7. **NOW** *Peltiphoridium*. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Peltiphoridium*. Age: Early Tertiary.

ligospinosum (de Coninck, 1969, p.50, pl.15, figs.9–19) Islam, 1983a, p.240. Holotype: de Coninck, 1969, pl.15, fig.19; Fauconnier and Masure, 2004, pl.49, fig.7. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Impletosphaeridium*. Age: early Eocene.

lorum Wrenn and Hart, 1988, p.357, fig.26, nos.1–2. Holotype: Wrenn and Hart, 1988, fig.26, nos.1–2. N.I.A. Age: Paleocene–Eocene.

lumectum (Sarjeant, 1960a, p.139–140, pl.6, fig.1; text-fig.2) Islam, 1993, p.86. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly (and now) *Impletosphaeridium*. Age: late Oxfordian.

luxurium Eaton, 1976, p.309, pl.21, figs.3–4; text-fig.25F. Holotype: Eaton, 1976, pl.21, fig.3; Bujak et al., 1980, pl.5, fig.6. Age: middle Eocene (see Aubry, 1986).

machaeroides Stover and Hardenbol, 1994, p.36–37, pl.13, figs.91a–b,92a–b. Holotype: Stover and Hardenbol, 1994, pl.13, figs.91a–b. Age: Rupelian.

"mediterraneum" (Corradini, 1973, p.137–138, pl.19, figs.5a–b; text-fig.4) Islam, 1993, p.86. Holotype: Corradini, 1973, text-fig.4. **NOW** *Pervosphaeridium*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Pervosphaeridium*. Age: Senonian.

minus (Jiabo, 1978, p.62, pl.20, figs.13–16) Islam, 1993, p.86. Holotype: Jiabo, 1978, pl.20, fig.16. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

multifurcillatum (Prössl, 1990, p.199–101, pl.9, figs.2,8,11 ex Prössl, 1992b, p.113–114) Williams et al., 1998, p.333. Holotype: Prössl, 1990, pl.9, figs.8,11; Fauconnier and Masure, 2004, pl.49, figs.9–10. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. The name *Cleistosphaeridium multifurcillatum* was not validly published in Prössl (1990) since that author did not specify the lodgement of the holotype. Age: early Hauterivian–late Barremian.

multispinosum Benedek, 1972, p.31–32, pl.11, fig.11; pl.12, fig.15. Holotype: Benedek, 1972, pl.12, fig.15. Age: middle Oligocene.

nanus (Rozen, 1965, p.311, pl.2, figs.7–8; text-fig.21) Islam, 1993, p.86. Holotype: Rozen, 1965, pl.2, figs.7–8. Originally *Cordosphaeridium microtriainum* var. *nanus*, subsequently *Cordosphaeridium microtriainum* subsp. *nanus*, thirdly *Cleistosphaeridium?* *nanus*, fourthly (and now) *Impletosphaeridium nanus*. N.I.A. Age: late Eocene.

"nenjiangense" (Gao Ruiqi et al., 1992a, p.18,24, pl.3, figs.1–9; pl.4, figs.1–7) Williams et al., 1998, p.333. Holotype: Gao Ruiqi et al., 1992a, pl.3, fig.1. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly *Spicadinium* (Appendix A). **Taxonomic senior synonym:** *Spicadinium akidoton* (Appendix A), according to Mao Shaozhi et al. (1999, p.159). Age: Campanian.

oblongatum Islam, 1983a, p.240, pl.3, figs.8–9. Holotype: Islam, 1983a, pl.3, fig.8. Junior homonym: *Impletosphaeridium oblongatum* (Jiabo, 1978 ex Lentin and Williams, 1981) Chen et al., 1988. Age: early Eocene.

"oblongatum" (Jiabo, 1978, p.58, pl.29, figs.1–3) Chen et al., 1988, p.7. Holotype: Jiabo, 1978, pl.29, fig.2. **Combination illegitimate** — **senior homonym:** *Impletosphaeridium oblongatum* Islam, 1983a. Substitute name: *Impletosphaeridium elongatum*. **NOW** *Peltiphoridium oblongatum*. Originally *Bipolaribucina oblongata*, subsequently *Impletosphaeridium oblongatum* (combination illegitimate), thirdly *Impletosphaeridium elongatum*, fourthly (and now) *Peltiphoridium oblongatum*. Age: Early Tertiary.

?oligacanthum (Wetzel, 1952, p.402–405, pl.A, figs.4,7–8,11a–b; text-figs.21–25) Islam, 1993, p.86. Emendation: Wilson and Sarjeant in Sarjeant, 1984c, p.128, as *Laticavodinium oligacanthum*. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625; Dietz et al., 1999, text-fig.6g. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium?*, fourthly *Laticavodinium*, fifthly (and now) *Impletosphaeridium?*. Questionable assignment: Islam (1993, p.86). Age: Danian.

pachydermum (Cookson and Eisenack, 1960b, p.251–252, pl.38, fig.5; text-fig.5) Masure in Fauconnier and Masure, 2004, p.343. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.5; Fauconnier and Masure, 2004, pl.48, fig.10. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Dapsilidinium*, fifthly (and now) *Impletosphaeridium*. Age: Oxfordian–Tithonian.

panniforme (Gerlach, 1961, p.196–198, pl.28, fig.13) Morgenroth, 1966a, p.35. Holotype: Gerlach, 1961, pl.28, fig.13. Originally *Baltisphaeridium*, subsequently (and now) *Impletosphaeridium*, thirdly *Cleistosphaeridium*. Eaton et al. (2001, p.191) implied that this species be retained in *Impletosphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Cleistosphaeridium*) *placacanthum*, according to Sarjeant (1984b, p.86–87) — however, Eaton et al. (2001, p.191) retained *Baltisphaeridium* (as *Impletosphaeridium*) *panniforme*. Age: middle Oligocene.

patagonicum (Archangelsky, 1969b, p.200–201, pl.3, figs.9–10) Islam, 1993, p.86. Holotype: Archangelsky, 1969b, pl.3, figs.9–10. Originally *Cleistosphaeridium*, subsequently *Cleistosphaeridium?*, thirdly (and now) *Impletosphaeridium*. Age: Eocene.

"?paucifurcatum" (Cookson and Eisenack, 1982, p.39, pl.8, figs.5–6) Islam, 1993, p.86. Holotype: Cookson and Eisenack, 1982, pl.8, fig.5. **NOW** *Spiniferites?*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium?*, thirdly (and now) *Spiniferites?*. Questionable assignment: Islam (1993, p.86). Age: Paleocene.

paucispinum He Chengquan, 1991, p.143, pl.24, fig.2; text-fig.29. Holotype: He Chengquan, 1991, pl.24, fig.2; text-fig.29. Age: Paleocene.

petalum Islam, 1983c, p.88, pl.4, figs.1–3,7. Holotype: Islam, 1983c, pl.4, fig.1. N.I.A. Age: middle Eocene.

placacanthum" (Deflandre and Cookson, 1955, p.276–277, pl.9, figs.1–3) Morgenroth, 1966a, p.35. Emendation: May, 1980, p.68, as *Systematophora placacantha*. Holotype: Deflandre and Cookson, 1955, pl.9, figs.1–2; Fauconnier and Masure, 2004, pl.76, figs.14–16. **NOW** *Cleistosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Systematophora*, fifthly (and now) *Cleistosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (as *Cleistosphaeridium*) *panniforme*, according to Sarjeant (1984b, p.86–87); *Systematophora* (now *Cleistosphaeridium*) *ancyrea*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: Miocene.

?*polyozum* (Brosius, 1963, p.45, pl.1, fig.6; pl.6, fig.5; text-figs.2a–d) Islam, 1993, p.87. Holotype: Brosius, 1963, pl.1, fig.6. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium?*, thirdly *Surculosphaeridium*, fourthly (and now) *Impletosphaeridium?*. Questionable assignment: Islam (1993, p.87). The epithet is derived from the Greek for "much branched", as implied by Brosius (1963). Since Principle 5 of the I.C.N. states that taxon names are to be treated as Latin, this epithet should be rendered as "*polyozum*" in agreement with the neuter gender of the generic name ("*polyoza*" would be the feminine form and "*polyozus*" the masculine form). Age: late Oligocene.

polypes" (Cookson and Eisenack, 1962b, p.491–492, pl.4, figs.11–13) He Chengquan and Li Peng, 1981, p.65. Emendation: Duxbury, 1983, p.49, as *Kiokansium polypes*. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. Originally *Hystrichosphaeridium recurvatum* subsp. *polypes*, subsequently *Polysphaeridium?* *polypes* (combination not validly published), thirdly *Cleistosphaeridium polypes*, fourthly *Bacchidinium polypes*, fifthly *Impletosphaeridium polypes*, sixthly *Kiokansium polypes*. **Taxonomic senior synonym** (at specific rank): *Hystrichosphaeridium* (as and now *Kiokansium*) *unituberculatum*, by implication in Duxbury (1983, p.49), who considered *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Bacchidinium polypes*) to be the senior name. Taxonomic junior synonym: *Cleistosphaeridium?* *solidum*, according to Below (1982c, p.16). Age: Albian–Cenomanian.

"subsp. ***clavulum***" (Davey, 1969a, p.154–155, pl.6, figs.9–10) He Chengquan and Li Peng, 1981, p.65. Holotype: Davey, 1969a, pl.6, fig.9; Fauconnier and Masure, 2004, pl.50, fig.1. **NOW** *Impletosphaeridium?* *clavulum*. Originally *Cleistosphaeridium polypes* var. *clavulum*, subsequently *Cleistosphaeridium polypes* subsp. *clavulum*, thirdly *Impletosphaeridium polypes* subsp. *clavulum*, fourthly *Bacchidinium polypes* subsp. *clavulum*, fifthly *Cleistosphaeridium clavulum*, sixthly *Impletosphaeridium clavulum*, seventhly (and now) *Impletosphaeridium?* *clavulum*. Age: Cenomanian.

"subsp. ***densum***" He Chengquan and Li Peng, 1981, p.65, pl.31, figs.14–17; text-fig.6. Holotype: He Chengquan and Li Peng, 1981, pl.31, fig.14; text-fig.6. **NOW** *Impletosphaeridium densum*. Originally *Impletosphaeridium polypes* subsp. *densum*, subsequently *Kiokansium polypes* subsp. *densum*, thirdly (and now) *Impletosphaeridium densum*. Age: late Oligocene.

"subsp. ***polypes***". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. **Now redundant**. Originally *Cleistosphaeridium polypes* subsp. *polypes*, subsequently *Bacchidinium polypes* subsp. *polypes*, thirdly *Impletosphaeridium polypes* subsp. *polypes*, fourthly *Kiokansium polypes* subsp. *polypes*.

?*polytrichum* (Valensi, 1947, p.818; text-fig.4) Islam, 1993, p.87. Holotype: Valensi, 1947; text-fig.4; Fauconnier and Masure, 2004, pl.24, figs.1–6. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Impletosphaeridium*, fifthly *Downiesphaeridium*, sixthly (and now) *Impletosphaeridium?*. Questionable assignment: Peyrot (2011, p.293–294). Taxonomic junior synonym: *Cleistosphaeridium* (as *Downiesphaeridium*) *polyacanthum*, according to Masure in Fauconnier and Masure (2004, p.196). Age: late Bathonian.

"*?primordiale*" Wetzel, 1967b, p.41–42, pl.3, fig.18. Holotype: Wetzel, 1967b, pl.3, fig.18. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Polygonium* — Appendix A) *polygonale*, according to Eisenack et al. (1973, p.497–498). Questionable assignment: Wetzel (1967b, p.41). Age: Ordovician.

prolatum Head et al., 1989c, p.491, pl.6, fig.1. Holotype: Head et al., 1989c, pl.6, fig.1. Age: early–?early late Miocene.

"*pycnospinosum*" Benedek, 1972, p.32, pl.12, fig.14. Emendation: Benedek and Sarjeant, 1981, p.343–344, as *Lingulodinium pycnospinosum*. Holotype: Benedek, 1972, pl.12, fig.14; Benedek and Sarjeant, 1981, fig.10, no.1. **NOW** *Lingulodinium*. Originally *Impletosphaeridium*, subsequently *Lingulodinium?*, thirdly (and now) *Lingulodinium*. Age: middle-late Oligocene.

radiculopse (Mao Shaozhi and Norris, 1988, p.38, pl.7, figs.21–23) Islam, 1993, p.87. Holotype: Mao Shaozhi and Norris, 1988, pl.7, fig.21. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Late Cretaceous.

"*regulatum*" (Zhou Heyi, 1985, p.7, pl.1, figs.16–17,19–21) Williams et al., 1998, p.335. Holotype: Zhou Heyi, 1985, pl.1, fig.16. **NOW** *Cleistosphaeridium*. Originally (and now) *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly *Sepispinula?*. Age: middle Oligocene.

rugosum Morgenroth, 1966a, p.36, pl.10, figs.2–3. Holotype: Morgenroth, 1966a, pl.10, figs.2–3. Age: early Eocene.

"*sarmentum*" (Stancliffe, 1991, p.187–188, pl.1, figs.1–2; pl.2, fig.6; text-figs.5A–B) Williams et al., 1998, p.335. Holotype: Stancliffe, 1991, pl.1, figs.1–2; text-figs.5A–B. **NOW** *Downiesphaeridium*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Downiesphaeridium*. N.I.A. Age: late Oxfordian.

selseyense (Islam, 1983b, p.337, pl.2, figs.3,7) Islam, 1993, p.87. Holotype: Islam, 1983b, pl.2, fig.3. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: middle Eocene.

"*severinii*" (Cookson and Cranwell, 1967, p.208, pl.3, figs.1–2) Liengjarern et al., 1980, p.486. Holotype: Cookson and Cranwell, 1967, pl.3, fig.1. **NOW** *Operculodinium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Impletosphaeridium*, thirdly (and now) *Operculodinium*. Age: Eocene–Oligocene.

shandongense (He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.44, pl.18, figs.5–6; pl.30, figs.3–6) Williams et al., 1998, p.335. Holotype: He Chengquan et al., 1989, pl.18, fig.6. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

?sphericum (Horowitz, 1975, p.24, pl.1, fig.5) Islam, 1993, p.87. Holotype: Horowitz, 1975, pl.1, fig.5. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Questionable assignment: Islam (1993, p.87). Age: Late Jurassic.

?spiralisetum (de Wit, 1943, p.383; text-figs.2,11) Islam, 1993, p.87. Holotype: de Wit, 1943; text-figs.2,11, lost according to R. de Wit (personal communication to GLW). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium?*, fourthly (and now) *Impletosphaeridium*. Questionable assignment: Islam (1993, p.87). Age: Late Cretaceous.

"*tenuis*" (Harris, 1974, p.164, pl.2, figs.7–9) Islam, 1993, p.87. Holotype: Harris, 1974, pl.2, figs.8–9. **NOW** *Sepispinula?*. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Sepispinula?*. Age: Paleocene.

?tenuifilum (Cookson and Eisenack, 1982, p.40, pl.8, fig.14) Islam, 1993, p.87. Holotype: Cookson and Eisenack, 1982, pl.8, fig.14. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium?*. Questionable assignment: Islam (1993, p.87). Age: Paleocene.

tianjinense (Jiabo, 1978, p.59, pl.29, figs.13–14) Chen et al., 1988, p.8. Holotype: Jiabo, 1978, pl.29, fig.13. Originally *Bipolaribucina*, subsequently (and now) *Impletosphaeridium*. Age: Early Tertiary.

tianshanense (He Chengquan, 1991, p.142, pl.25, figs.4–7; text-fig.28) Williams et al., 1998, p.336. Holotype: He Chengquan, 1991, pl.25, fig.4. Originally *Cleistosphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: early Eocene.

**transfodum* Morgenroth, 1966a, p.32, pl.10, figs.4–5. Holotype: Morgenroth, 1966a, pl.10, fig.5. Age: early Eocene.

"*tribuliferum*" (Sarjeant, 1962a, p.487–488, pl.70, fig.4; text-figs.6c,7) Islam, 1993, p.87. Holotype: Sarjeant, 1962a, pl.70, fig.4; Fauconnier and Masure, 2004, pl.23, fig.11. **NOW** *Downiesphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly *Impletosphaeridium*, fifthly (and now) *Downiesphaeridium*. Age: Oxfordian.

varispinosum (Sarjeant, 1959, p.338–340, pl.13, fig.7; text-fig.6) Islam, 1993, p.87. Holotype: Sarjeant, 1959, pl.13, fig.7; text-fig.6; Fauconnier and Masure, 2004, pl.49, fig.8. Originally *Baltisphaeridium* (Appendix A), subsequently *Tenua* Eisenack, thirdly *Sentusidinium*, fourthly *Sentusidinium?*, fifthly *Cleistosphaeridium*, sixthly (and now) *Impletosphaeridium*. Age: early Callovian.

"*whitei*" (Deflandre and Courteville, 1939, p.103, pl.3, figs.5–6) Morgenroth, 1966a, p.37. Emendation: Monteil, 1991a, p.444, as *Cometodinium? whitei*. Holotype: Deflandre and Courteville, 1939, pl.3, fig.5, lost according to Monteil (1991a, p.439). Neotype: Monteil, 1991a, pl.2, figs.1a–c; pl.3, fig.9, designated by Monteil (1991a, p.444); Fauconnier and Masure, 2004, pl.16, figs.7–8. **NOW** *Cometodinium*. Originally *Hystriospheridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Comasphaeridium* (Appendix A), fifthly *Cometodinium?*, sixthly (and now) *Cometodinium*. Age: Senonian.

williamsii (Boltenhagen, 1977, p.41–42, pl.2, figs.6–7) Islam, 1993, p.87. Holotype: Boltenhagen, 1977, pl.2, fig.6; Fauconnier and Masure, 2004, pl.50, fig.6. Originally *Polysphaeridium*, subsequently *Cleistosphaeridium*, thirdly (and now) *Impletosphaeridium*. Age: Cenomanian–early Turonian.

xinjiangense (Lentin and Williams, 1993, p.117) Williams et al., 1998, p.336. Holotype: He Chengquan, 1991, pl.24, fig.5. Originally *Cleistosphaeridium elegans* (name illegitimate), subsequently *Cleistosphaeridium xinjiangense*, thirdly (and now) *Impletosphaeridium xinjiangense*. Age: Paleocene.

INDODINIUM Kumar, 1986b, p.388–389. This name was not validly published in Kumar (1984, p.26), who did not provide a description. Type: Kumar, 1986b, pl.4, fig.3, as *Indodinium khariense*.

**khariense* Kumar, 1986b, p.389,391, pl.4, figs.2–3; text-figs.5A–B. Emendation: Riding and Helby, 2001f, p.157,159. Holotype: Kumar, 1986b, pl.4, fig.3; Fensome et al., 1995, fig.2 — p.1587. Taxonomic junior synonym: *Diplotesta nodosa* (name not validly published), according to Riding and Helby (2001f, p.157). This name was not validly published in Kumar (1984, p.26), who did not provide a description or illustration. Age: Kimmeridgian–Tithonian.

"?*parvelatum*" Jiang Qinghua in Jiang Qinghua et al., 1992, p.85,87, pl.2, fig.10. Emendation: Riding and Helby, 2001f, p.162, as *Mombasadinium parvelatum*. Holotype: Jiang Qinghua et al., 1992, pl.2, fig.10. **NOW** *Mombasadinium*. Originally *Indodinium?*, subsequently (and now) *Mombasadinium*. Questionable assignment: Jiang Qinghua in Jiang Qinghua et al. (1992, p.85). Taxonomic junior synonym: *Omatia jurabiana* (name not validly published), according to Riding and Helby (2001f, p.162). Age: Tithonian.

INDOSPHERA Kumar, 1986b, p.391. Type: Kumar, 1986b, pl.3, fig.5, as *Indosphaera bhujensis*.

***bhujensis** Kumar, 1986b, p.392, pl.3, figs.3,5; text-fig.6. Holotype: Kumar, 1986b, pl.3, fig.5; Fensome et al., 1993a, fig.2 — p.973. Age: Kimmeridgian–Tithonian.

INOCARDION Masters and Scott 1978 p.215. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1300). This generic name was proposed using the I.C.Z.N. Type: not designated — "type species" *Lagena orbularia* de Lapparent, 1918.

"**caucasicum**" (Keller 1946, p.95, pl.3, fig.2) Masters and Scott, 1978, p.216. Holotype: Keller 1946, pl.3, fig.2. **NOW** *Pithonella*. Originally (and now) *Pithonella*, subsequently *Inocardion*. As this combination was published under the I.C.Z.N., it can be considered validly published and legitimate when brought under the I.C.N., even though the basionym was not fully referenced. Age: information not available.

maastrichtiense (Visser 1951, p.211, pl.7, fig.13) Masters and Scott, 1978, p.216. Holotype: Visser, 1951, pl.7, fig.13. Originally *Leptodermella* (Appendix A), subsequently *Bonetocardiella*, thirdly and now *Inocardion*. Taxonomic junior synonym: *Stomiosphaera cardiiiformis*, according to Villain (1975, p.198). As this combination was published under the I.C.Z.N., it can be considered validly published and legitimate when brought under the I.C.N., even though the basionym was not fully referenced. Age: Maastrichtian.

neumannae (Villain 1975, p.199–200, pl.2, figs.7–8; pl.6, figs.1–17, pl.1, figs.1d–e; pl.2, figs.1–12; pl.15, fig.2) Masters and Scott 1978, p.216,218. Holotype: Villain, 1975, pl.6, fig.4. Originally *Bonetocardiella*, subsequently (and now) *Inocardion*. As this combination was published under the I.C.Z.N., it can be considered validly published and legitimate when brought under the I.C.N., even though the basionym was not fully referenced. Age: Late Cretaceous.

***orbularium** (de Lapparent, 1918, p.20, pl.2, figs.1–part,2–part; pl.3, fig.2–part) Masters and Scott 1978, p.218. Holotype: not designated. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly *Sphaerella* (generic name illegitimate), fourthly *Stomiodinium?*, fifthly (and now) *Inocardion*. Taxonomic senior synonym: *Lagena* (now *Pithonella*) *sphaerica*, according to Bonet (1956, p.450) — however, Masters and Scott (1978, p.215) retained this species as type of *Inocardion*. As this combination was published under the I.C.Z.N., it can be considered validly published and legitimate when brought under the I.C.N., even though the basionym was not fully referenced. Age: Late Cretaceous.

pseudoconoideum Masters and Scott, 1978, p.215–216,218. Holotype: not designated. *Inocardion pseudoconoideum* was proposed as a "new name" (sensu I.C.Z.N.) by Masters and Scott (1978, p.215) for a form included by Villain (1975, p.197–198, pl.4, fig.1; pl.5, figs.2–4; table 15, figs.7–8) as *Bonetocardiella conoidea*. As this name was published under the I.C.Z.N., it can be considered validly published and legitimate when brought under the I.C.N. even though no type was designated. Age: ?Cretaceous.

"**INVERSIDINIUM**" McLean, 1973b, p.730. **Taxonomic senior synonym:** *Palaeotetradinium*, according to Stover and Evitt (1978, p.70–71). Type: McLean, 1973b, pl.90, figs.1–2, as *Inversidinium exilimurum*.

"**caudatum**" Benson, 1976, p.218,220, pl.13, figs.4–6. Holotype: Benson, 1976, pl.13, figs.4–6. **NOW** *Palaeotetradinium*. Originally *Inversidinium*, subsequently (and now) *Palaeotetradinium*. Age: late Maastrichtian–early Paleocene.

"***exilimurum**" McLean, 1973b, p.730,732, pl.90, figs.1–9. Holotype: McLean, 1973b, pl.90, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1163. **Taxonomic senior synonym:** *Wetzeliella* (now *Palaeotetradinium*) *minusculum*, according to Stover and Evitt (1978, p.71). The nomenclatural type of the genus *Inversidinium* remains the holotype of *Inversidinium exilimurum*. Age: late Paleocene.

"**+minusculum**" (Alberti, 1961, p.10–11, pl.1, fig.10; pl.12, fig.4) Costa and Downie, 1979, p.44. Holotype: Alberti, 1961, pl.1, fig.10. **NOW** *Palaeotetradinium*. Originally *Wetzeliella* subgenus *Rhombodinium*, subsequently *Rhombodinium?*, thirdly *Inversidinium*, fourthly (and now) *Palaeotetradinium*. Taxonomic junior

synonym: *Inversidinium exilimurum*, according to Stover and Evitt (1978, p.71). The nomenclatural type of the genus *Inversidinium* remains the holotype of *Inversidinium exilimurum*. Age: early Eocene.

INVERTOCYSTA Edwards, 1984, p.585. Type: Edwards, 1984, pl.3, figs.3A–B; text-figs.6A–B, as *Invertocysta tabulata*.

"*flandriensis*" Louwye, 1997, p.150, pl.1, figs.10–13. Holotype: Louwye, 1997, pl.1, figs.10–13. **Taxonomic senior synonym:** *Turnosphaera hypoflata*, according to Slimani and Louwye (2012, p.110,114). Age: Turonian–Campanian.

lacrymosa Edwards, 1984, p.586, pl.3, figs.4a–b,5. Holotype: Edwards, 1984, pl.3, figs.4a–b. Age: middle-late Miocene.

**tabulata* Edwards, 1984, p.585–586, pl.3, figs.3A–B; text-figs.6A–B. Holotype: Edwards, 1984, pl.3, figs.3A–B; text-figs.6A–B; Fensome et al., 1995, figs.1–4 — p.1837. Age: middle-late Miocene.

"**ISABELIA**" Lentin and Williams, 1976, p.56. **Name illegitimate** — **senior homonym:** *Isabelia* Barbosa-Rodrigues, 1877. **Substitute name:** *Isabelidinium*. Type: Cookson and Eisenack, 1958, pl.4, fig.10, as *Deflandrea korojonensis*.

"*?amphiata*" (McIntyre, 1975, p.65–66, pl.2, figs.5–8) Lentin and Williams, 1976, p.57. Holotype: McIntyre, 1975, pl.2, figs.5–6. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium?*. Originally *Deflandrea*, subsequently *Isabelia?* (combination illegitimate), thirdly (and now) *Isabelidinium?*, fourthly *Alterbia* (combination illegitimate). Questionable assignment: Lentin and Williams (1976, p.57). Age: Campanian–Maastrichtian.

"*bakeri*" (Deflandre and Cookson, 1955, p.251, pl.4, figs.1–4) Lentin and Williams, 1976, p.57. Emendation: Stover, 1974, p.169–170, as a "revised description" for *Deflandrea bakeri*. Holotype: Deflandre and Cookson, 1955, pl.4, fig.1. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*, fourthly *Alterbia* (combination illegitimate). Age: Paleocene–early Eocene.

"*belfastensis*" (Cookson and Eisenack, 1961a, p.71, pl.11, figs.4–6) Lentin and Williams, 1976, p.57. Holotype: Cookson and Eisenack, 1961a, pl.11, fig.4; Helby et al., 1987, fig.41D. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **Taxonomic senior synonym:** *Deflandrea* (now *Isabelidinium*) *cooksoniae*, according to Fensome et al. (2009, p.39). Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*. Age: Late Cretaceous.

"*conorata*" (Stover, 1974, p.171–172, pl.1, figs.8a–b; text-fig.3C) Lentin and Williams, 1976, p.57. Holotype: Stover, 1974, pl.1, figs.8a–b. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly *Eurydinium*, fifthly (and now) *Manumiella*. Age: early-middle Paleocene.

"*cooksoniae*" (Alberti, 1959b, p.97, pl.9, figs.1–6) Lentin and Williams, 1976, p.57. Holotype: Alberti, 1959b, pl.9, fig.2. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Australiella*, thirdly *Isabelia* (combination illegitimate), fourthly (and now) *Isabelidinium*. Taxonomic junior synonyms: *Deflandrea* (as *Isabelidinium*) *belfastensis* and *Isabelidinium bujakii*, according to Fensome et al. (2009, p.39). Age: Late Cretaceous.

"*cretacea*" (Cookson, 1956, p.184–185, pl.1, figs.1–7 [but see discussion under *Isabelidinium cretaceum*]) Lentin and Williams, 1976, p.57. Holotype: Cookson, 1956, pl.1, fig.1; Helby et al., 1987, fig.42L. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*, fourthly *Manumiella?* Age: Late Cretaceous.

"*dakotaensis*" (Stanley, 1965, p.217–218, pl.19, figs.1–3) Lentin and Williams, 1976, p.57. Holotype: Stanley, 1965, pl.19, figs.1–3. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Chatangiella*?. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Chatangiella*?. Age: Paleocene.

"*delicata*" (Balteş, 1969, p.31, pl.1, fig.7 ex Lentin and Williams, 1973, p.40) Lentin and Williams, 1976, p.58. Holotype: Balteş, 1969, pl.1, fig.7, designated by Lentin and Williams (1973, p.40). **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Age: early Eocene.

"*druggii*" (Stover, 1974, p.171, pl.1, figs.3a–b,4; text-fig.3B) Lentin and Williams, 1976, p.58. Holotype: Stover, 1974, pl.1, figs.3a–b. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Taxonomic senior synonym: *Broomea* (as and now *Manumiella*) *seelandica*, according to Firth (1987, p.213) — however, Thorn et al. (2009, p.443) retained *Manumiella druggii*. Taxonomic junior synonym: *Isabelidinium tingitanense*, according to Lentin and Williams (1985, p.201). Age: early-middle Paleocene.

"*gambangensis*" (Cookson and Eisenack, 1970a, p.140, pl.11, figs.1–2) Lentin and Williams, 1976, p.58. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.1. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

"*glabra*" (Cookson and Eisenack, 1969, p.3, fig.1A) Lentin and Williams, 1976, p.58. Holotype: Cookson and Eisenack, 1969, fig.1A. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Albian–Cenomanian.

"*globosa*" (Davey, 1970, p.344, pl.2, fig.3) Lentin and Williams, 1976, p.58. Holotype: Davey, 1970, pl.2, fig.3. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*?. Originally *Deflandrea*, subsequently *Isabelia*? (combination illegitimate), thirdly (and now) *Isabelidinium*?. Questionable assignment: Lentin and Williams (1976, p.58). Age: Cenomanian.

"*glomerata*" (Davey, 1970, p.343–344, pl.1, figs.7–9) Lentin and Williams, 1976, p.58. Holotype: Davey, 1970, pl.1, figs.7–8. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eurydinium*. Age: Cenomanian.

"**korojonensis*" (Cookson and Eisenack, 1958, p.27–28, pl.4, figs.10–11) Lentin and Williams, 1976, p.56. Holotype: Cookson and Eisenack, 1958, pl.4, fig.10; Eisenack and Klement, 1964, p.191; Fensome et al., 1996, fig.1 — p.2187. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Campanian–early Maastrichtian.

"*lata*" (Cookson and Eisenack, 1968, p.110, figs.1A–C) Lentin and Williams, 1976, p.58. Holotype: Cookson and Eisenack, 1968, fig.1A. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Age: ?Santonian–early Campanian.

"*madurensis*" (Cookson and Eisenack, 1970a, p.140, pl.11, figs.3–4) Lentin and Williams, 1976, p.58. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.3; Eisenack and Kjellström, 1975a, page labelled "nach S.194"; Fensome et al., 1996, fig.1 — p.2219. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

"*microarma*" (McIntyre, 1975, p.65, pl.1, figs.5–8) Lentin and Williams, 1976, p.58. Holotype: McIntyre, 1975, pl.1, figs.5–6. **Combination illegitimate**: the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*.

Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Campanian–Maastrichtian.

"pellucida" (Deflandre and Cookson, 1955, p.251, pl.4, fig.3) Lentin and Williams, 1976, p.58. Holotype: Deflandre and Cookson, 1955, pl.4, fig.3; Cookson and Eisenack, 1958, pl.4, fig.9; Stover, 1974, pl.1, figs.7a–b. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium pellucidum*. Originally *Deflandrea bakeri* forma *pellucida*, subsequently *Deflandrea pellucida*, thirdly *Isabelia pellucida* (combination illegitimate), fourthly (and now) *Isabelidinium pellucidum*, fifthly *Alterbia pellucida* (combination illegitimate). Age: Paleocene–early Eocene.

"rhombovalis" (Cookson and Eisenack, 1970a, p.143, pl.12, figs.10–11) Lentin and Williams, 1976, p.58. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.11. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium?*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Isabelidinium?*. Age: late Albian–Santonian.

"seelandica" (Lange, 1969, p.113–114, pl.2, fig.10; pl.3, fig.3) Lentin and Williams, 1976, p.58. Emendation: Firth, 1987, p.213–214, as *Manumiella seelandica*. Holotype: Lange, 1969, pl.3, fig.3; Fensome et al., 1995, fig.2 — p.1773. **NOW** *Manumiella*. Originally *Broomea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Taxonomic junior synonym: *Deflandrea* (as *Manumiella*) *druggii*, according to Firth (1987, p.213) — however Thorn et al. (2009, p.443) retained *Deflandrea* (as *Manumiella*) *druggii*. Age: Danian

"spinosissima" (Cookson and Eisenack, 1970a, p.141, pl.11, figs.5–6) Lentin and Williams, 1976, p.59. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.5. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

"thomasii" (Cookson and Eisenack, 1961a, p.71–72, pl.11, figs.7–10) Lentin and Williams, 1976, p.59. Holotype: Cookson and Eisenack, 1961a, pl.11, fig.8. **Combination illegitimate:** the generic name *Isabelia* is illegitimate. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Senonian.

ISABELIDINIUM Lentin and Williams, 1977a, p.167. Emendations: Marshall, 1988, p.203,205; Fensome et al., 2009, p.39. Substitute name for *Isabelia* Lentin and Williams, 1976, p.56 (an illegitimate name). Marshall (1988, p.205) suggested that *Manumiella* may be a taxonomic junior synonym of this genus. Type: Cookson and Eisenack, 1958, pl.4, fig.10, as *Deflandrea korojonensis*.

acuminatum (Cookson and Eisenack, 1958, p.27, pl.4, figs.5–8) Stover and Evitt, 1978, p.109. Holotype: Cookson and Eisenack, 1958, pl.4, fig.5. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*, fourthly (and now) *Isabelidinium*. Age: Cenomanian–early Turonian.

?amphiatum (McIntyre, 1975, p.65–66, pl.2, figs.5–8) Lentin and Williams, 1977a, p.167. Holotype: McIntyre, 1975, pl.2, figs.5–6. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium?*, fourthly *Alterbia* (combination illegitimate). Lentin and Williams (1985, p.199) retained this species in *Isabelidinium*. Questionable assignment: Lentin and Williams (1977a, p.167). Age: Campanian–Maastrichtian.

armatum (Cookson and Eisenack, 1970a, p.142–143, pl.13, fig.9) Lindgren, 1984, p.165. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.9. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly *Chatangiella?*, fourthly (and now) *Isabelidinium*. Age: Senonian.

bakeri (Deflandre and Cookson, 1955, p.251, pl.4, figs.1–4) Lentin and Williams, 1977a, p.167. Emendation: Stover, 1974, p.169–170, as a "revised description" for *Deflandrea bakeri*. Holotype: Deflandre and Cookson, 1955, pl.4, fig.1. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now)

Isabelidinium, fourthly *Alterbia* (combination illegitimate). Lentin and Williams (1985, p.199) retained this species in *Isabelidinium*. Age: Paleocene–early Eocene.

"*balmei*" (Cookson and Eisenack, 1962b, p.486) Stover and Evitt, 1978, p.109. Emendation: Morgan, 1977, p.130, as *Alterbia minor*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.1; Morgan, 1977, text-fig.2. **NOW** *Spinidinium balmei*. Originally *Deflandrea minor* (name illegitimate), subsequently *Deflandrea balmei*, thirdly *Alterbia balmei* (combination illegitimate), fourthly *Isabelidinium balmei*, fifthly (and now) *Spinidinium balmei*, sixthly *Magallanesium balmei*. Taxonomic senior synonym: *Palaeohystrichophora* (as *Diconodinium*) *minuta*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea* (as *Isabelidinium*, now *Spinidinium*) *balmei*. Age: Late Cretaceous.

"*belfastense*" (Cookson and Eisenack, 1961a, p.71, pl.11, figs.4–6) Lentin and Williams, 1977a, p.167. Holotype: Cookson and Eisenack, 1961a, pl.11, fig.4; Helby et al., 1987, fig.41D. **Taxonomic senior synonym:** *Deflandrea* (now *Isabelidinium*) *cooksoniae* according to Fensome et al. (2009, p.39). Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*. Age: Late Cretaceous.

brunae Roncaglia et al., 1999, p.305,307, fig.14, nos.7–8,11. Holotype: Roncaglia et al., 1999, fig.14, no.11. Age: middle-late Campanian.

"*bujakii*" Marheinecke, 1992, p.86–87, pl.18, figs.1–3; text-fig.16. Holotype: Marheinecke, 1992, pl.18, figs.2–3. **Taxonomic senior synonym:** *Deflandrea* (now *Isabelidinium*) *cooksoniae*, according to Fensome et al. (2009, p.39). Contrary to the opinion of Lentin and Williams (1993, p.357), Williams et al. (1998, p.339) considered this name to be validly published. Age: early Maastrichtian.

campbellensis (Wilson, 1967b, p.225, figs.2–3) Lebedeva, 2000, p.118. Holotype: Wilson, 1967b, fig.2. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Isabelidinium*. Age: Maastrichtian (see Wilson, 1972).

cingulatum Wilson, 1988, p.25, pl.14, figs.3,4a–c. Holotype: Wilson, 1988, pl.14, figs.4a–c; Fensome et al., 1996, figs.1–3 — p.2091. Age: Paleocene.

"*conoratum*" (Stover, 1974, p.171–172, pl.1, figs.8a–b; text-fig.3C) Lentin and Williams, 1977a, p.167. Holotype: Stover, 1974, pl.1, figs.8a–b. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly *Eurydinium*, fifthly (and now) *Manumiella*. Age: early-middle Paleocene.

cooksoniae (Alberti, 1959b, p.97, pl.9, figs.1–6) Lentin and Williams, 1977a, p.167. Holotype: Alberti, 1959b, pl.9, fig.2. Originally *Deflandrea*, subsequently *Australiella*, thirdly *Isabelia* (combination illegitimate), fourthly (and now) *Isabelidinium*. Taxonomic junior synonyms: *Deflandrea* (as *Isabelidinium*) *belfastensis* and *Isabelidinium bujakii*, according to Fensome et al. (2009, p.39). Age: Late Cretaceous.

cretaceum (Cookson, 1956, p.184–185, pl.1, figs.1–7 [but see below]) Lentin and Williams, 1977a, p.167. Holotype: Cookson, 1956, pl.1, fig.1; Helby et al., 1987, fig.42L. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*, fourthly *Manumiella*? This species was retained in *Isabelidinium* by Bowman et al. (2012, p.54). Of the original illustrations in the protologue, pl.1, figs.6–7 were considered by Cookson and Eisenack (1960a, p.4) to belong to their new species, *Nelsoniella aceras*; pl.1, fig.5 was considered by Lentin and Williams (1985, p.231) to belong to *Manumiella delicata*; thus, only pl.1, figs.1–4 are now considered to belong to this species. Age: Late Cretaceous.

"subsp. *cretaceum*". Autonym. Holotype: Cookson, 1956, pl.1, fig.1; Helby et al., 1987, fig.42L. **NOW** *Manumiella cretacea* subsp. *cretacea*. Originally *Isabelidinium cretaceum* subsp. *cretaceum*, subsequently (and now) *Manumiella cretacea* subsp. *cretacea*.

"subsp. *gravidum*" Mao Shaozhi and Mohr, 1992, p.319, pl.1, figs.11–12. Holotype: Mao Shaozhi and Mohr, 1992, pl.1, fig.11. **NOW** *Manumiella? cretacea* subsp. *gravida*. Originally *Isabelidinium cretaceum* subsp. *gravidum*, subsequently (and now) *Manumiella? cretacea* subsp. *gravida*. Age: Maastrichtian.

- "subsp. *oviforme*" Mao Shaozhi and Mohr, 1992, p.319–310, pl.1, figs.7,9; pl.10, fig.2; pl.11, fig.5. Holotype: Mao Shaozhi and Mohr, 1992, pl.1, fig.7. **NOW** *Manumiella? cretacea* subsp. *oviformis*. Originally *Isabelidinium cretaceum* subsp. *oviforme*, subsequently (and now) *Manumiella? cretacea* subsp. *oviformis*. Age: late Campanian.
- "*dakotaense*" (Stanley, 1965, p.217–218, pl.19, figs.1–3) Lentin and Williams, 1977a, p.167. Holotype: Stanley, 1965, pl.19, figs.1–3. **NOW** *Chatangiella?*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Chatangiella?*. Age: Paleocene.
- "*delicatum*" (Balteş, 1969, p.31, pl.1, fig.7 ex Lentin and Williams, 1973, p.40) Lentin and Williams, 1977a, p.167. Holotype: Balteş, 1969, pl.1, fig.7, designated by Lentin and Williams (1973, p.40). **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Age: early Eocene.
- "*druggii*" (Stover, 1974, p.171, pl.1, figs.3a–b,4; text-fig.3B) Lentin and Williams, 1977a, p.167. Holotype: Stover, 1974, pl.1, figs.3a–b. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Taxonomic senior synonym: *Broomea* (as and now *Manumiella seelandica*, according to Firth (1987, p.213) — however, Thorn et al. (2009, p.443) retained *Manumiella druggii*. Taxonomic junior synonym: *Isabelidinium tingitanense*, according to Lentin and Williams (1985, p.201). Age: early-middle Paleocene.
- "*?extremum*" (Cookson and Eisenack, 1974, p.48, pl.20, fig.4) Stover and Evitt, 1978, p.109. Holotype: Cookson and Eisenack, 1974, pl.20, fig.4. **NOW** *Spongodinium?*. Originally *Deflandrea*, subsequently (and now) *Spongodinium?*, thirdly *Isabelidinium?*. Questionable assignment: Stover and Evitt (1978, p.109). Age: Albian–Cenomanian.
- foucheri* Schiøler, 1992, p.8,12,16,20, pl.1, figs.5–8. Holotype: Schiøler, 1992, pl.1, figs.6–7. Age: Coniacian.
- gallium* (Davey and Verdier, 1973, p.196–197, pl.3, figs.1–4) Stover and Evitt, 1978, p.109. Holotype: Davey and Verdier, 1973, pl.3, figs.1,3. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly (and now) *Isabelidinium*. Age: late Albian–early Cenomanian.
- "*gambangense*" (Cookson and Eisenack, 1970a, p.140, pl.11, figs.1–2) Lentin and Williams, 1977a, p.167. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.1. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.
- glabrum* (Cookson and Eisenack, 1969, p.3, fig.1A) Lentin and Williams, 1977a, p.167. Holotype: Cookson and Eisenack, 1969, fig.1A. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Albian–Cenomanian.
- ?globosum* (Davey, 1970, p.344, pl.2, fig.3) Lentin and Williams, 1977a, p.167. Holotype: Davey, 1970, pl.2, fig.3. Originally *Deflandrea*, subsequently *Isabelia?* (combination illegitimate), thirdly (and now) *Isabelidinium?*. Questionable assignment: Lentin and Williams (1977a, p.167). Age: Cenomanian.
- "*glomeratum*" (Davey, 1970, p.343–344, pl.1, figs.7–9) Lentin and Williams, 1977a, p.167. Holotype: Davey, 1970, pl.1, figs.7–8. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eurydinium*. Age: Cenomanian.
- greenense* Marshall, 1990a, p.24,26,28, figs.12A–C,14A–Z,AA–GG,21A–R,22A–D. Holotype: Marshall, 1990a, figs.12A,14S,21F–I; Fensome et al., 1996, figs.1–4,12 — p.2143. Age: Campanian.
- "*?haumuriense*" Wilson, 1984c, p.554, figs.14–21. Holotype: Wilson, 1984c, figs.14–15; Lentin and Manum, 1986, text-fig.4B; Fensome et al., 1996, figs.1–2 — p.2147. **NOW** *Satyrodinium*. Originally *Isabelidinium*, subsequently *Isabelidinium?*, thirdly (and now) *Satyrodinium*. Questionable assignment: Lentin and Williams (1985, p.200). Age: Maastrichtian.

**korojonense* (Cookson and Eisenack, 1958, p.27–28, pl.4, figs.10–11) Lentin and Williams, 1977a, p.167. Holotype: Cookson and Eisenack, 1958, pl.4, fig.10; Eisenack and Klement, 1964, p.191; Fensome et al., 1996, fig.1 — p.2187. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Campanian–early Maastrichtian.

"latum" (Cookson and Eisenack, 1968, p.110, figs.1A–C) Lentin and Williams, 1977a, p.168. Holotype: Cookson and Eisenack, 1968, fig.1A. **NOW** *Manumiella*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Age: ?Santonian–early Campanian.

"madurense" (Cookson and Eisenack, 1970a, p.140, pl.11, figs.3–4) Lentin and Williams, 1977a, p.168. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.3; Eisenack and Kjellström, 1975a, page labelled "nach S.194"; Fensome et al., 1996, fig.1 — p.2219. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium*. Age: Senonian.

magnum (Davey, 1970, p.342–343, pl.2, figs.6–8) Stover and Evitt, 1978, p.109. Holotype: Davey, 1970, pl.2, fig.6. Originally *Deflandrea*, subsequently *Chatangiella*, thirdly (and now) *Isabelidinium*. Age: Cenomanian.

majae Schiøler, 1993, p.108,110, pl.1, figs.1–6; text-figs.4a–h. Holotype: Schiøler, 1993, pl.1, fig.1; text-fig.4a. Age: latest Maastrichtian.

marshallii Roncaglia, 2000, p.138–139,142–143,145, figs.3A–N,4A–N. Holotype: Roncaglia, 2000, figs.3A–B. Age: Campanian.

microarmum (McIntyre, 1975, p.65, pl.1, figs.5–8) Lentin and Williams, 1977a, p.168. Holotype: McIntyre, 1975, pl.1, figs.5–6. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Campanian–Maastrichtian.

"microverrucosum" (Yu Jingxian and Zhang Wangping, 1980, p.109, pl.3, figs.1–2) Lentin and Williams, 1985, p.201. **Incorrect orthographic variant** of *Isabelidinium?* (now *Alterbidinium*) *microverrucosum*, which see.

"microverrucosum" (Yu Jingxian and Zhang Wangping, 1980, p.109, pl.3, figs.1–2) Lentin and Williams, 1985, p.201. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.3, fig.2. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Isabelidinium?*, thirdly (and now) *Alterbidinium*. Questionable assignment: Lentin and Williams (1985, p.201). Yu Jingxian and Zhang Wangping (1980, p.109) spelled the epithet as "*microverrucosa*", but as "*microverrucosa*" in their plate caption. Previous editions of the "Lentin and Williams Index" and DINOFLAJ2 have cited the epithet as "*microverrucosa* / *microverrucosum*", but He Chengquan et al. (2009, p.416) used "*microverrucosum*", which we follow here. Age: Campanian–early Maastrichtian.

papillum Sumner, 1992, p.306,308, figs.3b–c. Holotype: Sumner, 1992, fig.3b. Age: middle to late Campanian.

pellucidum (Deflandre and Cookson, 1955, p.251, pl.4, fig.3) Lentin and Williams, 1977a, p.168. Holotype: Deflandre and Cookson, 1955, pl.4, fig.3; Cookson and Eisenack, 1958, pl.4, fig.9; Stover, 1974, pl.1, figs.7a–b. Originally *Deflandrea bakeri* forma *pellucida*, subsequently *Deflandrea pellucida*, thirdly *Isabelia pellucida* (combination illegitimate), fourthly (and now) *Isabelidinium pellucidum*, fifthly *Alterbia pellucida* (combination illegitimate). Lentin and Williams (1985, p.201) retained this species in *Isabelidinium*. Age: Paleocene–early Eocene.

poncticum Marshall, 1988, p.205, figs.8A–M,15A–X. Holotype: Marshall, 1988, figs.8A,15A–F; Fensome et al., 1996, figs.1–5,13 — p.2287. Age: Santonian.

psilatium (Yu Jingxian and Zhang Wangping, 1980, p.108–109, pl.2, figs.19–20) Lentin and Williams, 1985, p.201. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.2, fig.20. Originally *Deflandrea*, subsequently (and now) *Isabelidinium*. Age: Campanian–early Maastrichtian.

?rhombovale (Cookson and Eisenack, 1970a, p.143, pl.12, figs.10–11) Lentin and Williams, 1977a, p.168. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.11. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Isabelidinium?*. Questionable assignment: Stover and Evitt (1978, p.109). Age: late Albian–Senonian.

"seelandicum" (Lange, 1969, p.113–114, pl.2, fig.10; pl.3, fig.3) Lentin and Williams, 1977a, p.168. Emendation: Firth, 1987, p.213–214, as *Manumiella seelandica*. Holotype: Lange, 1969, pl.3, fig.3; Fensome et al., 1995, fig.2 — p.1773. **NOW** *Manumiella*. Originally *Broomea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Taxonomic junior synonym: *Deflandrea* (as *Manumiella*) *druggii*, according to Firth (1987, p.213) — however Thorn et al. (2009, p.443) retained *Deflandrea* (as *Manumiella*) *druggii*. Age: Danian.

spasicum (Grigorovich, 1969b, p.67–68, pl.1, fig.1) Lentin and Williams, 1981, p.158. Holotype: Grigorovich, 1969b, pl.1, fig.1. Originally *Australiella*, subsequently (and now) *Isabelidinium*. Age: Late Cretaceous.

"spinossimum" (Cookson and Eisenack, 1970a, p.141, pl.11, figs.5–6) Lentin and Williams, 1977a, p.168. Holotype: Cookson and Eisenack, 1970a, pl.11, fig.5. **NOW** *Eucladinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Eucladinium* (combination illegitimate). Age: Senonian.

svartenhukense Nøhr-Hansen, 1996, p.34–35, pl.3, figs.7–12. Holotype: Nøhr-Hansen, 1996, pl.3, fig.7. Age: early Coniacian–early Santonian.

thomasii (Cookson and Eisenack, 1961a, p.71–72, pl.11, figs.7–10) Lentin and Williams, 1977a, p.168. Holotype: Cookson and Eisenack, 1961a, pl.11, fig.8. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*. Age: Senonian.

"tingitanense" Rauscher and Doubinger, 1982, p.103–104, pl.1, figs.1–6; pl.2, fig.17. Holotype: Rauscher and Doubinger, 1982, pl.1, fig.1. **Taxonomic senior synonym:** *Deflandrea* (now *Manumiella*) *druggii*, according to Lentin and Williams (1985, p.201). Age: late Maastrichtian.

variabile Marshall, 1988, p.205,207,211, figs.9A–P,10A–H,13A–Z,14A–Y. Holotype: Marshall, 1988, figs.13A–E; Fensome et al., 1996, figs.3–7 — p.2419. Age: Santonian.

?viborgense Heilmann-Clausen, 1985, p.22–23, pl.1, figs.21–25; text-fig.9. Holotype: Heilmann-Clausen, 1985, pl.1, figs.24–25; text-fig.9A. Questionable assignment: Heilmann-Clausen (1985, p.22). Age: late Paleocene.

weidichii Kirsch, 1991, p.107–108, pl.21, figs.5–8. Holotype: Kirsch, 1991, pl.21, fig.7. Age: early Maastrichtian.

ISLANDINIUM Head et al. 2001, p.629. Taxonomic junior synonym: *Cantiacidinium* (name not validly published), by implication in Head et al. (2001, p.629), who considered the only recorded species name, *Cantiacidinium conicum* (name not validly published), to be a taxonomic junior synonym of *Islandinium minutum*. Type: Harland et al., 1980, fig.2O, as *Multispinula? minuta*.

brevispinosum Pospelova and Head, 2002, p.594–595,597–598, figs.3a–u,4a–p,5a–b,6a–c. Holotype: Pospelova and Head, 2002, figs.3a–m. Age: Holocene.

?cezare (de Vernal et al., 1989, p.2463, pl.2, figs.5,10 ex de Vernal in Rochon et al., 1999, p.53) Head et al., 2001, p.631. Emendation: Head et al., 2001, p.631, as *Islandinium cezare*. Holotype: de Vernal et al., 1989, pl.2, fig. 10, designated by Rochon et al., 1999, p.53. Originally *Algidasphaeridium? minutum* var. *cezare*, subsequently (and now) *Islandinium? cezare*. Questionable assignment: Head et al. (2001, p.631). Age: late Pleistocene.

***minutum** (Harland and Reid in Harland et al., 1980, p.216,218, figs.2M–O) Head et al., 2001, p.629. Holotype: Harland et al., 1980, fig.2O. Emendation: Potvin et al. (2013, p.16–17). Originally *Multispinula*, subsequently

Multispinula?, thirdly *Algidasphaeridium?*, fourthly (and now) *Islandinium*. Taxonomic junior synonym: *Cantiacidinium conicum* (name not validly published), according to Head et al. (2001, p.629). Age: Holocene.

"*tricingulatum*" (Kawami et al., 2009, p.262–264, figs.2a–1,3a–p,4) Potvin et al., 2013, p.17. Holotype: Kawami et al., 2009, figs.3a–p. **Combination not validly published**: basionym not fully referenced. **NOW** *Protopteridinium* (Appendix B). Originally (and now) *Protopteridinium*, subsequently *Islandinium* (combination not validly published). This species is based on a motile cell. Age: extant.

ISTHMOCYSTIS Duxbury, 1979a, p.199–200. Type: Duxbury, 1979a, pl.1, figs.1–2; text-fig.4, as *Isthmocystis distincta*.

**distincta* Duxbury, 1979a, p.201, pl.1, figs.1–6; pl.2, fig.8; text-figs.3A–B,4. Holotype: Duxbury, 1979a, pl.1, figs.1–2; text-fig.4; Fensome et al., 1993a, figs.1–2,7 — p.1133. Age: Valanginian.

ITHNACYSTA Slimani, 1994, p.107. Type: Slimani, 1994, pl.18, figs.27–29, as *Ithnacysta elongata*.

**elongata* Slimani, 1994, p.107–108, pl.17, figs.16–19; pl.18, figs.27–29; text-fig.14. Holotype: Slimani, 1994, pl.18, figs.27–29. Age: late Maastrichtian–earliest Danian.

JAINIELLA Khowaja-Ateequzzaman and Garg, 1995, p.245–246. Type: Khowaja-Ateequzzaman and Garg, 1995, pl.1, figs.1–2, as *Jainiella breviornata*.

**breviornata* Khowaja-Ateequzzaman and Garg, 1995, p.246–247, pl.1, figs.1–6. Holotype: Khowaja-Ateequzzaman and Garg, 1995, pl.1, figs.1–2. Age: Late Cretaceous.

plena (Islam, 1983c, p.90, pl.4, figs.4–6) Khowaja-Ateequzzaman and Garg, 1995, p.246. Holotype: Islam, 1983c, pl.4, fig.5. Originally *Trivalvadinium*, subsequently (and now) *Jainiella*. Age: early Eocene.

JANSONIA Pocock, 1972, p.97. Emendation: Riding and Walton in Riding et al., 1991, p.146,148. Type: Pocock, 1972, pl.29, fig.8, as *Jansonia jurassica*.

**jurassica* Pocock, 1972, p.97–98, pl.29, figs.8–9; text-figs.14–15. Holotype: Pocock, 1972, pl.29, fig.8; Jansonius, 1986, pl.3, figs.4–6. Age: late Bajocian.

manifesta Riding and Walton in Riding et al., 1991, p.148–149, pl.8, figs.1–16; text-figs.5A–G. Holotype: Riding et al., 1991, pl.8, fig.1. Age: Bathonian.

psilata Martínez et al., 1999, p.257–259, pl.1, figs.1–9; text-figs.5A–D. Holotype: Martínez et al., 1999, pl.1, figs.1–2; text-figs.5A–D. Age: Middle Jurassic.

"*scarffei*" Tykoezinski et al., 2001, p.84,86, pl.1, figs.1a–c,2a–c,3a–b,4a–c,5a–c; pl.4, figs.10–13. Holotype: Tykoezinski et al., 2001, pl.1, figs.1a–c. **NOW** *Fostericysta*. Originally *Jansonia*, subsequently (and now) *Fostericysta*. Age: late Bathonian.

JINHUDINIUM Qian Zeshu et al., 1986, p.23,28. Type: Qian Zeshu et al., 1986, pl.1, fig.5, as *Jinhudinium laevigatum*.

granulatum Qian Zeshu et al., 1986, p.23, pl.1, figs.1–4. Holotype: Qian Zeshu et al., 1986, pl.1, fig.2. Age: Paleocene–Eocene.

**laevigatum* Qian Zeshu et al., 1986, p.23–24, pl.1, figs.5–6; text-fig.2. Holotype: Qian Zeshu et al., 1986, pl.1, fig.5. Age: Paleocene–Eocene.

JUERGENELLA Banasová et al., 2007, p.111 ex Streng et al., 2009, p.236. Calcareous dinoflagellate genus (see Gottschling and Soehner, 2013, p.128). The name was not validly published in Banasová et al. (2007), since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1). Type: Hildebrand-Habel and Willems, 1999, pl.1, figs.8–10, as *Calcigonellum ansatum*.

**ansata* (Hildebrand-Habel and Willems, 1999, p.93, pl.1, figs.8–12; pl.2, figs.1–6; text-fig.2) Streng et al., 2009, p.237. Holotype: Hildebrand-Habel and Willems, 1999, pl.1, figs.8–10. Originally *Calcigonellum*, subsequently *?Calcigonellum*, thirdly (and now) *Juergenella*. Age: late Eocene.

granulata (Kohring, 1993a, p.55–57, pl.32, figs.g–m; text-fig.9) Streng et al., 2009, p.237. Holotype: Kohring, 1993a, pl.32, fig.k. Originally *Calcigonellum*, subsequently *?Calcigonellum*, thirdly (and now) *Juergenella*. Age: middle Oligocene.

remanei Streng et al., 2009, p.237, pl.9, figs.1–9, text-figs.3A,7. Holotype: Streng et al., 2009, pl.9, fig.1. Age: middle Miocene.

JUSELLA Vozzhennikova, 1963, p.183. Siliceous dinoflagellate genus. Type: Vozzhennikova, 1963, text-figs.19a–b, as *Jusella denticulata* (which see for lectotype).

crebraporosa Vozzhennikova, 1967, p.120, pl.53, figs.1–6. Holotype: Vozzhennikova, 1967, p.120 specified a holotype but did not give any details of the illustration(s). Age: early Oligocene.

**denticulata* Vozzhennikova, 1963, p.183; text-figs.19a–b. Holotype: Vozzhennikova, 1963, text-figs.19a–b; Vozzhennikova, 1967, pl.52, figs.4–5; lost according to Vozzhennikova (1967, p.119). Vozzhennikova (1967, p.119) considered that no description had been provided under this name by Vozzhennikova (1963). However, since the latter author provided a description for the genus *Jusella*, and since *Jusella denticulata* was the only species proposed at that time, the generic description also applied to the species (I.C.N. Article 38.5). The name *Jusella denticulata* was thus validly published in Vozzhennikova (1963). Age: early Oligocene.

"rariporosa" Vozzhennikova, 1967, p.119–120, pl.52, figs.1–5. Holotype: Vozzhennikova, 1963, text-figs.19a–b; Vozzhennikova, 1967, pl.52, figs.4–5; lost according to Vozzhennikova (1967, p.119). **Name illegitimate — nomenclatural senior synonym:** *Jusella denticulata*, which has the same holotype. Vozzhennikova (1967, p.119) designated a "lectotype" for *Jusella rariporosa*, but did not identify that specimen in the accompanying illustrations. Age: early Oligocene.

KAIWARADINIUM Wilson, 1978, p.81–82. Type: Wilson, 1978, figs.2A–B,3–5, as *Kaiwaradinium buccinatum*.

**buccinatum* Wilson, 1978, p.82, figs.2A–B,3–8. Holotype: Wilson, 1978, figs.2A–B,3–5; Fensome et al., 1993a, figs.1–3 — p.993; Fauconnier and Masure, 2004, pl.50, fig.7. Age: early Tithonian.

ramosum Wilson, 1984a, p.217,219,221, figs.12A–B,13–21. Holotype: Wilson, 1984a, figs.12A–B,16–17; Fensome et al., 1996, figs.1–2,7–8 — p.2315; Fauconnier and Masure, 2004, pl.50, fig.8. Age: Valanginian, according to Wilson and Helby (1988).

scrutillinum Backhouse, 1987, p.216,219, figs.6A–B,11E–I,14A. Holotype: Backhouse, 1987, figs.6A–B,11G–H; Fensome et al., 1996, figs.4–5,7–8 — p.2341; Fauconnier and Masure, 2004, pl.51, figs.1–3. Age: Valanginian.

KALLOSPHAERIDIUM de Coninck, 1969, p.44. Emendation: Jan du Chêne et al., 1985a, p.8–9. Type: de Coninck, 1969, pl.13, figs.14–15, as *Kallosphaeridium brevibarbatum*.

"*agglutinatum*" McIntyre and Brideaux, 1980, p.25, pl.12, figs.5–12. Holotype: McIntyre and Brideaux, 1980, pl.12, figs.7–9. **NOW** *Batiacasphaera*. Originally *Kallosphaeridium*?, subsequently (and now) *Batiacasphaera*. Questionable assignment: McIntyre and Brideaux (1980, p.25). Age: early-middle Valanginian.

"*aspersum*" (Jiabo, 1978, p.116, pl.31, figs.1–6; pl.49, figs.2–4) Sarjeant and Stancliffe, 1994, p.56. Holotype: Jiabo, 1978, pl.31, fig.1. Originally *Filisphaeridium* (Appendix A), subsequently (and now) *Kallosphaeridium*?. Questionable assignment: Sarjeant and Stancliffe (1994, p.56). Age: Oligocene.

"*bellulum*" (Jiabo, 1978, p.51, pl.23, figs.14–16) Lentin and Williams, 1981, p.160. Holotype: Jiabo, 1978, pl.23, fig.15. **NOW** *Batiacasphaera*?. Originally *Tenua* Eisenack, subsequently *Kallosphaeridium*?, thirdly *Batiacasphaera*, fourthly (and now) *Batiacasphaera*?, fifthly *Sentusidinium*. Questionable assignment: Lentin and Williams (1981, p.160). Age: Early Tertiary.

"*biornatum*" (Jiabo, 1978, p.52, pl.22, figs.21–29; pl.23, figs.1–4) Lentin and Williams, 1981, p.160. Holotype: Jiabo, 1978, pl.22, fig.24. **Combination not validly published:** basionym not fully referenced. **NOW** *Sentusidinium biornatum*. Originally *Tenua biornata*, subsequently *Kallosphaeridium biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum*, fourthly *Batiacasphaera biornata*, fifthly (and now) *Sentusidinium biornatum*. Age: Early Tertiary.

"subsp. *biornatum*". Autonym. Holotype: Jiabo, 1978, pl.22, fig.24. **NOW** *Sentusidinium biornatum* subsp. *biornatum*. Originally *Tenua biornata* subsp. *biornata*, subsequently *Kallosphaeridium biornatum* subsp. *biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *biparatum*, fourthly *Batiacasphaera biornata* subsp. *biornata*, fifthly (and now) *Sentusidinium biornatum* subsp. *biornatum*.

"subsp. *crassum*" (Jiabo, 1978, p.52, pl.23, figs.1–4) Lentin and Williams, 1981, p.160. Holotype: Jiabo, 1978, pl.23, fig.3. **Combination not validly published:** basionym not fully referenced. **NOW** *Sentusidinium biornatum* subsp. *crassum*. Originally *Tenua biornata* subsp. *crassa*, subsequently *Kallosphaeridium biornatum* subsp. *crassum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *crassum*, fourthly *Batiacasphaera biornata* subsp. *crassa*, fifthly (and now) *Sentusidinium biornatum* subsp. *crassum*. Age: Early Tertiary.

biornatum Stover, 1977, p.73–74, pl.1, figs.9–10. Emendation: Jan du Chêne et al., 1985a, p.9–10. Holotype: Stover, 1977, pl.1, figs.9–10. Age: early Oligocene.

"*biparatum*" Lentin and Williams, 1981, p.160. Holotype: Jiabo, 1978, pl.22, fig.24. **NOW** *Sentusidinium biornatum*. Originally *Tenua biornata*, subsequently *Kallosphaeridium biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum*, fourthly *Batiacasphaera biornata*, fifthly (and now) *Sentusidinium biornatum*. Substitute name for *Tenua biornata* Jiabo, 1978, p.52, pl.22, figs.21–29; pl.23, figs.1–4 (an illegitimate name). Age: Early Tertiary.

"subsp. *biparatum*". Autonym. Holotype: Jiabo, 1978, pl.22, fig.24. **NOW** *Sentusidinium biornatum* subsp. *biornatum*. Originally *Tenua biornata* subsp. *biornata*, subsequently *Kallosphaeridium biornatum* subsp. *biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *biparatum*, fourthly *Batiacasphaera biornata* subsp. *biornata*, fifthly (and now) *Sentusidinium biornatum* subsp. *biornatum*.

"subsp. *crassum*" (Jiabo, 1978, p.52, pl.23, figs.1–4) Lentin and Williams, 1981, p.160. Holotype: Jiabo, 1978, pl.23, fig.3. **NOW** *Sentusidinium biornatum* subsp. *crassum*. Originally *Tenua biornata* subsp. *crassa*, subsequently *Kallosphaeridium biornatum* subsp. *crassum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *crassum*, fourthly *Batiacasphaera biornata* subsp. *crassa*, fifthly (and now) *Sentusidinium biornatum* subsp. *crassum*. Age: Early Tertiary.

**brevibarbatum* de Coninck, 1969, p.44–45, pl.13, figs.14–15. Emendation: Jan du Chêne et al., 1985a, p.10. Holotype: de Coninck, 1969, pl.13, figs.14–15; Jan du Chêne et al., 1985a, pl.1, fig.3; text-fig.4A. Age: early Eocene.

callosum Dodekova, 1994, p.22–23, pl.4, figs.7–9. Holotype: Dodekova, 1994, pl.4, fig.7. Age: middle Tithonian–Berriasian.

capulatum Stover, 1977, p.74, pl.1, figs.11–13. Emendation: Jan du Chêne et al., 1985a, p.10–11. Holotype: Stover, 1977, pl.1, figs.12–13; Jan du Chêne et al., 1985a, pl.2, figs.1–7; text-figs.5A–B. Age: middle-late Oligocene.

?*circulare* (Cookson and Eisenack, 1971, p.219, pl.8, fig.6) Helby, 1987, p.324–325. Holotype: Cookson and Eisenack, 1971, pl.8, fig.6. Originally *Canningia*, subsequently *Canningia*?, thirdly *Batiacasphaera*, fourthly (and now) *Kallosphaeridium*?. Questionable assignment: Helby (1987, p.324–325). Age: Middle Cretaceous, ?Turonian.

coninckii (Burger, 1980a, p.74, pl.26, figs.5,6a–b) Burger, 1980b, p.277. Holotype: Burger, 1980a, pl.26, figs.6a–b. Originally *Membranosphaera*, subsequently (and now) *Kallosphaeridium*. Age: Albian.

"*curiosum*" Bujak, 1984, p.188, pl.2, figs.17–20. Holotype: Bujak, 1984, pl.2, fig.19. **NOW** *Batiacasphaera*. Originally *Kallosphaeridium*, subsequently (and now) *Batiacasphaera*. Age: middle-late Eocene.

dolomiticum Torricelli, 2000, p.261–262, pl.4, figs.9,12. Holotype: Torricelli, 2000, pl.4, fig.9. Age: late Hauterivian.

?*granulatum* (Norvick, 1976, p.79–80, pl.11, fig.9; pl.12, fig.3) Stover and Evitt, 1978, p.59. Holotype: Norvick, 1976, pl.11, fig.9. Originally *Membranosphaera*, subsequently (and now) *Kallosphaeridium*?. Questionable assignment: Stover and Evitt (1978, p.59). Age: Cenomanian.

?*helbyi* Lentin and Williams, 1989, p.206. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. Originally *Canningia minor*, subsequently *Canningia? minor*, thirdly *Batiacasphaera minor*, fourthly *Chytroeisphaeridia minor*, fifthly *Kallosphaeridium? minus* (combination illegitimate), sixthly (and now) *Kallosphaeridium? helbyi*. Questionable assignment: Lentin and Williams (1989, p.206). Substitute name for *Kallosphaeridium? minus* (Cookson and Hughes, 1964, p.43, pl.8, figs.1–3,5) Helby, 1987, p.324–325 (an illegitimate name). Age: late Albian–early Cenomanian.

subsp. *helbyi*. Autonym. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. Originally *Canningia? minor* subsp. *minor*, subsequently *Chytroeisphaeridia minor* subsp. *minor*, thirdly (and now) *Kallosphaeridium? helbyi* subsp. *helbyi*. Age: late Albian–early Cenomanian.

subsp. *psilatum* (Burger, 1980a, p.71, pl.25, figs.5–11) Lentin and Williams, 1989, p.206. Holotype: Burger, 1980a, pl.25, fig.10. Originally *Canningia? minor* var. *psilata*, subsequently *Canningia? minor* subsp. *psilata*, thirdly *Chytroeisphaeridia minor* subsp. *psilata*, fourthly (and now) *Kallosphaeridium? helbyi* subsp. *psilatum*. Age: Aptian–Albian.

hypornatum Prauss, 1989, p.40–41, pl.6, figs.1–4; text-fig.16. Holotype: Prauss, 1989, pl.6, fig.1; text-fig.16. Age: middle-late Bajocian.

?*inornatum* Batten and Lister, 1988, p.344, figs.3a–b,d. Holotype: Batten and Lister, 1988, figs.3a–b. Questionable assignment: Batten and Lister (1988, p.344). Junior homonym: *Kallosphaeridium inornatum* Prauss, 1989. Age: Hauterivian.

"*inornatum*" Prauss, 1989, p.41–42, pl.5, figs.4–6, pl.6, fig.18; text-fig.17. Holotype: Prauss, 1989, pl.6, fig.18; text-fig.17. **Name illegitimate** — **senior homonym**: *Kallosphaeridium inornatum* Batten and Lister, 1988. **Substitute name**: *Kallosphaeridium praussii*. Originally *Kallosphaeridium inornatum* Prauss (name illegitimate), subsequently (and now) *Kallosphaeridium praussii*. Age: Aalenian–mid Bajocian.

jiyangense Xu Jinli et al., 1997, p.100, pl.18, fig.11; pl.20, fig.7 ex He Chengquan et al., 2009, p.656. Holotype: Xu Jinli et al., 1997, pl.18, fig.11. The name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided: He Chengquan et al. (2009, p.656) validated the name it by publishing an English diagnosis. Age: middle-late Eocene.

"?*minus*" (Cookson and Hughes, 1964, p.43, pl.8, figs.1–3,5) Helby, 1987, p.324–325. Holotype: Cookson and Hughes, 1964, pl.8, fig.1. **Combination illegitimate** — **senior homonym**: *Kallosphaeridium? minus* (Jiabo, 1978) Lentin and Williams, 1981. **Substitute name**: *Kallosphaeridium helbyi*. Originally *Canningia minor*, subsequently *Canningia? minor*, thirdly *Batiacasphaera minor*, fourthly *Chytroeisphaeridia minor*, fifthly *Kallosphaeridium minus* (combination illegitimate), sixthly (and now) *Kallosphaeridium? helbyi*. Questionable assignment: Helby (1987, p.324–325). Age: late Albian–early Cenomanian.

"?*minus*" (Jiabo, 1978, p.52–53, pl.23, figs.5–7) Lentin and Williams, 1981, p.161. Holotype: Jiabo, 1978, pl.23, fig.5. **NOW** *Sentusidinium minus*. Originally *Tenua hystrix* subsp. *minor*, subsequently *Kallosphaeridium? minus*, thirdly *Batiacasphaera minor* (combination illegitimate), fourthly *Batiacasphaera sinensis*, fifthly *Batiacasphaera jiaboi* (name not validly published), sixthly (and now) *Sentusidinium minus*. Questionable assignment: Lentin and Williams (1981, p.161). Junior homonym: *Kallosphaeridium? minus* (Cookson and Hughes, 1964) Helby, 1987. Age: Early Tertiary.

nigeriense Jan du Chêne et al., 1985a, p.12, pl.4, figs.1–13. Holotype: Jan du Chêne et al., 1985a, pl.4, figs.1–3. Age: late Paleocene (Thanetian)–early Eocene (Ypresian).

"*norvickii*" (Burger, 1980a, p.73–74, pl.26, figs.7–8) Lentin and Williams, 1981, p.161. Holotype: Burger, 1980a, pl.26, fig.7. **NOW** *Batiacasphaera*. Originally *Membranosphaera*, subsequently *Kallosphaeridium*, thirdly (and now) *Batiacasphaera*. Age: Albian.

orchiesense de Coninck, 1975, p.101–102, pl.18, figs.15–17. Emendation: Jan du Chêne et al., 1985a, p.12–13. Holotype: de Coninck, 1975, pl.18, figs.15–17; Jan du Chêne et al., 1985a, pl.3, figs.8–13; text-figs.4A–B. Age: early Eocene (Ypresian).

parvum Jan du Chêne, 1988, p.160–161, pl.13, figs.7–9; pl.14, figs.10–12; pl.15, figs.9–12; pl.16, figs.9–10; text-fig.5. Holotype: Jan du Chêne, 1988, pl.13, figs.7–8. This species was cited as "Jan du Chêne, sous presse" in Soncini and Rauscher (1988, p.449). Age: Danian.

praussii Lentin and Williams, 1993, p.365. Holotype: Prauss, 1989, pl.6, fig.18; text-fig.17. Originally *Kallosphaeridium inornatum* Prauss, 1989 (name illegitimate), subsequently (and now) *Kallosphaeridium praussii*. Substitute name for *Kallosphaeridium inornatum* Prauss, 1989, p.41–42, pl.5, figs.4–6; pl.6, fig.18; text-fig.17 (an illegitimate name). Age: Aalenian–mid Bajocian.

?*reticuloidum* (Jiabo, 1978, p.115–116, pl.31, figs.18–19) Sarjeant and Stancliffé, 1994, p.56. Holotype: Jiabo, 1978, pl.31, fig.19. Originally *Baltisphaeridium* (Appendix A), subsequently *Filisphaeridium* (Appendix A), thirdly (and now) *Kallosphaeridium?*. Questionable assignment: Sarjeant and Stancliffé (1994, p.56). Age: late Oligocene.

retirugosum (He Chengquan, 1991, p.56, pl.8, fig.11) He Chengquan et al., 2009, p.164. Holotype: He Chengquan, 1991, pl.8, fig.11. Originally *Canningia*; subsequently (and now) *Kallosphaeridium*. Age: Late Cretaceous.

?*ringnesiorum* (Manum and Cookson, 1964, p.15, pl.2, fig.10) Helby, 1987, p.324–325. Holotype: Manum and Cookson, 1964, pl.2, fig.10. Originally *Canningia*, subsequently *Canningia?*, thirdly *Batiacasphaera*, fourthly *Chytroeisphaeridia*, fifthly (and now) *Kallosphaeridium?*. Questionable assignment: Helby (1987, p.324–325). The epithet is correctly rendered as "*ringnesiorum*", rather than "*ringnesii*", since the species is named for the Ringnes brothers. Tocher and Jarvis (1987, p.151) also proposed this combination, but without question. Age: Campanian–Maastrichtian.

?*romaense* (Burger, 1980a, p.74, pl.27, figs.1–3) Burger, 1980b, p.277. Holotype: Burger, 1980a, pl.27, fig.3. Originally *Membranosphaera*, subsequently *Kallosphaeridium*, thirdly (and now) *Kallosphaeridium?*. Questionable assignment: Jan du Chêne et al. (1985a, p.15). Age: Aptian.

?*spongiosum* Batten and Lister, 1988, p.344–345, figs.4e–h. Holotype: Batten and Lister, 1988, figs.4e–g. Questionable assignment: Batten and Lister (1988, p.344). Age: late Hauterivian.

yorubaense Jan du Chêne and Adediran, 1985, p.22–23, pl.6, figs.7–12; pl.7, figs.7–10, pl.10; figs.1–4; text-fig.7. Holotype: Jan du Chêne and Adediran, 1985, pl.6, figs.11–12. Age: late Paleocene–early Eocene.

KALYPTEA Cookson and Eisenack, 1960b, p.256. Emendation: Wiggins, 1975, p.110. Taxonomic senior synonym: *Pareodinia*, according to Gocht (1970b, p.154) — however, Lentin and Williams (1993, p.365) retained *Kalyptea*. Taxonomic junior synonyms: *Komewuia*, according to Wiggins (1975, p.110) and, by implication in Dörhöfer and Davies (1980, p.30), who considered *Komewuia* to be the senior name — however, Chen (1982, p.32) retained *Komewuia*; *Netrelytron*, according to Wiggins (1975, p.110) and Poulsen (1996, p.60). Type: Cookson and Eisenack, 1960b, pl.39, fig.1, as *Kalyptea diceras*.

"*aceras*" Manum and Cookson, 1964, p.27–28, pl.6, figs.9–11. Holotype: Manum and Cookson, 1964, pl.6, fig.9. **NOW** *Caligodinium*. Originally *Kalyptea*, subsequently (and now) *Caligodinium*, thirdly *Pareodinia*. Taxonomic junior synonym: *Caligodinium amiculum*, according to Heilmann-Clausen (1985, p.18) — however, Lentin and Williams (1989, p.44) retained *Caligodinium amiculum*. Age: Cenomanian.

"*amiculum*" (Drugg, 1970b, p.815, figs.8A–B,9A–E) Jain and Millepied, 1975, p.145. Holotype: Drugg, 1970b, fig.9A; Biffi and Manum, 1988, text-fig.1D. **NOW** *Caligodinium*. Originally (and now) *Caligodinium*, subsequently *Kalyptea*. Taxonomic senior synonym: *Caligodinium aceraceras*, according to Heilmann-Clausen (1985, p.18) — however, Lentin and Williams (1989, p.44) retained *Caligodinium amiculum*. N.I.A. Age: Danian.

**diceras* Cookson and Eisenack, 1960b, p.256–257, pl.39, fig.1. Emendation: Fisher and Riley, 1980, p.323, as *Kalyptea diceras*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.1. Originally (and now) *Kalyptea*, subsequently *Komewuia*, thirdly *Pareodinia*. Lentin and Williams (1993, p.366) retained this species in *Kalyptea*. Taxonomic junior synonym: *Kalyptea jurassica*, according to Below (1990, p.65). Gocht (1970b, p.154) considered *Pareodinia ceratophora* to be the questionable taxonomic senior synonym of this species. Age: Tithonian.

?*distincta* Jain and Millepied, 1975, p.145–146, pl.4, fig.65. Holotype: Jain and Millepied, 1975, pl.4, fig.65. Originally *Kalyptea*, subsequently (and now) *Kalyptea*?. Questionable assignment: Stover and Evitt (1978, p.110) as a problematic species. Age: Aptian–Albian.

"*glabra*" (Cookson and Eisenack, 1960b, p.257, pl.39, figs.7–8) Wiggins, 1975, p.110. Emendation: Chen, 1982, p.32, as *Komewuia glabra*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.8. **NOW** *Komewuia*. Originally (and now) *Komewuia*, subsequently *Kalyptea*. Lentin and Williams (1981, p.162) retained this species in *Kalyptea*. Age: ?Tithonian.

"*granulata*" Jiabo, 1978, p.91, pl.6, fig.20. Holotype: Jiabo, 1978, pl.6, fig.20. **NOW** *Caligodinium*?. Originally *Kalyptea*, subsequently *Caligodinium*, thirdly (and now) *Caligodinium*?. Age: Early Tertiary.

"?halosa" Filatoff, 1975, p.91, pl.29, figs.10–11. Emendation: Prauss, 1989, p.42, as *Pareodinia halosa*. Holotype: Filatoff, 1975, pl.29, fig.10. **NOW** *Pareodinia*. Originally *Kalyptea*, subsequently *Kalyptea*?, thirdly *Caddasphaera*, fourthly *Pterocystidiopsis* (Appendix A), fifthly (and now) *Pareodinia*. Questionable assignment: Stover and Evitt (1978, p.110) as a problematic species. Age: Bajocian.

?*indica* Jain and Maheshwari in Jain et al., 1982, p.24–25, pl.1, figs.7–12; text-figs.1A–C. Holotype: Jain et al., 1982, pl.1, figs.8–9. Originally *Kalyptea*, subsequently (and now) *Kalyptea*?. Questionable assignment: Lentin and Williams (1985, p.205). Age: ?Late Jurassic.

"*jurassica*" Alberti, 1961, p.21, pl.7, fig.8. Holotype: Alberti, 1961, pl.7, fig.8. Originally *Kalyptea*, subsequently *Netrelytron* (combination not validly published). **Taxonomic senior synonym:** *Kalyptea diceras*, according to Below (1990, p.65). Taxonomic senior synonym: *Netrelytron* (as *Kalyptea*, now *Pareodinia*) *stegasta*, according to Wiggins (1975, p.110) and Kunz (1990 [January], p.12) — however, Below (1990 [October], p.65) considered

Kalyptea jurassica to be a taxonomic junior synonym of *Kalyptea diceras*. Gocht (1970b, p.154) considered *Pareodinia ceratophora* to be the questionable taxonomic senior synonym of this species. Age: Bathonian–Callovian.

"*monoceras*" Cookson and Eisenack, 1960b, p.257, pl.39, figs.2–3. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.2. **Taxonomic senior synonym:** *Pareodinia ceratophora*, according to Wiggins (1975, p.103) and Kunz (1990, p.13). Age: Late Jurassic.

"*par*" (Gitmez, 1970, p.314–315, pl.5, fig.4; pl.9, fig.4) Dodekova, 1992, p.51. Holotype: Gitmez, 1970, pl.9, fig.4. Originally *Netrelytron*, subsequently *Kalyptea*. **Taxonomic senior synonym:** *Netrelytron* (as *Kalyptea*) *stegastum*, according to Poulsen (1996, p.61). Taxonomic senior synonyms: *Pareodinia ceratophora* subsp. *ceratophora* (as *Pareodinia ceratophora* var. *ceratophora*), according to Below (1990, p.65); *Netrelytron* (as *Kalyptea*) *trinetrum*, according to Wiggins (1975, p.110). Gitmez (1970, p.314) indicated that the epithet is based on the Latin noun "par" (pair); hence, as a noun in apposition, it should be rendered as "*par*". N.I.A. Age: early Kimmeridgian.

stegasta (Sarjeant, 1961a, p.114–115, pl.15, fig.15; text-fig.14) Wiggins, 1975, p.110. Holotype: Sarjeant, 1961a, pl.15, fig.15; text-fig.14 (left figure); Sarjeant et al., 1987, pl.1, fig.6. Originally *Netrelytron*, subsequently (and now) *Kalyptea*, thirdly *Pareodinia*. Poulsen (1996, p.61) retained this species in *Kalyptea*. Taxonomic junior synonyms: *Netrelytron par* and *Netrelytron trinetrum*, both according to Poulsen (1996, p.61); *Kalyptea jurassica*, according to Wiggins (1975, p.110) and Kunz (1990 [January], p.12) — however, Below (1990 [October], p.65) considered *Kalyptea jurassica* to be a taxonomic junior synonym of *Kalyptea* (as *Pareodinia*) *diceras*. Age: early Oxfordian.

"*trinetra*" (Sarjeant, 1966c, p.199–200, pl.22, fig.3; text-fig.51) Wiggins, 1975, p.110. Holotype: Sarjeant, 1966c, pl.22, fig.3. Originally *Netrelytron*, subsequently *Kalyptea*, thirdly *Pareodinia*. **Taxonomic senior synonym:** *Netrelytron* (as *Kalyptea*) *stegastum*, according to Poulsen (1996, p.61). Taxonomic junior synonym: *Netrelytron par*, according to Wiggins (1975, p.110). For etymology, see under *Pareodinia trinetra*. Age: middle Barremian.

wisemaniae Stover and Helby, 1987a, p.110, figs.8,9A–C. Holotype: Stover and Helby, 1987a, fig.9A; Fensome et al., 1996, fig.1 — p.2451. Age: Berriasian.

KENLEYIA Cookson and Eisenack, 1965b, p.135–136. Type: Cookson and Eisenack, 1965b, pl.17, fig.3, as *Kenleyia pachycerata*.

conspicua He Chengquan, 1991, p.117, pl.12, figs.2,5. Holotype: He Chengquan, 1991, pl.12, fig.2. Age: early Eocene.

"*essentialis*" (de Coninck, 1969, p.38, pl.11, figs.7–8) Stover and Evitt, 1978, p.167. Holotype: de Coninck, 1969, pl.11, figs.7–8. **NOW** *Fibrocyta*. Originally *Lanternosphaeridium*, subsequently *Kenleyia?*, thirdly (and now) *Fibrocyta*. Questionable assignment: Stover and Evitt (1978 p.167). Age: early Eocene.

"*fimbriata*" Cookson and Eisenack, 1967b, p.252, pl.40, figs.1–7. Holotype: Cookson and Eisenack, 1967b, pl.40, fig.3. **NOW** *Muratodinium*. Originally *Kenleyia*, subsequently (and now) *Muratodinium*. Age: late Paleocene.

leptocerata Cookson and Eisenack, 1965b, p.136, pl.17, figs.5–6. Holotype: Cookson and Eisenack, 1965b, pl.17, fig.6. Age: Paleocene.

lophophora Cookson and Eisenack, 1965b, p.136–137, pl.17, figs.7–10. Holotype: Cookson and Eisenack, 1965b, pl.17, fig.8. Age: Paleocene.

nuda de Coninck, 1969, p.45–46, pl.13, figs.24–25. Holotype: de Coninck, 1969, pl.13, figs.24–25. Originally *Kenleyia?*, subsequently (and now) *Kenleyia*. Questionable assignment: de Coninck (1969, p.45) — however, Brinkhuis and Leereveld (1988, p.17) included the species in *Kenleyia* without question. Age: early Eocene.

**pachycerata* Cookson and Eisenack, 1965b, p.136, pl.17, figs.1–4. Holotype: Cookson and Eisenack, 1965b, pl.17, fig.3. Age: Paleocene.

shabaka Slimani et al., 2012, p.345–346, fig.5A–L. Holotype: Slimani et al., 2012, fig.5A–D. Age: early Danian.

xinjiangensis He Chengquan, 1991, p.117–118, pl.12, fig.1. Holotype: He Chengquan, 1991, pl.12, fig.1. Age: early Eocene.

KEUPPISPHAERA Lentin and Williams, 1989, p.397. Emendation: Keupp and Kowalski, 1992, p.216, as *Keuppisphaera*. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Substitute name for *Hexasphaera* Keupp, 1987, p.41 (an illegitimate name). Type: Keupp, 1987, pl.6, figs.8–12, as *Hexasphaera radiata*.

"*minuta*" (Keupp, 1987, p.40–41, pl.6, figs.1–7; text-fig.2a) Keupp and Kowalski, 1992, p.215. Holotype: Keupp, 1987, pl.6, figs.5–6. **Combination not validly published**: basionym not fully referenced. **NOW** *Calcigonellum*?. Originally *Calcigonellum*, subsequently *Keuppisphaera* (combination not validly published), thirdly (and now) *?Calcigonellum*. Age: middle Albian–early Cenomanian.

**radiata* (Keupp, 1987, p.41, pl.6, figs.8–12; text-fig.4) Lentin and Williams, 1989, p.397. Emendation: Keupp and Kowalski, 1992, p.216–217, as *Keuppisphaera radiata*. Holotype: Keupp, 1987, pl.6, figs.8–12. Originally *Hexasphaera* Keupp (name illegitimate), subsequently (and now) *Keuppisphaera*. Age: Albian–early Cenomanian.

KILWACYSTA Schrank, 2005, p.62. Type: Schrank, 2005, pl.6, figs.2,4, as *Kilwacysta semiseptata*.

multiramosa Schrank, 2005, p.64,66, pl.7, figs.1–4. Holotype: Schrank, 2005, pl.7, figs.1,3. Age: Tithonian.

**semiseptata* Schrank, 2005, p.62,64, pl.6, figs.2–6. Holotype: Schrank, 2005, pl.6, figs.2,4. Age: Tithonian.

KIOKANSIUM Stover and Evitt, 1978, p.167. Emendation: Duxbury, 1983, p.48. Taxonomic junior synonyms: *Bacchidinium*, according to Below (1982c, p.13–15) and Davey (1982a, p.377); *Nexosispinum*, according to Stover and Williams (1987, p.163) — however, Prössl (1990, p.104) retained *Nexosispinum*; *Taleisphaera*, according to Below (1982c, p.13–15) — however, Lentin and Williams (1985, p.206) retained *Taleisphaera*. Type: Tasch et al., 1964, pl.3, fig.8, as *Hystrichosphaeridium unituberculatum*.

"*brevispinosum*" Iosifova, 1992, p.61–62, pl.10, figs.2a–b,3a–b. Holotype: Iosifova, 1992, pl.10, figs.3a–b; Iosifova, 1996, pl.14, figs.1a–c. **NOW** *Warrenia*?. Originally *Kiokansium*, subsequently (and now) *Warrenia*?. Age: Valanginian.

"*corollum*" Hasenboehler in Below, 1984, p.634, pl.5, figs.2–4. **Name not validly published**: no description given. Below (1984, p.634) gave the citation "*Kiokansium corollum* (Hasenboehler, in press)".

declinatum Gao Ruiqi et al., 1992a, p.21,27, pl.2, figs.1–4. Holotype: Gao Ruiqi et al., 1992a, pl.2, fig.2. Age: Cenomanian.

?erectum (Manum and Cookson, 1964, p.14, pl.3, figs.5–6) Below, 1982c, p.15. Holotype: Manum and Cookson, 1964, pl.3, fig.5. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium*?, fourthly *Cleistosphaeridium*?, fifthly (and now) *Kiokansium*?. Questionable assignment: Below (1982c, p.15). Age: Albian–Turonian.

"*hesperus*" (Davey, 1979b, p.558, pl.6, figs.1–5) Stover and Williams, 1987, p.163. Holotype: Davey, 1979b, pl.6, fig.5; Fensome et al., 1995, fig.3 — p.1541. **NOW** *Nexosispinum*. Originally (and now) *Nexosispinum*, subsequently *Kiokansium*. N.I.A. Age: Aptian–Albian.

"*hydra*" (Duxbury, 1979a, p.201, pl.2, figs.1–4,6–7) Below, 1982c, p.16. Emendation: Harding, 1986a, p.97–98,100, as *Taleisphaera hydra*. Holotype: Duxbury, 1979a, pl.2, figs.1,4; Fensome et al., 1993a, figs.1–2 — p.1233. **NOW** *Taleisphaera*. Originally (and now) *Taleisphaera*, subsequently *Kiokansium*. N.I.A. Age: middle Barremian.

perprolatum Singh, 1983, p.150–151, pl.54, figs.7–8. Holotype: Singh, 1983, pl.54, fig.7. Age: middle Cenomanian.

"*polypes*" (Cookson and Eisenack, 1962b, p.491–492, pl.4, figs.11–13) Below, 1982c, p.16. Emendation: Duxbury, 1983, p.49, as *Kiokansium polypes*. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. Originally *Hystrichosphaeridium recurvatum* subsp. *polypes*, subsequently *Polysphaeridium?* *polypes* (combination not validly published), thirdly *Cleistosphaeridium polypes*, fourthly *Bacchidinium polypes*, fifthly *Impletosphaeridium polypes*, sixthly *Kiokansium polypes*. **Taxonomic senior synonym** (at specific rank): *Hystrichosphaeridium* (as *Kiokansium*) *unituberculatum*, by implication in Duxbury (1983, p.49), who considered *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*) to be the senior name. Taxonomic junior synonym: *Cleistosphaeridium?* *solidum*, according to Below (1982c, p.16). Age: Albian–Cenomanian.

"subsp. *densum*" (He Chengquan and Li Peng, 1981, p.65, pl.31, figs.14–17; text-fig.6) Lentin and Williams, 1985, p.207. Holotype: He Chengquan and Li Peng, 1981, pl.31, fig.14; text-fig.6. **NOW** *Impletosphaeridium densum*. Originally *Impletosphaeridium polypes* subsp. *densum*, subsequently *Kiokansium polypes* subsp. *densum*, thirdly (and now) *Impletosphaeridium densum*. Age: late Oligocene.

"subsp. *polypes*". Autonym. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. **Now redundant**. Originally *Cleistosphaeridium polypes* subsp. *polypes*, subsequently *Bacchidinium polypes* subsp. *polypes*, thirdly *Impletosphaeridium polypes* subsp. *polypes*, fourthly *Kiokansium polypes* subsp. *polypes*.

prolatum Duxbury, 1983, p.49–50, pl.6, figs.4,8. Emendation: Masure, 1986, p.114. Holotype: Duxbury, 1983, pl.6, fig.8. Age: late Aptian–early Albian.

regulatum Gao Ruiqi et al., 1992a, p.21,27–28 pl.2, figs.5–9. Holotype: Gao Ruiqi et al., 1992a, pl.2, fig.5. Age: Cenomanian.

"*sarmentum*" (Davey, 1979b, p.555, pl.1, figs.8–12) Davey, 1982a, p.377. Holotype: Davey, 1979b, pl.1, figs.8–9,12. **NOW** *Kleithriasphaeridium?*. Originally *Bacchidinium*, subsequently *Kiokansium*, thirdly (and now) *Kleithriasphaeridium?*. N.I.A. Age: late Aptian–middle Albian.

**unituberculatum* (Tasch in Tasch et al., 1964, p.194, pl.3, fig.8) Stover and Evitt, 1978, p.167,267. Holotype: Tasch et al., 1964, pl.3, fig.8; Eisenack and Kjellström, 1972, p.713; Fensome et al., 1995, fig.1 — p.1861. Originally *Hystrichosphaeridium*, subsequently (and now) *Kiokansium*. Taxonomic junior synonyms (at specific rank): *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*), by implication in Duxbury (1983, p.49), who considered *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*) to be the senior name; *Hystrichosphaeridium aruncium*, *Hystrichosphaeridium eccentricum*, *Hystrichosphaeridium entomium*, *Hystrichosphaeridium fabium*, *Hystrichosphaeridium folium*, *Hystrichosphaeridium kiowanum*, *Hystrichosphaeridium magnarmatum*, *Hystrichosphaeridium marsupium*, *Hystrichosphaeridium perovatum*, *Hystrichosphaeridium protellipticum*, *Hystrichosphaeridium replexum*, *Hystrichosphaeridium tribrachiosum*, *Hystrichosphaeridium triradicatum*, and *Hystrichosphaeridium valgum*, all according to Stover and Evitt (1978, p.267). Age: Albian.

"*vetusculum*" (Davey, 1974, p.45, pl.1, figs.1–2) Stover and Williams, 1987, p.163. Holotype: Davey, 1974, pl.1, fig.2. **NOW** *Nexosispinum*. Originally *Adnatosphaeridium*, subsequently *Systematophora*, thirdly (and now) *Nexosispinum*, fourthly *Kiokansium*. Age: early Barremian.

williamsii Singh, 1983, p.150, pl.54, figs.3–6. Holotype: Singh, 1983, pl.54, fig.3. Age: Albian–Cenomanian.

"**KISSELEVIA**" Vozzhennikova, 1963, p.183 ex Vozzhennikova, 1967, p.103. Emendations: Lentin and Williams, 1976, p.134–137 and Lentin and Vozzhennikova, 1989, p.221, both as *Kisselovia*. **Taxonomic senior synonym:** *Rhombodinium*, according to Williams et al. (2015, p.309–310). This name, as *Kisselovia*, was not validly published in Vozzhennikova (1963) since no validly published species names were assigned to it: Vozzhennikova (1963) indicated a "type species" (*Kisselevia ornata*), but did not provide a description for it, and since she assigned two species to the genus, the generic description cannot be taken as the description of the "type species" also. Williams et al. (1998, p.350) indicated that the correct spelling of this generic name is *Kisselevia*, as this was the version used in the validating publication (Vozzhennikova, 1967). Type: Vozzhennikova, 1967, pl.44, fig.6, as *Kisselevia ornata* (which see for lectotype).

"**aculeata**" Michoux, 1988, p.24,26, pl.1, figs.1,4,7–8; pl.2, figs.1–2, text-figs.5A–B,6A–B. Holotype: Michoux, 1988, pl.1, figs. 1,4,7; text-figs.5A–B. **NOW** *Michouxdinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Michouxdinium*. Age: early Eocene.

"**?clathrata**" (Eisenack, 1938b, p.187; fig.5) Lentin and Williams, 1976, p.136. Holotype: Eisenack, 1938b, fig.5; Eisenack, 1954b, pl.7, fig.12. **NOW** *Talladinium?* Originally *Wetzeliella*, subsequently *Kisselevia?*, thirdly *Charlesdowniea*, fourthly (and now) *Talladinium?* Questionable assignment: Lentin and Williams (1976, p.136). Taxonomic senior synonym: *Wetzeliella* (as *Hystrichosphaeridium articulata*, according to Pasteris (1948, p.42) — however, this synonymy has not been generally accepted. Age: late Eocene–early Oligocene.

"subsp. **angulosa**" (Châteauneuf and Gruas-Cavagnetto, 1978, p.69–70, pl.5, figs.8–9) Lentin and Vozzhennikova, 1989, p.227. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.5, figs.8–9. **NOW** *Talladinium? angulosum*. Originally *Kisselevia clathrata* subsp. *angulosa*, subsequently *Charlesdowniea clathrata* subsp. *angulosa*, thirdly (and now) *Talladinium? angulosum*. Age: early Oligocene (Sannoisian).

"subsp. **clathrata**". Autonym. Holotype: Eisenack, 1938b, fig.5; Eisenack, 1954b, pl.7, fig.12. **Now redundant**. Originally *Wetzeliella clathrata* subsp. *clathrata*, subsequently *Kisselevia? clathrata* subsp. *clathrata*, thirdly *Charlesdowniea clathrata? subsp. clathrata*.

"subsp. **fasciata**" (Rozen, 1965, p.296–297; pl.2, fig.13; text-fig.4) Lentin and Williams, 1976, p.136. Holotype: Rozen, 1965, pl.2, fig.13; text-fig.4. **NOW** *Charlesdowniea? fasciata*. Originally *Wetzeliella clathrata* var. *fasciata*, subsequently *Wetzeliella clathrata* subsp. *fasciata*, thirdly *Kisselevia? clathrata* subsp. *fasciata*, fourthly *Kisselevia fasciata*, fifthly *Charlesdowniea fasciata*, sixthly *Charlesdowniea? fasciata*. Age: late Eocene.

"**coleothrypta**" (Williams and Downie, 1966b, p.185–186, pl.18, figs.8–9; text-fig.47) Lentin and Williams, 1976, p.136. Holotype: Williams and Downie, 1966b, pl.18, fig.8; text-fig.47; Bujak et al., 1980, pl.12, figs.7–8. **NOW** *Charlesdowniea*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly (and now) *Charlesdowniea*. Age: early Eocene.

"subsp. **coleothrypta**". Autonym. Holotype: Williams and Downie, 1966b, pl.18, fig.8; text-fig.47; Bujak et al., 1980, pl.12, figs.7–8. **NOW** *Charlesdowniea coleothrypta* subsp. *coleothrypta*. Originally *Kisselevia coleothrypta* subsp. *coleothrypta*, subsequently (and now) *Charlesdowniea coleothrypta* subsp. *coleothrypta*.

"subsp. **rotundata**" Châteauneuf and Gruas-Cavagnetto, 1978, p.68–69, pl.3, fig.5. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.3, fig.5. **NOW** *Charlesdowniea? rotundata*. Originally *Kisselevia coleothrypta* subsp. *rotundata*, subsequently *Charlesdowniea coleothrypta* subsp. *rotundata*, thirdly (and now) *Charlesdowniea? rotundata*. Age: middle Eocene (Lutetian–Bartonian).

"**columna**" Michoux, 1988, p.28,30, pl.1, figs.2–3,5–6; pl.2, figs.3–5; text-figs.7A–B. Holotype: Michoux, 1988, pl.1, figs.2–3. **NOW** *Piladinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Piladinium*. N.I.A. Age: early Eocene.

"*crassoramosa*" (Williams and Downie, 1966b, p.189–190; pl.19, figs.1,5,7; text-fig.50) Damassa, 1979a, p.837. Holotype: Williams and Downie, 1966b, pl.19, fig.7. **NOW** *Sophismatia crassoramosa*. Originally *Wetzeliella tenuivirgula* var. *crassoramosa*, subsequently *Wetzeliella tenuivirgula* subsp. *crassoramosa*, thirdly *Kisselevia tenuivirgula* subsp. *crassoramosa*, fourthly *Kisselevia crassoramosa*, fifthly *Charlesdowniea crassoramosa*, sixthly (and now) *Sophismatia crassoramosa*. Age: early Eocene.

"*edwardsii*" (Wilson, 1967c, p.477, figs.8–9) Stover and Evitt, 1978, p.111. Holotype: Wilson, 1967c, fig.8. **NOW** *Piladinium*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Piladinium*. Age: early Eocene.

"*fasciata*" (Rozen, 1965, p.296–297; pl.2, fig.13; text-fig.4) Costa and Downie, 1979, p.44. Holotype: Rozen, 1965, pl.2, fig.13; text-fig.4. **NOW** *Charlesdowniea? fasciata*. Originally *Wetzeliella clathrata* var. *fasciata*, subsequently *Wetzeliella clathrata* subsp. *fasciata*, thirdly *Kisselevia? clathrata* subsp. *fasciata*, fourthly *Kisselevia fasciata*, fifthly *Charlesdowniea fasciata*, sixthly (and now) *Charlesdowniea? fasciata*. Age: late Eocene.

"*fusififormis*" Mao Shaozhi and Norris, 1988, p.49–50, pl.13, figs.2–4. Holotype: Mao Shaozhi and Norris, 1988, pl.13, fig.3. **NOW** *Talladinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Talladinium*. Age: early Oligocene.

"*?insolens*" Eaton, 1976, p.292–293, pl.18, figs.1–2. Holotype: Eaton, 1976, pl.18, fig.2; Bujak et al., 1980, pl.11, fig.4. **NOW** *Sophismatia*. Originally *Kisselevia*, subsequently *Kisselevia?*, thirdly (and now) *Sophismatia*. Questionable assignment: Lentin and Vozzhennikova (1989, p.221). Age: early Eocene.

"*major*" Vozzhennikova, 1967, p.104–105. Holotype: Vozzhennikova, 1960, pl.3, fig.1, lost according to Lentin and Vozzhennikova (1989, p.215–216). **NOW** *Rhombodinium? vozzhennikovae*. Originally *Kisselevia major*, subsequently (and now) *Rhombodinium? vozzhennikovae*. Fensome and Williams (2004, p.382) did not follow Lentin and Vozzhennikova (1989) in considering this name to be not validly published. Vozzhennikova (1967) provided a description and designated a holotype from Vozzhennikova (1960): that the holotype is lost has no bearing on the validity of the name. Lentin and Vozzhennikova (1989) noted that no potential lectotype is available. This name was not validly published in Vozzhennikova (1963, fig.15) since that author did not provide a description. Age: Eocene.

"**ornata*" Vozzhennikova, 1967, p.103–104, pl.42, figs.1–3; pl.43, figs.1–4; pl.44, figs.1–12; pl.45, figs.1–3. Emendations: Lentin and Vozzhennikova, 1989, p.223; Vasilyeva in Andreeva-Grigorovich et al., 2011, p.53. Holotype: Vozzhennikova, 1967, pl.44, fig.6, lost according to Lentin and Vozzhennikova (1989, p.223). Lectotype: Vozzhennikova, 1967, pl.44, fig.1 (as holotype of *Kisselevia ornata* forma *reticulata*); Lentin and Vozzhennikova, 1989, pl.1, figs.1–2; Lentin and Vozzhennikova, 1990, pl.9, fig.1; designated by Lentin and Vozzhennikova (1989, p.223). **NOW** *Rhombodinium*. Originally *Kisselevia*, subsequently (and now) *Rhombodinium*. This name was not validly published in Vozzhennikova (1963, p.183, figs.16a–b) since that author did not provide a description. Age: Bartonian.

"forma *ornata*". Autonym. Holotype: Vozzhennikova, 1967, pl.44, fig.6, lost according to Lentin and Vozzhennikova (1989, p.223). Lectotype: Vozzhennikova, 1967, pl.44, fig.1 (as holotype of *Kisselevia ornata* forma *reticulata*); Lentin and Vozzhennikova, 1989, pl.1, figs.1–2; Lentin and Vozzhennikova, 1990, pl.9, fig.1; designated by Lentin and Vozzhennikova (1989, p.223). **Now redundant**. Taxonomic junior synonym: *Kisselevia ornata* forma *reticulata*, according to Lentin and Vozzhennikova (1989, p.221,223).

"subsp. *ornata*". Autonym. Holotype: Vozzhennikova, 1967, pl.44, fig.6, lost according to Lentin and Vozzhennikova (1989, p.223). Lectotype: Vozzhennikova, 1967, pl.44, fig.1 (as holotype of *Kisselevia ornata* forma *reticulata*); Lentin and Vozzhennikova, 1989, pl.1, figs.1–2; Lentin and Vozzhennikova, 1990, pl.9, fig.1; designated by Lentin and Vozzhennikova (1989, p.223). **Now redundant**. Taxonomic junior synonym: *Kisselevia ornata* forma *reticulata*, according to Lentin and Vozzhennikova (1989, p.221,223).

"forma *reticulata*" Vozzhennikova, 1967, p.104, pl.44, figs.1–3,7–8; pl.45, figs.1–3;. Holotype: Vozzhennikova, 1967, pl.44, fig.1. Originally *Kisselevia ornata* forma *reticulata*, subsequently *Kisselevia ornata* subsp. *reticulata*. **Taxonomic senior synonym:** *Kisselevia ornata*, according to Lentin and Vozzhennikova (1989, p.221,223). Age: Eocene.

"subsp. *reticulata*" (Vozzhennikova, 1967, p.104, pl.44, figs.1–3,7–8; pl.45, figs.1–3) Lentin and Williams, 1973, p.84. Holotype: Vozzhennikova, 1967, pl.44, fig.1. Originally *Kisselevia ornata* forma *reticulata*, subsequently *Kisselevia ornata* subsp. *reticulata*. **Taxonomic senior synonym:** *Kisselevia ornata*, according to Lentin and Vozzhennikova (1989, p.221,223). Age: Eocene.

"?*pengchiahsuensis*" Shaw Chenglong, 1999a. Holotype: Shaw Chenglong, 1999a, figs.5–7. **NOW** *Charlesdowniea*? Originally *Kisselevia*, subsequently (and now) *Charlesdowniea*? Age: Eocene.

"*reticulata*" (Williams and Downie, 1966b, p.187–188, pl.19, figs.3,6; text-fig.48) Lentin and Williams, 1976, p.136. Holotype: Williams and Downie, 1966b, pl.19, figs.3,6; text-fig.48. **NOW** *Sophismatia*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

"*rhomboidalis*" He Chengquan, 1991, p.93, pl.35, figs.11–13. Holotype: He Chengquan, 1991, pl.35, figs.11–12. **NOW** *Michouxdinium*? Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Michouxdinium*? Age: middle Eocene.

"*stellata*" Damassa, 1979a, p.834,837, pl.7, figs.1–7. Holotype: Damassa, 1979a, pl.7, figs.1–2. **NOW** *Vallodinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Vallodinium*. Age: early-middle Eocene.

"*taiwaniana*" Shaw Chenglong, 1999a, p.38–39, figs.8–10,19–21. Holotype: Shaw Chenglong, 1999a, figs.8–10. **NOW** *Charlesdowniea*. Originally *Kisselevia*, subsequently (and now) *Charlesdowniea*. Age: Eocene.

"*tenuivirgula*" (Williams and Downie, 1966b, p.188–189, pl.19, figs.1–2,4–5,7; text-figs.49–50) Lentin and Williams, 1976, p.136. Holotype: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49. **NOW** *Sophismatia*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

"subsp. *conopia*" (Williams and Downie, 1966b, p.184, pl.18, fig.5) Costa and Downie, 1979, p.44. Holotype: Williams and Downie, 1966b, pl.18, fig.5. **NOW** *Sophismatia conopia*. Originally *Wetzeliella articulata* var. *conopia*, subsequently *Wetzeliella articulata* subsp. *conopia*, thirdly *Kisselevia tenuivirgula* subsp. *conopia*, fourthly *Charlesdowniea tenuivirgula* subsp. *conopia*, fifthly (and now) *Sophismatia conopia*. Age: early Eocene.

"subsp. *crassoramosa*" (Williams and Downie, 1966b, p.189–190; pl.19, figs.1,5,7; text-fig.50) Lentin and Williams, 1976, p.137. Holotype: Williams and Downie, 1966b, pl.19, fig.7. **NOW** *Sophismatia crassoramosa*. Originally *Wetzeliella tenuivirgula* var. *crassoramosa*, subsequently *Wetzeliella tenuivirgula* subsp. *crassoramosa*, thirdly *Kisselevia tenuivirgula* subsp. *crassoramosa*, fourthly *Kisselevia crassoramosa*, fifthly *Charlesdowniea crassoramosa*, sixthly (and now) *Sophismatia crassoramosa*. Age: early Eocene.

"subsp. *exouros*" Islam, 1983c, p.88, pl.3, figs.3–4. Holotype: Islam, 1983c, pl.3, fig.3. **NOW** *Sophismatia? exouros*. Originally *Kisselevia tenuivirgula* subsp. *exouros*, subsequently *Charlesdowniea tenuivirgula* subsp. *exouros*, thirdly (and now) *Sophismatia? exouros*. Age: middle Eocene.

"subsp. *tenuivirgula*". Autonym. Holotype: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49. **Now redundant.** Originally *Wetzeliella tenuivirgula* subsp. *tenuivirgula*, subsequently *Kisselevia tenuivirgula* subsp. *tenuivirgula*, thirdly *Charlesdowniea tenuivirgula* subsp. *tenuivirgula*.

"*variabilis*" Bujak in Bujak et al., 1980, p.67, pl.17, figs.1–6; text-fig.16. Holotype: Bujak et al., 1980, pl.17, figs.1–3. **NOW** *Michouxdinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Michouxdinium*. Age: middle Eocene (see Aubry, 1986).

"*wulagenensis*" Mao Shaozhi and Norris, 1988, p.50, pl.13, figs.5–10. Holotype: Mao Shaozhi and Norris, 1988, pl.13, fig.6. **NOW** *Talladinium*. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Talladinium*. Age: late Eocene.

"**KISSELJOVIA**" Vozzhennikova, 1961, p.1462. **Name not validly published**: no description or illustration. This is an orthographic variant of *Kisselevia*, which see.

"**KISSELOVIA**" Vozzhennikova, 1963, p.183. **Name not validly published**: no validly published species names. This is an orthographic variant of *Kisselevia*, which see.

KLEDODINIUM Williams et al., 2015, p.305–306. Type: Damassa, 1979a, pl.7, figs.4–7, as *Kisselevia stellata* (now *Kledodinium filosum*).

**filosum* Williams et al., 2015, p.306, pl.3, fig.10. Holotype: Damassa, 1979a, pl.7, figs.4–7, as *Kisselevia stellata*. Age: early-middle Eocene.

KLEITHRIASPHAERIDIUM Davey, 1974, p.55–56. Emendations: Torricelli, 2001, p.98; Fensome et al., 2009, p.40. Taxonomic junior synonym: *Diversispina*, according to Stover and Evitt (1978, p.167–168). Type: Davey, 1974, pl.5, figs.1–2; text-fig.3, as *Kleithriasphaeridium corrugatum*.

atlasiense (Below, 1982c, p.12, pl.3, figs.2a–c; text-figs.2a–c) Torricelli, 2001, p.100. Holotype: Below, 1982c, pl.3, figs.2a–c; Fauconnier and Masure, 2004, pl.43, figs.1–4. Originally *Hystrichosphaeridium?*, subsequently (and now) *Kleithriasphaeridium*. Age: Albian.

cooksoniae (Singh, 1971, p.329–330, pl.51, figs.7–8; pl.52, figs.1–4) Fensome et al., 2009, p.40. Emendation: Duxbury, 1980, p.120, as *Florentinia cooksoniae*. Holotype: Singh, 1971, pl.51, fig.7. Originally *Hystrichosphaeridium*, subsequently *Florentinia*, thirdly *Litosphaeridium*, fourthly (and now) *Kleithriasphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Florentinia*) *mantellii*, according to Below (1982c, p.8) — however, Lentin and Williams (1985, p.135) retained *Florentinia cooksoniae*. Taxonomic junior synonym: *Hystrichosphaeridium cylindratum*, according to Harker and Sarjeant (1975, p.225–226). Age: late Albian.

**corrugatum* Davey, 1974, p.56–57, pl.5, figs.1–5; text-fig.3. Holotype: Davey, 1974, pl.5, figs.1–2; text-fig.3. Age: early Barremian.

eoinodes (Eisenack, 1958a, p.402, pl.27, figs.3–4) Davey, 1974, p.58. Emendation: Sarjeant, 1985a, p.74–75, as *Kleithriasphaeridium eoinodes*. Holotype: Eisenack, 1958a, pl.27, fig.3; Sarjeant, 1985a, pl.5, figs.3–4. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly (and now) *Kleithriasphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Kleithriasphaeridium*) *simplicispinum*, according to Below (1982c, p.17). Age: late Aptian.

fasciatum (Davey and Williams, 1966b, p.90, pl.7, figs.5–6) Davey, 1974, p.58. Holotype: Davey and Williams, 1966b, pl.7, fig.5. Originally *Cordosphaeridium?*, subsequently (and now) *Kleithriasphaeridium*. Age: Barremian.

loffrense Davey and Verdier, 1976, p.310–312, pl.1, figs.1–6. Holotype: Davey and Verdier, 1976, pl.1, figs.1–2. Taxonomic junior synonym: *Florentinia aculeata*, according to Fensome et al. (2009, p.42). Age: Late Cretaceous.

perforatum (Firth, 1993, p.193,195, pl.2, figs.1–7) Fensome et al., 2009, p.42. Holotype: Firth, 1993, pl.2, figs.1–4. Originally *Florentinia*, subsequently (and now) *Kleithriasphaeridium*. Age: early–late Maastrichtian.

porosispinum Davey, 1982b, p.29–30, pl.10, figs.8–12. Holotype: Davey, 1982b, pl.10, figs.10–12. Originally (and now) *Kleithriasphaeridium*, subsequently *Tityrosphaeridium*. Lentin and Williams (1985, p.209) retained this species in *Kleithriasphaeridium*. Age: late Kimmeridgian–late Ryazanian.

readei (Davey and Williams, 1966b, p.64–65, pl.6, fig.3) Davey and Verdier, 1976, p.314. Emendation: Davey and Verdier, 1976, p.314, as *Kleithriasphaeridium readei*. Holotype: Davey and Williams, 1966b, pl.6, fig.3. Originally *Hystrichosphaeridium*, subsequently (and now) *Kleithriasphaeridium*. Age: Cenomanian.

?**sarmentum** (Davey, 1979b, p.555, pl.1, figs.8–12) Below, 1982c, p.17. Holotype: Davey, 1979b, pl.1, figs.8–9,12. Originally *Bacchidinium*, subsequently *Kiokansium*, thirdly (and now) *Kleithriasphaeridium*?. Questionable assignment: Below (1982c, p.17). N.I.A. Age: late Aptian–middle Albian.

secatum Schiøler and Wilson, 1998, p.340,342, pl.6, figs.1–6. Holotype: Schiøler and Wilson, 1998, pl.6, fig.5. Age: middle-late Coniacian.

"simplicispinum" (Davey and Williams, 1966b, p.59–60, pl.9, fig.3) Davey, 1974, p.57. Holotype: Davey and Williams, 1966b, pl.9, fig.3. Originally *Hystrichosphaeridium*, subsequently *Kleithriasphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Kleithriasphaeridium*) *einodes*, according to Below (1982c, p.17). Age: Barremian.

suevicum Dürr, 1988, p.79–81, pl.4, figs.1–5; pl.11, figs.1–3; text-fig.23. Holotype: Dürr, 1988, pl.4, figs.1–2. Age: early Tithonian.

telaspinosum (Fisher and Riley, 1980, p.322, pl.1, fig.5) Lentin and Williams, 1981, p.165. Holotype: Fisher and Riley, 1980, pl.1, fig.5. Originally *Hystrichodinium*?, subsequently (and now) *Kleithriasphaeridium*. Riley (1979, p.221), prior to valid publication of the name, and Fisher and Riley (1982, p.53) also proposed this combination. Age: Volgian.

truncatum (Benson, 1976, p.184–185, pl.2, figs.6–9) Stover and Evitt, 1978, p.168. Holotype: Benson, 1976, pl.2, figs.6–9. Originally *Diversispina*, subsequently (and now) *Kleithriasphaeridium*. Taxonomic junior synonym: *Cordosphaeridium digitatum* (name not validly published), according to Slimani (2001a, p.193). Schiøler et al. (1997, p.83) considered this to be the possible taxonomic senior synonym of *Achilleodinium bianii*. Age: late Maastrichtian–early Paleocene.

tubulosum (Cookson and Eisenack, 1969, p.5,7, pl.2, figs.D–F) Stover and Evitt, 1978, p.168. Holotype: Cookson and Eisenack, 1969, pl.2, fig.E. Originally *Conosphaeridium*, subsequently (and now) *Kleithriasphaeridium*. Age: Albian–Cenomanian.

"KLEMENTIA" Warren in Duxbury, 1983, p.44. **Name not validly published:** no description or illustration.

Taxonomic senior synonym: *Desmocysta*, according to Duxbury (1983, p.44).

"barbata" Warren in Duxbury, 1983, p.44. **Name not validly published:** no description or illustration.

KOMEWUIA Cookson and Eisenack, 1960b, p.257. Emendations: Dörhöfer and Davies, 1980, p.30; Chen, 1982, p.32. Taxonomic senior synonym: *Kalyptea*, according to Wiggins (1975, p.110) and by implication in Dörhöfer and Davies (1980, p.30), who considered *Komewuia* to be the senior name — however, Chen (1982, p.32) retained *Komewuia*. Taxonomic junior synonym: *Pontiadinium*, according to Chen (1982, p.36). Type: Cookson and Eisenack, 1960b, pl.39, fig.8, as *Komewuia glabra*.

"challisiana" Helby in Riding and Helby, 2001e, p.119. **Name not validly published:** no description. **Taxonomic senior synonym:** *Fusiformacysta challisiana*, according to Riding and Helby (2001e, p.119).

"*dicerus*" (Cookson and Eisenack, 1960b, p.256–257, pl.39, fig.1) Dörhöfer and Davies, 1980, p.30. Emendation: Fisher and Riley, 1980, p.323, as *Kalyptea dicerus*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.1. **NOW** *Kalyptea*. Originally (and now) *Kalyptea*, subsequently *Komewuia*, thirdly *Pareodinia*. Taxonomic junior synonym: *Kalyptea jurassica*, according to Below (1990, p.65). Age: Tithonian.

evittii Chen, 1982, p.36,38, pl.2, figs.17–18,21; text-figs.2e–i. Holotype: Chen, 1982, pl.2, fig.17; text-fig.2g. Age: ?Callovian–Kimmeridgian.

**glabra* Cookson and Eisenack, 1960b, p.257, pl.39, figs.7–8. Emendation: Chen, 1982, p.32, as *Komewuia glabra*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.8. Originally (and now) *Komewuia*, subsequently *Kalyptea*. Chen (1982, p.32) retained this species in *Komewuia*. Age: ?Tithonian.

"*granulata*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

inequicornuta (Balteş, 1971, p.5, pl.1, figs.8–12; pl.2, figs.1–3 ex Stover and Evitt, 1978, p.180) Chen, 1982, p.36. Holotype: Balteş, 1971, pl.2, fig.2; Fensome et al., 1996, fig.5 — p.2161; designated as a lectotype by Stover and Evitt (1978, p.180). Originally *Diconodinium* (name not validly published), subsequently *Pontiadinium*, thirdly (and now) *Komewuia*. The name *Diconodinium inequicornutum* was not validly published in Balteş (1971) since that author did not designate a holotype. Age: early Pliocene.

stoveri Chen, 1982, p.38,40, pl.3, figs.22,24–29; text-figs.2p–w. Holotype: Chen, 1982, pl.3, fig.29; text-fig.2s. Age: Kimmeridgian–Tithonian.

KORYSTOCYSTA Woollam, 1983, p.193–194. Emendation: Benson, 1985, p.154. Taxonomic senior synonym: *Ctenidodinium*, according to Courtinat (1989, p.208) — however, Lentin and Williams (1989, p.213) retained *Korystocysta*. Type: Sarjeant, 1976a, pl.1, figs.1–2, as *Dichadogonyaulax kettonensis*.

+*gochtii* (Sarjeant, 1976a, p.11,13, pl.2, fig.1; pl.3, fig.4; text-figs.2A–C) Woollam, 1983, p.194. Holotype: Sarjeant, 1976a, pl.2, fig.1; text-figs.2A–B. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly (and now) *Korystocysta*. Taxonomic senior synonym: *Gonyaulax* (now *Korystocysta*) *pachyderma*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as *Korystocysta*) *kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *gochtii*. Taxonomic junior synonym: *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, according to Riley and Fenton (1982, p.199) and Hengreen et al. (2000, p.50). The name *Dichadogonyaulax gochtii* has priority over the name *Dichadogonyaulax kettonensis* since the authors who first considered the two species to be synonyms (Riley and Fenton, 1982, p.199) designated the former name as senior (I.C.N. Article 11.5). The nomenclatural type of the genus *Korystocysta* remains the holotype of *Korystocysta kettonensis*. Age: Bathonian.

"**kettonensis*" (Sarjeant, 1976a, p.13,15, pl.1, figs.1–2; pl.3, figs.1–2; pl.6, fig.1; text-figs.3A–D) Woollam, 1983, p.193–194. Holotype: Sarjeant, 1976a, pl.1, figs.1–2; Fensome et al., 1995, figs.1–4 — p.1583. Originally *Dichadogonyaulax*, subsequently *Ctenidodinium*, thirdly *Korystocysta*. **Taxonomic senior synonym:** *Dichadogonyaulax* (now *Korystocysta*) *gochtii*, according to Riley and Fenton (1982, p.199) and Hengreen et al. (2000, p.50). Taxonomic senior synonyms: *Gonyaulax* (now *Korystocysta*) *pachyderma* and *Leptodinium* (subsequently *Korystocysta*) *norrisii*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as *Korystocysta*) *kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Korystocysta kettonensis*. The name *Dichadogonyaulax* (now *Korystocysta*) *gochtii* has priority over the name *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis* since the authors who first considered the two species to be synonyms (Riley and Fenton, 1982, p.199) designated the former name as senior (I.C.N. Article 11.5). Age: Bathonian.

"*norrisii*" (Pocock, 1972, p.92–93, pl.24, figs.9–12; text-fig.9) Woollam, 1983, p.194. Holotype: Pocock, 1972, pl.24, fig.9; Jansonius, 1986, pl.2, figs.6–8; text-fig.5. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Korystocysta*. **Taxonomic senior synonym:** *Gonyaulax* (now *Korystocysta*) *pachyderma*, according to Benson (1985, p.154). Taxonomic junior synonym: *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as

Korystocysta kettonensis to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta kettonensis*). Age: Callovian.

pachyderma (Deflandre, 1939a, p.176–178, pl.7, figs.6–10; text-figs.7–10) Woollam, 1983, p.194. Holotype: Deflandre, 1939a, pl.7, figs.6–7. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Ctenidodinium*, fourthly *Ctenidodinium?*, fifthly (and now) *Korystocysta*, sixthly *Dichadogonyaulax*. Lentin and Williams (1989, p.213) retained this species in *Korystocysta*. Taxonomic junior synonyms: *Dichadogonyaulax* (subsequently *Korystocysta kettonensis* by implication in Conway (1990, p.35), who considered *Dichadogonyaulax pachyderma* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta kettonensis*); *Leptodinium* (as *Korystocysta norrisii*, according to Benson (1985, p.154). Age: Oxfordian.

"***reticulata***" Partington et al., 1993, p.380. **Name not validly published:** no description or illustration.

"**KRUTZSCHIDIINIUM**" Strauss, 1991a, p.52,54. **Name not validly published:** no validly published species. Type: Strauss, 1991a, pl.1, figs.a–b; text-fig.4c, as *Krutzschidinium spinosum*.

"****spinosum***" Strauss, 1991a, p.54,56, pl.1, figs.a–h; pl.2, figs.a–e; text-figs.4a–h. Holotype: Strauss, 1991a, pl.1, figs.a–b; text-fig.4c. **Name not validly published:** lodgment of holotype not specified. Strauss (1991a, p.57) considered this species to be a possible taxonomic junior synonym of *Wetzeliella* (now *Apectodinium*) *summissa*. Age: middle Eocene.

"***summissum***" (Harland, 1979c, p.66–67, fig.12) Strauss, 1991a, p.57. Holotype: Harland, 1979c, pl.1, fig.12. **Combination not validly published:** basionym not fully referenced. **NOW** *Apectodinium*. Originally *Wetzeliella* subgenus *Apectodinium*, subsequently (and now) *Apectodinium*, thirdly *Krutzschidinium*. Age: late Paleocene.

"**KYLINDROCYSTA**" Fenton et al., 1980, p.162. **Taxonomic senior synonym:** *Valvaeodinium*, according to Below (1987b, p.64). Type: Fenton et al., 1980, pl.14, fig.13, as *Kylindrocysta spinosa*.

"***atlantica***" (Habib, 1972, p.375, pl.4, figs.2,5) Jansonius, 1989, p.67. Holotype: Habib, 1972, pl.4, fig.2. **NOW** *Valvaeodinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium?*, thirdly *Fromea* (Appendix A), fourthly *Kylindrocysta*, fifthly (and now) *Valvaeodinium*. Taxonomic junior synonym: *Fromea complicata* (Appendix A), according to Davies (1983, p.31) — however, Jansonius (1989, p.65) retained *Fromea complicata*. Age: Callovian–Oxfordian.

"****spinosa***" Fenton et al., 1980, p.162–163, pl.14, figs.10–13; pl.15, figs.2,4–6. Holotype: Fenton et al., 1980, pl.14, fig.13; Fensome et al., 1995, fig.4 — p.1797. **NOW** *Valvaeodinium*. Originally *Kylindrocysta*, subsequently (and now) *Valvaeodinium*. Age: late Bajocian–early Bathonian.

LABYRINTHODINIUM Piasecki, 1980, p.67. Type: Piasecki, 1980, pl.2, figs.9–11, as *Labyrinthodinium truncatum*.

****truncatum*** Piasecki, 1980, p.67,70, pl.2, figs.9–11; pl.3, fig.2; pl.6, figs.3–4. Emendation: de Verteuil and Norris, 1996a, p.150. Holotype: Piasecki, 1980, pl.2, figs.9–11; Fensome et al., 1995, figs.1–3 — p.1855; Fauconnier and Masure, 2004, pl.51, figs.5–6. Age: middle Miocene.

subsp. ***modicum*** de Verteuil and Norris, 1996a, p.151, pl.14, figs.7–18; pl.15, figs.1–8. Holotype: de Verteuil and Norris, 1996a, pl.14, figs.7–12. Age: early-middle Miocene.

var. ***reductum*** Strauss and Lund, 1992, p.164, pl.2, figs.7–11. Holotype: Strauss and Lund, 1992, pl.2, figs.9–11. Age: middle Miocene.

subsp. *truncatum*. Autonym. Holotype: Piasecki, 1980, pl.2, figs.9–11; Fensome et al., 1995, figs.1–3 — p.1855; Fauconnier and Masure, 2004, pl.51, figs.5–6.

var. *truncatum*. Autonym. Holotype: Piasecki, 1980, pl.2, figs.9–11; Fensome et al., 1995, figs.1–3 — p.1855; Fauconnier and Masure, 2004, pl.51, figs.5–6.

LACINIADINIUM McIntyre, 1975, p.70. Taxonomic junior synonyms: *Apiculodinium* and *Bellatudinium*, according to He Chengquan et al. (2009, p.386); and *Sinocysta* according to Chen et al. (1988, p.28) and He Chengquan et al. (2009, p.386). Type: McIntyre, 1975, pl.4, figs.12–13, as *Laciniadinium orbiculatum*.

?*aquiloniforme* Schiøler et al., 1997, p.83,85, pl.2, figs.9–12. Holotype: Schiøler et al., 1997, pl.2, fig.9. Questionable assignment: Schiøler et al. (1997, p.83). Age: late Maastrichtian.

arcticum (Manum and Cookson, 1964, p.18–19, pl.6, figs.1–4) Lentin and Williams, 1980, p.41. Holotype: Manum and Cookson, 1964, pl.6, fig.1. Originally *Diconodinium*, subsequently (and now) *Laciniadinium*. Taxonomic junior synonym: *Diconodinium acutum*, according to Morgan (1977, p.126). Age: Cenomanian.

biconiculum McIntyre, 1975, p.71, pl.4, figs.5–9. Holotype: McIntyre, 1975, pl.4, figs.5–6. Age: Campanian.

conpicuum (Yu Jingxian et al., 1981, p.261, pl.1, figs.20–22,24; text-fig.2) He Chengquan et al., 2009, p.387. Holotype: Yu Jingxian et al., 1981, pl.1, fig.20. Originally *Bellatudinium*, subsequently (and now) *Laciniadinium*. He Chengquan et al. (2009, p.387) spelled the epithet as "*conspicuum*". Age: Late Cretaceous.

elongatum He Chengquan, 1991, p.62–63, pl.4, figs.24–25. Holotype: He Chengquan, 1991, pl.4, fig.25. Age: Paleocene–Eocene.

"*eminens*" Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.48, pl.5, figs.17–18. Holotype: He Chengquan et al., 1989, pl.5, fig.17. **NOW** *Saeptodinium*. Originally *Laciniadinium*, subsequently (and now) *Saeptodinium*. Age: Early Tertiary.

firmum (Harland, 1973, p.669–670, pl.84, figs.8–9,15; text-fig.6) Morgan, 1977, p.136. Holotype: Harland, 1973, pl.84, fig.8. Originally *Diconodinium*, subsequently (and now) *Laciniadinium*. Lentin and Williams (1980, p.41) also proposed this combination. Age: late Campanian.

fusum (Yu Jingxian et al., 1981, p.261, pl.1, figs.25–27,29–31) He Chengquan et al., 2009, p.388. Holotype: Yu Jingxian et al., 1981, pl.1, fig.27. Originally *Bellatudinium*, subsequently (and now) *Laciniadinium*. Age: Late Cretaceous.

granulare He Chengquan in Zheng Yahui and He Chengquan, 1984, p.92, pl.8, figs.1–3; pl.11, figs.1–2. Holotype: Zheng Yahui and He Chengquan, 1984, pl.11, fig.1. Age: Late Cretaceous.

granulatum (He Chengquan, 1991, p.64, pl.1, figs.1–6,30) Lentin and Williams, 1993, p.377. Holotype: He Chengquan, 1991, pl.1, fig.1. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: late Turonian–early Senonian.

hokkaidoanum (Kurita and Matsuoka, 1995) comb. nov.

Bellatudinium hokkaidoanum Kurita and Matsuoka, 1995, p.146–147, pl.1, figs.1–7.

Holotype: Kurita and Matsuoka, 1995, pl.1, fig.1. Originally *Bellatudinium* subsequently (and now) *Laciniadinium*. The combination *Laciniadinium hokkaidoanum* is proposed here since *Bellatudinium* is now considered a taxonomic junior synonym of *Laciniadinium*. Age: late middle to late Eocene.

?*inflatum* (Eisenack and Cookson, 1960, p.4, pl.1, figs.12–13) Morgan, 1977, p.136. Emendation: Morgan, 1977, p.136, *Laciniadinium? inflatum*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.13; Morgan, 1977, pl.2, figs.5a–c. Originally *Diconodinium*, subsequently (and now) *Laciniadinium?*. Questionable assignment: Morgan (1977, p.136). Age: late Albian–Cenomanian.

macrocephalum (Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.69, pl.6, figs.23–25) Lentin and Williams, 1993, p.377. Holotype: He Chengquan et al., 1989, pl.6, fig.24. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: Early Tertiary.

minutum (He Chengquan, 1984a, p.769–770, pl.1, figs.5–7; text-fig.1) Chen et al., 1988, p.29. Holotype: He Chengquan, 1984a, pl.1, fig.5; text-fig.1. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: Late Cretaceous.

***orbiculatum** McIntyre, 1975, p.70–71, pl.4, figs.10–13. Holotype: McIntyre, 1975, pl.4, figs.12–13. Age: Campanian.

orientale He Chengquan, 1991, p.63, pl.4, figs.14–16. Holotype: He Chengquan, 1991, pl.4, fig.14. Age: Paleocene–middle Eocene.

"**ovatum**" He Chengquan and Li Peng, 1981, p.66, pl.31, fig.13. Holotype: He Chengquan and Li Peng, 1981, pl.31, fig.13. **NOW** *Holmwoodinium*. Originally *Laciniadinium*?, subsequently (and now) *Holmwoodinium*. Questionable assignment: He Chengquan and Li Peng (1981, p.66). Age: late Oligocene.

petaloidum Vasilyeva in Andreeva-Grigorovich et al., 2011, p.35–36, pl.9, figs.1–7; text-fig.17a–c. Holotype: Andreeva-Grigorovich et al., 2011, pl.9, fig.5; text-fig.17c. Vasilyeva in Andreeva-Grigorovich et al. (2011, p.36) cited the holotype as "pl.9, figs.1–7 and text-fig.17c". This holotype citation includes multiple specimens. However, in the caption to text-fig.17, the holotype is clearly indicated as the far right of three figures (here cited as text-fig.17c), which is also figured as pl.9, fig.5. Age: Danian–Selandian.

rhombiforme (Vozzhennikova, 1967, p.50, pl.7, figs.1–4; pl.15, fig.5) Lentin and Vozzhennikova, 1990, p.57. Emendation: Lentin and Vozzhennikova, 1990, p.57–58, as *Laciniadinium rhombiforme*. Holotype: Vozzhennikova, 1967, pl.7, fig.3; pl.15, fig.5, lost according to Lentin and Vozzhennikova (1990, p.57). Neotype: Vozzhennikova, 1967, pl.7, fig.2; Lentin and Vozzhennikova, 1990, pl.10, figs.4–5; text-fig.29; designated by Lentin and Vozzhennikova (1990, p.57). Originally *Diconodinium*, subsequently *Diconodinium*?, thirdly (and now) *Laciniadinium*. Age: Turonian.

rhomboidale He Chengquan in Zheng Yahui and He Chengquan, 1984, p.92–93, pl.8, figs.8–12; pl.11, fig.5. Holotype: Zheng Yahui and He Chengquan, 1984, pl.8, fig.10. Age: Late Cretaceous.

simplex He Chengquan in Zheng Yahui and He Chengquan, 1984, p.93, pl.8, figs.13–15. Holotype: Zheng Yahui and He Chengquan, 1984, pl.8, fig.14. Age: Late Cretaceous.

subtile (He Chengquan, 1991, p.65, pl.1, figs.19–23) Lentin and Williams, 1993, p.378. Holotype: He Chengquan, 1991, pl.1, fig.19. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: late Turonian–Eocene.

tenuistriatum (Eisenack and Cookson, 1960, p.4, pl.1, figs.14–16) Morgan, 1977, p.136. Holotype: Eisenack and Cookson, 1960, pl.1, figs.14–15; Morgan, 1977, pl.2, figs.3a–b. Originally *Diconodinium*, subsequently (and now) *Laciniadinium*. Age: late Albian–Cenomanian.

tianshanense (He Chengquan, 1991, p.65, pl.2, figs.8–9) Lentin and Williams, 1993, p.378. Holotype: He Chengquan, 1991, pl.2, fig.8. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: late Eocene.

williamsii Ioannides, 1986, p.28, pl.10, figs.1–6; pl.11, fig.5. Holotype: Ioannides, 1986, pl.10, fig.1. Age: Santonian–Campanian.

xinjiangense (He Chengquan, 1991, p.65, pl.1, figs.7–12) Lentin and Williams, 1993, p.378. Holotype: He Chengquan, 1991, pl.1, fig.11. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: Paleocene–Eocene.

LACRYMODINIUM Albert et al., 1986, p.305–307. Type: Albert et al., 1986, pl.1, figs.1–2,4, as *Lacrymodinium warrenii*.

**warrenii* Albert et al., 1986, p.307–308,310, pl.1, figs.1–12; pl.2, figs.1–13; text-fig.3. Holotype: Albert et al., 1986, pl.1, figs.1–2,4; Fensome et al., 1995, figs.1–3 — p.1907. Age: late Oxfordian or Kimmeridgian.

LACUNODINIUM He Chengquan, 1984a, p.768. Type: He Chengquan, 1984a, pl.1, figs.2a–b, as *Lacunodinium foveolatum*.

fissile (Jiabo, 1978, p.100–101, pl.35, figs.3–9) He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.49, pl.7, figs.27–30. Emendation: Mao Shaozhi et al., 1995, p.43, as *Lacunodinium fissile*. Holotype: Jiabo, 1978, pl.35, fig.4. Originally *Hungarodiscus* (Appendix A), subsequently (and now) *Lacunodinium*. Taxonomic junior synonym: *Hungarodiscus foveolatus* (Appendix A), according to Mao Shaozhi et al. (1995, p.43). Age: Oligocene.

**foveolatum* He Chengquan, 1984a, p.768, pl.1, figs.2a–b,3. Holotype: He Chengquan, 1984a, pl.1, figs.2a–b. Age: middle Eocene.

laxilveolum Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.73–74, pl.16, figs.19–20. Holotype: Liu Zhili et al., 1992, pl.16, fig.19. Age: Early Tertiary.

punctatum (Jiabo, 1978, p.101, pl.35, figs.1–2) Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.74. Holotype: Jiabo, 1978, pl.35, fig.1. Originally *Hungarodiscus* (Appendix A), subsequently (and now) *Lacunodinium*. Age: late Oligocene.

puyangense He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.49, pl.7, fig.26. Holotype: He Chengquan et al., 1989, pl.7, fig.26. Mao Shaozhi et al. (1995, p.99) indicated that this name should be restricted to the holotype. Age: Early Tertiary.

"**LAGENADINIUM**" Piel, 1985, p.108. **Taxonomic senior synonym:** *Stephanelytron*, according to Courtinat (1999, p.177). Type: Piel, 1985, pl.1, figs.1–6, as *Lagenadinium callovanum*.

callovanum*" Piel, 1985, p.108,110,112, pl.1, figs.1–9; pl.2, figs.1–8; pl.3, figs.1–5; text-figs.1a–d,2a–c,3 (part). Holotype: Piel, 1985, pl.1, figs.1–6; Fensome et al., 1993a, figs.1–3 — p.1011. **NOW *Stephanelytron*. Originally *Lagenadinium*, subsequently (and now) *Stephanelytron*. Age: middle to late Callovian.

"?*membranoidium*" (Vozzhennikova, 1967, p.114–115, pl.48, figs.1–2,3a–b,4a–b,5–8,9a–c,10) Lentin and Vozzhennikova, 1990, p.103. Emendation: Lentin and Vozzhennikova, 1990, p.103, as *Lagenadinium membranoidium*. Holotype: Vozzhennikova, 1967, pl.48, figs.9a–b; Lentin and Vozzhennikova, 1990, text-fig.58; lost according to Lentin and Vozzhennikova (1990, p.103). Lectotype: ?Vozzhennikova, 1967, pl.48, fig.6; Lentin and Vozzhennikova, 1990, pl.10, figs.6–7; designated by Lentin and Vozzhennikova (1990, p.103). **NOW** *Stephanelytron*. Originally *Chlamydothorella*, subsequently *Chlamydothorella*?, thirdly *Lagenadinium*?, fourthly (and now) *Stephanelytron*. Questionable assignment: Lentin and Vozzhennikova (1990, p.103). Taxonomic junior synonym: *Stephanelytron cretaceum*, according to Heilmann-Clausen in Heilmann-Clausen and Thomsen (1995, p.301) — however, Courtinat (1999, p.178) retained *Stephanelytron cretaceum*. Age: Late Jurassic.

"*scarburghense*" (Sarjeant, 1961a, p.111, pl.15, figs.12–13) Piel, 1985, p.112. Emendation: Stover et al., 1977, p.333, as *Stephanelytron scarburghense*. Holotype: Sarjeant, 1961a, pl.15, figs.12–13; Fauconnier and Masure, 2004, pl.73, fig.4. **NOW** *Stephanelytron*. Originally (and now) *Stephanelytron*, subsequently *Lagenadinium*. Age: early Oxfordian.

LAGENORHYTIS Duxbury, 1979b, p.587. Emendation: Piasecki, 1984, p.149. Substitute name for *Speetonia* Duxbury, 1977, p.48–49 (an illegitimate name). Type: Duxbury, 1977, pl.12, fig.4, as *Speetonia delicatula*.

**delicatula* (Duxbury, 1977, p.49, pl.12, figs.1–2,4–5; text-fig.18) Duxbury, 1979b, p.587. Emendation: Piasecki, 1984, p.149–150, as *Lagenorhytis delicatula*. Holotype: Duxbury, 1977, pl.12 (not pl.2), fig.4; Fensome et al., 1993a, fig.3 — p.1107. Originally *Speetonia* (generic name illegitimate), subsequently (and now) *Lagenorhytis*. Age: early Valanginian.

granorugosa Cheng Jinhui and He Chengquan, 2001, p.129,133, fig.1, nos.6–7. Holotype: Cheng Jinhui and He Chengquan, 2001, fig.1, no.7. Age: Berriasian–Valanginian.

LANTERNA Dodekova, 1969, p.16. Emendation: Courtinat, 1989, p.188. Type: Dodekova, 1969, pl.2, figs.4–6, as *Lanterna bulgarica*.

**bulgarica* Dodekova, 1969, p.16–17, pl.2, figs.3–6; pl.3, fig.1; text-figs.B,Db. Holotype: Dodekova, 1969, pl.2, figs.4–6. Age: Tithonian.

?*cantrellii* (Sarjeant, 1972, p.37–38, pl.4, fig.3; pl.6, figs.1–2; text-fig.8) Williams et al., 1993, p.56. Holotype: Sarjeant, 1972, pl.4, fig.3; pl.6, figs.1–2; text-fig.8. Originally *Meiourogonyaulax*?, subsequently *Lithodinia*?, thirdly *Lanterna*, fourthly and now *Lanterna*?. Questionable assignment: Courtinat in Fauconnier and Masure (2004, p.371) as a problematic species. Age: late Bathonian.

emitecta Courtinat, 1989, p.188–189, pl.17, fig.1; pl.20, fig.12; pl.23, figs.12–13,16. Holotype: Courtinat, 1989, pl.23, fig.16; Fauconnier and Masure, 2004, pl.51, figs.8–9. Age: Portlandian.

"?*pattei*" (Valensi, 1949, p.539–540, fig.1) Brideaux and Fisher, 1976, p.25. Holotype: Valensi, 1949, fig.1; Fauconnier and Masure, 2004, pl.62, figs.8–9. **NOW** *Hystrichosphaeridium*. Originally (and now) *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Lanterna*, fourthly *Lanterna*?, fifthly *Pandadinium*. Questionable assignment: Stover and Evitt (1978, p.59). Age: Bathonian.

"?*saturnalis*" Brideaux and Fisher, 1976, p.24–25, pl.6, figs.1–10; pl.7, figs.1–13. Holotype: Brideaux and Fisher, 1976, pl.6, figs.1–7. **NOW** *Epipliosphaera*. Originally *Lanterna*, subsequently *Lanterna*?, thirdly *Pandadinium*, fourthly (and now) *Epipliosphaera*. Questionable assignment: Stover and Evitt (1978, p.59). Age: late Oxfordian–late Kimmeridgian.

"?*spinosa*" Dodekova, 1969, p.17–18, pl.3, figs.2–3,5–6,9,12; text-figs.C,Da. Holotype: Dodekova, 1969, pl.3, figs.2–3,5. **NOW** *Pandadinium*. Originally *Lanterna*, subsequently *Lanterna*?, thirdly (and now) *Pandadinium*. Questionable assignment: Stover and Evitt (1978, p.59). Age: Tithonian.

sportula Dodekova, 1969, p.18–19, pl.3, figs.4,7,10–11; text-fig.Dc. Holotype: Dodekova, 1969, pl.3, figs.4,7. Age: Tithonian.

LANTERNOSPHAERIDIUM Morgenroth, 1966a, p.37. Emendation: Stover and Evitt, 1978, p.168. Taxonomic junior synonym: *Amphorosphaeridium*, according to Norvick (1976, p.50) — however, Stover and Evitt (1978, p.169) retained *Amphorosphaeridium*. Type: Morgenroth, 1966a, pl.10, fig.10, as *Lanternosphaeridium lanosum*.

"*axiale*" (Eisenack, 1965b, p.150, pl.15, figs.1–4) Morgenroth, 1966a, p.38–39. Holotype: Eisenack, 1965b, pl.15, fig.2. **NOW** *Fibrocysta*. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocysta*. Age: late Eocene–early Oligocene.

"*bipolare*" (Cookson and Eisenack, 1965b, p.135, pl.16, figs.7–8) de Coninck, 1969, p.38. Holotype: Cookson and Eisenack, 1965b, pl.16, fig.8. **NOW** *Fibrocysta*. Originally *Cordosphaeridium*, subsequently *Lanternosphaeridium*, thirdly *Amphorosphaeridium*, fourthly (and now) *Fibrocysta*. Age: early Eocene.

"*ciliatum*" Khanna and Singh, 1981b, p.402, fig.4, nos.7–8; text-fig.12. Holotype: Khanna and Singh, 1981b, fig.4, no.8. **NOW** *Fibrocysta*?. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*?. Age: middle Eocene.

"*cinctum*" Cookson and Eisenack, 1982, p.45, pl.2, fig.22. Holotype: Cookson and Eisenack, 1982, pl.2, fig.22. **NOW** *Fibrocysta*?. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*?. Age: Albian–Cenomanian.

doubingerae Troncoso in Troncoso and Doubinger, 1980, p.103, pl.3, figs.7–9. Holotype: Troncoso and Doubinger, 1980, pl.3, figs.8–9. Age: Maastrichtian–Danian.

"*essentiale*" de Coninck, 1969, p.38, pl.11, figs.7–8. Holotype: de Coninck, 1969, pl.11, figs.7–8. **NOW** *Fibrocysta*. Originally *Lanternosphaeridium*, subsequently *Kenleyia*?, thirdly (and now) *Fibrocysta*. Age: early Eocene.

"*hirundo*" (Eisenack, 1958a, p.404–405, pl.24, fig.12) Corradini, 1973, p.154. Emendation: Sarjeant, 1985a, p.76–77, as *Achomosphaera hirundo*. Holotype: Eisenack, 1958a, pl.24, fig.12. **NOW** *Cordosphaeridium*?. Originally *Hystrichosphaeridium*, subsequently *Achomosphaera*, thirdly *Lanternosphaeridium*, fourthly (and now) *Cordosphaeridium*?, fifthly *Spiniferites*?. N.I.A. Age: Early Cretaceous.

**lanosum* Morgenroth, 1966a, p.38, pl.10, figs.10–11. Holotype: Morgenroth, 1966a, pl.10, fig.10. Age: early Eocene.

"*lappaceum*" Drugg, 1970b, p.812–813, figs.4A–D,5A–D. Holotype: Drugg, 1970b, figs.4A–D. **NOW** *Ifecysta*. Originally *Lanternosphaeridium*, subsequently *Fibrocysta*, thirdly (and now) *Ifecysta*. Age: early Eocene.

"*licium*" Jain et al., 1975, p.10, pl.4, figs.51–53. Holotype: Jain et al., 1975, pl.4, fig.51. **NOW** *Fibrocysta*. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: Danian.

"*morgenrothii*" Corradini, 1973, p.155, pl.23, fig.1. Holotype: Corradini, 1973, pl.23, fig.1. **NOW** *Pervosphaeridium*. Originally *Lanternosphaeridium*, subsequently *Fibrocysta*, thirdly (and now) *Pervosphaeridium*. Age: Senonian.

"*mutinense*" Corradini, 1973, p.155–156, pl.23, figs.2,9; pl.34, figs.2,3a–b. Holotype: Corradini, 1973, pl.23, fig.2. Originally *Lanternosphaeridium*, subsequently *Fibrocysta*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Corradinisphaeridium*) *horridum*, according to Masure (1986, p.112). Age: Senonian.

"*ovale*" Hansen, 1977, p.17, figs.19F–G. Holotype: Hansen, 1977, figs.19F–G. **NOW** *Fibrocysta*. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: Maastrichtian–Danian.

"*personatum*" Corradini, 1973, p.157, pl.23, figs.5–6. Emendation: Masure, 1986, p.110–111, as *Corradinisphaeridium personatum*. Holotype: Corradini, 1973, pl.23, fig.6; Eisenack and Kjellström, 1981b, p.770f; Masure, 1986, pl.1, figs.1–3; text-figs.1a–b; Fensome et al., 1995, figs.1–3,5–7 — p.1663. **NOW** *Corradinisphaeridium*. Originally *Lanternosphaeridium*, subsequently *Operculodinium*?, thirdly (and now) *Corradinisphaeridium*. Age: Senonian.

"*radiatum*" Morgenroth, 1966a, p.37–38, pl.10, figs.7–9. Holotype: Morgenroth, 1966a, pl.10, figs.7–8. **NOW** *Fibrocysta*. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: early Eocene.

reinhardtii Habib in Moshkovitz and Habib, 1993, p.184,186, pl.5, figs.1a–c,2,3a–b,4a–b. Holotype: Moshkovitz and Habib, 1993, pl.5, figs.1a–c. Age: early Danian.

"*vectense*" Eaton, 1976, p.275–276, pl.12, figs.4–6. Holotype: Eaton, 1976, pl.12, fig.4; Bujak et al., 1980, pl.7, fig.10. **NOW** *Fibrocysta*. Originally *Lanternosphaeridium*, subsequently (and now) *Fibrocysta*. Age: middle-late Eocene.

LASAGNIELLA Brinkhuis et al., 2000, p.101. Type: Brinkhuis et al., 2000, pl.1, figs.11–13, as *Lasagniella herngreenii*.

**herngreenii* Brinkhuis et al., 2000, p.101,103, pl.1, figs.1–13; pl.2, figs.1–12; pl.3, figs.1–12; pl.6, figs.1–2; pl.7, fig.1. Holotype: Brinkhuis et al., 2000, pl.1, figs.11–13. Age: latest Maastrichtian–Danian.

"**LATICAVODINIUM**" Wilson and Sarjeant in Sarjeant, 1984c, p.127. **Taxonomic senior synonym:** *Impletosphaeridium*, by implication in Islam (1993, p.86), who questionably transferred the "type species", *Laticavodinium oligacanthum*, to *Impletosphaeridium* and by Masare in Fauconnier and Masare (2004, p.337). Taxonomic senior synonym: *Cleistosphaeridium*, according to Stover and Williams (1987, p.145) — however, *Laticavodinium* is now considered a taxonomic junior synonym of *Impletosphaeridium*. Type: Wetzel, 1952, pl.A, fig.8, as *Hystrichosphaeridium oligacanthum*.

"*latispinosum*" Wilson in Slimani, 2001a, p.194. **Name not validly published:** no description. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Raetiaedinium*) *truncigerum*, according to Slimani (2001a, p.194).

"**oligacanthum*" (Wetzel, 1952, p.402–405, pl.A, figs.4,7–8,11a–b; text-figs.21–25) Wilson and Sarjeant in Sarjeant, 1984c, p.127–128. Emendation: Wilson and Sarjeant in Sarjeant, 1984c, p.128, as *Laticavodinium oligacanthum*. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625; Dietz et al., 1999, text-fig.6g. **NOW** *Impletosphaeridium*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*?, fourthly *Laticavodinium*, fifthly (and now) *Impletosphaeridium*?. Age: Danian.

LEBERIDOCYSTA Stover and Evitt, 1978, p.59–60. Emendation: Pestchevitskaya, 2009, p.110. Taxonomic senior synonym: *Polygonifera*, according to Mehrotra and Sarjeant (1984c, p.46) — however, Lentin and Williams (1985, p.214) retained *Leberidocysta*. Type: Cookson and Eisenack, 1962b, pl.7, fig.2, as *Hexagonifera chlamydata*.

**chlamydata* (Cookson and Eisenack, 1962b, p.496, pl.7, figs.1–3,5–8) Stover and Evitt, 1978, p.60. Emendations: Fechner, 1985, p.119 and Marheinecke, 1992, p.88, both as *Leberidocysta chlamydata*. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.2; Fensome et al., 1993a, fig.2 — p.1049. Originally *Hexagonifera*, subsequently *Hexagonifera*?, thirdly (and now) *Leberidocysta*, fourthly *Polygonifera*. Lentin and Williams (1985, p.214) retained this species in *Leberidocysta*. Age: Albian–Cenomanian.

subsp. *chlamydata*. Autonym. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.2; Fensome et al., 1993a, fig.2 — p.1049.

subsp. *schioeleri* Slimani, 1996, p.375, pl.1, figs.A–G ex Slimani 2001b, p.3,5. Holotype: Slimani, 1996, pl.1, figs.A–D; Slimani, 2001a, pl.1, figs.10–13. This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Slimani (2001b, p.3) cited the epithet as "*schioeleri*"; with latinization of the diacritical marks ("ø" to "oe" and correction of the ending ("er" endings takes a single "i" in the genitive), the epithet is to be cited as "*schioeleri*". Age: late Campanian–earliest Danian.

defloccata (Davey and Verdier, 1973, p.198, pl.3, figs.6,8) Stover and Evitt, 1978, p.60. Holotype: Davey and Verdier, 1973, pl.3, fig.8. Originally *Hexagonifera*, subsequently *Thalassiphora*, thirdly (and now) *Leberidocysta*, fourthly *Disphaeria*, fifthly *Craspedodinium*. Lentin and Williams (1985, p.214) retained this species in *Leberidocysta*. Age: late Albian–early Cenomanian.

"**eisenackii*" (Mehrotra and Sarjeant, 1984c, p.46–48, pl.1, figs.1–7; pl.2, figs.1–7; text-figs.1a–d,2a–c,3a–b) Lentin and Williams, 1985, p.214. Holotype: Mehrotra and Sarjeant, 1984c, pl.1, fig.6; text-fig.1c. **NOW** *Platycystidia* (Appendix A). Originally *Polygonifera*, subsequently *Leberidocysta*?, thirdly (and now) *Platycystidia* (Appendix A). Questionable assignment: Lister and Batten (1988b, p.39). Age: Aptian.

?*flagellichnia* Schiøler, 1993, p.110–111, pl.3, figs.7–14; text-fig.5. Holotype: Schiøler, 1993, pl.3, figs.7–8; text-fig.5. Questionable assignment: Schiøler (1993, p.110). Schiøler et al. (1997, p.87) considered this species to be the possible taxonomic senior synonym of *Leberidocysta microverrucosa*. Age: Maastrichtian–early Danian.

?*laticaudata* (Vozzhennikova, 1967, p.125–126, pl.54, fig.1) Stover and Evitt, 1978, p.60. Holotype: Vozzhennikova, 1967, pl.54, fig.1; Lentin and Vozzhennikova, 1990, text-fig.30; lost according to Lentin and Vozzhennikova (1990, p.59). Originally *Hexagonifera*, subsequently *Hexagonifera?*, thirdly (and now) *Leberidocysta?*. Lentin and Williams (1985, p.214) retained this species in *Leberidocysta*. Questionable assignment: Stover and Evitt (1978, p.60). According to Lentin and Vozzhennikova (1990, p.59), no potential lectotype is available. Age: Santonian.

lingfengensis (Yu Jingxian, 1989, p.158, pl.38, figs.9–10) He Chengquan et al., 2009, p.442. Holotype: Yu Jingxian, 1989, pl.38, fig.10. Originally *Ascodinium*, subsequently (and now) *Leberidocysta*. Age: Paleocene.

?*microverrucosa* Slimani, 1994, p.111–112, pl.18, figs.18,21–25. Holotype: Slimani, 1994, pl.18, figs.24–25. Questionable assignment: Slimani (1994, p.111). Taxonomic junior synonyms: *Hexagonifera verrucosa* (name not validly published) and *Leberidocysta? verrucosa*, both according to Slimani (2001a, p.193). Schiøler et al. (1997, p.87) considered this species to be a possible taxonomic junior synonym of *Leberidocysta? flagellichnia*. Age: early Campanian–earliest Danian.

?*pergamentacea* (Burger, 1980a, p.88, pl.47, figs.2–3) Burger, 1980b, p.272. Holotype: Burger, 1980a, pl.47, fig.3. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Leberidocysta?*, thirdly *Craspedodinium*. Lentin and Williams (1985, p.215) retained this species in *Leberidocysta*. Questionable assignment: Burger (1980b, p.272). Age: Aptian.

"?*scabrata*" (Jain and Taugourdeau-Lantz, 1973, p.64, pl.4, figs.11–12) Stover and Evitt, 1978, p.60. Holotype: Jain and Taugourdeau-Lantz, 1973, pl.4, fig.11. **NOW** *Ovoidinium*. Originally *Hexagonifera*, subsequently *Leberidocysta?*, thirdly *Hexagonifera?*, fourthly (and now) *Ovoidinium*. Questionable assignment: Stover and Evitt (1978, p.60). Age: Early Cretaceous.

spinosa Pestchevitskaya, 2009, p.110–111, pl.1, figs.5,7–9, text-fig.2C. Holotype: Pestchevitskaya, 2009, pl.1, fig.5. Age: Berriasian–early Valanginian.

?*strigosa* Mantle, 2009b, p.109,110, pl.13, figs.11–13; text-fig.4. Holotype: Mantle, 2009b, pl.13, fig.11. Questionable assignment: Mantle (2009b, p.109). Age: Callovian.

suibinensis He Chengquan and Zhu Youhua, 2003, p.339,341–342, pl.2, figs.1–3,5–6. Holotype: He Chengquan and Zhu Youhua, 2003, pl.2, fig.2. Age: Berriasian–Valanginian.

"?*verrucosa*" Schiøler et al., 1997, p.85,87, pl.3, figs.1–8. Holotype: Schiøler et al., 1997, pl.3, figs.1–3. Questionable assignment: Schiøler et al. (1997, p.85). **Taxonomic senior synonym:** *Leberidocysta? microverrucosa*, according to Slimani (2001a, p.193). Age: late Maastrichtian.

LEIPOKATIUM Bradford, 1975, p.3066. Harland and Reid in Harland et al. (1980, p.223) contended that this name was not validly published in Bradford (1975) since that author did not provide a Latin description. However, it is based on a fossil type and thus does not require a Latin description in order to be validly published. Type: Bradford, 1975, fig.8, as *Leipokatium invisitatum*.

**invisitatum* Bradford, 1975, p.3067, figs.8–16. Holotype: Bradford, 1975, fig.8; Fensome et al., 1995, fig.1 — p.1569. Age: Holocene.

LEJEUNECYSTA Artzner and Dörhöfer, 1978, p.1381. Emendations: Kjellström, 1972, p.467, Lentin and Williams, 1976, p.68–69 and Bujak in Bujak et al., 1980, p.68, all as *Lejeunia* — however, see Head (1993, p.30–

31). Originally *Lejeunia* Gerlach, 1961 (name illegitimate), subsequently (and now) *Lejeunecysta*, thirdly *Protoperidinium* subgenus *Protoperidinium* section *Lejeunecysta* (section name not validly published). Substitute name for *Lejeunia* Gerlach, 1961, p.169 (an illegitimate name). Taxonomic senior synonym: *Quinquecuspis*, by implication in Matsuoka (1987, p.57), who incorrectly considered *Lejeunecysta* to be the senior name — however, this synonymy has not been generally followed. Type: Gerlach, 1961, pl.26, figs.10–11, as *Lejeunia hyalina*.

acuminata Clowes et al., 2016, p.72, figs.5a–l. Holotype: Clowes et al., figs.5a–c. Age: Oligocene.

"*aechmophora*" (Benedek, 1972, p.41, pl.5, figs.7,11; text-fig.17) Wilson and Clowes, 1980, p.63. Emendation: Benedek and Sarjeant, 1981, p.340–341, as *Gerlachidium aechmophorum*. Holotype: Benedek, 1972, pl.5, fig.7; text-fig.17; Benedek and Sarjeant, 1981, figs.7,9, nos.1–2; Fensome et al., 1993a, figs.1–2 — p.887. **NOW** *Gerlachidium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Wilsonidium*?, thirdly *Lejeunecysta*, fourthly (and now) *Gerlachidium*. Age: middle-late Oligocene.

"*applanata*" (Bradford, 1977 [April], p.47–49, fig.2, nos.1–8) Artzner and Dörhöfer, 1978, p.1381. Holotype: Bradford, 1977, fig.2, nos.1–4. **NOW** *Trinovantedinium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunecysta*, thirdly (and now) *Trinovantedinium*, fourthly *Capillicysta*. Taxonomic junior synonym: *Trinovantedinium capitatum* Reid, 1977 (November), by implication in Matsuoka (1984b, p.6), who did not specify priority, and de Verteuil and Norris (1992, p.408). Age: Holocene.

attenuata Clowes et al., 2016, p.72–75, figs.6a–l. Holotype: Clowes et al., figs.6a–c. Age: Oligocene.

beninensis Biffi and Grignani, 1983, p.128–130, pl.2, figs.4–5,8; text-fig.2A. Holotype: Biffi and Grignani, 1983, pl.2, fig.5. Age: Oligocene.

brassensis Biffi and Grignani, 1983, p.130, pl.1, figs.1–3; text-fig.2B. Holotype: Biffi and Grignani, 1983, pl.1, fig.1. Age: Oligocene.

catomus (Harland in Harland et al., 1991, p.651,653, figs.4d–e) Lentin and Williams, 1993, p.383. Holotype: Harland et al., 1991, fig.4d. Originally *Protoperidinium* subgenus *Protoperidinium* section *Lejeunecysta* (section name not validly published; Appendix B), subsequently (and now) *Lejeunecysta*. Contrary to the opinion of Lentin and Williams (1993, p.383), the name *Protoperidinium catomus* was validly published in Harland in Harland et al. (1991) since, although *Lejeunecysta* as a section name was not validly published, the species was assigned to the validly published generic name *Protoperidinium*. N.I.A. Age: early Pleistocene.

challengerensis Louwye et al., 2008, p.136, pl.2, figs.1–9. Holotype: Louwye et al., 2008, pl.2, figs.1–9. Age: early-middle Miocene.

cinctoria (Bujak in Bujak et al., 1980, p.68–69, pl.18, figs.1–4; text-fig.17) Lentin and Williams, 1981, p.169. Holotype: Bujak et al., 1980, pl.18, figs.1–2. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Age: middle Eocene (see Aubry, 1986).

circularis (He Chengquan in Zheng Yahui and He Chengquan, 1984, p.94, pl.7, figs.21–25; pl.10, figs.3–4) Lentin and Williams, 1989, p.218. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.22. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Age: Late Cretaceous.

communis Biffi and Grignani, 1983, p.130–132, pl.1, figs.4–7; text-fig.2C. Holotype: Biffi and Grignani, 1983, pl.1, fig.5. Age: Oligocene.

"*concreta*" (Reid, 1977, p.438–439, pl.1, figs.9–11) Matsuoka, 1987, p.58. Holotype: Reid, 1977, pl.1, figs.9–11; Fensome et al., 1993a, figs.1–3 — p.1069. **NOW** *Quinquecuspis*. Originally *Trinovantedinium*, subsequently (and now) *Quinquecuspis*, thirdly *Lejeunecysta*. Motile equivalent: *Protoperidinium leonis* (Pavillard, 1916) Balech, 1974, according to Harland (1981, p.68) and Lewis et al. (1984, p.30). Age: Holocene.

convexa Matsuoka and Bujak, 1988, p.56–58, pl.7, fig.2; pl.19, figs.1–2; text-figs.11A–C. Holotype: Matsuoka and Bujak, 1988, pl.7, fig.2; text-fig.11A. Age: late Oligocene–early Miocene.

cowiei Hannah et al., 1998, p.535, figs.5f–g. Holotype: Hannah et al., 1998, figs.5f–g. Age: early Miocene.

decorinassa Srivastava, 1995, p.312,314, pl.30, figs.6–7. Holotype: Srivastava, 1995, pl.30, fig.7. Age: Maastrichtian.

subsp. *diversiforma*. Autonym. Holotype: Bradford, 1977, fig.4, no.1. Originally *Lejeunia diversiforma* subsp. *diversiforma* (generic name illegitimate), subsequently (and now) *Lejeunecysta diversiforma* subsp. *diversiforma*.

subsp. *muscatensis* (Bradford, 1977, p.55–56, figs.6, nos.1–3) Artzner and Dörhöfer, 1978, p.1381. Holotype: Bradford, 1977, fig.6, no.3. Originally *Lejeunia diversiforma* subsp. *muscatensis* (generic name illegitimate), subsequently (and now) *Lejeunecysta diversiforma* subsp. *muscatensis*. Age: Holocene.

diversiforma (Bradford, 1977, p.49,52,55–56, fig.4, nos.1–4,6–7; fig.6, nos.1–3) Artzner and Dörhöfer, 1978, p.1381. Holotype: Bradford, 1977, fig.4, no.1. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Age: Holocene.

?*epidoma* Matsuoka, 1987, p.59–60, pl.9, figs.5–6. Holotype: Matsuoka, 1987, pl.9, figs.5–6. Questionable assignment: Matsuoka (1987, p.59). Age: Quaternary.

fallax (Morgenroth, 1966b, p.2–3, pl.1, figs.6–7) Artzner and Dörhöfer, 1978, p.1381. Emendation: Biffi and Grignani, 1983, p.132, as *Lejeunecysta fallax*. Holotype: Morgenroth, 1966b, pl.1, fig.6. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Age: middle Oligocene.

"*gaditana*" (Riegel, 1974, p.356–357, pl.2, figs.8–9; pl.3, figs.1–2) Wilson and Clowes, 1980, p.63. Emendation: Riegel and Sarjeant, 1982, p.297–299, as *Phelodinium gaditanum*. Holotype: Riegel, 1974, pl.2, figs.8–9; Riegel and Sarjeant, 1982, fig.7D. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Lejeunia* (combination illegitimate), fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: Senonian.

globosa Biffi and Grignani, 1983, p.132–134, pl.2, figs.6–7,10; text-fig.2E. Holotype: Biffi and Grignani, 1983, pl.2, fig.6. Age: Oligocene.

granosa Biffi and Grignani, 1983, p.134, pl.4, figs.1–2; text-fig.2D. Holotype: Biffi and Grignani, 1983, pl.4, fig.2. Age: Oligocene.

hatterasensis Head and Norris, 2003, p.3–4,6, fig.4, nos.1–20. Holotype: Head and Norris, 2003, fig.4, nos.10–13. Age: Pliocene.

**hyalina* (Gerlach, 1961, p.169–171, pl.26, figs.10–11) Artzner and Dörhöfer, 1978, p.1381. Emendations: Kjellström, 1972, p.469, as *Lejeunia hyalina*; Sarjeant, 1984b, p.89–90, as *Lejeunecysta hyalina*. Holotype: Gerlach, 1961, pl.26, figs.10–11. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Age: late Oligocene.

illecebrosa Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.49–50, pl.3, figs.8–17; text-fig.4. Holotype: He Chengquan et al., 1989, pl.3, fig.15. Age: Early Tertiary.

interrupta Head and Norris, 2003, p.6,8, fig.6, nos.1–20. Holotype: Head and Norris, 2003, fig.6, nos.14–17. Age: late Miocene–earliest Pliocene.

izerzenensis Slimani et al., 2008, p.340–342, figs.10A–F. Holotype: Slimani et al., 2008, figs.10A–B. Age: late Maastrichtian.

kammae Willumsen, 2011, p.224,226, figs.11K–L. Holotype: Willumsen, 2011, fig.K. Age: early Paleocene.

katatonos Clowes et al. 2016, p.75–77, figs.8a–l. Holotype: Clowes et al., figs.8a–c. N.I.A. Age: Oligocene.

"laevigata" (Malloy, 1972, p.64, pl.1, figs.1–7) Wilson and Clowes, 1980, p.63. Holotype: Malloy, 1972, pl.1, fig.5. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Andalusiella*, fourthly *Lejeunecysta*, fifthly (and now) *Senegalinium*. Taxonomic junior synonym: *Senegalinium psilatatum*, according to Hergreen (1975, p.61). Age: Senonian.

lata Biffi and Grignani, 1983, p.134–136, pl.3, figs.1–2,4; text-fig.2G. Holotype: Biffi and Grignani, 1983, pl.3, fig.2; text-fig.2G. Age: Oligocene.

"magnifica" (Stanley, 1965, p.218–219, pl.20, figs.1–6) Artzner and Dörhöfer, 1978, p.1381. Holotype: Stanley, 1965, pl.20, figs.4–6. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Taxonomic junior synonym (at specific rank): *Peridinium crassipes* forma *altum*, according to Sarjeant (1985b, p.159) and Lentin and Williams (1993, p.503). Age: Paleocene.

marieae (Harland in Harland et al., 1991, p.653, figs.4j–l) Lentin and Williams, 1993, p.383. Holotype: Harland et al., 1991, fig.4j. Originally *Protoperidinium* subgenus *Protoperidinium* section *Lejeunecysta* (section name not validly published; Appendix B), subsequently (and now) *Lejeunecysta*. Contrary to the opinion of Lentin and Williams (1993, p.383), the name *Protoperidinium marieae* was validly published in Harland in Harland et al. (1991) since, although *Lejeunecysta* as a section name was not validly published, the species was assigned to the validly published generic name *Protoperidinium*. Age: early Pleistocene.

microgranulata (He Chengquan in Zheng Yahui and He Chengquan, 1984, p.94, pl.7, fig.30) Lentin and Williams, 1989, p.218. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.30. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Age: Late Cretaceous.

oliva (Reid, 1977, p.439–440, pl.1, figs.12–14; pl.2, fig.18) Turon and Londeix, 1988, p.344. Holotype: Reid, 1977, pl.1, figs.12–13. Originally *Trinovantedinium*, subsequently (and now) *Lejeunecysta*. Taxonomic senior synonym: *Lejeunia* (now *Lejeunecysta*) *paratenella*, according to Harland (1977b, p.105) — however, Turon and Londeix (1988, p.344) retained *Trinovantedinium* (as *Lejeunecysta*) *oliva*. N.I.A. Age: Holocene.

"paratenella" (Benedek, 1972, p.41–42, pl.5, fig.8; text-fig.18) Artzner and Dörhöfer, 1978, p.1381. Holotype: Benedek, 1972, pl.5, fig.8; Benedek and Sarjeant, 1981, fig.9, nos.3–4. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunecysta*. **Taxonomic senior synonym:** *Selenopemphix selenoides*, according to Benedek and Sarjeant (1981, p.336–338). Taxonomic junior synonym: *Trinovantedinium* (now *Lejeunecysta*) *oliva*, according to Harland (1977b, p.105) — however, Turon and Londeix (1988, p.344) retained *Trinovantedinium* (as *Lejeunecysta*) *oliva*. Age: late Oligocene.

pentagona He Chengquan, 1991, p.68, pl.1, figs.13–14. Holotype: He Chengquan, 1991, pl.1, fig.13. Age: middle Eocene.

"pentagonalis" (Corradini, 1973, p.175, pl.28, fig.3) Artzner and Dörhöfer, 1978, p.1381. Holotype: Corradini, 1973, pl.28, fig.3; Eisenack and Kjellström, 1981a, page labelled "nach S.208"; Fensome et al., 1995, fig.1 — p.1649. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: Senonian.

?psilodora (Benedek, 1972, p.42, pl.6, fig.5) Artzner and Dörhöfer, 1978, p.1381. Holotype: Benedek, 1972, pl.6, fig.5. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunia?* (generic name illegitimate), thirdly (and now) *Lejeunecysta?*. Taxonomic senior synonym: *Selenopemphix nephroides*, according to Benedek and Sarjeant (1981, p.333) — however, Lentin and Williams (1985, p.217) and Head (1993, p.36) retained *Lejeunecysta psilodora*. Questionable assignment: Stover and Evitt (1978, p.112) as *Lejeunia psilodora*. Age: middle Oligocene.

psuchra Matsuoka, 1987, p.60–61, pl.9, figs.7–8; pl.14, figs.11–12. Holotype: Matsuoka, 1987, pl.9, figs.7–8. Age: Holocene.

pulchra Biffi and Grignani, 1983, p.136, pl.2, figs.1–3; text-fig.2I. Holotype: Biffi and Grignani, 1983, pl.2, fig.1; text-fig.2I. Age: Oligocene.

rotunda Clowes et al., 2016, p.77–78, figs.9a–l. Holotype: Clowes et al., figs.9a–c. Age: Oligocene.

sabrina (Reid, 1977, p.441–442, pl.2, figs.15–17) Bujak, 1984, p.193. Holotype: Reid, 1977, pl.2, fig.15. Originally *Trinovantedinium*, subsequently (and now) *Lejeunecysta*. Motile equivalent: *Protoperidinium leonis* (Pavillard, 1916) Balech, 1974, according to Harland (1981, p.68). N.I.A. Age: Holocene.

spatiosa (Morgenroth, 1966b, p.3–4, pl.1, fig.5) Wilson and Clowes, 1980, p.63. Holotype: Morgenroth, 1966b, pl.1, fig.5. Originally *Lejeunia* (generic name illegitimate), subsequently *Maduradinium*, thirdly (and now) *Lejeunecysta*. Lentin and Williams (1981, p.170) also proposed this combination. Age: early Oligocene.

spectabilis He Chengquan, 1991, p.68–69, pl.1, fig.40. Holotype: He Chengquan, 1991, pl.1, fig.40. Age: middle Eocene.

striata Clowes et al., 2016, p.78–79, figs.10a–l. Holotype: Clowes et al., figs.10a–c. Age: Oligocene–Miocene.

tenella (Morgenroth, 1966b, p.4–5, pl.1, figs.8–9) Wilson and Clowes, 1980, p.63. Holotype: Morgenroth, 1966b, pl.1, fig.8. Originally *Lejeunia* (generic name illegitimate), subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Lejeunecysta*. Lentin and Williams (1981, p.170) also proposed this combination. Age: early Oligocene.

"*tricuspis*" (Wetzel, 1933a, p.166, pl.2, fig.14) Artzner and Dörhöfer, 1978, p.1381–1382. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.20, as *Lejeunecysta tricuspis*. Holotype: Wetzel, 1933a, pl.2, fig.14; Lejeune-Carpentier, 1942, fig.21; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.5. **NOW** *Phelodinium*. Originally *Peridinium* (Appendix B), subsequently *Lejeunia* (combination illegitimate), thirdly *Astrocysta*, fourthly *Senegalinium*, fifthly *Lejeunecysta*, sixthly (and now) *Phelodinium*. Taxonomic junior synonym: *Lejeunia* (now *Phelodinium*) *kozłowskii*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Lejeunia* (as *Phelodinium*) *kozłowskii*. According to Lejeune-Carpentier and Sarjeant (1981, p.20, pl.6, fig.5), this species represents an autocyst; therefore it should be retained in *Lejeunecysta*. Age: Senonian.

variabilis (He Chengquan in Zheng Yahui and He Chengquan, 1984, p.94–95, pl.7, figs.26–29; pl.10, fig.5) Lentin and Williams, 1989, p.219. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.26. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Age: Late Cretaceous.

"**LEJEUNIA**" Gerlach, 1961, p.169. Emendations: Kjellström, 1972, p.467, Lentin and Williams, 1976, p.68–69 and Bujak in Bujak et al., 1980, p.68, all as *Lejeunia* — however, see Head (1993, p.30–31). **Name illegitimate** — **senior homonym**: *Lejeunea* Libert, 1820. **Substitute name**: *Lejeunecysta*. Originally *Lejeunia* Gerlach, 1961 (generic name illegitimate), subsequently (and now) *Lejeunecysta*, thirdly *Protoperidinium* subgenus *Protoperidinium* section *Lejeunecysta* (section name not validly published). Taxonomic senior synonym: *Quinquecuspis*, by implication in Matsuoka (1987, p.57), who incorrectly considered *Lejeunecysta* to be the senior name — however, this synonymy has not been generally followed. Type: Gerlach, 1961, pl.26, figs.10–11, as *Lejeunia hyalina*.

"*aechmophora*" Benedek, 1972, p.41, pl.5, figs.7,11; text-fig.17. Emendation: Benedek and Sarjeant, 1981, p.340–341, as *Gerlachidium aechmophorum*. Holotype: Benedek, 1972, pl.5, fig.7; text-fig.17; Benedek and Sarjeant, 1981, figs.7,9, nos.1–2; Fensome et al., 1993a, figs.1–2 — p.887. **NOW** *Gerlachidium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Wilsonidium*?, thirdly *Lejeunecysta*, fourthly (and now) *Gerlachidium*. Following I.C.N. Article 55.1, the species name *Lejeunia aechmophora* is validly published even though the generic name *Lejeunia* is illegitimate. Age: middle-late Oligocene.

"*ampla*" Harland, 1973, p.673–674, pl.84, figs.1,7; text-fig.8. Holotype: Harland, 1973, pl.84, fig.1. Originally *Lejeunia* (generic name illegitimate), subsequently *Astrocysta* (combination not validly published), thirdly *Palaeoperidinium*. **Taxonomic senior synonym**: *Palaeoperidinium cretaceum*, according to Harker and Sarjeant in

Harker et al. (1990, p.128). Following I.C.N. Article 55.1, the species name *Lejeunia ampla* is validly published even though the generic name *Lejeunia* is illegitimate. Age: late Campanian.

"*applanata*" Bradford, 1977 (April), p.47–49, fig.2, nos.1–4. Holotype: Bradford, 1977, fig.2, nos.1–4. **NOW** *Trinovantedinium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunecysta*, thirdly (and now) *Trinovantedinium*, fourthly *Capillicysta*. Taxonomic junior synonym: *Trinovantedinium capitatum* Reid, 1977 (November), by implication in Matsuoka (1984b, p.6), who did not specify priority, and de Verteuil and Norris (1992, p.408). Following I.C.N. Article 55.1, the species name *Lejeunia applanata* is validly published even though the generic name *Lejeunia* is illegitimate. Age: Holocene.

"*cinctoria*" Bujak in Bujak et al., 1980, p.68–69, pl.18, figs.1–4; text-fig.17. Holotype: Bujak et al., 1980, pl.18, figs.1–2. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia cinctoria* is validly published even though the generic name *Lejeunia* is illegitimate. Age: middle Eocene (see Aubry, 1986).

"*circularis*" He Chengquan in Zheng Yahui and He Chengquan, 1984, p.94, pl.7, figs.21–25; pl.10, figs.3–4. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.22. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia circularis* is validly published even though the generic name *Lejeunia* is illegitimate. Age: Late Cretaceous.

"?*cretacea*" (Pocock, 1962, p.80, pl.14, figs.219–221 ex Davey, 1970, p.359, pl.2, fig.4) Brideaux, 1971, p.86. Emendation: Harding, 1990a, p.44, as *Palaeoperidinium cretaceum*. Holotype: Pocock, 1962, pl.14, fig.219. **Combination illegitimate**: the generic name *Lejeunia* is illegitimate. **NOW** *Palaeoperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Astrocysta*, thirdly *Lejeunia?* (name illegitimate), fourthly *Subtilisphaera*, fifthly (and now) *Palaeoperidinium*. Questionable assignment: Brideaux (1971, p.86). Taxonomic junior synonyms: *Lejeunia* (as *Palaeoperidinium*) *ampla*, according to Harker and Sarjeant in Harker et al. (1990, p.128); *Astrocysta* (as *Palaeoperidinium*) *manumcooksonii*, according to Lentin and Williams (1976, p.110). Age: Aptian–Albian.

"*diversiforma*" Bradford, 1977, p.49, 52, 55–56, fig.4, nos.1–4, 6–7; fig.6, nos.1–3. Holotype: Bradford, 1977, fig.4, no.1. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia diversiforma* is validly published even though the generic name *Lejeunia* is illegitimate. Age: Holocene.

"*elongata*" Jiabo, 1978, p.54–55, pl.1, figs.5–7. Holotype: Jiabo, 1978, pl.1, fig.6. **NOW** *Cangxianella*. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Following I.C.N. Article 55.1, the species name *Lejeunia elongata* is validly published even though the generic name *Lejeunia* is illegitimate. Age: Early Tertiary.

"*fallax*" Morgenroth, 1966b, p.2–3, pl.1, figs.6–7. Emendation: Biffi and Grignani, 1983, p.132, as *Lejeunecysta fallax*. Holotype: Morgenroth, 1966b, pl.1, fig.6. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia fallax* is validly published even though the generic name *Lejeunia* is illegitimate. Age: middle Oligocene.

"*fissurata*" Jiabo, 1978, p.55, pl.1, figs.4, 8–10. Holotype: Jiabo, 1978, pl.1, fig.9. **NOW** *Cangxianella*. Originally *Lejeunia* (generic name illegitimate), subsequently *Ceratiopsis* (combination illegitimate), thirdly *Cerodinium*, fourthly (and now) *Cangxianella*. Following I.C.N. Article 55.1, the species name *Lejeunia fissurata* is validly published even though the generic name *Lejeunia* is illegitimate. Age: Early Tertiary.

"*gaditana*" (Riegel, 1974, p.356–357, pl.2, figs.8–9; pl.3, figs.1–2) Stover and Evitt, 1978, p.112. Emendation: Riegel and Sarjeant, 1982, p.297–299, as *Phelodinium gaditanum*. Holotype: Riegel, 1974, pl.2, figs.8–9; Riegel and Sarjeant, 1982, fig.7D. **Combination illegitimate**: the generic name *Lejeunia* is illegitimate. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Senegalium*, thirdly *Lejeunia* (combination illegitimate), fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: ?Senonian.

"**hyalina*" Gerlach, 1961, p.169–171, pl.26, figs.10–11. Emendations: Kjellström, 1972, p.469, as *Lejeunia hyalina*; Sarjeant, 1984b, p.89–90, as *Lejeunecysta hyalina*. Holotype: Gerlach, 1961, pl.26, figs.10–11. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia hyalina* is validly published even though the generic name *Lejeunia* is illegitimate. Age: late Oligocene.

"*kozlowskii*" Górka, 1963, p.41, pl.5, fig.4. Holotype: Górka, 1963, pl.5, fig.4. **NOW** *Phelodinium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Astrocysta*, thirdly *Senegalinium*, fourthly (and now) *Phelodinium*. Taxonomic senior synonym: *Peridinium* (now *Phelodinium*) *tricuspis*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Peridinium* (as *Phelodinium*) *kozlowskii*. Following I.C.N. Article 55.1, the species name *Lejeunia kozlowskii* is validly published even though the generic name *Lejeunia* is illegitimate. Age: late Maastrichtian.

"*laevigata*" (Malloy, 1972, p.64, pl.1, figs.1–7) Lentin and Williams, 1976, p.71. Holotype: Malloy, 1972, pl.1, fig.5. **Combination illegitimate**: the generic name *Lejeunia* is illegitimate. **NOW** *Senegalinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Andalusiella*, fourthly *Lejeunecysta*, fifthly (and now) *Senegalinium*. Taxonomic junior synonym: *Senegalinium psilatatum*, according to Herengreen (1975, p.61). Age: Senonian.

"*magnifica*" (Stanley, 1965, p.218–219, pl.20, figs.1–6) Lentin and Williams, 1976, p.71. Holotype: Stanley, 1965, pl.20, figs.4–6. **Combination illegitimate**: the generic name *Lejeunia* is illegitimate. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Taxonomic junior synonym (at specific rank): *Peridinium crassipes* forma *altum*, according to Sarjeant (1985b, p.159) and Lentin and Williams (1993, p.503). Age: Paleocene.

"*microgranulata*" He Chengquan in Zheng Yahui and He Chengquan, 1984, p.94, pl.7, fig.30. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.30. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia microgranulata* is validly published even though the generic name *Lejeunia* is illegitimate. Age: Late Cretaceous.

"*paratenella*" Benedek, 1972, p.41–42, pl.5, fig.8; text-fig.18. Holotype: Benedek, 1972, pl.5, fig.8; Benedek and Sarjeant, 1981, fig.9, nos.3–4. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunecysta*. **Taxonomic senior synonym**: *Selenopemphix selenoides*, according to Benedek and Sarjeant (1981, p.336–338). Taxonomic junior synonym: *Trinovantedinium* (now *Lejeunecysta*) *oliva*, according to Harland (1977b, p.105) — however, Turon and Londeix (1988, p.344) retained *Trinovantedinium* (as *Lejeunecysta*) *oliva*. Following I.C.N. Article 55.1, the species name *Lejeunia paratenella* is validly published even though the generic name *Lejeunia* is illegitimate. Age: late Oligocene.

"*parva*" Harland, 1973, p.672–673, pl.84, figs.3,12–14; text-fig.7. Holotype: Harland, 1973, pl.84, fig.14. **NOW** *Palaeoperidinium*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Palaeoperidinium*. Following I.C.N. Article 55.1, the species name *Lejeunia parva* is validly published even though the generic name *Lejeunia* is illegitimate. Age: late Campanian.

"*pentagonalis*" (Corradini, 1973, p.175, pl.28, fig.3) Lentin and Williams, 1976, p.71. Holotype: Corradini, 1973, pl.28, fig.3; Eisenack and Kjellström, 1981a, page labelled "nach S.208"; Fensome et al., 1995, fig.1 — p.1649. **Combination illegitimate**: the generic name *Lejeunia* is illegitimate. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: Senonian.

"?*psilodora*" Benedek, 1972, p.42, pl.6, fig.5. Holotype: Benedek, 1972, pl.6, fig.5. **NOW** *Lejeunecysta*?. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunia*? (generic name illegitimate), thirdly (and now) *Lejeunecysta*. Questionable assignment: Stover and Evitt (1978, p.112). Taxonomic senior synonym: *Selenopemphix nephroides*, according to Benedek and Sarjeant (1981, p.333) — however, Lentin and Williams (1985, p.217) and Head (1993, p.36) retained *Lejeunia* (as *Lejeunecysta*) *psilodora*. Following I.C.N. Article 55.1, the species name *Lejeunia psilodora* is validly published even though the generic name *Lejeunia* is illegitimate. Age: middle Oligocene.

"*spatiosa*" Morgenroth, 1966b, p.3–4, pl.1, fig.5. Holotype: Morgenroth, 1966b, pl.1, fig.5. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently *Maduradinium*, thirdly (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia spatiosa* is validly published even though the generic name *Lejeunia* is illegitimate. Age: early Oligocene.

"*tenella*" Morgenroth, 1966b, p.4–5, pl.1, figs.8–9. Holotype: Morgenroth, 1966b, pl.1, fig.8. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia tenella* is validly published even though the generic name *Lejeunia* is illegitimate. Age: early Oligocene.

"*tricuspis*" (Wetzel, 1933a, p.166, pl.2, fig.14) Górka, 1963, p.40. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.20, as *Lejeunecysta tricuspis*. Holotype: Wetzel, 1933a, pl.2, fig.14; Lejeune-Carpentier, 1942, fig.21; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.5. **Combination illegitimate**: the generic name *Lejeunia* is illegitimate. **NOW** *Phelodinium*. Originally *Peridinium* (Appendix B), subsequently *Lejeunia* (combination illegitimate), thirdly *Astrocysta*, fourthly *Senegalinium*, fifthly *Lejeunecysta*, sixthly (and now) *Phelodinium*. Taxonomic junior synonym: *Lejeunia* (now *Phelodinium*) *kozłowskii*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Lejeunia* (as *Phelodinium*) *kozłowskii*. Age: Senonian.

"*variabilis*" He Chengquan in Zheng Yahui and He Chengquan, 1984, p.94–95, pl.7, figs.26–29; pl.10, fig.5. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.26. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Lejeunecysta*. Following I.C.N. Article 55.1, the species name *Lejeunia variabilis* is validly published even though the generic name *Lejeunia* is illegitimate. Age: Late Cretaceous.

"subsp. *diversiforma*". Autonym. Holotype: Bradford, 1977, fig.4, no.1. **NOW** *Lejeunecysta diversiforma* subsp. *diversiforma*. Originally *Lejeunia diversiforma* subsp. *diversiforma* (generic name illegitimate), subsequently (and now) *Lejeunecysta diversiforma* subsp. *diversiforma*.

"subsp. *muscatensis*" Bradford, 1977, p.55–56, fig.6, nos.1–3. Holotype: Bradford, 1977, fig.6, no.3. **NOW** *Lejeunecysta diversiforma* subsp. *muscatensis*. Originally *Lejeunia diversiforma* subsp. *muscatensis* (generic name illegitimate), subsequently (and now) *Lejeunecysta diversiforma* subsp. *muscatensis*. Age: Holocene.

LENTINIA Bujak in Bujak et al., 1980, p.69. Type: Bujak et al., 1980, pl.18, figs.7–9; text-figs.18A–F, as *Lentinia serrata*.

"*extensa*" (Stover, 1974, p.178–179, pl.5, figs.4a–c, 5a–d, 6) Bujak and Davies, 1983, p.162. Holotype: Stover, 1974, pl.5, figs.4a–c; Fensome et al., 1993a, figs.1–3 — p.1167. **NOW** *Gippslandia*. Originally *Deflandrea*, subsequently *Vozzhennikovia*?, thirdly *Dioxya*?, fourthly *Lentinia*, fifthly (and now) *Gippslandia*. Age: middle-late Eocene.

"*orei*" Jan du Chêne and Adediran, 1985, p.29, pl.1, figs.2–4. Holotype: Jan du Chêne and Adediran, 1985, pl.1, fig.3. **NOW** *Senegalinium*. Originally *Lentinia*, subsequently (and now) *Senegalinium*. Age: late Paleocene–early Eocene.

**serrata* Bujak in Bujak et al., 1980, p.71–72, pl.18, figs.7–12; text-figs.18A–F, 19. Holotype: Bujak et al., 1980, pl.18, figs.7–9; text-figs.18A–F; Fensome et al., 1995, figs.1–7 — p.1783. Age: middle Eocene (see Aubry, 1986).

?*wetzelii* (Morgenroth, 1966a, p.9, pl.1, figs.4–5) Bujak in Bujak et al., 1980, p.72. Holotype: Morgenroth, 1966a, pl.1, figs.4–5. Originally *Deflandrea*, subsequently *Lentinia*, thirdly (and now) *Lentinia*?. Questionable assignment: Stover and Williams (1987, p.148). Age: early Eocene.

LENTODINELLA Kienel, 1994, p.54. (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1298, the latter noting that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). Type: Kienel, 1994, pl.14, figs.1–3, as *Lentodinella danica*.

**danica* Kienel, 1994, p.54–55, pl.14, figs.1–15; pl.15, figs.1–8. Holotype: Kienel, 1994, pl.14, figs.1–3. Age: Danian.

LEONELLA Janofske and Karwath, 2000, p.107. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Elbrächter et al. (2008, p.1300) implied that this is an extant genus; however, the type is Gelasian. Type: Fütterer, 1978, pl.2, figs.1,4,7, as *Thoracosphaera granifera*.

**granifera* (Fütterer, 1978, p.715, pl.2, figs.1–12) Janofske and Karwath, 2000, p.107. Emendation: Janofske and Karwath, 2000, p.107–108, as *Leonella granifera*. Holotype: Fütterer, 1978, pl.2, figs.1,4,7. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Orthopithonella*, fourthly (and now) *Leonella*. Age: Gelasian.

LEPTODINIUM Klement, 1960, p.45–46. Emendations: Sarjeant, 1966b, p.133; Wall, 1967, p.104; Sarjeant, 1969, p.11–12; Stover and Evitt, 1978, p.169–170; Sarjeant, 1982b, p.37. Type: Klement, 1960, pl.6, figs.1–2; text-figs.23–24, as *Leptodinium subtile*.

"*aceras*" (Eisenack, 1958a, p.391, pl.21, figs.1–2) Sarjeant, 1969, p.12. Emendation: Sarjeant, 1985a, p.57,59, as *Cribroperidinium aceras*. Holotype: Eisenack, 1958a, pl.21, fig.1; Sarjeant, 1985a, pl.4, figs.1–2; Jan du Chêne et al., 1986a, pl.2, figs.6–7. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Leptodinium*, fourthly *Acanthaulax?*, fifthly (and now) *Cribroperidinium*. Age: Aptian.

acneum Snape, 1992, p.275, figs.7l–m. Holotype: Snape, 1992, figs.7l–m. Age: middle Tithonian.

"*aculeatum*" Wall, 1967, p.104–105, pl.14, figs.18–19; text-figs.3C–D. Holotype: Wall, 1967, pl.14, fig.18; Jan du Chêne et al., 1986a, pl.53, figs.1–3. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: Pleistocene–Holocene.

"*allectrolophum*" Sarjeant, 1966b, p.134–135, pl.15, figs.3–6; text-fig.34. Holotype: Sarjeant, 1966b, pl.15, figs.5–6; Jan du Chêne et al., 1986a, pl.54, figs.15–16. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*, thirdly *Pterodinium*. Age: middle Barremian.

amabile (Deflandre, 1939b, p.143, pl.6, fig.8) Sarjeant, 1969, p.12. Emendation: Kunz, 1990, p.18–19, as *Leptodinium amabile*. Holotype: Deflandre, 1939b, pl.6, fig.8; Jan du Chêne et al., 1986a, pl.69, figs.1–3. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Leptodinium*, thirdly *Gonyaulacysta*, fourthly *Leptodinium?*. Lentin and Williams (1973, p.86) retained this species in *Leptodinium*. Questionable assignment: Stover and Evitt (1978, p.171) as a problematic species — however, Kunz (1990, p.18) included the species in *Leptodinium* without question. Age: Kimmeridgian.

?*ambiguiforme* Dodekova, 1994, p.39–40, pl.12, figs.5,8–11; text-figs.6a–b. Holotype: Dodekova, 1994, pl.12, figs.9–11. Questionable assignment: Dodekova (1994, p.39). Age: late Tithonian.

ambiguum (Deflandre, 1939b, p.144, pl.6, fig.2) Helenes, 1984, p.131. Holotype: Deflandre, 1939b, pl.6, fig.2; Jan du Chêne et al., 1986a, pl.68, figs.1–3. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Leptodinium*. Age: Kimmeridgian.

?*ancoralium* Mantle, 2005, p.256,258–260, pl.3, figs.1–9; text-figs.7A–D,8A–C. Holotype: Mantle, 2005, pl.3, figs.4–7. Questionable assignment: Mantle (2005, p.256). Age: Callovian–early Oxfordian.

?*antigonium* Ioannides et al., 1977, p.456–457, pl.3, figs.7–8; text-fig.10. Holotype: Ioannides et al., 1977, pl.3, fig.8; Jan du Chêne et al., 1986a, pl.74, figs.7–8. Originally *Leptodinium*, subsequently (and now) *Leptodinium?*. Questionable assignment: Stover and Evitt (1978, p.170). Age: Kimmeridgian.

arcuatum Klement, 1960, p.48, pl.6, figs.5–6. Emendations: Gitmez, 1970, p.270; Sarjeant, 1984a, p.163–164. Holotype: Klement, 1960, pl.6, figs.5–6; Sarjeant, 1984a, pl.1, figs.1–2; text-fig.4; Jan du Chêne et al., 1986a, pl.67, figs.9–12. Age: middle Oxfordian.

asymmetricum Morgan, 1980, p.25–26, pl.17, figs.1–5. Holotype: Morgan, 1980, pl.17, figs.1–3; Jan du Chêne et al., 1986a, pl.75, figs.5–6; pl.152, figs.1–3. Age: Aptian–middle Albian.

"*bab*" (Below, 1981a, p.113, pl.7, figs.10a–b, 11a–c; pl.14, figs.9, 12a–c, 13; text-figs.72a–d, 73a–c) Sarjeant, 1985a, p.72. Holotype: Below, 1981a, pl.7, figs.11a–c; Jan du Chêne et al., 1986a, pl.87, fig.8; Fensome et al., 1991, figs.1–3 — p.581. **NOW** *Pterodinium*. Originally (and now) *Pterodinium*, subsequently *Leptodinium*. N.I.A. Age: Hauterivian.

?*bacculatum* Balteş, 1971, p.3, pl.1, figs.4–5. Holotype: Balteş, 1971, pl.1, figs.4–5. Originally *Leptodinium*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*?, fourthly (and now) *Leptodinium*?. Questionable assignment: Helenes (1984, p.131). Age: early Pliocene.

cancellatum Brideaux and McIntyre, 1975, p.21–22, pl.5, figs.7–9. Holotype: Brideaux and McIntyre, 1975, pl.5, fig.8; Jan du Chêne et al., 1986a, pl.73, figs.5–6. Age: middle Albian.

"*churchillii*" Harland, 1968, p.548, 550–551, figs.12–13, 22–24. Holotype: Harland, 1968, figs.12–13, 22–24. Originally *Leptodinium*, subsequently *Impagidinium*. **Taxonomic senior synonym:** *Hystrichosphaera* (now *Spiniferites*) *nodosa*, according to Reid (1974, p.599). Taxonomic senior synonym: *Hystrichosphaera* (now *Spiniferites*) *bentorii* according to Harland (1977b, p.98–99) — however, *Leptodinium churchillii* is now generally considered a taxonomic junior synonym of *Hystrichosphaera* (now *Spiniferites*) *nodosa*. Age: Holocene.

clathratum (Cookson and Eisenack, 1960b, p.246–247, pl.37, fig.5; text-fig.2) Sarjeant in Davey et al., 1969, p.12. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.5; text-fig.2; Jan du Chêne et al., 1986a, pl.71, figs.10–12. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Leptodinium*, thirdly *Gonyaulacysta*. Lentin and Williams (1973, p.86) retained this species in *Leptodinium*. Age: ?Tithonian.

"*crassinervum*" (Deflandre, 1939b, p.144, pl.6, fig.5 ex Sarjeant, 1967b, p.248–249) Sarjeant, 1969, p.12. Emendation: Nøhr-Hansen, 1986, p.33, as *Cribroperidinium crassinervum*. Holotype: Deflandre, 1939b, pl.6, fig.5; Jan du Chêne et al., 1986a, pl.70, figs.1–4. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Leptodinium*, fourthly *Leptodinium*?, fifthly (and now) *Cribroperidinium*. Questionable assignment: Stover and Evitt (1978, p.170) as a problematic species. Age: Kimmeridgian.

"*cristatum*" May, 1980, p.57, pl.5, figs.16–20. Holotype: May, 1980, pl.5, figs.16–20. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Junior homonym: *Leptodinium cristatum* (Riley in Fisher and Riley, 1980) Lentin and Williams, 1981. Age: late Campanian–early Maastrichtian.

"*cristatum*" (Riley in Fisher and Riley, 1980, p.320, pl.1, figs.8, 12) Lentin and Williams, 1981, p.175. Holotype: Fisher and Riley, 1980, pl.1, figs.8, 12; Jan du Chêne et al., 1986a, pl.67, fig.20. **Combination illegitimate — senior homonym:** *Leptodinium cristatum* May, 1980. **Substitute name:** *Leptodinium volgense*. Originally *Gonyaulacysta cristata*, subsequently *Leptodinium cristatum* (combination illegitimate), thirdly (and now) *Leptodinium volgense*, fourthly *Millioudodinium cristatum*, fifthly *Cribroperidinium cristatum* (combination not validly published). Age: Volgian.

deflandrei (Riley in Fisher and Riley, 1980, p.320–321, pl.1, figs.1–2) Lentin and Williams, 1981, p.173. Holotype: Fisher and Riley, 1980, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.75, fig.7. Originally *Gonyaulacysta*, subsequently (and now) *Leptodinium*, thirdly *Millioudodinium*. This species name, as *Gonyaulacysta deflandrei*, was not validly published in Fisher and Riley (1976, p.52) since no description was provided. Age: Volgian.

?*delicatum* (Davey, 1969a, p.123–124, pl.1, figs.7–8; text-figs.10A–B) Sarjeant in Davey et al., 1969, p.12. Holotype: Davey, 1969a, pl.1, fig.7; text-figs.10A–B; Jan du Chêne et al., 1986a, pl.75, figs.1–3. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly (and now) *Leptodinium*?. Questionable assignment: Stover and

Evitt (1978, p.170). Sarjeant (1969, p.12) cited the date for the publication of the name of this species as 1968; Davey's paper appeared early in 1969. Age: Cenomanian.

"*dispertitum*" Cookson and Eisenack, 1965a, p.122–123, pl.12, figs.5–7. Holotype: Cookson and Eisenack, 1965a, pl.12, figs.5–6; Jan du Chêne et al., 1986a, pl.149, figs.11–16; Fensome et al., 1993a, figs.1–2 — p.1127. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: late Eocene.

"*egemenii*" Gitmez, 1970, p.272–274, pl.10, figs.5–6; text-fig.18. Holotype: Gitmez, 1970, pl.10, figs.5–6; text-fig.18; Jan du Chêne et al., pl.126, figs.4–7. **NOW** *Tubotuberella*. Originally *Leptodinium*, subsequently (and now) *Tubotuberella*. Age: early Kimmeridgian.

"*elegans*" Cookson and Eisenack, 1965a, p.123–124, pl.12, figs.10–13. Holotype: Cookson and Eisenack, 1965a, pl.12, figs.10,12; Jan du Chêne et al., 1986a, pl.149, figs.5–10. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: late Eocene.

episomum (Sarjeant, 1966b, p.118–119, pl.13, figs.9–10; text-fig.27) Helenes, 1984, p.131. Holotype: Sarjeant, 1966b, pl.13, figs.9–10; text-fig.27; Jan du Chêne et al., 1986a, pl.67, figs.15–16. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium*. Age: late Barremian.

eumorphum (Cookson and Eisenack, 1960b, p.246, pl.37, figs.1–3; text-fig.3) Sarjeant in Davey et al., 1969, p.12. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.1; Jan du Chêne et al., 1986a, pl.75, fig.4. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*. Age: Late Jurassic.

flammeolum Morgan, 1980, p.26, pl.17, figs.14–17. Holotype: Morgan, 1980, pl.17, figs.14–17; Jan du Chêne et al., 1986a, pl.75, figs.8–9. Age: Aptian–Albian.

formosum Singh, 1983, p.140, pl.48, figs.6–8; text-fig.17. Holotype: Singh, 1983, pl.48, figs.6–7; Jan du Chêne et al., 1986a, pl.71, figs.2–3. Age: early Cenomanian.

"*freakei*" (Sarjeant, 1963c, p.85–86, pl.1, figs.1–3) Sarjeant in Davey et al., 1969, p.12. Holotype: Sarjeant, 1963c, pl.1, figs.1–3; Jan du Chêne et al., 1986a, pl.67, figs.13–14. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Leptodinium*. **Taxonomic senior synonym:** *Leptodinium subtile*, according to Brenner (1988, p.60). Age: early Oxfordian.

gitmeziae Sarjeant, 1985a, p.62. Holotype: Gitmez and Sarjeant, 1972, pl.5, figs.1–2; text-fig.17; Jan du Chêne et al., 1986a, pl.150, figs.1–6. Age: early Kimmeridgian.

?*globosum* Oлару, 1978a, p.81, pl.12, fig.14; pl.15, fig.23. Holotype: Oлару, 1978a, pl.12, fig.14. Originally *Leptodinium*, subsequently (and now) *Leptodinium?*, thirdly *Scriniodinium*. Questionable assignment: Jan du Chêne et al. (1986a, p.211) as a problematic species. Lentini and Williams (1985, p.316) incorrectly listed this species in the genus *Scriniodinium*, as well as correctly in *Leptodinium*. Age: late Eocene.

"?*gongylos*" (Sarjeant, 1966b, p.111–113, pl.13, figs.1–2; text-fig.23) Stover and Evitt, 1978, p.170. Holotype: Sarjeant, 1966b, pl.13, figs.1–2; text-fig.23; Jan du Chêne et al., 1986a, pl.93, figs.10–13. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulacysta*, subsequently *Leptodinium?*, thirdly (and now) *Rhynchodiniopsis*. Questionable assignment: Stover and Evitt (1978, p.170). N.I.A. Age: early Oxfordian.

?*hadrum* (Sarjeant, 1966b, p.119–121, pl.14, fig.1; text-fig.28) Helenes, 1984, p.131. Holotype: Sarjeant, 1966b, pl.14, fig.1. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium?*. Questionable assignment: Helenes (1984, p.131). Age: late Barremian.

hulinense He Chengquan et al., 1999, p.188–189,200–201, pl.2, figs.4–5. Holotype: He Chengquan et al., 1999, pl.2, figs.4–5. Age: late Hauterivian–Barremian.

?hyalodermopse (Cookson and Eisenack, 1958, p.34, pl.3, figs.11–12; text-figs.5–6) Stover and Evitt, 1978, p.170. Holotype: Cookson and Eisenack, 1958, pl.3, figs.11–12; text-figs.5–6; Jan du Chêne et al., 1986a, pl.74, figs.9–10. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Leptodinium?*, fourthly *Rhynchodiniopsis*. Jan du Chêne et al. (1986a, p.210) provisionally retained this species in *Leptodinium*. Questionable assignment: Stover and Evitt (1978, p.170). Age: Neocomian–Aptian.

impenseum Yu Jingxian, 1982, p.242, pl.2, figs.10–11. Holotype: Yu Jingxian, 1982, pl.2, fig.10. Taxonomic junior synonym: *Leptodinium quadrangulum*, according to He Chengquan et al. (2009, p.107). Age: Late Jurassic–Early Cretaceous.

"incompositum" (Drugg, 1970b, p.810–811, figs.1E–O,2A) Lentin and Williams, 1973, p.87. Holotype: Drugg, 1970b, figs.1I–J; Eisenack and Kjellström, 1975a, page labelled "nach S.306d"; Jan du Chêne et al., 1986a, pl.17, figs.1–2; Fensome et al., 1995, figs.1–2 — p.1561. **NOW** *Corrudinium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly (and now) *Corrudinium*. Age: Oligocene.

italicum Biffi and Manum, 1988, p.208, pl.13, figs.4–17. Holotype: Biffi and Manum, 1988, pl.13, figs.4,8,15. Age: Oligocene–early Miocene.

kubassense Fedorova, 1980, p.71–72, pl.1, figs.6–6a. Holotype: Fedorova, 1980, pl.1, figs.6–6a. Age: Aptian.

"latolineatum" Yun Hyesu, 1981, p.10–11, pl.9, figs.10a–b,15a–b; text-figs.2a–c. Holotype: Yun Hyesu, 1981, pl.9, figs.10a–b; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.75, figs.12–14; Fensome et al., 1991, figs.1–4 — p.659. **NOW** *Ynezidinium*. Originally *Leptodinium*, subsequently (and now) *Ynezidinium*. Age: early Santonian.

"maculatum" Cookson and Eisenack, 1961b, p.40, pl.2, figs.5–6. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.5–6. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: Eocene.

mamilliferum (Deflandre, 1939b, p.143, pl.6, fig.1) Helenes, 1984, p.131. Holotype: Deflandre, 1939b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.72, figs.1–8. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Leptodinium*. Age: Kimmeridgian.

"margaritiferum" (Cookson and Eisenack, 1960a, p.5–6, pl.2, figs.1–2; text-fig.1) Sarjeant, 1969, p.31. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.54, fig.6. **NOW** *Impagidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly *Leptodinium*, fourthly (and now) *Impagidinium*. Age: Campanian.

membranigerum Gerlach, 1961, p.162–164, pl.26, figs.1–4,7; text-figs.4–5. Emendation: Sarjeant, 1984b, p.75–76, as *Leptodinium membranigerum*. Holotype: Gerlach, 1961, pl.26, figs.1–3, lost according to Sarjeant (1984b, p.75). Lectotype: Gerlach, 1961, pl.26, fig.7; text-fig.5; Sarjeant, 1984b, pl.1, fig.1,3; text-figs.1A–B; Jan du Chêne et al., 1986a, pl.67, figs.17–18; designated by Sarjeant (1984b, p.75). Originally (and now) *Leptodinium*, subsequently *Impagidinium?*. Sarjeant (1984b, p.75) retained this species in *Leptodinium*. Age: late Oligocene.

?micropunctatum Jain and Millepied, 1975, p.139, pl.2, figs.32–33. Holotype: Jain and Millepied, 1975, pl.2, fig.32, lost according to Jan du Chêne et al. (1986a, p.211). Originally *Leptodinium*, subsequently (and now) *Leptodinium?*. Questionable assignment: Stover and Evitt (1978, p.170) as a problematic species. Taxonomic senior synonym: *Oodnadattia tuberculata*, according to Below (1981a, p.107) — however, Lentin and Williams (1981, p.173) retained *Leptodinium? micropunctatum*. Age: early–?late Aptian.

millioudii (Sarjeant, 1963c, p.86–88, pl.1, figs.4–7) Sarjeant, 1969, p.13. Holotype: Sarjeant, 1963c, pl.1, figs.4–7; Jan du Chêne et al., 1986a, pl.71, figs.4–7. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*. Age: early Oxfordian.

"minutiornatum" Beju, 1978, p.4. **Name not validly published**: no description or illustration.

mirabile Klement, 1960, p.48–50, pl.6, figs.7–10; text-figs.25–27. Emendation: Sarjeant, 1984a, p.164–166, as *Leptodinium mirabile*. Holotype: Klement, 1960, pl.6, figs.7–8; text-figs.25–26; Sarjeant, 1984a, pl.4, figs.1–2;

text-fig.5; Jan du Chêne et al., 1986a, pl.67, figs.5–8. Originally (and now) *Leptodinium*, subsequently *Gonyaulacysta*. Lentin and Williams (1973, p.87) retained this species in *Leptodinium*. Age: middle Oxfordian.

"**modicum**" Brideaux and McIntyre, 1975, p.22, pl.5, figs.10–15. Holotype: Brideaux and McIntyre, 1975, pl.5, figs.10–13; Jan du Chêne et al., 1986a, pl.59, figs.4–6. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Albian.

"subsp. **denticulatum**" Brideaux, 1977, p.8, pl.1, figs.10–11. Holotype: Brideaux, 1977, pl.1, figs.10–11. **NOW** *Impagidinium modicum* subsp. *denticulatum*. Originally *Leptodinium modicum* subsp. *denticulatum*, subsequently (and now) *Impagidinium modicum* subsp. *denticulatum*. Age: Barremian.

"subsp. **modicum**". Autonym. Holotype: Brideaux and McIntyre, 1975, pl.5, figs.10–12. **NOW** *Impagidinium modicum* subsp. *modicum*. Originally *Leptodinium modicum* subsp. *modicum*, subsequently (and now) *Impagidinium modicum* subsp. *modicum*.

?**mosaicum** (Downie, 1957, p.424, pl.20, fig.7; text-fig.2f ex Sarjeant, 1967b, p.253) Sarjeant, 1969, p.13. Emendation: Sarjeant, 1976c, p.6–7, as *Leptodinium mosaicum*. Holotype: Downie, 1957, pl.20, fig.7; text-fig.2f; Sarjeant, 1976c, pl.2, figs.3,5; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.70, figs.5–6. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Leptodinium*, fourthly (and now) *Leptodinium*?. Questionable assignment: Stover and Evitt (1978, p.170). The name *Palaeoperidinium mosaicum* was not validly published in Downie (1957) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.371) accepted Sarjeant's (1967b) indirect reference to Downie (1957) as indication of a type (I.C.N. Article 40.3). Jan du Chêne et al. (1986a, p.210) considered that this species may be assignable to *Acanthaulax*. N.I.A. Age: late Kimmeridgian.

"**multiplax**" Wall and Dale, 1968a, p.318, pl.1, figs.1–7; text-fig.1. Holotype: Wall and Dale, 1968a, pl.1, figs.1–6; Jan du Chêne et al., 1986a, pl.54, figs.7–9. **NOW** *Impagidinium*. Originally *Anhystrichosphaera* (name not validly published), subsequently *Leptodinium*, thirdly (and now) *Impagidinium*. Age: early Pleistocene.

?**nannotrix** (Deflandre, 1939b, p.143, pl.6, fig.7) Jan du Chêne et al., 1986a, p.211. Holotype: Deflandre, 1939b, pl.6, fig.7; Jan du Chêne et al., 1986a, pl.69, figs.4–6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta*?, fourthly *Rhynchodiniopsis*?, fifthly (and now) *Leptodinium*. Questionable assignment: Jan du Chêne et al. (1986a, p.211) as a problematic species. Jan du Chêne et al. (1986a, p.211) recommended that this name be restricted to the holotype. Age: Kimmeridgian.

"**norrisii**" Pocock, 1972, p.92–93, pl.24, figs.9–12; text-fig.9. Holotype: Pocock, 1972, pl.24, fig.9; Jansonius, 1986, pl.2, figs.6–8; text-fig.5. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Korystocysta*. **Taxonomic senior synonym:** *Gonyaulax* (as *Korystocysta*) *pachyderma*, according to Benson (1985, p.154). **Taxonomic junior synonym:** *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax* (as *Korystocysta*) *kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *kettonensis*. Age: Callovian.

okerense Kunz, 1990, p.19–20, pl.4, figs.5a–e,6a–c; text-fig.8. Holotype: Kunz, 1990, pl.4, figs.5a–e; text-fig.8. Age: Oxfordian.

"**ovum**" Sah et al., 1970, p.147–148, pl.2, fig.25. Holotype: Sah et al., 1970, pl.2, fig.25. **NOW** *Impagidinium*?. Originally *Leptodinium*, subsequently (and now) *Impagidinium*?. N.I.A. Age: Late Cretaceous.

"**panneum**" Norris, 1965, p.796–798, figs.3,10–13. Holotype: Norris, 1965, figs.10–12. **NOW** *Dichadogonyaulax*?. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly (and now) *Dichadogonyaulax*?. Age: Kimmeridgian–Portlandian.

"**paradoxum**" Wall, 1967, p.106–107, pl.15, figs.5–8; text-figs.2–3A–B. Holotype: Wall, 1967, pl.15, fig.5. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Miocene–Holocene.

"*patulum*" Wall, 1967, p.105–106, pl.14, fig.20; pl.15, figs.1–4; text-fig.4. Holotype: Wall, 1967, pl.14, fig.20; pl.15, figs.1–2. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Miocene–Holocene.

"*pectinigerum*" (Gocht, 1970b, p.138–139, pl.33, figs.1–4; text-fig.11) Fenton et al., 1980, p.158. Emendation: Fensome, 1979, p.43, as *Gonyaulacysta pectinigera*. Holotype: Gocht, 1970b, pl.33, fig.1. **NOW** *Gonyaulacysta pectinigera*. Originally *Leptodinium subtile* subsp. *pectinigerum*, subsequently *Hystrichogonyaulax pectinigera*, thirdly (and now) *Gonyaulacysta pectinigera*, fourthly *Leptodinium pectinigerum*. Age: early Bathonian.

"*perforans*" (Cookson and Eisenack, 1958, p.30–32, pl.2, figs.1–4,7–8; text-figs.8–9) Stover and Evitt, 1978, p.170. Holotype: Cookson and Eisenack, 1958, pl.2, fig.1; text-figs.8–9; Jan du Chêne et al., 1986a, pl.32, fig.2. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Leptodinium?*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium*, sixthly (and now) *Cribroperidinium?*. Questionable assignment: Stover and Evitt (1978, p.69). Age: Late Jurassic.

perornatum Jansonius, 1986, p.212, pl.3, figs.1–3; text-fig.11. Holotype: Jansonius, 1986, pl.3, figs.1–3; text-fig.11. Age: late Bajocian.

?*pilum* (Gocht, 1959, p.56–57, pl.6, fig.14; pl.8, fig.8 ex Sarjeant, 1967b, p.254) Sarjeant, 1969, p.13. Holotype: Gocht, 1959, pl.6, fig.14; Jan du Chêne et al., 1986a, pl.73, figs.7–8. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta?*, thirdly (and now) *Leptodinium?*. Questionable assignment: Sarjeant (1969, p.13). The name *Palaeoperidinium pilum* was not validly published in Gocht (1959) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.372) accepted Sarjeant's (1967b) indirect reference to Gocht (1959) as indication of a type (I.C.N. Article 40.3). Jan du Chêne et al. (1986a, p.211) recommended that this name be restricted to the holotype. N.I.A. Age: Valanginian.

pinnosum Davey, 1988, p.39–40, pl.5, figs.1–5,8–9. Holotype: Davey, 1988, pl.5, figs.1–3; Fensome et al., 1996, figs.1–3 — p.2277. Age: late Berriasian.

?*plagatum* Dodekova, 1994, p.41–42, pl.11, figs.1–12; text-figs.7a–d. Holotype: Dodekova, 1994, pl.11, figs.1–4. Questionable assignment: Dodekova (1994, p.41). Age: middle Tithonian–Berriasian.

porosum (Lejeune-Carpentier, 1946, p.B193,B196; text-fig.6) Sarjeant, 1969, p.13. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.7–8, as *Leptodinium porosum*. Holotype: Lejeune-Carpentier, 1946, text-fig.6; Streel et al., 1977, pl.2, fig.4; Lejeune-Carpentier and Sarjeant, 1981, pl.3, figs.1–2; text-fig.4. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*, fourthly *Leptodinium?*. Questionable assignment: Stover and Evitt (1978, p.171) as a problematic species — however, Lejeune-Carpentier and Sarjeant (1981, p.7) included the species in *Leptodinium* without question. Jan du Chêne et al. (1986a, p.211) recommended that this name be restricted to the holotype. Age: Late Cretaceous.

posterolucatum Snape, 1992, p.275, figs.7i–j. Holotype: Snape, 1992, fig.7i. Age: Tithonian.

"*punctatum*" Balteş, 1971, p.3, pl.1, figs.2–3,6–7. **Name not validly published:** holotype not designated. Originally *Leptodinium* (name not validly published), subsequently *Millioudodinium* (name not validly published). Age: early Pliocene.

?*pustulatum* Crouch et al., 2014, p.64–65, pl.1, figs.1–12. Holotype: Crouch et al., 2014, pl.1, figs.1–3. Questionable assignment: Crouch et al. (2014, p.64). Age: middle Paleocene–earliest Eocene.

"*quadrangulum*" Yu Jingxian, 1982, p.242, pl.4, figs.10,13,15. Holotype: Yu Jingxian, 1982, pl.4, fig.13. **Taxonomic senior synonym:** *Leptodinium impenseum*, according to He Chengquan et al. (2009, p.107). Age: Late Jurassic–Early Cretaceous.

"*regale*" Gocht, 1970b, p.139–140, pl.33, figs.5–7; text-fig.10. Holotype: Gocht, 1970b, pl.33, fig.6; text-fig.10; Jan du Chêne et al., 1986a, pl.98, figs.6–10. **NOW** *Rhynchodiniopsis*?. Originally *Leptodinium*, subsequently *Hystrichogonyaulax*, thirdly (and now) *Rhynchodiniopsis*?. Age: early Bathonian.

?*reticulatum* (Nagy, 1969, p.293, pl.1, figs.7,10; text-figs.4a–b) Lentin and Williams, 1973, p.88. Holotype: Nagy, 1969, pl.1, figs.7,10; Jan du Chêne et al., 1986a, pl.74, figs.5–6. Originally *Gonyaulax* (Appendix B), subsequently *Leptodinium*, thirdly (and now) *Leptodinium*?. Questionable assignment: Stover and Evitt (1978, p.171) as a problematic species. Jan du Chêne et al. (1986a, p.211–212) recommended that this name be restricted to the holotype. Age: late Miocene.

saepitum Ashraf, 1979, p.128, pl.2, fig.27; pl.3, figs.1–3,5. Holotype: Ashraf, 1979, pl.3, fig.2. Originally (and now) *Leptodinium*, subsequently *Hystrichogonyaulax*, thirdly *Rhynchodiniopsis*, fourthly *Ctenidodinium*. Brenner (1988, p.60) retained this species in *Leptodinium*. Age: Late Jurassic (Malm).

"*schizoblattum*" Norris, 1965, p.798–800, figs.4–5,14–17. Holotype: Norris, 1965, figs.5,15–17. **NOW** *Ctenidodinium*?. Originally *Leptodinium*, subsequently *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly (and now) *Ctenidodinium*?. Age: Portlandian.

sepimentum Stevens and Helby, 1987, p.178–179, figs.11A–D,12A–I. Holotype: Stevens and Helby, 1987, figs.11A–D,12D–F; Fensome et al., 1996, figs.1–3,8–11 — p.2347. N.I.A. Age: early Berriasian.

"*setcheyense*" (Sarjeant, 1976c, p.4–6, pl.1, fig.7; text-fig.1) Stover and Evitt, 1978, p.170. Holotype: Sarjeant, 1976c, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.74, figs.1–4. **NOW** *Impagidinium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Impagidinium*. Jan du Chêne et al. (1986a, p.210) retained this species in *Leptodinium*. Age: Kimmeridgian.

simplex Burger, 1980a, p.84, pl.42, figs.1–5. Holotype: Burger, 1980a, pl.42, figs.4a–b; Jan du Chêne et al., 1986a, pl.75, fig.10. Questionable assignment: Sarjeant (1982b, p.38) — however, Jan du Chêne et al. (1986a, p.210) included the species in *Leptodinium* without question. Age: Aptian.

songhuajiangense He Chengquan and Huang Guanjun, 1997, p.29,38, pl.3, figs.5–7; text-fig.3. Holotype: He Chengquan and Huang Guanjun, 1997, pl.3, figs.5–7; text-fig.3. Age: Callovian.

"*sphaericum*" Wall, 1967, p.108, pl.15, figs.11–15; text-figs.2a–c. Holotype: Wall, 1967, pl.15, figs.11–12. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: Pleistocene–Holocene.

"*striatum*" Wall, 1967, p.107–108, pl.15, figs.9–10; text-fig.5. Holotype: Wall, 1967, pl.15, fig.9. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: middle Miocene–Holocene.

"*striatum*" (Clarke and Verdier, 1967, p.31, pl.4, figs.11–13; pl.5, fig.15; text-fig.12) Sarjeant, 1969, p.13. Holotype: Clarke and Verdier, 1967, pl.4, figs.11–13; Jan du Chêne et al., 1986a, pl.88, figs.9–11. **NOW** *Dimidium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Impagidinium*, fourthly *Pterodinium*, fifthly (and now) *Dimidium*. Age: Santonian.

**subtile* Klement, 1960, p.46–47, pl.6, figs.1–4; text-figs.23–24. Holotype: Klement, 1960, pl.6, figs.1–2; text-figs.23–24. Taxonomic junior synonym: *Gonyaulax* (subsequently *Leptodinium*) *freaki*, according to Brenner (1988, p.60). Age: early Kimmeridgian.

"subsp. *pectinigerum*" Gocht, 1970b, p.138–139, pl.33, figs.1–4; text-fig.11. Emendation: Fensome, 1979, p.43, as *Gonyaulacysta pectinigera*. Holotype: Gocht, 1970b, pl.33, fig.1. **NOW** *Gonyaulacysta pectinigera*. Originally *Leptodinium subtile* subsp. *pectinigerum*, subsequently *Hystrichogonyaulax pectinigera*, thirdly (and now) *Gonyaulacysta pectinigera*, fourthly *Leptodinium pectinigerum*. Age: early Bathonian.

"subsp. *subtile*". Autonym. Holotype: Klement, 1960, pl.6, figs.1–2; text-figs.23–24. **Now redundant.**

?*tenuicornutum* Cookson and Eisenack, 1962b, p.478, pl.3, figs.12–13; text-figs.1a–b. Holotype: Cookson and Eisenack, 1962b, pl.3, figs.12–13; text-figs.1a–b. Originally *Leptodinium*, subsequently *Gonyaulacysta*, thirdly (and now) *Leptodinium*?. Questionable assignment: Stover and Evitt (1978, p.160). Age: Albian.

tunellum Stover and Helby, 1987c, p.244–245, figs.16A–B,17A–I. Holotype: Stover and Helby, 1987c, figs.17A–C; Fensome et al., 1996, figs.1–3 — p.2415. Age: Hauterivian.

"*victorianum*" Cookson and Eisenack, 1965a, p.123, pl.12, figs.8–9. Holotype: Cookson and Eisenack, 1965a, pl.12, figs.8–9; Jan du Chêne et al., 1986a, pl.149, figs.1–4. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*. Age: late Eocene.

volgense Lentin and Williams, 1981, p.175. Holotype: Fisher and Riley, 1980, pl.1, figs.8,12; Jan du Chêne et al., 1986a, pl.67, fig.20. Originally *Gonyaulacysta cristata*, subsequently *Leptodinium cristatum* (combination illegitimate), thirdly (and now) *Leptodinium volgense*, fourthly *Millioudodinium cristatum*, fifthly *Cribroperidinium cristatum* (combination not validly published). Substitute name for *Leptodinium cristatum* (Riley in Fisher and Riley, 1980, p.320, pl.1, figs.8,12) Lentin and Williams, 1981, p.175 (an illegitimate name). Jan du Chêne et al. (1986a, p.210) retained this species in *Leptodinium*. Age: Volgian.

LEVISPHAERA Davey, 1988, p.40. Type: Burger, 1980b, figs.4.D1–2, as *Canningia crassicingulata*.

**crassicingulata* (Burger, 1980b, p.268, figs.4C,D1–2) Davey, 1988, p.40. Holotype: Burger, 1980b, figs.4D1–2; Fensome et al., 1993a, figs.2–3 — p.1081. Originally *Canningia*, subsequently *Batiacasphaera*, thirdly (and now) *Levisphaera*. Age: Berriasian–Valanginian

"**LIAOHEDINA**" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.74. **Taxonomic senior synonym:** *Bosedinia*, according to He Chengquan et al. (2009, p.455). Type: Liu Zhili et al., 1992, pl.16, fig.10; text-fig.5, as *Liaohedina obovata*.

*"*obovata*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.74, pl.16, figs.7–12; text-fig.5. Holotype: Liu Zhili et al., 1992, pl.16, fig.10; text-fig.5. **NOW** *Bosedinia*. Originally *Liaohedina*, subsequently (and now) *Bosedinia*. Age: Early Tertiary.

LIASIDIUM Drugg, 1978, p.69. Type: Drugg, 1978, pl.5, fig.9, as *Liasidium variabile*.

**variabile* Drugg, 1978, p.69–70, pl.4, fig.10; pl.5, figs.1–9. Holotype: Drugg, 1978, pl.5, fig.9; Fensome et al., 1995, fig.4 — p.1881. Age: late Sinemurian.

LICRACYSTA Fensome et al., 2007, p.400,402. Type: Fensome et al., 2007, pl.4, figs.9–12, as *Licracysta corymbus*.

**corymbus* Fensome et al., 2007, p.402,404,406,408, pl.4, figs.5–6,9–20, pl.5, figs.1–8,12,16,20. Holotype: Fensome et al., 2007, pl.4, figs.9–12. N.I.A. Age: youngest occurrence, Rupelian.

?*semicirculata* (Morgenroth, 1966b, p.9–10, pl.2, figs.3–4) Fensome et al., 2007, p.408. Holotype: Morgenroth, 1966b, pl.2, fig.3. Originally *Cyclonephelium*, subsequently *Areoligera*, thirdly (and now) *Licracysta*?. Questionable assignment: Fensome et al. (2007, p.408). Age: middle Oligocene.

LIESBERGIA Berger, 1986, p.341. Type: Berger, 1986, fig.3 (part), fig.5, nos.1–4, as *Liesbergia liesbergensis*.

abdounensis Soncini, 1992, p.329,331–334, pl.2, figs.2–9; text-figs.5,6a–b. Holotype: Soncini, 1992, pl.2, figs.4–6. Age: Thanetian–Ypresian.

**liesbergensis* Berger, 1986, p.341–342, fig.3 (part); fig.5, nos.1–7. Holotype: Berger, 1986, fig.3 (part), fig.5, nos.1–4; Fensome et al., 1995, figs.1–4,7 — p.1605. Age: early Oxfordian.

"*scarburghensis*" (Sarjeant, 1964b, p.472–473) Berger, 1986, p.343. Holotype: Sarjeant, 1961a, pl.13, fig.13; text-fig.5; Jan du Chêne et al., 1986a, pl.3, figs.1–2. **NOW** *Trichodinium scarburghense*. Originally *Gonyaulax areolata* (name illegitimate; Appendix B), subsequently *Gonyaulacysta areolata* (combination illegitimate), thirdly *Gonyaulacysta scarburghensis*, fourthly *Acanthaulax areolata* (combination illegitimate), fifthly *Acanthaulax scarburghensis*, sixthly *Liesbergia scarburghensis*, seventhly (and now) *Trichodinium scarburghense*. *Gonyaulacysta scarburghensis* is the substitute name for *Gonyaulax areolata* Sarjeant, 1961a, p.95–96, pl.13, fig.13; text-fig.5 (an illegitimate name). Taxonomic junior synonym: *Acanthaulax senta*, according to Berger (1986, p.343). Age: late Callovian–early Oxfordian.

LIMBODINIUM Riding, 1987b, p.56,58,60. Type: Drugg, 1978, pl.4, fig.7, as *Dinopterygium absidatum*.

**absidatum* (Drugg, 1978, p.66–67, pl.4, figs.7–9) Riding, 1987b, p.60. Emendation: Riding, 1987b, p.60,62, as *Limbodinium absidatum*. Holotype: Drugg, 1978, pl.4, fig.7; Riding, 1987b, pl.1, fig.7; Fensome et al., 1993a, fig.1 — p.871. Originally *Dinopterygium*, subsequently *Dinopterygium?*, thirdly (and now) *Limbodinium*. Age: late Callovian–middle Oxfordian.

ridingii Herngreen et al., 2000, p.50, pl.8, figs.3–5. Holotype: Herngreen et al., 2000, pl.8, figs.3–4. Age: early Kimmeridgian.

"**LINGULASPHAERA**" Drugg, 1970b, p.817. **Taxonomic senior synonym:** *Diphyes*, according to Stover and Evitt (1978, p.38). Type: Drugg, 1970b, fig.11D, as *Lingulasphaera spinula*.

spinula* Drugg, 1970b, p.817–818, figs.10G,11D–E,12A–B. Holotype: Drugg, 1970b, fig.11D. **NOW *Diphyes*. Originally *Lingulasphaera*, subsequently (and now) *Diphyes*. N.I.A. Age: early Eocene.

LINGULODINIUM Wall, 1967, p.109. Emendations: Wall and Dale in Wall et al., 1973, p.23–24; Dodge, 1989, p.291. Taxonomic junior synonym: *Trioperculodinium*, according to Wall and Dale in Wall et al. (1973, p.24). Type: Deflandre and Cookson, 1955, pl.9, fig.4, as *Hystrichosphaeridium machaerophorum*.

bergmannii (Archangelsky, 1969a, p.414–415, pl.2, figs.8,11) Quattrocchio and Sarjeant, 2003, p.142. Holotype: Archangelsky, 1969a, pl.2, fig.11. Originally *Cleistosphaeridium*, subsequently *Operculodinium*, thirdly *Downiesphaeridium*, fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Solisphaeridium filamentosum* (Appendix A) and *Impletosphaeridium charrieri*, both according to Quattrocchio and Sarjeant (2003, p.142). Quattrocchio and Sarjeant (2003, p.142) considered this species to be the possible taxonomic senior synonym of *Operculodinium radiculatum*. Masure in Fauconnier and Masure (2004, p.197) proposed the retention of this species in *Operculodinium*, but was not aware of the work of Quattrocchio and Sarjeant (2003). Age: Eocene.

"*brevispinosum*" Matsuoka and Bujak, 1988, p.60–61, pl.7, figs.8a–b,9; pl.8, fig.1. Holotype: Matsuoka and Bujak, 1988, pl.7, figs.8a–b; Head, 1994b, pl.8, figs.2–5. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Lingulodinium*) *machaerophorum*, according to Kokinos and Anderson (1995, p.162). Age: late Oligocene–early Miocene.

echinatum (Menéndez, 1965, p.12–13, pl.2, fig.9) Guerstein et al. 2008, p.79. Emendation: Guerstein et al. 2008, p.79, as *Lingulodinium echinatum*. Holotype: Menéndez, 1965, pl.2, fig.9. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Lingulodinium*. Age: Late Cretaceous.

"*funginum*" (Morgenroth, 1966a, p.17–18, pl.3, figs.7–8) Islam, 1983b, p.341. Holotype: Morgenroth, 1966a, pl.3, fig.7. Originally *Baltisphaeridium* (Appendix A), subsequently *Lingulodinium*. **Taxonomic senior synonym:**

Hystrichosphaeridium (as and now *Lingulodinium*) *machaerophorum*, according to Kokinos and Anderson (1995, p.162). Age: early Eocene.

hemicystum McMinn, 1991, p.278, pl.3, figs.1–5,7–8,10–11,13–14. Holotype: McMinn, 1991, pl.3, figs.7,10,13. Age: Holocene.

**machaerophorum* (Deflandre and Cookson, 1955, p.274, pl.9, figs.4,8) Wall, 1967, p.109. Holotype: Deflandre and Cookson, 1955, pl.9, fig.4. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Cleistosphaeridium disjunctum*, according to Reid (1974, p.591); *Cleistosphaeridium mikirii*, according to Jain and Garg (1983, p.61); *Hystrichosphaeridium ashdodense*, according to Wall (1967, p.109); *Baltisphaeridium* (subsequently *Lingulodinium*) *funginum*, *Lingulodinium brevispinosum* and *Lingulodinium sadoense*, all according to Kokinos and Anderson (1995, p.162); *Hystrichosphaeridium redonense*, questionably according to Harland (1977b, p.94) and according to Rochon et al. (1999, p.20). Motile equivalent: *Gonyaulax* (now *Lingulodinium*) *polyedra* Stein, 1883, according to Wall and Dale (1967, p.352; 1968c, p.271). Stover and Evitt (1978, p.172) considered *Impletosphaeridium* (as *Lingulodinium*?) *pycnospinosum* to be a possible taxonomic junior synonym of this species. Age: Miocene.

subsp. *breve* He Chengquan, 1991, p.144, pl.19, fig.5. Holotype: He Chengquan, 1991, pl.19, fig.5. Age: middle Eocene.

subsp. *filiforme* (Rossignol, 1964, p.91, pl.2, fig.13) Lentin and Williams, 1973, p.89. Holotype: Rossignol, 1964, pl.2, fig.13. Originally *Baltisphaeridium machaerophorum* var. *filiforme* (Appendix A), subsequently (and now) *Lingulodinium machaerophorum* subsp. *filiforme*. Age: Pleistocene.

subsp. *machaerophorum*. Autonym. Holotype: Deflandre and Cookson, 1955, pl.9, fig.4.

var. *machaerophorum*. Autonym. Holotype: Deflandre and Cookson, 1955, pl.9, fig.4.

subsp. *megacanthum* (Rossignol, 1964, p.91, pl.2, fig.15) Lentin and Williams, 1973, p.89. Holotype: Rossignol, 1964, pl.2, fig.15. Originally *Baltisphaeridium machaerophorum* var. *megacanthum* (Appendix A), subsequently (and now) *Lingulodinium machaerophorum* subsp. *megacanthum*. Age: Pleistocene.

"subsp. *strangulatum*" (Rossignol, 1964, p.92, pl.2, fig.16) Lentin and Williams, 1973, p.89. Holotype: Rossignol, 1964, pl.2, fig.16. **NOW** *Lingulodinium strangulatum*. Originally *Baltisphaeridium machaerophorum* var. *strangulatum* (Appendix A), subsequently *Lingulodinium machaerophorum* subsp. *strangulatum*, thirdly (and now) *Lingulodinium strangulatum*. Age: Pleistocene.

var. *truncatum* Strauss et al., 2001, p.405; pl.6, fig.7. Holotype: Strauss et al., 2001, p.405; pl.6, fig.7. Originally *Lingulodinium truncatum* (name not validly published), subsequently (and now) *Lingulodinium machaerophorum* var. *truncatum*. Age: late Miocene.

milneri (Murray and Whitting, 1899, p.325, pl.27, figs.2a–d) Dodge, 1989, p.294. Holotype: not designated. Originally *Goniodoma* (Appendix B), subsequently *Gonyaulax* (Appendix B), thirdly (and now) *Lingulodinium*. This species represents living motile cells and has no fossil representation; it is included here because it has been assigned to a genus, *Lingulodinium*, with a fossil type. Age: extant.

multivirgatum de Verteuil and Norris, 1996a, p.118,120,122, pl.4, figs.1–14; pl.18, fig.7. Holotype: de Verteuil and Norris, 1996a, pl.4, figs.4–6. Age: early Miocene.

polyedra (Stein, 1883, p.13, pl.4, figs.7–9) Dodge, 1989, p.291. Holotype: not designated. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Lingulodinium*. This species name was originally proposed for the motile stage of a living dinoflagellate; its cyst equivalent is *Lingulodinium machaerophorum*. N.I.A. Age: extant.

pugiatum (Drugg, 1970b, p.819; text-figs.16D–E) Wall and Dale in Wall et al., 1973, p.24. Holotype: Drugg, 1970b, text-fig.16E. Originally *Operculodinium*, subsequently (and now) *Lingulodinium*. Age: Oligocene.

pyncospinosum (Benedek, 1972, p.32, pl.12, fig.14) Stover and Evitt, 1978, p.172. Emendation: Benedek and Sarjeant, 1981, p.343–344, as *Lingulodinium pyncospinosum*. Holotype: Benedek, 1972, pl.12, fig.14; Benedek and Sarjeant, 1981, fig.10, no.1. Originally *Impletosphaeridium*, subsequently *Lingulodinium?*, thirdly (and now) *Lingulodinium*. Questionable assignment: Stover and Evitt (1978, p.172) — however, Benedek and Sarjeant (1981, p.343) retained the species in *Lingulodinium* without question. Stover and Evitt (1978, p.172) considered *Hystrichosphaeridium* (as *Lingulodinium*) *machaerophorum* to be a possible taxonomic senior synonym of this species. Age: middle-late Oligocene.

"*sadoense*" Matsuoka, 1983b, p.124, pl.10, figs.1a–c,2–3,4a–b,5–7. Holotype: Matsuoka, 1983b, pl.10, figs.1a–c. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Lingulodinium*) *machaerophorum*, according to Kokinos and Anderson (1995, p.162). Age: early Pleistocene.

sicula (Drugg, 1970b, p.820; text-figs.16F–G) Wall and Dale in Wall et al., 1973, p.24. Holotype: Drugg, 1970b, text-figs.16F–G. Originally *Trioperculodinium*, subsequently (and now) *Lingulodinium*. N.I.A. Age: Oligocene.

solarum (Drugg, 1970b, p.819; text-figs.16A–C) Wall and Dale in Wall et al., 1973, p.24. Holotype: Drugg, 1970b, text-figs.16A–C. Originally *Operculodinium*, subsequently (and now) *Lingulodinium*. Age: Oligocene.

strangulatum (Rossignol, 1964, p.92, pl.2, fig.16) Islam, 1983c, p.90. Holotype: Rossignol, 1964, pl.2, fig.16. Originally *Baltisphaeridium machaerophorum* var. *strangulatum* (Appendix A), subsequently *Lingulodinium machaerophorum* subsp. *strangulatum*, thirdly (and now) *Lingulodinium strangulatum*. Age: Pleistocene.

"*truncatum*" Strauss in Pross, 1997, p.91. **Name not validly published:** holotype not designated. **NOW** *Lingulodinium machaerophorum* var. *truncatum*. Originally *Lingulodinium truncatum* (name not validly published), subsequently (and now) *Lingulodinium machaerophorum* var. *truncatum*. Pross (1997) indicated that this name is from an unpublished thesis by Strauss.

varispinosum Slimani, 1994, p.75–76, pl.11, fig.17; pl.13, figs.16–21. Holotype: Slimani, 1994, pl.11, fig.17; pl.13, figs.16–19. Age: early Campanian–early Maastrichtian.

varium Sütő-Szentai, 1986, p.33–34, pl.1, figs.1–2. Holotype: Sütő-Szentai, 1986, pl.1, fig.1. Age: late Miocene.

"*xanthium*" (Benedek, 1972, p.27–28, pl.9, fig.8; text-fig.9) Benedek and Sarjeant, 1981, p.342. Emendation: Benedek and Sarjeant, 1981, p.342–343, as *Lingulodinium xanthium*. Holotype: Benedek, 1972, pl.9, fig.8; Benedek and Sarjeant, 1981, fig.9, no.5. **NOW** *Operculodinium*. Originally *Cordosphaeridium*, subsequently (and now) *Operculodinium*, thirdly *Lingulodinium*. Age: middle-late Oligocene.

LITHODINIA Eisenack, 1935, p.175. Emendations: Gocht, 1975b, p.353; Williams et al., 1993, p.54. Taxonomic junior synonym: *Meiourogonyaulax*, according to Gocht (1975b, p.353) and Williams et al. (1993, p.54) — however, *Meiourogonyaulax* was retained by Riding and Helby (2001d, p.81,83). Type: Eisenack, 1935, pl.4, fig.5, as *Lithodinia jurassica*.

"*acanthosphaera*" (Sarjeant, 1961a, p.94–95, pl.13, fig.14; text-fig.4) Lentin and Williams, 1977b, p.100. Emendation: Sarjeant, 1976c, p.12, as *Meiourogonyaulax? acanthosphaera*. Holotype: Sarjeant, 1961a, pl.13, fig.14; text-fig.4; Sarjeant, 1976c, pl.5, figs.2,4. **NOW** *Meiourogonyaulax?* Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Meiourogonyaulax*, fifthly (and now) *Meiourogonyaulax?*, sixthly *Lithodinia*, seventhly *Lithodinia?*. Questionable assignment: Williams et al. (1993, p.56) as a problematic species. Age: early Oxfordian.

"*amlasis*" (Below, 1981a, p.58, pl.6, figs.14–15,16a–b) Williams et al., 1993, p.55. Holotype: Below, 1981a, pl.6, figs.16a–b; Fensome et al., 1991, figs.3–4 — p.567. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: Hauterivian.

"*araneosa*" (Muir and Sarjeant, 1978, p.197–198, pl.1, fig.1; text-fig.1) Riley, 1979, p.221. Holotype: Muir and Sarjeant, 1978, pl.1, fig.1; text-fig.1. **NOW** *Meiourogonyaulax* Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Lithodinia*?. Questionable assignment: Williams et al. (1993, p.56) as a problematic species. Age: middle Callovian.

arcanitabulata Brenner, 1988, p.61–63, pl.18, figs.3–5; text-fig.20. Holotype: Brenner, 1988, pl.18, fig.4. Age: Oxfordian–early Kimmeridgian.

"*areolata*" (Klement, 1960, p.76–77, pl.8, figs.5–9) Sarjeant, 1984a, p.166. Holotype: Klement, 1960, pl.8, figs.5–7; Fauconnier and Masure, 2004, pl.26, fig.8; pl.27, fig.1. **NOW** *Epiplosphaera*?. Originally *Epiplosphaera*, subsequently *Lithodinia*?, thirdly (and now) *Epiplosphaera*?. Brenner (1988, p.50–51) retained this species in *Epiplosphaera*. Questionable assignment: Sarjeant (1984a, p.166). Age: early Kimmeridgian.

"*arktika*" Fenton, 1981, p.251,253, pl.2, figs.1–2; pl.3, fig.1. Holotype: Fenton, 1981, pl.2, fig.2. **Taxonomic senior synonym:** *Meiourogonyaulax borealis*, according to Riley and Fenton (1982, p.200) and Lentin and Williams (1989, p.228). Age: late Bathonian.

"*australica*" Morgan in Riding and Helby, 2001d, p.81. **Name not validly published:** no description. **Taxonomic senior synonym:** *Lithodinia protothymosa*, according to Riding and Helby (2001d, p.81).

"*bathonica*" Conway, 1978, p.349, pl.2, figs.4–5,7–8. Holotype: Conway, 1978, pl.2, figs.4–5. **NOW** *Meiourogonyaulax* Originally *Lithodinia*, subsequently (and now) *Meiourogonyaulax*. Age: late Bathonian.

"*bejui*" (Zotto et al., 1987, p.199–202, pl.1, figs.1a–b,2a–c,3; text-figs.5a–c) Williams et al., 1993, p.55. Holotype: Zotto et al., 1987, pl.1, figs.1a–b. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This combination was not validly published in Dodekova (1992, p.46), since that author did not fully reference the basionym. Age: Kimmeridgian.

"*borealis*" (Sarjeant, 1980b, p.123–124) Riley and Fenton, 1982, p.200. Holotype: Sarjeant, 1972, pl.5, fig.3; text-fig.5 [as *Meiourogonyaulax decapitata* (Wetzel, 1967a) Sarjeant, 1972]. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Taxonomic junior synonym: *Lithodinia arktika*, according to Riley and Fenton (1982, p.200) and Lentin and Williams (1989, p.228). Age: late Bathonian.

"*bulloidea*" (Cookson and Eisenack, 1960b, p.247, pl.37, fig.11; text-figs.4a–b) Gocht, 1976, p.334. Emendation: Riding and Helby, 2001g, p.206, as *Meiourogonyaulax bulloidea*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.11. **NOW** *Meiourogonyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Lithodinia*. Age: Tithonian.

"*callomonii*" (Sarjeant, 1972, p.31–33, pl.5, fig.5; text-fig.6) Gocht, 1976, p.334. Holotype: Sarjeant, 1972, pl.5, fig.5; text-fig.6. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: late Bathonian–early Callovian.

"*cantrellii*" (Sarjeant, 1972, p.37–38, pl.4, fig.3; pl.6, figs.1–2; text-fig.8) Gocht, 1976, p.334. Holotype: Sarjeant, 1972, pl.4, fig.3; pl.6, figs.1–2; text-fig.8. **NOW** *Lanterna*. Originally *Meiourogonyaulax*?, subsequently *Lithodinia*?, thirdly *Lanterna*, fourthly and now *Lanterna*?. Questionable assignment: Gocht (1976, p.334). Age: late Bathonian.

"*caytonensis*" (Sarjeant, 1959, p.330–332, pl.13, fig.1; text-fig.1) Gocht, 1976, p.334. Holotype: Sarjeant, 1959, pl.13, fig.1; text-fig.1. **NOW** *Meiourogonyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Lithodinia*. Age: early Callovian.

"*crisulata*" (Sarjeant, 1959, p.332–334, pl.13, fig.2; text-fig.2) Gocht, 1976, p.334. Holotype: Sarjeant, 1959, pl.13, fig.2; text-fig.2. **NOW** *Meiourogonyaulax*. Originally *Gonyaulax*? (Appendix B), subsequently *Meiourogonyaulax*?, thirdly *Lithodinia*?, fourthly (and now) *Meiourogonyaulax*, fifthly *Lithodinia*. Questionable assignment: Gocht (1976, p.334) — however, Williams et al. (1993, p.55) retained this species in *Lithodinia* without question. Age: early Callovian.

"*decapitata*" (Wetzel, 1967a, p.869, pl.16, figs.7a–b) Gocht, 1976, p.334. Holotype: Wetzel, 1967a, pl.16, figs.7a–b; Sarjeant, 1980b, pl.3, figs.1–3; text-fig.3; Dietz et al., 1999, text-fig.5b. Originally *Gonyaulax* (Appendix B), subsequently *Meiourogonyaulax*, thirdly *Lithodinia*, fourthly *Meiourogonyaulax*?. **Taxonomic senior synonym:** *Meiourogonyaulax* (as *Lithodinia*) *valensii*, according to Fenton (1981, p.253) and Williams et al. (1993, p.56). Age: Bajocian.

"*deflandrei*" (Sarjeant, 1968, p.228–229, pl.1, fig.20; pl.3, fig.13; text-fig.4) Gocht, 1976, p.334. Holotype: Sarjeant, 1968, pl.1, fig.20; text-fig.4. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: late Callovian.

"*diaphana*" (Stevens, 1987, p.191–192, figs.4A–K,6A–B,7A–D) Williams et al., 1993, p.56. Holotype: Stevens, 1987, figs.4A–D,6A–B; Fensome et al., 1996, figs.1–3,9–10 — p.2111. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Questionable assignment: Williams et al. (1993, p.56). Age: early Berriasian.

"*dicrypta*" (Gitmez and Sarjeant, 1972, p.225–226, pl.7, fig.6; text-fig.22) Gocht, 1976, p.334. Holotype: Gitmez and Sarjeant, 1972, pl.7, fig.6; text-fig.22. **NOW** *Escharisphaeridia*. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Meiourogonyaulax*?, fourthly *Canningia*?, fifthly (and now) *Escharisphaeridia*. Age: early–late Kimmeridgian.

"*ghermanii*" (Beju, 1971, p.287–288, pl.4, figs.1–3; text-fig.4) Gocht, 1976, p.334. Holotype: Beju, 1971, pl.4, fig.1; text-fig.4. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: Callovian–early Oxfordian.

"*helbyi*" Morgan, 1980, p.26, pl.18, figs.4–7. Emendation: Stover and Helby, 1987d, p.265,267, as *Cernicysta helbyi*. Holotype: Morgan, 1980, pl.18, figs.4–6; Fensome et al., 1996, figs.1–3 — p.2149. **NOW** *Cernicysta*. Originally *Lithodinia*, subsequently (and now) *Cernicysta*. Age: middle Aptian–early Albanian.

"*insulofigurata*" (Dodekova, 1975, p.21–22, pl.2, figs.4–5,7–8; text-figs.3a–c) Gocht, 1976, p.334. Holotype: Dodekova, 1975, pl.2, figs.4–5. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Lithodinia*?. Questionable assignment: Williams et al. (1993, p.56). Age: late Bathonian.

**jurassica* Eisenack, 1935, p.175–177, pl.4, figs.5–10; text-figs.1–4. Emendations: Eisenack and Klement, 1964, p.505; Gocht, 1975b, p.355. Holotype: Eisenack, 1935, pl.4, fig.5; Gocht, 1975b, figs.22a–b. Age: Callovian.

subsp. *jurassica*. Autonym. Holotype: Eisenack, 1935, pl.4, fig.5; Gocht, 1975b, figs.22a–b.

"var. *jurassica*". Autonym. Holotype: Eisenack, 1935, pl.4, fig.5; Gocht, 1975b, figs.22a–b. **Now redundant.**

"var. *ornata*" Eisenack, 1935, p.176, pl.4, figs.9–10; text-figs.1–4. Holotype: Eisenack, 1935, pl.4, fig.9. **NOW** *Ctenidodinium ornatum*. Originally *Lithodinia jurassica* var. *ornata*, subsequently (and now) *Ctenidodinium ornatum*, thirdly *Gonyaulacysta ornata*. Taxonomic junior synonym: *Brotzenia* (as *Ctenidodinium*?) *cristata*, according to Woollam (1983, p.190). Age: Oxfordian.

subsp. *reburrosa* Quattrocchio and Sarjeant, 1992, p.72–73(al. 2–224 — 2–225), pl.1, figs.10–11; pl.7, figs.2–3; text-figs.3A–B. Holotype: Quattrocchio and Sarjeant, 1992, pl.1, fig.10; text-figs.3A–B. Age: middle-late Callovian–early middle Tithonian.

"*maculata*" (Backhouse, 1988, p.96, pl.32, figs.8,9a–b,10–11; text-figs.29A–B) Williams et al., 1993, p.55. Holotype: Backhouse, 1988, pl.32, figs.9a–b; text-figs.29A–B; Fensome et al., 1996, figs.2–3,6–7 — p.2217. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: early Barremian.

"*mitra*" (Dürr, 1987, p.74,77, figs.3a–b; fig.4, nos.3–6; fig.6, nos.1–3,5) Williams et al., 1993, p.55. Holotype: Dürr, 1987, fig.4, no.3; Dürr, 1988, pl.1, fig.5. **NOW** *Semicavidinium*. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly (and now) *Semicavidinium*. N.I.A. Age: middle Kimmeridgian.

"*mombasaensis*" (Mungai in Jiang Qinghua et al., 1992, p.87, pl.2, figs.1–2; text-figs.3a–c) Lentin and Williams, 1993, p.400. Holotype: Jiang Qinghua et al., 1992, pl.2, fig.1. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: Kimmeridgian–Tithonian.

perforata Iosifova, 1996, p.223,225, pl.8, figs.6a–c; text-figs.9A–B. Holotype: Iosifova, 1996, pl.8, figs.6a–c; text-figs.9A–B. Age: Ryazanian.

"*pertusa*" Duxbury, 1977, p.41–43, pl.8, fig.5; text-fig.15. Holotype: Duxbury, 1977, pl.8, fig.5; text-fig.15; Fensome et al., 1991, figs.1–3 — p.709; figs.1–3 — p.711. **NOW** *Meiourogonyaulax*. Originally *Lithodinia*, subsequently (and now) *Meiourogonyaulax*. Age: late Berriasian–early Hauterivian.

"subsp. *heta*" (Below, 1981a, p.56–57, pl.3, figs.7a–b,8a–b; pl.11, fig.21; pl.14, figs.1–4; text-figs.59a–b,60) Williams et al., 1993, p.55. Holotype: Below, 1981a, pl.3, figs.8a–b; Fensome et al., 1991, figs.3–4 — p.647; figs.4–5 — p.709. **NOW** *Meiourogonyaulax pertusa* subsp. *heta*. Originally (and now) *Meiourogonyaulax pertusa* subsp. *heta*, subsequently *Lithodinia pertusa* subsp. *heta*. Age: Hauterivian.

"subsp. *pertusa*". Autonym. Holotype: Duxbury, 1977, pl.8, fig.5; text-fig.15; Fensome et al., 1991, figs.1–3 — p.709; figs.1–3 — p.711. **NOW** *Meiourogonyaulax pertusa* subsp. *pertusa*. Originally (and now) *Meiourogonyaulax pertusa* subsp. *pertusa*, subsequently *Lithodinia pertusa* subsp. *pertusa*.

"*pila*" (Gitmez and Sarjeant, 1972, p.226–227, pl.4, fig.5; pl.7, fig.3; text-fig.23) Gocht, 1976, p.334. Holotype: Gitmez and Sarjeant, 1972, pl.4, fig.5; text-fig.23. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. N.I.A. Age: middle-late Kimmeridgian.

"*planoseptata*" (Riding, 1987a, p.262, fig.9, nos.9–12; fig.13) Williams et al., 1993, p.55. Holotype: Riding, 1987a, fig.9, nos.9–10. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: early Callovian.

"*pocockii*" (Sarjeant, 1968, p.230, pl.3, fig.9) Davey, 1979d, p.217. Holotype: Sarjeant, 1968, pl.3, fig.9; Eisenack and Kjellström, 1972, p.185; Davey, 1979d, pl.2, figs.7,10; Fensome et al., 1995, fig.1 — p.1673. **NOW** *Escharisphaeridia*. Originally *Chytroeisphaeridia*, subsequently *Lithodinia*, thirdly (and now) *Escharisphaeridia*. Age: late Callovian.

"*?predae*" (Beju, 1971, p.288–289, pl.4, figs.4a–b,5–7; text-fig.5) Gocht, 1976, p.334. Emendations: Drugg, 1978, p.64 and Below, 1990, p.45–46, both as *Carpathodinium predae*. Holotype: Beju, 1971, pl.4, figs.4a–b; text-fig.5; Eisenack and Kjellström, 1975b, p.792d; Fensome et al., 1995, figs.1–4 — p.1679. **NOW** *Carpathodinium*. Originally *Meiourogonyaulax?*, subsequently *Lithodinia?*, thirdly (and now) *Carpathodinium*. Questionable assignment: Gocht (1976, p.334). Age: Callovian–early Oxfordian.

protothymosa Riding and Helby, 2001d, p.81–83, figs.10A–L. Holotype: Riding and Helby, 2001d, fig.10D. Taxonomic junior synonyms: *Lithodinia australica* and *Meiourogonyaulax protothymosa* (both names not validly published), both according to Riding and Helby (2001d, p.81). Age: Callovian.

"*psora*" (Davey and Verdier, 1974, p.634,636, pl.92, figs.8–9) Gocht, 1976, p.334. Holotype: Davey and Verdier, 1974, pl.92, fig.9. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. N.I.A. Age: Aptian.

"*reticulata*" (Dodekova, 1975, p.22–23, pl.2, figs.11–13; text-fig.4) Gocht, 1976, p.334. Holotype: Dodekova, 1975, pl.2, figs.11–12. **NOW** *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: late Bathonian.

"*rioultii*" (Sarjeant, 1968, p.229) Gocht, 1976, p.334. Holotype: Sarjeant, 1965, pl.1, fig.1. NOW *Meiourogonyaulax*? Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly (and now) *Meiourogonyaulax*?, fourthly *Lithodinia*?. Questionable assignment: Williams et al. (1993, p.56). Age: early Callovian.

"*sagena*" Duxbury, 1980, p.127, pl.3, figs.6,9,12–13. Emendation: Harding, 1990b, p.35, as *Meiourogonyaulax sagena*. Holotype: Duxbury, 1980, pl.3, figs.6,9,12. NOW *Ellipsoidictyum*. Originally *Lithodinia*, subsequently *Meiourogonyaulax*, thirdly (and now) *Ellipsoidictyum*. N.I.A. Age: middle-late Barremian.

"*serrulata*" Davies, 1983, p.26, pl.9, figs.1–6; text-figs.21A–B. Holotype: Davies, 1983, pl.9, figs.3–4; text-figs.21A–B. NOW *Freboldinium*. Originally *Lithodinia*, subsequently (and now) *Freboldinium*. Age: Toarcian–early Bajocian.

"*spongiosa*" (Smelror, 1987, p.230,232, figs.5A–G); text-fig.3) Williams et al., 1993, p.56. Holotype: Smelror, 1987, fig.5B. NOW *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: late Callovian.

"*staffinensis*" (Gitmez, 1970, p.276–278, pl.3, fig.1; text-figs.20A–B) Gocht, 1976, p.334. Emendation: Poulsen and Riding, 1992, p.26, as *Ambonosphaera? staffinensis*. Holotype: Gitmez, 1970, pl.3, fig.1; text-figs.20A–B; Poulsen and Riding, 1992, pl.1, fig.6; text-figs.1A–B. NOW *Ambonosphaera?*. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Polygonifera*, fourthly (and now) *Ambonosphaera?*, fifthly *Lithodinia*?. Questionable assignment: Williams et al. (1993, p.56). Taxonomic junior synonyms: *Senoniasphaera? frisia*, according to Poulsen and Riding (1992, p.26); *Hexagonifera* (now *Senoniasphaera*) *jurassica*, according to Williams et al. (1993, p.32) — however, elsewhere in the same publication, Williams et al. (1993, p.56) retained *Hexagonifera* (now *Senoniasphaera*) *jurassica*. Age: early Kimmeridgian.

"*stoveri*" (Millioud, 1969, p.429, pl.3, figs.1–3) Gocht, 1976, p.334. Holotype: Millioud, 1969, pl.3, figs.1–2. NOW *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Age: early Hauterivian–early Aptian.

"*strongyla*" (Sarjeant, 1972, p.35–37, pl.4, fig.7; text-fig.7) Gocht, 1976, p.334. Holotype: Sarjeant, 1972, pl.4, fig.7; text-fig.7. NOW *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Lithodinia*?. Questionable assignment: Williams et al. (1993, p.56). For etymology, see *Meiourogonyaulax strongyla*. Age: Bathonian.

"*superornata*" (Wetzel, 1967a, p.869–870, pl.16, figs.8a–b) Fenton, 1981, p.253. Emendation: Sarjeant, 1980b, p.124–125, as *Meiourogonyaulax superornata*. Holotype: Wetzel, 1967a, pl.16, figs.8a–b; Sarjeant, 1980b, pl.1, figs.2–3; text-fig.4; Dietz et al., 1999, text-fig.5c. NOW *Meiourogonyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Gonyaulacysta*, fourthly *Lithodinia*?. Questionable assignment: Williams et al. (1993, p.56). Age: late Bathonian.

"*valensii*" (Sarjeant, 1966b, p.145–146, pl.15, fig.7; text-fig.37) Gocht, 1976, p.334. Holotype: Valensi, 1953, pl.2, figs.12–13 (as *Gonyaulax* sp.); Sarjeant, 1966b, pl.15, fig.7; text-fig.37. NOW *Meiourogonyaulax*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. Taxonomic junior synonym: *Lithodinia decapitata*, according to Fenton (1981, p.253) and Williams et al. (1993, p.56). Age: Bathonian.

LITHOPERIDINIUM Deflandre, 1933, p.272. Siliceous dinoflagellate genus. Taxonomic junior synonym: *Peridinites*, by implication in Deflandre (1945b, cards 806–809), who believed *Peridinites* to be the senior name — however, Harding and Lewis (1994, p.834) retained *Peridinites*. Type: Deflandre, 1933, text-figs.1–7, as *Lithoperidinium oamaruense*.

barbadense (Lefèvre, 1933b, p.222–223, text-figs.9–12) Lentin and Williams, 1993, p.402. Holotype: Lefèvre, 1933b, text-fig.9. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. Age: Early Tertiary.

diodos (Lefèvre, 1933b, p.227, text-fig.23) Lentin and Williams, 1993, p.402. Holotype: Lefèvre, 1933b, text-fig.23. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. N.I.A. Age: Early Tertiary.

globosum (Lefèvre, 1933b, p.224, text-figs.15–16) Lentin and Williams, 1993, p.402. Holotype: Lefèvre, 1933b, text-fig.15. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. Age: Early Tertiary.

"**maculatum**" Vozzhennikova, 1967, p.117–118, pl.49, figs.1–12; pl.50, figs.1–8. **Name not validly published:** holotype not designated. Originally *Lithoperidinium* (name not validly published), subsequently *Peridinites* (name not validly published). Age: early Oligocene.

***oamaruense** Deflandre, 1933, p.273; text-figs.1–7. Holotype: Deflandre, 1933, text-figs.1–7. Originally (and now) *Lithoperidinium*, subsequently *Peridinites*. Age: Tertiary.

ovale (Lefèvre, 1933b, p.226, text-figs.21–22) Lentin and Williams, 1993, p.402. Holotype: Lefèvre, 1933b, text-figs.21–22. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. Age: Early Tertiary.

"**parvulum**" (Lefèvre, 1933b, p.221–222; text-figs.6–8) Lentin and Williams, 1993, p.402. Holotype: Lefèvre, 1933b, text-fig.7, according to Eisenack and Klement (1964, p.657). **NOW** *Peridinites*. Originally (and now) *Peridinites*, subsequently *Lithoperidinium*. Age: Early Tertiary.

perforatum (Lefèvre, 1933b, p.227–228, text-figs.25–30) Lentin and Williams, 1993, p.402. Holotype: Lefèvre, 1933b, text-figs.29–30. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. Age: Early Tertiary.

"**piriforme**" (Lefèvre, 1933b, p.225, text-figs.17–18) Lentin and Williams, 1993, p.402. Emendation: Harding and Lewis, 1994, p.834–835, as *Peridinites piriformis*. Holotype: Lefèvre, 1933b, text-fig.17. **NOW** *Peridinites*. Originally (and now) *Peridinites*, subsequently *Lithoperidinium*. Age: Early Tertiary.

"subsp. **compactum**" (Lefèvre, 1933b, p.225, text-figs.19–20) Lentin and Williams, 1993, p.402. Holotype: Lefèvre, 1933b, text-figs.19–20. **NOW** *Peridinites piriformis* subsp. *compactum*. Originally *Peridinites piriformis* var. *compactum*, subsequently (and now) *Peridinites piriformis* subsp. *compactum*, thirdly *Lithoperidinium piriforme* subsp. *compactum*. Age: Early Tertiary.

"subsp. **piriforme**". Autonym. Holotype: Lefèvre, 1933b, text-fig.17. **NOW** *Peridinites piriformis* subsp. *piriformis*. Originally (and now) *Peridinites piriformis* subsp. *piriformis*, subsequently *Lithoperidinium piriforme* subsp. *piriforme*.

rossicum Deflandre, 1940, p.266; text-figs.1–4. Holotype: Deflandre, 1940, text-figs.1–4. Originally (and now) *Lithoperidinium*, subsequently *Peridinites*. Age: Eocene.

"**sphaericum**" (Lefèvre, 1933b, p.223–224, text-figs.13–14,24) Lentin and Williams, 1993, p.403. Emendation: Harding and Lewis, 1994, p.835–836, as *Peridinites sphaericus*. Holotype: Lefèvre, 1933b, text-figs.13–14. **NOW** *Peridinites*. Originally (and now) *Peridinites*, subsequently *Lithoperidinium*. Age: Early Tertiary.

"subsp. **minus**" (Lefèvre, 1933b, p.224, text-fig.24) Lentin and Williams, 1993, p.403. Holotype: Lefèvre, 1933b, text-fig.24. Originally *Peridinites sphaericus* var. *minor*, subsequently *Peridinites sphaericus* subsp. *minor*, thirdly *Lithoperidinium sphaericum* subsp. *minus*. **Taxonomic senior synonym** (at specific rank): *Peridinites sphaericus*, according to Harding and Lewis (1994, p.837). Age: Early Tertiary.

"subsp. **sphaericum**". Autonym. Holotype: Lefèvre, 1933b, text-figs.13–14. **Now redundant.** Originally *Peridinites sphaericus* subsp. *sphaericus*, subsequently *Lithoperidinium sphaericum* subsp. *sphaericum*.

LITOSPHAERIDIUM Davey and Williams, 1966b, p.79–80. Emendations: Davey and Verdier, 1973, p.193; Lucas-Clark, 1984, p.181–182. Taxonomic junior synonym: *Conosphaeridium*, by implication in Sarjeant (1969, p.14), who transferred the "type species" of *Conosphaeridium*, *Conosphaeridium striatoconum*, to *Litosphaeridium* — however, Lentin and Williams (1973, p.31) retained *Conosphaeridium*. Type: Cookson and Eisenack, 1958, pl.11, fig.8, as *Hystrichosphaeridium siphoniphorum*.

adnatum Lucas-Clark, 2007, p.210, pl.1, figs.1–9; text-figs.7A,8. Holotype: Lucas-Clark, 2007, pl.1, figs.1–3. Age: late Albian.

arundum (Eisenack and Cookson, 1960, p.8, pl.3, figs.7–9) Davey, 1979b, p.557. Emendation: Lucas-Clark, 1984, p.188, as *Litosphaeridium arundum*. Holotype: Eisenack and Cookson, 1960, pl.3, fig.7; Helby et al., 1987, figs.29J–K. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Litosphaeridium*. Taxonomic senior synonym: *Micrhystridium* (as *Dapsilidinium?*, now *Litosphaeridium*) *fucosum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.227) retained *Hystrichosphaeridium* (as *Litosphaeridium*) *arundum*. Age: Albian.

bacar Lucas-Clark, 1984, p.187, pl.3, figs.1–12. Holotype: Lucas-Clark, 1984, pl.3, figs.1–2,4; Fauconnier and Masure, pl.52, figs.5–7. N.I.A. Age: late Albian–Cenomanian.

conispinum Davey and Verdier, 1973, p.193–194, pl.4, figs.4,6,8–9. Emendation: Lucas-Clark, 1984, p.187, as *Litosphaeridium conispinum*. Holotype: Davey and Verdier, 1973, pl.4, fig.8. Originally (and now) *Litosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*. Lucas-Clark (1984, p.187) retained this species in *Litosphaeridium*. Age: late Albian.

"cooksoniae" (Singh, 1971, p.329–330, pl.51, figs.7–8; pl.52, figs.1–4) Yu Jingxian and Zhang Wangping, 1980, p.112. Emendation: Duxbury, 1980, p.120, as *Florentinia cooksoniae*. Holotype: Singh, 1971, pl.51, fig.7. **NOW** *Kleithriasphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Florentinia*, thirdly *Litosphaeridium*, fourthly (and now) *Kleithriasphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Florentinia*) *mantellii*, according to Below (1982c, p.8) — however, Lentin and Williams (1985, p.135) retained *Florentinia cooksoniae*. Taxonomic junior synonym: *Hystrichosphaeridium cylindratum*, according to Harker and Sarjeant (1975, p.225–226). Age: late Albian.

"?crassipes" (Reade, 1839, pl.9, figs.2–5) Davey and Williams, 1969, p.5. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.10, as *Hystrichokolpoma? crassipes*. Holotype: Reade, 1839, pl.9, fig.2, lost according to Lejeune-Carpentier and Sarjeant (1981, p.11). Neotype: Lejeune-Carpentier, 1941, fig.9; Lejeune-Carpentier and Sarjeant, 1981, pl.3, fig.3; text-fig.6; designated by Lejeune-Carpentier and Sarjeant (1981, p.11). **NOW** *Hystrichokolpoma*. Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Litosphaeridium?*, fourthly (and now) *Hystrichokolpoma*. Questionable assignment: Davey and Williams (1969, p.5). Taxonomic junior synonym: *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*, by implication in Yun Hyesu (1981, p.27), who considered *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Pervosphaeridium truncigerum*. This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.83), since these authors did not fully reference the basionym. Age: Late Cretaceous.

fenestreconum (May, 1980, p.54–55, pl.3, figs.6–11) Lucas-Clark, 1984, p.190. Holotype: May, 1980, pl.3, figs.6–8. Originally *Hystrichokolpoma*, subsequently (and now) *Litosphaeridium*. Age: Maastrichtian.

"?flosculus" (Deflandre, 1937b, p.75, pl.15 [al. pl.12], figs.5–6) Davey and Williams, 1969, p.5. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.5. **NOW** *Florentinia?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published; Appendix A), thirdly *Litosphaeridium?*, fourthly *Silicisphaera?*, fifthly (and now) *Florentinia?*. Questionable assignment: Davey and Williams (1969, p.5). Taxonomic junior synonym: *Eurysphaeridium fibratum* (name not validly published), according to Slimani (2001a, p.192). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.83), since these authors did not fully reference the basionym. N.I.A. Age: Senonian.

fucosum (Valensi, 1955a, p.40; text-fig.2b) Masure in Fauconnier and Masure, 2004, p.378. Holotype: Valensi, 1955a, text-fig.2b; Fauconnier and Masure, pl.52, figs.8–11. Originally *Micrhystridium*, subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?*, fourthly *Dapsilidinium?*, fifthly (and now) *Litosphaeridium*. Taxonomic junior synonyms (at specific rank): *Hystrichosphaeridium tubiferum* subsp. *brevispinum*, according to Below (1982c, p.29); *Hystrichosphaeridium* (as and now *Litosphaeridium*) *arundum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.190,227) retained *Hystrichosphaeridium tubiferum* subsp. *brevispinum* and *Litosphaeridium arundum*. Age: Late Cretaceous.

gaponoffiae Lucas-Clark, 2007, p.210,212, pl.2, figs.1–9; text-figs.7B,9. Holotype: Lucas-Clark, 2007, pl.2, figs.1–2. Age: late Albian.

"?*inversibuccinum*" Davey and Williams, 1966b, p.82, pl.12, fig.3. Emendation: Bujak et al., 1980, p.32, as *Paucisphaeridium inversibuccinum*. Holotype: Davey and Williams, 1966b, pl.12, fig.3; Eisenack and Kjellström, 1972, p.781; Bujak et al., 1980, pl.2, figs.4–5; Fensome et al., 1995, p.1567; Fauconnier and Masure, pl.63, fig.1. **NOW** *Paucisphaeridium*. Originally *Litosphaeridium*?, subsequently (and now) *Paucisphaeridium*. Questionable assignment: Davey and Williams (1966b, p.82). N.I.A. Age: early Eocene.

"*luteticum*" Gruas-Cavagnetto, 1976, p.222, pl.2, figs.9–10. **Name not validly published**: no description.

"?*mamellatum*" de Coninck, 1977, p.42, pl.6, figs.8–13. Holotype: de Coninck, 1977, pl.6, figs.8–10. Questionable assignment: de Coninck (1977, p.42). **Taxonomic senior synonym**: *Cystidiopsis certis* Nagy, 1965, an acritarch species, according to Lucas-Clark (1984, p.184). Age: early-middle Eocene.

?*oblongum* Yu Jingxian and Zhang Wangping, 1980, p.112, pl.4, figs.7–8. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.4, fig.8. Questionable assignment: Lucas-Clark (1984, p.184). Age: Turonian–Santonian.

"?*parvum*" Matsuoka and Bujak, 1988, p.62–63, pl.8, figs.2a–b,3a–b,4; text-fig.12. Holotype: Matsuoka and Bujak, 1988, pl.8, figs.2a–b; text-fig.12. Questionable assignment: Matsuoka and Bujak (1988, p.62). **Taxonomic senior synonym**: *Minisphaeridium latirictum*, according to Fensome et al. (2009, p.44). Age: late Oligocene–early Miocene.

serratocyclum (Wetzel, 1933b, p.27–28, pl.4, fig.9) Sarjeant, 1985b, p.144–145. Emendation: Sarjeant, 1985b, p.144–145, as *Litosphaeridium serratocyclus*. Holotype: Wetzel, 1933b, pl.4, fig.9; Sarjeant, 1985b, pl.1, fig.6. Originally *Cymatiosphaera radiata* forma *serratocycla* (Appendix A), subsequently (and now) *Litosphaeridium serratocyclum*. Age: Late Cretaceous.

**siphoniphorum* (Cookson and Eisenack, 1958, p.44, pl.11, figs.8–10) Davey and Williams, 1966b, p.80–82. Emendation: Lucas-Clark, 1984, p.186, as *Litosphaeridium siphoniphorum*. Holotype: Cookson and Eisenack, 1958, pl.11, fig.8; Helby et al., 1987, figs.38O–P. Originally *Hystrichosphaeridium*, subsequently (and now) *Litosphaeridium*. Age: Albian–Cenomanian.

subsp. *glabrum* Lucas-Clark, 1984, p.186–187, pl.1, figs.1–11; pl.2, fig.2. Holotype: Lucas-Clark, 1984, pl.1, figs.2–3; Fauconnier and Masure, pl.53, fig.11. Age: Albian–Cenomanian.

subsp. *siphoniphorum*. Autonym. Holotype: Cookson and Eisenack, 1958, pl.11, fig.8.

"?*striatoconum*" (Deflandre and Cookson, 1955, p.275, pl.2, fig.10; text-fig.36) Sarjeant, 1969, p.14. Holotype: Deflandre and Cookson, 1955, text-fig.36. **NOW** *Conosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Litosphaeridium*?, fourthly (and now) *Conosphaeridium*. Questionable assignment: Sarjeant (1969, p.14). Age: middle Senonian.

"?*truncigerum*" (Deflandre, 1937b, p.71–72, pl.13 [al. pl.10], figs.6–7) Davey and Williams, 1969, p.6. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. **NOW** *Raetiaedinium*. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium*?, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium*?, seventhly *Florentinia*, eighthly *Pervosphaeridium*?, ninthly (and now) *Raetiaedinium*. Questionable assignment: Davey and Williams (1969, p.6). Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes*, by implication in Yun Hyesu (1981, p.27), who considered *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Hystrichosphaeridium* (as *Pervosphaeridium*) *truncigerum*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.83), since these authors did not fully reference the basionym. Age: Senonian.

LOBIONELLA Batten and Lister, 1988, p.355. Type: Batten and Lister, 1988, figs.31,5c, as *Lobionella hirsuta*.

**hirsuta* Batten and Lister, 1988, p.355,357, figs.31,5a–d. Holotype: Batten and Lister, 1988, figs.31,5c. Age: Hauterivian.

LOPHOCYSTA Manum, 1979, p.238. Type: Manum, 1979, pl.1, figs.4–6; text-figs.1A–B, as *Lophocysta sulcolimbata*.

**sulcolimbata* Manum, 1979, p.238,240–242, pl.1, figs.1–11; text-figs.1A–E. Holotype: Manum, 1979, pl.1, figs.4–6; text-figs.1A–B; Fensome et al., 1995, figs.1–3,9 — p.1811. Age: early Miocene.

LOPSIDINIUM Dolby, 2014, p.173. Type: Dolby, 2014, pl.1, fig.2, as *Lopsidinium subrisum*.

paxense Dolby, 2014, p.176, pl.1, figs.9–12. Holotype: Dolby, 2014, pl.1, fig. 10. Age: middle Albian.

**subrisum* Dolby, 2014, p.173,175–176, pl.1, figs.1–8. Holotype: Dolby, 2014, pl.1, fig.2. Age: early Albian.

LOTHARINGIA Below, 1990, p.20–21. Contrary to the opinion of Lentin and Williams (1993, p.405), this name is validly published since the name of the "type species is validly published. This name was not validly published in Below (1987a, p.57), who did not provide a description. Type: Below, 1990, pl.4, figs.11,13, as *Lotharingia maubeugii*.

**maubeugii* Below, 1990, p.21–23, pl.4, figs.10–18; text-figs.5a–g. Holotype: Below, 1990, pl.4, figs.11,13. Contrary to the opinion of Lentin and Williams (1993, p.405), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). This name was not validly published in Below (1987a, p.57), who did not provide a description; Below (1987a, caption to pl.26, fig.d) cited the name as *Saxodinium maubeugii*. Age: Toarcian.

LUEHNDEA Morgenroth, 1970, p.346–347. Emendations: Bucefalo Palliani et al., 1997b, p.114–115; Riding and Helby, 2001a, p.3,5. Type: Morgenroth, 1970, pl.9, fig.1, as *Luehndea spinosa*.

cirilliae Bucefalo Palliani et al., 1997b, p.115,117, pl.1, figs.1–6; pl.2, figs.1–2,5–7; text-fig.3. Holotype: Bucefalo Palliani et al., 1997b, pl.1, figs.1–2. Age: late Pliensbachian–early Toarcian.

microreticulata Bucefalo Palliani et al., 1997b, p.117,119, pl.2, fig.4; text-fig.3. Holotype: Bucefalo Palliani et al., 1997b, pl.2, fig.4. Age: early Toarcian.

septata Riding and Helby, 2001a, p.5, figs.3A–P. Holotype: Riding and Helby, 2001a, fig.3O. Age: Toarcian.

**spinosa* Morgenroth, 1970, p.347, pl.9, figs.1–4. Holotype: Morgenroth, 1970, pl.9, fig.1. Age: late Pliensbachian.

LUNATADINIUM Brideaux and McIntyre, 1973, p.396. Taxonomic junior synonym: *Pylomacystion* (name not validly published), according to Brideaux and McIntyre (1973, p.400). Type: Brideaux and McIntyre, 1973, pl.1, figs.3–4, as *Lunatadinium dissolutum*.

**dissolutum* Brideaux and McIntyre, 1973, p.396–397,400–401, pl.1, figs.1–13. Holotype: Brideaux and McIntyre, 1973, pl.1, figs.3–4; Fensome et al., 1993a, figs.1–2 — p.1129. Taxonomic junior synonym: *Pylomacystion*

californicum (name not validly published), according to Brideaux and McIntyre (1973, p.400). Age: Hauterivian–middle Albian.

LUNNOMIDINIUM Lindström, 2002, p.253,255. Type: Lindström, 2002, pl.1, figs.1–6, as *Lunnomidinium scaniense*.

**scaniense* Lindström, 2002, p.255–258, pl.1, figs.1–12; pl.2, figs.1–12; pl.3, figs.1–12; pl.4, figs.1–6; text-figs.4a–d. Holotype: Lindström, 2002, pl.1, figs.1–6; text-figs.4a–b. Age: Rhaetian.

"**LUTETIANELLA**" Filipescu, 1959, p.168. Siliceous dinoflagellate genus. **Name not validly published**: type not designated. **Taxonomic senior synonym**: *Actiniscus*, according to Dumitrică (1973, p.820). This name was also not validly published in Filipescu (1943, p.264), since no species were proposed.

"*communis*" Filipescu, 1959, p.170, pl.1, figs.8–9. Holotype: Filipescu, 1959, pl.1, fig.8. **Name not validly published**: the generic name *Lutetianella* is not validly published. Age: Miocene.

"var. *acanthica*" Filipescu, 1959, p.170, pl.1, fig.9. Holotype: Filipescu, 1959, pl.1, fig.9. **Name not validly published**: the species name *Lutetianella communis* is not validly published. Age: Miocene.

"*diadema*" Filipescu, 1959, p.170–171, pl.1, figs.10–11. **Name not validly published**: no type designated and also the generic name *Lutetianella* is not validly published. Age: Miocene.

"var. *complexa*" Filipescu, 1959, p.170–171, pl.1, fig.11. Holotype: Filipescu, 1959, pl.1, fig.11. **Name not validly published**: the specific name *Lutetianella diadema* is not validly published. Age: Miocene.

"var. *simplex*" Filipescu, 1959, p.170–171, pl.1, fig.10. Holotype: Filipescu, 1959, pl.1, fig.10. **Name not validly published**: the specific name *Lutetianella diadema* is not validly published. Age: Miocene.

LUXADINIUM Brideaux and McIntyre, 1975, p.36. Type: Brideaux and McIntyre, 1975, pl.12, fig.9, as *Luxadinium primulum*.

auriculatum Xu Jinli, 1987, p.151–152, pl.3, figs.1a–d,2a–b,3–4,5a–c. Holotype: Xu Jinli, 1987, pl.3, figs.1a–d. Age: ?middle-late Eocene.

conchatum Xu Jinli, 1987, p.152–153, pl.1, figs.5a–d,8a–b,11a–b. Holotype: Xu Jinli, 1987, pl.1, figs.5a–d. Age: ?middle-late Eocene.

?*dabendorfense* (Alberti, 1961, p.5, pl.3, fig.4) Bujak and Davies, 1983, p.163. Holotype: Alberti, 1961, pl.3, fig.4. Originally *Gymnodinium* (Appendix B), subsequently *Diconodinium*, thirdly (and now) *Luxadinium*?. Questionable assignment: Bujak and Davies (1983, p.163). Age: Valanginian.

dongmingense Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.50, pl.4, figs.9–12. Holotype: He Chengquan et al., 1989, pl.4, fig.9. Age: Early Tertiary.

elegans He Chengquan in Zheng Yahui and He Chengquan, 1984, p.95, pl.6, figs.18–19; pl.11, fig.3. Holotype: He Chengquan et al., 1989, pl.6, fig.18. Age: Late Cretaceous.

elongatum Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.50–51, pl.5, figs.4–15, pl.29, fig.1. Holotype: He Chengquan et al., 1989, pl.5, fig.5. Age: Early Tertiary.

friabile Xu Jinli, 1987, p.152, pl.2, figs.1a–b,2a–b. Holotype: Xu Jinli, 1987, pl.2, figs.1a–b. Age: ?middle-late Eocene.

lingulatum Marshall, 1989, p.52, pl.9, figs.1–9; text-figs.16A–B. Holotype: Marshall, 1989, pl.9, figs.1–3; text-fig.16A; Fensome et al., 1996, figs.1–3,7 — p.2193. Age: Turonian–early Santonian.

macrocephalum Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.51, pl.4, figs.6–8. Holotype: He Chengquan et al., 1989, pl.4, fig.7. Age: Early Tertiary.

orientale He Chengquan in Zheng Yahui and He Chengquan, 1984, p.96, pl.6, fig.20. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.20. Mao Shaozhi et al. (1995, p.48) implied that this name should be restricted to the holotype. Age: Late Cretaceous.

***primulum** Brideaux and McIntyre, 1975, p.37–38, pl.12, figs.9–12; pl.13, figs.1–8. Holotype: Brideaux and McIntyre, 1975, pl.12, fig.9; Fensome et al., 1995, fig.4 — p.1683. Age: middle Albian.

propatulum Brideaux and McIntyre, 1975, p.37. Holotype: Singh, 1971, pl.62, fig.8, as *Scriniodinium eurypylum*; Brideaux and McIntyre, 1975, pl.13, figs.9–11. Age: late Albian.

psilatum Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.51–52, pl.4, fig.5. Holotype: He Chengquan et al., 1989, pl.4, fig.5. Age: Early Tertiary.

speciale Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.52, pl.4, fig.14. Holotype: He Chengquan et al., 1989, pl.4, fig.14. Mao Shaozhi et al. (1995, p.48) implied that this name should be restricted to the holotype. Age: Early Tertiary.

MADURADINIUM Cookson and Eisenack, 1970a, p.150. Type: Cookson and Eisenack, 1970a, pl.10, fig.13, as *Maduradinium pentagonum*.

***pentagonum** Cookson and Eisenack, 1970a, p.150, pl.10, figs.13–17. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.13. Age: Senonian.

subsp. **ovale** (Cookson and Eisenack, 1982, p.34, pl.1, figs.15–16) Lentin and Williams, 1985, p.230. Holotype: Cookson and Eisenack, 1982, pl.1, fig.16. Originally *Maduradinium pentagonum* var. *ovale*, subsequently (and now) *Maduradinium pentagonum* subsp. *ovale*. Age: Senonian.

"var. **ovale**" Cookson and Eisenack, 1982, p.34, pl.1, figs.15–16. Holotype: Cookson and Eisenack, 1982, pl.1, fig.16. **NOW** *Maduradinium pentagonum* subsp. *ovale*. Originally *Maduradinium pentagonum* var. *ovale*, subsequently (and now) *Maduradinium pentagonum* subsp. *ovale*. Age: Senonian.

subsp. **pentagonum**. Autonym. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.13.

"var. **pentagonum**". Autonym. Holotype: Cookson and Eisenack, 1970a, pl.10, fig.13. **Now redundant.**

"spatiosum" (Morgenroth, 1966b, p.3–4, pl.1, fig.5) Lentin and Williams, 1976, p.73. Holotype: Morgenroth, 1966b, pl.1, fig.5. **NOW** *Lejeuncysta*. Originally *Lejeunia* (generic name illegitimate), subsequently *Maduradinium*, thirdly (and now) *Lejeuncysta*. Age: early Oligocene.

turpe Norris, 1986, p.44–45, pl.13, fig.7; pl.14, figs.1–4. Holotype: Norris, 1986, pl.13, fig.7. Age: Eocene.

"MAGALLANESIUM" Quattrocchio and Sarjeant, 2003, p.138,140. **Senior taxonomic synonym:** *Spinidinium* according to Fensome et al. (2009 [February], p.59) and Sluijs et al. (2009 [April], p.46). Type: Wilson, 1967a, figs.11–13, as *Deflandrea macmurdoensis*.

"asymmetricum" (Wilson, 1967a, p.62–63, figs.17–21) Quattrocchio and Sarjeant, 2003, p.140. Holotype: Wilson, 1967a, figs.19–21. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium?*, fourthly (and now) *Alterbidinium*, fifthly *Magallanesium*. Age: ?Eocene (erratic).

"*balmei*" (Cookson and Eisenack, 1962b, p.486) Quattrocchio and Sarjeant, 2003, p.140. Emendation: Morgan, 1977, p.130, as *Alterbia minor*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.1; Morgan, 1977, text-fig.2. **NOW** *Spinidinium balmei*. Originally *Deflandrea minor* (name illegitimate), subsequently *Deflandrea balmei*, thirdly *Alterbia balmei* (combination illegitimate), fourthly *Isabelidinium balmei*, fifthly (and now) *Spinidinium balmei*, sixthly *Magallanesium balmei*. Taxonomic senior synonym: *Palaeohystrichophora* (as *Diconodinium*) *minuta*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea* (as *Isabelidinium*, now *Spinidinium*) *balmei*. Age: Late Cretaceous.

"*densispinatum*" (Stanley, 1965, p.226–227, pl.21, figs.1–5) Quattrocchio and Sarjeant, 2003, p.140. Holotype: Stanley, 1965, pl.21, figs.1–3. **NOW** *Spinidinium*. Originally (and now) *Spinidinium*, subsequently *Magallanesium*. Taxonomic junior synonym: *Spinidinium microceratum*, according to Stone (1973, p.53–54). Age: Paleocene.

"*denticulatum*" (Pöthe de Baldis and Ramos, 1983, p.438, pl.2, figs.7,11; pl.4, fig.2) Quattrocchio and Sarjeant, p.140. Holotype: Pöthe de Baldis and Ramos, 1983, pl.2, figs.7,11; pl.4, fig.2. **NOW** *Spinidinium argentinum*. Originally *Dioxya denticulata*, subsequently (and now) *Spinidinium argentinum*, thirdly *Magallanesium denticulatum*. *Spinidinium argentinum* is a substitute name, since the epithet "*denticulatum*" is preoccupied in *Spinidinium*. Age: early Aptian.

"*essoii*" (Cookson and Eisenack, 1967a, p.135, pl.19, figs.1–8) Quattrocchio and Sarjeant, 2003, p.140. Holotype: Cookson and Eisenack, 1967a, pl.19, figs.1–2. **NOW** *Spinidinium*. Originally (and now) *Spinidinium*, subsequently *Magallanesium*. Age: late Paleocene.

"**macmurdoense*" (Wilson, 1967a, p.60–62, figs.11–16,22; text-fig.2a) Quattrocchio and Sarjeant, 2003, p.140. Holotype: Wilson, 1967a, figs.11–13. **NOW** *Spinidinium*. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Magallanesium*. Age: Early Tertiary.

"*pilatum*" (Stanley, 1965, p.222, pl.21, figs.12–16) Quattrocchio and Sarjeant, 2003, p.140. Holotype: Stanley, 1965, pl.21, figs.14–16. **NOW** *Spinidinium*? Originally *Wetzeliella*, subsequently *Wetzeliella*?, thirdly (and now) *Spinidinium*?, fourthly *Magallanesium*. Age: Paleocene.

"*pulchrum*" (Benson, 1976, p.194, pl.9, figs.4–9) Quattrocchio and Sarjeant, 2003, p.140. Holotype: Benson, 1976, pl.9, figs.4–7. **NOW** *Spinidinium*? Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Magallanesium*, fourthly (and now) *Spinidinium*? Age: early Paleocene.

"*rallum*" (Heisecke, 1970, p.226,228, pl.1, figs.1–2; pl.2, fig.1) Quattrocchio and Sarjeant, 2003, p.140. Holotype: Heisecke, 1970, pl.1, fig.2; pl.2, fig.1. **NOW** *Spinidinium*? Originally *Spinidinium*, subsequently *Magallanesium*, thirdly (and now) *Spinidinium*? Age: Danian.

"**MAGHREBINIA**" Below, 1981a, p.22. Emendation: Masure, 1988a, p.362–363. **Taxonomic senior synonym:** *Atopodinium*, according to Masure (1991, p.64) and Masure in Fauconnier and Masure (2004, p.73). Type: Clarke and Verdier, 1967, pl.6, figs.1–2, as *Dinopterygium perforatum*.

"*breviornata*" Masure, 1988b, p.129, pl.3, figs.11A–B,12; pl.5, figs.10A–B; text-fig.4, nos.1–2. Holotype: Masure, 1988b, pl.3, figs.11A–B; text-fig.4, nos.1–2; Fauconnier and Masure, 2004, pl.9, fig.9. **Taxonomic senior synonym:** *Atopodinium haromense*, according to Masure (1991, p.65). Age: Vraconian–middle Cenomanian.

"*chleuh*" Below, 1981a, p.22–23, pl.1, figs.5a–b; pl.12, fig.5; text-figs.13a–b. Emendation: Masure, 1988a, p.365–366, as *Maghrebinia chleuh*. Holotype: Below, 1981a, pl.1, figs.5a–b; text-figs.13a–b; Masure, 1988a, pl.2, figs.1–8; text-figs.3a–b; Fensome et al., 1991, figs.1–4 — p.619; Fauconnier and Masure, 2004, pl.9, figs.1–3. **NOW** *Montanarocysta*. Originally *Maghrebinia*, subsequently *Atopodinium*, thirdly (and now) *Montanarocysta*. N.I.A. Age: Vraconian–Cenomanian.

"*membraniphora*" (Cookson and Eisenack, 1962b, p.495, pl.6, figs.8–14) Below, 1981a, p.22. Holotype: Cookson and Eisenack, 1962b, pl.6, fig.9. **NOW** *Cauveridinium*. Originally *Cyclonephelium*, subsequently *Maghrebinia*, thirdly (and now) *Cauveridinium*. Age: Albian–Cenomanian.

"*mirabilis*" (Below, 1984, p.635–636, pl.6, fig.2) Masure, 1988a, p.366. Emendation: Masure, 1988a, p.366–368, as *Maghrebinia mirabilis*. Holotype: Below, 1981a, pl.1, figs.1a–c, as *Maghrebinia perforata*; Masure, 1988a, pl.3, figs.1–11; text-figs.4a–c, as *Maghrebinia mirabilis*; Fauconnier and Masure, 2004, pl.10, figs.1–4. **NOW** *Montanarocysta mirabilis*. Originally *Maghrebinia perforata* subsp. *mirabilis*, subsequently *Maghrebinia mirabilis*, thirdly *Atopodinium mirabile*, fourthly (and now) *Montanarocysta mirabilis*. Age: late Albian–early Cenomanian.

"**perforata*" (Clarke and Verdier, 1967, p.36–37, pl.6, figs.1–3; text-fig.15) Below, 1981a, p.23. Emendations: Davey and Verdier, 1971, p.30, as *Pterodinium perforatum*; Below, 1981a, p.23–24 and Masure, 1988a, p.363–364, both as *Maghrebinia perforata*. Holotype: Clarke and Verdier, 1967, pl.6, figs.1–2; Masure, 1988a, pl.1, figs.1–9; text-figs.1a–b; Fensome et al., 1995, figs.1–2 — p.1653; Fauconnier and Masure, 2004, pl.10, figs.5–6. **NOW** *Atopodinium*. Originally *Dinopterygium*, subsequently *Pterodinium*, thirdly *Pterodinium?*, fourthly *Maghrebinia*, fifthly (and now) *Atopodinium*. Fensome et al. (1993b, p.98) retained this species in *Maghrebinia*. Age: early Cenomanian.

"subsp. *mirabilis*" Below, 1984, p.635–636, pl.6, fig.2. Emendation: Masure, 1988a, p.366–368, as *Maghrebinia mirabilis*. Holotype: Below, 1981a, pl.1, figs.1a–c, as *Maghrebinia perforata*; Masure, 1988a, pl.3, figs.1–11; text-figs.4a–c; Fauconnier and Masure, 2004, pl.10, figs.1–4. **NOW** *Montanarocysta mirabilis*. Originally *Maghrebinia perforata* subsp. *mirabilis*, subsequently *Maghrebinia mirabilis*, thirdly *Atopodinium mirabile*, fourthly (and now) *Montanarocysta mirabilis*. Age: late Albian–early Cenomanian.

"subsp. *perforata*". Autonym. Holotype: Clarke and Verdier, 1967, pl.6, figs.1–2; Masure, 1988a, pl.1, figs.1–9; text-figs.1a–b. **Now redundant.**

MALVINIA Houben et al., 2011, p.177. Type: Houben et al., 2011, pl.1, figs.1–3, as *Malvinia escutiana*.

**escutiana* Houben et al., 2011, p.177, 179, pl.1, figs.1–12, pl.2, figs.1–6; text-fig.3. Holotype: Houben et al., 2011, pl.1, figs.1–3. Age: early Oligocene.

MANCODINIUM Morgenroth, 1970, p.352. Emendation: Below, 1987b, p.20–22. Taxonomic senior synonym: *Dapcodinium*, according to Dörhöfer and Davies (1980, p.23) — however, Lentin and Williams (1985, p.230) retained *Mancodinium*. Type: Morgenroth, 1970, pl.12, fig.3, as *Mancodinium semitabulatum*.

coalitum (Davies, 1983, p.14, pl.1, figs.1–8; text-figs.6A–B) Below, 1987b, p.22. Holotype: Davies, 1983, pl.1, figs.7–8. Originally *Dapcodinium*, subsequently (and now) *Mancodinium*. Age: Toarcian–early Bajocian.

morgensternii Tykoezinski et al., 2001, p.86,88, pl.2, figs.1a–c,2a–c,3a–c,4a–b,5; pl.3, figs.1a–b,2a–b,3a–b,4a–b,5a–b,6a–b,7–8,9a–b; pl.4, fig.14. Tykoezinski et al., 2001, pl.2, figs.1a–c. Taxonomic junior synonym: *Mancodinium tykoezinskii* (name not validly published), according to Tykoezinski et al. (2001, p.86). Age: late Bathonian.

**semitabulatum* Morgenroth, 1970, p.352–353, pl.12, figs.3–6; pl.13, figs.1–4. Emendation: Below, 1987b, p.23, as *Mancodinium semitabulatum*. Holotype: Morgenroth, 1970, pl.12, fig.3; Fensome et al., 1993a, fig.1 — p.1319; fig.1 — p.1323. Originally (and now) *Mancodinium*, subsequently *Dapcodinium*. Lentin and Williams (1985, p.230) retained this species in *Mancodinium*. Taxonomic junior synonym: *Parvulodinium penitabulatum*, according to Prauss (1989, p.25). Age: late Pliensbachian.

subsp. *fossatum* (Below, 1987b, p.27, pl.6, figs.1–10) Lentin and Williams, 1989, p.234. Holotype: Below, 1987b, pl.6, figs.7–8,10; Fensome et al., 1993a, figs.5–6,8 — p.1201; fig.2 — p.1319. Originally

Mancodinium semitabulatum var. *fossatum*, subsequently (and now) *Mancodinium semitabulatum* subsp. *fossatum*. Age: late Pliensbachian.

"var. *fossatum*" Below, 1987b, p.27, pl.6, figs.1–10. Holotype: Below, 1987b, pl.6, figs.7–8,10; Fensome et al., 1993a, figs.5–6,8 — p.1201; fig.2 — p.1319. **NOW** *Mancodinium semitabulatum* subsp. *fossatum*. Originally *Mancodinium semitabulatum* var. *fossatum*, subsequently (and now) *Mancodinium semitabulatum* subsp. *fossatum*. Age: late Pliensbachian.

subsp. *glabrum* (Below, 1987b, p.27, pl.5, figs.17–19,22,25) Lentin and Williams, 1989, p.234. Holotype: Below, 1987b, pl.5, figs.17–19,22,25; Fensome et al., 1993a, figs.1–5 — p.1213; fig.3 — p.1319. Originally *Mancodinium semitabulatum* var. *glabrum*, subsequently (and now) *Mancodinium semitabulatum* subsp. *glabrum*. Age: late Pliensbachian.

"var. *glabrum*" Below, 1987b, p.27, pl.5, figs.17–19,22,25. Holotype: Below, 1987b, pl.5, figs.17–19,22,25; Fensome et al., 1993a, figs.1–5 — p.1213; fig.3 — p.1319. **NOW** *Mancodinium semitabulatum* subsp. *glabrum*. Originally *Mancodinium semitabulatum* var. *glabrum*, subsequently (and now) *Mancodinium semitabulatum* subsp. *glabrum*. Age: late Pliensbachian.

subsp. *semitabulatum*. Autonym. Holotype: Morgenroth, 1970, pl.12, fig.3; Fensome et al., 1993a, fig.1 — p.1319; fig.1 — p.1323.

"var. *semitabulatum*". Autonym. Holotype: Morgenroth, 1970, pl.12, fig.3; Fensome et al., 1993a, fig.1 — p.1319; fig.1 — p.1323. **Now redundant.**

"*tykoezinski*" Smith in Tykoezinski et al., 2001, p.86. **Name not validly published:** no description. **Taxonomic senior synonym:** *Mancodinium morgensternii*, according to Tykoezinski et al. (2001, p.86).

MANUMIELLA Bujak and Davies, 1983, p.160. Emendations: Fensome et al. 2009, p.43; Thorn et al., 2009, p.439. Marshall (1988, p.205) considered *Isabelidinium* to be the possible taxonomic senior synonym of this genus. Type: Lange, 1969, pl.3, fig.3, as *Broomea seelandica*.

bertodano Thorn et al., 2009, p.439,441, pl.1, figs.1–3,5,6. Holotype: Thorn et al., 2009, pl.1, figs.5–6. Age: latest Maastrichtian.

conorata (Stover, 1974, p.171–172, pl.1, figs.8a–b; text-fig.3C) Bujak and Davies, 1983, p.160. Holotype: Stover, 1974, pl.1, figs.8a–b. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly *Eurydinium*, fifthly (and now) *Manumiella*. Age: early-middle Paleocene.

"?*cretacea*" (Cookson, 1956, p.184–185, pl.1, figs.1–7 [but see discussion under *Isabelidinium cretaceum*]) Bujak and Davies, 1983, p.161. Holotype: Cookson, 1956, pl.1, fig.1; Helby et al., 1987, fig.42L. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly (and now) *Isabelidinium*, fourthly (and now) *Manumiella*? Questionable assignment: Bujak and Davies (1983, p.161). Age: Late Cretaceous.

subsp. *cretacea*. Autonym. Holotype: Cookson, 1956, pl.1, fig.1. Originally *Isabelidinium cretaceum* subsp. *cretaceum*, subsequently (and now) *Manumiella?* *cretacea* subsp. *cretacea*.

subsp. *gravida* (Mao Shaozhi and Mohr, 1992, p.319, pl.1, figs.11–12) Lentin and Williams, 1993, p.411. Holotype: Mao Shaozhi and Mohr, 1992, pl.1, fig.11. Originally *Isabelidinium cretaceum* subsp. *gravidum*, subsequently (and now) *Manumiella?* *cretacea* subsp. *gravida*. Age: Maastrichtian.

subsp. *oviformis* (Mao Shaozhi and Mohr, 1992, p.319–320, pl.1, figs.7,9; pl.10, fig.2; pl.11, fig.5) Lentin and Williams, 1993, p.411. Holotype: Mao Shaozhi and Mohr, 1992, pl.1, fig.7. Originally *Isabelidinium cretaceum* subsp. *oviforme*, subsequently (and now) *Manumiella?* *cretacea* subsp. *oviformis*. Age: late Campanian.

delicata (Balteş, 1969, p.34, pl.1, fig.7 ex Lentin and Williams, 1973, p.40) Bujak and Davies, 1983, p.161. Holotype: Balteş, 1969, pl.1, fig.7, designated by Lentin and Williams (1973, p.40). Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. This name was not validly published in Balteş (1969, p.34) since that author considered it to be provisional. Age: early Eocene.

druggii (Stover, 1974, p.171, pl.1, figs.3a–b,4; text-fig.3B) Bujak and Davies, 1983, p.161. Holotype: Stover, 1974, pl.1, figs.3a–b. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Taxonomic senior synonym: *Broomea* (as and now *Manumiella*) *seelandica*, according to Firth (1987, p.213) — however, Thorn et al. (2009, p.443) retained *Manumiella druggii*. Taxonomic junior synonym: *Isabelidinium tingitanense*, according to Lentin and Williams (1985, p.201). Age: early-middle Paleocene.

?*hemmoorensis* Marheinecke, 1992, p.89–90, pl.18, figs.13–15; text-fig.18. Holotype: Marheinecke, 1992, pl.18, fig.13; text-fig.18. Questionable assignment: Marheinecke (1992, p.89). Contrary to the opinion of Lentin and Williams (1993, p.411), Williams et al. (1998, p.387) considered this name to be validly published. Age: early Maastrichtian.

"*hungarica*" Siegl-Farkas, 1997, p.81,88, pl.7, fig.7. **Name not validly published:** no description. Age: late Campanian.

lata (Cookson and Eisenack, 1968, p.110; figs.1A–C) Bujak and Davies, 1983, p.161. Holotype: Cookson and Eisenack, 1968, fig.1A. Originally *Deflandrea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Age: ?Santonian–early Campanian.

minuta Marheinecke, 1992, p.91, pl.18, fig.12; text-fig.19. Holotype: Marheinecke, 1992, pl.18, fig.12; text-fig.19. Contrary to the opinion of Lentin and Williams (1993, p.411), Williams et al. (1998, p.387) considered this name to be validly published. Age: late early–early late Maastrichtian.

raijae (Kjellström, 1973, p.20–22, fig.16) Bujak and Davies, 1983, p.161. Holotype: Kjellström, 1973, fig.16. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Eurydinium*, fourthly (and now) *Manumiella*. Age: middle-late Maastrichtian.

rotunda Wilson, 1988, p.26, pl.16, figs.3a–c,4a–b. Holotype: Wilson, 1988, pl.16, figs.3a–c; Fensome et al., 1996, figs.1–3 — p.2335. Age: Paleocene.

**seelandica* (Lange, 1969, p.113–114, pl.2, fig.10; pl.3, fig.3) Bujak and Davies, 1983, p.162. Emendation: Firth, 1987, p.213–214, as *Manumiella seelandica*. Holotype: Lange, 1969, pl.3, fig.3; Fensome et al., 1995, fig.2 — p.1773. Originally *Broomea*, subsequently *Isabelia* (combination illegitimate), thirdly *Isabelidinium*, fourthly (and now) *Manumiella*. Taxonomic junior synonym: *Deflandrea* (as *Manumiella*) *druggii*, according to Firth (1987, p.213) — however Thorn et al. (2009, p.443) retained *Deflandrea* (as *Manumiella*) *druggii*. Age: Danian.

MATURODINIUM Morgenroth, 1970, p.353–354. Taxonomic senior synonym: *Dapcodinium*, according to Dörrhöfer and Davies (1980, p.23) — however, Lentin and Williams (1985, p.231) retained *Maturodinium*. Type: Morgenroth, 1970, pl.13, figs.5–6, as *Maturodinium inornatum*.

**inornatum* Morgenroth, 1970, p.354–355, pl.13, figs.5–8 (plate caption transposed with that of pl.12, fig.6). Holotype: Morgenroth, 1970, pl.13, figs.5–6; Fensome et al., 1993a, figs.1–2 — p.1237; figs.1–2 — p.1241. Originally (and now) *Maturodinium*, subsequently *Dapcodinium*. Lentin and Williams (1985, p.231) retained this species in *Maturodinium*. Age: late Pliensbachian.

subsp. *inornatum*. Autonym. Holotype: Morgenroth, 1970, pl.13, figs.5–6; Fensome et al., 1993a, figs.1–2 — p.1237; figs.1–2 — p.1241.

"var. *inornatum*". Autonym. Holotype: Morgenroth, 1970, pl.13, figs.5–6; Fensome et al., 1993a, figs.1–2 — p.1237; figs.1–2 — p.1241. **Now redundant.**

subsp. *reticulatum* (Below, 1987b, p.28, pl.7, figs.7–10,13,18; pl.8, figs.12–15) Lentin and Williams, 1989, p.235. Holotype: Below, 1987b, pl.7, figs.7–10,18; Fensome et al., 1993a, fig.3 — p.1237; figs.1–5 — p.1305. Originally *Maturodinium inornatum* var. *reticulatum*, subsequently (and now) *Maturodinium inornatum* subsp. *reticulatum*. Age: late Pliensbachian–Aalenian.

"var. *reticulatum*" Below, 1987b, p.28, pl.7, figs.7–10,13,18; pl.8, figs.12–15. Holotype: Below, 1987b, pl.7, figs.7–10,18; Fensome et al., 1993a, fig.3 — p.1237; figs.1–5 — p.1305. **NOW** *Maturodinium inornatum* subsp. *reticulatum*. Originally *Maturodinium inornatum* var. *reticulatum*, subsequently (and now) *Maturodinium inornatum* subsp. *reticulatum*. Age: late Pliensbachian–Aalenian.

MEIOUROGONYAULAX Sarjeant, 1966b, p.144. Taxonomic senior synonym: *Lithodinia*, according to Gocht (1975b, p.353) and Williams et al. (1993, p.54) — however, *Meiourogonyaulax* was retained by Riding and Helby (2001d, p.81,83). This name was not validly published in Sarjeant (1965, p.181), who did not provide a diagnosis. Type: Valensi, 1953, pl.12, figs.12–13, as *Gonyaulax* sp.

?*acanthosphaera* (Sarjeant, 1961a, p.94–95, pl.13, fig.14; text-fig.4) Sarjeant, 1976c, p.12. Emendation: Sarjeant, 1976c, p.12, as *Meiourogonyaulax?* *acanthosphaera*. Holotype: Sarjeant, 1961a, pl.13, fig.14; text-fig.4; Sarjeant, 1976c, pl.5, figs.2,4. Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Meiourogonyaulax*, fifthly (and now) *Meiourogonyaulax?*, sixthly *Lithodinia*, seventhly *Lithodinia?*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Questionable assignment: Sarjeant (1976c, p.12). Age: early Oxfordian.

amlasis Below, 1981a, p.58, pl.6, figs.14–15,16a–b. Holotype: Below, 1981a, pl.6, figs.16a–b; Fensome et al., 1991, figs.3–4 — p.567. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: Hauterivian.

araneosa Muir and Sarjeant, 1978, p.197–198, pl.1, fig.1; text-fig.1. Holotype: Muir and Sarjeant, 1978, pl.1, fig.1; text-fig.1. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Lithodinia?*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: middle Callovian.

baculata Mantle, 2009a, p.59, pl.14, figs.4a–b,5–6; text-fig.12C. Holotype: Mantle, 2009a, pl.14, figs.4a–b. Age: Callovian.

bathonica (Conway, 1978, p.349, pl.2, figs.4–5;7–8) Fensome and Williams, 2004, p.421. Holotype: Conway, 1978, pl.2, figs.4–5. Originally *Lithodinia*, subsequently (and now) *Meiourogonyaulax*. This combination was not validly published in Conway (1990, p.32) since that author did not fully reference the basionym. Age: late Bathonian.

bejui Zotto et al., 1987, p.199–202, pl.1, figs.1a–b,2a–c,3; text-figs.5a–c. Holotype: Zotto et al., 1987, pl.1, figs.1a–b. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: Kimmeridgian.

borealis Sarjeant, 1980b, p.123–124. Holotype: Sarjeant, 1972, pl.5, fig.3; text-fig.5, as *Meiourogonyaulax decapitata*. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Taxonomic junior synonym: *Lithodinia arktika*, according to Riley and Fenton (1982, p.200). Age: late Bathonian.

bulloidea (Cookson and Eisenack, 1960b, p.247, pl.37, fig.11; text-figs.4a–b) Sarjeant, 1969, p.14. Emendation: Riding and Helby, 2001g, p.206, as *Meiourogonyaulax bulloidea*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.11. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d,

p.81,83). Backhouse (1988, p.95) considered *Meiourogonyaulax stoveri* to be the possible taxonomic senior synonym of this species. Age: Tithonian.

callomonii Sarjeant, 1972, p.31–33, pl.5, fig.5; text-fig.6. Holotype: Sarjeant, 1972, pl.5, fig.5; text-fig.6. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: late Bathonian–early Callovian.

"?**cantrellii**" Sarjeant, 1972, p.37–38, pl.4, fig.3; pl.6, figs.1–2; text-fig.8. Holotype: Sarjeant, 1972, pl.4, fig.3; pl.6, figs.1–2; text-fig.8. **NOW** *Lanterna*. Originally *Meiourogonyaulax*?, subsequently *Lithodinia*?, thirdly *Lanterna*, fourthly and now *Lanterna*?. Questionable assignment: Sarjeant (1972, p.37). Age: late Bathonian.

caytonensis (Sarjeant, 1959, p.330–332, pl.13, fig.1; text-fig.1) Sarjeant, 1969, p.14. Holotype: Sarjeant, 1959, pl.13, fig.1; text-fig.1. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). This combination, as a questionable assignment, was not validly published in Sarjeant (1966b, p.146), since that author did not fully reference the basionym. Age: early Callovian.

cristulata (Sarjeant, 1959, p.332–334, pl.13, fig.2; text-fig.2) Sarjeant, 1969, p.14. Holotype: Sarjeant, 1959, pl.13, fig.2; text-fig.2. Originally *Gonyaulax*? (Appendix B), subsequently *Meiourogonyaulax*?, thirdly *Lithodinia*?, fourthly (and now) *Meiourogonyaulax*, fifthly *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Questionable assignment: Sarjeant (1969, p.14) — however, Stover and Evitt (1978, p.63) retained it in *Meiourogonyaulax* without question. This combination was not validly published in Sarjeant (1966b, p.146), since that author did not fully reference the basionym. Age: early Callovian.

"?**decapitata**" (Wetzel, 1967a, p.869, pl.16, figs.7a–b) Sarjeant, 1969, p.14. Emendation: Sarjeant, 1980b, p.121, as *Meiourogonyaulax decapitata*. Holotype: Wetzel, 1967a, pl.16, figs.7a–b; Sarjeant, 1980b, pl.3, figs.1–3; text-fig.3; Dietz et al., 1999, text-fig.5b. Originally *Gonyaulax* (Appendix B), subsequently *Meiourogonyaulax*, thirdly *Lithodinia*, fourthly *Meiourogonyaulax*?. Questionable assignment: Stover and Evitt (1978, p.63) as a problematic species. **Taxonomic senior synonym:** *Meiourogonyaulax* (as *Lithodinia*) *valensii*, according to Fenton (1981, p.253) and Williams et al. (1993, p.56). Age: Bajocian.

deflandrei Sarjeant, 1968, p.228–229, pl.1, fig.20; pl.3, fig.13; text-fig.4. Holotype: Sarjeant, 1968, pl.1, fig.20; text-fig.4. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: late Callovian.

diaphana Stevens, 1987, p.191–192, figs.4A–K,6A–B,7A–D. Holotype: Stevens, 1987, figs.4A–D,6A–B; Fensome et al., 1996, figs.1–3,9–10 — p.2111. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*?. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: early Berriasian.

"?**dicrypta**" Gitmez and Sarjeant, 1972, p.225–226, pl.7, fig.6; text-fig.22. Holotype: Gitmez and Sarjeant, 1972, pl.7, fig.6; text-fig.22. **NOW** *Escharisphaeridia*. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Meiourogonyaulax*?, fourthly *Canningia*?, fifthly (and now) *Escharisphaeridia*. Questionable assignment: Stover and Evitt (1978, p.63) as a problematic species. Age: early–late Kimmeridgian.

distincta Smith and Harding, 2004, p.363,365,367, pl.4, figs.1–5; pl.5, figs.7–11; text-figs.3,4a–d. Holotype: Smith and Harding, 2004, pl.4, figs.1–2. Age: early Valanginian.

ghermanii Beju, 1971, p.287–288, pl.4, figs.1–3; text-fig.4. Holotype: Beju, 1971, pl.4, fig.1; text-fig.4. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: Callovian–early Oxfordian.

insulofigurata Dodekova, 1975, p.21–22, pl.2, figs.4–5,7–8; text-figs.3a–c. Holotype: Dodekova, 1975, pl.2, figs.4–5. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Lithodinia*?. This species is

here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: late Bathonian.

maculata Backhouse, 1988, p.96, pl.32, figs.8,9a–b,10–11; text-figs.29A–B. Holotype: Backhouse, 1988, pl.32, figs.9a–b; text-figs.29A–B; Fensome et al., 1996, figs.2–3,6–7 — p.2217. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: early Barremian.

"membranacea" Wilson in Slimani, 2001a, p.193. **Name not validly published:** no description. **Taxonomic senior synonym:** *Membranigonyaulax wilsonii*, according to Slimani (2001a, p.193).

"mitra" Dürr, 1987, p.74,77, figs.3a–b; fig.4, nos.3–6; fig.6, nos.1–3,5. Holotype: Dürr, 1987, fig.4, no.3; Dürr, 1988, pl.1, fig.5. **NOW** *Semicavidinium*. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly (and now) *Semicavidinium*. N.I.A. Age: middle Kimmeridgian.

mombasaensis Mungai in Jiang Qinghua et al., 1992, p.87, pl.2, figs.1–2; text-figs.3a–c. Holotype: Jiang Qinghua et al., 1992, pl.2, fig.1. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: Kimmeridgian–Tithonian.

penitabulata Riding and Helby, 2001d, p.83,85,87, figs.11A–M,12A–I. Holotype: Riding and Helby, 2001d, figs.11I–J. Age: late Callovian.

pertusa (Duxbury, 1977, p.41–43, pl.8, fig.5; text-fig.15) Below, 1981a, p.57. Holotype: Duxbury, 1977, pl.8, fig.5; text-fig.15; Fensome et al., 1991, figs.1–3 — p.709; figs.1–3 — p.711. Originally *Lithodinia*, subsequently (and now) *Meiourogonyaulax*. This combination was not validly published in Fisher and Riley (1976, p.52), since these authors did not fully reference the basionym. Age: late Berriasian–early Hauterivian.

subsp. **heta** Below, 1981a, p.56–57, pl.3, figs.7a–b,8a–b; pl.11, fig.21; pl.14, figs.1–4; text-figs.59a–b,60. Holotype: Below, 1981a, pl.3, figs.8a–b; Fensome et al., 1991, figs.3–4 — p.647; figs.4–5 — p.709. Originally (and now) *Meiourogonyaulax heta* subsp. *pertusa*, subsequently *Lithodinia pertusa* subsp. *heta*. Age: Hauterivian.

subsp. **pertusa**. Autonym. Holotype: Duxbury, 1977, pl.8, fig.5; text-fig.15; Fensome et al., 1991, figs.1–3 — p.709; figs.1–3 — p.711. Originally (and now) *Meiourogonyaulax pertusa* subsp. *pertusa*, subsequently *Lithodinia pertusa* subsp. *pertusa*.

pila Gitmez and Sarjeant, 1972, p.226–227, pl.4, fig.5; pl.7, fig.3; text-fig.23. Holotype: Gitmez and Sarjeant, 1972, pl.4, fig.5; text-fig.23. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). N.I.A. Age: middle-late Kimmeridgian.

planoseptata Riding, 1987a, p.262, fig.9, nos.9–12; fig.13. Holotype: Riding, 1987a, fig.9, nos.9–10. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: early Callovian.

"?predae" Beju, 1971, p.288–289, pl.4, figs.4a–b,5–7; text-fig.5. Emendations: Drugg, 1978, p.64 and Below, 1990, p.45–46, both as *Carpathodinium predae*. Holotype: Beju, 1971, pl.4, figs.4a–b; text-fig.5; Eisenack and Kjellström, 1975b, p.792d; Fensome et al., 1995, figs.1–4 — p.1679. **NOW** *Carpathodinium*. Originally *Meiourogonyaulax?*, subsequently *Lithodinia?*, thirdly (and now) *Carpathodinium*. Questionable assignment: Beju (1971, p.288). Age: Callovian–early Oxfordian.

"protothymosa" Helby in Riding and Helby, 2001d, p.81. **Name not validly published:** no description. **Taxonomic senior synonym:** *Lithodinia protothymosa*, according to Riding and Helby (2001d, p.81).

psora Davey and Verdier, 1974, p.634,636, pl.92, figs.8–9. Holotype: Davey and Verdier, 1974, pl.92, fig.9. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). N.I.A. Age: Aptian.

reticulata Dodekova, 1975, p.22–23, pl.2, figs.11–13; text-fig.4. Holotype: Dodekova, 1975, pl.2, figs.11–12. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: late Bathonian.

?rioultii Sarjeant, 1965, p.181, pl.1, fig.1; text-fig.1 ex Sarjeant, 1968, p.229. Holotype: Sarjeant, 1965, pl.1, fig.1. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly (and now) *Meiourogonyaulax?*, fourthly *Lithodinia?*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Questionable assignment: Stover and Evitt (1978, p.63) as a problematic species. This name was not validly published in Sarjeant (1965, p.181) since the genus *Meiourogonyaulax* was not validly published until 1966. Age: early Callovian.

"sagena" (Duxbury, 1980, p.127, pl.3, figs.6,9,12–13) Lentin and Williams, 1981, p.182. Emendation: Harding, 1990b, p.35, as *Meiourogonyaulax sagena*. Holotype: Duxbury, 1980, pl.3, figs.6,9,12. **NOW** *Ellipsoidictyum*. Originally *Lithodinia*, subsequently *Meiourogonyaulax*, thirdly (and now) *Ellipsoidictyum*. N.I.A. Age: middle-late Barremian.

spongiosa Smelror, 1987, p.230,232, figs.5A–G; text-fig.3. Holotype: Smelror, 1987, fig.5B. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: late Callovian.

"staffinensis" Gitmez, 1970, p.276–278, pl.3, fig.1; text-figs.20A–B. Emendation: Poulsen and Riding, 1992, p.26, as *Ambonosphaera? staffinensis*. Holotype: Gitmez, 1970, pl.3, fig.1; text-figs.20A–B; Poulsen and Riding, 1992, pl.1, fig.6; text-figs.1A–B. **NOW** *Ambonosphaera?*. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Polygonifera*, fourthly (and now) *Ambonosphaera?*, fifthly *Lithodinia?*. Taxonomic junior synonyms: *Senoniasphaera? frisia*, according to Poulsen and Riding (1992, p.26); *Hexagonifera* (now *Senoniasphaera*) *jurassica*, according to Williams et al. (1993, p.32) — however, elsewhere in the same publication, Williams et al. (1993, p.56) retained *Hexagonifera* (now *Senoniasphaera*) *jurassica*. Age: early Kimmeridgian.

stoveri Millioud, 1969, p.429, pl.3, figs.1–3. Holotype: Millioud, 1969, pl.3, figs.1–2. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Backhouse (1988, p.95) considered *Gonyaulax* (as and now *Meiourogonyaulax*) *bulloidea* to be the possible taxonomic senior synonym of this species. Age: early Hauterivian–early Aptian.

straussii Mantle and Riding, 2012, p.57–58,61, pl.1, figs.1–16. Holotype: Mantle and Riding, 2012, pl.1, figs.5–6. Age: late Bajocian–early Bathonian.

strongyla Sarjeant, 1972, p.35–37, pl.4, fig.7; text-fig.7. Holotype: Sarjeant, 1972, pl.4, fig.7; text-fig.7. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Lithodinia?*. This species was retained in *Meiourogonyaulax* by Fensome and Williams (2004, p.424) following the retention of the genus by Riding and Helby (2001d, p.81,83). Sarjeant (1972) cited the epithet as "*strongylos*", the Greek adjective for rounded. Since Principle 5 of the I.C.N. states that taxon names are to be treated as Latin, this epithet should be rendered as "*strongyla*", in agreement with the feminine gender of the generic name ("*strongylum*" would be the neuter form, and "*strongylus*" the masculine form). Age: Bathonian.

superornata (Wetzel, 1967a, p.869–870, pl.16, figs.8a–b) Sarjeant, 1969, p.15. Emendation: Sarjeant, 1980b, p.124–125, as *Meiourogonyaulax superornata*. Holotype: Wetzel, 1967a, pl.16, figs.8a–b; Sarjeant, 1980b, pl.1, figs.2–3; text-fig.4; Dietz et al., 1999, text-fig.5c. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Gonyaulacysta?*, fourthly *Lithodinia*, fifthly *Lithodinia?*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Age: late Bathonian.

**valensii* Sarjeant, 1966b, p.145–146, pl.15, fig.7; text-fig.37. Holotype: Valensi, 1953, pl.2, figs.12–13 (as *Gonyaulax* sp.); Sarjeant, 1966b, pl.15, fig.7; text-fig.37. Originally (and now) *Meiourogonyaulax*, subsequently *Lithodinia*. This species is here retained in *Meiourogonyaulax* following the retention of the genus by Riding and Helby (2001d, p.81,83). Taxonomic junior synonym: *Lithodinia decapitata*, according to Fenton (1981, p.253) and Williams et al. (1993, p.56). Age: Bathonian.

viriosa Riding and Helby, 2001d, p.87,89, figs.13A–L. Holotype: Riding and Helby, 2001d, figs.13K. Age: late Callovian.

MELITASPHAERIDIUM Harland and Hill, 1979, p.38–39. Type: Deflandre and Cookson, 1955, text-figs.23–26, as *Hystrichosphaeridium choanophorum*.

"*aequabile*" Matsuoka, 1983b, p.114–115, pl.3, figs.7a–b,8a–b,9a–b; pl.4, figs.3a–c; text-figs.9A–B. Holotype: Matsuoka, 1983b, pl.3, figs.7a–b. **Taxonomic senior synonym:** *Melitasphaeridium choanophorum*, according to Harland, Head and Wrenn in Head and Wrenn (1992, p.10). Age: late Miocene.

angustum Matsuoka, 1983b, p.115–116, pl.3, figs.6a–b; pl.4, figs.1a–b,2a–b,4. Holotype: Matsuoka, 1983b, pl.4, figs.2a–b. Age: Pliocene–early Pleistocene.

asterium (Eaton, 1976, p.273, pl.11, figs.7–10) Bujak et al., 1980, p.30. Holotype: Eaton, 1976, pl.11, figs.7–8; Bujak et al., 1980, pl.2, fig.3. Originally *Hystrichosphaeridium*, subsequently (and now) *Melitasphaeridium*. Age: middle Eocene (see Aubry, 1986).

**choanophorum* (Deflandre and Cookson, 1955, p.271–272; text-figs.23–29) Harland and Hill, 1979, p.39. Emendation: Harland and Hill, 1979, p.39,41, as *Melitasphaeridium choanophorum*. Holotype: Deflandre and Cookson, 1955, text-figs.23–26; Fensome et al., 1993a, figs.1–4 — p.1055. Originally *Hystrichosphaeridium*, subsequently (and now) *Melitasphaeridium*. Taxonomic junior synonym: *Melitasphaeridium aequabile*, according to Harland, Head and Wrenn in Head and Wrenn (1992, p.10). Age: Pliocene.

var. *choanophorum*. Autonym. Holotype: Deflandre and Cookson, 1955; text-figs.23–26; Fensome et al., 1993a, figs.1–4 — p.1055.

var. *reductum* Strauss and Lund, 1992, p.165–166, pl.2, figs.12–14; text-fig.2. Holotype: Strauss and Lund, 1992, pl.2, figs.13–14. Age: middle Miocene.

pseudorecurvatum (Morgenroth, 1966a, p.30–31, pl.8, figs.5–6) Bujak et al., 1980, p.30. Holotype: Morgenroth, 1966a, pl.8, fig.5. Originally *Hystrichosphaeridium*, subsequently *Operculodinium*, thirdly (and now) *Melitasphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium sheppeyense*, according to Stover and Evitt (1978, p.179). Age: early Eocene.

?*simpulum* Islam, 1983a, p.241, pl.3, figs.10–11. Holotype: Islam, 1983a, pl.3, fig.11. Questionable assignment: Islam (1983a, p.241). Age: early Eocene.

?*variabile* He Chengquan, 1991, p.170–171, pl.59, fig.4. Holotype: He Chengquan, 1991, pl.59, fig.4. Questionable assignment: He Chengquan (1991, p.170). Age: middle Eocene.

MELODOMUNCULA Versteegh, 1993, p.371. Emendation: Streng et al., 2009, p.232. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1300). Type: Versteegh, 1993, pl.6, figs.1–3,7, as *Melodomuncula berlinensis*.

**berlinensis* Versteegh, 1993, p.371,372, pl.6, figs.1–7; text-figs.7A–D. Holotype: Versteegh, 1993, pl.6, figs.1–3,7. Age: late Pleistocene.

MEMBRANIGONYAULAX Slimani, 1994, p.19. Type: Slimani, 1994, pl.2, figs.17–18; text-figs.5A–B, as *Membranigonyaulax wilsonii*.

granulata Slimani, 1994, p.20–21, pl.2, figs.1–9. Holotype: Slimani, 1994, pl.2, figs.1–2. Age: early Campanian–early Maastrichtian.

prominenseptata Slimani, 1994, p.21–22, pl.2, figs.13–14,21–23. Holotype: Slimani, 1994, pl.2, figs.21–23. Age: late Campanian.

***wilsonii** Slimani, 1994, p.22–23, pl.2, figs.10–12,17–18,36–37; text-figs.5A–B. Holotype: Slimani, 1994, pl.2, figs.17–18; text-figs.5A–B. Taxonomic junior synonyms: *Meiourogonyaaulax membranacea* (name not validly published), according to Slimani (2001a, p.193); *Microdinium? sincfalense*, according to Slimani and Louwye (2012, p.110,113). Age: early Campanian–early Maastrichtian.

MEMBRANILARNACIA Eisenack, 1963a, p.99. Emendation: Williams and Downie, 1966c, p.219. Taxonomic senior synonym: *Membranilarnax*, by implication in Downie and Sarjeant (1965, p.130) who questionably transferred the "type species" of *Membranilarnax*, *Membranilarnax pterospermoides*, to *Membranilarnacia* — however, Lentin and Williams (1973, p.92) retained *Membranilarnax*. Type: Cookson and Eisenack, 1958, pl.10, fig.9, as *Membranilarnax leptoderma*.

"**amalthei**" Wetzel, 1966, p.318, pl.31, fig.6. Emendation: Sarjeant, 1980b, p.117–118, as *Scriniodinium amalthei*. Holotype: Wetzel, 1966, pl.31, fig.6. **NOW** *Scriniodinium?*. Originally *Membranilarnacia*, subsequently *Membranilarnacia?*, thirdly *Scriniodinium*, fourthly *Endoscrinium*, fifthly (and now) *Scriniodinium?*. Questionable assignment: Stover and Evitt (1978, p.64) and Jan du Chêne et al. (1986a, p.317). Age: late Pliensbachian.

angustivela (Deflandre and Cookson, 1955, p.290, pl.7, figs.4–5) McMinn, 1988, p.150. Holotype: Deflandre and Cookson, 1955, pl.7, fig.4; McMinn, 1988, fig.8C. Originally *Membranilarnax*, subsequently *Samlandia*, thirdly (and now) *Membranilarnacia*. Taxonomic junior synonym: *Samlandia solida* (name not validly published), according to May (1980, p.24) — however, see discussion under *Samlandia solida*. Age: Eocene.

australis (Pöthe de Baldis, 1966, p.225, pl.1, fig.h) Eisenack and Kjellström, 1972, p.797. Holotype: Pöthe de Baldis, 1966, pl.1, fig.h. Originally *Membranilarnax*, subsequently *Cyclonephelium*, thirdly *Membranilarnacia*, fourthly (and now) *Membranilarnacia?*. Questionable assignment: Stover and Evitt (1978, p.64). Age: Early Tertiary.

"**characta**" (Tasch in Tasch et al., 1964, p.192, pl.1, fig.20) Eisenack and Kjellström, 1972, p.799. Holotype: Tasch et al., 1964, pl.1, fig.20. Originally *Membranilarnax*, subsequently *Membranilarnacia?*. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnetacean zygospore species, according to Pierce (1976, p.27). Questionable assignment: Eisenack and Kjellström (1972, p.799). Age: Albian.

choneta Xu Jinli et al., 1997, p.111, pl.10, figs.3–9 ex He Chengquan et al. 2009, p.352–353,656–657. Holotype: Xu Jinli et al., 1997, pl.10, fig.3. The name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided: He Chengquan et al. (2009, p.657) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

compressa Bujak, 1994, p.127, pl.3, figs.5–6. Holotype: Bujak, 1994, pl.3, figs.5–6. Age: Ypresian.

"**delicata**" Kar, 1979, p.35, pl.4, figs.70–71. Holotype: Kar, 1979, pl.4, fig.70. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Polysphaeridium*) *zoharyi*, according to Jain and Garg (1991, p.82). Taxonomic senior synonym: *Hystrichosphaeridium* (as *Operculodinium*) *centrocarpum*, according to Jain (1980, p.140) — however, *Membranilarnacia delicata* is now considered a taxonomic junior synonym of *Hystrichosphaeridium* (now *Polysphaeridium*) *zoharyi*. Age: Oligocene.

"*densa*" Cookson and Eisenack, 1974, p.71, pl.25, fig.19; pl.29, fig.19. Holotype: Cookson and Eisenack, 1974, pl.25, fig.19. **Taxonomic senior synonym:** *Membranilarnax* (as *Valensiella?*) *clathroderma*, according to Stover and Evitt (1978, p.64). Age: late Eocene.

"*diktyophora*" Agelopoulos, 1967, p.49–50, pl.12, figs.3–4,6. Holotype: Agelopoulos, 1967, pl.12, fig.4. **Taxonomic senior synonym:** *Cannosphaeropsis* (now *Eatonicysta*) *ursulae*, according to Eaton (1976, p.277). Lachkar and Masure in Fauconnier and Masure (2004, p.389) considered this to be a problematic species, but apparently also accepted the synonymy cited above. Age: late Eocene.

"*donaensis*" Saxena and Rao, 1984, p.55, pl.1, figs.8–9. Holotype: Saxena and Rao, 1984, pl.1, fig.8. **Taxonomic senior synonym:** *Pterospermopsis* (as and now *Tuberculodinium*) *vancampoae*, according to Jain and Garg (1990, p.108). Age: early Miocene.

fibrosa Jiabo, 1978, p.91–92, pl.28, figs.1–12. Holotype: Jiabo, 1978, pl.28, fig.1. Age: Early Tertiary.

"*?formosa*" (Tasch in Tasch et al., 1964, p.192, pl.1, fig.23) Eisenack and Kjellström, 1972, p.801. Holotype: Tasch et al., 1964, pl.1, fig.23. Originally *Membranilarnax*, subsequently *Membranilarnacia?*. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnematacean zygosporic species, according to Pierce (1976, p.27). Questionable assignment: Eisenack and Kjellström (1972, p.801). Age: Albian.

"*?gigantea*" (Tasch in Tasch et al., 1964, p.192, pl.2, fig.13) Eisenack and Kjellström, 1972, p.803. Holotype: Tasch et al., 1964, pl.2, fig.13. Originally *Membranilarnax*, subsequently *Membranilarnacia?*. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnematacean zygosporic species, according to Pierce (1976, p.27). Questionable assignment: Eisenack and Kjellström (1972, p.803). Age: Albian.

glabra Agelopoulos, 1967, p.47–49, pl.12, fig.5; pl.13, figs.2–9; text-fig.6. Holotype: Agelopoulos, 1967, pl.12, fig.5; text-fig.6. Age: late Eocene.

hapala (Schjøler and Wilson, 1993, p.346–347, pl.2, figs.1–7; text-figs.12a–b) Lachkar and Masure in Fauconnier and Masure, 2004, p.387. Holotype: Schjøler and Wilson, 1993, pl.2, fig.6. Originally *Eatonicysta*, subsequently (and now) *Membranilarnacia*. This name (not as a new combination, formal or proposed, attributed to an unpublished thesis) was not validly published in Slimani (2001a, p.192). Age: late Campanian–early Maastrichtian.

**leptoderma* (Cookson and Eisenack, 1958, p.50–51, pl.10, figs.7,9) Eisenack, 1963a, p.101. Holotype: Cookson and Eisenack, 1958, pl.10, fig.9; Fauconnier and Masure, 2004, pl.54, fig.1. Originally *Membranilarnax*, subsequently (and now) *Membranilarnacia*. Age: Albian.

"*?liradiscoides*" (Wetzel, 1933b, p.52–53, pl.6, figs.3a–b) Downie and Sarjeant, 1965, p.129. Emendation: Marheinecke, 1992, p.116, as *Membranilarnax liradiscoides*. Holotype: not designated. Lectotype: Wetzel, 1933b, pl.6, fig.3a (specimen to right), designated by Lentin and Williams (1989, p.239). **NOW** *Membranilarnax*. Originally (and now) *Membranilarnax*, subsequently *Membranilarnacia*, thirdly *Membranilarnacia?*. Questionable assignment: Stover and Evitt (1978, p.64) as a problematic species. Age: Late Cretaceous.

?marina (Kufferath, 1950, p.34; text-fig.40) Downie and Sarjeant, 1965, p.129. Holotype: Kufferath, 1950, text-fig.40. Originally *Membranilarnax*, subsequently (and now) *Membranilarnacia?*. Questionable assignment: Downie and Sarjeant (1965, p.129); and Lachkar and Masure in Fauconnier and Masure (2004, p.389) as a problematic species. Age: Holocene.

?minuta de Coninck, 1969, p.43, pl.12, figs.13–14. Holotype: de Coninck, 1969, pl.12, figs.13–14; Fauconnier and Masure, 2004, pl.54, figs.8–9. Originally *Membranilarnacia*, subsequently (and now) *Membranilarnacia?*. Questionable assignment: Stover and Evitt (1978, p.64). Age: early Eocene.

"*multifibrata*" Wilson in Slimani, 1994, p.114. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Membranilarnacia polycladiata*, according to Slimani (2001a, p.193).

?*ovalis* Cookson and Eisenack, 1974, p.72, pl.29, fig.21. Holotype: Cookson and Eisenack, 1974, pl.29, fig.21; Fauconnier and Masure, 2004, pl.54, fig.7. Originally *Membranilarnacia*, subsequently (and now) *Membranilarnacia*?. Questionable assignment: Stover and Evitt (1978, p.64). Age: Senonian.

paucitubata He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.52, pl.22, figs.15–17. Holotype: He Chengquan et al., 1989, pl.22, fig.15. Taxonomic junior synonym: *Membranilarnacia biornata*, according to Mao Shaozhi et al. (1995, p.44) — however, He Chengquan et al. (2009, p.366) retained that species as *Songiella biornata*. Age: Early Tertiary.

pellucida Yu Jingxian and Zhang Wangping, 1980, p.110, pl.3, figs.14–15. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.3, fig.14. Age: Cenomanian–early Turonian.

?*picena* Biffi and Manum, 1988, p.190,192, pl.7, figs.1–3,5–7,9,12. Emendation: Zevenboom and Santarelli in Zevenboom, 1995, p.151, as *Ectosphaeridium picenum*. Holotype: Biffi and Manum, 1988, pl.7, figs.1,5,9,12; Fauconnier and Masure, 2004, pl.54, figs.12–13. Originally (and now) *Membranilarnacia*, subsequently *Ectosphaeridium* (combination not validly published). Questionable assignment: Biffi and Manum (1988, p.192). Age: early Miocene.

?*pirus* (Deunff, 1959, p.35–36, pl.10, figs.90–93) Downie and Sarjeant, 1965, p.130. Holotype: Deunff, 1959, pl.10, fig.93. Originally *Membranilarnax*?, subsequently (and now) *Membranilarnacia*?. Questionable assignment: Downie and Sarjeant (1965, p.130); and Lachkar and Masure in Fauconnier and Masure (2004, p.389) as a problematic species. This species probably represents acritarchs. N.I.A. Age: Ordovician (Caradoc).

polycladiata Cookson and Eisenack in Eisenack, 1963a, p.100. Holotype: Cookson and Eisenack, 1958, p.51, pl.10, fig.8, as *Membranilarnax* sp. Taxonomic junior synonym: *Membranilarnacia multifibrata* (name not validly published), according to Slimani (2001a, p.193). Age: Albian.

pterococcoides (Wetzel, 1933b, p.53, pl.6, fig.4) Eisenack, 1963a, p.102. Emendation: Sarjeant, 1985b, p.154–155, as *Eatonicysta pterococcoides*. Holotype: Wetzel, 1933b, pl.6, fig.4; Sarjeant, 1985b, pl.4, figs.3,6 (not 1–2); Dietz et al., 1999, fig.10, no.3. Originally *Membranilarnax*, subsequently (and now) *Membranilarnacia*, thirdly *Membranilarnacia*?, fourthly *Eatonicysta*. This species was retained in *Membranilarnacia* without question by Lachkar and Masure in Fauconnier and Masure (2004, p.388). Questionable assignment: Stover and Evitt (1978, p.64) as a problematic species. Age: Senonian.

"?subsp. *minuta*" (Rozen, 1965, p.312–313, pl.2, figs.4–5; text-figs.23–24) Lentin and Williams, 1973, p.92. **Name not validly published**; holotype not designated. Originally *Membranilarnacia pterococcoides* var. *minuta* (name not validly published) subsequently *Membranilarnacia pterococcoides* subsp. *minuta* (name not validly published), thirdly *Eatonicysta pterococcoides* subsp. *minuta* (name not validly published), fourthly *Membranilarnacia pterococcoides*? subsp. *minuta*. Questionable assignment: Lachkar and Masure in Fauconnier and Masure (2004, p.389) as a problematic taxon. Age: late Eocene.

"var. *minuta*" Rozen, 1965, p.312–313, pl.2, figs.4–5; text-figs.23–24. **Name not validly published**: holotype not designated. Originally *Membranilarnacia pterococcoides* var. *minuta* (name not validly published), subsequently *Membranilarnacia pterococcoides* subsp. *minuta* (name not validly published), thirdly *Eatonicysta pterococcoides* subsp. *minuta* (name not validly published). Age: late Eocene.

"?*pterospermoides*" (Wetzel, 1933b, p.52, pl.6, figs.1–2) Downie and Sarjeant, 1965, p.130. Emendation: Sarjeant, 1985b, p.152, as *Membranilarnax pterospermoides*. Holotype: Wetzel, 1933b, pl.6, fig.2 (not fig.1); Sarjeant, 1985b, pl.6, figs.3–4; Fensome et al., 1995, fig.1 — p.1715. **Combination illegitimate**: this is the "type species" of the senior name *Membranilarnax*. **NOW** *Membranilarnax*. Originally (and now) *Membranilarnax*, subsequently *Membranilarnacia*? (combination illegitimate). Questionable assignment: Downie and Sarjeant (1965, p.130). Age: Late Cretaceous.

regulata (Jiabo, 1978, p.78, pl.27, figs.1–2) He Chengquan et al., 2009, p.354. Holotype: Jiabo, 1978, pl.27, fig.1. Originally *Cyclonephelium*, subsequently *Membranophoridium*?, thirdly (and now) *Membranilarnacia*. Age: Early Tertiary.

"reticulata" Williams and Downie, 1966c, p.220–221, pl.24, figs.4,6; text-fig.59. Holotype: Williams and Downie, 1966c, pl.24, fig.4; Bujak et al., 1980, pl.10, figs.3–4. **Taxonomic senior synonym:** *Cannosphaeropsis* (now *Eatonicysta*) *ursulae*, according to de Coninck (1969, p.43) and Gocht (1969, p.65). Lachkar and Masure in Fauconnier and Masure (2004, p.390) considered this to be a problematic species, but apparently also accepted the synonymy cited above. Age: early Eocene.

"reticulovata" (Tasch in Tasch et al., 1964, p.192, pl.2, fig.3) Eisenack and Kjellström, 1972, p.811. Holotype: Tasch et al., 1964, pl.2, fig.3. Originally *Membranilarnax*, subsequently *Membranilarnacia*. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnematacean zygospore species, according to Pierce (1976, p.27). Age: Albian.

scabra Jiabo, 1978, p.92, pl.27, fig.13. Holotype: Jiabo, 1978, pl.27, fig.13. Age: Early Tertiary.

?tenella Morgenroth, 1968, p.554–555, pl.48, figs.2–4. Holotype: Morgenroth, 1968, pl.48, figs.2–3. Originally *Membranilarnacia*, subsequently (and now) *Membranilarnacia*?. Questionable assignment: Stover and Evitt (1978, p.64). Age: Danian.

?tenera de Coninck, 1975, p.93–94, pl.17, figs.2–3. Holotype: de Coninck, 1975, pl.17, fig.2; Fauconnier and Masure, 2004, pl.54, fig.6. Originally *Membranilarnacia*, subsequently (and now) *Membranilarnacia*?. Questionable assignment: Stover and Evitt (1978, p.64). Age: Ypresian.

"ursulae" (Morgenroth, 1966a, p.20, pl.3, figs.11–12) de Coninck, 1969, p.43. Holotype: Morgenroth, 1966a, pl.3, fig.11; Eisenack and Kjellström, 1972, figure to left — p.143; Fensome et al., 1995, fig.1 — p.1865. **NOW** *Eatonicysta*. Originally *Cannosphaeropsis*, subsequently *Membranilarnacia*, thirdly (and now) *Eatonicysta*. Taxonomic junior synonyms: *Membranilarnacia diktyophora*, according to Eaton (1976, p.277); *Membranilarnacia reticulata*, according to de Coninck (1969, p.43) and Gocht (1969, p.65). Age: early Eocene.

variata (Jiabo, 1978, p.78–79, pl.27, figs.6–10) He Chengquan et al., 2009, p.355. Holotype: Jiabo, 1978, pl.27, fig.6. Originally *Cyclonephelium*, subsequently *Membranophoridium*, thirdly (and now) *Membranilarnacia*. Age: Early Tertiary.

?wetzeli Cookson and Eisenack, 1982, p.46, pl.5, fig.3. Holotype: Cookson and Eisenack, 1982, pl.5, fig.3. Originally *Membranilarnacia*, subsequently *Membranilarnacia*?. Questionable assignment: Lachkar and Masure in Fauconnier and Masure (2004, p.390) as a problematic species; these authors recommended that the name be restricted to the type material. Age: Albian–Cenomanian.

wilsonii Pearce, 2010, p.66, pl.5, figs.1–3. Holotype: Pearce, 2010, pl.5, figs.1–3. Age: early Coniacian–early Campanian.

MEMBRANILARNAX Wetzel, 1933b, p.51. Emendation: Sarjeant, 1985b, p.149,151–152. Taxonomic junior synonym: *Membranilarnacia*, by implication in Downie and Sarjeant (1965, p.130) who questionably transferred the "type species" of *Membranilarnax*, *Membranilarnax pterospermoides*, to *Membranilarnacia* — however, Lentin and Williams (1973, p.93) retained *Membranilarnacia*. Stover and Evitt (1978, p.295) considered *Membranilarnax* to be an acritarch genus. Sarjeant (1985b, p.149,151–152) considered *Membranilarnax* to be a skolochorate dinoflagellate cyst. This name was not validly published in Wetzel (1932, p.136), since that author did not provide a description or designate a type, the latter being a requirement at that time under the I.C.Z.N. Type: Wetzel, 1933b, pl.6, fig.2, as *Membranilarnax pterospermoides*.

"amandopolitana" Valensi, 1955b, p.590, pl.2, fig.7; pl.5, fig.2. Holotype: Valensi, 1955b, pl.2, fig.7. **NOW** *Valensiella*?. Originally *Membranilarnax*, subsequently *Favilarnax*, thirdly *Valensiella*, fourthly (and now) *Valensiella*?. Age: Middle Jurassic.

"angustivela" Deflandre and Cookson, 1955, p.290, pl.7, figs.4–5. Holotype: Deflandre and Cookson, 1955, pl.7, fig.4; McMinn, 1988, fig.8C. **NOW** *Membranilarnacia*. Originally *Membranilarnax*, subsequently *Samlandia*,

thirdly (and now) *Membranilarnacia*. Taxonomic junior synonym: *Samlandia solida* (name not validly published), according to May (1980, p.24) — however, see discussion under *Samlandia solida*. Age: Eocene.

"*australis*" Pöthe de Baldis, 1966, p.225, pl.1, fig.h. Holotype: Pöthe de Baldis, 1966, pl.1, fig.h. **NOW** *Membranilarnacia*?. Originally *Membranilarnax*, subsequently *Cyclonephelium*, thirdly *Membranilarnacia*, fourthly (and now) *Membranilarnacia*?. Age: Early Tertiary.

"*characta*" Tasch in Tasch et al., 1964, p.192, pl.1, fig.20. Holotype: Tasch et al., 1964, pl.1, fig.20. Originally *Membranilarnax*, subsequently *Membranilarnacia*?. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnematacean zygospore species, according to Pierce (1976, p.27). Age: Albanian.

"*clathroderma*" Deflandre and Cookson, 1955, p.290, pl.7, fig.6; text-fig.51. Holotype: Deflandre and Cookson, 1955, pl.7, fig.6. **NOW** *Valensiella*?. Originally *Membranilarnax*, subsequently *Valensiella*, thirdly (and now) *Valensiella*?. Taxonomic junior synonym: *Membranilarnacia densa*, according to Stover and Evitt (1978, p.64). N.I.A. Age: ?early Eocene.

"*formosa*" Tasch in Tasch et al., 1964, p.192, pl.1, fig.23. Holotype: Tasch et al., 1964, pl.1, fig.23. Originally *Membranilarnax*, subsequently *Membranilarnacia*?. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnematacean zygospore species, according to Pierce (1976, p.27). Age: Albanian.

"*gigantea*" Tasch in Tasch et al., 1964, p.192, pl.2, fig.13. Holotype: Tasch et al., 1964, pl.2, fig.13. Originally *Membranilarnax*, subsequently *Membranilarnacia*?. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnematacean zygospore species, according to Pierce (1976, p.27). Age: Albanian.

"*leptoderma*" Cookson and Eisenack, 1958, p.50–51, pl.10, figs.7,9. Holotype: Cookson and Eisenack, 1958, pl.10, fig.9; Fauconnier and Masure, 2004, pl.54, fig.1. **NOW** *Membranilarnacia*. Originally *Membranilarnax*, subsequently (and now) *Membranilarnacia*, thirdly *Membranilarnacia*?. Age: Albanian.

liradisoides Wetzel, 1933b, p.52–53, pl.6, figs.3a–b. Emendation: Marheinecke, 1992, p.116, as *Membranilarnax liradisoides*. Holotype: not designated. Lectotype: Wetzel, 1933b, pl.6, fig.3a (specimen to right), designated by Lentin and Williams (1989, p.239). Originally (and now) *Membranilarnax*, subsequently *Membranilarnacia*, thirdly *Membranilarnacia*?. Marheinecke (1992, p.116) retained this species in *Membranilarnax*. Age: Late Cretaceous.

"forma *gulpensis*" de Wit, 1943, p.384–385, text-figs.12a–b. Holotype: not designated. **NOW** *Membranilarnax liradisoides* subsp. *gulpensis*. Originally *Membranilarnax liradisoides* forma *gulpensis*, subsequently (and now) *Membranilarnax liradisoides* subsp. *gulpensis*. Age: late Senonian.

subsp. *gulpensis* (de Wit, 1943, p.384–385; text-figs.12a–b) Lentin and Williams, 1993, p.420. Holotype: not designated. Originally *Membranilarnax liradisoides* forma *gulpensis*, subsequently (and now) *Membranilarnax liradisoides* subsp. *gulpensis*. Age: late Senonian.

"forma *liradisoides*". Autonym. Holotype: Wetzel, 1933b, pl.6, figs.3a–b (four specimens illustrated). Lectotype: Wetzel, 1933b, pl.6, fig.3a (specimen to right), designated by Lentin and Williams (1989, p.239). **Now redundant.**

subsp. *liradisoides*. Autonym. Holotype: Wetzel, 1933b, pl.6, figs.3a–b (four specimens illustrated). Lectotype: Wetzel, 1933b, pl.6, fig.3a (specimen to right), designated by Lentin and Williams (1989, p.239).

"*marina*" Kufferath, 1950, p.34; text-fig.40. Holotype: Kufferath, 1950, text-fig.40. **NOW** *Membranilarnacia*?. Originally *Membranilarnax*, subsequently (and now) *Membranilarnacia*?. Age: Holocene.

"*ovulum*" Deflandre, 1947d, p.9–10; text-figs.22–23. Emendation: Courtinat, 1989, p.183, as *Valensiella ovulum*. Holotype: Deflandre, 1947d, text-fig.22; Eisenack and Kjellström, 1972, figure to left — p.1095; Fensome et al., 1995, fig.1 — p.1633. **NOW** *Valensiella*. Originally *Membranilarnax*, subsequently *Favilarnax*, thirdly (and now) *Valensiella*. N.I.A. Age: Bajocian.

"?pirus" Deunff, 1959, p.35–36, pl.10, figs.90–93. Holotype: Deunff, 1959, pl.10, fig.93. **NOW** *Membranilarnacia*?. Originally *Membranilarnax*?, subsequently (and now) *Membranilarnacia*?. Questionable assignment: Deunff (1959, p.35). N.I.A. Age: Ordovician (Caradoc).

"*pterococcoides*" Wetzel, 1933b, p.53, pl.6, fig.4. Emendation: Sarjeant, 1985b, p.154–155, as *Eatonicysta pterococcoides*. Holotype: Wetzel, 1933b, pl.6, fig.4; Sarjeant, 1985b, pl.4, figs.3,6 (not 1–2); Dietz et al., 1999, fig.10, no.3. **NOW** *Membranilarnacia*. Originally *Membranilarnax*, subsequently (and now) *Membranilarnacia*, thirdly *Membranilarnacia*?, fourthly *Eatonicysta*. Age: Senonian.

**pterospermoides* Wetzel, 1933b, p.52, pl.6, figs.1–2. Emendation: Sarjeant, 1985b, p.152, as *Membranilarnax pterospermoides*. Holotype: Wetzel, 1933b, pl.6, fig.2 (not fig.1); Sarjeant, 1985b, pl.6, figs.3–4; Fensome et al., 1995, fig.1 — p.1715. Originally (and now) *Membranilarnax*, subsequently *Membranilarnacia*? (combination illegitimate). Wetzel (1933b, p.52) gave the citation for the holotype as his pl.6, fig.1. However, Sarjeant in Lentin and Williams (1989, p.240) noted that the preparation number for the holotype given in the text, the preparation number for pl.6, fig.2 and the preparation marked "holotype: *Membranilarnax pterospermoides*" are all the same. Age: Late Cretaceous.

"*reticulovata*" Tasch in Tasch et al., 1964, p.192, pl.2, fig.3. Holotype: Tasch et al., 1964, pl.2, fig.3. Originally *Membranilarnax*, subsequently *Membranilarnacia*. **Taxonomic senior synonym:** *Schizosporis reticulata* Cookson and Dettmann, 1959, a zygnematacean zygospore species, according to Pierce (1976, p.27). Age: Albanian.

MEMBRANOPHORIDIUM Gerlach, 1961, p.198–199. Emendation: Stover and Evitt, 1978, p.64–65. Taxonomic senior synonym: *Chiropteridium*, according to Brosius (1963, p.47) and Schindler (1992, p.202) — however, Lentin and Williams (1993, p.421) retained *Membranophoridium*. Type: Gerlach, 1961, pl.29, fig.7, designated by Gocht (1969, p.61) as a lectotype of *Membranophoridium aspinatum*.

**aspinatum* Gerlach, 1961, p.199–201, pl.29, figs.7–8. Holotype: designated by Gerlach (1961), but not clearly related to an illustration. Lectotype: Gerlach, 1961, pl.29, fig.7; Fensome et al., 1993a, fig.1 — p.945; designated by Gocht (1969, p.61). Originally (and now) *Membranophoridium*, subsequently *Chiropteridium*. Age: middle Oligocene.

attadalicum Cookson and Eisenack, 1982, p.46, pl.6, fig.21. Holotype: Cookson and Eisenack, 1982, pl.6, fig.21. Age: early Cenomanian.

bilobatum Michoux, 1985, p.145–146, pl.2, figs.8,11; pl.3, figs.9–10. Holotype: Michoux, 1985, pl.3, fig.9. Age: middle Eocene.

connectum Stover and Hardenbol, 1994, p.37, pl.4, figs.22a–c,23a–b. Holotype: Stover and Hardenbol, 1994, pl.4, figs.22a–c. Age: Rupelian.

intermedium Stover and Hardenbol, 1994, p.37–38, pl.4, figs.24a–b,25a–b. Holotype: Stover and Hardenbol, 1994, pl.4, figs.24a–b. Age: Rupelian.

"*multispinatum*" Gerlach, 1961, p.203–204, pl.29, fig.5. Holotype: Gerlach, 1961, pl.29, fig.5. **Taxonomic senior synonym:** *Galea* (as and now *Chiropteridium*) *galea*, by implication in Brosius (1963, p.48) and Gocht (1969, p.63), who considered *Membranophoridium multispinatum* to be a taxonomic junior synonym of *Galea* (as *Chiropteridium*) *dispersa*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium*) *galea*. Age: late Oligocene–middle Miocene.

"*partispinatum*" Gerlach, 1961, p.201, pl.29, fig.6. Holotype: Gerlach, 1961, pl.29, fig.6; Fauconnier and Masure, 2004, pl.13, figs.1–2. Originally *Membranophoridium*, subsequently *Chiropteridium*. **Taxonomic senior synonym:** *Galea* (as *Chiropteridium*) *galea*, by implication in Matsuoka and Bujak (1988, p.40), who considered *Membranophoridium* (as *Chiropteridium*) *partispinatum* to be a taxonomic junior synonym of *Galea* (as

Chiropteridium) *mespilana*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium*) *galea*. Age: middle-late Oligocene.

perforatum Wilson, 1988, p.26, pl.16, figs.5a–b,6a–b. Holotype: Wilson, 1988, pl.16, figs.5a–b; Fensome et al., 1996, figs.1–2 — p.2271. This name was not validly published in Wilson (1985, p.93) since no description or illustration was provided. Age: early Eocene.

"**regulatum**" (Jiabo, 1978, p.78, pl.27, figs.1–2) Lentin and Williams, 1981, p.185. Holotype: Jiabo, 1978, pl.27, fig.1. **NOW** *Membranilarnacia*?. Originally *Cyclonephelium*, subsequently *Membranophoridium*?, thirdly (and now) *Membranilarnacia*. Questionable assignment: Lentin and Williams (1981, p.185). Age: Early Tertiary.

"**variatum**" (Jiabo, 1978, p.78–79, pl.27, figs.6–10) Lentin and Williams, 1981, p.185. Holotype: Jiabo, 1978, pl.27, fig.6. **NOW** *Membranilarnacia*. Originally *Cyclonephelium*, subsequently *Membranophoridium*, thirdly (and now) *Membranilarnacia*. Age: Early Tertiary.

MEMBRANOSPHERA Samoilovitch in Samoilovitch and Mtchedlishvili, 1961, p.251. Emendation: Drugg, 1967, p.29. The name *Membranosphaera* was originally used by Samoilovitch in Samoilovitch and Mtchedlishvili (1961, p.251) as the name of a "group". Lentin and Williams (1989, p.241) considered that the name *Membranosphaera* was validly published by Norris and Sarjeant (1965, p.40). However, Fensome et al. (1990, p.313) noted "... Samoilovitch and Mtchedlishvili (1961) assigned species directly to *Membranosphaera*, thus clearly indicating *Membranosphaera* to be equivalent to a genus. Since Lentin and Williams (1989) did not specify which nomenclatural rule they were invoking, Williams et al. (1998, p.396) considered this generic name to have been validly published in Samoilovitch and Mtchedlishvili (1961)". Stover and Evitt (1978, p.263) and Fensome et al. (1990, p.313) included this genus in the acritarchs. Vozzhennikova in Lentin and Williams (1993, p.421) noted that *Membranosphaera* is a dinoflagellate cyst with an apical archeopyle. Type: Samoilovitch and Mtchedlishvili, 1961, pl.83, figs.1a–d, as *Membranosphaera maastrichtica*.

bulluliniformis Malyavkina in Samoilovitch and Mtchedlishvili, 1961, p.253–254, pl.84, figs.1a–b,2a–b,3–4. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.84, figs.1a–b. Malyavkina in Samoilovitch and Mtchedlishvili (1961) expressly cited this taxon as a species; it was not therefore a new combination in Lentin and Williams (1973, p.94). Age: Oxfordian–Early Cretaceous.

"forma **bulluliniformis**". Autonym. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.84, figs.1a–b. **Now redundant**. Nomenclatural junior synonym: *Membranosphaera bulluliniformis* forma *typica* Malyavkina in Samoilovitch and Mtchedlishvili, which has the same holotype.

subsp. **bulluliniformis**. Autonym. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.84, figs.1a–b. Nomenclatural junior synonym: *Membranosphaera bulluliniformis* forma *typica*, which has the same holotype.

"forma **sphaerica**" Malyavkina in Samoilovitch and Mtchedlishvili, 1961, p.254–255, pl.84, fig.4. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.84, fig.4. **NOW** *Membranosphaera bulluliniformis* subsp. *sphaerica*. Originally *Membranosphaera bulluliniformis* forma *sphaerica*, subsequently (and now) *Membranosphaera bulluliniformis* subsp. *sphaerica*. Age: middle Oxfordian–mid Valanginian.

subsp. **sphaerica** (Malyavkina in Samoilovitch and Mtchedlishvili, 1961, p.254–255, pl.84, fig.4) Lentin and Williams, 1973, p.94. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.84, fig.4. Originally *Membranosphaera bulluliniformis* forma *sphaerica*, subsequently (and now) *Membranosphaera bulluliniformis* subsp. *sphaerica*. Age: middle Oxfordian–mid Valanginian.

"forma **typica**" Malyavkina in Samoilovitch and Mtchedlishvili, 1961, p.253–254, pl.84, figs.1a–b,2a–b,3. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.84, figs.1a–b. **Name illegitimate** — **nomenclatural senior synonym**: *Membranosphaera bulluliniformis* subsp. *bulluliniformis*, which has the same holotype. Age: Late Jurassic–Late Cretaceous.

"*coninckii*" Burger, 1980a, p.74, pl.26, figs.5,6a–b. Holotype: Burger, 1980a, pl.26, figs.6a–b. **NOW** *Kallosphaeridium*. Originally *Membranosphaera*, subsequently (and now) *Kallosphaeridium*. Age: Albanian.

"*granulata*" Norvick, 1976, p.79–80, pl.11, fig.9; pl.12, fig.3. Holotype: Norvick, 1976, pl.11, fig.9. **NOW** *Kallosphaeridium?*. Originally *Membranosphaera*, subsequently (and now) *Kallosphaeridium?*. Age: Cenomanian.

**maastrichtica* Samoilovitch in Samoilovitch and Mtchedlishvili, 1961, p.252, pl.83, figs.1a–d,2a–d,3,4a–d. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.83, figs.1a–d. Samoilovitch and Mtchedlishvili (1961) expressly cited this taxon as a species; it was therefore not a new combination in Lentin and Williams (1973, p.94). See also *Elytrocysta druggii*. Age: Santonian–late Eocene.

subsp. *maastrichtica*. Autonym. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.83, figs.1a–d.

"var. *maastrichtica*". Autonym. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.83, figs.1a–d. **Now redundant.**

subsp. *pilata* (Samoilovitch in Samoilovitch and Mtchedlishvili, 1961, p.253, pl.83, figs.3,4a–d) Lentin and Williams, 1973, p.94. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.83, fig.3. Originally *Membranosphaera maastrichtica* var. *pilata*, subsequently (and now) *Membranosphaera maastrichtica* subsp. *pilata*. Age: Santonian–Maastrichtian.

"var. *pilata*" Samoilovitch in Samoilovitch and Mtchedlishvili, 1961, p.253, pl.83, figs.3,4a–d. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.83, fig.3. **NOW** *Membranosphaera maastrichtica* subsp. *pilata*. Originally *Membranosphaera maastrichtica* var. *pilata*, subsequently (and now) *Membranosphaera maastrichtica* subsp. *pilata*. Age: Santonian–Maastrichtian.

"*norvickii*" Burger, 1980a, p.73–74, pl.26, figs.7–8. Holotype: Burger, 1980a, pl.26, fig.7. **NOW** *Batiacasphaera*. Originally *Membranosphaera*, subsequently *Kallosphaeridium*, thirdly (and now) *Batiacasphaera*. Age: Albanian.

"*romaensis*" Burger, 1980a, p.74, pl.27, figs.1–3. Holotype: Burger, 1980a, pl.27, fig.3. **NOW** *Kallosphaeridium?*. Originally *Membranosphaera*, subsequently *Kallosphaeridium*, thirdly (and now) *Kallosphaeridium?*. Age: Aptian.

rugosa Shaw Chenglong and Huang Tsengchieng, 1994, p.86–87, pl.44, figs.1–2. Holotype: Shaw Chenglong and Huang Tsengchieng, 1994, figs.1–2. Age: Early Cretaceous.

taiwaniana Shaw Chenglong and Huang Tsengchieng, 1994, p.87, pl.44, figs.8–9. Holotype: Shaw Chenglong and Huang Tsengchieng, 1994, pl.44, figs.8–9. Age: Early Cretaceous.

tuberculata Malyavkina in Samoilovitch and Mtchedlishvili, 1961, p.255, pl.84, figs.7a–b,8. Holotype: Samoilovitch and Mtchedlishvili, 1961, pl.84, figs.7a–b. Malyavkina in Samoilovitch and Mtchedlishvili (1961) expressly cited this taxon as a species; it was therefore not a new combination in Lentin and Williams (1973, p.94). Age: Oxfordian–mid Kimmeridgian.

MENDICODINIUM Morgenroth, 1970, p.347–348. Emendation: Bucefalo Palliani et al., 1997a, p.101. Taxonomic junior synonyms: *Thuledinium*, according to Davey (1979c, p.64); *Breedoxella*, according to Stover and Williams (1987, p.45). Type: Morgenroth, 1970, pl.9, figs.5–6, as *Mendicodinium reticulatum*.

brunneum Bucefalo Palliani et al., 1997a, p.110, pl.2, figs.1–4; pl.3, fig.5; text-fig.2. Holotype: Bucefalo Palliani et al., 1997a, pl.2, fig.2. Age: early Toarcian.

caperatum Brideaux, 1977, p.19–20, pl.7, figs.7–11. Holotype: Brideaux, 1977, pl.7, figs.8–9; Fensome et al., 1993a, figs.1–2 — p.1025. Originally (and now) *Mendicodinium*, subsequently *Breedoxella*. Stover and Williams (1987, p.45) retained this species in *Mendicodinium*. Age: Aptian–early Albanian.

echinatum Riding and Helby, 2001a, p.5,7, figs.4A–L. Holotype: Riding and Helby, 2001a, fig.4H. Taxonomic junior synonym: *Mendicodinium spinosum* Helby (name not validly published), according to Riding and Helby (2001a, p.5). Age: Toarcian.

granulatum Kumar, 1986b, p.393, pl.3, fig.6; text-fig.7. Holotype: Kumar, 1986b, pl.3, fig.6. Age: early Kimmeridgian–Tithonian.

groenlandicum (Pocock and Sarjeant, 1972, p.352–354, pl.2, figs.1–9; text-fig.2) Davey, 1979c, p.64. Holotype: Pocock and Sarjeant, 1972, pl.2, fig.1; text-fig.2; Fensome et al., 1995, fig.1 — p.1535. Originally *Thuledinium*, subsequently (and now) *Mendicodinium*. Taxonomic junior synonym: *Mendicodinium woodhamense*, according to Riley and Fenton (1982, p.200). Age: middle Callovian.

kemperii Heilmann-Clausen in Heilmann-Clausen and Thomsen, 1995, p.302–303, pl.5, figs.11–12,14–16. Holotype: Heilmann-Clausen and Thomsen, 1995, pl.5, figs.11–12. Age: early Barremian.

mataschenense Soliman and Feist-Burkhardt in Soliman et al., 2013, p.37,41,43, pl.1, figs.1–9; pl.2, figs.1–9; pl.3, figs.1–12; text-fig.2. Holotype: Soliman et al., 2013, pl.1, figs.1–3. Age: Tortonian.

microreticulatum Kumar, 1986b, p.395–396, pl.5, figs.1,5; text-fig.8. Holotype: Kumar, 1986b, pl.5, fig.5. Age: early Kimmeridgian–Tithonian.

microscabratum Bucefalo Palliani et al., 1997a, p.109, pl.2, figs.10–12; pl.3, figs.8–11; text-fig.2. Holotype: Bucefalo Palliani et al., 1997a, pl.2, fig.10. Age: early Toarcian.

morgenrothii Butler, 1995, p.25–26, pl.1, figs.1–9. Holotype: Butler, 1995, pl.1, figs.1,3. Age: Aalenian–earliest Bajocian.

"quadratum" Kumar, 1987a, p.242, pl.2, figs.8–9. Holotype: Kumar, 1987a, pl.2, fig.8. **NOW** *Shanbeipollenites* (Appendix A). Originally *Mendicodinium*, subsequently (and now *Shanbeipollenites* (Appendix A)). Age: early Kimmeridgian–Tithonian.

***reticulatum** Morgenroth, 1970, p.348–349, pl.9, figs.5–6; pl.10, figs.1–4. Holotype: Morgenroth, 1970, pl.9, figs.5–6. Age: late Pliensbachian.

robustum Zevenboom and Santarelli in Zevenboom, 1995, p.159–160, pl.8, figs.10–12 ex Fensome et al., 2009, p.44. Holotype: Zevenboom, 1995, pl.8, figs.10–12. The name was not validly published in Zevenboom (1995, p.159–160) since the author considered it a manuscript name. Age: latest middle Miocene–early late Miocene.

"rugarum" Piasecki, 1984, p.150–151, pl.4, figs.1–5,7–8; text-fig.5. Holotype: Piasecki, 1984, pl.4, fig.1; text-fig.5; Fensome et al., 1995, figs.1,4–5 — p.1751. **NOW** *Hurlandsia*. Originally *Mendicodinium*, subsequently (and now) *Hurlandsia*. Age: late Ryazanian–early Valanginian.

scabratum Riding and Helby, 2001a, p.7,9, figs.5A–I. Holotype: Riding and Helby, 2001a, figs.5D–F. Age: Toarcian–Bajocian.

spinosum Bucefalo Palliani et al., 1997a, p.103,105–106,109, pl.1, figs.1–12; pl.3, figs.1–2,7; text-fig.2. Holotype: Bucefalo Palliani et al., 1997a, pl.1, figs.7–8. Age: early Toarcian.

subsp. ***perforatum*** Bucefalo Palliani et al., 1997a, p.106,109, pl.1, figs.1–5; pl.3, figs.1–2,7; text-fig.2. Holotype: Bucefalo Palliani et al., 1997a, pl.1, figs.1–2. Age: early Toarcian.

subsp. ***spinosum***. Autonym. Holotype: Bucefalo Palliani et al., 1997a, pl.1, figs.7–8.

"spinosum" Helby in Riding and Helby, 2001a, p.5. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Mendicodinium echinatum*, according to Riding and Helby (2001a, p.5).

umbriense Bucefalo Palliani et al., 1997a, p.103, pl.2, figs.5–9; pl.3, figs.4,6; text-fig.2. Holotype: Bucefalo Palliani et al., 1997a, pl.2, fig.7. Age: early Toarcian.

"*woodhamense*" Drugg, 1978, p.70, pl.5, figs.10–11; pl.6, figs.1–2. Holotype: Drugg, 1978, pl.6, fig.1. **Taxonomic senior synonym:** *Thuledinium* (as *Mendicodinium*) *groenlandicum*, according to Riley and Fenton (1982, p.200). Age: late Callovian.

"**MERISTAULAX**" Brenner, 1988, p.65. **Name illegitimate — senior homonym:** *Meristaulax* Sarjeant, 1984a. **Taxonomic senior synonym:** *Cribroperidinium*, by implication in Jan du Chêne et al. (1986a, p.76) and Lentin and Williams (1993, p.423), who listed *Meristaulax* Sarjeant as a taxonomic junior synonym of *Cribroperidinium* on the basis of the morphology of Sarjeant's lectotype of *Meristaulax granulata*, which is now the type of *Meristaulax* Brenner. Brenner (1988, p.65) cited this genus as "*Meristaulax* Sarjeant 1984". However, he listed as "type species" "*Meristaulax granulata* Sarjeant 1984" with the specimen illustrated by Sarjeant (1984a, pl.3, figs.3–4) as holotype, and clearly separated this species from *Meristaulax granulata* (Klement, 1960) Sarjeant, 1984a, with Klement (1960, pl.4, figs.10–11; text-figs.18–19) as type, which he cited separately (Brenner, 1988, p.35). Thus, Brenner (1988, p.65) effectively created a new genus, *Meristaulax* Brenner, 1988, which is validly published since Brenner (1988, p.65–66) provided a description under the single formal species *Meristaulax granulata* Brenner, listed a type and presented illustrations. Type: Sarjeant, 1984a, pl.3, figs.3–4, text-fig.3, as *Meristaulax granulata*.

"**granulata*" Brenner, 1988, p.65–66, pl.3, figs.2,5. Holotype: Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2,5; Fensome et al., 1995, figs.5–6 — p.1525; designated by Brenner (1988, p.65). **Name illegitimate — senior homonym:** *Meristaulax granulata* (Klement, 1960) Sarjeant, 1984a. **NOW** *Cribroperidinium swithini*. Originally *Meristaulax granulata* Brenner (name illegitimate), subsequently (and now) *Cribroperidinium swithini*. Sarjeant (1984a, p.161–162) designated a lectotype in place of the disintegrated holotype of *Gonyaulax* (as *Meristaulax* Sarjeant, now *Acanthaulax*) *granulata* Klement, 1960. Brenner (1988, p.35) argued that Sarjeant's lectotype was not conspecific with Klement's holotype for the species and thus designated a second lectotype; at the same time, Brenner transferred *Meristaulax granulata* (Klement) to *Acanthaulax*. Simultaneously, Brenner (1988, p.65) treated as a separate genus and species "*Meristaulax granulata* sensu Sarjeant 1984[a]" with Sarjeant's lectotype designated as holotype. Brenner thus effectively created an illegitimate junior homonym, *Meristaulax granulata* Brenner, 1988, of *Meristaulax granulata* (Klement, 1960) Sarjeant, 1984a. Age: Late Jurassic.

"**MERISTAULAX**" Sarjeant, 1984a, p.160. **Taxonomic senior synonym:** *Cribroperidinium*, according to Jan du Chêne et al. (1986a, p.76) and Lentin and Williams (1993, p.423). Taxonomic senior synonym: *Acanthaulax*, by implication in Brenner (1988, p.35), who included the type of the genus *Meristaulax* Sarjeant in *Acanthaulax granulata*. Junior homonym: *Meristaulax* Brenner, 1988. Type: Klement, 1960, pl.4, figs.10–11; text-figs.18–19, as *Gonyaulax granulata*; for lectotypes, see *Meristaulax granulata*.

"*angulosa*" (Gitmez, 1970, p.252, pl.2, figs.4–5; text-figs.7A–B) Sarjeant and Gocht in Sarjeant, 1984a, p.160. Holotype: Gitmez, 1970, pl.2, figs.4–5; text-figs.7A–B; Jan du Chêne et al., 1986a, pl.2, figs.11–15. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Acanthaulax*, thirdly *Meristaulax*, Sarjeant, fourthly *Acanthaulax*?, fifthly *Rhynchodiniopsis*, sixthly (and now) *Cribroperidinium*. Taxonomic senior synonym: *Gonyaulax* (as and now *Cribroperidinium*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Meristaulax angulosa*. Age: early Kimmeridgian.

"*granulata*" (Klement, 1960, p.39–41, pl.4, figs.10–13; text-figs.18–20) Sarjeant, 1984a, p.161. Emendation: Sarjeant, 1984a, p.161–162, as *Meristaulax granulata*. Holotype: Klement, 1960, pl.4, figs.10–11; text-figs.18–20; Fensome et al., 1995, figs.1–2 — p.1525; disintegrated according to Sarjeant (1984a, p.162). Lectotype (designated by Sarjeant, 1984a, p.162): Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2a–b; Fensome et al., 1995, figs.5–6 — p.1525 — however, Brenner (1988, p.35) argued that this specimen is not conspecific with the holotype. Lectotype (designated by Brenner, 1988, p.35): Brenner, 1988, pl.1, figs.3a–c; Fensome et al., 1995, figs.7–9 — p.1525. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Meristaulax* Sarjeant, sixthly *Acanthaulax*. Poulsen (1996, p.73) retained this species in *Cribroperidinium*.

Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *venusta*, according to Schrank (2005, p.56); *Gonyaulax* (now *Cribroperidinium*) *granuligera*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156–158) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*; *Gonyaulacysta* (as *Acanthaulax*?, now *Cribroperidinium*) *angulosa*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*) *angulosa*. For further discussion, see *Cribroperidinium granulatum*. Age: middle Oxfordian–early Kimmeridgian.

MESSELODINIUM Lenz et al., 2007, p.122,124. Type: Lenz et al., pl.1, figs.1–2, as *Messelodinium thielepfeifferae*.

**thielepfeifferae* Lenz et al., 2007, p.124,126, pl.1, figs.1–16; pl.2, figs.1–3; pl.3, figs.1–3; pl.4, figs.1–6. Holotype: Lenz et al., 2007, pl.1, figs.1–2. Age: middle Eocene.

MICHOUXDINIUM Williams et al., 2015, p.306–307. Type: Michoux, 1988, pl.1, figs.1,4,7; text-fig.5A–B, as *Kisselevia aculeata*.

**aculeatum* (Michoux, 1988, p.24,26, pl.1, figs.1,4,7–8; pl.2, figs.1–2, text-figs.5A–B,6A–B) Williams et al., 2015, p.307. Holotype: Michoux, 1988, pl.1, figs.1,4,7; text-figs.5A–B. Originally *Kisselevia*, subsequently *Charlesdownia*, thirdly (and now) *Michouxdinium*. Age: early Eocene.

limitatum (Stover and Hardenbol, 1994, p.34–35, pl.10, figs.70a–c,71a–c) Williams et al., 2015, p.307. Holotype: Stover and Hardenbol, 1994, pl.10, figs.70a–c. Originally *Charlesdownia*, subsequently (and now) *Michouxdinium*. Age: Rupelian.

proserpinum (van Mourik et al., 2001, p.239,241, figs.7a–e) Williams et al., 2015, p.307. Holotype: van Mourik et al., 2001, figs.7b–c. Originally *Charlesdownia*, subsequently (and now) *Michouxdinium*. N.I.A. Age: late Eocene.

?*rhomboidale* (He Chengquan, 1991, p.93, pl.35, figs.11–13) Williams et al., 2015, p.307. Holotype: He Chengquan, 1991, pl.35, figs.11–12. Originally *Kisselevia*, subsequently *Charlesdownia*, thirdly (and now) *Michouxdinium*? Questionable assignment: Williams et al. (2015, p.307). Age: middle Eocene.

variabile (Bujak in Bujak et al., 1980, p.67, pl.17, figs.1–6; text-fig.16) Williams et al., 2015, p.307. Holotype: Bujak et al., 1980, pl.17, figs.1–3. Originally *Kisselevia*, subsequently *Charlesdownia*, thirdly (and now) *Michouxdinium*. Age: middle Eocene (see Aubry, 1986).

MICROCONUS Trejo, 1983, p.7. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298, who noted that the cyst wall is pithonelloid and so dinoflagellate affinity is questionable). See discussion in Elbrächter et al. (2008, p.1300) regarding the validity of this name. Type: Trejo, 1983, pl.38, fig.4, as *Microconus aequilaterus*.

**aequilaterus* Trejo, 1983, p.7, pl.38, figs.1–5; pl.39, figs.1–8. Holotype : Trejo, 1983, pl.38, fig.4. Age: Late Cretaceous.

diffringens (de Lapparent, 1918, p.21–22 [name first used on p.22], pl.2, fig.1–part; pl.3, figs.1–part,2–part) Trejo, 1983, p.7. Holotype: not designated. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly (and now) *Microconus*. Age: Late Cretaceous? (according to Vogler, 1941, "Inhalt" and p.283).

simplex Trejo, 1983, p.7, pl.38, figs.6–8. Holotype: Trejo, 1983, pl.38, fig.7. Age: Late Cretaceous.

MICRODINIUM Cookson and Eisenack, 1960a, p.6. Emendations: Sarjeant, 1966b, p.148–149; Stover and Evitt, 1978, p.65–66; Slimani, 1994, p.24. Taxonomic senior synonym: *Phanerodinium*, according to Below (1987b, p.36) — however, Lentin and Williams (1989, p.243) retained *Microdinium*. Type: Cookson and Eisenack, 1960a, pl.2, figs.3–4; text-fig.2, as *Microdinium ornatum*.

?alatum Conrad, 1941, p.5, pl.1, fig.C ex Sarjeant, 1967b, p.247–248. Holotype: Conrad, 1941, pl.1, fig.C. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Microdinium?*, thirdly *Palaeoperidinium?*. Lentin and Williams (1993, p.424) retained this species in *Microdinium*. Questionable assignment: Sarjeant (1967b, p.248). The name *Palaeoperidinium alatum* was not validly published in Conrad (1941) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.399) accepted Sarjeant's (1967b) indirect reference to Conrad (1941), in which the name *Palaeoperidinium alatum* was first proposed, as indication of a type (I.C.N. Article 40.3). Lentin and Williams (1976, p.109) also proposed this name as a new combination. Age: Maastrichtian.

"*amphidoxosum*" (Jiabo, 1978, p.93, pl.6, fig.2) Lentin and Williams, 1989, p.243. Holotype: Jiabo, 1978, pl.6, fig.2. **NOW** *Tetrachacysta*. Originally *Dinogymnium?*, subsequently *Microdinium*, thirdly (and now) *Tetrachacysta*. Age: Early Tertiary.

angulare (Below, 1987b, p.39–40, pl.12, figs.12–13; pl.13, figs.11–15; pl.16, fig.12) Lentin and Williams, 1989, p.243. Holotype: Below, 1987b, pl.13, figs.11–15; Fensome et al., 1993a, figs.1–4 — p.913. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: middle Albian.

avocetianum Riding, 2002, p.4–6,8, pl.1, figs.1–16; text-fig.2. Holotype: Riding, 2002, pl.1, figs.5–6. Age: late Tithonian.

balteus (Below, 1987b, p.40, pl.15, figs.11–15) Lentin and Williams, 1989, p.243. Holotype: Below, 1987b, pl.15, figs.11–15; Fensome et al., 1993a, figs.1–5 — p.959. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. N.I.A. Age: middle-late Albian.

bensonii Slimani, 1994, p.25–27, pl.4, figs.1–9,14–21. Holotype: Slimani, 1994, pl.4, figs.1–4,16–17. Age: late Campanian–earliest Danian.

subsp. *bensonii*. Autonym. Holotype: Slimani, 1994, pl.4, figs.1–4,16–17.

subsp. *pilatam* Slimani, 1994, p.27, pl.4, figs.6–9,18–21. Holotype: Slimani, 1994, pl.4, figs.7–9,18–19. Age: late Campanian–earliest Danian.

carinatum (Below, 1987b, p.41–43, pl.10, figs.1–10; text-figs.10a–f) Lentin and Williams, 1989, p.243. Holotype: Below, 1987b, pl.10, figs.1–5; Fensome et al., 1993a, figs.1–4 — p.1035. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: late Campanian.

"*carpaticum*" Balteş, 1969, p.31, pl.1, fig.14. Holotype: Balteş, 1969, pl.1, fig.14. **Name not validly published:** provisional designation. Age: Pliocene.

carpentierae Slimani, 1994, p.29–30, pl.5, figs.3–4,11–19,25. Holotype: Slimani, 1994, pl.5, figs.11–13,16–17. Age: late Campanian–earliest Danian.

cassiculus Wilson, 1984c, p.552, figs.6–10. Holotype: Wilson, 1984c, figs.6–7; Fensome et al., 1996, figs.4–5 — p.2087. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Lentin and Williams (1993, p.424) retained this species in *Microdinium*. N.I.A. Age: Maastrichtian.

chengquani Lentin and Williams, 1993, p.424. Holotype: He Chengquan, 1991, pl.5, fig.8. Originally *Microdinium granulatum* He Chengquan (name illegitimate), subsequently (and now) *Microdinium chengquani*. Substitute name for *Microdinium granulatum* He Chengquan, 1991, p.61, pl.5, figs.1–8 (an illegitimate name). Since the epithet is based on a given name, it ends in "i" rather than "ii" (I.C.B.N. Article 60C.2). Age: late Turonian–Eocene.

consaepum (Below, 1987b, p.43–44, pl.14, figs.1–5,7–12) Lentin and Williams, 1989, p.243. Holotype: Below, 1987b, pl.14, figs.2–5; Fensome et al., 1993a, figs.1–2 — p.1075; figs.2–5 — p.1079. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: middle Albian.

subsp. *baculatum* (Below, 1987b, p.43–44, pl.14, figs.7–12) Lentin and Williams, 1989, p.243. Holotype: Below, 1987b, pl.14, figs.7–10; Fensome et al., 1993a, figs.1–4 — p.953; fig.3 — p.1075. Originally *Phanerodinium consaeptum* var. *baculatum*, subsequently (and now) *Microdinium consaeptum* subsp. *baculatum*. Age: middle-late Albian.

subsp. *consaeptum*. Autonym. Holotype: Below, 1987b, pl.14, figs.2–5; Fensome et al., 1993a, figs.1–2 — p.1075; figs.2–5 — p.1079.

cretaceum Slimani, 1994, p.30–32, pl.6, figs.1–4,18–21. Holotype: Slimani, 1994, pl.6, figs.1–3,18–19. Taxonomic junior synonym: *Microdinium ovatum* Wilson (name not validly published), according to Slimani (2001a, p.193). Age: Maastrichtian.

?*crinitum* Davey, 1969a, p.137, pl.2, figs.7–8. Emendation: Below, 1987b, p.38, as *Phanerodinium?* *crinitum*. Holotype: Davey, 1969a, pl.2, fig.8. Originally (and now) *Microdinium?*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.244) questionably retained this species in *Microdinium*. Questionable assignment: Davey (1969a, p.137). Age: Cenomanian.

deconinckii Slimani, 1994, p.32–33, pl.3, fig.30; pl.5, figs.1–2,5–8,23–24. Holotype: Slimani, 1994, pl.5, figs.1–2,5–6. Age: early Campanian–earliest Danian.

"*deflandrei*" Millioud, 1969, p.429–430, pl.2, figs.5–7. Emendations: Habib, 1973, p.52, as *Druggidium deflandrei*; Below, 1987b, p.58–59, as *Rhaphidodinium deflandrei*. Holotype: Millioud, 1969, pl.2, figs.5–6. **NOW** *Druggidium*. Originally *Microdinium*, subsequently (and now) *Druggidium*, thirdly *Rhaphidodinium*. Age: Barremian.

densigranulatum (Below, 1987b, p.44–45, pl.13, figs.6–10; pl.14, figs.13–15) Lentin and Williams, 1989, p.244. Holotype: Below, 1987b, pl.13, figs.6–10; Fensome et al., 1993a, figs.1–5 — p.1119. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: middle-late Albian.

dentatum Vozzhennikova, 1967, p.94–95, pl.38, figs.2a–e. Emendations: Fechner, 1985, p.120; Lentin and Vozzhennikova, 1990, p.104–105, both as *Microdinium dentatum*; Below, 1987b, p.45–46, as *Phanerodinium dentatum*. Holotype: Vozzhennikova, 1967, pl.38, figs.2a–e; Lentin and Vozzhennikova, 1990, pl.12, figs.5–7; text-fig.59. Originally (and now) *Microdinium*, subsequently *Microdinium?*, thirdly *Phanerodinium*. Questionable assignment: Stover and Evitt (1978, p.66) — however, Fechner (1985, p.120) and Lentin and Vozzhennikova (1990, p.104) included the species in *Microdinium* without question. Age: Late Cretaceous.

"forma *dentatum*". Autonym. Holotype: Vozzhennikova, 1967, pl.38, figs.2a–e; Lentin and Vozzhennikova, 1990, pl.12, figs.5–7; text-fig.59. **Now redundant.**

"subsp. *dentatum*". Autonym. Holotype: Vozzhennikova, 1967, pl.38, figs.2a–e; Lentin and Vozzhennikova, 1990, pl.12, figs.5–7; text-fig.59. **Now redundant.**

"forma *sphaericum*" Vozzhennikova, 1967, p.95–96, pl.36, figs.2a–b; pl.38, figs.1a–b. Emendation: Lentin and Vozzhennikova, 1990, p.115, as *Sokolovidinium sphaericum*. Holotype: Vozzhennikova, 1967, pl.38, figs.1a–b; Lentin and Vozzhennikova, 1990, pl.13, figs.5–6; text-fig.67. **NOW** *Sokolovidinium sphaericum*. Originally *Microdinium dentatum* forma *sphaericum*, subsequently *Microdinium dentatum* subsp. *sphaericum*, thirdly (and now) *Sokolovidinium sphaericum*. Age: Late Cretaceous.

"subsp. *sphaericum*" (Vozzhennikova, 1967, p.95–96, pl.36, figs.2a–b; pl.38, figs.1a–b) Lentin and Williams, 1973, p.95. Emendation: Lentin and Vozzhennikova, 1990, p.115, as *Sokolovidinium sphaericum*. Holotype: Vozzhennikova, 1967, pl.38, figs.1a–b; Lentin and Vozzhennikova, 1990, pl.13, figs.5–6; text-fig.67. **NOW** *Sokolovidinium sphaericum*. Originally *Microdinium dentatum* forma *sphaericum*, subsequently *Microdinium dentatum* subsp. *sphaericum*, thirdly (and now) *Sokolovidinium sphaericum*. Age: Late Cretaceous.

distinctum Davey, 1969a, p.133–135, pl.2, figs.9–11; text-figs.13D–E,I. Holotype: Davey, 1969a, pl.2, figs.9–10; text-fig.13D. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.244) retained this species in *Microdinium*. Below (1987b, p.38) considered *Microdinium?* (as *Phanerodinium*) *variospinum*, *Microdinium glabrum* and *Microdinium* (as *Phanerodinium*) *opacum* to be questionable taxonomic junior synonyms of this species. Age: early Cenomanian.

"**echinatum**" Clarke and Verdier, 1967, p.64, pl.1, figs.9–10; text-fig.26. Holotype: Clarke and Verdier, 1967, pl.1, fig.9. **Taxonomic senior synonym:** *Microdinium setosum*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

?**ellipsoideum** Deflandre, 1936b, p.178, pl.6, figs.5–7 ex Sarjeant, 1967b, p.250. Holotype: Deflandre, 1936b, pl.6, fig.6. Originally *Palaeoperidinium* (name not validly published), subsequently *Microdinium*, thirdly (and now) *Microdinium?*, fourthly *Palaeoperidinium?*. Lentin and Williams (1981, p.187) retained this species in *Microdinium*. Questionable assignment: Lentin and Williams (1976, p.110). The name *Palaeoperidinium ellipsoideum* was not validly published in Deflandre (1936b) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.401) accepted Sarjeant's (1967b) indirect reference to Deflandre (1936b) as indication of a type (I.C.N. Article 40.3). Lentin and Williams (1976, p.110) also proposed this name, as a new combination. Age: Late Cretaceous.

"?**fibratum**" Batten and Lister, 1988, p.345,347, figs.2g–h. Holotype: Batten and Lister, 1988, figs.2g–h. **NOW** *Protoellipsodinium*. Originally *Microdinium*, subsequently (and now) *Protoellipsodinium*. Questionable assignment: Batten and Lister (1988, p.345). Age: Barremian.

glabrum Cookson and Eisenack, 1974, p.53, pl.20, fig.19. Holotype: Cookson and Eisenack, 1971, pl.7, fig.11, as *Microdinium* sp. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.244) retained this species in *Microdinium*. Below (1987b, p.38) considered *Microdinium* (as *Phaneordinium*) *distinctum* to be the questionable taxonomic senior synonym of this species. Age: Senonian.

"**glabrum**" Wilson in Slimani, 2001a, p.193. **Name not validly published:** no description. **Taxonomic senior synonym:** *Microdinium inornatum*, according to Slimani (2001a, p.193).

granocarinatum (Below, 1987b, p.48–49, pl.16, figs.7–10,14–15) Lentin and Williams, 1989, p.244. Holotype: Below, 1987b, pl.16, figs.7,10,15; Fensome et al., 1993a, figs.1,4,6 — p.1219. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: late early–late Campanian.

"**granulatum**" He Chengquan, 1991, p.61, pl.5, figs.1–8. Holotype: He Chengquan, 1991, pl.5, fig.8. **Name illegitimate — senior homonym:** *Microdinium granulatum* (Jiabo, 1978) Lentin and Williams, 1989. **Substitute name:** *Microdinium chengquani*. Originally *Microdinium granulatum* (name illegitimate), subsequently (and now) *Microdinium chengquani*. Age: late Turonian–Eocene.

"**granulatum**" (Jiabo, 1978, p.94, pl.6, figs.7–8) Lentin and Williams, 1989, p.244. Holotype: Jiabo, 1978, pl.6, fig.7. **NOW** *Tetrachacysta*. Originally *Dinogymnium*, subsequently *Microdinium*, thirdly *Dinogymniopsis*, fourthly (and now) *Tetrachacysta*. Junior homonym: *Microdinium granulatum* He Chengquan, 1991. Age: Early Tertiary.

?**gymnosuturum** Smith, 1992, p.342,344–345, figs.5a–f,6a–d,11j–l. Holotype: Smith, 1992, figs.5a–b. Questionable assignment: Smith (1992, p.342). Age: late Campanian–early Maastrichtian.

?**horridum** (Below, 1987b, p.49–50, pl.17, figs.1–6; text-figs.11a–h) Lentin and Williams, 1989, p.245. Holotype: Below, 1987b, pl.17, figs.1–6; Fensome et al., 1993a, figs.1–4 — p.1229. Originally *Phanerodinium*, subsequently (and now) *Microdinium?*. Lentin and Williams (1993, p.426) retained this species in *Microdinium*. Questionable assignment: Lentin and Williams (1989, p.245). Age: middle Albian–early Cenomanian.

inornatum Slimani, 1994, p.34–36, pl.4, fig.13; pl.6, figs.5–8,14–15,22–23. Holotype: Slimani, 1994, pl.6, figs.5–8,22–23. Taxonomic junior synonym: *Microdinium glabrum* Wilson (name not validly published), according to Slimani (2001a, p.193). Age: early Campanian–late Maastrichtian.

"irregulare" Clarke and Verdier, 1967, p.65–66, pl.7, figs.5–8; text-fig.27. Holotype: Clarke and Verdier, 1967, pl.7, fig.5. **Taxonomic senior synonym:** *Micrhystridium* (as *Phanerodinium*, now *Rhiptocorys*) *veligera*, according to Below (1987b, p.56). Age: Cenomanian–Santonian.

"jiaboense" Lentin and Williams, 1989, p.245. Holotype: Jiabo, 1978 pl.6, fig.1. **NOW** *Tianjinella ovata*. Originally *Dinogymnium ovatum*, subsequently *Microdinium jiaboense*, thirdly (and now) *Tianjinella ovata*. Substitute name for *Dinogymnium ovatum* Jiabo, 1978, p.94, pl.6, fig.1; the name *Microdinium ovatum* is preoccupied. Age: Early Tertiary.

jurassicum Riding and Helby, 2001e, p.120,122–123, figs.6A–T. Holotype: Riding and Helby, 2001e, figs.6M–O. Taxonomic junior synonym: *Microdinium oxfordense* (name not validly published), according to Riding and Helby (2001e, p.120). Age: Callovian–Oxfordian.

kustanaicum Vozzhennikova, 1967, p.96, pl.37, figs.1a–b. Holotype: Vozzhennikova, 1967, pl.37, figs.1a–b; Lentin and Vozzhennikova, 1990, text-fig.60; lost according to Lentin and Vozzhennikova (1990, p.106). Originally (and now) *Microdinium*, subsequently *Microdinium?*. Questionable assignment: Stover and Evitt (1978, p.66) — however, Lentin and Vozzhennikova (1990, p.106) retained this species in *Microdinium* without question. According to Lentin and Vozzhennikova (1990, p.106), no potential lectotype is available and they recommended that the name be restricted to the type material. Age: ?Maastrichtian.

marheinecke Slimani, 1994, p.36–37, pl.6, figs.16–17,24–25. Holotype: Slimani, 1994, pl.6, figs.16–17,24–25. Age: late Maastrichtian–earliest Danian.

mariae Slimani, 1994, p.37–38, pl.4, figs.10–12,26–27,32–34. Holotype: Slimani, 1994, pl.4, figs.10–12,32–34. Age: late Campanian–earliest Danian.

minutum Louwye, 1997, p.151, pl.1, figs.14–16; pl.2, fig.5. Holotype: Louwye, 1997, pl.1, figs.14–16; pl.2, fig.5. This name was not validly published in Slimani (1994, p.41), since no description was provided. Age: latest Cenomanian–Santonian.

"obscuriplicatum" Wilson in Soncini and Rauscher, 1988, p.449. **Name not validly published:** no description. See also Slimani (2001a, p.193).

opacum Brideaux, 1971, p.76–77, pl.21, figs.19–22; text-figs.7d–e. Holotype: Brideaux, 1971, pl.21, figs.21–22; text-figs.7d–e. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.245) retained this species in *Microdinium*. Taxonomic junior synonym: *Microdinium spinosum*, according to Below (1987b, p.38). Below (1987b, p.39) considered *Microdinium* (as *Phanerodinium*) *distinctum* to be the questionable taxonomic senior synonym of this species. Age: middle-late Albian.

***ornatum** Cookson and Eisenack, 1960a, p.6–7, pl.2, figs.3–8; text-figs.2–4. Holotype: Cookson and Eisenack, 1960a, pl.2, figs.3–4; text-fig.2. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.245) retained this species in *Microdinium*. Age: Albian–Turonian.

?ovatum Horowitz, 1975, p.24, pl.1, fig.3. Holotype: Horowitz, 1975, pl.1, fig.3. Originally *Microdinium*, subsequently (and now) *Microdinium?*. Questionable assignment: Stover and Evitt (1978, p.66). Age: Late Triassic (probably not in place).

"ovatum" Wilson in Slimani, 1994, p.31. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Microdinium cretaceum*, according to Slimani (2001a, p.193).

"oxfordense" Ott in Riding and Helby, 2001e, p.120. **Name not validly published:** no description. **Taxonomic senior synonym:** *Microdinium jurassicum*, according to Riding and Helby (2001e, p.120).

parvum Slimani, 1994, p.38–39, pl.6, figs.11–13,28–29. Holotype: Slimani, 1994, pl.6, figs.12,28. Age: late Campanian–early Maastrichtian.

pauciscabrosum Slimani, 1994, p.39–41, pl.4, figs.28–29; pl.6, figs.9–10,26–27. Holotype: Slimani, 1994, pl.6, figs.9–10,26–27. Age: late Campanian–late Maastrichtian.

"*perplexum*" (Wilson in Soncini and Rauscher, 1988, p.449. **Name not validly published**: no description.

Taxonomic senior synonym: *Phanerodinium?* (now *Microdinium*) *sonciniae*, according to Slimani (2001a, p.193).

punctulatum Vozzhennikova, 1967, p.96, pl.37, figs.7a–b. Holotype: Vozzhennikova, 1967, pl.37, figs.7a–b; Lentin and Vozzhennikova, 1990, text-fig.61; lost according to Lentin and Vozzhennikova (1990, p.107). Originally (and now) *Microdinium*, subsequently *Microdinium?*. Questionable assignment: Stover and Evitt (1978, p.66) — however, Lentin and Vozzhennikova (1990, p.106) included the species in *Microdinium* without question. According to Lentin and Vozzhennikova (1990, p.107), no potential lectotype is available and the name should be restricted to the type. Age: ?Maastrichtian.

?*reteinvolvatum* (Below, 1987b, p.51–52, pl.12, figs.3,8) Lentin and Williams, 1989, p.245. Holotype: Below, 1987b, pl.12, fig.3; Fensome et al., 1993a, fig.1 — p.1297. Originally *Phanerodinium*, subsequently (and now) *Microdinium?*. Questionable assignment: Lentin and Williams (1989, p.245). Age: middle-late Albian.

reticulatum Vozzhennikova, 1967, p.96–97, pl.37, figs.2–5. Holotype: Vozzhennikova, 1967, pl.37, fig.2; Lentin and Vozzhennikova, 1990, text-fig.62; lost according to Lentin and Vozzhennikova (1990, p.107). Originally (and now) *Microdinium*, subsequently *Microdinium?*. Questionable assignment: Stover and Evitt (1978, p.66) — however, Lentin and Vozzhennikova (1990, p.107) included the species in *Microdinium* without question. According to Lentin and Vozzhennikova (1990, p.107), no potential lectotype is available and the name should be restricted to the type. Age: Eocene.

"*robustum*" Davey, 1969b, p.6, pl.1, fig.3; pl.2, fig.2. Holotype: Davey, 1969b, pl.1, fig.3; pl.2, fig.2. **Taxonomic senior synonym**: *Microdinium* (as *Cladopyxidium*) *saepatum*, according to Stover and Evitt (1978, p.30). Age: Maastrichtian–?Danian.

"*saepatum*" Morgenroth, 1968, p.536–537, pl.41, figs.7–9; pl.42, fig.1. Holotype: Morgenroth, 1968, pl.41, fig.7; Eisenack and Kjellström, 1971, p.516a; Fensome et al., 1995, fig.1 — p.1755. **NOW** *Cladopyxidium*. Originally *Microdinium*, subsequently (and now) *Cladopyxidium*. Taxonomic junior synonyms: *Microdinium robustum* and *Cladopyxidium septatum*, both according to Stover and Evitt (1978, p.30). Age: Danian.

septofibrosus (Below, 1987b, p.52–53, pl.13, figs.1–5) Lentin and Williams, 1989, p.245. Holotype: Below, 1987b, pl.13, figs.1–5; Fensome et al., 1993a, figs.1–5 — p.1337. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: late Albian.

setosum Sarjeant, 1966b, p.151, pl.16, figs.9–10; text-fig.39. Emendation: Below, 1987b, p.53–54, as *Phanerodinium setosum*. Holotype: Sarjeant, 1966b, pl.16, figs.9–10. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.245–246) retained this species in *Microdinium*. Taxonomic junior synonym: *Microdinium echinatum*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

?*shangsicum* He Chengquan, 1984b, p.160–161, pl.2, figs.1–6. Holotype: He Chengquan, 1984b, pl.2, fig.1. Originally *Microdinium*, subsequently *Microdinium?*. Questionable assignment: Below (1987b, p.39), as a "nomen dubium". Age: Tertiary.

"?*sincfalense*" Louwye, 1997, p.151–152, pl.2, figs.7–8,12–14. Holotype: Louwye, 1997, pl.2, figs.12–14. Questionable assignment: Louwye (1997, p.151). **Taxonomic senior synonym**: *Membranigonyaulax wilsonii*, according to Slimani and Louwye (2012, p.110,113). Age: Turonian–Campanian.

singulare Vozzhennikova, 1967, p.97, pl.39, figs.2a–e. Holotype: Vozzhennikova, 1967, pl.39, figs.2a–b; Lentin and Vozzhennikova, 1990, text-fig.63; lost according to Lentin and Vozzhennikova (1990, p.108). Originally (and now) *Microdinium*, subsequently *Microdinium?*. Questionable assignment: Stover and Evitt (1978, p.66) — however, Lentin and Vozzhennikova (1990, p.108) included the species in *Microdinium* without question. According to Lentin and Vozzhennikova (1990, p.108), no potential lectotype is available and the name should be restricted to the type. Age: Eocene.

"?*smolenskiense*" (Vozzhennikova, 1967, p.93, pl.34, figs.1–6; pl.35, fig.6; pl.36, fig.4) Lentin and Williams, 1973, p.95. Emendation: Lentin and Vozzhennikova, 1990, p.112, as *Rhiptocorys smolenskiensis*. Holotype: Vozzhennikova, 1967, pl.36, fig.4, lost according to Lentin and Vozzhennikova (1990, p.112). Lectotype: Lentin and Vozzhennikova, 1990, pl.13, figs.1–3; text-fig.65, designated by Lentin and Vozzhennikova (1990, p.112). **NOW** *Rhiptocorys*. Originally *Ceratocorys* (Appendix B), subsequently *Microdinium*, thirdly *Microdinium?*, fourthly (and now) *Rhiptocorys*. Questionable assignment: Stover and Evitt (1978, p.66) as a problematic species. Taxonomic senior synonym: *Micrhystridium* (as *Phanerodinium*, now *Rhiptocorys*) *veligera*, according to Below (1987b, p.56) — however, Lentin and Vozzhennikova (1990, p.112) retained *Ceratocorys* (as *Rhiptocorys*) *smolenskiensis*. Age: Late Cretaceous.

sonciniae (Marheinecke, 1992, p.110–111, pl.25, figs.1–4) Slimani, 1994, p.41. Holotype: Marheinecke, 1992, pl.25, figs.1–2. Originally *Phanerodinium?*, subsequently (and now) *Microdinium*. Taxonomic junior synonym: *Microdinium perplexum* (name not validly published), according to Slimani (2001a, p.193). Age: late early–late late Maastrichtian.

"*spinosum*" Brideaux and McIntyre, 1975, p.23–24, pl.6, figs.3–5. Holotype: Brideaux and McIntyre, 1975, pl.6, figs.3–4. **Taxonomic senior synonym:** *Microdinium* (as *Phanerodinium*) *opacum*, according to Below (1987b, p.38). Age: middle Albian.

?*variospinum* Davey, 1969a, p.135, pl.2, figs.5–6; text-fig.13G. Holotype: Davey, 1969a, pl.2, fig.6. Originally *Microdinium*, subsequently (and now) *Microdinium?*. Questionable assignment: Stover and Evitt (1978, p.66). Below (1987b, p.38) considered *Microdinium* (as *Phanerodinium*) *distinctum* to be the questionable taxonomic senior synonym of this species. Age: Cenomanian.

"?*veligerum*" (Deflandre, 1937b, p.81, pl.12 [al. pl.9], fig.9) Davey, 1969a, p.136–137. Emendations: Lejeune-Carpentier, 1943, p.B24–B25, as *Ceratocorys veligera*; Lejeune-Carpentier and Sarjeant, 1983, p.5–6, as *Rhiptocorys veligera*. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), fig.9; Fensome et al., 1995, fig.1 — p.1885. **NOW** *Rhiptocorys*. Originally *Micrhystridium* (Appendix A), subsequently *Ceratocorys* (Appendix B), thirdly *Microdinium*, fourthly *Microdinium?*, fifthly (and now) *Rhiptocorys*, sixthly *Phanerodinium*, seventhly *Phanerodinium?*. Questionable assignment: Stover and Evitt (1978, p.66) as a problematic species. Taxonomic junior synonyms: *Microdinium irregulare* and *Ceratocorys* (as *Microdinium*, now *Rhiptocorys*) *smolenskiensis*, both according to Below (1987b, p.56) — however, Lentin and Vozzhennikova (1990, p.112) retained *Ceratocorys* (as *Rhiptocorys*) *smolenskiensis*. Age: Senonian.

wakuraense Fuji, 1966, p.62, pl.12, fig.3. Holotype: Fuji, 1966, pl.12, fig.3. Age: late Miocene.

"**MICRODISTEPHANUS**" Filipescu, 1959, p.168. Siliceous dinoflagellate genus. **Name not validly published:** type not designated. **Taxonomic senior synonym:** *Actiniscus*, according to Dumitrică (1973, p.820). This name was not validly published in Filipescu (1943, p.264) since no species were proposed. Type: not designated.

"*ellipticus*" Filipescu, 1959, p.170, pl.1, fig.7. Holotype: Filipescu, 1959, pl.1, fig.7, as *Microdistephanus ellipticus* var. *uniornatus*. **Name not validly published:** the generic name *Microdistephanus* is not validly published. Age: Miocene.

"var. *uniornatus*" Filipescu, 1959, p.170, pl.1, fig.7. Holotype: Filipescu, 1959, pl.1, fig.7. **Name not validly published:** the species name *Microdistephanus ellipticus* is not validly published. **Nomenclatural senior synonym:** *Microdistephanus ellipticus* var. *ellipticus*. Age: Miocene.

"*hexaradiatus*" Filipescu, 1959, p.170, pl.1, fig.6. Holotype: Filipescu, 1959, pl.1, fig.6, as *Microdistephanus hexaradiatus* var. *triornatus*. **Name not validly published:** the generic name *Microdistephanus* is not validly published. Age: Miocene.

"var. *triornatus*" Filipescu, 1959, p.170, pl.1, fig.6. Holotype: Filipescu, 1959, pl.1, fig.6. **Name not validly published:** the species name *Microdistephanus hexaradiatus* is not validly published.

Nomenclatural senior synonym: *Microdistephanus hexaradiatus* var. *hexaradiatus* which has the same holotype. Age: Miocene.

"*pentaradiatus*" Filipescu, 1959, p.168–169, pl.1, figs.2–5. Holotype: Filipescu, 1959, not designated. **Name not validly published:** the generic name *Microdistephanus* is not validly published and additionally since Filipescu (1959) did not designate a holotype. Age: Miocene.

"var. *biannelatus*" Filipescu, 1959, p.169, pl.1, fig.2. Holotype: Filipescu, 1959, pl.1, fig.2. **Name not validly published:** the specific name *Microdistephanus pentaradiatus* is not validly published. Age: Miocene.

"var. *biornatus*" Filipescu, 1959, p.169, pl.1, fig.4. Holotype: Filipescu, 1959, pl.1, fig.4. **Name not validly published:** the specific name *Microdistephanus pentaradiatus* is not validly published. Age: Miocene.

"var. *triornatus*" Filipescu, 1959, p.169, pl.1, fig.5. Holotype: Filipescu, 1959, pl.1, fig.5. **Name not validly published:** the specific name *Microdistephanus pentaradiatus* is not validly published. Age: Miocene.

"var. *uniornatus*" Filipescu, 1959, p.169, pl.1, fig.3. Holotype: Filipescu, 1959, pl.1, fig.3. **Name not validly published:** the specific name *Microdistephanus pentaradiatus* is not validly published. Age: Miocene.

"*stellatus*" Filipescu, 1959, p.168, pl.1, fig.1. Holotype: Filipescu, 1959, pl.1, fig.1. **Name not validly published:** the generic name *Microdistephanus* is not validly published. Age: Miocene.

MICROSPHAERIDIUM Benedek, 1972, p.46–47. Type: Benedek, 1972, pl.12, figs.3a–b, as *Microsphaeridium ancistroides*.

**ancistroides* Benedek, 1972, p.47, pl.12, figs.3a–b; text-fig.21. Holotype: Benedek, 1972, pl.12, figs.3a–b; Benedek and Sarjeant, 1981, fig.10, no.4; Sarjeant et al., 1987, pl.2, fig.3. Benedek and Sarjeant (1981, p.347) recommended that this name be restricted to the holotype. Brinkhuis et al. (1992, p.238) considered *Distatodinium biffii* to be a possible taxonomic junior synonym of this species. Age: late Oligocene.

MIKROCYSTA Bjaerke, 1980, p.71. Emendation: Below, 1987b, p.13–14. Type: Bjaerke, 1980, pl.5, fig.10, as *Mikrocysta erugata*.

bjaerkei Below, 1987b, p.14–16, pl.2, figs.1–15; pl.3, figs.1–6,11; text-figs.3a–b. Holotype: Below, 1987b, pl.2, figs.1–2,4; Fensome et al., 1993a, figs.1–3 — p.981. Age: Toarcian.

**erugata* Bjaerke, 1980, p.71–72, pl.5, figs.10–11. Emendation: Below, 1987b, p.16–17. Holotype: Bjaerke, 1980, pl.5, fig.10; Fensome et al., 1993a, fig.1 — p.1145. Age: Toarcian.

granulata Below, 1987b, p.18–19, pl.3, figs.12–15. Holotype: Below, 1987b, pl.3, figs.13,15; Fensome et al., 1993a, figs.2,4 — p.1223. Age: late Pliensbachian–Toarcian.

rugosa Below, 1987b, p.19, pl.3, figs.7–10. Holotype: Below, 1987b, pl.3, figs.7–10; Fensome et al., 1993a, figs.1–2 — p.1307. Age: Toarcian.

MIKROPITHON Agelopoulos, 1967, p.51. Type: Agelopoulos, 1967, pl.10, fig.7, as *Mikropithon amniophorum*.

**amniophorum* Agelopoulos, 1967, p.51–52, pl.10, figs.6–8. Holotype: Agelopoulos, 1967, pl.10, fig.7. Age: Eocene.

"**MILLIOUDODINIUM**" Stover and Evitt, 1978, p.173. Emendation: Sarjeant, 1982b, p.39. **Taxonomic senior synonym:** *Cribroperidinium*, according to Duxbury (1980, p.122) and Lentin and Williams (1993, p.430). Type: Sarjeant, 1966b, pl.15, figs.1–2; text-fig.33, as *Gonyaulacysta fetchamensis*.

"**aequum**" Mao Shaozhi and Norris, 1988, p.35, pl.2, figs.17–19; text-fig.9. Holotype: Mao Shaozhi and Norris, 1988, pl.2, fig.17. **NOW** *Cribroperidinium?*. Originally *Millioudodinium?*, subsequently (and now) *Cribroperidinium?*. Questionable assignment: Mao Shaozhi and Norris (1988, p.35). Age: Late Cretaceous.

"**aichmetes**" (Sarjeant, 1966b, p.123–124, pl.13, figs.5–6; text-fig.30) Stover and Evitt, 1978, p.173. Holotype: Sarjeant, 1966b, pl.13, figs.5–6; text-fig.30; Jan du Chêne et al., 1986a, pl.20, figs.5–7. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*. Age: late Barremian.

"**ambiguum**" (Deflandre, 1939b, p.144, pl.6, fig.2) Stover and Evitt, 1978, p.173. Holotype: Deflandre, 1939b, pl.6, fig.2; Jan du Chêne et al., 1986a, pl.68, figs.1–3. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Leptodinium*. Age: Kimmeridgian.

"**apione**" (Cookson and Eisenack, 1958, p.36, pl.3, fig.7; text-figs.3–4) Stover and Evitt, 1978, p.173. Holotype: Cookson and Eisenack, 1958, text-figs.3–4; Jan du Chêne et al., 1986a, pl.33, fig.6. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribroperidinium*. Taxonomic senior synonym: *Gonyaulax* (now *Cribroperidinium*) *edwardsii*, according to Burger (1980a, p.82) — however, Jan du Chêne et al. (1986a, p.76) retained *Gonyaulax* (as *Cribroperidinium*) *apione*. Age: Albian.

"**bacculatum**" (Balteş, 1971, p.3, pl.1, figs.4–5) Stover and Evitt, 1978, p.173. Holotype: Balteş, 1971, pl.1, figs.4–5. **NOW** *Leptodinium?*. Originally *Leptodinium*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis?*, fourthly (and now) *Leptodinium?*. Age: early Pliocene.

"**baltesii**" Sütő-Szentai, 1990, p.851,853, pl.5, fig.3; text-fig.77b, nos.1–2. Holotype: Sütő-Szentai, 1990, pl.5, fig.3; text-fig.77b, nos.1–2. **Name not validly published:** lodgement of holotype not specified (I.C.N. Article 40.7). Age: late Miocene.

"**birkelundiae**" (Fensome, 1979, p.38–40, pl.5, figs.5,8,11; text-figs.14A–C) Lentin and Williams, 1981, p.189. Holotype: Fensome, 1979, pl.5, figs.5,8,11; text-figs.14A–B; Jan du Chêne et al., 1986a, pl.24, figs.1–3. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium?*. Age: Portlandian.

"**boreas**" (Davey, 1974, p.52–53, pl.4, figs.1–4; pl.7, fig.5) Stover and Evitt, 1978, p.174. Holotype: Davey, 1974, pl.4, figs.1–4; Jan du Chêne et al., 1986a, pl.21, figs.1–4. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly (and now) *Cribroperidinium*. Questionable assignment: Stover and Evitt (1978, p.174). N.I.A. Age: late Barremian.

"**cauda**" (Gitmez and Sarjeant, 1972, p.193–194, pl.2, figs.1–2,4–5) Stover and Evitt, 1978, p.173. Holotype: Gitmez and Sarjeant, 1972, pl.2, figs.1–2. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribroperidinium?*. **Taxonomic senior synonym:** *Gonyaulacysta* (as and now *Cribroperidinium*) *globata*, according to Poulsen (1996, p.72). N.I.A. Age: early–late Kimmeridgian.

"**confossum**" (Duxbury, 1977, p.33, pl.2, figs.2–4) Sarjeant, 1982b, p.39. Holotype: Duxbury, 1977, pl.2, figs.3–4; Jan du Chêne et al., 1986a, pl.19, fig.5. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Cribroperidinium?*, fourthly (and now) *Cribroperidinium*. Age: late Hauterivian.

"**confusum**" (Vozzhennikova, 1967, p.80, pl.17, figs.1a–b; pl.25, figs.4–5; pl.27, figs.3–4) Stover and Evitt, 1978, p.174. Holotype: Vozzhennikova, 1967, pl.25, fig.5, lost according to Lentin and Vozzhennikova (1990, p.93).

NOW *Apteodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Apteodinium*. Questionable assignment: Stover and Evitt (1978, p.174). Age: Late Jurassic.

"**crispum**" (Wetzel, 1967a, p.870, pl.15, figs.4a–b) Stover and Evitt, 1978, p.173. Emendations: Sarjeant, 1980b, p.119–120, as *Hystrichogonyaulax crista*; Fenton, 1981, p.255–256, as *Cribroperidinium crispum*. Holotype: Wetzel, 1967a, pl.15, figs.4a–b; Dietz et al., 1999, text-fig.5a. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Hystrichogonyaulax*, fifthly (and now) *Cribroperidinium*, sixthly *Acanthaulax*. Age: Middle Jurassic.

"**cristatum**" (Riley in Fisher and Riley, 1980, p.320, pl.1, figs.8,12) Fisher and Riley, 1982, p.53. Holotype: Fisher and Riley, 1980, pl.1, figs.8,12; Jan du Chêne et al., 1986a, pl.67, fig.20. **NOW** *Leptodinium volgense*. Originally *Gonyaulacysta cristata*, subsequently *Leptodinium cristatum* (combination illegitimate), thirdly (and now) *Leptodinium volgense*, fourthly *Millioudodinium cristatum*, fifthly *Cribroperidinium cristatum* (combination not validly published). Age: Volgian.

"**deflandrei**" (Riley in Fisher and Riley, 1980, p.320–321, pl.1, figs.1–2) Fisher and Riley, 1982, p.53. Holotype: Fisher and Riley, 1980, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.75, fig.7. **NOW** *Leptodinium*. Originally *Gonyaulacysta*, subsequently (and now) *Leptodinium*, thirdly *Millioudodinium*. Age: Volgian.

"**dektense**" Sütő-Szentai, 1990, p.853–854, pl.5, figs.4–5; text-figs.77c,78c. Holotype: Sütő-Szentai, 1990, pl.5, fig.4; text-fig.78c. **Name not validly published**: lodgement of holotype not specified (I.C.N. Article 40.7). Age: late Miocene.

"**diutinum**" (Duxbury, 1977, p.34–35, pl.1, figs.3–4; text-fig.9) Sarjeant, 1982b, p.39. Holotype: Duxbury, 1977, pl.1, fig.3; text-fig.9; Jan du Chêne et al., 1986a, pl.41, figs.3–4. **NOW** *Wrevittia?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly (and now) *Wrevittia?*. Questionable assignment: Sarjeant (1982b, p.39). Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*, now *Wrevittia*) *helicoidea*, according to Stover and Helby (1987d, p.287) — however, Jan du Chêne et al. (1986a, p.130) and Lentin and Williams (1989, p.152) retained *Gonyaulacysta diutina*. Age: Berriasian–Hauterivian.

"**ehrenbergii**" (Gitmez, 1970, p.252–254, pl.2, figs.8–9; text-fig.8) Stover and Evitt, 1978, p.173. Holotype: Gitmez, 1970, pl.2, figs.8–9; text-fig.8, lost according to Jan du Chêne et al. (1986a, p.80). **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium?*. Age: early Kimmeridgian.

"**episomum**" (Sarjeant, 1966b, p.118–119, pl.13, figs.9–10; text-fig.27) Stover and Evitt, 1978, p.173. Holotype: Sarjeant, 1966b, pl.13, figs.9–10; text-fig.27; Jan du Chêne et al., 1986a, pl.67, figs.15–16. **NOW** *Leptodinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium*. Age: late Barremian.

"**exanguium**" (Duxbury, 1977, p.35–36, pl.1, figs.6–7; text-fig.10) Sarjeant, 1982b, p.39. Emendation: Harding, 1990b, p.31–32, as *Gonyaulacysta exanguia*. Holotype: Duxbury, 1977, pl.1, fig.6; text-fig.10b; Jan du Chêne et al., 1986a, pl.40, figs.1–3. **NOW** *Stanfordella*. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly (and now) *Stanfordella*. Questionable assignment: Sarjeant (1982b, p.39). Age: Hauterivian–Barremian.

"**fetchamense**" (Sarjeant, 1966b, p.128,130, pl.15, figs.1–2; text-fig.33) Stover and Evitt, 1978, p.173. Holotype: Sarjeant, 1966b, pl.15, figs.1–2; text-fig.33; Helenes, 1984, text-figs.4A–B; Jan du Chêne et al., 1986a, pl.20, figs.1–4; Fensome et al., 1993a, figs.1–2 — p.1189. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium*. Age: early Cenomanian.

"**foveolatum**" Sütő-Szentai, 1982a, p.211–212,219, pl.2, figs.1–5. Holotype: Sütő-Szentai, 1982a, pl.2, fig.1. **NOW** *Apteodinium?*. Originally *Millioudodinium*, subsequently (and now) *Apteodinium?*. Age: late Miocene.

"**gigas**" (Raynaud, 1978, p.392–393, pl.2, fig.16) Lentin and Williams, 1981, p.190. Holotype: Raynaud, 1978, pl.2, fig.16; Jan du Chêne et al., 1986a, pl.30, fig.6. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium?*. N.I.A. Age: late Kimmeridgian–Portlandian.

"?**giuseppeii**" (Morgenroth, 1966a, p.5, pl.2, figs.3–6) Stover and Evitt, 1978, p.174. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Cribroperidinium*. Questionable assignment: Stover and Evitt (1978, p.174). Age: early Eocene.

"subsp. **giuseppeii**". Autonym. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **Now redundant**. Originally *Gonyaulax giuseppeii* subsp. *giuseppeii* (Appendix B), subsequently *Gonyaulacysta giuseppeii* subsp. *giuseppeii*, thirdly *Millioudodinium? giuseppeii* subsp. *giuseppeii*, fourthly *Rhynchodiniopsis? giuseppeii* subsp. *giuseppeii*, fifthly *Cribroperidinium giuseppeii* subsp. *giuseppeii*. Taxonomic junior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *giuseppeii* subsp. *major*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81).

"subsp. **majus**" (Morgenroth, 1966a, p.6, pl.2, figs.5–6) Stover and Evitt, 1978, p.174. Holotype: Morgenroth, 1966a, pl.2, figs.5–6. Originally *Gonyaulax giuseppeii* subsp. *major* (Appendix B), subsequently *Gonyaulacysta giuseppeii* subsp. *major*, thirdly *Millioudodinium? giuseppeii* subsp. *majus*, fourthly *Rhynchodiniopsis? giuseppeii* subsp. *major*, fifthly *Cribroperidinium giuseppeii* subsp. *major*. **Taxonomic senior synonym:** *Gonyaulax* (as *Rhynchodiniopsis*) *giuseppeii* subsp. *giuseppeii*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81). Age: early Eocene.

"**globatum**" (Gitmez and Sarjeant, 1972, p.195,197, pl.3, figs.1–2; text-figs.5A–B) Stover and Evitt, 1978, p.173. Holotype: Gitmez and Sarjeant, 1972, pl.3, fig.1; text-fig.5A; Jan du Chêne et al., 1986a, pl.29, fig.3. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribroperidinium?*, fifthly (and now) *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulacysta cauda* and *Gonyaulacysta systremmata*, both according to Poulsen (1996, p.72). Age: middle-late Kimmeridgian.

"?**globosum**" (Brideaux, 1971, p.81, pl.23, figs.37–38; text-figs.7g–h) Stover and Evitt, 1978, p.174. Holotype: Brideaux, 1971, pl.23, figs.37–38; text-fig.7g; Jan du Chêne et al., 1986a, pl.28, figs.10–11. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly (and now) *Cribroperidinium?*. Questionable assignment: Stover and Evitt (1978, p.174). Age: middle-late Albian.

"?**gottisii**" (Dupin, 1968, p.4, pl.1, figs.7–12) Stover and Evitt, 1978, p.174. Holotype: Dupin, 1968, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.12, fig.11; pl.94, figs.9–10. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly *Apteodinium*. Questionable assignment: Stover and Evitt (1978, p.174). **Taxonomic senior synonym:** *Gonyaulax* (now *Rhynchodiniopsis*) *cladophora*, according to Jan du Chêne et al. (1986a, p.48) and Jan du Chêne and Fauconnier (1986, p.55). Age: Late Jurassic.

"**gracillimum**" Sütő-Szentai, 1983, p.21, pl.3, fig.7. **Name not validly published:** no description.

"**granomembranaceum**" Matsuoka, 1983b, p.121–122, pl.1, figs.1a–c,2,3a–b,4a–b,5a–b; text-figs.14A–B. Holotype: Matsuoka, 1983b, pl.1, figs.1a–c; Jan du Chêne et al., 1986a, pl.27, figs.1–2. **NOW** *Cribroperidinium?*. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium?*. Age: early–early middle Miocene.

"**hadra**" (Sarjeant, 1966b, p.119–121, pl.14, fig.1; text-fig.28) Stover and Evitt, 1978, p.173. Holotype: Sarjeant, 1966b, pl.14, fig.1. **NOW** *Leptodinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium?*. N.I.A. Age: late Barremian.

"?**italicum**" (Corradini, 1973, p.132–133, pl.19, figs.8a–b; pl.33, figs.5a–b; text-figs.3a–d) Stover and Evitt, 1978, p.174. Holotype: Corradini, 1973, pl.19, figs.8a–b; text-figs.3a–d; Jan du Chêne et al., 1986a, pl.98, fig.11. **NOW** *Rhynchodiniopsis?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis?*. Questionable assignment: Stover and Evitt (1978, p.174). Age: Late Cretaceous–Paleocene.

- "*jamborü*" Sütő-Szentai, 1988, p.356, pl.4, fig.4. **Name not validly published**: no description. Age: late Miocene.
- "*jubaris*" Davies, 1983, p.19, pl.5, figs.13–20; text-fig.13. Holotype: Davies, 1983, pl.5, fig.16; Jan du Chêne et al., 1986a, pl.150, figs.17–18. **NOW** *Cribroperidinium*. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium*. N.I.A. Age: Tithonian.
- "*kashiense*" He Chengquan, 1991, p.108–109, pl.4, figs.34–37. Holotype: He Chengquan, 1991, pl.4, fig.37. **NOW** *Cribroperidinium*. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium*. Age: Paleocene–Eocene.
- "*longicorne*" (Downie, 1957, p.420, pl.20, fig.8; text-figs.2a–b) Sarjeant, 1982b, p.39. Holotype: Downie, 1957, pl.20, fig.8; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.30, fig.1. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly *Millioudodinium*, fifthly (and now) *Cribroperidinium?*. Age: late Kimmeridgian.
- "*lorentheyi*" Sütő-Szentai, 1988, p.355, pl.3, fig.1. **Name not validly published**: no description. Age: late Miocene.
- "*?mamilliferum*" (Deflandre, 1939b, p.143, pl.6, fig.1) Stover and Evitt, 1978, p.174. Holotype: Deflandre, 1939b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.72, figs.1–8. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Leptodinium*. Questionable assignment: Stover and Evitt (1978, p.174). Age: Kimmeridgian.
- "*?mecsekense*" (Nagy, 1969, p.292, pl.1, figs.6,8) Stover and Evitt, 1978, p.174. Holotype: Nagy, 1969, pl.1, figs.6,8; Jan du Chêne et al., 1986a, pl.11, figs.10–12. **NOW** *Apteodinium*. Originally *Palaeoperidinium*, subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly (and now) *Apteodinium*. Questionable assignment: Stover and Evitt (1978, p.174). Age: late Miocene.
- "*monacanthum*" (Deflandre, 1936b, p.176–177, pl.5, fig.10 ex Sarjeant, 1967b, p.252) Stover and Evitt, 1978, p.174. Holotype: Deflandre, 1935, pl.6, fig.1; Deflandre, 1936b, pl.5, fig.10; lost according to Jan du Chêne et al. (1986a, p.48). **NOW** *Apteodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Apteodinium*, fifthly (and now) *Apteodinium?*. Age: Senonian.
- "*nuciforme*" (Deflandre, 1939a, p.180, pl.8, figs.4–6 ex Sarjeant, 1962a, p.482–483) Sarjeant, 1982b, p.39. Holotype: Deflandre, 1939a, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.11, figs.1–3. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulax* (Appendix B), thirdly *Gonyaulacysta*, fourthly *Apteodinium*, fifthly *Millioudodinium*, sixthly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Palaeoperidinium nuciformoides*, according to Sarjeant (1968, p.227). Age: Oxfordian.
- "*obesum*" (Brideaux, 1971, p.82, pl.23, fig.39; text-figs.8a–b) Stover and Evitt, 1978, p.174. Holotype: Brideaux, 1971, pl.23, fig.39; text-figs.8a–b; Jan du Chêne et al., 1986a, pl.30, fig.9. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Cribroperidinium?*. Age: late Albanian.
- "*obscurum*" (Lejeune-Carpentier, 1946, p.B191, figs.3–5) Sarjeant, 1982b, p.39. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.4, as *Gonyaulacysta? obscura*. Holotype: Lejeune-Carpentier, 1946, figs.3–4; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.3–4; text-fig.2. **NOW** *Gonyaulacysta?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Gonyaulacysta?*, fourthly *Millioudodinium*. Age: Senonian.
- "*ordocavum*" (Duxbury, 1977, p.37–38, pl.1, figs.10–11; text-fig.12) Sarjeant, 1982b, p.39. Holotype: Duxbury, 1977, pl.1, figs.10–11; text-fig.12; Jan du Chêne et al., 1986a, pl.41, figs.1–2. **NOW** *Stanfordella*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Stanfordella*. Age: early–late Hauterivian.
- "*?palla*" (Sarjeant, 1966b, p.113–114, pl.13, figs.3–4; text-fig.24) Stover and Evitt, 1978, p.174. Holotype: Sarjeant, 1966b, pl.13, figs.3–4; Jan du Chêne et al., 1986a, pl.27, figs.15–17. **NOW** *Cribroperidinium*. Originally

Gonyaulacysta, subsequently *Millioudodinium*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Cribroperidinium*. Questionable assignment: Below (1981a, p.58). N.I.A. Age: early Barremian.

"*?panonicum*" (Nagy, 1965, p.200–201, pl.1, figs.1–2; pl.2, fig.10; text-figs.1–2) Stover and Evitt, 1978, p.174. Holotype: Nagy, 1965, pl.1, figs.1–2; pl.2, fig.10; Jan du Chêne et al., 1986a, pl.31, figs.1–4. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. Questionable assignment: Stover and Evitt (1978, p.174). Age: early Pliocene.

"*parorthoceras*" (Davey, 1968, p.1) Stover and Evitt, 1978, p.174. Holotype: Sarjeant, 1966b, pl.14, figs.5–6; text-fig.29, as *Gonyaulacysta orthoceras*; Jan du Chêne et al., 1986a, pl.26, figs.6–8. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Cribroperidinium?*. Age: late Barremian.

"*pelagicum*" Sütő-Szentai, 1990, p.854, pl.4, fig.3; text-fig.78d. Holotype: Sütő-Szentai, 1990, pl.4, fig.3; text-fig.78d. **Name not validly published**: lodgement of holotype not specified (I.C.N. Article 40.7). This name was also not validly published in Sütő-Szentai (1982a, pl.4, figs.3–4), since that author did not provide a description. Age: late Miocene.

"*pennatum*" (Riley in Fisher and Riley, 1980, p.321–322, pl.1, figs.10–11) Fisher and Riley, 1982, p.53. Holotype: Fisher and Riley, 1980, pl.1, figs.10–11; Jan du Chêne et al., 1986a, pl.98, fig.5. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulacysta*, subsequently *Hystrihogonyaulax*, thirdly *Millioudodinium*, fourthly (and now) *Rhynchodiniopsis*. Age: late Kimmeridgian.

"*punctatum*" (Balteş, 1971, p.3, pl.1, figs.2–3,6–7) Stover and Evitt, 1978, p.174. **Name not validly published**: holotype not designated. Originally *Leptodinium* (name not validly published), subsequently *Millioudodinium* (name not validly published). Age: early Pliocene.

"*quadratum*" Sütő-Szentai, 1988, p.349,351. **Name not validly published**: no description. Age: late Miocene.

"*saetigerum*" McIntyre and Brideaux, 1980, p.15, pl.2, figs.2–3,7. Holotype: McIntyre and Brideaux, 1980, pl.3, figs.2–3,7; Jan du Chêne et al., 1986a, pl.24, figs.4–6. **NOW** *Cribroperidinium?*. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium?*. Age: Valanginian.

"*sarjeantii*" (Vozzhennikova, 1967, p.87–89, pl.25, figs.1–2; pl.28, fig.4; pl.31, figs.1a–b,2a–b,3; pl.32, figs.1,2a–c,3,4a–b) Stover and Evitt, 1978, p.174. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium?*, sixthly (and now) *Cribroperidinium*. Age: Tithonian.

"subsp. *sarjeantii*". Autonym. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **NOW** *Cribroperidinium sarjeantii* subsp. *sarjeantii*. Originally *Gonyaulacysta sarjeantii* subsp. *sarjeantii*, subsequently *Millioudodinium sarjeantii* subsp. *sarjeantii*, thirdly *Rhynchodiniopsis sarjeantii* subsp. *sarjeantii*, fourthly *Cribroperidinium? sarjeantii* subsp. *sarjeantii*, fifthly (and now) *Cribroperidinium sarjeantii* subsp. *sarjeantii*.

"subsp. *sphaericum*" (Vozzhennikova, 1967, p.89, pl.25, figs.1–2; pl.28, fig.4; pl.32, figs.1–4) Stover and Evitt, 1978, p.174. Holotype: Vozzhennikova, 1967, pl.28, fig.4; Jan du Chêne et al., 1986a, pl.20, fig.9; lost according to Lentin and Vozzhennikova (1990, p.97). Lectotype: Lentin and Vozzhennikova, 1990, pl.16, figs.1–2, designated by Lentin and Vozzhennikova (1990, p.97). **NOW** *Cribroperidinium sarjeantii* subsp. *sphaericum*. Originally *Gonyaulax sarjeantii* var. *sphaerica* (Appendix B), subsequently *Gonyaulacysta sarjeantii* subsp. *sphaerica*, thirdly *Millioudodinium sarjeantii* subsp. *sphaericum*, fourthly

Rhynchodiniopsis sarjeantii subsp. *sphaerica*, fifthly *Cribroperidinium?* *sarjeantii* subsp. *sphaericum*, sixthly (and now) *Cribroperidinium sarjeantii* subsp. *sphaericum*. Age: Tithonian.

"?*scottii*" (Cookson and Eisenack, 1958, p.30, pl.2, figs.5–6) Stover and Evitt, 1978, p.174. Holotype: Cookson and Eisenack, 1958, pl.2, fig.5; Jan du Chêne et al., 1986a, pl.33, fig.5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. Questionable assignment: Stover and Evitt (1978, p.174). Age: early-middle Kimmeridgian.

"*spinoreticulatum*" McIntyre and Brideaux, 1980, p.15–16, pl.3, figs.4,8–12. Holotype: McIntyre and Brideaux, 1980, pl.3, figs.4,9,12; Jan du Chêne et al., 1986a, pl.13, figs.9–11. **NOW** *Cribroperidinium*. Originally *Millioudodinium*, subsequently *Apteodinium*, thirdly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Gonyaulacysta* (as *Apteodinium*) *compta*, according to Lucas-Clark (1987, p.178). Age: Valanginian.

"*systemmatum*" (Gitmez and Sarjeant, 1972, p.204–205, pl.5, figs.7–8) Sarjeant, 1982b, p.39. Holotype: Gitmez and Sarjeant, 1972, pl.5, figs.7–8; Jan du Chêne et al., 1986a, pl.29, figs.4–7. Originally *Gonyaulacysta*, subsequently *Cribroperidinium*, thirdly *Millioudodinium*, fourthly *Cribroperidinium?*, fifthly *Acanthaulax*. **Taxonomic senior synonym:** *Gonyaulacysta* (as and now *Cribroperidinium*) *globata*, according to Poulsen (1996, p.72). Age: early Kimmeridgian.

"*tenuitabulatum*" (Gerlach, 1961, p.159, pl.25, figs.10–11; text-figs.1–3) Stover and Evitt, 1978, p.174. Emendation: Sarjeant, 1984b, p.76, as *Rhynchodiniopsis tenuitabulata*. Holotype: Gerlach, 1961, pl.25, figs.10–11, lost according to Sarjeant (1984b, p.78). Lectotype: Sarjeant, 1984b, pl.2, fig.2, designated by Sarjeant (1984b, p.78). **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribroperidinium*, fifthly *Rhynchodiniopsis*. Age: middle Oligocene–middle Miocene.

"*transdanuvianum*" Sütő-Szentai, 1990, p.855, pl.4, figs.1a–b,2; text-fig.78b. Holotype: Sütő-Szentai, 1990, pl.4, fig.2; text-fig.78b. **Name not validly published:** lodgement of holotype not specified (I.C.N. Article 40.7). This name was also not validly published in Sütő-Szentai (1989, pl.7, fig.1), since that author did not provide a description. Age: late Miocene.

"*unicarpum*" Kar, 1992, p.341. **Name not validly published:** no description or illustration.

"*unicornum*" Kar, 1985, p.206, pl.49, fig.8. Emendation: Jain and Garg, 1991, p.72–73, as *Apteodinium unicornum*. Holotype: Kar, 1985, pl.49, fig.8. **NOW** *Apteodinium*. Originally *Millioudodinium*, subsequently (and now) *Apteodinium*. Age: Miocene.

"?*venulosum*" Mao Shaozhi and Norris, 1988, p.34–35, pl.3, figs.1–2; text-fig.9. Holotype: Mao Shaozhi and Norris, 1988, pl.3, fig.1. **NOW** *Cribroperidinium?*. Originally *Millioudodinium?*, subsequently (and now) *Cribroperidinium?*. Questionable assignment: Mao Shaozhi and Norris (1988, p.34). Age: Late Cretaceous.

"*wetzelii*" (Lejeune-Carpentier, 1939, p.B526; text-figs.1–2) Sarjeant, 1985b, p.137. Emendations: Lejeune-Carpentier, 1946, p.B189–B190, as *Gonyaulax wetzelii*; Lejeune-Carpentier and Sarjeant, 1981, p.2–3, as *Gonyaulacysta wetzelii*. Holotype: Lejeune-Carpentier, 1939, text-figs.1–2; Lejeune-Carpentier and Sarjeant, 1981, pl.5, figs.5–6. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly (and now) *Cribroperidinium*, fifthly *Millioudodinium*. Age: Senonian.

"*xinjiangense*" He Chengquan, 1991, p.109, pl.4, fig.21. Holotype: He Chengquan, 1991, pl.4, fig.21. **NOW** *Cribroperidinium*. Originally *Millioudodinium*, subsequently (and now) *Cribroperidinium*. Age: Paleocene–late Eocene.

MINISPHAERIDIUM Fensome et al., 2009, p.44. Type: Davey and Williams, 1966b, pl.10, fig.8, as *Hystrichosphaeridium latirictum*.

**latirictum* (Davey and Williams, 1966b, p.66–67, pl.10, fig.8) Fensome et al., 2009, p.44. Holotype: Davey and Williams, 1966b, pl.10, fig.8; Bujak et al., 1980, pl.8, figs.4–5. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Minisphaeridium*. Taxonomic junior synonyms: *Cordosphaeridium minimum* (al. *Cordosphaeridium inodes* subsp. *minimum*) according to Fensome et al. (2009, p.44) — the epithet *latirictum* has priority at specific rank over the epithet *minimum*; *Litosphaeridium? parvum*, according to Fensome et al. (2009, p.44). Age: early Eocene.

MOESIODINIUM Antonescu, 1974, p.62. Emendation: Below, 1987a, p.129. Taxonomic junior synonym: *Angustidinium*, according to Below (1987a, p.129) — however, Lentin and Williams (1989, p.17) retained *Angustidinium*. Type: Antonescu, 1974, pl.1, figs.5–8,10–12, as *Moesiodinium raileanui*.

"*acribes*" (Davey and Verdier, 1971, p.38–39, pl.2, figs.10,12) Below, 1987a, p.129. Emendation: Goodman and Evitt, 1981, p.48,50,52–53, as *Angustidinium acribes*. Holotype: Davey and Verdier, 1971, pl.2, fig.10; Fensome et al., 1993a, fig.1 — p.875. **NOW** *Angustidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Alterbia?* (combination illegitimate), fourthly (and now) *Angustidinium*, fifthly *Moesiodinium*. Age: early Albanian.

**raileanui* Antonescu, 1974, p.62–63, pl.1, figs.1–16. Holotype: Antonescu, 1974, pl.1, figs.5–8,10–12. Age: Middle Jurassic.

"*vozhennikovae*" Below, 1987a, p.130–131, pl.19, figs.1–10; text-figs.69a–f. Holotype: Below, 1987a, pl.19, figs.1,4–6,8; Fensome et al., 1993a, figs.1,3–6 — p.1381. **NOW** *Angustidinium*. Originally *Moesiodinium*, subsequently (and now) *Angustidinium*. Age: early–late Volgian.

MOMBASADINIUM Riding and Helby, 2001f, p.159–160,162. Type: Jiang Qinghua et al., 1992, pl.2, fig.10, as *Indodinium? parvelatum*.

**parvelatum* (Jiang Qinghua in Jiang Qinghua et al., 1992, p.85,87, pl.2, fig.10) Riding and Helby, 2001f, p.162. Emendation: Riding and Helby, 2001f, p.162, as *Mombasadinium parvelatum*. Holotype: Jiang Qinghua et al., 1992, pl.2, fig.10. Originally *Indodinium?*, subsequently (and now) *Mombasadinium*. Taxonomic junior synonym: *Omatia jurabiana* (name not validly published), according to Riding and Helby (2001f, p.162). Age: Kimmeridgian–Tithonian.

MONTANAROCYSTA Corradini, 1973, p.183. Emendation: Slimani, 2004, p.177. Type: Corradini, 1973, pl.30, figs.3a–b, as *Montanarocysta aemiliana*.

**aemiliana* Corradini, 1973, p.183–184, pl.30, figs.2,3a–b. Emendation: Slimani, 2004, p.177,179–180. Holotype: Corradini, 1973, pl.30, figs.3a–b. Age: Late Cretaceous–Paleocene.

chleuh (Below, 1981a, p.22–23, pl.1, figs.5a–b; pl.12, fig.5; text-figs.13a–b) Slimani, 2004, p.181. Emendation: Masure, 1988a, p.365–366, as *Maghrebina chleuh*. Holotype: Below, 1981a, pl.1, figs.5a–b; text-figs.13a–b; Masure, 1988a, pl.2, figs.1–8; text-figs.3a–b; Fensome et al., 1991, figs.1–4 — p.619; Fauconnier and Masure, 2004, pl.9, figs.1–3. Originally *Maghrebina*, subsequently *Atopodinium*, thirdly (and now) *Montanarocysta*. N.I.A. Age: Vraconian–Cenomanian.

mirabilis (Below, 1984, p.635–636, pl.6, fig.2) Slimani, 2004, p.181,182. Emendation: Masure, 1988a, p.366–368, as *Maghrebina mirabilis*. Holotype: Below, 1981a, pl.1, figs.1a–c, as *Maghrebina perforata*; Masure, 1988a, pl.3, figs.1–11; text-figs.4a–c; Fauconnier and Masure, 2004, pl.10, figs.1–4. Originally *Maghrebina perforata* subsp. *mirabilis*, subsequently *Maghrebina mirabilis*, thirdly *Atopodinium mirabile*, fourthly (and now) *Montanarocysta mirabilis*. Age: late Albian–early Cenomanian.

MOORODINIUM Backhouse, 1988, p.97. Fensome et al. (1991, p.359) argued that the correct spelling should be "*Mooradinium*", as opposed to the protologue rendition "*Moorodinium*"; however, Fensome et al. (1996, p.2015–2016), reconsidered and recommended that the spelling "*Moorodinium*" be retained. Type: Backhouse, 1988, pl.34, fig.8; text-fig.30E, as *Moorodinium spinatum*.

peregrinum Backhouse, 1988, p.97,99, pl.33, figs.1a–b,2,3a–b,4–5; pl.48, figs.5–6; text-figs.30A–C. Holotype: Backhouse, 1988, pl.33, figs.1a–b; text-fig.30A; Fensome et al., 1996, figs.1–2,8 — p.2265. Age: late Tithonian–?earliest Valanginian.

quindalupense Backhouse, 1988, p.99, pl.33, figs.6–10; pl.34, fig.1. Holotype: Backhouse, 1988, pl.33, fig.9; Fensome et al., 1996, fig.3 — p.2313. Age: early Barremian.

simplex Backhouse, 1988, p.99–100, pl.34, figs.2–5. Holotype: Backhouse, 1988, pl.34, fig.4; Fensome et al., 1996, fig.3 — p.2361. Age: late Tithonian–?earliest Valanginian.

***spinatum** Backhouse, 1988, p.100, pl.34, figs.6–14; pl.47, fig.9; pl.48, figs.7–10; text-figs.30D–F. Holotype: Backhouse, 1988, pl.34, fig.8; text-fig.30E; Fensome et al., 1996, figs.2,11 — p.2369. Age: late Tithonian–?earliest Valanginian.

tessellatum Riding and Helby, 2001a, p.9,11,13, figs.6A–P. Holotype: Riding and Helby, 2001a, fig.6J. Age: Toarcian.

MORIA Sluijs et al., 2009, p.50. Type: Sluijs et al., 2009, pl.1, figs.1–4, as *Moria zachosii*.

***zachosii** Sluijs et al., 2009, p.50, pl.1, figs.1–7; pl.2, figs.1–6; text-figs.3a–b. Holotype: Sluijs et al., 2009, pl.1, figs.1–4. Age: late Eocene.

MORKALLACYSTA Harris, 1974, p.163. Taxonomic senior synonym: *Palaeoperidinium*, according to Lentin and Williams (1976, p.160) — however Stover and Evitt (1978, p.113–114) retained *Morkallacysta*. Type: Harris, 1974, pl.1, fig.5, as *Morkallacysta pyramidalis*.

dalangshanensis (Yu Jingxian et al., 1981, p.259, pl.1, figs.7–10,15–16) He Chengquan et al., 2009, p.508. Holotype: Yu Jingxian et al., 1981, pl.1, fig.7. Originally *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*, fourthly (and now) *Morkallacysta*. Age: Late Cretaceous.

paradoxa (Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.58–59, pl.4, figs.15–17) Mao Shaozhi et al., 1995, p.52. Holotype: He Chengquan et al., 1989, pl.4, fig.17. Originally *Palaeoperidinium*, subsequently (and now) *Morkallacysta*. Age: Early Tertiary.

***pyramidalis** Harris, 1974, p.163, pl.1, figs.5–11. Holotype: Harris, 1974, pl.1, fig.5. Originally (and now) *Morkallacysta*, subsequently *Palaeoperidinium*. Stover and Evitt (1978, p.113–114) retained this species in *Morkallacysta*. Age: Paleocene.

?**tasmanica** Cookson and Eisenack, 1982, p.37, pl.8, figs.9–10. Holotype: Cookson and Eisenack, 1982, pl.8, fig.10. Questionable assignment: Cookson and Eisenack (1982, p.37). Age: Eocene.

MOSAICODINIUM Dodekova, 1990, p.38–39. Type: Dodekova, 1975, pl.1, figs.1–3, as *Ctenidodinium mosaicum*.

***mosaicum** (Dodekova, 1975, p.18–19, pl.1, figs.1–6; pl.2, figs.1–3,6) Dodekova, 1990, p.39. Holotype: Dodekova, 1975, pl.1, figs.1–3. Originally *Ctenidodinium*, subsequently *Ctenidodinium?*, thirdly *Eodinia*, fourthly (and now) *Mosaicodinium*. Age: late Bathonian.

MUDERONGIA Cookson and Eisenack, 1958, p.40–41. Emendation: Monteil, 1991b, p.470–471. Taxonomic junior synonyms: *Phoberocysta*, according to Monteil (1991b, p.470) — however, Poulsen (1996, p.56) retained *Phoberocysta*; *Pseudomuderongia*, according to Helby (1987, p.297) and Stover and Williams (1987, p.181). Helby (1987, p.298) considered the "modified description" provided by Stover and Evitt (1978, p.66) to represent an emendation of *Muderongia*. Type: Cookson and Eisenack, 1958, pl.6, fig.2, as *Muderongia mcwhaei*.

aequicornia Århus in Århus et al., 1990, p.189, figs.11J,12B,G,H. Emendation: Monteil, 1991b, p.472. Holotype: Århus et al., 1990, fig.12H. Age: early Barremian.

asymmetrica Brideaux, 1977, p.40, pl.15, figs.9–10; pl.16, fig.1. Emendation: Monteil, 1991b, p.472, as *Muderongia asymmetrica*. Holotype: Brideaux, 1977, pl.15, fig.9; pl.16, fig.1. Originally (and now) *Muderongia*, subsequently *Pseudomuderongia*. Stover and Williams (1987, p.181) retained this species in *Muderongia*. Age: Aptian–early Albian.

australis Helby, 1987, p.300–303, figs.2A–C,3A–K,5. Emendation: Monteil, 1991b, p.472. Holotype: Helby, 1987, figs.2A–C; Monteil, 1991b, pl.5, fig.2; Fensome et al., 1996, figs.1–3 — p.2055. Age: Hauterivian–Barremian.

brachialis Ottone and Pérez-Loinaze, 2002, p.117–118,120, figs.2A–D. Holotype: Ottone and Pérez-Loinaze, 2002, fig.2D. Age: Hauterivian.

"*brevispinosa*" Iosifova, 1996, p.225,227, pl.14, figs.2,3a–b,4; pl.15, figs.1a–c. Holotype: Iosifova, 1996, pl.15, figs.1a–c. **Taxonomic senior synonym:** *Muderongia longicornia*, according to Monteil (1996, p.42). Age: Ryazanian.

crucis Neale and Sarjeant, 1962, p.449–450, pl.20, figs.2,6; text-fig.6. Emendation: Monteil, 1991b, p.473. Holotype: Neale and Sarjeant, 1962, pl.20, fig.6; text-fig.6; Monteil, 1991b, pl.5, fig.6. Taxonomic senior synonym: *Pseudoceratium?* (as *Muderongia tetracanthum*, according to Morgan (1980, p.28) — however, Jansonius (1982, p.16) retained *Muderongia crucis*. Age: late Hauterivian.

"*digitata*" Duxbury, 1983, p.35–36, pl.3, fig.15; text-fig.15. Holotype: Duxbury, 1983, pl.3, fig.15; text-fig.15. **NOW** *Vesperopsis*. Originally *Muderongia?*, subsequently *Australisphaera*, thirdly (and now) *Vesperopsis*. Questionable assignment: Duxbury (1983, p.35). Age: late Aptian.

endovata Riding et al., 2001, p.24–26,28, pl.1, figs.1–2; text-fig.3. Holotype: Riding et al., 2001, pl.1, fig.1; text-fig.3. Age: Valanginian.

extensiva Duxbury, 1977, p.54–55, pl.15, fig.10. Holotype: Duxbury, 1977, pl.15, fig.10. Taxonomic senior synonym: *Muderongia mcwhaei*, according to Monteil (1991b, p.473) — however, Poulsen (1996, p.57) retained *Muderongia extensiva*. Age: early Valanginian–early Hauterivian.

"*imparilis*" Duxbury, 1980, p.127–129, pl.5, figs.2,4–5; text-figs.11A–B. Holotype: Duxbury, 1980, pl.5, figs.4–5; text-fig.11B. **NOW** *Odontochitina*. Originally *Muderongia*, subsequently *Odontochitina?*, thirdly (and now) *Odontochitina*. Age: middle-late Barremian.

?*lata* Yu Jingxian and Zhang Wangping, 1980, p.110, pl.3, figs.12–13. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.3, fig.12. Questionable assignment: Monteil (1991b, p.471). Age: Late Cretaceous.

longicornia Monteil, 1991b, p.473, pl.2, figs.1–3. Emendation: Monteil, 1996, p.42. Holotype: Monteil, 1991b, pl.2, fig.1. Taxonomic senior synonym: *Muderongia simplex*, according to Poulsen (1992a, p.57) — however, Monteil (1996, p.42) retained *Muderongia longicornia*. Taxonomic junior synonym: *Muderongia brevispinosa*, according to Monteil (1996, p.42). Age: early Berriasian.

****mcwhaei*** Cookson and Eisenack, 1958, p.41, pl.6, figs.1–5. Emendations: Helby, 1987, p.303–305; Monteil, 1991b, p.473–474. Holotype: Cookson and Eisenack, 1958, pl.6, fig.2; Helby et al., 1987, figs.7A–B; Monteil,

1991b, pl.4, fig.4. Taxonomic junior synonyms: *Muderongia extensiva* and *Phoberocysta rariornata*, both according to Monteil (1991b, p.473) — however, Prössl (1992b, p.115) retained *Phoberocysta rariornata*. Helby (1987, p.303–305) considered that the specimens illustrated in pl.6, figs.1,4–5 of Cookson and Eisenack (1958) are not *Muderongia mcwhaei*. Age: Aptian.

"*microperforata*" (Davey, 1982b, p.30, pl.9, figs.4–6) Monteil, 1991b, p.474. Emendation: Monteil, 1991b, p.474, as *Muderongia microperforata*. Holotype: Davey, 1982b, pl.9, figs.4–5; Monteil, 1991b, pl.2, fig.10. **NOW** *Muderongia simplex* subsp. *microperforata*. Originally (and now) *Muderongia simplex* subsp. *microperforata*, subsequently *Muderongia microperforata*. Age: late Ryazanian–early Valanginian.

"*neocomica*" (Gocht, 1957, p.172–178, pl.19, figs.1–5; pl.20, figs.1–7; text-figs.7–16) Lentin and Williams, 1993, p.438. Emendation: Helby, 1987, p.310–313, as *Phoberocysta neocomica*. Holotype: Gocht, 1957, pl.19, fig.1; text-fig.7. **NOW** *Phoberocysta*. Originally *Wetzeliella?*, subsequently (and now) *Phoberocysta*, thirdly *Muderongia*. Taxonomic junior synonym: *Muderongia tomaszowensis*, by implication in Monteil (1991b, p.477), who considered *Wetzeliella?* (as *Phoberocysta neocomica* to be the junior name — however, this synonymy has not been generally followed. Monteil, in an errata sheet accompanying Monteil (1991b), gave the citation: "*Muderongia neocomica* Gocht 1957 comb. nov. and emend." — however, an errata sheet does not constitute effective publication (cf. I.C.N. Article 30.1). Monteil (1991b, p.477) listed in synonymy with *Muderongia tomaszowensis* the following taxa: *Wetzeliella?* (as *Phoberocysta neocomica* subsp. *circulata*, *Wetzeliella?* (as *Phoberocysta neocomica* subsp. *cruciformis* and *Wetzeliella?* (as *Phoberocysta neocomica* subsp. *dedecosa*; Lentin and Williams (1993, p.438) assumed that Monteil (1991b) intended to treat all three subspecies as taxonomic junior synonyms of the autonym *Phoberocysta neocomica* subsp. *neocomica*. Age: Hauterivian.

"*pannosa*" Duxbury, 1980, p.129–130, pl.10, figs.3,6; text-figs.12A–B. Holotype: Duxbury, 1980, pl.10, fig.3; text-fig.12B. **NOW** *Nyktericysta?*. Originally *Muderongia*, subsequently *Australisphaera*, thirdly (and now) *Nyktericysta?*. Age: middle Barremian.

pariata Duxbury, 1983, p.36–37, pl.2, figs.5,8; text-fig.16. Emendation: Monteil, 1991b, p.474–475. Holotype: Duxbury, 1983, pl.2, figs.5,8; text-fig.16; Monteil, 1991b, pl.7, figs.3a–c. Taxonomic senior synonym: *Muderongia perforata*, according to Århus in Århus et al. (1990, p.191) — however, Monteil (1991b, p.474) retained *Muderongia pariata*. Age: early Aptian–early Albian.

"*pentaradiata*" Singh, 1983, p.127, pl.43, fig.5. Holotype: Singh, 1983, pl.43, fig.5. **NOW** *Nyktericysta*. Originally *Muderongia*, subsequently *Balmula*, thirdly (and now) *Nyktericysta*. Age: early Cenomanian.

perforata Alberti, 1961, p.13, pl.2, figs.8–9 (not fig.7 according to Riding et al., 2001, p.28). Emendations: Monteil, 1991b, p.475; Riding et al., 2001, p.28. Holotype: Alberti, 1961, pl.2, fig.8; lost according to Riding et al. (2001, p.28). Lectotype: Alberti, 1961, pl.2, fig.9 and Riding et al., 2001, pl.1, fig.3, designated (as a neotype) by Riding et al. (2001, p.28). Taxonomic senior synonym: *Muderongia simplex*, according to Jain and Khowaja-Ateequzaman (1984, p.39) — however, Lentin and Williams (1989, p.252) retained *Muderongia perforata*. Taxonomic junior synonym: *Muderongia pariata*, according to Århus in Århus et al. (1990, p.191) — however, Monteil (1991b, p.474) retained *Muderongia pariata*. Age: Turonian.

sarjeantii Volkheimer 2010, p.240, figs.4E–H. Holotype: Volkheimer 2010, fig.4E. Age: late Valanginian–early Hauterivian.

siciliana Torricelli, 1997, p.341, pl.1, figs.1–6. Holotype: Torricelli, 1997, pl.1, fig.1. Age: early Hauterivian.

simplex Alberti, 1961, p.12, pl.2, figs.1–2,4–6; pl.12, figs.1–2. Emendations: Monteil, 1991b, p.475; Poulsen, 1996, p.57; Riding et al., 2001, p.29. Holotype: Alberti, 1961, pl.2, fig.4; lost according to Riding et al. (2001, p.30). Neotype: Davey, 1979c, pl.2, fig.5, as *Muderongia* sp. A; Monteil, 1991b, pl.1, figs.3a–c, as *Senoniasphaera tabulata*; Riding et al., 2001, pl.1, figs.4–5; designated by Riding et al. (2001, p.30). Taxonomic junior synonyms: *Muderongia longicornia*, according to Poulsen (1996, p.57) — however, Monteil (1996, p.42) retained *Muderongia longicornia*; *Muderongia perforata*, according to Jain and Khowaja-Ateequzaman (1984, p.39) — however, Lentin and Williams (1989, p.252) retained *Muderongia perforata*; *Muderongia tomaszowensis*, according to Jain and Khowaja-Ateequzaman (1984, p.39) and Poulsen (1996, p.58) — however, Riding et al. (2001, p.31) retained

Muderongia tomaszowensis; *Senoniasphaera tabulata*, according to Riding et al. (2001), p.29. Age: Valanginian–early Barremian.

subsp. *microperforata* Davey, 1982b, p.30, pl.9, figs.4–6. Emendation: Monteil, 1991b, p.474, as *Muderongia microperforata*. Holotype: Davey, 1982b, pl.9, figs.4–5; Monteil, 1991b, pl.2, fig.10. Originally (and now) *Muderongia simplex* subsp. *microperforata*, subsequently *Muderongia microperforata*. Poulsen (1996, p.59) retained this taxon as a subspecies of *Muderongia simplex*. Age: late Ryazanian–early Valanginian.

subsp. *simplex*. Autonym. Holotype: Alberti, 1961, pl.2, fig.4.

staurota Sarjeant, 1966c, p.203–204, pl.21, figs.6–7; pl.23, fig.4; text-fig.53. Emendation: Monteil, 1991b, p.475–476. Holotype: Sarjeant, 1966c, pl.21, fig.6; text-fig.53a; Sarjeant et al., 1987, pl.2, fig.5. Age: early Barremian.

"*tabulata*" (Raynaud, 1978, p.393–394, pl.1, figs.1–2) Monteil, 1991b, p.476. Emendation: Monteil, 1991b, p.476, as *Muderongia tabulata*. Holotype: Raynaud, 1978, pl.1, fig.1. **NOW** *Phoberocysta*. Originally (and now) *Phoberocysta*, subsequently *Muderongia*. Taxonomic junior synonyms (at specific rank): *Wetzeliella?* (as *Phoberocysta*) *neocomica* subsp. *convexa*, *Wetzeliella?* (as *Phoberocysta*) *neocomica* subsp. *pteridia*, and *Wetzeliella?* (as *Phoberocysta*) *neocomica* subsp. *subovalis*, all according to Monteil (1991b, p.476). Age: Berriasian–Valanginian.

testudinaria Burger, 1980b, p.274–275, figs.9B,10A–E. Emendation: Monteil, 1991b, p.476. Holotype: Burger, 1980b, fig.9B; Fensome et al., 1996, fig.1 — p.2401. Originally (and now) *Muderongia*, subsequently *Pseudomuderongia*. Helby (1987, p.305) and Stover and Williams (1987, p.181) retained this species in *Muderongia*. Taxonomic junior synonyms: *Phoberocysta lowryi*, *Phoberocysta burgeri*, and *Phoberocysta edgellii*, all according to Monteil (1991b, p.476). Age: ?Hauterivian.

tetracantha (Gocht, 1957, p.168, pl.18, figs.7–9; text-fig.5) Alberti, 1961, p.14. Emendation: Monteil, 1991b, p.476–477, as *Muderongia tetracantha*. Holotype: Gocht, 1957, pl.18, fig.7. Originally *Pseudoceratium?*, subsequently (and now) *Muderongia*. Taxonomic junior synonym: *Muderongia crucis*, according to Morgan (1980, p.28) — however, Jansonius (1982, p.16) retained *Muderongia crucis*. Age: late Hauterivian.

tomaszowensis Alberti, 1961, p.12–13, pl.2, figs.12–13. Emendations: Monteil, 1991b, p.477; Riding et al., 2001, p.31. Holotype: Alberti, 1961, pl.2, fig.12; lost according to Riding et al. (2001, p.31). Lectotype: Alberti, 1961, pl.2, fig.13; Riding et al., pl.1, fig.7; designated (as a neotype) by Riding et al. (2001, p.31). Taxonomic senior synonyms: *Wetzeliella?* (as *Phoberocysta*) *neocomica*, by implication in Monteil (1991b, p.476), who considered *Muderongia tomaszowensis* to be the senior name — however, this synonymy has not been generally followed; *Muderongia simplex*, according to Jain and Khowaja-Ateequzaman (1984, p.39) and Poulsen (1996, p.59) — however, Riding et al. (2001, p.31) retained *Muderongia tomaszowensis*. Age: Valanginian.

MUIRADINIUM Harland and Sarjeant, 1970, p.225. Type: Churchill and Sarjeant, 1962, pl.1, fig.18; text-fig.2, as *Gymnodinium dorsispirale*.

**dorsispirale* (Churchill and Sarjeant, 1962, p.33, pl.1, fig.18; text-fig.2) Harland and Sarjeant, 1970, p.225. Holotype: Churchill and Sarjeant, 1962, pl.1, fig.18; text-fig.2. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Muiradinium*. Age: Holocene.

MUIRIELLA Churchill and Sarjeant, 1962, p.36. Emendation: Harland and Sarjeant, 1970, p.226–227. Type: Churchill and Sarjeant, 1962, pl.1, figs.20–21, as *Muiriella plioplax*.

**plioplax* Churchill and Sarjeant, 1962, p.37–38, pl.1, figs.20–21; text-fig.4. Emendation: Harland and Sarjeant, 1970, p.227–228. Holotype: Churchill and Sarjeant, 1962, pl.1, figs.20–21. Age: Holocene.

"**MULTISPINULA**" Bradford, 1975, p.3067. **Taxonomic senior synonym:** *Selenopemphix*, according to Matsuoka (1985a, p.51) and Head (1993, p.31–32). Harland and Reid in Harland et al. (1980, p.222) considered *Multispinula* to be not validly published in Bradford (1975) because it lacked a Latin diagnosis. However, since the type is a fossil, a Latin diagnosis is not a requirement. Type: Bradford, 1975, fig.5, as *Multispinula quanta*.

"?*minuta*" Harland and Reid in Harland et al., 1980, p.216,218, figs.2M–O. Holotype: Harland et al., 1980, fig.2O. **NOW** *Islandinium*. Originally *Multispinula*, subsequently *Multispinula?*, thirdly *Algidasphaeridium?*, fourthly (and now) *Islandinium*. Questionable assignment: Matsuoka (1985a, p.53). Taxonomic junior synonym: *Cantiacidinium conicum* (name not validly published), according to Head et al. (2001, p.629). Age: Holocene.

"**quanta*" Bradford, 1975, p.3067,3069, figs.5–7. Holotype: Bradford, 1975, fig.5; Fensome et al., 1995, fig.1 — p.1725. **NOW** *Selenopemphix*. Originally *Multispinula*, subsequently (and now) *Selenopemphix*. Motile equivalent: *Protoperidinium conicum* (Gran, 1900) Balech, 1974, according to Harland (1981, p.68) — however, see Head (1993, p.37; 1996b, p.1214). Age: Holocene.

"**MURATICYSTA**" Head et al., 1989b, p.458. **Taxonomic senior synonym:** *Filisphaera*, according to Head (1994b, p.234). Type: Head et al., 1989b, pl.5, figs.1–3,5, as *Muraticysta microornata*.

"**microornata*" Head et al., 1989b, p.458, pl.5, figs.1–3,5–7. Holotype: Head et al., 1989b, pl.5, figs.1–3,5; Head, 1994b, pl.5, figs.1–3. **NOW** *Filisphaera*. Originally *Muraticysta*, subsequently (and now) *Filisphaera*. Age: early Pliocene.

MURATODINIUM Drugg, 1970b, p.818. Type: Cookson and Eisenack, 1967b, pl.40, fig.3, as *Kenleyia fimbriata*.

eocenicum (Yu Jingxian, 1989, p.159, pl.43, figs.1,3,6; text-fig.3) He Chengquan et al., 2009, p.168,645. Emendation: He Chengquan et al., 2009, p.645, as *Muratodinium eocenicum*. Holotype: Yu Jingxian, 1989, pl.43, fig.3. Originally *Thalassiphora*, subsequently (and now) *Muratodinium*. Age: Eocene.

**fimbriatum* (Cookson and Eisenack, 1967b, p.252, pl.40, figs.1–7) Drugg, 1970b, p.818–819. Holotype: Cookson and Eisenack, 1967b, pl.40, fig.3. Originally *Kenleyia*, subsequently (and now) *Muratodinium*. Age: late Paleocene.

"*subathuensis*" Sarkar, 2012, p.174–177; pl.1, figs.1–6; text-fig.3. Holotype: Sarkar, 2012, pl.1, fig.1; text-fig.3. **Name illegitimate — nomenclatural senior synonym:** *Thalassiphora simlaensis*. Sarkar (2012, p.174) included the type of *Thalassiphora simlaensis*, the substitute name for *Subathua spinosa*, in synonymy with *Muratodinium subathuensis*, and thus *Muratodinium subathuensis* must be considered an illegitimate nomenclatural junior synonym. Age: Lutetian.

NANNOCERATOPSIS Deflandre, 1939a, p.183. Emendations: Evitt, 1961b, p.306; Piel and Evitt, 1980, p.102; Poulsen, 1992b, p.44; Riding and Helby, 2001a, p.13. Type: Deflandre, 1939a, pl.8, fig.10, as *Nannoceratopsis pellucida*.

ambonis Drugg, 1978, p.70–71, pl.6, figs.3–7. Emendation: Riding, 1984a, p.75–76. Holotype: Drugg, 1978, pl.6, fig.3. Age: Aalenian.

deflandrei Evitt, 1961b, p.308–312, pl.1, figs.1–14; pl.2, figs.1–29; text-figs.5,9–17. Emendation: Ilyina in Ilyina et al., 1994, p.12–13. Holotype: Evitt, 1961b, pl.1, fig.13. Taxonomic senior synonym: *Nannoceratopsis gracilis*, according to Evitt (1962, p.1129–1130) and (at varietal and subspecific ranks) *Nannoceratopsis gracilis* var. *obsoleta* (subsequently *Nannoceratopsis gracilis* subsp. *obsoleta*), according to Prauss (1989, p.13). — however, Ilyina in Ilyina et al. (1994, p.12) retained *Nannoceratopsis deflandrei*. Age: late Pliensbachian.

subsp. *anabarensis* Ilyina in Ilyina et al., 1994, p.15–16, pl.2, figs.1–6; pl.5, figs.4–5. Holotype: Ilyina et al., 1994, pl.5, fig.4. Age: late Pliensbachian–early Toarcian.

subsp. *deflandrei*. Autonym. Holotype: Evitt, 1961b, pl.1, fig.13. Taxonomic junior synonym: *Nannoceratopsis gracilis* var. *obsoleta* (subsequently *Nannoceratopsis gracilis* subsp. *obsoleta*), according to Ilyina in Ilyina et al. (1994, p.14).

subsp. *senex* (van Helden, 1977, p.165, pl.33.1, figs.1–9; text-fig.33.4) Ilyina in Ilyina et al., 1994, p.14. Holotype: van Helden, 1977, pl.33.1, figs.6–7. Originally *Nannoceratopsis senex*, subsequently (and now) *Nannoceratopsis deflandrei* subsp. *senex*. Age: ?late Pliensbachian–early Bajocian.

dictyambonis Riding, 1984a, p.78–79, pl.1, figs.1–6; text-figs.1B–C. Holotype: Riding, 1984a, pl.1, fig.1. Age: late Toarcian–early Bajocian.

evae Prauss, 1989, p.13, pl.8, figs.18–21; text-fig.3 (part). Holotype: Prauss, 1989, pl.8, figs.19–21; text-fig.3. Age: late Aalenian–late Bajocian.

globiformis Bucefalo Palliani and Riding, 1997b, p.115–116, pl.1, figs.1–8; text-fig.9 (part). Holotype: Bucefalo Palliani and Riding, 1997b, pl.1, figs.1–2. Age: late Pliensbachian.

gracilis Alberti, 1961, p.30, pl.7, figs.16–17. Emendations: Evitt, 1962, p.1129–1130; van Helden, 1977, p.165. Holotype: Alberti, 1961, pl.7, fig.17. Taxonomic junior synonym: *Nannoceratopsis deflandrei*, according to Evitt (1962, p.1129–1130) — however, Ilyina et al. (1994, p.12) retained *Nannoceratopsis deflandrei*. Age: Bajocian.

"subsp. *gracilis*". Autonym. Emendation: Prauss, 1989, p.13, as *Nannoceratopsis gracilis* var. *gracilis*. Holotype: Alberti, 1961, pl.7, fig.17. **Now redundant.**

"var. *gracilis*". Autonym. Emendation: Prauss, 1989, p.13, as *Nannoceratopsis gracilis* var. *gracilis*. Holotype: Alberti, 1961, pl.7, fig.17. **Now redundant.**

"subsp. *obsoleta*" (Prauss, 1989, p.13–14, pl.7, fig.16; text-fig.3 [part]) Lentin and Williams, 1993, p.441. Holotype: Prauss, 1989, pl.7, fig.16. Originally *Nannoceratopsis gracilis* var. *obsoleta*, subsequently *Nannoceratopsis gracilis* subsp. *obsoleta*. **Taxonomic senior synonym:** *Nannoceratopsis deflandrei* subsp. *deflandrei*, according to Ilyina in Ilyina et al. (1994, p.14). Taxonomic junior synonym (at varietal rank): *Nannoceratopsis deflandrei*, according to Prauss (1989, p.13) — however, Ilyina in Ilyina et al. (1994, p.12) retained *Nannoceratopsis deflandrei*. Age: late Pliensbachian–late Toarcian.

"var. *obsoleta*" Prauss, 1989, p.13–14, pl.7, fig.16; text-fig.3 (part). Holotype: Prauss, 1989, pl.7, fig.16. Originally *Nannoceratopsis gracilis* var. *obsoleta*, subsequently *Nannoceratopsis gracilis* subsp. *obsoleta*. **Taxonomic senior synonym** (at specific rank): *Nannoceratopsis deflandrei*, according to Ilyina et al. (1994, p.12). Taxonomic junior synonym (at varietal rank): *Nannoceratopsis deflandrei*, according to Prauss (1989, p.13) — however, Ilyina in Ilyina et al. (1994, p.12) retained *Nannoceratopsis deflandrei*. Age: late Pliensbachian–late Toarcian.

subsp. *superba* Bucefalo Palliani and Riding, 1998, p.172,174,177, fig.9, nos.1–6. Holotype: Bucefalo Palliani and Riding, 1998, fig.9, no.1. Age: late Toarcian–Aalenian.

magnicornis Bucefalo Palliani and Riding, 1997b, p.116, pl.1, figs.9–15; text-fig.9 (part). Holotype: Bucefalo Palliani and Riding, 1997b, pl.1, fig.9. The epithet spelling is revised to accord grammatically with a meaning "big horned"; the neuter would be *magnicorne* (J. Jansonius and J. Riding, pers. comm.). Age: late Pliensbachian.

**pellucida* Deflandre, 1939a, p.183, pl.8, figs.8–12. Emendation: Evitt, 1961b, p.312. Holotype: Deflandre, 1939a, pl.8, fig.10. Age: Oxfordian.

plegas Drugg, 1978, p.71, pl.6, figs.8–9; pl.7, fig.3. Holotype: Drugg, 1978, pl.6, fig.8. N.I.A. Age: Aalenian.

- subsp. *brevicorna* (Prauss, 1989, p.14–15, pl.7, figs.5–6,13; text-fig.3 [part]) Lentin and Williams, 1993, p.442. Holotype: Prauss, 1989, pl.7, fig.13. Originally *Nannoceratopsis plegas* var. *brevicorna*, subsequently (and now) *Nannoceratopsis plegas* subsp. *brevicorna*. Age: late Toarcian–late Bajocian.
- "var. *brevicorna*" Prauss, 1989, p.14–15, pl.7, figs.5–6,13; text-fig.3 (part). Holotype: Prauss, 1989, pl.7, fig.13. **NOW** *Nannoceratopsis plegas* subsp. *brevicorna*. Originally *Nannoceratopsis plegas* var. *brevicorna*, subsequently (and now) *Nannoceratopsis plegas* subsp. *brevicorna*. Age: late Toarcian–late Bajocian.
- subsp. *dictyornata* (Prauss, 1989, p.15,17, pl.7, figs.2–4; text-fig.3 [part]) Lentin and Williams, 1993, p.442. Holotype: Prauss, 1989, pl.7, figs.2–3. Originally *Nannoceratopsis plegas* var. *dictyornata*, subsequently (and now) *Nannoceratopsis plegas* subsp. *dictyornata*. Age: early Aalenian.
- "var. *dictyornata*" Prauss, 1989, p.15,17, pl.7, figs.2–4; text-fig.3 (part). Holotype: Prauss, 1989, pl.7, figs.2–3. **NOW** *Nannoceratopsis plegas* subsp. *dictyornata*. Originally *Nannoceratopsis plegas* var. *dictyornata*, subsequently (and now) *Nannoceratopsis plegas* subsp. *dictyornata*. Age: early Aalenian.
- subsp. *plegas*. Autonym. Emendation: Prauss, 1989, p.15, as *Nannoceratopsis plegas* var. *plegas*. Holotype: Drugg, 1978, pl.6, fig.8. N.I.A.
- "var. *plegas*". Autonym. Emendation: Prauss, 1989, p.15, as *Nannoceratopsis plegas* var. *plegas*. Holotype: Drugg, 1978, pl.6, fig.8. **Now redundant**. N.I.A.
- radiata* Kumar, 1986b, p.404–405, pl.5, figs.2,6. Holotype: Kumar, 1986b, pl.5, fig.6. Age: Kimmeridgian–Tithonian.
- raunsgaardii* Poulsen, 1996, p.53–54, pl.35, figs.14–15; pl.36, figs.5–6; pl.40, fig.3. Holotype: Poulsen, 1996, pl.35, fig.15. Age: late Pliensbachian–earliest Bajocian.
- reticulata* Mantle, 2005, p.260,262, pl.4, figs.1–9. Holotype: Mantle, 2005, pl.4, figs.1–3. Age: Callovian–early Oxfordian.
- ridingii* Poulsen, 1992b, p.45, pl.1, figs.A–F. Holotype: Poulsen, 1992b, pl.1, fig.E. Age: Pliensbachian–Aalenian.
- "*senex*" van Helden, 1977, p.165, pl.33.1, figs.1–9; text-fig.33.4. Holotype: van Helden, 1977, pl.33.1, figs.6–7. **NOW** *Nannoceratopsis deflandrei* subsp. *senex*. Originally *Nannoceratopsis senex*, subsequently (and now) *Nannoceratopsis deflandrei* subsp. *senex*. Age: ?late Pliensbachian–early Bajocian.
- spiculata* Stover, 1966, p.42–43, pl.8, figs.1A–5E. Holotype: Stover, 1966, pl.8, figs.1A–D. Age: Bajocian–Bathonian.
- spinosa* Riding and Helby, 2001a, p.13–14, figs.7A–F,I. Holotype: Riding and Helby, 2001a, fig.7I. Age: early Toarcian.
- symmetrica* Bucefalo Palliani and Riding, 2000, p.12, figs.6I–P,7J. Holotype: Bucefalo Palliani and Riding, 2000, fig.6I. Age: early Toarcian.
- triangulata* Prauss, 1987, p.131–135, fig.2, nos.1–3; fig.3, nos.1–3; fig.4, nos.1–3. Holotype: Prauss, 1987, fig.2, no.1; fig.3, nos.1,3. Age: late Toarcian.
- tricerias* Drugg, 1978, p.71, pl.6, figs.10–12; pl.7, figs.1–2. Holotype: Drugg, 1978, pl.6, fig.12. Taxonomic junior synonym: *Nannoceratopsis tricornuta*, according to Wille and Gocht (1979, p.256). Age: Pliensbachian–late Callovian.

"*tricornuta*" Wille and Gocht, 1979, p.241–242,244, figs.18–23. Holotype: Wille and Gocht, 1979, fig.23.

Taxonomic senior synonym: *Nannoceratopsis tricerias*, according to Wille and Gocht (1979, p.256). Age: early Toarcian.

NANSHADINIUM He Chengquan and Sun Xuekun, 1991, p.290. Type: He Chengquan and Sun Xuekun, 1991, pl.1, figs.7a–b; text-fig.59, as *Nanshadinium decorosum*.

**decorosum* He Chengquan and Sun Xuekun, 1991, p.290–291, pl.1, figs.7a–b,8–9,10a–b,11; text-fig.59. Holotype: He Chengquan and Sun Xuekun, 1991, pl.1, figs.7a–b; text-fig.59. Age: Quaternary.

psilatam He Chengquan and Sun Xuekun, 1991, p.291, pl.2, figs.5a–b. Holotype: He Chengquan and Sun Xuekun, 1991, pl.2, figs.5a–b. Age: Quaternary.

NAVARRELLA Trejo, 1983, p.12. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1298, who noted that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). Trejo (1983, p.12) gave the spelling as *Navarrela*, corrected in Elbrächter et al. (2008, p.1300). Type : Trejo, 1983, pl.58, fig.5, as *Navarrella castroi*.

**castroi* Trejo, 1983, p.12, pl.58, figs.5–6. Holotype: Trejo, 1983, pl.58, fig.5. Age: Late Cretaceous.

"**NECROBROOMEA**" Wiggins, 1975, p.111. Emendation: Below, 1990, p.52. **Taxonomic senior synonym:** *Batioladinium*, according to Brideaux (1977, p.10). Taxonomic senior synonym: *Imbatodinium*, according to Dörhöfer and Davies (1980, p.36–37) — however, Lentin and Williams (1985, p.249) retained *Necrobroomea* as a taxonomic junior synonym of *Batioladinium*. With respect to the synonymy of *Necrobroomea* and *Batioladinium*, Below (1990, p.52) considered *Necrobroomea* to be the senior name. Taxonomic junior synonym: *Aprobolocysta*, according to Below (1990, p.52) — however, Lentin and Williams (1993, p.31) retained *Aprobolocysta*. Fensome et al. (1993b, p.78) gave the following statement: "Below (1990, p.52) listed *Batioladinium* Brideaux 1975 as a taxonomic junior synonym of *Necrobroomea* Wiggins 1975 rather than the reverse, as is customarily the case. Below stated that '... the genus *Necrobroomea* Wiggins (publication date 25 April 1975 in *Geoscience and Man*, volume 11) has priority over *Batioladinium* Brideaux 1975 (publication date 15 June 1975 in the *Canadian Journal of Botany*, volume 53(12))' [translation]. However, Below was clearly unaware that Brideaux (1977, p.10) stated that '*Necrobroomea* Wiggins, 1975 appeared in *Geoscience and Man*, v.11, the date of publication being given as April 25th, 1975. However, in a letter to the writer, acting editor, Ruth B. Hubert, established that no copies of this volume were available to the public before July 23rd, 1975, and that there was no prior distribution of the volume.' On the basis of this evidence and the observation that the *Canadian Journal of Botany*, v.53, no.12 did appear in June 1975 (W.W. Brideaux, personal communication to R.A.F.), *Necrobroomea* must be considered junior to *Batioladinium* if these two taxa are considered congeneric." Type: Alberti, 1961, pl.5, fig.19, as *Broomea? longicornuta*.

"*alata*" (Backhouse, 1987, p.211–212, figs.5A–D,9A–D) Below, 1990, p.53. Holotype: Backhouse, 1987, figs.5A–B,9A–B; Fensome et al., 1996, figs.1–2,5–6 — p.2019. **NOW** *Aprobolocysta*. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Age: middle Hauterivian–early Barremian.

"*bipartita*" (Backhouse, 1987, p.212, figs.9E–H) Below, 1990, p.53. Holotype: Backhouse, 1987, figs.9E–F; Fensome et al., 1996, figs.1–2 — p.2067. **NOW** *Aprobolocysta*. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Age: middle Hauterivian.

"*eilema*" (Duxbury, 1977, p.52–53, pl.14, figs.4–5,8; text-figs.19A–B) Below, 1990, p.53. Holotype: Duxbury, 1977, pl.14, figs.4–5; text-fig.19B; Pourtoy, 1988, pl.3, figs.1–3,5–6; Fensome et al., 1993a, figs.1–2,5 — p.1139. **NOW** *Aprobolocysta*. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. N.I.A. Age: late Hauterivian.

"*exigua*" (Alberti, 1961, p.26–27, pl.5, fig.14) Wiggins, 1975, p.111. Holotype: Alberti, 1961, pl.5, fig.14. **NOW** *Batioladinium*?. Originally *Broomea*, subsequently (and now) *Batioladinium*?, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Below (1990, p.53) also proposed this combination. Age: early Hauterivian.

"*galeata*" (Backhouse, 1987, p.212, figs.9I–L) Below, 1990, p.53. Holotype: Backhouse, 1987, figs.9I–J; Fensome et al., 1996, figs.1–2 — p.2135. **NOW** *Aprobolocysta*. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Age: Valanginian–earliest Hauterivian.

"*gochtii*" (Alberti, 1961, p.27, pl.5, figs.8–10,?16) Wiggins, 1975, p.111. Holotype: Alberti, 1961, pl.5, fig.8. **NOW** *Batioladinium*?. Originally *Broomea*, subsequently (and now) *Batioladinium*?, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonyms: *Batioladinium pomum* and *Aprobolocysta* (as *Batioladinium varigranosa*, both according to Below (1990, p.53). Below (1990, p.53) also proposed this combination. Age: Valanginian–?Hauterivian.

"*imbatodinensis*" (Vozzhennikova, 1967, p.55, pl.12, figs.4a–c) Wiggins, 1975, p.111. Emendation: Lentin and Vozzhennikova, 1990, p.91–92, as *Protobatioladinium imbatodinense*. Holotype: Vozzhennikova, 1967, pl.12, fig.4a; Lentin and Vozzhennikova, 1990, pl.11, figs.9–11; text-fig.50. **NOW** *Protobatioladinium*. Originally *Imbatodinium*, subsequently *Necrobroomea*?, thirdly *Pareodinia*, fourthly *Pareodinia*?, fifthly *Batioladinium*, sixthly (and now) *Protobatioladinium*, seventhly *Gochteodinia*. Questionable assignment: Wiggins (1975, p.111). Age: Late Jurassic.

"*jaegeri*" (Alberti, 1961, p.26, pl.5, figs.1–7) Wiggins, 1975, p.111. Emendation: Below, 1990, p.54, as *Necrobroomea jaegeri*. Holotype: Alberti, 1961, pl.5, fig.2; Eisenack and Klement, 1964, p.67; Fensome et al., 1995, fig.2 — p.1571. **NOW** *Batioladinium*. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonym: *Pseudoceratium gochtii* Pocock (subsequently *Pseudoceratium hansgochtii*), according to Singh (1971, p.320). Age: late Barremian.

"**longicornuta*" (Alberti, 1961, p.27–28, pl.5, figs.18–21; pl.6, figs.1–2) Wiggins, 1975, p.111. Emendation: Below, 1990, p.56, as *Necrobroomea longicornuta*. Holotype: Alberti, 1961, pl.5, fig.19; Eisenack and Klement, 1964, p.69; Fensome et al., 1996, fig.1 — p.2205. **NOW** *Batioladinium*. Originally *Broomea*?, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonym: *Batioladinium radiculatum*, according to Below (1990, p.53). Below (1990, p.53) also proposed this combination. Age: late Hauterivian–late Barremian.

"*micropoda*" (Eisenack and Cookson, 1960, p.7–8, pl.2, figs.8–9) Wiggins, 1975, p.111. Emendation: Below, 1990, p.56, as *Necrobroomea micropoda*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.9. **NOW** *Batioladinium*. Originally *Broomea*, subsequently (and now) *Batioladinium*, thirdly *Necrobroomea*, fourthly *Imbatodinium*. Taxonomic junior synonyms: *Imbatodinium fractum*, according to Below (1990, p.56); *Broomea* (now *Batioladinium*?) *pellifera*, according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Broomea* (as *Batioladinium*?) *pellifera*. Below (1990, p.54) also proposed this combination. Age: Aptian–Albian.

"*neista*" (Duxbury, 1980, p.112–113, pl.2, figs.8–9; text-fig.5) Below, 1990, p.54. Holotype: Duxbury, 1980, pl.2, figs.8–9; text-fig.5; Pourtoy, 1988, pl.4, figs.4–5,7–9. **NOW** *Aprobolocysta*. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Duxbury (1980) cited the epithet as "*neistosa*" but indicated that it was based on the Greek adjective "*neistos*". Since Principle 5 of the I.C.N. states that taxon names are to be treated as Latin, this epithet should be rendered as "*neista*", in agreement with the feminine gender of the generic name ("*neistum*" would be the neuter form and "*neistus*" the masculine form). Age: Barremian.

"*pellifera*" (Alberti, 1961, p.26, pl.5, figs.11–13) Below, 1990, p.54. Holotype: Alberti, 1961, pl.5, fig.11. **NOW** *Batioladinium*?. Originally *Broomea*, subsequently (and now) *Batioladinium*?, thirdly *Imbatodinium*, fourthly *Necrobroomea*. Taxonomic senior synonym: *Broomea* (as *Batioladinium*) *micropoda*, according to Wiggins (1975, p.111) — however, Dörhöfer and Davies (1980, p.38) retained *Broomea* (as *Batioladinium*) *pellifera*. Age: late Barremian–early Aptian.

"*reticulata*" (Stover and Helby, 1987a, p.101–103, figs.1A–N) Below, 1990, p.54. Holotype: Stover and Helby, 1987a, figs.1E–G; Helby et al., 1987, fig.25I; Fensome et al., 1996, figs.1–3 — p.2325. **NOW** *Batioladinium*. Originally (and now) *Batioladinium*, subsequently *Necrobroomea*. Age: Berriasian.

"*simplex*" (Cookson and Eisenack, 1958, p.42, pl.6, fig.9) Wiggins, 1975, p.111. Holotype: Cookson and Eisenack, 1958, pl.6, fig.9. **NOW** *Broomea*. Originally (and now) *Broomea*, subsequently *Necrobroomea*. Age: Late Jurassic.

"?*tricornoides*" (Alberti, 1961, p.28, pl.5, fig.17) Wiggins, 1975, p.111. Holotype: Alberti, 1961, pl.5, fig.17. **NOW** *Batioladinium*?. Originally *Broomea*?, subsequently (and now) *Batioladinium*?, thirdly *Necrobroomea*?, fourthly *Imbatodinium*?. Questionable assignment: Wiggins (1975, p.111). Age: late Hauterivian.

"*trycheria*" (Pourtoy, 1988, p.388–389, pl.1, figs.1–6,8; pl.5, figs.1–2,5,9) Below, 1990, p.54. Holotype: Pourtoy, 1988, pl.1, figs.1–3. **NOW** *Aprobolocysta*. Originally (and now) *Aprobolocysta*, subsequently *Necrobroomea*. Age: late Valanginian.

NELCHINOPSIS Wiggins, 1972, p.299. Emendation: Harding, 1996, p.352–353,355. Taxonomic senior synonym: *Gonyaulacysta*, according to Duxbury (1977, p.37) — however, Stover and Williams (1987, p.11) retained *Nelchinopsis*. Taxonomic junior synonym: *Alaskadinium*, according to Stover and Williams (1987, p.11). Type: Vozzhennikova, 1967, pl.26, figs.1–6, as *Gonyaulax kostromiensis* (see *Nelchinopsis kostromiensis* for lectotype).

**kostromiensis* (Vozzhennikova, 1967, p.85–86, pl.26, figs.1–6; pl.27, figs.1–2) Wiggins, 1972, p.301–302. Emendation: Harding, 1996, p.353,355, as *Nelchinopsis kostromiensis*. Holotype: Vozzhennikova, 1967, pl.26, figs.1–6; Jan du Chêne et al., 1986a, pl.44, figs.7–8; Lentin and Vozzhennikova, 1990, text-fig.64; lost according to Lentin and Vozzhennikova (1990, p.109). Lectotype: Lentin and Vozzhennikova, 1990, pl.15, figs.5–6, designated by Lentin and Vozzhennikova (1990, p.109); Harding, 1996, pl.1, fig.1. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Nelchinopsis*. Stover and Williams (1987, p.11) retained this species in *Nelchinopsis*. Taxonomic junior synonym: *Alaskadinium wigginsii*, according to Stover and Williams (1987, p.11). Age: ?Valanginian or early Hauterivian.

NELSONIELLA Cookson and Eisenack, 1960a, p.4. Type: Cookson and Eisenack, 1960a, pl.1, fig.12, as *Nelsoniella aceras*.

**aceras* Cookson and Eisenack, 1960a, p.4, pl.1, figs.12–13. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.12. Age: Santonian–Campanian.

"*glomerosa*" Wilson in Slimani, 1994, p.65. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Disphaeria* (now *Turnhosphaera*) *hypoflata*, according to Slimani (2001a, p.194).

incomposita Pearce, 2010, p.68, pl.5, figs.8–11. Holotype: Pearce, 2010, pl.5, figs.8–9,11. Age: Campanian.

oviformis Cookson and Eisenack, 1982, p.33, pl.3, fig.2. Holotype: Cookson and Eisenack, 1982, pl.3, fig.2. Age: Senonian.

semireticulata Cookson and Eisenack, 1960a, p.4–5, pl.1, fig.15. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.15. Age: Santonian–Campanian.

tuberculata Cookson and Eisenack, 1960a, p.4, pl.1, fig.14. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.14. Age: Santonian–Campanian.

NEMATOSPHAEROPSIS Deflandre and Cookson, 1955, p.268. Emendations: Williams and Downie, 1966c, p.222; Wrenn, 1988, p.137. Taxonomic junior synonyms: *Trabeculidium*, according to Stover and Williams (1987,

p.217) — however, Sarjeant (1989, p.93) retained *Trabeculidium*; *Pterococcus* Lohmann (an illegitimate name) and *Coccolpaterus*, by implication in Reid (1974, p.592) and Fensome et al. (1993b, p.93), who included the "type species", *Pterococcus* (subsequently *Coccolpaterum*) *labyrinthus*, in *Nematosphaeropsis*. This name was not validly published in Deflandre and Cookson (1954, p.1237), since these authors did not provide a description. Type: Deflandre and Cookson, 1955, pl.8, fig.5, as *Nematosphaeropsis balcombiana*.

"*aquaeductus*" Piasecki, 1980, p.70, pl.1, figs.1–3; pl.5, figs.1–2. Holotype: Piasecki, 1980, pl.1, figs.1–3. **NOW** *Unipontidinium*. Originally *Nematosphaeropsis*, subsequently *Nematosphaeropsis?*, thirdly *Impagidinium*, fourthly (and now) *Unipontidinium*. Questionable assignment: Edwards (1984, p.586) as a problematic species. N.I.A. Age: middle Miocene.

**balcombiana* Deflandre and Cookson, 1955, p.268–269, pl.8, fig.5. Holotype: Deflandre and Cookson, 1955, pl.8, fig.5. Taxonomic senior synonym: *Pterosperma* (as *Nematosphaeropsis*) *labyrinthus*, according to Reid (1974, p.592) — however, Wrenn (1988, p.139) retained *Nematosphaeropsis balcombiana*. Head and Westphal (1999, p.12) considered this species to be the questionable taxonomic senior synonym of *Nematosphaeropsis rigida*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Wall and Dale (1967, p.352; 1968c, p.270). Wrenn in Head and Wrenn (1992, p.14) recommended that this name be restricted to the holotype. Age: middle Miocene.

"*bicorporis*" Sütő-Szentai, 1990, p.847,849, pl.2, figs.1a–b; text-figs.76d,77a. Holotype: Sütő-Szentai, 1990, pl.2, figs.1a–b; text-fig.77a. **Name not validly published**: lodgement of holotype not specified (I.C.B.N. Article 37.5). This name was also not validly published in Sütő-Szentai (1989, pl.6, fig.3), since that author did not provide a description. Age: late Miocene.

crassimuratus Strauss et al., 2001, p.406, pl.3, figs.3–4. Holotype: Strauss et al., 2001, pl.3, fig.3. Age: late Miocene.

"*delicata*" Wilson in Slimani, 1994, p.76. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Cannosphaeropsis* (as and now *Nematosphaeropsis*) *philippotii*, according to Slimani (2001a, p.193).

densiradiata (Cookson and Eisenack, 1962b, p.493, pl.4, figs.5–7) Stover and Evitt, 1978, p.176. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.5–6. Originally *Cannosphaeropsis*, subsequently (and now) *Nematosphaeropsis*. Age: Cenomanian.

downiei Brown, 1986, p.7,10, pl.1, figs.1–6. Holotype: Brown, 1986, pl.1, figs.1–2. Age: early Miocene.

"*elegantula*" (Drugg, 1967, p.25, pl.4, fig.17) Stover and Williams, 1987, p.217. Holotype: Drugg, 1967, pl.4, fig.17. **NOW** *Trabeculidium*. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Trabeculidium*, fourthly *Nematosphaeropsis*. Jan du Chêne (1988, p.162) also proposed this combination. Age: Danian.

"*grandis*" Davey, 1975, p.153–154, pl.1, fig.9. Holotype: Davey, 1975, pl.1, fig.9; Jan du Chêne et al., 1986a, pl.55, figs.1–8. **NOW** *Unipontidinium*. Originally *Nematosphaeropsis*, subsequently *Impagidinium*, thirdly (and now) *Unipontidinium*. Age: Senonian, ?Campanian.

labyrinthus (Ostenfeld, 1903, p.578, fig.127) Reid, 1974, p.592. Holotype: Ostenfeld, 1903, fig.127. Originally *Pterosperma* (a modern prasinophyte), subsequently *Pterococcus* (combination illegitimate), thirdly *Coccolpaterum*, fourthly (and now) *Nematosphaeropsis*. Taxonomic junior synonym: *Nematosphaeropsis balcombiana*, according to Reid (1974, p.592) — however, Wrenn (1988, p.139) retained *Nematosphaeropsis balcombiana*. Motile equivalent: *Gonyaulax spinifera* complex, according to Dodge (1989, p.289). Wrenn (1988, p.136) retained this species in *Pterococcus* and did not consider it to be a dinoflagellate; however, Dale in Head and Wrenn (1992, p.12) and Fensome et al. (1993b, p.93) retained this species in *Nematosphaeropsis*. Wrenn in Head and Wrenn (1992, p.14) recommended that this name be restricted to the holotype, but see discussion in Rochon et al. (1999, p.30). Rochon et al. (1999, p.30) implied that this species may be the taxonomic senior synonym of *Nematosphaeropsis lemniscata*. N.I.A. Age: extant.

lativittata Wrenn, 1988, p.140,142, pl.1, figs.5–15,18; pl.5, figs.1–5; pl.6, figs.5–6. Holotype: Wrenn, 1988, pl.1, figs.12–15,18. Age: Pliocene.

lemniscata Bujak, 1984, p.189–190, pl.3, figs.5–7. Emendation: Wrenn, 1988, p.142,144. Holotype: Bujak, 1984, pl.3, fig.7. Taxonomic junior synonym: *Nematosphaeropsis oblonga*, according to Wrenn (1988, p.142) — however, Mudie in Head and Wrenn (1992, p.16,18) retained *Nematosphaeropsis oblonga*. Rochon et al. (1999, p.30) implied that this species may be a taxonomic junior synonym of *Nematosphaeropsis labyrinthus*. Age: late Oligocene–early Pleistocene.

major Head et al., 1989b, p.459, pl.2, figs.1–4. Holotype: Head et al., 1989b, pl.2, figs.1–2. Age: late Miocene.

oblonga Mudie, 1987, p.804, pl.3, figs.4a–b. Holotype: Mudie, 1987, pl.3, figs.4a–b; Head and Wrenn, 1992, pl.1, figs.3,6. Taxonomic senior synonym: *Nematosphaeropsis lemniscata*, according to Wrenn (1988, p.142) — however, Mudie in Head and Wrenn (1992, p.16,18) retained *Nematosphaeropsis oblonga*. Age: late Miocene–early Pliocene.

philippotii (Deflandre, 1947a, p.1574; text-figs.2–3) de Coninck, 1969, p.29. Holotype: Deflandre, 1947a, text-fig.3. Originally *Cannosphaeropsis*, subsequently (and now) *Nematosphaeropsis*, thirdly *Nematosphaeropsis*?. Questionable assignment: Stover and Evitt (1978, p.176) — however, Slimani (1994, p.76) included this species in *Nematosphaeropsis* without question. Taxonomic junior synonym: *Nematosphaeropsis delicata* (name not validly published), according to Slimani (2001a, p.193). Age: Senonian.

"pusulosa" (Morgenroth, 1966b, p.8, pl.2, fig.6) Stover and Evitt, 1978, p.176. Holotype: Morgenroth, 1966b, pl.2, fig.6; Sarjeant et al., 1987, pl.1, fig.8. **NOW** *Trabeculidium*. Originally *Cannosphaeropsis*, subsequently *Nematosphaeropsis*, thirdly (and now) *Trabeculidium*. Age: early Oligocene.

"quinquetra" (Duxbury, 1980, p.133–134, pl.9, figs.1–2,5) Stover and Williams, 1987, p.217. Holotype: Duxbury, 1980, pl.9, fig.2; Fensome et al., 1995, fig.2 — p.1729. **NOW** *Trabeculidium*. Originally (and now) *Trabeculidium*, subsequently *Nematosphaeropsis*. Age: middle Barremian.

reticulensis (Pastiels, 1948, p.49, pl.5, figs.7–10) Sarjeant, 1986, p.9. Emendation: Sarjeant, 1986, p.9,11, as *Nematosphaeropsis reticulensis*. Holotype: Pastiels, 1948, pl.5, fig.10, unrecognizable according to Sarjeant (1986, p.11). Lectotype: Pastiels, 1948, pl.5, fig.7; Sarjeant, 1986, pl.3, fig.6; designated by Sarjeant (1986, p.11). Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly (and now) *Nematosphaeropsis*. De Coninck (1986a, p.17–18) also proposed this combination. Age: early Eocene.

rigida Wrenn, 1988, p.144,146,148, pl.2, figs.1–6; pl.3, fig.4; pl.4, figs.1–5; pl.6, figs.3–4. Holotype: Wrenn, 1988, pl.2, figs.1–6. Head and Westphal (1999, p.12) considered this species to be a questionable taxonomic junior synonym of *Nematosphaeropsis balcombiana*. Age: Miocene–Holocene.

scala Duxbury, 1977, p.43, pl.9, fig.2. Holotype: Duxbury, 1977, pl.9, fig.2. N.I.A. Age: early Valanginian–late Hauterivian.

silsila Guédé and Slimani in Guédé et al., 2014, p.295–298, figs.3A–L,4A–B. Holotype: Guédé et al., 2014, figs.3A–C. Age: late Maastrichtian.

singularis Davey, 1979b, p.557, pl.5, figs.6,10,14. Holotype: Davey, 1979b, pl.5, fig.14. Age: Aptian–Albian.

"velata" Clarke and Verdier, 1967, p.51–52, pl.10, figs.1–2; text-fig.22. Holotype: Clarke and Verdier, 1967, pl.10, fig.2. **NOW** *Culversphaera*. Originally *Nematosphaeropsis*, subsequently *Spiniferites*?, thirdly (and now) *Culversphaera*. Age: Santonian.

?*wrennii* McMinn, 1992, p.435, pl.3, figs.17–20. Holotype: McMinn, 1992, pl.3, figs.19–20. Questionable assignment: McMinn (1992, p.435). Age: late Miocene.

NENJIANGELLA Yuan Deyan and He Chengquan, 1999, p.90,92–93. Type: Yuan Deyan and He Chengquan, 1999, pl.1, fig.14, as *Nenjiangella granulata*.

***granulata** Yuan Deyan and He Chengquan, 1999, p.90–91,93, pl.1, figs.9–15. Holotype: Yuan Deyan and He Chengquan, 1999, pl.1, fig.14. Age: Middle Late Cretaceous.

NEODIACRODIUM Fedorova-Shakhmundes, 1976, p.94. Fedorova-Shakhmundes (1976, p.94) considered this to be an acritarch genus, but Lentin in Lentin and Williams (1993, p.447) determined it to be a dinoflagellate genus. Type: Fedorova-Shakhmundes, 1976, pl.1, figs.7,7a, as *Neodiacrodium longiprocessatum*.

breviprocessatum Fedorova-Shakhmundes, 1976, p.97–98, pl.1, figs.5,5a–b,6,6a. Holotype: Fedorova-Shakhmundes, 1976, pl.1, figs.5,5a–b. Age: late Barremian.

corniculatum Fedorova-Shakhmundes, 1976, p.96–97, pl.1, figs.4,4a. Holotype: Fedorova-Shakhmundes, 1976, pl.1, figs.4,4a. Age: Barremian.

hystrichoforme Fedorova-Shakhmundes, 1976, p.99, pl.1, figs.11,11a–b. Holotype: Fedorova-Shakhmundes, 1976, pl.1, figs.11,11a–b. Age: late Barremian.

***longiprocessatum** Fedorova-Shakhmundes, 1976, p.94–95, pl.1, figs.7,7a,8. Holotype: Fedorova-Shakhmundes, 1976, pl.1, figs.7,7a. Age: early Valanginian.

proprium Fedorova-Shakhmundes, 1976, p.98–99, pl.1, figs.9,9a,10. Holotype: Fedorova-Shakhmundes, 1976, pl.1, figs.9,9a. Age: late Barremian.

timofeevii (Shakhmundes, 1971, p.438–439, figs.1e–f [in published English translation]) Fedorova-Shakhmundes, 1976, p.95. Holotype: Shakhmundes, 1971, fig.1e (in published English translation, p.226); Fedorova-Shakhmundes, 1976, pl.1, figs.2,2a. Originally *Acanthodiacrodium* (Appendix A), subsequently (and now) *Neodiacrodium*. Fensome et al. (1990, p.33–34) accepted this name as validly published, at least in the published translation of Shakhmundes (1971), the original of which is in Russian. Shakhmundes (1971, p.438) cited "Fig.1d" as holotype; however, no illustrations appear to have accompanied that publication (or, at least, none is present in the copy held in the Geological Survey of Canada Library, Ottawa). In the published translation, fig.1e is listed as the holotype of *Acanthodiacrodium timofeevii*. Age: early Aptian.

NEOEURYSphaeridium Slimani, 1994, p.77–78. According to Slimani (1994, p.77) this may be the taxonomic senior synonym of *Eurysphaeridium* (name not validly published). However, *Eurysphaeridium* has no formal type, and the other specific epithet assigned to *Eurysphaeridium* has been synonymized with another genus. Type: Slimani, 1994, pl.13, figs.1–4; text-figs.12A–B, as *Neoeurysphaeridium glabrum*.

***glabrum** Slimani, 1994, p.78–80, pl.13, figs.1–6; text-figs.12A–B. Holotype: Slimani, 1994, pl.13, figs.1–4; text-figs.12A–B. Taxonomic junior synonym: *Eurysphaeridium glabrum* (name not validly published), according to Slimani (2001a, p.193). Age: late Campanian–early Maastrichtian.

"**NEOGIPPSLANDIA**" Özdikmen, 2009, p.235. **Name illegitimate — nomenclatural senior synonym:** *Gippslandia*, which has the same type. Özdikmen (2009, p.235) considered *Gippslandia* Stover and Williams, 1987 to be illegitimate because it is a junior homonym of *Gippslandia* Bayly and Arnott 1969; however, *Gippslandia* Bayly and Arnott is an animal and under the I.C.N. it does not pre-empt *Gippslandia* Stover and Williams. Type: Stover, 1974, pl.5, figs.4a–c, as *Deflandrea extensa*.

***extensa** (Stover, 1974, p.178–179, pl.5, figs.4a–c,5a–d,6) Özdikmen, 2009, p.235. Holotype: Stover, 1974, pl.5, figs.4a–c; Fensome et al., 1993a, figs.1–3 — p.1167. Originally *Deflandrea*, subsequently *Vozzhemikovia*?, thirdly *Dioxya*?, fourthly *Lentinia*, fifthly (and now) *Gippslandia*, sixthly *Neogippslandia* (generic name illegitimate).

Although Özdikmen (2009) did not fully reference the basionym when proposing the transfer of this species to *Neogippslandia*, he did so under the aegis of the I.C.Z.N., so the combination can be considered validly published. Age: middle-late Eocene.

NEONORTHIDIUM Marheinecke, 1992, p.117. Taxonomic junior synonym: *Northidium* (name not validly published), according to Marheinecke (1992, p.117). Contrary to the opinion of Lentin and Williams (1993, p.447), Williams et al. (1998, p.421) considered *Neonorthidium* to be validly published. Type: Marheinecke, 1992, pl.26, figs.12–14; text-fig.23, as *Neonorthidium perforatum*.

***perforatum** Marheinecke, 1992, p.117–118, pl.26, figs.12–14; text-fig.23. Holotype: Marheinecke, 1986, pl.22, figs.1–2,4, as *Northidium perforatum* (name not validly published); Marheinecke, 1992, pl.26, figs.12–14; text-fig.23. Originally *Northidium* (name not validly published), subsequently (and now) *Neonorthidium*. Contrary to the opinion of Lentin and Williams (1993, p.447), Williams et al. (1998, p.421) considered this name to be validly published. Age: late early–early late Maastrichtian.

NEOSPHAERODICTYON Slimani, 2003, p.273–274. Taxonomic junior synonym: *Sphaerodictyon* (name not validly published), according to Slimani (2003, p.273). Type: Slimani, 2003, pl.1, figs.8–9, as *Neosphaerodictyon filusum*.

***filusum** Slimani, 2003, p.274–275, pl.1, figs.8–12. Holotype: Slimani, 2003, pl.1, figs.8–9. Taxonomic junior synonym: *Sphaerodictyon filusum* (name not validly published) according to Slimani (2003, p.274). Age: Campanian–early Maastrichtian.

NEPHRODINELLA Keupp, 1981, p.66. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Type: Keupp, 1981, pl.53, figs.1–3, as *Nephrodinella reniformis*.

***reniformis** Keupp, 1981, p.66–68, pl.53, figs.1–11. Holotype: Keupp, 1981, pl.53, figs.1–3. Age: late Hauterivian–mid Barremian.

"**NETRELYTRON**" Sarjeant, 1961a, p.113. Emendation: Sarjeant, 1966c, p.199. **Taxonomic senior synonym:** *Kalyptea*, according to Wiggins (1975, p.110) and Poulsen (1996, p.60). Taxonomic senior synonym: *Pareodinia*, according to Below (1990, p.64). Type: Sarjeant, 1961a, pl.15, fig.15; text-fig.14 (left figure), as *Netrelytron stegastum*.

"**jurassicum**" (Alberti, 1961, p.21, pl.7, fig.8) Sarjeant, 1966c, p.201. Holotype: Alberti, 1961, pl.7, fig.8. **Combination not validly published:** basionym not fully referenced. Originally *Kalyptea*, subsequently *Netrelytron* (combination not validly published). **Taxonomic senior synonym:** *Kalyptea* (as *Pareodinia diceras*, according to Below (1990 [October], p.65). Taxonomic senior synonym: *Netrelytron* (as *Kalyptea*, now *Pareodinia stegasta*, according to Wiggins (1975, p.110) and Kunz (1990 [January], p.12) — however, Below (1990 [October], p.65) considered *Kalyptea jurassica* to be a taxonomic junior synonym of *Kalyptea* (as *Pareodinia diceras*). Gocht (1970b, p.154) considered *Pareodinia ceratophora* to be the questionable taxonomic senior synonym of this species. Age: Bathonian–Callovian.

"**par**" Gitmez, 1970, p.314–315, pl.5, fig.4; pl.9, fig.4. Holotype: Gitmez, 1970, pl.9, fig.4. Originally *Netrelytron*, subsequently *Kalyptea*. **Taxonomic senior synonym:** *Netrelytron* (as *Kalyptea stegastum*, according to Poulsen (1996, p.61). Taxonomic senior synonyms: *Pareodinia ceratophora* subsp. *ceratophora* (as *Pareodinia ceratophora* var. *ceratophora*), according to Below (1990, p.65); *Netrelytron* (as *Kalyptea trinetrum*, according to Wiggins (1975, p.110). For etymology, see *Kalyptea par*. N.I.A. Age: early Kimmeridgian.

"***stegastum**" Sarjeant, 1961a, p.114–115, pl.15, fig.15; text-fig.14. Holotype: Sarjeant, 1961a, pl.15, fig.15; text-fig.14 (left figure); Sarjeant et al., 1987, pl.1, fig.6. **NOW** *Kalyptea*. Originally *Netrelytron*, subsequently (and now) *Kalyptea*, thirdly *Pareodinia*. Taxonomic junior synonyms: *Netrelytron par* and *Netrelytron trinetrum*, both

according to Poulsen (1996, p.61); *Kalyptea jurassica*, according to Wiggins (1975, p.110) and Kunz (1990 [January], p.12) — however, Below (1990 [October], p.65) considered *Kalyptea jurassica* to be a taxonomic junior synonym of *Kalyptea* (as *Pareodinia*) *dicerias*. Age: early Oxfordian.

"*trinetrum*" Sarjeant, 1966c, p.199–200, pl.22, fig.3; text-fig.51. Holotype: Sarjeant, 1966c, pl.22, fig.3. Originally *Netrelytron*, subsequently *Kalyptea*, thirdly *Pareodinia*. **Taxonomic senior synonym:** *Netrelytron* (as and now *Kalyptea*) *stegastum*, according to Poulsen (1996, p.61). Taxonomic junior synonym: *Netrelytron* *par*, according to Wiggins (1975, p.110) — however, *Netrelytron parum* is now a taxonomic junior synonym of *Pareodinia* *ceratophora* subsp. *ceratophora*. For etymology, see *Pareodinia trinetra*. Age: middle Barremian.

NEUFFENIA Brenner and Dürr, 1986, p.12. Type: Brenner and Dürr, 1986, fig.2, no.1; fig.3, nos.1–2, as *Neuffenia willei*.

**willei* Brenner and Dürr, 1986, p.13, fig.2, nos.1–2, fig.3, nos.1–4, fig.4, nos.1–2. Holotype: Brenner and Dürr, 1986, fig.2, no.1; fig.3, nos.1–2; Fensome et al., 1995, figs.1–3 — p.1919. Age: late Oxfordian.

subsp. *lanterna* Poulsen, 1996, p.87, pl.19, figs.7–9. Holotype: Poulsen, 1996, pl.19, fig.9. Age: latest Oxfordian–Volgian.

subsp. *willei*. Autonym. Holotype: Brenner and Dürr, 1986, fig.2, no.1; fig.3, nos.1–2; Fensome et al., 1995, figs.1–3 — p.1919.

NEXOSISPINUM Davey, 1979b, p.557–558. Taxonomic senior synonym: *Kiokansium*, according to Stover and Williams (1987, p.163) — however, Prössl (1990, p.104) retained *Nexosispinum*. Type: Davey, 1979b, pl.6, fig.5, as *Nexosispinum hesperus*.

"?*complicatum*" Slimani, 1996, p.377, pl.3, figs.D–E; pl.4, figs.H,J–N ex Slimani, 2001b, p.5, pl.3, figs.6–11. Holotype: Slimani, 1996, pl.4, fig.M; Slimani, 2001b, pl.3, fig.11. Questionable assignment: Slimani (1996, p.377; 2001b, p.5). **Taxonomic senior synonym:** *Pulchrasphaera minuscula*, according to Slimani (2001b, p.5). This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Age: late early Maastrichtian–Danian.

**hesperus* Davey, 1979b, p.558, pl.6, figs.1–5. Emendation: Torricelli, 2000, p.262. Holotype: Davey, 1979b, pl.6, fig.5; Fensome et al., 1995, fig.3 — p.1541. Originally (and now) *Nexosispinum*, subsequently *Kiokansium*. Prössl (1990, p.104) retained this species in *Nexosispinum*. N.I.A. Age: early Aptian–early middle Albanian.

subsp. *brevispinosum* Torricelli, 2000, p.262, pl.16, figs.2,4–6. Holotype: Torricelli, 2000, pl.16, figs.4–5. Age: Hauterivian.

subsp. *hesperus*. Autonym. Holotype: Davey, 1979b, pl.6, fig.5; Fensome et al., 1995, fig.3 — p.1541.

minimum Prössl, 1990, p.104–105, pl.1, figs.2,4,6,8–9 ex Prössl, 1992b, p.113,115. Holotype: Prössl, 1990, pl.1, figs.2,4,6. This name was not validly published in Prössl (1990, p.104–105), since that author did not specify the lodgment of the holotype. Age: early Hauterivian–early Barremian.

vetusculum (Davey, 1974, p.45, pl.1, figs.1–2) Davey, 1979b, p.558. Holotype: Davey, 1974, pl.1, fig.2. Originally *Adnatosphaeridium*, subsequently *Systematophora*, thirdly (and now) *Nexosispinum*, fourthly *Kiokansium*. Prössl (1990, p.104) retained this species in *Nexosispinum*. Age: early Barremian.

NIDAROCYSTA Monteil, 1997, p.390,392–394. Type: Monteil, 1997, pl.3, fig.3; pl.4, figs.1–6; text-figs.6a–b, as *Nidarocysta jubilaea*.

**jubilaea* Monteil, 1997, p.394, pl.1, figs.1–6; pl.2, figs.1–6; pl.3, figs.1–3; pl.4, figs.1–6; pl.5, figs.1–6; pl.6, figs.1–6; pl.7, figs.1–6; pl.8, figs.1–6; text-figs.3a–f,4A–D,5A–D,6a–f,7a–f,8a–b. Holotype: Monteil, 1997, pl.3, fig.3; pl.4, figs.1–6; text-figs.6a–b. Age: latest Oxfordian–earliest Kimmeridgian.

NORICYSTA Bujak and Fisher, 1976, p.58. Emendation: Dörhöfer and Davies, 1980, p.23–24. Type: Bujak and Fisher, 1976, pl.9, figs.2–4, as *Noricysta fimbriata*.

**fimbriata* Bujak and Fisher, 1976, p.60,62, pl.9, figs.1–5; text-figs.5A–B. Emendation: Dörhöfer and Davies, 1980, p.24. Holotype: Bujak and Fisher, 1976, pl.9, figs.2–4. Age: Norian.

pannucea Bujak and Fisher, 1976, p.62, pl.9, figs.6–10; text-fig.5D. Holotype: Bujak and Fisher, 1976, pl.9, fig.6–7; text-fig.5D. Age: Norian.

varivallata Bujak and Fisher, 1976, p.62, pl.9, figs.16–17; text-fig.5C. Holotype: Bujak and Fisher, 1976, pl.9, figs.16–17; text-fig.5C. Age: Norian.

"**NORMANDIA**" Zügel, 1994, p.30. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300, the latter noting that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). **Name illegitimate** — **senior homonym**: *Normandia* Hooker, 1872, a rubiacean. **Substitute name**: *Zuegelia*. Type: Zügel, 1994, pl.3, figs.1–5, as *Normandia circumperforata*.

***circumperforata** Zügel, 1994, p.30,32,34, pl.3, figs.1–15; text-figs.12–13. Holotype: Zügel, 1994, pl.3, figs.1–5. **NOW** *Zuegelia*. Originally *Normandia* (generic name illegitimate), subsequently (and now) *Zuegelia*. Age: early Turonian.

"**NORTHIDIUM**" Marheinecke, 1986, p.27. **Name not validly published**: no description. **Taxonomic senior synonym**: *Neonorthidium*, according to Marheinecke (1992, p.117).

"**perforatum**" Marheinecke, 1986, p.27. **Name not validly published**: no description. **NOW** *Neonorthidium*. Originally *Northidium* (name not validly published), subsequently (and now) *Neonorthidium*. Marheinecke (1986, p.27), indicated that this name is from an unpublished thesis by G. Wilson. Age: late early–early late Maastrichtian.

"**NOVEDWARDSIELLA**" Özdikmen, 2009, p.234. **Name illegitimate** — **nomenclatural senior synonym**: *Edwardsiella* Versteegh and Zevenboom 1995. Özdikmen (2009) considered *Edwardsiella* Versteegh and Zevenboom to be illegitimate because it is a junior homonym of *Edwardsiella* Andres, 1883; however, *Edwardsiella* Andres is an animal and under the I.C.N. does not pre-empt *Edwardsiella* Versteegh and Zevenboom. Type: Versteegh, 1995, pl.2, figs.1,4, as *Edwardsiella sexispinosa*.

***sexispinosa** (Versteegh and Zevenboom in Versteegh, 1995, p.88–89, pl.2, figs.1–4) Özdikmen, 2009, p.234. Holotype: Versteegh, 1995, pl.2, figs.1,4; Versteegh and Zevenboom, 1995, pl.2, figs.1,4. **NOW** *Edwardsiella*. Originally (and now) *Edwardsiella*, subsequently *Novedwardsiella* (generic name illegitimate). Although Özdikmen (2009) did not fully reference the basionym when proposing the transfer of this species to *Novedwardsiella*, he did so under the aegis of the I.C.Z.N., so the combination can be considered validly published. Age: Chattian–mid Piacenzian.

NYKTERICYSTA Bint, 1986, p.148–149. Emendations: Wan Chuanbiao and Zhang Ying, 1990, p.6–7,13; He Chengquan et al., 1992, p.183–184,190; Gao Ruiqi et al., 1992b, p.35; Mao Shaozhi et al., 1999, p.152; Fensome et al., 2009, p.46. Taxonomic junior synonym: *Balmula*, according to Fensome et al. (2009, p.46). Type: Bint, 1986, pl.4, figs.1–2,5–6; text-figs.3A–B, as *Nyktericysta davisii*.

arachnion Bint, 1986, p.153–154, pl.4, figs.13–16; pl.5, figs.1–5; pl.8, figs.7–8. Holotype: Bint, 1986, pl.4, figs.13–15; pl.8, figs.7–8. N.I.A. Age: early late Albian.

aspera Wan Chuanbiao and Zhang Ying, 1990, p.10, pl.2, figs.7–9. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.2, fig.7. **Taxonomic senior synonym:** *Nyktericysta hailaerensis*, according to Mao Shaozhi et al. (1999, p.154). Wan Chuanbiao and Zhang Ying (1990, p.10) assigned this species to *Nyktericysta* subgenus *Hailaera*. Age: Early Cretaceous.

beierensis Wan Chuanbiao and Zhang Ying, 1990, p.8–9, pl.1, figs.1–4. Emendation: Mao Shaozhi et al., 1999, p.154. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.1, fig.4. Wan Chuanbiao and Zhang Ying (1990, p.8,13) assigned this species to *Nyktericysta* subgenus *Hastodinium*. Age: Early Cretaceous.

**davisii* Bint, 1986, p.149–150,152–153, pl.4, figs.1–12; pl.8, figs.1–6; text-figs.3A–C,4A–B,10A–B. Holotype: Bint, 1986, pl.4, figs.1–2,5–6; text-figs.3A–B; Fensome et al., 1993a, figs.1–3,7–8 — p.1099. Age: late Mid–early late Albian.

dictyophora He Chengquan et al., 1992, p.184,190–191, pl.1, figs.1–9. Emendation: Mao Shaozhi et al., 1999, p.156, as *Quantouendinium dictyophorum*. Holotype: He Chengquan et al., 1992, pl.1, fig.1; Gao Ruiqi et al., 1992b, pl.1, fig.1; Gao Ruiqi et al., 1992c, pl.1, fig.8; Mao Shaozhi et al., 1999, pl.5, fig.2. **NOW** *Quantouendinium*. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Taxonomic junior synonyms: *Nyktericysta dictyophora* subsp. *circularis* and *Nyktericysta fusiformis*, both according to Mao Shaozhi et al. (1999, p.156); however, He Chengquan et al. (2009, p.304) retained the two taxa as *Quantouendinium dictyophorum* subsp. *circularis* and *Quantouendinium fusiforme* respectively. Age: Albian.

"subsp. *circularis*" He Chengquan et al., 1992, p.185,191, pl.1, figs.7–9. Holotype: He Chengquan et al., 1992, pl.1, fig.7; Gao Ruiqi et al., 1992b, pl.2, fig.4. **NOW** *Quantouendinium dictyophorum* subsp. *circularis*. Originally *Nyktericysta dictyophora* subsp. *circularis*, subsequently (and now) *Quantouendinium dictyophorum* subsp. *circularis*. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *dictyophora*, according to Mao Shaozhi et al. (1999, p.156); however, He Chengquan et al. (2009, p.304) retained this taxon as *Quantouendinium dictyophorum* subsp. *circularis*. Age: Albian.

"subsp. *dictyophora*". Autonym. Holotype: He Chengquan et al., 1992, pl.1, fig.1; Gao Ruiqi et al., 1992b, pl.1, fig.1; Gao Ruiqi et al., 1992c, pl.1, fig.8. **NOW** *Quantouendinium dictyophorum* subsp. *dictyophora*. Originally *Nyktericysta dictyophora* subsp. *dictyophora*, subsequently (and now) *Quantouendinium dictyophorum* subsp. *dictyophora*.

fusiformis He Chengquan et al., 1992, p.185,191–192, pl.1, fig.16; pl.2, figs.1–3. Holotype: He Chengquan et al., 1992, pl.2, fig.2; Gao Ruiqi et al., 1992b, pl.4, fig.6. **NOW** *Quantouendinium*. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *dictyophora*, according to Mao Shaozhi et al. (1999, p.156); however, He Chengquan et al. (2009, p.304) retained this species as *Quantouendinium fusiforme*. Age: Albian.

granorugosa (Qiao Xiuyun et al., 1992) Williams and Fensome, 2016, p.140. Holotype: Qiao Xiuyun et al., 1992, pl.2, fig.10; Gao Ruiqi et al., 1992b, pl.2, fig.5; Gao Ruiqi et al., 1992c, pl.1, fig.11. Originally *Balmula*, subsequently (and now) *Nyktericysta*. Age: Berriasian–Barremian.

hailaerensis Wan Chuanbiao and Zhang Ying, 1990, p.10, pl.2, figs.4–6. Emendation: Mao Shaozhi et al., 1999, p.154. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.2, fig.6. Taxonomic junior synonym: *Nyktericysta aspera*, according to Mao Shaozhi et al. (1999, p.154). Wan Chuanbiao and Zhang Ying (1990, p.8,13) assigned this species to *Nyktericysta* subgenus *Hailaera*. Age: Early Cretaceous.

lacustra Zippi, 1998, p.50,52, pl.24, figs.1–9; pl.25, figs.1–9; pl.26, figs.1–10; pl.27, figs.1–10; pl.28, figs.1–6; text-fig.16 (part). Holotype: Zippi, 1998, pl.28, figs.1–3. Age: Albian.

microreticulata He Chengquan et al., 1992, p.185–186,192, pl.1, figs.10–15. Emendation: Mao Shaozhi et al., 1999, p.157, as *Quantouendinium microreticulatum*. Holotype: He Chengquan et al., 1992, pl.1, fig.10; Gao Ruiqi

et al., 1992b, pl.3, fig.1. **NOW** *Quantouendinium*. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Taxonomic junior synonyms: *Nyktericysta microreticulata* subsp. *circularis* and *Nyktericysta symmetrica*, both according to Mao Shaozhi et al. (1999, p.156); however, He Chengquan et al. (2009, p.305–306) retained the two taxa as *Quantouendinium microreticulata* subsp. *circularis* and *Quantouendinium symmetricum* respectively. Age: Albian.

"subsp. *circularis*" He Chengquan et al., 1992, p.186,193, pl.1, figs.13–15. Holotype: He Chengquan et al., 1992, pl.1, fig.13; Gao Ruiqi et al., 1992b, pl.3, fig.7. **NOW** *Quantouendinium microreticulatum* subsp. *circularis*. Originally *Nyktericysta microreticulata* subsp. *circularis*, subsequently (and now) *Quantouendinium microreticulatum* subsp. *circularis*. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *microreticulata*, according to Mao Shaozhi et al. (1999, p.157); however, He Chengquan et al. (2009, p.305) retained this taxon as *Quantouendinium microreticulatum* subsp. *circularis*. Age: Albian.

"subsp. *microreticulata*". Autonym. Holotype: He Chengquan et al., 1992, pl.1, fig.10; Gao Ruiqi et al., 1992b, pl.3, fig.1. **NOW** *Quantouendinium microreticulatum* subsp. *microreticulatum*. Originally *Nyktericysta microreticulata* subsp. *microreticulata*, subsequently (and now) *Quantouendinium microreticulatum* subsp. *microreticulatum*.

nebulosa Wan Chuanbiao and Zhang Ying, 1990, p.10–11, pl.3, figs.1,3. Emendation: Mao Shaozhi et al., 1999, p.154–155. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.3, fig.1. Wan Chuanbiao and Zhang Ying (1990, p.10) assigned this species to *Nyktericysta* subgenus *Hailaera*. Age: Early Cretaceous.

?pannosa (Duxbury, 1980, p.129–130, pl.10, figs.3,6; text-figs.12A–B) Bint, 1986, p.149. Holotype: Duxbury, 1980, pl.10, fig.3; text-fig.12B. Originally *Muderongia*, subsequently *Australisphaera*, thirdly (and now) *Nyktericysta*?. Questionable assignment: Bint (1986, p.149). Age: middle Barremian.

pentagonum (Singh, 1983, p.128–129, pl.44, figs.2–3) Bint, 1986, p.149. Holotype: Singh, 1983, pl.44, fig.2. Originally *Endoceratium*, subsequently (and now) *Nyktericysta*. N.I.A. Age: middle Cenomanian.

pentaradiata (Singh, 1983, p.127, pl.43, fig.5) Williams and Fensome, 2016, p.140. Holotype: Singh, 1983, pl.43, fig.5. Originally *Muderongia*, subsequently *Balmula*, thirdly (and now) *Nyktericysta*. Age: early Cenomanian.

puyangensis Wan Chuanbiao and Qiao Xiuyun, 1994, p.503,507–508, pl.1, figs.3,5–6,8,10; pl.2, figs.1,3,8. Emendation: Mao Shaozhi et al., 1999, p.152. Holotype: Wan Chuanbiao and Qiao Xiuyun, 1994, pl.2, fig.8; Mao Shaozhi et al., 1999, pl.4, fig.7. Age: Middle-late Early Cretaceous.

ramiformis Wan Chuanbiao and Zhang Ying, 1990, p.9, pl.1, figs.5–7. Emendation: Mao Shaozhi et al., 1999, p.154, as *Nyktericysta ramuliformis*. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.1, fig.7. Wan Chuanbiao and Zhang Ying (1990, p.9) assigned this species to *Nyktericysta* subgenus *Hastodinium*. Age: Early Cretaceous.

reticulata Wan Chuanbiao and Zhang Ying, 1990, p.7–8, pl.1, figs.8–10; pl.2, fig.1. Emendation: Mao Shaozhi et al., 1999, p.152–154. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.2, fig.1. Wan Chuanbiao and Zhang Ying (1990, p.7) assigned this species to *Nyktericysta* subgenus *Nyktericysta*. Age: Early Cretaceous.

spinosa (Gao Ruiqi et al., 1992a) comb. nov.

Balmula spinosa Gao Ruiqi et al., 1992a, p.18,24, pl.1, figs.17–18.

Emendation: Mao Shaozhi et al., 1999, p.157, as *Quantouendinium spinosum*. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.17; Gao Ruiqi et al., 1992b, pl.8, fig.1; Mao Shaozhi et al., 1999, pl.4, fig.2. Originally *Balmula*, subsequently *Quantouendinium*, thirdly (and now) *Nyktericysta*. He Chengquan et al. (2009, p.294) retained this species in *Balmula*. The combination *Nyktericysta spinosa* is proposed here since *Balmula* is now considered a taxonomic junior synonym of *Nyktericysta*. Age: Campanian.

"*symmetrica*" He Chengquan et al., 1992, p.186–187,193, pl.2, figs.4–6. Holotype: He Chengquan et al., 1992, pl.2, fig.4; Gao Ruiqi et al., 1992b, pl.2, fig.5. **NOW** *Quantouendinium*. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *microreticulata*,

according to Mao Shaozhi et al. (1999, p.157); however, He Chengquan et al. (2009, p.306) retained this species as *Quantouendinium symmetricum*. Age: Albian.

"*trigona*" Lang Yan et al., 1999, p.375,387–388, pl.3, figs.1–7. Holotype: Lang Yan et al., 1999, pl.3, fig.3. **NOW** *Quantouendinium*. Originally *Nyctericysta*, subsequently (and now) *Quantouendinium*. Age: Early Cretaceous.

tripenta (Bint, 1986, p.158,160, pl.6, figs.9–17; pl.7, fig.8; text-figs.6A–B) Fensome et al., 2009, p.46. Holotype: Bint, 1986, pl.6, figs.10,14–16; text-fig.6B; Fensome et al., 1995, figs.1,4,7 — p.1851. Originally *Balmula*, subsequently (and now) *Nyctericysta*. Age: late Albian.

?*vitrea* (Duxbury, 1983, p.26–27, pl.2, fig.11; pl.3, fig.5; text-fig.8) Bint, 1986, p.149. Holotype: Duxbury, 1983, pl.2, fig.11; text-fig.8. Originally *Australisphaera*, subsequently (and now) *Nyctericysta*?. Questionable assignment: Bint (1986, p.149). Age: early Aptian.

NYKTERICYSTA subgenus **HAILAERA** Wan Chuanbiao and Zhang Ying, 1990, p.9–10,13. Emendation: Mao Shaozhi et al., 1999, p.154. Wan Chuanbiao and Zhang Ying (1990, p.9–10,13) included the following species in this subgenus: *Nyctericysta aspera*, *Nyctericysta hailaerensis* and *Nyctericysta nebulosa*. This subgenus was also used by He Chengquan et al. (2009, p.297–298). Type: Wan Chuanbiao and Zhang Ying, 1990, pl.2, fig.6, as *Nyctericysta (Hailaera) hailaerensis*.

NYKTERICYSTA subgenus **HASTODINIUM** Wan Chuanbiao and Zhang Ying, 1990, p.8,13. Emendation: Mao Shaozhi et al., 1999, p.154. Wan Chuanbiao and Zhang Ying (1990, p.8–9,13) included the following species in this subgenus: *Nyctericysta beierensis* and *Nyctericysta ramiformis*. This subgenus was also used by He Chengquan et al. (2009, p.298–299). Type: Wan Chuanbiao and Zhang Ying, 1990, pl.1, fig.4, as *Nyctericysta (Hastodinium) beierensis*.

NYKTERICYSTA subgenus **NYKTERICYSTA**. Autonym. Emendation: Mao Shaozhi et al., 1999, p.152. Wan Chuanbiao and Zhang Ying (1990, p.7,13) included the following species in this subgenus: *Nyctericysta arachnion*, *Nyctericysta davisii*, *Nyctericysta pentagonum* and *Nyctericysta reticulata*. Mao Shaozhi et al. (1999, p.152) additionally included *Nyctericysta puyangensis*. This subgenus was also used by He Chengquan et al. (2009, p.299–301). Type: Bint, 1986, pl.4, figs.1–2,5–6; text-figs.3A–B, as *Nyctericysta davisii*.

"**OBLIQUIPITHONELLA**" Keupp in Keupp and Mutterlose, 1984, p.158. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1300). **Taxonomic senior synonym:** *Pirumella*, according to Streng et al. (2004, p.482), who included the type of *Obliquipithonella* in *Pirumella*; see also Fensome and Williams (2004, p.461). Although the "type species", *Obliquipithonella multistrata*, was not validly transferred to *Obliquipithonella* by Keupp in Keupp and Mutterlose (1984, p.158), the generic name *Obliquipithonella* was validly published, since it is based on a previously validly published species name, *Pithonella multistrata*. Type: Pflaumann and Krasheninnikov, 1978, pl.7, figs.3a–f, as *Pithonella multistrata*.

"*albiensis*" Keupp and Kowalski, 1992, p.222–223, pl.8, figs.13–15. Holotype: Keupp and Kowalski, 1992, pl.8, fig.13. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: middle to late Albian.

"*amplicrostallina*" (Pflaumann and Krasheninnikov, 1978, p.820, pl.3, figs.4a–c,5a–d,6a–d (not 7a–d) Lentin and Williams, 1985, p.380. Holotype: Pflaumann and Krasheninnikov, 1978, pl.3, figs.5a–c. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Maastrichtian.

"*bassriverensis*" (Olsson and Youssefnia, 1979, p.1090, pl.1, figs.13–16) Lentin and Williams, 1985, p.380. Holotype: Olsson and Youssefnia, 1979, pl.1, fig.16. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Cenomanian.

"bilamellata" (Pflaumann and Krasheninnikov, 1978, p.822, pl.5, figs.5,6a–d; pl.6, figs.1a–b,2a–b) Lentin and Williams, 1985, p.380. Holotype: Pflaumann and Krasheninnikov, 1978, pl.5, figs.6a–d. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Campanian–early Maastrichtian.

"carteri" (Bolli, 1974, p.852, pl.1, figs.1–4; pl.8, figs.1–3; pl.21, fig.1) Lentin and Williams, 1985, p.380. Holotype: Bolli, 1974, pl.1, figs.1–2; pl.21, fig.1. **NOW** *Pirumella multistrata* forma *carteri*. Originally *Pithonella carteri*, subsequently *Obliquipithonella carteri*, thirdly *Pirumella carteri*, fourthly *Obliquipithonella multistrata* forma *carteri*, fifthly (and now) *Pirumella multistrata* forma *carteri*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1992a, p.500) — however, Kohring (1993a, p.65) retained *Pithonella carteri* (as *Obliquipithonella multistrata* forma *carteri*). Taxonomic junior synonym (at specific rank): *Pithonella woodburyensis*, according to Kohring (1993a, p.65) — however, *Pithonella woodburyensis* is now considered a taxonomic junior synonym of *Pithonella* (now *Pirumella*) *tanyphloia*. Age: Tithonian.

"cookii" (Bolli, 1974, p.856, pl.6, figs.9–12; pl.18, figs.3–9; pl.23, fig.6) Lentin and Williams, 1985, p.380. Holotype: Bolli, 1974, pl.6, fig.9; pl.23, fig.6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Orthopithonella* (combination not validly published), fourthly (and now) *Pirumella*. Age: Coniacian–Santonian.

"cumulosa" Zügel, 1994, p.73–74, pl.16, figs.14–15. Holotype: Zügel, 1994, pl.16, fig.14. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

"cylindrica" (Pflaumann and Krasheninnikov, 1978, p.822, pl.5, figs.1a–c,2a–b,3a–c,4a–c) Lentin and Williams, 1985, p.380. Holotype: Pflaumann and Krasheninnikov, 1978, pl.5, figs.4a–c. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Campanian–Maastrichtian.

"echinosa" (Keupp, 1982, p.331–332, pl.6.2–7, figs.10–12; pl.6.2–8, figs.1–2) Lentin and Williams, 1985, p.380. Holotype: Keupp, 1982, pl.6.2–7, figs.11–12; pl.6.2–8, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Willems (1988, p.456) also proposed this combination. Age: early Albian.

"edgarii" (Bolli, 1974, p.854, pl.4, figs.1–4; pl.13, figs.3–7; pl.22, fig.4) Lentin and Williams, 1985, p.380. Holotype: Bolli, 1974, pl.4, figs.1–2; pl.13, fig.3; pl.22, fig.4. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonym: *Pithonella titanoplax*, according to Keupp (1981, p.64) — however, Kohring (1993a, p.74) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *titanoplax*. Age: Albian.

"fragilis" Hildebrand-Habel and Willems, 1997, p.183, pl.2, fig.7 ex Hildebrand-Habel and Willems 2004, p.183,185. Holotype: Hildebrand-Habel and Willems, 1997, pl.2, fig.7, as *Obliquipithonella fragilis* and Hildebrand-Habel and Willems, 2004, pl.1, figs.1–3. **Name not validly published**, since it was used in anticipation of future acceptance (I.C.N. Article 36.1b). **NOW** *Pirumella*. Originally *Obliquipithonella* (name not validly published), subsequently (and now) *Pirumella*. Hildebrand-Habel and Willems (1997, p.183) referred this name to a submitted manuscript. Age: middle Coniacian–early Santonian.

"fusiformis" (Rögl, 1976, p.702, pl.1, figs.12–14; pl.2, figs.9–12) Lentin and Williams, 1985, p.380. Holotype: Rögl, 1976, pl.1, fig.12; pl.2, figs.9–10. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Danian.

"globosa" (Fütterer, 1984, p.536, pl.2, figs.1–9) Fütterer, 1990, p.541. Holotype: Fütterer, 1984, pl.2, figs.1–3. **NOW** *Orthopithonella*?. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Orthopithonella*?. Age: middle Maastrichtian–early Danian.

"granifera" (Fütterer, 1978, p.715, pl.2, figs.1–12) Kohring, 1993a, p.71. Emendation: Janofske and Karwath, 2000, p.107–108, as *Leonella granifera*. Holotype: Fütterer, 1978, pl.2, figs.1,4,7. **NOW** *Leonella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Orthopithonella*, fourthly (and now) *Leonella*. Age: late Pliocene–Pleistocene.

"*guttula*" (Pflaumann and Krasheninnikov, 1978, p.821–822, pl.8, figs.1a–e,2a–c,3a–b,4a–b) Lentin and Williams, 1985, p.380. Holotype: Pflaumann and Krasheninnikov, 1978, pl.8, figs.1a–e. Originally *Pithonella*, subsequently *Obliquipithonella*. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *thayeri*, according to Keupp (1981, p.43–44). Age: Valanginian–Hauterivian.

"*heirtzleri*" (Bolli, 1974, p.855, pl.5, figs.5–8; pl.15, figs.7–12; pl.16, figs.1–4; pl.23, fig.2) Lentin and Williams, 1985, p.380. Holotype: Bolli, 1974, pl.5, fig.5; pl.23, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

"*hystrichosphaeroidea*" Zügel, 1994, p.76, pl.18, figs.1–6. Holotype: Zügel, 1994, pl.18, figs.1–2. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

"*irregularis*" Akselman and Keupp, 1990, p.172–173,175–178, pl.1, figs.1–19; text-fig.2. Holotype: Akselman and Keupp, 1990, pl.1, fig.3. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Motile equivalent: *Scrippsiella patagonica* Akselman and Keupp, 1990, according to Akselman and Keupp (1990, p.169). Contrary to the opinion of Lentin and Williams (1993, p.452), the name *Obliquipithonella irregularis* can be considered legitimate, since Akselman and Keupp (1990) did not explicitly include the type of *Scrippsiella patagonica* in synonymy (I.C.N. Article 52.2e). Age: extant.

"*johnstonei*" (Bolli, 1974, p.856, pl.6, figs.5–8; pl.18, figs.1–2; pl.23, fig.5) Lentin and Williams, 1985, p.380. Holotype: Bolli, 1974, pl.6, figs.5–6; pl.18, fig.1; pl.23, fig.5. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Thoracosphaera* (now *Orthopithonella*) *deflandrei*, according to Kohring (1993a, p.30) — however, Streng et al. (2004, p.482) retained *Pithonella* (as *Pirumella*) *johnstonei*. Age: Coniacian–Santonian.

"*krasheninnikovii*" (Bolli, 1974, p.856, pl.7, figs.1–5; pl.18, figs.10–12; pl.19, figs.1–12; pl.20, figs.1–4; pl.24, figs.1–2) Lentin and Williams, 1985, p.381. Holotype: Bolli, 1974, pl.7, figs.1–2; pl.18, fig.10; pl.24, fig.1. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Coniacian–Santonian.

"*labyrinthica*" Zügel, 1994, p.75, pl.17, figs.10–15. Holotype: Zügel, 1994, pl.17, figs.10–12. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: middle Cenomanian.

"*laquaeta*" Keupp and Mutterlose, 1994, p.755, figs.9.6–9.8. Holotype: Keupp and Mutterlose, 1994, fig.9.7. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early Aptian.

"*lepidota*" (Keupp, 1982, p.330–331, pl.6.2–7, figs.2–7) Lentin and Williams, 1985, p.381. Holotype: Keupp, 1982, pl.6.2–7, figs.2,7. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: late Aptian–early Albian.

"*loeblichii*" (Bolli, 1974, p.853–854; pl.3, figs.1–4; pl.11, figs.9–12; pl.12, figs.1–3; pl.22, fig.1) Lentin and Williams, 1985, p.381. Holotype: Bolli, 1974, pl.3, figs.1–2; pl.11, figs.9–10; pl.22, fig.1. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella helentappaniae*, according to Keupp (1979c, p.23) — however, Keupp (1981, p.60) retained *Pithonella loeblichii*. Taxonomic junior synonyms: *Pithonella bollii*, *Pithonella megalithica* and *Pithonella nonarenziae*, all according to Keupp (1981, p.60) — however, Zügel (1994, p.66) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *nonarenziae*. Age: ?late Aptian–middle Albian.

"*longiporosa*" (Pflaumann and Krasheninnikov, 1978, p.820, pl.2, figs.1a–c,2a–c,3a–b) Lentin and Williams, 1985, p.381. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.1a–c. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: latest Albian–Cenomanian.

"*loricata*" (Krasheninnikov and Basov, 1983, p.982, pl.3, figs.1–7) Lentin and Williams, 1985, p.381. Holotype: Krasheninnikov and Basov, 1983, pl.3, figs.1,4. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

"*mcnighii*" (Bolli, 1974, p.852–853, pl.1, figs.5–8; pl.8, figs.4–8; pl.21, fig.2) Lentin and Williams, 1985, p.381. Holotype: Bolli, 1974, pl.1, figs.5–6; pl.8, fig.4; pl.21, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Tithonian.

"*microspinosa*" Zügel, 1994, p.74–75, pl.17, figs.1–8. Holotype: Zügel, 1994, pl.17, figs.1–2. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early Cenomanian.

"*miniaperta*" (Krasheninnikov and Basov, 1983, p.983, pl.5, figs.1–8) Lentin and Williams, 1985, p.381. Holotype: Krasheninnikov and Basov, 1983, pl.5, figs.1,7. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

"**multistrata*" (Pflaumann and Krasheninnikov, 1978, p.821, pl.7, figs.3a–f,4a–b,5a–b,6a–b) Lentin and Williams, 1985, p.381. Holotype: Pflaumann and Krasheninnikov, 1978, pl.7, figs.3a–f. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonyms: *Pithonella atlantica*, *Pithonella excentrica* and *Pithonella hannoverana*, all according to Keupp (1981, p.29–30) — however, Kohring (1993a, p.66) retained *Pithonella excentrica* (as *Obliquipithonella multistrata* forma *excentrica*). Age: Valanginian–Barremian.

"forma *carteri*" (Bolli, 1974, p.852, pl.1, figs.1–4; pl.8, figs.1–3, pl.21, fig.1) Kohring, 1993a, p.65. Holotype: Bolli, 1974, pl.1, figs.1–2; pl.21, fig.1. **NOW** *Pirumella multistrata* forma *carteri*. Originally *Pithonella carteri*, subsequently *Obliquipithonella carteri*, thirdly *Pirumella carteri*, fourthly *Obliquipithonella multistrata* forma *carteri*, fifthly (and now) *Pirumella multistrata* forma *carteri*. Taxonomic senior synonym (at specific rank): *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1992a, p.500) — however, Kohring (1993a, p.65) retained *Pithonella carteri* (as *Obliquipithonella multistrata* forma *carteri*). Taxonomic junior synonym (at specific rank): *Pithonella woodburyensis*, according to Kohring (1993a, p.65) — however, *Pithonella woodburyensis* is now considered a taxonomic junior synonym of *Pithonella* (now *Pirumella*) *tanyphloia*. Age: Tithonian.

"forma *continga*" Kohring, 1993a, p.69–70, pl.30, figs.a–p. Holotype: Kohring, 1993a, pl.30, figs.a,c,e. **NOW** *Pirumella multistrata* forma *continga*. Originally *Obliquipithonella multistrata* forma *continga*, subsequently (and now) *Pirumella multistrata* forma *continga*. Age: middle Oligocene.

"forma *excentrica*" (Keupp, 1979c, p.660, pl.6, figs.6–12) Kohring, 1993a, p.66. Holotype: Keupp, 1979c, pl.6, figs.7–8,11. **NOW** *Pirumella multistrata* forma *excentrica*. Originally *Pithonella excentrica*, subsequently *Obliquipithonella multistrata* forma *excentrica*, thirdly (and now) *Pirumella multistrata* forma *excentrica*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1981, p.30) — however, Kohring (1993a, p.66) retained *Pithonella excentrica* (as *Obliquipithonella multistrata* forma *excentrica*). Monnet (1993, p.33) also proposed this combination. Age: late Hauterivian.

"forma *multistrata*". Autonym. Holotype: Pflaumann and Krasheninnikov, 1978, pl.7, figs.3a–f. **NOW** *Pirumella multistrata* forma *multistrata*. Originally *Obliquipithonella multistrata* forma *multistrata*, subsequently (and now) *Pirumella multistrata* forma *multistrata*.

"forma *patriciagreeleyae*" (Bolli, 1974, p.853, pl.2, figs.9–12; pl.11, figs.1–8; pl.21, fig.6) Kohring, 1993a, p.67. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. **NOW** *Pirumella multistrata* forma *patriciagreeleyae*. Originally *Pithonella patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae*, fourthly *Obliquipithonella multistrata* forma *patriciagreeleyae*, fifthly (and now) *Pirumella multistrata* forma *patriciagreeleyae*. Taxonomic junior synonym: *Pithonella francadecimae*, according to Keupp (1981, p.41). Age: Barremian–Albian.

"*nonarenziae*" (Bolli, 1974, p.853, pl.2, figs.5–8; pl.10, figs.9–12; pl.21, fig.5) Zügel, 1994, p.66. Holotype: Bolli, 1974, pl.2, fig.5; pl.21, fig.5. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *loeblichii*, according to Keupp (1981,

p.60) — however, Zügel (1994, p.66) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *nonarenziae*. Taxonomic junior synonym: *Pithonella sheilasantawae*, according to Zügel (1994, p.66). Age: Barremian–Albian.

"*operculata*" (Bramlette and Martini, 1964, p.305–306, pl.5, figs.3–7) Fütterer, 1990, p.540. Holotype: Bramlette and Martini, 1964, pl.5, figs.4–5. **NOW** *Cervisiella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Pirumella*, fourthly *Operculodinella*, fifthly (and now) *Cervisiella*. Taxonomic junior synonym: *Thoracosphaera atlantica*, according to Fütterer (1990, p.540). Age: Maastrichtian–Paleocene.

"*ossis*" Kienel, 1994, p.45–46, pl.8, figs.7–15. Holotype: Kienel, 1994, pl.8, figs.7–10. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. N.I.A. Age: Danian.

"*pachystrata*" Zügel, 1994, p.37–38, pl.5, figs.1–12. Holotype: Zügel, 1994, pl.5, figs.1–3. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

"*paradoxa*" Keupp, 1991b, p.132, pl.3, figs.7–12. Holotype: Keupp, 1991b, pl.3, figs.7–9. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

"*parva*" (Fütterer, 1984, p.536–537, pl.3, figs.1–10; pl.4, figs.8–9) Lentin and Williams, 1985, p.381. Holotype: Fütterer, 1984, pl.3, figs.3,6,10. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Fütterer (1990, p.541) also proposed this combination. Age: Danian–early Pleistocene.

"*patriciagreeleyae*" (Bolli, 1974, p.853, pl.2, figs.9–12; pl.11, figs.1–8; pl.21, fig.6) Lentin and Williams, 1985, p.381. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. **NOW** *Pirumella multistrata* forma *patriciagreeleyae*. Originally *Pithonella patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae*, fourthly *Obliquipithonella multistrata* forma *patriciagreeleyae*, fifthly (and now) *Pirumella multistrata* forma *patriciagreeleyae*. Taxonomic junior synonym: *Pithonella francadecimae*, according to Keupp (1981, p.41). Age: Barremian–Albian.

"subsp. *ovata*" (Keupp, 1979a, p.32, pl.6, fig.10; pl.7, figs.1–3) Lentin and Williams, 1985, p.382. Holotype: Keupp, 1979a, pl.7, figs.1–2. Originally *Pithonella patriciagreeleyae* subsp. *ovata*, subsequently *Obliquipithonella patriciagreeleyae* subsp. *ovata*, thirdly *Pirumella patriciagreeleyae* subsp. *ovata*. **Taxonomic senior synonym** (at specific rank): *Pithonella sliteri*, according to Keupp (1982, p.334). Age: early Barremian.

"subsp. *patriciagreeleyae*". Autonym. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. **Now redundant**. Originally *Pithonella patriciagreeleyae* subsp. *patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae* subsp. *patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae* subsp. *patriciagreeleyae*.

"*pinguis*" Keupp and Ilg, 1989, p.173, pl.11, figs.1–6. Holotype: Keupp and Ilg, 1989, pl.11, figs.1–2. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early-middle Oxfordian.

"*piriformis*" (Keupp, 1977, p.66–67, pl.23, figs.1–5; text-fig.7) Lentin and Williams, 1985, p.382. Holotype: information not available. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Tithonian.

"*porosa*" (Pflaumann and Krasheninnikov, 1978, p.820, pl.2, figs.4a–b,5a–c,6a–b,7; pl.3, figs.1a–b,2a–b,3) Lentin and Williams, 1985, p.382. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.4a–b. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian–Cenomanian.

"forma *obturata*" (Pflaumann and Krasheninnikov, 1978, p.820, pl.3, figs.1a–b,2a–b,3) Lentin and Williams, 1985, p.382. Holotype: Pflaumann and Krasheninnikov, 1978, pl.3, figs.1a–b. **NOW** *Pirumella porosa* subsp. *obturata*. Originally *Pithonella porosa* forma *obturata*, subsequently *Obliquipithonella porosa* forma *obturata*, thirdly (and now) *Pirumella porosa* subsp. *obturata*. Age: latest Albian–Cenomanian.

- "forma *porosa*". Autonym. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.4a–b. **Now redundant.** Originally *Pithonella porosa* forma *porosa*, subsequently *Obliquipithonella porosa* forma *porosa*.
- "*prasina*" Janofske, 1992, p.14, pl.4, figs.1a–h; pl.5, figs.1a–h,2a–c; pl.6, figs.1a–f,2a–d; pl.19, figs.4–5. Holotype: Janofske, 1992, pl.4, figs.1a–h; pl.19, fig.5. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: Carnian.
- "*quiltyi*" (Bolli, 1974, p.855–856, pl.6, figs.1–4; pl.17, figs.1–12; pl.23, fig.4) Lentin and Williams, 1985, p.382. Holotype: Bolli, 1974, pl.6, fig.1; pl.23, fig.4. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.
- "*rhombica*" Janofske, 1987, p.50, pl.1, fig.5. Holotype: Janofske, 1987, pl.1, fig.5. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: Rhaetian.
- "*robinsonii*" (Bolli, 1974, p.854, pl.4, figs.5–8; pl.13, figs.8–12; pl.14, figs.1–3; pl.22, fig.5) Lentin and Williams, 1985, p.382. Holotype: Bolli, 1974, pl.4, figs.5–6; pl.13, figs.8–9; pl.22, fig.5. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonym: *Pithonella trilamellata*, according to Keupp (1982, p.325). Age: Albian.
- "subsp. *coalita*" (Keupp, 1979a, p.27, pl.4, figs.9–10) Lentin and Williams, 1985, p.382. Holotype: Keupp, 1979a, pl.4, figs.9–10. **NOW** *Pirumella robinsonii* subsp. *coalita*. Originally *Pithonella robinsonii* subsp. *coalita*, subsequently *Obliquipithonella robinsonii* subsp. *coalita*, thirdly (and now) *Pirumella robinsonii* subsp. *coalita*. Age: early Barremian.
- "subsp. *robinsonii*". Autonym. Holotype: Bolli, 1974, pl.4, figs.5–6; pl.13, figs.8–9; pl.22, fig.5. **NOW** *Pirumella robinsonii* subsp. *robinsonii*. Originally *Pithonella robinsonii* subsp. *robinsonii*, subsequently *Obliquipithonella robinsonii* subsp. *robinsonii*, thirdly (and now) *Pirumella robinsonii* subsp. *robinsonii*.
- "*rockeri*" (Bolli, 1974, p.854, pl.3, figs.5–8; pl.12, figs.4–6; pl.22, fig.2) Lentin and Williams, 1985, p.382. Holotype: Bolli, 1974, pl.3, fig.5; pl.22, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: ?late Aptian–middle Albian.
- "*saxea*" (Stradner, 1961, p.84, fig.71) Kohring, 1997, p.155. Holotype: Stradner, 1961, fig.71. **Combination not validly published:** basionym not fully referenced. **NOW** *Cervisiella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella* (combination not validly published), thirdly *Pirumella*, fourthly (and now) *Cervisiella*. This combination was not validly published in Keupp (1987, p.51) and Kienel (1994, p.46), since these authors did not fully reference the basionym. Age: Danian.
- "*scobidota*" Zügel, 1994, p.70, pl.15, figs.13–15. Holotype: Zügel, 1994, pl.15, figs.13–15. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.
- "*sheilasantawae*" (Bolli, 1974, p.854–855, pl.4, figs.9–12; pl.14, figs.4–9; pl.22, fig.6) Lentin and Williams, 1985, p.382. Holotype: Bolli, 1974, pl.4, figs.9–10; pl.14, figs.7–8; pl.22, fig.6. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Pirumella*. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *nonarenziae*, according to Zügel (1994, p.66). Taxonomic junior synonym: *Thoracosphaera thoracata*, according to Keupp (1981, p.63). Age: Albian.
- "*sicelis*" Kohring, 1993b, p.17, pl.2, figs.10–15. Holotype: Kohring, 1993b, pl.2, figs.10–11. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early Pliocene.
- "*sliteri*" (Bolli, 1980, p.528, pl.5, figs.1–12; pl.6, figs.1–6) Lentin and Williams, 1985, p.382. Holotype: Bolli, 1980, pl.5, figs.1–2. **NOW** *Pirumella*. Originally (and now) *Pirumella*, subsequently *Pithonella*, thirdly *Obliquipithonella*. Taxonomic junior synonym (at specific rank): *Pithonella* (subsequently *Pirumella*) *patriciagreeleyae* subsp. *ovata*, according to Keupp (1982, p.334). Age: late Hauterivian.

"*spathulata*" Keupp and Ilg, 1989, p.172–173, pl.8, fig.15; pl.9, figs.1–15. Holotype: Keupp and Ilg, 1989, pl.9, figs.1–3. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Callovian–early Oxfordian.

"*sphenifera*" Keupp, 1987, p.52, pl.19, figs.7–12. Holotype: Keupp, 1987, pl.19, figs.7–8. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: middle Albian–early Cenomanian.

"*spinosa*" (Keupp, 1979a, p.17–18, pl.1, fig.6) Lentin and Williams, 1985, p.382. Holotype: Keupp, 1979a, pl.1, fig.6. **NOW** *Pirumella*. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

"*squalida*" (Krasheninnikov and Basov, 1983, p.982, pl.4, figs.1–8) Lentin and Williams, 1985, p.383. Holotype: Krasheninnikov and Basov, 1983, pl.4, figs.3–4,6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: earliest late Cenomanian.

"*squamosa*" (Krasheninnikov and Basov, 1983, p.983, pl.6, figs.1–6) Lentin and Williams, 1985, p.383. Holotype: Krasheninnikov and Basov, 1983, pl.6, figs.3,5. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Junior homonym: *Obliquipithonella squamosa* Zügel, 1994. Age: Albian.

"*squamosa*" Zügel, 1994, p.72–73, pl.16, figs.10–13. Holotype: Zügel, 1994, pl.16, fig.10. **Name illegitimate — senior homonym:** *Obliquipithonella squamosa* (Krasheninnikov and Basov, 1983) Lentin and Williams, 1985. **Substitute name:** *Pirumella zuegelii*. Originally *Obliquipithonella squamosa* (name illegitimate), subsequently (and now) *Pirumella zuegelii*. Age: late Cenomanian.

"*stellata*" Zügel, 1994, p.40, pl.6, figs.4–6. Holotype: Zügel, 1994, pl.6, figs.4–5. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

"*strobila*" (Keupp, 1979a, p.18, pl.2, figs.1–3) Lentin and Williams, 1985, p.383. Holotype: Keupp, 1979a, pl.2, figs.1–2. **NOW** *Pirumella*. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

"*tanyphloia*" (Keupp, 1979a, p.29–30, pl.6, figs.1–8) Lentin and Williams, 1985, p.383. Holotype: Keupp, 1979a, pl.6, figs.1–3. **NOW** *Pirumella multistrata* forma *tanyphloia*. Originally *Pithonella tanyphloia*, subsequently *Obliquipithonella tanyphloia*, thirdly *Pirumella tanyphloia*, fourthly (and now) *Pirumella multistrata* forma *tanyphloia*. Taxonomic junior synonym: *Pithonella woodburyensis*, according to Keupp (1981, p.36–38). Age: early Barremian.

"*thayeri*" (Bolli, 1974, p.853, pl.1, figs.9–12; pl.8, figs.9–12; pl.9, figs.1–12; pl.21, fig.3) Lentin and Williams, 1985, p.383. Holotype: Bolli, 1974, pl.1, fig.9; pl.21, fig.3. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonyms: *Pirumella edithvincentiae*, *Pithonella guttula*, *Pithonella helentappanae* and *Pithonella oviformis*, all according to Keupp (1981, p.43–44). Age: Oxfordian–Tithonian.

"*titanoplax*" (Rögl, 1976, p.701–702, pl.1, figs.5–9; pl.2, figs.5–8) Kohring, 1993a, p.74. Holotype: Rögl, 1976, pl.1, fig.5; pl.2, figs.5–6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *edgarii*, according to Keupp (1981, p.64) — however, Kohring (1993a, p.74) retained *Obliquipithonella titanoplax*. Age: Danian.

"*toichohadra*" Keupp, 1995, p.162–163, pl.7, figs.7–9. Holotype: Keupp and Kowalski, 1992, pl.8, fig.8, as *Obliquipithonella* sp. cf. *williamsenii*. **NOW** *Pirumella*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: Albian.

"*transitoria*" (Krasheninnikov and Basov, 1983, p.983, pl.7, figs.1–6) Lentin and Williams, 1985, p.383. Holotype: Krasheninnikov and Basov, 1983, pl.7, figs.1,6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Campanian.

"*trilamellata*" (Pflaumann and Krasheninnikov, 1978, p.821, pl.6, figs.3a–c,4a–b,5a–c,7a–b; pl.7, figs.1a–c,2) Lentin and Williams, 1985, p.383. Holotype: Pflaumann and Krasheninnikov, 1978, pl.6, figs.3a–c. Originally *Pithonella*, subsequently *Obliquipithonella*. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *robinsonii*, according to Keupp (1982, p.325). Age: Valanginian to ?Aptian–Albian.

"*usheri*" (Krasheninnikov and Basov, 1983, p.983, pl.7, figs.7–9; pl.8, figs.1–2) Lentin and Williams, 1989, p.400. Holotype: Krasheninnikov and Basov, 1983, pl.7, fig.7; pl.8, fig.1. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Maastrichtian.

"*williamsonii*" (Bolli, 1978b, p.912–913, pl.2, figs.1–12; pl.3, figs.1–12) Lentin and Williams, 1985, p.383. Holotype: Bolli, 1978b, pl.2, figs.1–3. **NOW** *Pirumella*. Originally *Bonetocardiella*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly *Orthopithonella*, fifthly (and now) *Pirumella*. Age: Oxfordian–Kimmeridgian.

OCCISUCYSTA Gitmez, 1970, p.267. Emendation: Jan du Chêne et al., 1986b, p.12–15. Taxonomic junior synonym: *Diacanthum*, according to Below (1981a, p.59) — however, Lentin and Williams (1981, p.80) retained *Diacanthum*. Type: Gitmez, 1970, pl.5, figs.1–2; text-fig.16, as *Occisucysta balios*.

"*aculeata*" (Klement, 1960, p.42, pl.5, figs.6–9; text-fig.21) Below, 1981a, p.60. Holotype: Klement, 1960, pl.5, figs.6–7. **NOW** *Tehamadinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Acanthaulax*, fourthly *Occisucysta*, fifthly (and now) *Tehamadinium*. Age: early Kimmeridgian.

**balios* Gitmez, 1970, p.267–268, pl.5, figs.1–2; text-fig.16. Emendation: Jan du Chêne et al., 1986b, p.15–16. Holotype: Gitmez, 1970, pl.5, figs.1–2; text-fig.16; Jan du Chêne et al., 1986a, pl.77, figs.1–3; Jan du Chêne et al., 1986b, pl.1, figs.1–3. N.I.A. Age: early Kimmeridgian.

"*brixii*" Below, 1982a, p.29–30,32, pl.2, figs.3a–b,4a–b,5–11,12a–b,13a–b; pl.3, figs.10–17,21; text-figs.5a–d. Emendation: Jan du Chêne et al., 1986b, p.21–22, as *Tehamadinium brixii*. Holotype: Below, 1982a, pl.2, figs.13a–b; Jan du Chêne et al., 1986a, pl.116, figs.1–2; Jan du Chêne et al., 1986b, pl.13, figs.1–4; Fensome et al., 1993a, figs.1–2 — p.987. **NOW** *Tehamadinium*. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. Below (1982a, p.29) gave the citation "*Occisucysta brixii brixii* n.sp." but did not name any formal varieties of *Occisucysta brixii*. Age: early Valanginian.

"*cornuta*" (Davey, 1974, p.48–49, pl.2, figs.1–5) Below, 1981a, p.60. Holotype: Davey, 1974, pl.2, figs.2–3; Jan du Chêne et al., 1986a, pl.21, figs.8–9. **NOW** *Cribroperidinium?*. Originally *Cribroperidinium*, subsequently *Occisucysta*, thirdly (and now) *Cribroperidinium?*. Age: middle-late Barremian.

"*coummia*" Below, 1981a, p.61, pl.8, figs.6–7; pl.13, figs.10–11. Emendation: Jan du Chêne et al., 1986b, p.22–23, as *Tehamadinium coummia*. Holotype: Below, 1981a, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.118, figs.7–9; Jan du Chêne et al., 1986b, pl.14, figs.1–4; Fensome et al., 1991, figs.1–2 — p.631. **NOW** *Tehamadinium*. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. Age: Albian.

"*crestata*" Jain, 1977b, p.175, pl.5, figs.63–65. Emendation: Jan du Chêne et al., 1986b, p.23–24, as *Tehamadinium crestata*. Holotype: Jain, 1977b, pl.5, figs.63–65; Jan du Chêne et al., 1986a, pl.118, fig.11; Jan du Chêne et al., 1986b, pl.26, fig.4. **NOW** *Tehamadinium*. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. Age: early Albian.

duxburyi Jan du Chêne et al., 1986b, p.16–17, pl.4, figs.1–12; pl.5, figs.1–12; pl.6, figs.1–4; pl.7, figs.1–7. Holotype: Jan du Chêne et al., 1986b, pl.4, figs.4–7; Jan du Chêne et al., 1986a, pl.78, fig.4. Age: late Aptian.

?*echinata* Duxbury, 1983, p.51, pl.4, figs.12–13. Emendation: Jan du Chêne et al., 1986b, p.17–18. Holotype: Duxbury, 1983, pl.4, figs.12–13; Jan du Chêne et al., 1986a, pl.77, figs.10–12; Jan du Chêne et al., 1986b, pl.8, figs.1–6. Questionable assignment: Duxbury (1983, p.51). Age: Aptian.

elongata Sun Xuekun and He Chengquan, 1992, p.196,203, pl.1, fig.9; pl.4, fig.1. Holotype: Sun Xuekun and He Chengquan, 1992, pl.1, fig.9. Age: Late Jurassic.

evittii" (Dodekova, 1969, p.14–15, pl.1, figs.1–6; pl.2, figs.1–12; text-figs.Aa–b) Gitmez, 1970, p.269. Emendation: Jan du Chêne et al., 1986b, p.26–27, as *Tehamadinium evittii*. Holotype: Dodekova, 1969, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.117, figs.1–2; Jan du Chêne et al., 1986b, pl.20, figs.1–4. **NOW** *Tehamadinium*. Originally *Gonyaulacysta*, subsequently *Occisucysta*, thirdly (and now) *Tehamadinium*. Taxonomic junior synonym: *Diacanthum hollisteri*, according to Below (1982a, p.32–33) — however, Jan du Chêne et al. (1986b, p.122) and Habib and Drugg (1987, p.762–763) retained *Diacanthum hollisteri*. Age: Tithonian.

hinzii Below, 1984, p.636, pl.6, figs.7A–C,8A–B; text-fig.6. Emendation: Jan du Chêne et al., 1986b, p.18–19. Holotype: Below, 1984, pl.6, figs.7A–C; Jan du Chêne et al., 1986a, pl.79, figs.7–9; Jan du Chêne et al., 1986b, pl.10, figs.1–9. Age: middle-late Aptian.

hollisteri" (Habib, 1972, p.376–377, pl.9, figs.1,3; pl.10, fig.1; text-fig.2) Below, 1981a, p.60. Emendation: Habib and Drugg, 1987, p.762, as *Diacanthum hollisteri*. Holotype: Habib, 1972, pl.9, fig.1; Fensome et al., 1995, fig.1 — p.1547. **NOW** *Diacanthum*. Originally (and now) *Diacanthum*, subsequently *Occisucysta*. Taxonomic senior synonym: *Gonyaulacysta* (as and now *Occisucysta*) *evittii*, according to Below (1982a, p.32–33) — however, Jan du Chêne et al. (1986b, p.122) and Habib and Drugg (1987, p.762–763) retained *Diacanthum hollisteri*. Age: ?Valanginian.

mazaganensis" Below, 1984, p.636–637, pl.6, figs.9A–C; pl.7, figs.1A–B; text-fig.7. Emendation: Jan du Chêne et al., 1986b, p.27, as *Tehamadinium mazaganense*. Holotype: Below, 1984, pl.7, figs.1A–B; Jan du Chêne et al., 1986a, pl.117, figs.4–6; Jan du Chêne et al., 1986b, pl.21, figs.1–9. **NOW** *Tehamadinium*. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. Age: late Albian.

monoheuriskos Gitmez and Sarjeant, 1972, p.221–223, pl.7, figs.10–11; text-fig.21. Emendation: Jan du Chêne et al., 1986b, p.19–20. Holotype: Gitmez and Sarjeant, 1972, pl.7, figs.10–11; text-fig.21; Jan du Chêne et al., 1986a, pl.77, figs.8–9; Jan du Chêne et al., 1986b, pl.1, figs.8–11. Originally *Occisucysta*, subsequently (and now) *Occisucysta*?. Questionable assignment: Jan du Chêne et al. (1986b, p.19–20). N.I.A. Age: early Kimmeridgian.

paucispina" (Eisenack and Cookson, 1960, p.5–6, pl.2, fig.7) Below, 1981a, p.60. Emendation: Jan du Chêne et al., 1986a, p.369, as *Pervosphaeridium paucispinum*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.7; Jan du Chêne et al., 1986a, pl.122, fig.13. **NOW** *Pervosphaeridium*. Originally *Trichodinium*, subsequently *Occisucysta*, thirdly (and now) *Pervosphaeridium*. Age: Albian.

sousensis" Below, 1981a, p.61–62, pl.8, figs.1a–b,2. Emendation: Jan du Chêne et al., 1986b, p.26–27, as *Tehamadinium sousense*. Holotype: Below, 1981a, pl.8, figs.1a–b; Jan du Chêne et al., 1986a, pl.117, figs.7–10; Jan du Chêne et al., 1986b, pl.22, figs.1–5; Fensome et al., 1991, figs.1–5 — p.743. **NOW** *Tehamadinium*. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. Age: late Aptian.

speetonensis" (Davey, 1974, p.63, pl.7, figs.2–3) Below, 1981a, p.60. Holotype: Davey, 1974, pl.7, figs.2–3; Jan du Chêne et al., 1986a, pl.121, figs.1–2. **NOW** *Trichodinium*. Originally (and now) *Trichodinium*, subsequently *Occisucysta*?. Questionable assignment: Below (1981a, p.60). Age: Barremian.

tentorium Duxbury, 1977, p.44–45, pl.3, figs.8–9; text-fig.16. Emendation: Jan du Chêne et al., 1986b, p.20. Holotype: Duxbury, 1977, pl.3, figs.8–9; Jan du Chêne et al., 1986a, pl.79, figs.1–3; Jan du Chêne et al., 1986b, pl.11, figs.1–5. N.I.A. Age: late Berriasian–early Barremian.

tenuiceras" (Eisenack, 1958a, p.389–391, pl.21, figs.14–15; pl.22, figs.1–3; pl.24, fig.2; text-figs.4a–c,5) Below, 1981a, p.63. Emendations: Sarjeant, 1985a, p.63,65–66, as *Acanthaulax? tenuiceras*; Jan du Chêne et al., 1986b, p.29–30, as *Tehamadinium tenuiceras*. Holotype: Eisenack, 1958a, pl.21, fig.15; Sarjeant, 1985a, pl.6, figs.1–2; text-fig.3; Jan du Chêne et al., 1986a, pl.118, fig.1; Jan du Chêne et al., 1986b, pl.24, fig.5. **NOW** *Cribroperidinium*?. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*?, thirdly *Diacanthum*, fourthly *Occisucysta*, fifthly *Acanthaulax*?, sixthly *Tehamadinium*, seventhly (and now) *Cribroperidinium*?.

Taxonomic junior synonym: *Occisucysta victorii*, according to Pöthe de Baldis and Ramos (1988, p.33). Age: late Barremian–Aptian.

"*thulia*" Davies, 1983, p.19–20, pl.5, figs.1–8,10–12; text-fig.14. Holotype: Davies, 1983, pl.5, figs.10–11. **NOW** *Ctenidodinium*?. Originally *Occisucysta*, subsequently (and now) *Ctenidodinium*?. Age: middle Callovian–Oxfordian.

"*victorii*" Pöthe de Baldis and Ramos, 1983, p.444, pl.3, figs.6,8. Holotype: Pöthe de Baldis and Ramos, 1983, pl.3, figs.6,8; Jan du Chêne et al., 1986a, pl.26, figs.1–2. Originally *Occisucysta*, subsequently *Tehamadinium*. **Taxonomic senior synonym:** *Gonyaulax* (as *Occisucysta*, now *Cribroperidinium*?) *tenuiceras*, according to Pöthe de Baldis and Ramos (1988, p.33). Age: early Aptian.

wierzbowskii Poulsen, 1996, p.67,69, pl.25, figs.1–5; text-figs.21A–B. Holotype: Poulsen, 1996, pl.25, figs.1–3. Age: early Volgian.

OCHETODINIUM Damassa, 1979a, p.830,833. Type: Damassa, 1979a, pl.6, figs.1,5, as *Ochetodinium romanum*.

**romanum* Damassa, 1979a, p.833–834, pl.6, figs.1–12. Holotype: Damassa, 1979a, pl.6, figs.1,5; Fensome et al., 1995, figs.1–2 — p.1747. Age: early-middle Eocene.

taiwanianum Shaw Chenglong, 1999b, p.174, figs.43–44. Holotype: Shaw Chenglong, 1999b, figs.43–44. Age: Eocene.

"*vermiculatum*" Wilson, 1988, p.26–27, pl.16, figs.1–2. Holotype: Wilson, 1988, pl.16, fig.2; Fensome et al., 1996, fig.2 — p.2429. **NOW** *Corrudinium*. Originally *Ochetodinium*, subsequently (and now) *Corrudinium*. Age: early Eocene.

OCTODINIUM Wrenn and Hart, 1988, p.359. Type: Wrenn and Hart, 1988, fig.29, no.5, as *Octodinium askinia*.

**askinia* Wrenn and Hart, 1988, p.359–360, fig.28, nos.1–2,4, fig.29, nos.1–7. Holotype: Wrenn and Hart, 1988, fig.29, no.5; Fensome et al., 1993a, fig.7 — p.941. Age: Eocene.

ODONTOCHITINA Deflandre, 1937b, p.94. Emendations: Davey, 1970, p.354; Bint, 1986, p.138; El Mehdawi, 1998, p.174; Núñez-Betelu and Hills, 1998, p.925–926,928. This name was not validly published in Deflandre (1935, p.234) since no type was designated, a requirement under the I.C.Z.N. at that time. Type: Deflandre, 1937b, pl.18 (al. pl.15), fig.8, as *Odontochitina silicorum*.

ancala Bint, 1986, p.139–140, pl.1, figs.2–8; pl.7, figs.1–2; text-fig.2A. Holotype: Bint, 1986, pl.1, figs.5–6; text-fig.2A. Age: middle-late Albian.

annulata Yu Jingxian and Zhang Wangping, 1980, p.110, pl.3, figs.10–11. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.3, fig.10. Age: Late Cretaceous.

athabaskensis Pocock, 1962, p.78, pl.14, figs.209–210. Holotype: Pocock, 1962, pl.14, fig.209. Age: Barremian.

"*blastema*" Davey, 1970, p.356, pl.5, figs.4–5. Holotype: Davey, 1970, pl.5, fig.4. **NOW** *Xenascus*. Originally *Odontochitina*, subsequently (and now) *Xenascus*. Taxonomic senior synonym: *Hystrichosphaera* (as *Xenascus*) *ceratioides*, according to Davey and Verdier (1971, p.27) — however, Stover and Helby (1987a, p.128) retained *Odontochitina* (as *Xenascus*) *blastema*. N.I.A. Age: Cenomanian.

costata Alberti, 1961, p.31, pl.6, figs.10–13. Emendation: Clarke and Verdier, 1967, p.58–59. Holotype: Alberti, 1961, pl.6, fig.12. Taxonomic junior synonym: *Odontochitina striatoperforata*, according to Clarke and Verdier (1967, p.58) and Yun Hyesu (1981, p.59). Age: Cenomanian–Turonian.

cribropoda Deflandre and Cookson, 1955, p.292, pl.3, figs.7–11; text-fig.58. Holotype: Deflandre and Cookson, 1955, pl.3, fig.7. Taxonomic junior synonym: *Odontochitina subbaramana*, according to Jain (1977b, p.186). This name was not validly published in Deflandre and Cookson (1954, p.1236), who did not provide a description. Age: Senonian.

diducta Pearce, 2010, p.62,64, pl.6, fig.1. Holotype: Pearce, 2010, pl.6, fig.1. Age: middle Santonian–late Campanian.

grandis Fedorova-Shakhmundes, 1980, p.6, pl.1, fig.3. Holotype: Fedorova-Shakhmundes, 1980, pl.1, fig.3. Age: Cenomanian.

imparilis (Duxbury, 1980, p.127–129, pl.5, figs.2,4–5; text-figs.11A–B) Jain and Khowaja-Ateequzzaman, 1984, p.38. Holotype: Duxbury, 1980, pl.5, figs.4–5; text-fig.11B. Originally *Muderongia*, subsequently *Odontochitina*?, thirdly (and now) *Odontochitina*. Questionable assignment: Jain and Khowaja-Ateequzzaman (1984, p.38) — however, Bint (1986, p.138) included this species in *Odontochitina* without question. Age: middle-late Barremian.

indigena Marshall, 1988, p.198–199, figs.5A–B,11G–S. Holotype: Marshall, 1988, figs.11Q–S; Fensome et al., 1996, figs.11–13 — p.2157. Age: Santonian.

kashiensis He Chengquan, 1991, p.60, pl.6, figs.14–16. Holotype: He Chengquan, 1991, pl.6, fig.14. Age: Turonian.

nuda (Gocht, 1957, p.168, pl.18, figs.3–4,6) Dörhöfer and Davies, 1980, p.39. Holotype: Gocht, 1957, pl.18, fig.3. Originally *Pseudoceratium*?, subsequently (and now) *Odontochitina*. Age: late Hauterivian.

octopus Núñez-Betelu and Hills, 1998, p.928–929, pl.1, figs.1–6. Holotype: Núñez-Betelu and Hills, 1998, pl.1, fig.5. Age: late Coniacian?

+***operculata*** (Wetzel, 1933a, p.170, pl.2, figs.21–22; text-fig.3) Deflandre and Cookson, 1955, p.291–292. Holotype: Wetzel, 1933a, pl.2, fig.21. Originally *Ceratium* subgenus *Euoceratium* (Appendix B), subsequently *Palaeoceratium* subgenus *Euoceratium* (combination not validly published), thirdly *Odontochitina*. Taxonomic junior synonym: *Odontochitina silicorum*, according to Deflandre and Cookson (1955, p.292). The nomenclatural type of the genus *Odontochitina* remains the holotype of *Odontochitina silicorum*. Age: Senonian.

porifera Cookson, 1956, p.188, pl.1, fig.17. Holotype: Cookson, 1956, pl.1, fig.17. Age: Senonian.

rhakodes Bint, 1986, p.140,142,144, pl.1, figs.9–12; pl.2, figs.1–4; pl.7, figs.3–4; text-figs.2B,13A. Holotype: Bint, 1986, pl.1, figs.9–10; text-fig.2B. Age: middle Albian–early Cenomanian.

"****silicorum***" Deflandre, 1937b, p.95, pl.18 (al. pl.15), figs.8–13. Holotype: Deflandre, 1937b, pl.18 (al. pl.15), fig.8. **Taxonomic senior synonym:** *Ceratium* (as *Odontochitina*) *operculata*, according to Deflandre and Cookson (1955, p.292). The nomenclatural type of the genus *Odontochitina* remains the holotype of *Odontochitina silicorum*. This name was not validly published in Deflandre (1935, p.234, caption to pl.9, figs.8–10), since that author did not designate a type, a requirement at that time under the I.C.Z.N. N.I.A. Age: Late Cretaceous.

singhii Morgan, 1980, p.29–30, pl.20, figs.12–15. Holotype: Morgan, 1980, pl.20, figs.12–13. Age: early–late Albian.

spinosa Wilson, 1984c, p.554,556, figs.22–26. Holotype: Wilson, 1984c, figs.22,25–26; Fensome et al., 1996, figs.1,4–5 — p.2373. Age: Maastrichtian.

streelii Slimani, 1996, p.377–378, pl.3, figs.A–C; text-figs.6A–B ex Slimani, 2001b, p.5, pl.2, figs.1–2; pl.3, fig.5. Holotype: Slimani, 1996, pl.3, figs.A–B; Slimani, 2001b, pl.2, figs.1–2. This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Age: late Campanian–early Maastrichtian.

"*striatoperforata*" Cookson and Eisenack, 1962b, p.490, pl.3, figs.14–19. Holotype: Cookson and Eisenack, 1962b, pl.3, fig.16. **Taxonomic senior synonym:** *Odontochitina costata*, according to Clarke and Verdier (1967, p.58) and Yun Hyesu (1981, p.59). Age: Albanian–Cenomanian.

"*subbaramana*" Jain and Taugourdeau-Lantz, 1973, p.64–65, pl.4, fig.3. Holotype: Jain and Taugourdeau-Lantz, 1973, pl.4, fig.3. **Taxonomic senior synonym:** *Odontochitina cribropoda*, according to Jain (1977b, p.186). Age: Early Cretaceous.

tabulata El Mehdawi, 1998, p.174,177–178, pl.1, figs.1–8; pl.2, figs.1–6; text-figs.2A–D. Holotype: El Mehdawi, 1998, pl.1, fig.2; text-fig.2B. Age: late Santonian–early Campanian.

"*wetzeli*" Wilson in Foucher in Robaszynski et al., 1985, p.33, pl.10, figs.9–12. **Name not validly published:** no description. **Taxonomic senior synonym:** *Xenascus wetzeli*, according to Slimani (2001a, p.194; 2001b, p.9).

ODONTOCHITINOPSIS Eisenack, 1961, p.298–299,308. Type: Deflandre, 1937b, pl.17 (al. pl.14), figs.2–3, as *Ceratocystidiopsis molesta*.

incerta (Deflandre-Rigaud, 1954, p.59; text-fig.3) Eisenack and Klement, 1964, p.563. Holotype: Deflandre-Rigaud, 1954, text-fig.3. Originally *Ceratocystidiopsis* (Appendix A), subsequently (and now) *Odontochitina*. Lentin and Williams (1981, p.199) retained this species in *Odontochitina*. This combination was not validly published in Eisenack (1961, p.299), since that author did not fully reference the basionym. Age: Late Cretaceous.

**molesta* (Deflandre, 1937b, p.90, pl.17 [al. pl.14], figs.2–3) Eisenack, 1961, p.299. Holotype: Deflandre, 1937b, pl.17 (al. pl.14), figs.2–3. Originally *Ceratocystidiopsis* (Appendix A), subsequently (and now) *Odontochitina*. Age: Senonian.

"**OKERISPHAERIDIUM**" Kunz, 1990, p.22. **Taxonomic senior synonym:** *Dissiliodinium*, according to Feist-Burkhardt and Monteil (2001, p.58). Type: Kunz, 1990, pl.4, figs.11a–b; text-figs.9a–c, as *Okerisphaeridium fragile*.

"**fragile*" Kunz, 1990, p.22–23, pl.4, figs.11a–b,12a–b,13,14a–b,15; text-figs.9a–c. Holotype: Kunz, 1990, pl.4, figs.11a–b; figs.11a–b; text-figs.9a–c. **NOW** *Dissiliodinium*. Originally *Okerisphaeridium*, subsequently (and now) *Dissiliodinium*. Age: late Oxfordian.

OLIGOKOLPOMA Fensome et al., 2009, p.47. Type: Fensome et al., 2009, pl.7, figs.m–o, as *Oligokolpoma tubulus*.

galeottii Pross et al. 2010, p.230, pl. 3, figs.1–10. Holotype: Pross et al. 2010, pl. 3, figs.1–3. Age: Oligocene.

**tubulus* Fensome et al., 2009, p.47, pl.7, figs.m–o,q–t. Holotype: Fensome et al., 2009, pl.7, figs.m–o. N.I.A. Age: youngest occurrence, early Serravallian.

OLIGOSPHAERIDIUM Davey and Williams, 1966b, p.70–71. Emendation: Davey, 1982b, p.13. Original type: White, 1842, pl.4, fig.11, as *Xanthidium tubiferum* var. *complex*. Neotype: Davey and Williams, 1966b, pl.7, fig.1, designated by Davey and Williams (1966b, p.71).

abaculum Davey, 1979a, p.428,430,432–433, pl.48, figs.1–6; pl.49, figs.1–7; pl.50, figs.1,4,10–11; text-figs.1–2. Holotype: Davey, 1979a, pl.49, figs.1,3; Fauconnier and Masure, 2004, pl.56, figs.1–3. Age: Barremian–early Albanian.

abbreviatum Xu Jinli et al., 1997, p.82–83, pl.24, fig.10 ex He Chengquan et al., 2009, p.657. Holotype: Xu Jinli et al., 1997, pl.24, fig.10. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.657) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

albertense (Pocock, 1962, p.82, pl.15, figs.226–227) Davey and Williams, 1969, p.5. Holotype: Pocock, 1962, pl.15, fig.226; Brideaux, 1977, pl.11, figs.3–4; Jansonius, 1986, pl.4, figs.4–5; Fauconnier and Masure, 2004, pl.55, figs.1–6. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. Taxonomic junior synonyms: *Hystrichosphaeridium* (as *Oligosphaeridium*) *irregulare*, according to Jansonius (1986, p.213); *Hystrichosphaeridium* (as *Oligosphaeridium*?) *coelenteratum*, *Hystrichosphaeridium* (as *Oligosphaeridium*?) *dispare* and *Hystrichosphaeridium* (as *Oligosphaeridium*) *reniforme*, by implication in Stover and Evitt (1978, p.68–69), who considered these species to be taxonomic junior synonyms of *Hystrichosphaeridium* (as *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. This combination was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Age: Barremian.

anapetum van Mourik et al., 2001, p.241,243, figs.8a–e. Holotype: van Mourik et al., 2001, figs.8a–c. Age: late middle-late Eocene.

"anthophorum" (Cookson and Eisenack, 1958, p.43, pl.11, figs.12–13; text-figs.16–18) Davey, 1969a, p.147. Holotype: Cookson and Eisenack, 1958, pl.11, fig.12; Fauconnier and Masure, 2004, pl.73, figs.5–6. **NOW** *Stiphrosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly *Polystephanephorus*, fourthly *Hystrichosphaerina*, fifthly (and now) *Stiphrosphaeridium*. Taxonomic junior synonym: *Hystrichosphaerina schindewolfii*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Hystrichosphaerina schindewolfii*. This combination was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Age: Aptian–Albian.

?asterigerum (Gocht, 1959, p.67, pl.3, fig.1; pl.7, figs.1–4) Davey and Williams, 1969, p.5. Holotype: Gocht, 1959, pl.3, fig.1; Fauconnier and Masure, 2004, pl.57, figs.1–6. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*?. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium*) *vasiformum*, according to Duxbury (1977, p.45) — however, McIntyre and Brideaux (1980, p.21) retained *Hystrichosphaeridium* (as *Oligosphaeridium*) *vasiformum*. Questionable assignment: Davey and Williams (1969, p.5). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Age: late Valanginian–late Hauterivian.

buciniferum Corradini, 1973, p.142–143, pl.21, figs.2a–b; text-fig.5. Holotype: Corradini, 1973, pl.21, figs.2a–b; text-fig.5. Age: Senonian.

byersense Duane, 1997, p.134–136, pl.3, figs.1–2,4–5; pl.4, figs.1–4; text-figs.5–6. Holotype: Duane, 1997, pl.3, fig.1; text-fig.5. Age: Valanginian.

"cephalum" Sah et al., 1970, p.147, pl.2, figs.22–23. Holotype: Sah et al., 1970, pl.2, fig.22. **Taxonomic senior synonym:** *Xanthidium tubiferum* var. *complex* (as *Oligosphaeridium*) *complex*, according to Lejeune-Carpentier and Sarjeant (1981, p.9) and, Jain (1982, p.52). Fauconnier and Cornu in Fauconnier and Masure (2004, p.403) listed this as a problematic species but apparently accepted the synonymy cited above. Age: Late Cretaceous.

"?coelenteratum" (Tasch in Tasch et al., 1964, p.195, pl.2, fig.11) Davey and Williams, 1969, p.5. Holotype: Tasch et al., 1964, pl.2, fig.11. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*, by implication in Stover and Evitt (1978, p.69), who considered *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *coelenteratum* to be a taxonomic junior synonym of *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. Questionable assignment: Davey and Williams (1969, p.5). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Fauconnier and Cornu in Fauconnier and Masure (2004, p.403) listed this as a problematic species but apparently accepted the synonymy cited above. Age: Albian.

***complex** (White, 1842, p.39, pl.4, fig.11) Davey and Williams, 1966b, p.71–74. Holotype: White, 1842, pl.4, fig.11, lost according to Davey and Williams (1966b, p.74). Neotype: Davey and Williams, 1966b, pl.7, fig.1, designated by Davey and Williams (1966b, p.71). Originally *Xanthidium tubiferum* var. *complex* (Appendix A), subsequently *Xanthidium complex* (Appendix A), thirdly *Hystrichosphaeridium complex*, fourthly (and now) *Oligosphaeridium complex*. Taxonomic junior synonyms: *Hystrichosphaeridium elegantulum*, according to Deflandre (1946b, p.111); *Hystrichosphaeridium himalayense*, according to Jain and Garg (1986b, p.64); *Oligosphaeridium cephalum*, according to Lejeune-Carpentier and Sarjeant (1981, p.9) and Jain (1982, p.52); *Geodia? irregularis*, according to Harker and Sarjeant in Harker et al. (1990, p.59). Srivastava (1995, p.316) indicated that the epithet should be rendered as "*complexum*". In Latin, "complexus" is an adjective derived from the verb "complector" (= to embrace, clasp). White (1842) may have been referring to the process endings in this species, which expand distally and may be imagined to reach out to "clasp", in which case the epithet would indeed be properly rendered as "*complexum*". However, he may have wished to imply the English meaning of the word "complex", believing, incorrectly, that the word also existed in Latin, parallel to Latin words such as "triplex" and "felix", which retain the same ending regardless of gender. Given the uncertainty of White's original intent, and the long-standing stability of the epithet as "*complex*", we prefer to retain the latter spelling, considering it a "fantasy" or "neo-latin name". (We acknowledge discussion with J. Jansonius, upon which the preceding sentences are based.) Age: Senonian.

subsp. **brevispinum** Jain, 1977b, p.182, pl.1, fig.4. Holotype: Jain, 1977b, pl.1, fig.4; Fauconnier and Masure, 2004, pl.55, figs.10–11. Age: Albian.

subsp. **complex**. Autonym. Holotype: White, 1842, pl.4, fig.11, lost according to Davey and Williams (1966b, p.74). Neotype: Davey and Williams, 1966b, pl.7, fig.1, designated by Davey and Williams (1966b, p.71).

dharmpurense Khanna and Singh, 1981b, p.398, fig.2, nos.5–6; text-fig.11. Holotype: Khanna and Singh, 1981b, fig.2, no.5. This name was not validly published in Singh et al. (1979, p.35–36), Khanna (1979, p.217) and Khanna et al. (1981, pl.3, fig.5), since no description was provided. Age: middle Eocene.

"**diastema**" Singh, 1971, p.337, pl.55, figs.4–5; pl.56, figs.1–2. Holotype: Singh, 1971, pl.55, fig.4. **Taxonomic senior synonym:** *Oligosphaeridium totum*, according to Harker and Sarjeant (1975, p.226) and Brideaux and McIntyre (1975, p.29). Fauconnier and Cornu in Fauconnier and Masure (2004, p.403) listed this as a problematic species but apparently accepted the synonymy cited above. N.I.A. Age: late Albian.

"**dictyophorum**" (Cookson and Eisenack, 1958, p.44, pl.11, fig.14) Davey and Williams, 1969, p.5. Holotype: Cookson and Eisenack, 1958, pl.11, fig.14; Fensome et al., 1993a, fig.1 — p.1125. **NOW** *Stiphrosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Oligosphaeridium*, fourthly (and now) *Stiphrosphaeridium*. This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Age: Late Jurassic.

"**dictyostilum**" (Menéndez, 1965, p.11,12, pl.2, fig.6; pl.3, figs.18–22) Eisenack and Kjellström, 1972, p.845. Emendation: Sarjeant, 1981, p.115, as *Areosphaeridium dictyostilum*. Holotype: Menéndez, 1965, pl.2, fig.6; pl.3, figs.18–20. **NOW** *Enneadocysta?*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium?*, thirdly *Areosphaeridium*, fourthly (and now) *Enneadocysta?*. Questionable assignment: Eisenack and Kjellström (1972, p.845). Taxonomic senior synonym: *Hystrichosphaeridium* (as *Areosphaeridium*) *diktyoplokum*, according to Eaton (1971, p.359) — however, Sarjeant (1981, p.115–116) retained *Hystrichosphaeridium* (as *Areosphaeridium*, now *Enneadocysta?*) *dictyostilum*. Taxonomic junior synonyms: *Areosphaeridium* (now *Enneadocysta*) *arcuatum*, according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Enneadocysta*) *arcuatum*; *Cordosphaeridium* (as *Areosphaeridium*, now *Cooksonidium*) *capricornum*, according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Cooksonidium*) *capricornum*. Age: Tertiary.

diluculum Davey, 1982b, p.14–15, pl.2, figs.1–5. Holotype: Davey, 1982b, pl.2, figs.1–2; Fauconnier and Masure, 2004, pl.58, figs.1–3. Age: late Ryazanian–early Valanginian.

"*dispare*" (Tasch in Tasch et al., 1964, p.195, pl.2, fig.8) Davey and Williams, 1969, p.5. Holotype: Tasch et al., 1964, pl.2, fig.8. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Oligosphaeridium*) *albertense*, by implication in Stover and Evitt (1978, p.69), who considered *Hystrichosphaeridium* (as *Oligosphaeridium*) *dispare* to be a taxonomic junior synonym of *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. Questionable assignment: Davey and Williams (1969, p.5). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Fauconnier and Cornu in Fauconnier and Masure (2004, p.403) listed this as a problematic species but apparently accepted the synonymy cited above. Age: Albian.

dividuum Williams, 1978, p.797, pl.5, fig.8. Holotype: Williams, 1978, pl.5, fig.8. Age: Valanginian–Barremian.

djenn Below, 1982c, p.22, pl.2, figs.1–2, 3a–b; text-figs.5i–l. Holotype: Below, 1982c, pl.2, figs.3a–b; Fauconnier and Masure, 2004, pl.58, figs.4–5. N.I.A. Age: Barremian–late Albian.

dongmingense He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.53, pl.20, figs.11–14. Holotype: He Chengquan et al., 1989, pl.20, fig.11. Age: Early Tertiary.

fenestratum Duxbury, 1980, p.130–131, pl.9, figs.8–9. Holotype: Duxbury, 1980, pl.9, figs.8–9; Fauconnier and Masure, 2004, pl.59, figs.1–2. Age: middle Barremian.

granulatum He Chengquan, 1991, p.132–133, pl.26, fig.17. Holotype: He Chengquan, 1991, pl.26, fig.17. Age: late Eocene.

heilongjiangense Yu Jingxian, 1982, p.248–49, pl.5, figs.1,4. Holotype: Yu Jingxian, 1982, pl.5, fig.4. Age: Valanginian–Hauterivian.

homomorphum He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.53, pl.20, figs.16–17. Holotype: He Chengquan et al., 1989, pl.20, fig.17. Age: Early Tertiary.

intermedium Corradini, 1973, p.143–144, pl.21, fig.7; text-fig.6. Holotype: Corradini, 1973, pl.21, fig.7; text-fig.6. Age: Late Cretaceous–?Paleocene.

"*irregulare*" (Pocock, 1962, p.82, pl.15, figs.228–229) Davey and Williams, 1969, p.5. Holotype: Pocock, 1962, pl.15, figs.228–229, lost according to Jansonius (1986, p.220). Lectotype: Jansonius, 1986, pl.4, fig.3, designated by Jansonius (1986, p.214 — caption to pl.4); Fauconnier and Masure, 2004, pl.55, fig.9. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Oligosphaeridium*) *albertense*, according to Jansonius (1986, p.213). Taxonomic junior synonyms: *Hystrichosphaeridium* (as *Oligosphaeridium*?) *coelenteratum*, *Hystrichosphaeridium* (as *Oligosphaeridium*?) *dispare*, *Hystrichosphaeridium* (as *Oligosphaeridium*) *reniforme*, all according to Stover and Evitt (1978, p.69). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Fauconnier and Cornu in Fauconnier and Masure (2004, p.404) listed this as a problematic species but apparently accepted the synonymy cited above. Age: late Barremian–Aptian.

"*itajaiense*" Masure and Arai, 2003, p.61–62, pl.1, fig.19. Holotype: Masure and Arai, 2003, pl.1, fig.19. **Name not validly published:** no Latin or English description. Age: Turonian.

jixiense He Chengquan and Sun Xuekun, 2000, p.50–51, 58, pl.3, figs.1–2; text-fig.1. Holotype: He Chengquan and Sun Xuekun, 2000, pl.3, fig.1; text-fig.1. Age: late Hauterivian.

junctum Bailey and Loy, 1997, p.159, 162, pl.1, figs.1–4; pl.2, figs.1–4; text-fig.2. Holotype: Bailey and Loy, 1997, pl.1, figs.1–3. Originally *Oligosphaeridium*, subsequently (and now) *Oligosphaeridium*?. Questionable assignment: Fauconnier and Cornu in Fauconnier and Masure (2004, p.402). Age: early–late Hauterivian.

levimarginatum Marheinecke, 1992, p.64–65, pl.12, figs.4,10–11. Holotype: Marheinecke, 1992, pl.12, fig.4; Fauconnier and Masure, 2004, pl.57, fig.10. Contrary to the opinion of Lentin and Williams (1993, p.461), Williams et al. (1998, p.436) considered this name to be validly published. Age: late early–early late Maastrichtian.

"*longicercale*" He Chengquan, 1991, p.133, pl.26, fig.8. Holotype: He Chengquan, 1991, pl.26, fig.8. **Name not validly published:** lodgement of holotype not specified (I.C.N. Article 40.7). Age: Cenomanian.

"*macrotubulum*" (Neale and Sarjeant, 1962, p.452–455, pl.20, fig.7; text-fig.8a) Davey and Williams, 1966b, p.75. Holotype: Neale and Sarjeant, 1962, pl.20, fig.7; text-fig.8a; Fauconnier and Masure, 2004, pl.57, fig.7. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly *Oligosphaeridium*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Oligosphaeridium*) *vasiformum*, according to McIntyre and Brideaux (1980, p.21). Questionable assignment: Stover and Evitt (1978, p.68–69). Age: Hauterivian.

?*membranaceum* Jiabo, 1978, p.71–72, pl.26, fig.12. Holotype: Jiabo, 1978, pl.26, fig.12. Originally *Oligosphaeridium*, subsequently (and now) *Oligosphaeridium*?. Questionable assignment: Fauconnier and Cornu in Fauconnier and Masure (2004, p.404) as a problematic species. Age: Early Tertiary.

minus Jiabo, 1978, p.72, pl.26, figs.5–6. Holotype: Jiabo, 1978, pl.26, fig.6. Originally *Oligosphaeridium*, subsequently (and now) *Oligosphaeridium*?. Questionable assignment: Fauconnier and Cornu in Fauconnier and Masure (2004, p.404) as a problematic species; however, He Chengquan et al. (2009, p. 116) included this species in *Oligosphaeridium* without question. Taxonomic junior synonyms: *Oligosphaeridium panjinense* and *Bipolaribucina pusilla*, both according to He Chengquan et al. (2009, p. 116). N.I.A. Age: Early Tertiary.

"*nannus*" Davey, 1974, p.59, pl.4, figs.9–10. Emendations: Duxbury, 1977, p.31; Khowaja-Atequzaman et al., 1985, p.98,100, both as *Discorsia nannus*. Holotype: Davey, 1974, pl.4, fig.9; Fensome et al., 1995, fig.1 — p.1619; Fauconnier and Masure, 2004, pl.22, fig.1. **NOW** *Discorsia*. Originally *Oligosphaeridium*, subsequently (and now) *Discorsia*. N.I.A. Age: early Barremian.

ovatum He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.54, pl.19, figs.18–22. Holotype: He Chengquan et al., 1989, pl.19, fig.20. Age: Early Tertiary.

"*panjinense*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.75, pl.14, figs.9–11. Holotype: Liu Zhili et al., 1992, pl.14, fig.10. **Taxonomic senior synonym:** *Oligosphaeridium minus*, according to He Chengquan et al. (2009, p.116) Age: Early Tertiary.

"*paradoxum*" (Brosius, 1963, p.41–42, pl.4, figs.1,6; text-fig.2, nos.1a–c) Davey and Williams, 1969,p.5. Holotype: Brosius, 1963, pl.4, fig.6; Fensome et al., 1995, fig.2 — p.1639. **NOW** *Distatodinium*. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly *Oligosphaeridium*?, fourthly (and now) *Distatodinium*, fifthly *Bipolaribucina*. Questionable assignment: Davey and Williams (1969,p.5). Taxonomic junior synonym: *Distatodinium craterum*, according to Fensome et al. (2009, p.31). Age: late Oligocene.

patulum Riding and Thomas, 1988, p.80–82, pl.3, figs.1–3,5–6; text-figs.8a–b,9b. Holotype: Riding and Thomas, 1988, pl.3, figs.1–2; Fauconnier and Masure, 2004, pl.60, fig.1. Age: early–late Kimmeridgian.

perforatum (Gocht, 1959, p.68–69, pl.3, fig.7; pl.7, figs.13–16) Davey and Williams, 1969, p.5. Holotype: Gocht, 1959, pl.3, fig.7; pl.7, fig.13; Fauconnier and Masure, 2004, pl.59, figs.3–11. Junior homonym: *Oligosphaeridium perforatum* Jain, 1977b. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. This combination was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Age: Hauterivian–Barremian.

?subsp. *colum* Duxbury, 1983, p.53, pl.8, fig.9; text-fig.24. Holotype: Duxbury, 1983, pl.8, fig.9; Fauconnier and Masure, 2004, pl.62, figs.1–3. Originally *Oligosphaeridium perforatum* subsp. *colum*, subsequently (and now) *Oligosphaeridium perforatum*? subsp. *colum*. Questionable assignment: Fauconnier and Cornu in Fauconnier and Masure (2004, p.403). Age: late Aptian–early Albian.

subsp. *perforatum*. Autonym. Holotype: Gocht, 1959, pl.3, fig.7; Fauconnier and Masure, 2004, pl.59, figs.3–11.

"*perforatum*" Jain, 1977b, p.181, pl.1, figs.5–7. Holotype: Jain, 1977b, pl.1, fig.5. **Name illegitimate** — **senior homonym**: *Oligosphaeridium perforatum* (Gocht, 1959) Davey and Williams, 1969. **Substitute name**: *Oligosphaeridium porosum*. Originally *Oligosphaeridium perforatum* Jain, 1977b (name illegitimate), subsequently (and now) *Oligosphaeridium porosum*. Age: early Albian.

potculum Jain, 1977b, p.181, pl.1, figs.1–3. Holotype: Jain, 1977b, pl.1, fig.3; Fauconnier and Masure, 2004, pl.62, figs.5–7. N.I.A. Age: early Albian.

porosum Lentin and Williams, 1981, p.201. Holotype: Jain, 1977b, pl.1, fig.5. Originally *Oligosphaeridium perforatum* Jain, 1977b (name illegitimate), subsequently (and now) *Oligosphaeridium porosum*. Substitute name for *Oligosphaeridium perforatum* Jain, 1977b, p.181, pl.1, figs.5–7 (an illegitimate name). Age: early Albian.

prolixispinosum Davey and Williams, 1966b, p.76–77, pl.8, figs.2–3. Holotype: Davey and Williams, 1966b, pl.8, fig.3; Fauconnier and Masure, 2004, pl.60, figs.2–4. Originally (and now) *Oligosphaeridium*, subsequently *Tanyosphaeridium*. Lentin and Williams (1981, p.201) retained this species in *Oligosphaeridium*. Age: Cenomanian.

pseudoabaculum Harding, 1990b, p.42, pl.24, figs.1–7 ex Harding in Williams et al. 1998, p.437. Holotype: Harding, 1990b, pl.24, fig.1; Fauconnier and Masure, 2004, pl.60, fig.5. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: early Barremian.

pulcherrimum (Deflandre and Cookson, 1955, p.270–271, pl.1, fig.8; text-figs.21–22) Davey and Williams, 1966b, p.75–76. Holotype: Deflandre and Cookson, 1955, pl.1, fig.8; text-figs.21–22; Fauconnier and Masure, 2004, pl.60, figs.8–11. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. Age: Albian.

quattrocchioae Volkheimer 2010, p.236,238, figs.5H–M,6A–B,F–H. Holotype: Volkheimer 2010, fig.6B. Age: late Valanginian–early Hauterivian.

"*reniforme*" (Tasch in Tasch et al., 1964, p.193, pl.2, fig.6) Davey, 1969a, p.148. Holotype: Tasch et al., 1964, pl.2, fig.6. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*. **Taxonomic senior synonym**: *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*, by implication in Stover and Evitt (1978, p.69), who considered *Hystrichosphaeridium reniforme* to be a taxonomic junior synonym of *Hystrichosphaeridium* (subsequently *Oligosphaeridium*) *irregulare*, which is now a taxonomic junior synonym of *Hystrichosphaeridium* (now *Oligosphaeridium*) *albertense*. This combination was not validly published in Davey and Williams (1966b, p.77), since these authors did not fully reference the basionym. Fauconnier and Cornu in Fauconnier and Masure (2004, p.404) listed this as a problematic species but apparently accepted the synonymy cited above. Age: Albian.

reticulatum Davey and Williams, 1966b, p.74, pl.7, fig.10. Holotype: Davey and Williams, 1966b, pl.7, fig.10; Fauconnier and Masure, 2004, pl.61, figs.1–3. Age: Cenomanian.

saghirum Slimani et al., 2012, p.342–344, fig.4A–J. Holotype: Slimani et al., 2012, fig.4A–F. Age: late Maastrichtian–Danian.

speciale Xu Jinli et al., 1997, p.83–84, pl.14, fig.2 ex He Chengquan et al., 2009, p.658. Holotype: Xu Jinli et al., 1997, pl.14, fig.2. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.658) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

suibinense Yu Jingxian, 1982, p.249, pl.5, fig.7. Holotype: Yu Jingxian, 1982, pl.5, fig.7. Age: Valanginian–Hauterivian.

swanense Riding and Helby, 2001f, p.163,165–166, figs.12A–F,13A–C. Holotype: Riding and Helby, 2001f, fig.12E. Age: Oxfordian–Kimmeridgian.

tenuiprocessum Singh, 1983, p.123–124, pl.42, figs.1–4. Holotype: Singh, 1983, pl.42, fig.1; Fauconnier and Masure, 2004, pl.61, fig.4. Age: latest Albian–early Cenomanian.

totum Brideaux, 1971, p.88–89, pl.25, figs.53–55,57. Holotype: Brideaux, 1971, pl.25, fig.53. Taxonomic junior synonym: *Oligosphaeridium diastema*, according to Harker and Sarjeant (1975, p.226) and Brideaux and McIntyre (1975, p.29). Age: late Albian.

subsp. *minus* (Brideaux, 1971, p.88–89, pl.25, figs.54,57) Lentin and Williams, 1973, p.100. Holotype: Brideaux, 1971, pl.25, fig.57. Originally *Oligosphaeridium totum* var. *minus*, subsequently (and now) *Oligosphaeridium totum* subsp. *minus*. Age: late Albian.

"var. *minus*" Brideaux, 1971, p.88–89, pl.25, figs.54,57. Holotype: Brideaux, 1971, pl.25, fig.57. **NOW** *Oligosphaeridium totum* subsp. *minus*. Originally *Oligosphaeridium totum* var. *minus*, subsequently (and now) *Oligosphaeridium totum* subsp. *minus*. Age: late Albian.

subsp. *totum*. Autonym. Holotype: Brideaux, 1971, pl.25, fig.57.

"var. *totum*". Autonym. Holotype: Brideaux, 1971, pl.25, fig.57. **Now redundant.**

?*trabeculosum* Singh, 1983, p.122–123, pl.41, fig.11. Holotype: Singh, 1983, pl.41, fig.11; Fauconnier and Masure, 2004, pl.61, fig.5. Originally *Oligosphaeridium*, subsequently (and now) *Oligosphaeridium?*. Questionable assignment: Fauconnier and Cornu in Fauconnier and Masure (2004, p.403). Age: early Cenomanian.

?*tubulatum* (Menéndez, 1965, p.13, pl.2, fig.7; pl.3, fig.17) Sarjeant and Stancliffe, 1994, p.56. Holotype: Menéndez, 1965, pl.2, fig.7. Originally *Micrhystridium* (Appendix A), subsequently (and now) *Oligosphaeridium?*. Questionable assignment: Sarjeant and Stancliffe (1994, p.56); and Fauconnier and Cornu in Fauconnier and Masure (2004, p.404) as a problematic species. Age: Oligocene.

umbraculum Duxbury, 2001, p.109–111, fig.10, nos.1–4. Holotype: Duxbury, 2001, fig.10, nos.1–2. Age: early Hauterivian.

vasiformum (Neale and Sarjeant, 1962, p.452, pl.20, fig.1; text-fig.8b) Davey and Williams, 1966b, p.74–75. Holotype: Neale and Sarjeant, 1962, pl.20, fig.1; text-fig.8b; Fauconnier and Masure, 2004, pl.62, fig.4. Originally *Hystrichosphaeridium*, subsequently (and now) *Oligosphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium?*) *asterigerum*, according to Duxbury (1977, p.45) — however, McIntyre and Brideaux (1980, p.21) retained *Hystrichosphaeridium* (as *Oligosphaeridium*) *vasiformum*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium?*) *macrotubulum*, according to McIntyre and Brideaux (1980, p.21). Age: middle Hauterivian–early Barremian.

verrucosum Davey, 1979b, p.558, pl.5, figs.1–3. Holotype: Davey, 1979b, pl.5, figs.1–2; Fauconnier and Masure, 2004, pl.61, figs.6–9. Age: late Aptian.

xinjiangense He Chengquan, 1991, p.133–134, pl.26, figs.15–16; pl.59, figs.5–6; text-fig.23. Holotype: He Chengquan, 1991, pl.26, fig.16; text-fig.23. Age: Paleocene–middle Eocene.

"**OMANODINIUM**" Bradford, 1975, p.3070. **Taxonomic senior synonym:** *Selenopemphix*, according to Bradford and Wall (1984, p.49) and Head (1993, p.32). Lentin and Williams (1981, p.202) did not agree with Harland and Reid in Harland et al. (1980, p.223) that *Omanodinium* and the two included species, *Omanodinium alticinctum* and *Omanodinium tholus*, are not validly published names because they lack Latin diagnoses. As no living forms were observed, Lentin and Williams (1981) agreed with Bradford (1975), who clearly stated that he considered cysts of unknown origin in unconsolidated sediments to be fossils. Type: Bradford, 1975, figs.23–26, as *Omanodinium alticinctum*.

"**alticinctorum*" Bradford, 1975, p.3070,3072, figs.23–28. Holotype: Bradford, 1975, figs.23–26; Fensome et al., 1993a, figs.1–4 — p.907. **NOW** *Selenopemphix*. Originally *Omanodinium*, subsequently (and now) *Selenopemphix*. Motile equivalent: *Protopteridinium subinerve* (Paulsen, 1904) Loeblich III, 1970, according to Bradford (1975, p.3070) and Matsuoka (1984b, p.2) — however, see Head (1996b, p.1215). Age: Holocene.

"*tholus*" Bradford, 1975, p.3072,3074, figs.17–22. Holotype: Bradford, 1975, fig.17. **NOW** *Selenopemphix*. Originally *Omanodinium*, subsequently *Protopteridinium* subgenus *Protopteridinium* section *Selenopemphix* (combination not validly published; Appendix B), thirdly *Selenopemphix* (combination not validly published), fourthly (and now) *Selenopemphix*. N.I.A. Age: Holocene.

OMATIA Cookson and Eisenack, 1958, p.60. Emendations: Wiggins, 1969, p.150; Stover and Helby, 1987b, p.149,152. Taxonomic junior synonym: *Herendeenia*, according to Stover and Evitt (1978, p.280) — however, Stover and Helby (1987b, p.149,152) retained *Herendeenia*. Type: Cookson and Eisenack, 1958, pl.8, fig.8, as *Omatia montgomeryi*.

"*alaskaensis*" Stover and Evitt, 1978, p.178. Holotype: Wiggins, 1969, pl.1, figs.1–3 (as *Herendeenia pisciformis*). **NOW** *Herendeenia*. Originally *Omatia*, subsequently (and now) *Herendeenia*. Age: Neocomian, ?late Hauterivian–Barremian.

"*butticula*" Wiggins, 1969, p.150, pl.2, figs.1–5. Holotype: Wiggins, 1969, pl.2, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1005. **NOW** *Boreocysta*. Originally *Omatia*, subsequently (and now) *Boreocysta*. Age: Neocomian, ?late Valanginian or early Hauterivian.

"*jurabiana*" Helby in Riding and Helby, 2001f, p.162. **Name not validly published**: no description. **Taxonomic senior synonym**: *Indodinium* (as and now *Mombasadinium*) *parvelatum*, according to Riding and Helby (2001f, p.162).

**montgomeryi* Cookson and Eisenack, 1958, p.60, pl.8, figs.7–9. Emendation: Stover and Helby, 1987b, p.152–153. Holotype: Cookson and Eisenack, 1958, pl.8, fig.8. Age: Late Jurassic.

"*pisciformis*" Cookson and Eisenack, 1958, p.61, pl.8, fig.6. Emendation: Stover and Helby, 1987b, p.154, as *Herendeenia pisciformis*, as a revised description. Holotype: Cookson and Eisenack, 1958, pl.8, fig.6. **NOW** *Herendeenia*. Originally *Omatia*, subsequently (and now) *Herendeenia*. Age: Late Jurassic.

OMATIDIUM Courtinat in Courtinat and Gaillard, 1980, p.40. Emendation: Courtinat, 1989, p.168. Type: Cookson and Eisenack, 1958, pl.5, fig.9, as *Hystrichodinium amphiacanthum*.

**amphiacanthum* (Cookson and Eisenack, 1958, p.37, pl.5, fig.9) Courtinat in Courtinat and Gaillard, 1980, p.40. Holotype: Cookson and Eisenack, 1958, pl.5, fig.9; Fensome et al., 1993a, fig.1 — p.911. Originally *Hystrichodinium*, subsequently *Hystrichodinium?*, thirdly (and now) *Omatidium*. Age: Late Jurassic or Neocomian.

bernieri Courtinat, 1989, p.170–171, pl.15, figs.1,3–6; text-fig.75. Holotype: Courtinat, 1989, pl.15, fig.1. Age: Oxfordian.

"*enayi*" Courtinat, 1989, p.181, pl.23, fig.6. Holotype: Courtinat, 1989, pl.23, fig.6. Originally *Escharisphaeridia*, subsequently *Omatidium*. **Taxonomic senior synonym**: *Escharisphaeridia psilata*, according to Poulsen (1996, p.80). This species was inadvertently included in *Omatidium* by Lentin and Williams (1993, p.464). Age: Oxfordian.

"**OODNADATTIA**" Eisenack and Cookson, 1960, p.6. **Taxonomic senior synonym**: *Dinoptyrgium*, according to Norris and Sarjeant (1965, p.44) and Lentin and Williams (1985, p.259). Taxonomic junior synonym: *Xiphophoridium*, according to Below (1981a, p.64) — however, Lentin and Williams (1981, p.294) retained *Xiphophoridium*. Type: Eisenack and Cookson, 1960, pl.2, fig.10, as *Oodnadattia tuberculata*.

"*alata*" (Cookson and Eisenack, 1962b, p.487–488, pl.2, figs.1–4) Below, 1981a, p.107. Emendation: Sarjeant, 1966b, p.147, as *Xiphophoridium alatum*. Holotype: Cookson and Eisenack, 1962b, pl.2, fig.1; Fensome et al., 1993a, fig.1 — p.893; Fauconnier and Masure, 2004, pl.80, fig.6. **NOW** *Dinopterygium*. Originally *Hystrichodinium*, subsequently *Xiphophoridium*, thirdly *Pyramidium* (combination illegitimate, since the generic name is illegitimate), fourthly *Oodnadattia*, fifthly (and now) *Dinopterygium*. Age: Albian–Cenomanian.

"*cooksoniae*" Kimyai, 1966, p.471, pl.2, fig.21. Holotype: Kimyai, 1966, pl.2, fig.21. Originally *Oodnadattia*, subsequently *Dinopterygium*. **Taxonomic senior synonym:** *Oodnadattia* (now *Dinopterygium*) *tuberculata*, according to Below (1981a, p.107). Age: Cenomanian.

"*pterophora*" (Deflandre and Courteville, 1939, p.102, pl.2, figs.4–5) Below, 1981a, p.107. Holotype: Deflandre and Courteville, 1939, pl.2, figs.4–5. **NOW** *Dinopterygium*. Originally *Hystrichosphaeridium*, subsequently *Cymatiosphaera* (Appendix A), thirdly *Oodnadattia*, fourthly (and now) *Dinopterygium*. Age: Senonian.

"**tuberculata*" Eisenack and Cookson, 1960, p.6–7, pl.2, figs.10–14; text-fig.1. Holotype: Eisenack and Cookson, 1960, pl.2, fig.10; Helby et al., 1987, fig.38G. **NOW** *Dinopterygium*. Originally *Oodnadattia*, subsequently (and now) *Dinopterygium*. Taxonomic senior synonym: *Dinopterygium cladoides*, according to Clarke and Verdier (1967, p.36) — however, Stover and Evitt (1978, p.205) retained *Oodnadattia* (as *Dinopterygium*) *tuberculata*. Taxonomic junior synonyms: *Oodnadattia cooksoniae* and *Leptodinium? micropunctatum*, both according to Below (1981a, p.107) — however, Lentin and Williams (1981, p.173) retained *Leptodinium? micropunctatum*. Age: Albian.

OPAEOPSOMUS Pocock, 1972, p.96. Taxonomic senior synonyms: *Ellipsoidictyum*, according to Stover and Evitt (1978, p.69); *Dapcodinium*, according to Dörhöfer and Davies (1980, p.23); *Valvaeodinium*, according to Below (1987b, p.64) — however, Lentin and Williams (1993, p.465) retained *Opaeopsomus*. Pocock (1972, p.96) cited this genus as "*Opaeopsomus* Evitt n.gen.". Lentin and Williams (1993, p.465) recommended that this name be restricted to the "type species". Type: Pocock, 1972, pl.24, fig.14, as *Opaeopsomus wapellensis*.

**wapellensis* Pocock, 1972, p.97, pl.24, fig.14. Emendation: Dörhöfer and Davies, 1980, p.23, as *Dapcodinium wapellense*. Holotype: Pocock, 1972, pl.24, fig.14, lost according to Jansonius (1986, p.220). Originally (and now) *Opaeopsomus*, subsequently *Dapcodinium*, thirdly *Valvaeodinium*. Lentin and Williams (1993, p.465) retained this species in *Opaeopsomus*. Lentin and Williams (1993, p.465) recommended that this name be restricted to the type. Age: Callovian.

"subsp. *minutus*" Mao Shaozhi, 1989, p.141, pl.29, figs.12–15,17–25,30–31. Holotype: Mao Shaozhi, 1989, pl.29, fig.15. **NOW** *Operculodinium centrocarpum* subsp. *minutum*. Originally (and now) *Operculodinium centrocarpum* subsp. *minutum*, subsequently *Opaeopsomus wapellensis* subsp. *minutus*. Lentin and Williams (1993, p.465) inadvertently cited this taxon as *Opaeopsomus wapellensis* subsp. *minutus*. Age: Quaternary.

"subsp. *wapellensis*". Autonym. Holotype: Pocock, 1972, pl.24, fig.14. **Now redundant.**

OPERCULODINELLA Kienel, 1994, p.48. Emendation: Hildebrand-Habel et al., 1999, p.79. Calcareous dinoflagellate genus. Type: Kienel, 1994, pl.10, figs.1–2,4–6, as *Operculodinella costata*.

**costata* Kienel, 1994, p.48–49, pl.10, figs.1–6; text-fig.17. Holotype: Kienel, 1994, pl.10, figs.1–2,4–6. Age: Danian.

hydria Kienel, 1994, p.48, pl.9, figs.6–10. Holotype: Kienel, 1994, pl.9, figs.8–9. Age: Danian.

"*operculata*" (Bramlette and Martini, 1964, p.305–306, pl.5, figs.3–7) Hildebrand-Habel et al., 1999, p.79. Emendation: Streng et al., 2004, p.467, as *Cervisiella operculata*. Holotype: Bramlette and Martini, 1964, pl.5, figs.4–5. **NOW** *Cervisiella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Pirumella*,

fourthly *Operculodinella*, fifthly (and now) *Cervisiella*. Taxonomic junior synonym: *Thoracosphaera atlantica*, according to Fütterer (1990, p.540). Age: Maastrichtian–Paleocene.

reticulata Kienel, 1994, p.49–50, pl.9 (not pl.10), figs.11–15. Holotype: Kienel, 1994, pl.9, figs.13–14. Age: Danian.

OPERCULODINIUM Wall, 1967, p.110–111. Emendation: Matsuoka et al., 1997, p.22. Type: Deflandre and Cookson, 1955, pl.8, figs.3–4, as *Hystriosphæridium centrocarpum*.

alsium Matsuoka and Bujak, 1988, p.64–65, pl.8, figs.7,8a–b,9. Holotype: Matsuoka and Bujak, 1988, pl.8, figs.8a–b; Head, 1994b, pl.8, figs.6–9. Age: late Miocene.

ancoriferum Gao Ruiqi et al., 1992a, p.21–22,28, pl.2, figs.10–12. Holotype: Gao Ruiqi et al., 1992a, pl.2, fig.10. Age: Cenomanian.

"*antwerpense*" Louwye, 1999, p.115–117, pl.2, figs.1–9. Holotype: Louwye, 1999, pl.2, figs.1–6. **Taxonomic senior synonym:** *Operculodinium tegillatum*, according to Louwye and de Schepper (2010, p.767). Taxonomic junior synonym: *Operculodinium? pontis* (name not validly published), according to Louwye (1999, p.115). Age: late Miocene.

aquinawense Marret and Kim, 2009, p.128,130,132,136, pl.1, figs.1–12; pl.2, figs.1–12; pl.3, figs.1–9; pl.4, fig.1; pl.5, figs.1–4,6. Holotype: Marret and Kim, 2009, pl.1, figs.1–8. Age: late Pleistocene–Holocene.

azcaratei Troncoso and Doubinger, 1980, p.104–105, pl.2, figs.1–2. Holotype: Troncoso and Doubinger, 1980, pl.2, figs.1–2. Age: Maastrichtian–Danian.

baculatum Yu Jingxian and Zhang Wangping, 1980, p.114–115, pl.6, figs.8–9. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.6 (not pl.4 as stated in the text), fig.9. Age: Turonian–early Maastrichtian.

bahamense Head in Head and Westphal, 1999, p.12–13, fig.9, nos.9–14; fig.10, nos.1–5. Emendation: Paez-Reyes and Head, 2013, p.789,791. Holotype: Head and Westphal, 1999, fig.9, nos.9–12. Age: Pliocene.

bahiaense (Regali et al., 1974, p.289–290, pl.23, fig.5) Arai in Fauconnier and Masure, 2004, p.345. Holotype: Regali et al., 1974, pl.23, fig.5. Originally *Hystriosphæridium*, subsequently *Cleistosphæridium?*, thirdly *Impletosphæridium?*, fourthly (and now) *Operculodinium*. Age: Eocene–Oligocene.

bellulum Islam, 1983a, p.241, pl.2, fig.6. Holotype: Islam, 1983a, pl.2, fig.6. Age: early Eocene.

"*bergmannii*" (Archangelsky, 1969a, p.414–415, pl.2, figs.8,11) Stover and Evitt, 1978, p.178. Holotype: Archangelsky, 1969a, pl.2, fig.11. **NOW** *Lingulodinium*. Originally *Cleistosphæridium*, subsequently *Operculodinium*, thirdly *Downiesphaeridium*, fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Solisphaeridium filamentosum* (Appendix A) and *Impletosphæridium charrieri*, both according to Quattrocchio and Sarjeant (2003, p.142). Masure in Fauconnier and Masure (2004, p.197) proposed the retention of this species in *Operculodinium* but were not aware of the work of Quattrocchio and Sarjeant (2003). Age: Eocene.

?*borgerholtense* Louwye, 2001, p.126–127, fig.4, nos.1–12. Emendation: Soliman et al., 2009, p.75. Holotype: Louwye, 2001, fig.4, nos.1–5; Soliman et al., 2009, pl.1, figs.1–3; pl.2, figs.11–20. Questionable assignment: Louwye (2001, p.126). Age: early-middle Miocene.

brevibaculatum He Chengquan, 1991, p.144–145, pl.20, figs.1–3. Holotype: He Chengquan, 1991, pl.20, fig.2. Age: Paleocene–early Eocene.

capituliferum He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.55, pl.17, figs.4–5; text-fig.5. Holotype: He Chengquan et al., 1989, pl.17, fig.5; text-fig.5. Age: Early Tertiary.

**centrocarpum* (Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4) Wall, 1967, p.111. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum* (Appendix A), thirdly *Cordosphaeridium centrocarpum*, fourthly *Cordosphaeridium tiara* subsp. *centrocarpum*, fifthly (and now) *Operculodinium centrocarpum*, sixthly *Cordosphaeridium? microtriainum* subsp. *centrocarpum*, seventhly *Cleistosphaeridium centrocarpum*. Lentin and Williams (1973, p.102) retained this taxon as *Operculodinium centrocarpum*. Taxonomic junior synonyms: *Operculodinium? echigoense*, according to Matsuoka et al. (1997, p.22); *Membranilarnacia delicata*, according to Jain (1980, p.140) — however, *Membranilarnacia delicata* is now considered to be a taxonomic junior synonym of *Hystrichosphaeridium* (now *Polysphaeridium*) *zoharyi*. Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Head in Head and Wrenn (1992, p.24) considered this species to be the possible taxonomic senior synonym of *Operculodinium wallii*. See also *Hystrichosphaeridium westii*. Age: Miocene.

subsp. *amplum* (Wetzel, 1955, p.38; text-fig.11) Sarjeant, 1984c, p.130. Emendation: Sarjeant, 1984c, p.131, as *Operculodinium centrocarpum* subsp. *amplum*. Holotype: Wetzel, 1955, text-fig.11; Sarjeant, 1984c, pl.3, figs.1–3; text-fig.4. Originally *Hystrichosphaeridium hirsutum* subsp. *amplum* (name not validly published), subsequently *Baltisphaeridium hirsutum* subsp. *amplum* (name not validly published; Appendix A), thirdly *Operculodinium? hirsutum* subsp. *amplum* (name not validly published), fourthly (and now) *Operculodinium centrocarpum* subsp. *amplum*. Age: Danian.

subsp. *centrocarpum*. Autonym. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4.

var. *centrocarpum*. Autonym. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6.

var. *cezare* de Vernal et al., 1989, p.2462, pl.1, figs.8–11 ex Head, 2007, p.1011. Holotype: de Vernal et al., 1989, pl.1, figs.8–9; de Vernal et al., 2001, fig.3.4 (lower panel); designated by Head (2007, p.1011). The name was not validly published in de Vernal et al. (1989), since these authors did not designate a holotype. Age: Quaternary.

var. *minus* Morzadec-Kerfourn, 1979, p.226, pl.33, fig.7. Holotype: Morzadec-Kerfourn, 1979, pl.33, fig.7.

subsp. *minutum* Mao Shaozhi, 1989, p.141–142, pl.29, figs.12–15, 17–25, 30–31. Holotype: Mao Shaozhi, 1989, pl.29, fig.15. Originally (and now) *Operculodinium centrocarpum* subsp. *minutum*, subsequently *Opaeopsomus wapellensis* subsp. *minutus*. Lentin and Williams (1993, p.465) inadvertently cited this taxon as *Opaeopsomus wapellensis* subsp. *minutus*. Age: Quaternary.

subsp. *novum* Marheinecke, 1992, p.54–55, pl.10, figs.4, 7–8. Holotype: Marheinecke, 1992, pl.10, figs.4, 7–8. Contrary to the opinion of Lentin and Williams (1993, p.466), Williams et al. (1998, p.441) considered this name to be validly published. Age: late early–late late Maastrichtian.

subsp. *teokides* (Srivastava and Banerjee, 1969, p.103, pl.1, figs.6–8) Lentin and Williams, 1981, p.204. Holotype: Srivastava and Banerjee, 1969, pl.1, figs.6–7. Originally *Hystrichosphaeridium centrocarpum* var. *teokides*, subsequently (and now) *Operculodinium centrocarpum* subsp. *teokides*. Age: Eocene.

"*charrieri*" (Troncoso and Doubinger, 1980, p.102, pl.2, figs.7–8) Masure in Fauconnier and Masure, 2004, p.198. Holotype: Troncoso and Doubinger, 1980, pl.2, fig.7. Originally *Impletosphaeridium*, subsequently *Operculodinium*. **Taxonomic senior synonym:** *Cleistosphaeridium* (now *Lingulodinium*) *bergmannii*, according to Quattrocchio and Sarjeant, 2003, p.142. When Masure in Fauconnier and Masure (2004, p.197) proposed this combination, she was not aware of the work of Quattrocchio and Sarjeant (2003). Age: Maastrichtian–Danian.

corradinii Slimani, 1994, p.80–81, pl.12, figs.20–23. Holotype: Slimani, 1994, pl.12, figs.22–23. Age: early Campanian–early Maastrichtian.

crassum Harland, 1979b, p.536, pl.2, figs.12–14. Holotype: Harland, 1979b, pl.2, figs.12–14. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Operculodinium*) *israelianum*, according to Harland in Head and Wrenn (1992, p.20) — however, Head (1996b, p.1231) provisionally retained *Operculodinium crassum*. Williams et al. (1998, p.441) incorrectly indicated that Head (1996b, p.1231) questioned the assignment of this species to *Operculodinium*. Age: late Miocene–early Pleistocene.

deconinckii Lentin and Williams, 1989, p.267. Holotype: de Coninck, 1986b, pl.6, figs.26–28. Originally *Operculodinium spiniferum* de Coninck (name illegitimate), subsequently (and now) *Operculodinium deconinckii*. Substitute name for *Operculodinium spiniferum* de Coninck, 1986b, p.16–17, pl.6, figs.21–22, 26–28 (an illegitimate name). Age: Bartonian–Tongrian.

?**delicatum** Kar, 1985, p.207, pl.50, fig.7. Holotype: Kar, 1985, pl.50, fig.7. Questionable assignment: Jain and Garg (1991, p.78). Jain and Garg (1991, p.78) recommended that this name be restricted to the holotype. Age: Miocene.

divergens (Eisenack, 1954b, p.67, pl.9, figs.13–16) Stover and Evitt, 1978, p.178. Holotype: Eisenack, 1954b, pl.9, fig.14. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published; Appendix A), thirdly *Cordosphaeridium*, fourthly (and now) *Operculodinium*. Age: early Oligocene.

"?**echigoense**" Matsuoka, 1983b, p.126, pl.7, figs.1, 2a–b, 3–5, 8. Holotype: Matsuoka, 1983b, pl.7, fig.5; Matsuoka et al., 1997, pl.3, figs.1–3. Originally *Operculodinium*, subsequently (and now) *Operculodinium*?. Questionable assignment: Mudie (1987, p.804). **Taxonomic senior synonym:** *Operculodinium centrocarpum*, according to Matsuoka et al. (1997, p.22). Age: early middle Miocene.

?**eirikianum** Head et al., 1989b, p.459, pl.4, figs.11, 13–16. Emendation: Head, 1997, p.180. Holotype: Head et al., 1989b, pl.4, figs.11, 15–16. Questionable assignment: Head et al. (1989b, p.459). Age: late Miocene–early Pliocene.

var. **crebrum** De Schepper and Head, 2008, p.103–104, 106, pl.1, figs.1–20. Holotype: De Schepper and Head, 2008, pl.1, figs.1–4. Age: Piacenzian.

var. **eirikianum**. Autonym. Holotype: Head et al., 1989b, pl.4, figs.11, 15–16.

eisenackii Heilmann-Clausen and Van Simaey, 2005, p.176–177, pl.8, figs.3–6. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.8, fig.5. Taxonomic junior synonym (at specific rank): *Hystrichosphaeridium divergens* forma *areolatum*, according to Heilmann-Clausen and Van Simaey (2005, p.176). Age: middle Eocene.

erinaceum (Morgenroth, 1966a, p.33–34, pl.8, figs.10–12) Stover and Evitt, 1978, p.178. Holotype: Morgenroth, 1966a, pl.8, fig.10. Originally *Impletosphaeridium*, subsequently (and now) *Operculodinium*. Age: early Eocene.

evittii Khanna and Singh, 1981b, p.404–405, fig.4, no.5; text-fig.15. Holotype: Khanna and Singh, 1981b, fig.4, no.5. Age: early Eocene.

exquisitum Islam, 1983b, p.341, pl.4, fig.8. Holotype: Islam, 1983b, pl.4, fig.8. Age: middle Eocene.

floridium Warny and Wrenn, 1997, p.287, 290, pl.3, figs.1–6; pl.4, figs.1–6. Holotype: Warny and Wrenn, 1997, pl.4, figs.1, 3, 5. Age: Oligocene–Pliocene.

flucturum Davey, 1969b, p.8, pl.2, figs.3, 7–8. Holotype: Davey, 1969b, pl.2, fig.7. Age: Maastrichtian–?Danian.

giganteum Wall, 1967, p.112, pl.16, figs.9–10. Holotype: Wall, 1967, pl.16, figs.9–10. Age: Pleistocene–Holocene.

"?**hirsutum**" (Ehrenberg, 1837b, pl.1, figs.10, ?13) Lentin and Williams, 1973, p.102. **Name not validly published:** Ehrenberg (1837b) did not intend to introduce a new species. Originally *Xanthidium hirsutum* (name not validly published; Appendix A), subsequently *Ovum hispidum* subsp. *hirsutum* (name not validly published; Appendix A),

thirdly *Hystrichosphaera hirsuta* (name not validly published), fourthly *Hystrichosphaeridium hirsutum* (name not validly published), fifthly *Baltisphaeridium hirsutum* (name not validly published; Appendix A), sixthly *Operculodinium hirsutum* (name not validly published), seventhly *Operculodinium? hirsutum* (name not validly published). Questionable assignment: Stover and Evitt (1978, p.179). According to Fensome et al. (1990, p.102): "It is apparent from the discussion given by Sarjeant (1984a, p.131–132) that Ehrenberg (1838 [1837b herein]) did not intend to introduce a new taxon but was comparing fossil specimens with *Xanthidium* (now *Staurastrum*) *hirsutum* Ehrenberg, 1838 [1837b herein], a species of extant desmids. Thus the microfossil species name *Xanthidium hirsutum* and derivatives (*Hystrichosphaeridium hirsutum*, *Hystrichosphaera hirsuta* and *Operculodinium hirsutum*) are not validly published according to I.C.N. Article 36.1a. The specimen illustrated and provisionally identified as *Xanthidium hirsutum* by Ehrenberg (1838 [1837b herein]) is a specimen of *Coronifera striolata* ... according to Sarjeant (1984a, p.131–132)." Yun Hyesu (1981, p.29) considered *Xanthidium hirsutum* of Ehrenberg (1837b) to be a possible taxonomic junior synonym of *Hystrichosphaeridium* (now *Pervosphaeridium*) *pseudhystrichodinium*. Age: Late Cretaceous.

"subsp. **amplum**" (Wetzel, 1955, p.38; text-fig.11) Lentin and Williams, 1973, p.102. Emendation: Sarjeant, 1984c, p.131, as *Operculodinium centrocarpum* subsp. *amplum*. Holotype: Wetzel, 1955, text-fig.11; Sarjeant, 1984c, pl.3, figs.1–3; text-fig.4. **Name not validly published:** the species name *Operculodinium? hirsutum* is not validly published. **NOW** *Operculodinium centrocarpum* subsp. *amplum*. Originally *Hystrichosphaeridium hirsutum* subsp. *amplum* (name not validly published), subsequently *Baltisphaeridium hirsutum* subsp. *amplum* (name not validly published; Appendix A), thirdly *Operculodinium hirsutum?* subsp. *amplum* (name not validly published), fourthly (and now) *Operculodinium centrocarpum* subsp. *amplum*. Age: Danian.

"subsp. **minus**" (Wetzel, 1933b, p.45–46, pl.4, fig.26) Lentin and Williams, 1973, p.102. Holotype: Wetzel, 1933b, pl.4, fig.26. **Name not validly published:** the species name *Operculodinium? hirsutum* is not validly published. **NOW** *Coronifera? striolata* subsp. *minor*. Originally *Hystrichosphaera hirsuta* forma *minor* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *minus* (name not validly published; Appendix A), thirdly *Operculodinium? hirsutum* subsp. *minus* (name not validly published), fourthly (and now) *Coronifera? striolata* subsp. *minor*. Age: Late Cretaceous.

"subsp. **varians**" (Wetzel, 1933b, p.47–48, pl.4, figs.27–29) Lentin and Williams, 1973, p.102. Holotype: not designated. Lectotype: Wetzel, 1933b, fig.29; designated by Lentin and Williams (1989, p.78). **NOW** *Coronifera? striolata* subsp. *varians*. Originally *Hystrichosphaera hirsuta* subsp. *varians* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *varians* (name not validly published; Appendix A), thirdly *Operculodinium? hirsutum* subsp. *varians* (name not validly published), fourthly (and now) *Coronifera? striolata* subsp. *varians*. Age: Late Cretaceous.

"**?iaculigerum**" (Klement, 1960, p.57–58, pl.7, fig.10) Sarjeant, 1984a, p.171, pl.2, fig.5; text-fig.7. Emendation: Sarjeant, 1984a, p.171, as *Operculodinium? iaculigerum*. Holotype: Klement, 1960, pl.7, fig.10; Sarjeant, 1984a, pl.2, fig.5; text-fig.7; Fauconnier and Masure, 2004, pl.23, figs.4–5. **NOW** *Downiesphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Operculodinium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Questionable assignment: Sarjeant (1984a, p.171). Taxonomic junior synonym: *Cleistosphaeridium? polyacanthum*, according to Brenner (1988, p.42) — however, Islam (1993, p.84) retained *Cleistosphaeridium?* (as *Downiesphaeridium*) *polyacanthum*. Age: middle Kimmeridgian.

israelianum (Rossignol, 1962, p.132, pl.2, fig.3) Wall, 1967, p.111. Holotype: Rossignol, 1962, pl.2, fig.3. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Operculodinium*, fifthly *Cordosphaeridium* (combination not validly published). Taxonomic junior synonyms: *Cleistosphaeridium cephalum*, according to Jain and Garg (1991, p.78); *Operculodinium crassum*, according to Edwards and Andrieu (1992, p.262) — however, Head (1996b, p.1231) retained *Operculodinium crassum*; and *Hystrichosphaeridium westii* (name not validly published), by implication in Wall and Dale (1968a, p.315, as "hystrichosphere type x of West"). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859, questionably according to Wall and Dale (1968c, p.272), and without question according to Matsuoka (1989, p.224). Age: Pleistocene.

janduchenei Head et al., 1989b, p.459, pl.4, figs.7–8,12. Holotype: Head et al., 1989b, pl.4, figs.7–8. Age: late Miocene–early Pliocene.

?*kashiense* He Chengquan, 1991, p.145, pl.21, fig.4. Holotype: He Chengquan, 1991, pl.21, fig.4. Questionable assignment: He Chengquan (1991, p.145). Age: middle Eocene.

longispinigerum Matsuoka, 1983b, p.125, pl.9, figs.5–7,8a–b,9. Holotype: Matsuoka, 1983b, pl.9, figs.8a–b; Head and Wrenn, 1992, pl.5, figs.4,8,11. Age: late Miocene–early Pleistocene.

majus Jain and Dutta in Dutta and Jain, 1980, p.68, pl.3, figs.19–22. Holotype: Dutta and Jain, 1980, pl.3, fig.19. Age: late Paleocene.

?*megagranum* Head in Head and Westphal, 1999, p.13,15, fig.10, nos.14–15; fig.12, nos.1–9. Holotype: Head and Westphal, 1999, fig.12, nos.1–3. Questionable assignment: Head and Westphal (1999, p.13). Age: late late Pliocene.

microtriainum (Klumpp, 1953, p.390, pl.17, figs.6–7) Islam, 1983a, p.241. Emendation: Sarjeant, 1981, p.110–112, as *Achomosphaera microtriaina*. Holotype: Klumpp, 1953, pl.17, figs.6–7; Sarjeant, 1981, pl.2, figs.1–2; text-fig.2. Originally *Hystriosphæridium*, subsequently *Cordosphæridium*, thirdly *Cordosphæridium?*, fourthly *Polysphaeridium*, fifthly *Achomosphaera*, sixthly (and now) *Operculodinium*. Taxonomic junior synonym: *Operculodinium paucispinosum*, according to Jain and Garg (1991, p.80). Age: late Eocene.

minutum He Chengquan, 1991, p.145–146, pl.21, figs.6–7; text-figs.30a–b. Holotype: He Chengquan, 1991, pl.21, fig.6; text-fig.30b. Age: Paleocene.

multispinosum Ashraf, 1979, p.144, pl.9, figs.9,11. Holotype: Ashraf, 1979, pl.9, fig.11. Age: Early Cretaceous.

nanaconulum Islam, 1983a, p.241–242, pl.3, figs.12–14. Holotype: Islam, 1983a, pl.3, figs.12–13. Age: early Eocene.

nitidum Islam, 1983a, p.242, pl.4, figs.2–3. Holotype: Islam, 1983a, pl.4, fig.3. Age: early Eocene.

operculatum (Sah et al., 1970, p.144, pl.1, figs.1–2) Jain, 1982, p.51. Holotype: Sah et al., 1970, pl.1, fig.1. Originally *Achomosphaera*, subsequently *Achomosphaera?*, thirdly (and now) *Operculodinium*. Age: Late Cretaceous.

oriensum Warny and Wrenn, 1997, p.290–291, pl.1, figs.7–9; pl.2, figs.1–4. Holotype: Warny and Wrenn, 1997, pl.1, figs.7–9. Age: Tortonian–Messinian.

ornamentum (Jain and Tandon, 1981, p.12–13, pl.2, fig.35) Jain and Garg, 1991, p.80–81. Holotype: Jain and Tandon, 1981, pl.2, fig.35. Originally *Polysphaeridium*, subsequently (and now) *Operculodinium*. Age: middle Eocene.

"*paucispinosum*" Kar, 1985, p.207, pl.50, fig.6. Holotype: Kar, 1985, pl.50, fig.6. **Taxonomic senior synonym:** *Hystriosphæridium* (as *Operculodinium*) *microtriainum*, according to Jain and Garg (1991, p.80). Age: Miocene.

"?*personatum*" (Corradini, 1973, p.157, pl.23, figs.5–6) Stover and Evitt, 1978, p.179. Emendation: Masure, 1986, p.110–111, as *Corradinisphaeridium personatum*. Holotype: Corradini, 1973, pl.23, fig.6; Eisenack and Kjellström, 1981b, p.770f; Masure, 1986, pl.1, figs.1–3; text-figs.1a–b; Fensome et al., 1995, figs.1–3,5–7 — p.1663. **NOW** *Corradinisphaeridium*. Originally *Lanternosphaeridium*, subsequently *Operculodinium?*, thirdly (and now) *Corradinisphaeridium*. Questionable assignment: Stover and Evitt (1978, p.179). Age: Senonian.

piaseckii Strauss and Lund, 1992, p.167, pl.3, figs.2–3. Emendation: de Verteuil and Norris, 1996a, p.126. Holotype: Strauss and Lund, 1992, pl.3, fig.3. Age: middle Miocene.

"*piaseckii*" Zevenboom and Santarelli in Zevenboom, 1995, p.139–140, pl.7, figs.1–6. Holotype: Zevenboom, 1995, pl.7, figs.1–3. **Name not validly published**: considered a manuscript name. If validated, this name would be an illegitimate junior homonym of *Operculodinium piaseckii* Strauss and Lund. Age: early Miocene–late Pliocene.

?*placitum* Drugg and Loeblich Jr., 1967, p.186, pl.1, figs.9–10,11a–b; text-fig.4. Holotype: Drugg and Loeblich Jr., 1967, pl.1, figs.11a–b. Originally *Operculodinium*, subsequently *Operculodinium?*. Questionable assignment: Stover and Evitt (1978, p.179) as a problematic species. Taxonomic junior synonym: *Polysphaeridium cephalum*, according to Jain and Garg (1991, p.81). Age: late Eocene–Oligocene.

"?*pontis*" Zevenboom and Santarelli in Zevenboom, 1995, p.139, pl.6, figs.11–14. Holotype: Zevenboom, 1995, pl.6, figs.11–14. **Name not validly published**: considered a manuscript name. Questionable assignment: Zevenboom and Santarelli in Zevenboom (1995, p.139). **Taxonomic senior synonym**: *Operculodinium tegillatum*; Louwye (1999, p.115) considered *Operculodinium? pontis* to be a taxonomic junior synonym of *Operculodinium antwerpense*, which is now considered a taxonomic junior synonym of *Operculodinium tegillatum*. N.I.A. Age: ?late Miocene–Pliocene.

"*pseudorecurvatum*" (Morgenroth, 1966a, p.30–31, pl.8, figs.5–6) Stover and Evitt, 1978, p.179. Holotype: Morgenroth, 1966a, pl.8, fig.5. **NOW** *Melitasphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Operculodinium*, thirdly (and now) *Melitasphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium sheppeyense*, according to Stover and Evitt (1978, p.179). Age: early Eocene.

psilatium Wall, 1967, p.111–112, pl.16, figs.6–8. Holotype: Wall, 1967, pl.16, figs.6–8. Motile equivalent: *Protoceratium reticulatum* (Claparède and Lachmann, 1859) Bütschli, 1885, according to Wall and Dale (1967, p.352). Age: Holocene.

"*pugiatum*" Drugg, 1970b, p.819; text-figs.16D–E. Holotype: Drugg, 1970b, text-fig.16E. **NOW** *Lingulodinium*. Originally *Operculodinium*, subsequently (and now) *Lingulodinium*. Age: Oligocene.

?*punctatum* Cookson and Eisenack, 1971, p.220, pl.9, fig.6. Holotype: Cookson and Eisenack, 1971, pl.9, fig.6. Questionable assignment: Cookson and Eisenack (1971, p.220). Partridge in Lentin and Williams (1985, p.262) considered this species to be an acritarch. Age: Albian–Cenomanian.

radiculatum Smith, 1992, p.348,351, figs.9,10e,i–j. Holotype: Smith, 1992, figs.9,10j. Quattrocchio and Sarjeant (2003, p.142) considered this species to be a possible taxonomic junior synonym of *Cleistosphaeridium* (now *Linguladinium*) *bergmannii*. Age: late Campanian–early Maastrichtian.

?*rarispinosum* Cookson and Eisenack, 1971, p.220–221, pl.9, figs.7–8. Holotype: Cookson and Eisenack, 1971, pl.9, fig.7. Questionable assignment: Cookson and Eisenack (1971, p.220–221). Partridge in Lentin and Williams (1985, p.262) considered this species to be an acritarch. Age: Albian–Cenomanian.

robustum Kar, 1985, p.207–208, pl.50, fig.8. Holotype: Kar, 1985, pl.50, fig.8. Age: Miocene.

severinii (Cookson and Cranwell, 1967, p.208, pl.3, figs.1–2) Islam, 1983b, p.342. Holotype: Cookson and Cranwell, 1967, pl.3, fig.1. Originally *Baltisphaeridium* (Appendix A) subsequently *Impletosphaeridium*, thirdly (and now) *Operculodinium*. Age: Eocene–Oligocene.

"*solarum*" Drugg, 1970b, p.819; text-figs.16A–C. Holotype: Drugg, 1970b, text-figs.16A–C. **NOW** *Lingulodinium*. Originally *Operculodinium*, subsequently (and now) *Lingulodinium*. Age: Oligocene.

?*spiniferum* Cookson and Eisenack, 1982, p.47, pl.4, fig.21. Holotype: Cookson and Eisenack, 1982, pl.4, fig.21. Originally *Operculodinium*, subsequently (and now) *Operculodinium?*. Questionable assignment: Lentin and Williams (1985, p.262). Junior homonym: *Operculodinium spiniferum* de Coninck, 1986b. Age: Senonian.

"*spiniferum*" de Coninck, 1986b, p.16–17, pl.6, figs.21–22,26–28. Holotype: de Coninck, 1986b, pl.6, figs.26–28. **Name illegitimate — senior homonym**: *Operculodinium? spiniferum* Cookson and Eisenack, 1982. **Substitute**

name: *Operculodinium deconinckii*. Originally *Operculodinium spiniferum* de Coninck (name illegitimate), subsequently (and now) *Operculodinium deconinckii*. Age: Bartonian–Tongrian.

"?*spinigerum*" Brideaux, 1977, p.30, pl.12, figs.8–9; pl.13, figs.1–11. Holotype: Brideaux, 1977, pl.12, figs.8–9; pl.13, figs.1–4. Originally *Operculodinium?*, subsequently *Protoellipsodinium*. Questionable assignment: Brideaux (1977, p.30). **Taxonomic senior synonym:** *Protoellipsodinium clavulus*, according to Duxbury (1983, p.53). Age: Barremian.

?*spinulosum* He Chengquan, 1991, p.146, pl.21, fig.5. Holotype: He Chengquan, 1991, pl.21, fig.5. Questionable assignment: He Chengquan (1991, p.146). Age: late Turonian–early Senonian.

taiwanianum Shaw Chenglong, 1999b, p.174–176, figs.45–51. Holotype: Shaw Chenglong, 1999b, figs.46–48. Age: Eocene.

tegillatum Head, 1997, p.180,183, fig.9, nos.13–20; fig.10; fig.11, nos.1–2; fig.16, nos.13–16; fig.17, no.1. Holotype: Head, 1997, fig.9, nos.13–17. Taxonomic junior synonyms: *Operculodinium antwerpense*, according to Louwe and de Schepper (2010, p.767); *Operculodinium? pontis* (name not validly published), a taxonomic junior synonym of *Operculodinium antwerpense* according to Louwe (1999, p.115). Age: middle Pliocene.

tenuissimum He Chengquan et al., 1992, p.187, pl.2, figs.7–12. Holotype: He Chengquan et al., 1992, pl.2, fig.7. Age: Albian.

tiara (Klumpp, 1953, p.390–391, pl.17, figs.8–10) Stover and Evitt, 1978, p.179. Holotype: Klumpp, 1953, pl.17, figs.8–9. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cordosphaeridium*, fourthly *Cleistosphaeridium*, fifthly (and now) *Operculodinium*. N.I.A. Age: Eocene.

uncinispinosum (de Coninck, 1969, p.32–33, pl.9, figs.6–8) Islam, 1983b, p.342. Holotype: de Coninck, 1969, pl.9, figs.6–8. Originally *Cordosphaeridium*, subsequently *Cordosphaeridium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Operculodinium*. Age: early Eocene.

vacuolatum Head et al., 1989c, p.492–493, pl.9, figs.8–9. Holotype: Head et al., 1989c, pl.9, figs.8–9. Age: middle or early late? Miocene.

"*variabile*" Zevenboom and Santarelli in Zevenboom, 1995, p.140–141, pl.7, figs.7–12. Holotype: Zevenboom, 1995, pl.7, figs.7–9. **Name not validly published:** considered a manuscript name. Age: early–late Miocene.

wallii Matsuoka, 1983b, p.127, pl.7, fig.9; pl.9, figs.1a–b,2,3a–b,4. Holotype: Matsuoka, 1983b, pl.9, figs.1a–b. Head in Head and Wrenn (1992, p.24) considered this species to be a possible taxonomic junior synonym of *Operculodinium centrocarpum*. Age: late Miocene–early Pleistocene.

xanthium (Benedek, 1972, p.27–28, pl.9, fig.8; text-fig.9) Stover and Evitt, 1978, p.179. Emendation: Benedek and Sarjeant, 1981, p.342–343, as *Lingulodinium xanthium*. Holotype: Benedek, 1972, pl.9, fig.8; Benedek and Sarjeant, 1981, fig.9, no.5. Originally *Cordosphaeridium*, subsequently (and now) *Operculodinium*, thirdly *Lingulodinium*. Stover and Hardenbol (1994, p.33) retained this species in *Operculodinium*. Age: middle-late Oligocene.

zhongyuanense He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.56, pl.17, figs.16–25; pl.30, fig.2; text-fig.7. Holotype: He Chengquan et al., 1989, pl.17, fig.20; text-fig.7. Age: Early Tertiary.

OROBODINIUM Gocht and Wille, 1990, p.697–698. Type: Gocht and Wille, 1990, fig.4, as *Orobodinium automobile*.

**automobile* Gocht and Wille, 1990, p.699–700,702, figs.4–7,8a–b,9a–b,10–17,27–29. Holotype: Gocht and Wille, 1990, fig.4. Age: late Bajocian–middle Callovian.

changii Tykoezinski et al., 2001, p.89, pl.4, figs.1a–b,2a–b,3a–b,4a–b,5a–b,6a–b,7a–b,8–9. Tykoezinski et al., 2001, pl.4, figs.1a–b,9. Taxonomic junior synonym: *Orobodinium cunstonense* (name not validly published), according to Tykoezinski et al. (2001, p.89). Age: early Callovian.

"*cunstonense*" Smith in Tykoezinski et al., 2001, p.89. **Name not validly published**: no description. **Taxonomic senior synonym**: *Orobodinium changii*, according to Tykoezinski et al. (2001, p.89).

rete Gocht and Wille, 1990, p.702–703, figs.23a–b,24a–b. Holotype: Gocht and Wille, 1990, figs.24a–b. Age: early Bathonian.

ORTHOCARINELLUM Keupp, 1987, p.41. Emendation: Kienel, 1994, p.37. Calcareous dinoflagellate genus. Type: Keupp, 1987, pl.7, figs.1–6, as *Orthocarinellum galerum*.

biconvexum Kienel, 1994, p.37–38, pl.5, figs.1–6 (not 11–16). Holotype: Kienel, 1994, pl.5, figs.1–2,4–5. Age: Danian.

conosimile Kohring, 1993a, p.47–48, pl.8b, figs.a–f. Holotype: Kohring, 1993a, pl.8b, figs.a,c–d. Age: late Eocene.

**galerum* Keupp, 1987, p.43, pl.7, figs.1–6; text-fig.5. Holotype: Keupp, 1987, pl.7, figs.1–6. N.I.A. Age: middle Albian–early Cenomanian.

ORTHOPITHONELLA Keupp in Keupp and Mutterlose, 1984, p.158. Emendations: Keupp and Versteegh, 1989, p.210; Streng et al., 2002, p.401. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300–1301). Taxonomic senior synonym: *Stomiosphaera*, according to Reháková and Michalík (1996, p.93 — however, Streng et al. (2004, p.482) retained *Orthopithonella*. Although in proposing this genus Keupp in Keupp and Mutterlose (1984, p.158), did not validly transfer the "type species" to *Orthopithonella*, the generic name was still valid since it was based on a pre-existing species name. Type: Bolli, 1974, pl.3, fig.9; pl.12, fig.9; pl.22, fig.3, as *Pithonella gustafsonii*.

"*aculeata*" Willems, 1996, p.223, pl.1, fig.2. Holotype: not designated. **Name not validly published**: no description. Age: early Danian.

?*aequilamellata* Willems, 1988, p.446–449, pl.3, figs.11–16. Holotype: Willems, 1988, pl.3, fig.15. Questionable assignment: Streng et al. (2004, p.482). Age: early Santonian.

"*albatrosiana*" (Kamptner, 1963, p.177–178, pl.5, fig.30) Lentin and Williams, 1985, p.383. Holotype: Kamptner, 1963, fig.30. **NOW** *Calciodinellum*. Originally *Thoracosphaera*, subsequently *Orthopithonella*, thirdly *Sphaerodinella*, fourthly (and now) *Calciodinellum*. Taxonomic junior synonyms: *Thoracosphaera ricaseta*, according to Fütterer (1976, p.134); and *Thoracosphaera rela* according to Fütterer (1978, p.716). Age: extant.

?*aspera* Fütterer, 1990, p.538, pl.5, figs.1–3. Holotype: Fütterer, 1990, pl.5, figs.1–2. Questionable assignment: Streng et al. (2004, p.482). Age: latest Maastrichtian–late Danian.

compsa (Keupp, 1982, p.318–319, pl.6.2–3, figs.5–8) Lentin and Williams, 1985, p.384. Holotype: Keupp, 1982, pl.6.2–3, figs.6–8. Originally *Pithonella*, subsequently (and now) *Orthopithonella*. Age: late Aptian–Campanian.

?*congruens* Fütterer, 1990, p.539, pl.4, figs.1–3,6–7. Holotype: Fütterer, 1990, pl.4, fig.6. Questionable assignment: Streng et al. (2004, p.482). Taxonomic senior synonym: *Stomiosphaera wanneri* according to Reháková and Michalík (1996, p.93) — however, Streng et al. (2004, p.482) retained *Orthopithonella congruens*. Age: late Maastrichtian–earliest Danian.

"*cookii*" (Bolli, 1974, p.856, pl.6, figs.9–12; pl.18, figs.3–9; pl.23, fig.6) Willems, 1988, p.437. Holotype: Bolli, 1974, pl.6, fig.9; pl.23, fig.6. **Combination not validly published**: basionym not fully referenced. **NOW**

Pirumella. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Orthopithonella* (combination not validly published), fourthly (and now) *Pirumella*. Age: Coniacian–Santonian.

"*deflandrei*" (Kamptner, 1956, p.448–455, figs.1–4) Kohring, 1993a, p.30. Holotype: Kamptner, 1956, fig.1. **NOW** *Fuettererella*. Originally *Thoracosphaera*, subsequently *Orthopithonella*, thirdly (and now) *Fuettererella*. This combination was not validly published in Keupp (1992a, p.499), since that author did not fully reference the basionym. Taxonomic junior synonyms: *Thoracosphaera* (now *Orthopithonella*) *johnstonei* and *Orthopithonella?* *minuta*, according to Kohring (1993a, p.30) — however, Streng et al. (2004, p.482) retained *Pithonella* (as *Pirumella*) *johnstonei* and *Orthopithonella?* *minuta*. Age: Eocene.

?*duplicata* Kohring, 1993a, p.36–38, pl.5, figs.a–h; pl.6, figs.a–l; pl.36, figs.d–e; text-fig.6. Holotype: Kohring, 1993a, pl.5, fig.a; pl.6, fig.l. Questionable assignment: Streng et al. (2004, p.482). Age: late Eocene.

"*flora*" Fütterer, 1990, p.538, pl.3, figs.1–7. Holotype: Fütterer, 1990, pl.3, figs.1,3. **NOW** *Fuettererella*. Originally *Orthopithonella*, subsequently (and now) *Fuettererella*. N.I.A. Age: late Maastrichtian–Danian.

?*geometrica* (Jafar, 1983, p.233, fig.10, nos.5–6; fig.11, no.6) Janofske, 1987, p.50. Holotype: Jafar, 1983, fig.10, no.5. Originally *Prinsiosphaera* (Appendix A), subsequently *Orthopithonella*, thirdly *Thoracosphaera*, fourthly (and now) ?*Orthopithonella*. Janofske (1992, p.18) retained this species in *Orthopithonella*. Questionable assignment: Streng et al. (2004, p.482). Taxonomic junior synonyms (at specific rank): *Prinsiosphaera triassica* subsp. *hyalina* and *Prinsiosphaera triassica* subsp. *noeliae* (both Appendix A), according to Janofske (1987, p.50). Age: Rhaetian.

?*globosa* (Fütterer, 1984, p.536, pl.2, figs.1–9) Lentin and Williams, 1985, p.384. Holotype: Fütterer, 1984, pl.2, figs.1–3. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Orthopithonella?*. Questionable assignment: Kohring (1993a, p.38). Age: middle Maastrichtian–early Danian.

"*granifera*" (Fütterer, 1978, p.715, pl.2, figs.1–12) Keupp and Kohring, 1993, p.29. Emendation: Janofske and Karwath, 2000, p.107–108, as *Leonella granifera*. Holotype: Fütterer, 1978, pl.2, figs.1,4,7. **NOW** *Leonella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Orthopithonella*, fourthly (and now) *Leonella*. Age: late Pliocene–Pleistocene.

"forma *salebra*" Kienel, 1994, p.35–36, pl.3, figs.11–12,14–15. **Name not validly published**: holotype not designated. Age: Danian.

**gustafsonii* (Bolli, 1974, p.854, pl.3, figs.9–12; pl.12, figs.7–12; pl.13, figs.1–2; pl.22, fig.3) Lentin and Williams, 1985, p.384. Emendation: Streng et al., 2002, p.404. Holotype: Bolli, 1974, pl.3, fig.9; pl.12, fig.9; pl.22, fig.3. Originally *Pithonella*, subsequently (and now) *Orthopithonella*. Taxonomic junior synonyms: *Pithonella paratabulata*, according to Keupp (1981, p.20); *Pithonella pycnothecata* and *Pithonella tithonica*, both according to Willems (1988, p.437) — however, Kohring (1993a, p.35) retained *Pithonella* (as and now *Orthopithonella*) *pycnothecata*. Age: ?late Aptian–middle Albian.

forma *gustafsonii*. Autonym. Holotype: Bolli, 1974, pl.3, fig.9; pl.12, fig.9; pl.22, fig.3.

forma *salebra* Kienel, 1994, p.34–35, pl.3, figs.1–10,13. Holotype: Kienel, 1994, pl.3, figs.3,6, as *Orthopithonella* cf. *gustafsonii* forma *salebra*. Age: Danian.

?*minuta* Fütterer, 1990, p.537–538, pl.1, figs.3–9. Holotype: Fütterer, 1990, pl.1, figs.4–5. Questionable assignment: Streng et al. (2004, p.482). Taxonomic senior synonym: *Thoracosphaera* (now *Fuettererella*) *deflandrei*, according to Kohring (1993a, p.30) — however, Streng et al. (2004, p.482) retained *Orthopithonella?* *minuta*. Age: early Paleocene–middle Miocene.

?*misurinae* Janofske, 1992, p.12–13, pl.1, figs.1a–f,2a–e; pl.2, figs.1a–d,2a–d,3a–c,4a–e; pl.3, figs.1a–d,2a–f; pl.19, figs.1–3. Holotype: Janofske, 1992, pl.1, figs.1a–f. fig.3. Questionable assignment: Streng et al. (2004, p.482). Age: Carnian.

?*multipora* Kienel, 1994, p.36, pl.4, figs.1–4. Holotype: Kienel, 1994, pl.4, figs.1–2. Questionable assignment: Streng et al. (2004, p.482). Age: Danian.

?*ornata* Zügel, 1994, p.83–85, pl.20, figs.8–15. Holotype: Zügel, 1994, pl.20, figs.8–10. Questionable assignment: Streng et al. (2004, p.482). Age: late Cenomanian.

?*porata* (Keupp, 1982, p.316–318, pl.6.2–2, fig.12; pl.6.2–3, figs.1–4,10) Lentin and Williams, 1985, p.384. Holotype: Keupp, 1982, pl.6.2–3, figs.1–2. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly (and now) *Orthopithonella*. Questionable assignment: Streng et al. (2004, p.482). Age: early Barremian–early Albian.

?*porifera* Keupp and Kowalski, 1992, p.218, pl.2, figs.6–15. Holotype: Keupp and Kowalski, 1992, pl.2, figs.7–9. Questionable assignment: Streng et al. (2004, p.482). Age: late Albian.

?*pynothecata* (Keupp, 1978, p.94, figs.11–12) Lentin and Williams, 1985, p.384. Holotype: Keupp, 1978, fig.11. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly (and now) *Orthopithonella*. Questionable assignment: Streng et al. (2004, p.482). Taxonomic senior synonym: *Pithonella* (as and now *Orthopithonella gustafsonii*, according to Willems (1988, p.437) — however, Kohring (1993a, p.35) retained *Orthopithonella pynothecata*. Age: Tithonian.

?*reticulata* Zügel, 1994, p.81, pl.19, figs.12–14. Holotype: Zügel, 1994, pl.19, figs.12–13. Questionable assignment: Streng et al. (2004, p.482). Age: late Cenomanian.

"*tesserula*" (Fütterer, 1978, p.715, pl.3, figs.1–8,10–11) Keupp, 1992a, p.499. Holotype: Fütterer, 1978, pl.3, figs.1,4,7,10. **Combination not validly published:** basionym not fully referenced. **NOW** *Fuettererella*. Originally *Thoracosphaera*, subsequently *Orthopithonella* (combination not validly published), thirdly (and now) *Fuettererella*. N.I.A. Age: Paleocene–late Oligocene.

"*tithonica*" (Keupp, 1978, p.90,92, figs.7–10) Lentin and Williams, 1985, p.384. Holotype: Keupp, 1978, fig.7. Originally *Pithonella*, subsequently *Orthopithonella*. **Taxonomic senior synonym:** *Pithonella* (as and now *Orthopithonella gustafsonii*, according to Willems (1988, p.437). Age: Tithonian.

?*veeversii* (Bolli, 1974, p.855, pl.5, figs.9–12; pl.16, figs.5–12; pl.23, fig.3) Lentin and Williams, 1985, p.384. Holotype: Bolli, 1974, pl.5, figs.9–10; pl.23, fig.3. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly (and now) *Orthopithonella*. Questionable assignment: Streng et al. (2004, p.482). Age: Albian.

?*weileri* Kohring, 1993a, p.40, pl.34, figs.a–f. Holotype: Kohring, 1993a, pl.34, figs.d–f. Questionable assignment: Streng et al. (2004, p.482). Age: Oligocene.

"*williamsonii*" (Bolli, 1978b, p.912–913, pl.2, figs.1–12; pl.3, figs.1–12 ex Keupp, 1981, p.65) Willems, 1988, p.449. Holotype: Bolli, 1978b, pl.2, figs.1–3. **NOW** *Pirumella*. Originally *Bonetocardiella*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly *Orthopithonella*, fifthly (and now) *Pirumella*. Age: Oxfordian–Kimmeridgian.

ORTHOTABULATA Kienel, 1994, p.38. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1301). Type: Kienel, 1994, pl.5, figs.7–12, as *Orthotabulata obscura*.

**obscura* Kienel, 1994, p.38–39, pl.5, figs.7–15. Holotype: Kienel, 1994, pl.5, figs.7–12. Age: Danian.

OVALICYSTA Bjaerke, 1980, p.71. Taxonomic senior synonym: *Dodekovia*, according to Below (1987a, p.113) — however, Stover and Williams (1987, p.169) and Lentin and Williams (1989, p.269) retained *Ovalicysta*. Type: Bjaerke, 1980, pl.2, fig.7, as *Ovalicysta hiata*.

***hiata** Bjaerke, 1980, p.71, pl.2, figs.7–12. Holotype: Bjaerke, 1980, pl.2, fig.7; Fensome et al., 1995, fig.1 — p.1543. Taxonomic senior synonym: *Dodekovia syzygia*, according to Below (1987a, p.121) — however, Lentin and Williams (1989, p.269) retained *Ovalicysta hiata*. Age: Toarcian.

VOIDINIUM Davey, 1970, p.351. Emendations: Lentin and Williams, 1976, p.103–104; Duxbury, 1983, p.61,63. Taxonomic senior synonym: *Ascodinium*, according to Helenes (1983, p.258) — however, Lentin and Williams (1989, p.269) retained *Ovoidinium*. Taxonomic junior synonyms: *Craspedodinium*, according to Lentin and Williams (1976, p.157) — however, Stover and Evitt (1978, p.34) retained *Craspedodinium*; *Evittia* Pocock (illegitimate name); *Pocockia* (substitute name for *Evittia* Pocock), according to Lentin and Williams (1976, p.162). Type: Cookson and Hughes, 1964, pl.5, fig.4, as *Ascodinium verrucosum*.

cinctum (Cookson and Eisenack, 1958, p.26, pl.4, figs.1–3) Davey, 1970, p.354. Holotype: Cookson and Eisenack, 1958, pl.4, fig.3. Originally *Deflandrea*, subsequently *Evittia* Pocock (combination illegitimate), thirdly *Pocockia*, fourthly (and now) *Ovoidinium*, fifthly *Ascodinium*. Lentin and Williams (1989, p.269) retained this species in *Ovoidinium*. Age: late Neocomian–early Aptian.

diversum Davey, 1979b, p.558, pl.6, figs.6–16. Holotype: Davey, 1979b, pl.6, fig.9. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Lentin and Williams (1989, p.269) retained this species in *Ovoidinium*. Age: late Aptian–early Albian.

?fragile Norvick, 1976, p.88, pl.13, figs.1,8; pl.17, fig.7. Holotype: Norvick, 1976, pl.13, fig.1. Originally (and now) *Ovoidinium?*, subsequently *Ascodinium?*. Lentin and Williams (1989, p.269) questionably retained this species in *Ovoidinium*. Questionable assignment: Norvick (1976, p.88). Age: Cenomanian.

granulatum Song Zhichen in Song Zhichen et al., 1985, p.39, pl.7, figs.1–2. Holotype: Song Zhichen et al., 1985, pl.7, figs.1–2. Age: late Eocene–early Oligocene.

implanum Davey, 1979b, p.558–559, pl.5, figs.7–9,11–12. Holotype: Davey, 1979b, pl.5, figs.7,11. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Lentin and Williams (1989, p.269) retained this species in *Ovoidinium*. Age: late Albian.

incomptum Duxbury, 1983, p.64, pl.10, figs.4–5,9; text-figs.30A–C. Holotype: Duxbury, 1983, pl.10, figs.5,9; text-fig.30C. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Lentin and Williams (1989, p.269) retained this species in *Ovoidinium*. Age: late Aptian.

incorporeum Duxbury, 1983, p.65, pl.10, fig.14; text-figs.31A–B. Holotype: Duxbury, 1983, pl.10, fig.14; text-figs.31A–B. Originally (and now) *Ovoidinium*, subsequently *Ascodinium*. Lentin and Williams (1989, p.270) retained this species in *Ovoidinium*. Age: late Aptian–early Albian.

"?indicum" Jain and Taugourdeau-Lantz, 1973, p.64, pl.4, figs.1–2. Holotype: Jain and Taugourdeau-Lantz, 1973, pl.4, fig.1. **NOW** *Yalkalpodinium*. Originally *Ovoidinium*, subsequently *Ovoidinium?*, thirdly (and now) *Yalkalpodinium*. Questionable assignment: Stover and Evitt (1978, p.217). Age: ?Aptian–?early Albian.

"?indistinctum" (Cookson and Eisenack, 1974, p.76, pl.25, figs.6–8) Lentin and Williams, 1976, p.105. Emendation: Riding and Helby, 2001h, p.229–230, as *Craspedodinium indistinctum*. Holotype: Cookson and Eisenack, 1974, pl.25, fig.7. **NOW** *Craspedodinium*. Originally (and now) *Craspedodinium*, subsequently *Ovoidinium?*. Questionable assignment: Lentin and Williams (1976, p.105). Age: late Albian (as revised by Riding and Helby, 2001h, p.232).

?kansanum (Tasch in Tasch et al., 1964, p.196, pl.1, fig.1) Lentin and Williams, 1976, p.105. Holotype: Tasch et al., 1964, pl.1, fig.1. Originally *Peridinium* (Appendix B), subsequently *Deflandrea?*, thirdly (and now) *Ovoidinium?*, fourthly *Ascodinium?*. Lentin and Williams (1989, p.270) questionably retained this species in *Ovoidinium*. Questionable assignment: Lentin and Williams (1976, p.105). Age: Albian.

membranaceum Slimani, 1994, p.115–116, pl.18, figs.7–12. Holotype: Slimani, 1994, pl.18, figs.7–9. Age: early Campanian–late Maastrichtian.

"**ostium**" Davey, 1970, p.353, pl.4, figs.5–6; text-fig.1B. Holotype: Davey, 1970, pl.4, fig.5. **NOW** *Ovoidinium verrucosum* subsp. *ostium*. Originally *Ovoidinium ostium*, subsequently *Ovoidinium verrucosum* var. *ostium*, thirdly (and now) *Ovoidinium verrucosum* subsp. *ostium*, fourthly *Ascodinium verrucosum* subsp. *ostium*. Lentin and Williams (1989, p.270) retained this taxon in *Ovoidinium* as *Ovoidinium verrucosum* subsp. *ostium*. Age: Albian–early Cenomanian.

ovale (Cookson and Eisenack, 1970a, p.145, pl.13, fig.8) Lentin and Williams, 1976, p.105. Holotype: Cookson and Eisenack, 1970a, pl.13, fig.8. Originally *Ascodinium*, subsequently (and now) *Ovoidinium*. Lentin and Williams (1989, p.270) retained this species in *Ovoidinium*. Age: Albian–Cenomanian.

scabratum (Jain and Taugourdeau-Lantz, 1973, p.64, pl.4, figs.11–12) Khowaja-Ateequzzaman and Garg, 2004b, p.13. Holotype: Jain and Taugourdeau-Lantz, 1973, pl.4, fig.11. Emendation: Khowaja-Ateequzzaman and Garg, 2004a, p.13–14. Originally *Hexagonifera*, subsequently *Leberidocysta?*, thirdly *Hexagonifera?*, fourthly (and now) *Ovoidinium*. Age: Early Cretaceous.

scabrosum (Cookson and Hughes, 1964, p.40, pl.5, figs.1–3) Davey, 1970, p.352. Holotype: Cookson and Hughes, 1964, pl.5, fig.1. Originally *Ascodinium*, subsequently (and now) *Ovoidinium*. Lentin and Williams (1989, p.270) retained this species in *Ovoidinium*. Age: late Albian–early Cenomanian.

striatum Riding and Helby, 2001h, p.232–233, figs.4A–P,5A–D. Holotype: Riding and Helby, 2001h, figs.4I–K. Age: late Aptian.

"?**torulosum**" (Davey and Verdier, 1973, p.180,183, pl.1, figs.2,5,8) Below, 1981a, p.124. Holotype: Davey and Verdier, 1973, pl.1, fig.2. **NOW** *Canningia*. Originally (and now) *Canningia*, subsequently *Batiacasphaera*, thirdly *Ovoidinium*. Questionable assignment: Below (1981a, p.124). Age: late Albian–early Cenomanian.

"?**turritum**" (Brideaux, 1977, p.13, pl.4, figs.1–9) Below, 1981a, p.125. Holotype: Brideaux, 1977, pl.4, figs.1–3. **NOW** *Canningia?*. Originally (and now) *Canningia?*, subsequently *Ovoidinium?*. Questionable assignment: Below (1981a, p.125). Age: Barremian.

***verrucosum** (Cookson and Hughes, 1964, p.41, pl.5, figs.4–7) Davey, 1970, p.351–352. Holotype: Cookson and Hughes, 1964, pl.5, fig.4. Originally *Ascodinium*, subsequently (and now) *Ovoidinium*. Lentin and Williams (1989, p.270) retained this species in *Ovoidinium*. Age: late Albian–early Cenomanian.

subsp. **ostium** (Davey, 1970, p.353, pl.4, figs.5–6; text-fig.1B) Lentin and Williams, 1975, p.2153. Holotype: Davey, 1970, pl.4, fig.5. Originally *Ovoidinium ostium*, subsequently *Ovoidinium verrucosum* var. *ostium*, thirdly (and now) *Ovoidinium verrucosum* subsp. *ostium*, fourthly *Ascodinium verrucosum* subsp. *ostium*. Lentin and Williams (1989, p.270) retained this taxon as *Ovoidinium verrucosum* subsp. *ostium*. Age: Albian–early Cenomanian.

"var. **ostium**" (Davey, 1970, p.353, pl.4, figs.5–6; text-fig.1B) Davey and Verdier, 1973, p.198. Holotype: Davey, 1970, pl.4, fig.5. **NOW** *Ovoidinium verrucosum* subsp. *ostium*. Originally *Ovoidinium ostium*, subsequently *Ovoidinium verrucosum* var. *ostium*, thirdly (and now) *Ovoidinium verrucosum* subsp. *ostium*, fourthly *Ascodinium verrucosum* subsp. *ostium*. Age: Albian–early Cenomanian.

subsp. **verrucosum**. Autonym. Holotype: Cookson and Hughes, 1964, pl.5, fig.4. Originally (and now) *Ovoidinium verrucosum* subsp. *verrucosum*, subsequently *Ascodinium verrucosum* subsp. *verrucosum*.

"var. **verrucosum**". Autonym. Holotype: Cookson and Hughes, 1964, pl. 5, fig. 4. **Now redundant**.

waltonii (Pocock, 1972, p.93, pl.22, figs.13–14) Lentin and Williams, 1976, p.105. Holotype: Pocock, 1972, pl.22, fig.14. Originally *Evittia* Pocock (generic name illegitimate), subsequently *Pocockia*, thirdly (and now)

Ovoidinium, fourthly *Ascodinium*. Lentin and Williams (1989, p.270) retained this species in *Ovoidinium*. Age: ?Toarcian–?Bajocian, as given by Jansonius (1986, p.202).

PALAECYSTA Chen, 2013, p.288–289. Type: Chen, 2013, pl.1, fig.1, as *Palaecysta integra*.

complicata (Neale and Sarjeant 1962, p.455–456, pl.19, figs.6–7) Williams and Fensome, 2016, p.140. Holotype: Neale and Sarjeant, 1962, pl.19, figs.6–7; Fauconnier and Masure, 2004, pl.75, figs.7–8. Originally *Systematophora*, subsequently (and now) *Palaecysta*. This combination was not validly published in Chen (2013, p.290), since that author did not fully reference the basionym. Age: late Hauterivian–mid Barremian.

crispabaculata Chen, 2013, p.290–291, pl.11, figs.124–130; pl.12, figs.135–147; text-fig.9, nos.1–2, text-fig.10, nos.27–28, text-fig.11, nos.53–55. Holotype: Chen, 2013, pl.11, fig.124. The validity of this species name may be in question. Chen (2013) provided no separate entry for the species but provided two separate entries for "*Palaecysta crispabaculata* sp. nov. subsp. *crispa* (Chen, 2013, p.290–291) and "*Palaecysta crispabaculata* subsp. *delicata*" (Chen, 2013, p.291). In the remarks to the former he refers to "this species" and in remarks to the latter he makes comparison with "*P. crispabaculata*" rather than with the autonym (i.e. the other subspecies). Here we consider the species *Palaecysts crispabaculata* to be validly published with the protologue circumscribing the text and illustrations for the two subspecies. On this basis, Chen's *Palaecysta crispabaculata* subsp. *crispa* must be called *Palaecysta crispabaculata* subsp. *crispabaculata* as the autonym. Age: early Hauterivian.

"subsp. ***crispa***" Chen, 2013, p.290–291, pl.11, figs.124–130; pl.12, figs.139,145–147, text-fig.9, no.1; text-fig.10, no.27; text-fig.11, nos.53–55. Holotype: Chen, 2013, pl.11, fig.124. **Incorrect name for autonym.** **NOW** *Palaecysta crispabaculata*. Originally *Palaecysta crispabaculata* subsp. *crispa* (name incorrect), subsequently (and now) *Palaecysta crispabaculata* subsp. *crispabaculata*.

subsp. ***crispabaculata***. Autonym. Holotype: Chen, 2013, pl.11, fig.124. This taxon was illustrated in Chen (2013) as pl.11, figs.124–130; pl.12, figs.139,145–147, text-fig.9, no.1; text-fig.10, no.27; text-fig.11, nos.53–55.

subsp. ***delicata*** Chen, 2013, p.291, pl.12, figs.135–138,140–144; text-fig.9, no.2, text-fig.10, no.28. Holotype: Chen, 2013, pl.12, fig.142. Age: early Hauterivian.

foveoreticulata Chen, 2013, p.291–292, pl.6, figs.59–69; pl.7, figs.71–81; pl.8, figs.82–87; text-fig.9, nos.6,17–25; text-fig.10, nos.32,42–50. Holotype: Chen, 2013, pl.6, fig.59. Age: late Berriasian.

subsp. ***foveoreticulata***. Autonym. Holotype: Chen, 2013, pl.6, fig.59.

subsp. ***madagascarensis*** Chen, 2013, p.291–292, pl.8, figs.82–87; text-fig.9, nos. 6,10,32. Holotype: Chen, 2013, pl.8, fig.83. Age: Berriasian.

****integra*** Chen, 2013, p.289–290, pl.1, figs.1–6; pl.2, figs.16–20; pl.5, figs.51–58; text-figs.5A–C; text-figs.9, nos.5,7,11,14; text-figs.10, nos.31,38, text-figs.11, nos.64–65,67. Holotype: Chen, 2013, pl.1, fig.1. Age: late Tithonian–Berriasian.

subsp. ***digitata*** Chen, 2013, p.290, pl.2, figs.16–17; text-fig.9, no.14, text-fig.10, no.38, text-fig.11, no.67. Holotype: Chen, 2013, pl.2, fig.17. Age: late Tithonian.

subsp. ***integra***. Autonym. Holotype: Chen, 2013, pl.1, fig.1.

mahajangaensis Chen, 2013, p.290, pl.5, figs.51–58; text-fig.9, no.7, text-fig.11, nos.62–63. Holotype: Chen, 2013, pl.5, fig.52; text-fig.10, no.33. Age: late Tithonian.

melakyensis Chen, 2013, p.292, pl.13, figs.148–151; text-figs.9, no.13, text-fig.10, no.39. Holotype: Chen, 2013, pl.13, fig.148. Age: late Tithonian–early Berriasian.

morondavaensis Chen, 2013, p.293, pl.3, figs.27–36; text-fig.6; text-fig.10, no.3; text-fig.11, nos.69–70. Holotype: Chen, 2013, pl.3, fig.34; text-fig.9, no.3, text-fig.10, no.29. Age: late Tithonian–Berriasian.

palmula (Davey, 1982b, p.11–12, pl.1, figs.1–4) Williams and Fensome, 2016, p.140. Holotype: Davey, 1982b, pl.1, figs.1–3; Fauconnier and Masure, 2004, pl.76, figs.11–13 Originally *Systematophora*, subsequently (and now) *Palaecysta*. This combination was not validly published in Chen (2013, p.293), since that author did not fully reference the basionym. Chen (2013, p.293) listed some of his illustrations as paratypes; however, since Chen's paper does not constitute the protologue for this species, and as the illustrations do not purport to be from Davey's (1982b) original study, they are not paratypes. Age: Ryazanian–Valanginian.

subsp. *ankamotraensis* Chen, 2013, p.293, pl.2, figs.22–26; text-fig.7, text-fig.9, nos.9–10, text-fig.10, no.35 ex Williams and Fensome, 2016, 141. Holotype: Chen, 2013, pl.2, fig.23. The name was not validly published in Chen (2013, p.293), since the combination *Palaecysta palmula* was not validly published. Age: late Tithonian.

subsp. *palmula*. Autonym. Holotype: Davey, 1982b, pl.1, figs.1–3.

pectita Chen, 2013, p.293–294, pl.8, figs.88–98; pl.11, figs.132–134; text-fig.9, no.4,11; text-fig., 10, nos.30, 36, text-fig.11, no.66. Holotype: Chen, 2013, pl.8, fig.91. Age: middle Berriasian.

subsp. *merinai* Chen, 2013, p.294, pl.11, figs.132–134, text-fig.10, no.30. Holotype: Chen, 2013, pl.11, fig.132; text-fig.10, no.30. Age: late Tithonian.

subsp. *pectita*. Autonym. Holotype: Chen, 2013, pl.8, fig.91.

sylibum (Davey, 1979a, p.433–434,436, pl.48, figs.7–9, pl.50, figs.2–7,5–6,7–9) Williams and Fensome, 2016, p.140. Holotype: Davey, 1979a, pl.50, fig.2; Fauconnier and Masure, 2004, pl.77, fig.3. Originally *Systematophora*, subsequently (and now) *Palaecysta*. This combination was not validly published in Chen (2013, p.293), since that author did not fully reference the basionym. N.I.A. Age: late Tithonian–Barremian.

virgae Chen, 2013, p.292,294–295, pl.1, figs.7–14; pl.9, figs.100–101, pl.10, figs.110–120; text-fig.9, nos.12,16,26, text-fig.10, nos.37,41, 52, text-fig.11, nos.58–61. Holotype: Chen, 2013, pl.1, fig.7. Age: Berriasian.

subsp. *externa* Chen, 2013, p.294–295, pl.10, figs.110–120; text-fig.8, text-fig.9, no.12, text-fig.10, no.37, text-fig.11, nos.60–61. Holotype: Chen, 2013, pl.10, fig.119. Age: late Tithonian–Berriasian.

subsp. *lanceolata* Chen, 2013, p.292, pl.9, figs.100–101,104–105,107–109; text-figs.9, no.26, text-fig.10, no.52. Holotype: Chen, 2013, pl.9, fig.107. Chen (2013, p.292) described this subspecies several pages before he erected the species (Chen, 2013, p.294). Age: late Tithonian–Berriasian.

subsp. *virgae*. Autonym. Holotype: Chen, 2013, pl.1, fig.7.

"**PALAEOCERATIUM**" Wetzels, 1948, p.329. **Name not validly published:** no description.

"*operculatum*" (Wetzels, 1933a, p.170, pl.2, figs.21–22; text-fig.3) Wetzels, 1948, p.329. Holotype: Wetzels, 1933a, pl.2, fig.21. **Combination not validly published:** the generic name *Palaecoceratium* is not validly published. **NOW** *Odontochitina*. Originally *Ceratium* subgenus *Euceratium* (Appendix B), subsequently *Palaecoceratium* subgenus *Euceratium* (combination not validly published), thirdly (and now) *Odontochitina*. Taxonomic junior synonym: *Odontochitina silicorum*, according to Deflandre and Cookson (1955, p.292). Age: Senonian.

PALAEOCYSTODINIUM Alberti, 1961, p.20. Emendation: Fensome et al. 2009, p.48. Taxonomic senior synonym: *Svalbardella*, according to Lindgren (1984, p.186) — however, Wrenn and Hart (1988, p.361–362) retained *Palaecocystodinium*. Taxonomic junior synonym: *Cystodiniopsis* Vozzhennikova, 1963, by implication in Vozzhennikova (1967, p.152), who transferred the "type species" of *Cystodiniopsis* Vozzhennikova, 1963,

Cystodiniopsis hyperxantha, to *Palaeocystodinium*. Type: Alberti, 1961, pl.7, fig.12, as *Palaeocystodinium golzowense*.

akhmetievi Vasilyeva in Andreeva-Grigorovich et al., 2011, p.48–49, pl.6, figs. 5–6. Holotype: Andreeva-Grigorovich et al., 2011, pl.6, figs.5–6. Age: Danian–Selandian.

australinum (Cookson, 1965b, p.140, pl.25, figs.1–4) Lentin and Williams, 1976, p.89. Emendation: Malloy, 1972, p.63, as *Svalbardella australina*. Holotype: Cookson, 1965b, pl.25, fig.4. Originally *Svalbardella*, subsequently (and now) *Palaeocystodinium*. Age: Paleocene.

benjaminii Drugg, 1967, p.31, pl.3, fig.1; pl.9, fig.3. Holotype: Drugg, 1967, pl.3, fig.1. Age: Maastrichtian–Danian.

bulliforme Ioannides, 1986, p.31, pl.17, figs.2–5. Holotype: Ioannides, 1986, pl.17, fig.4. Age: Maastrichtian–early Paleocene.

?*deflandrei* Gruas-Cavagnetto, 1968, p.92–93, pl.13, figs.15–19. Holotype: Gruas-Cavagnetto, 1968, pl.13, figs.15,18. Questionable assignment: Gruas-Cavagnetto (1968, p.92). Age: late Paleocene.

?*denticulatum* Alberti, 1961, p.20–21, pl.7, fig.9. Holotype: Alberti, 1961, pl.7, fig.9. Questionable assignment: Alberti (1961, p.20). Age: Turonian.

elegans He Chengquan, 1991, p.86–87, pl.34, figs.12–13. Holotype: He Chengquan, 1991, pl.34, fig.13. Age: late Eocene.

"*gabonense*" Stover and Evitt, 1978, p.115. Holotype: Malloy, 1972, pl.1, fig.17, as *Svalbardella australina*. **NOW** *Andalusiella*. Originally *Palaeocystodinium*, subsequently (and now) *Andalusiella*. Age: Maastrichtian.

****golzowense*** Alberti, 1961, p.20, pl.7, figs.10–12; pl.12, fig.16. Holotype: Alberti, 1961, pl.7, fig.12. Age: late Eocene–late Oligocene.

granulatum (Wilson, 1967b, p.226–227, figs.7–9) Lentin and Williams, 1976, p.89. Holotype: Wilson, 1967b, fig.9. Originally *Svalbardella*, subsequently (and now) *Palaeocystodinium*. Age: Maastrichtian (see Wilson, 1972).

hampdenense (Wilson, 1977, p.564–566, figs.1–8) Wrenn and Hart, 1988, p.362. Holotype: Wilson, 1977, figs.1–3. Originally *Svalbardella*, subsequently (and now) *Palaeocystodinium*. Age: middle Eocene.

?*hyperxanthum* (Vozzhennikova, 1963, p.185, fig.20) Vozzhennikova, 1967, p.152. Emendation: Lentin and Vozzhennikova, 1990, p.60, as *Palaeocystodinium? hyperxanthum*. Holotype: Vozzhennikova, 1963, fig.20, lost according to Lentin and Vozzhennikova (1990, p.60). Lectotype: Lentin and Vozzhennikova, 1990, pl.7, fig.7; text-fig.31, designated by Lentin and Vozzhennikova (1990, p.60). Originally *Cystodiniopsis*, subsequently *Palaeocystodinium*, thirdly (and now) *Palaeocystodinium?*. Questionable assignment: Stover and Evitt (1978, p.115). Age: Paleocene.

lidiae (Górka, 1963, p.37–39, pl.5, fig.6) Davey, 1969b, p.12–13. Emendation: Davey, 1969b, p.12, as *Palaeocystodinium lidiae*. Holotype: Górka, 1963, pl.5, fig.6. Originally *Leiofusa* (Appendix A), subsequently (and now) *Palaeocystodinium*. Age: Maastrichtian.

"*microgranulatum*" Jain and Milleped, 1973, p.29, pl.2, figs.23–24; pl.3, fig.30. Holotype: Jain and Milleped, 1973, pl.3, fig.30. **Taxonomic senior synonym:** *Svalbardella* (as *Alterbia*; now *Andalusiella polymorpha*, according to Lentin and Williams (1976, p.89)). Age: Maastrichtian.

minor Strauss in Strauss et al., 2001, p.407, pl.2, figs.1–3; text-fig.2 (part). Holotype: Strauss et al., 2001, pl.2, fig.1. This name was not validly published in Rusbült and Strauss (1992, p.156 — caption to fig.2) and Lund et al. (1993, caption to pl.1, fig.15) since these authors did not provide a description. Age: middle Miocene.

miocaenicum Strauss in Strauss et al., 2001, p.407–409, pl.2, figs.4–5; text-fig.2 (part). Holotype: Strauss et al., 2001, pl.2, fig.5. This name was not validly published in Rusbült and Strauss (1992, caption to fig.2) since these authors did not provide a description. Age: middle Miocene.

obesum Fensome et al., 2009, p.50, pl.8, figs.j–l. Holotype: Fensome et al., 2009, pl.8, fig.l. Age: youngest occurrence, Rupelian.

pilosum Guler et al., 2005, p.421–422, figs.6F–R. Holotype: Guler et al., 2005, fig.6R. Age: late? Maastrichtian.

powellense Strauss et al., 2001, p.409, pl.2, figs.6–7. Holotype: Strauss and Lund, 1992, pl.5, fig.1, designated by Strauss et al. (2001, p.409). Age: middle Miocene.

"**punctatum**" Jain and Millepied, 1973, p.29, pl.2, fig.24 (identified as *Palaeocystodinium microgranulatum* in the figure caption); pl.3, figs.26–28. Emendation: Masure et al., 1996, p.180–181, as *Andalusiella mauthei* subsp. *punctata*. Holotype: Jain and Millepied, 1973, pl.3, fig.27. **NOW** *Andalusiella mauthei* subsp. *punctata*. Originally *Palaeocystodinium punctatum*, subsequently *Andalusiella polymorpha* subsp. *punctata*, thirdly (and now) *Andalusiella mauthei* subsp. *punctata*. Taxonomic senior synonym (at specific rank): *Svalbardella* (as *Alterbia*; now *Andalusiella*) *polymorpha*, according to Lentin and Williams (1976, p.89) — however, Schrank (1987, p.265) retained *Palaeocystodinium punctatum* (as *Andalusiella polymorpha* subsp. *punctata*). Age: Maastrichtian.

rafi Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.60, pl.1, fig.8; pl.2, figs.3,7. Holotype: Antolinez-Delgado and Oboh-Ikuenobe, 2007, pl.1, fig.8. Age: Paleocene–?earliest Eocene.

"**reductum**" May, 1980, p.84–85, pl.21, fig.20. Emendation: Kirsch, 1991, p.120, as *Biconidinium reductum*. Holotype: May, 1980, pl.21, fig.20. **NOW** *Biconidinium*. Originally *Palaeocystodinium*, subsequently (and now) *Biconidinium*. Taxonomic junior synonym: *Svalbardella parva* (name not validly published), according to Slimani (2001a, p.192). Age: late Campanian–early Maastrichtian.

?**rhomboides** (Wetzel, 1933a, p.168, pl.2, fig.17) Lentin and Williams, 1973, p.103. Holotype: Wetzel, 1933a, pl.2, fig.17. Originally *Ceratium fusus* forma *rhomboides* (Appendix B), subsequently (and now) *Palaeocystodinium? rhomboides*. Questionable assignment: Lentin and Williams (1973, p.103). Age: Senonian.

subsp. **filosum** (Wetzel, 1933a, p.169, pl.2, fig.20) Lentin and Williams, 1973, p.103. Holotype: Wetzel, 1933a, pl.2, fig.20. Originally *Ceratium fusus* forma *filosum* (Appendix B), subsequently (and now) *Palaeocystodinium? rhomboides* subsp. *filosum*. Age: Senonian.

subsp. **incertum** (Deflandre, 1936b, p.188, pl.10, figs.8–9 [not fig.5]) Lentin and Williams, 1973, p.103. Holotype: not designated. Lectotype: Deflandre, 1936b, pl.10, fig.8, designated by Lentin and Williams (1993, p.476). Originally *Ceratium fusus* forma *incertum* (Appendix B), subsequently (and now) *Palaeocystodinium? rhomboides* subsp. *incertum*. Age: Senonian.

"subsp. **nodosum**" (Wetzel, 1933a, p.169, pl.2, fig.19) Lentin and Williams, 1973, p.104. Holotype: Wetzel, 1933a, pl.2, fig.19; Dietz et al., 1999, fig.10, no.5. Originally *Ceratium fusus* forma *nodosum* (Appendix B), subsequently *Palaeocystodinium? rhomboides* subsp. *nodosum*. **Taxonomic senior synonym** (at specific rank): *Deflandrea delineata*, according to Sarjeant (1985b, p.157). Age: Senonian.

subsp. **ovatum** (Wetzel, 1933a, p.168–169, pl.2, fig.18) Lentin and Williams, 1973, p.104. Holotype: Wetzel, 1933a, pl.2, fig.18. Originally *Ceratium fusus* forma *ovatum* (Appendix B), subsequently (and now) *Palaeocystodinium? rhomboides* subsp. *ovatum*. Age: Senonian.

subsp. **rhomboides**. Autonym. Holotype: Wetzel, 1933a, pl.2, fig.17.

scabratum Jain et al., 1975, p.12–13, pl.6, fig.63. Holotype: Jain et al., 1975, pl.6, fig.63. Age: Danian.

stockmansii Boltenhagen, 1977, p.114–115, pl.23, figs.1a–b,2–4. Holotype: Boltenhagen, 1977, pl.23, figs.1a–b. Age: Campanian–Maastrichtian.

"*striatogranulosum*" Zevenboom and Santarelli in Zevenboom, 1995, p.160–161, pl.9, figs.12–13. Holotype: Zevenboom, 1995, pl.9, figs.12–13. **Name not validly published**: considered a manuscript name. Age: early to middle Miocene.

teespinosum Fensome et al., 2009, p.50, pl.8, figs.q–t. Holotype: Fensome et al., 2009, pl.8, fig.r. Age: youngest occurrence, middle Rupelian.

"*ventricosum*" Zevenboom and Santarelli in Zevenboom, 1995, p.161, pl.9, figs.14–15. Holotype: Zevenboom, 1995, pl.9, figs.14–15. **Name not validly published**: considered a manuscript name. Age: latest early Miocene–middle Miocene.

PALAEOGLENODINIUM Deflandre, 1935, p.227. This name not validly published in Deflandre (1934, caption to fig.3 — p.967) since no description was provided. Type: Deflandre, 1935, pl.7, figs.2–3, as *Palaeoglenodinium cretaceum*.

**cretaceum* Deflandre, 1935, p.227, pl.7, figs.2–3. Holotype: Deflandre, 1934, figs.2–3; Deflandre, 1935, pl.7, figs.2–3; Deflandre, 1936b, pl.3, figs.5–6. Sarjeant in Lentin and Williams (1989, p.272) recommended that this name be restricted to the holotype. This species was not validly published in Deflandre (1934, caption to fig.3 — p.967) since no description was provided. A full description of this species appeared in Deflandre (1936b, p.172). Age: ?Senonian.

PALAEOHYSTRICHODINIUM He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.56. Type: He Chengquan et al., 1989, pl.16, fig.4; text-fig.8, as *Palaeohystrichodinium elegans*.

cavispineum Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.76, pl.7, fig.29; text-fig.6. Holotype: Liu Zhili et al., 1992, pl.7, fig.29; text-fig.6. Age: Early Tertiary.

conicosum (Jiabo, 1978, p.57, pl.29, figs.4–5) He Chengquan et al., 2009, p.531. Holotype: Jiabo, 1978, pl.29, fig.4. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Palaeohystrichodinium*. Age: Early Tertiary.

**elegans* He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.57, pl.16, figs.4–8; text-fig.8. Holotype: He Chengquan et al., 1989, pl.16, fig.4; text-fig.8. Age: Early Tertiary.

?*insuetum* Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.77, pl.12, figs.8–9. Holotype: Liu Zhili et al., 1992, pl.12, fig.8. Questionable assignment: Liu Zhili et al. (1992, p.77). Age: Early Tertiary.

jinxianense Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.77, pl.11, figs.11–12. Holotype: Liu Zhili et al., 1992, pl.11, fig.11. Age: Early Tertiary.

quadratum He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.57, pl.16, figs.1–3. Holotype: He Chengquan et al., 1989, pl.16, fig.1. Age: Early Tertiary.

PALAEOHYSTRICHOPHORA Deflandre, 1935, p.230. Emendation: Deflandre and Cookson, 1955, p.257. This genus was not validly published in Deflandre (1934, caption to fig.8 — p.967) since no description was provided. Type: Deflandre, 1935, pl.8, fig.4, as *Palaeohystrichophora infusorioides*.

"*brevispinosa*" Pocock, 1962, p.81, pl.14, figs.222–223. Emendation: Brideaux, 1977, p.15–16, as *Tenua brevispinosa*. Holotype: Pocock, 1962, pl.14, fig.222; Jansonius, 1986, pl.4, fig.6; Fauconnier and Masure, 2004, pl.14, figs.7–8. **NOW** *Circulodinium*. Originally *Palaeohystrichophora*, subsequently *Tenua* Eisenack, thirdly *Canningia*?, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Age: Barremian.

cheit (Below, 1981a, p.126–127, pl.9, figs.23–24; text-fig.85) Mahmoud, 1998, p.93–94. Holotype: Below, 1981a, pl.9, fig.23; Fensome et al., 1991, fig.1 — p.611. Originally *Subtilisphaera*, subsequently (and now) *Palaeohystrichophora*. Age: Aptian–Vraconian.

"dispersa" Cookson and Eisenack, 1958, p.39, pl.10, figs.12,14. Emendation: Morgan, 1977, p.127, as *Diconodinium dispersum*. Holotype: Cookson and Eisenack, 1958, pl.10, fig.14; Morgan, 1977, pl.1, figs.2a–b. Originally *Palaeohystrichophora*, subsequently *Diconodinium*. **Taxonomic senior synonym:** *Palaeohystrichophora* (as and now *Diconodinium*) *multispina*, according to Stover and Helby (1987a, p.103). Age: Albian–Cenomanian.

granulata Mao Shaozhi and Norris, 1988, p.47, pl.12, figs.9–12. Holotype: Mao Shaozhi and Norris, 1988, pl.12, fig.11. Age: Late Cretaceous.

***infusorioides** Deflandre, 1935, p.230–231, pl.8, fig.4. Holotype: Deflandre, 1934, fig.8; Deflandre, 1935, pl.8, fig.4; Deflandre, 1936b, pl.9, fig.7. Taxonomic junior synonym: *Palaeohystrichophora paucisetosa*, according to Aurisano (1989, p.170). This species was not validly published in Deflandre (1934, caption to fig.8 — p.967) since no description was provided. A full description was given in Deflandre (1936b, p.186–187). Age: ?Senonian.

"isodiametrica" Cookson and Eisenack, 1958, p.38, pl.12, figs.11–12. Holotype: Cookson and Eisenack, 1958, pl.12, figs.11–12. **NOW** *Hystrichodinium*. Originally *Palaeohystrichophora*, subsequently (and now) *Hystrichodinium*. Age: Campanian–early Maastrichtian.

"minuta" Deflandre and Cookson, 1955, p.257, text-fig.4. Holotype: Deflandre and Cookson, 1955, text-fig.4. **NOW** *Diconodinium*. Originally *Palaeohystrichophora*, subsequently (and now) *Diconodinium*. Taxonomic junior synonym: *Deflandrea* (as *Alterbia*; now *Spinidinium*) *balmei*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea* (as *Isabelidinium*) *balmei*. This name was not validly published in Deflandre and Cookson (1954, p.1236) since no description was given. Age: Santonian.

"multispina" Deflandre and Cookson, 1955, p.257, pl.1, fig.5. Emendation: Morgan, 1977, p.127–128, as *Diconodinium multispinum*. Holotype: Deflandre and Cookson, 1955, pl.1, fig.5; Morgan, 1977, pl.1, figs.1a–b. **NOW** *Diconodinium*. Originally *Palaeohystrichophora*, subsequently (and now) *Diconodinium*. Taxonomic junior synonyms: *Palaeohystrichophora* (as *Diconodinium*) *dispersum*, according to Stover and Helby (1987a, p.103); *Diconodinium pusillum*, according to Morgan (1977, p.127) — however, Below (1981a, p.124) retained *Diconodinium pusillum*. Age: Santonian.

?muriciformis Conrad, 1941, p.7, pl.1, fig.k ex Sarjeant, 1967b, p.253. Holotype: Conrad, 1941, pl.1, fig.k. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Palaeohystrichophora*?. Questionable assignment: Sarjeant (1967b, p.253). The name *Palaeoperidinium muriciforme* was not validly published in Conrad (1941) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.453) accepted Sarjeant's (1967b) indirect reference to Conrad (1941) as indication of a type (I.C.N. Article 40.3). Lentin and Williams (1976, p.110) also proposed this name, as a new combination. Age: Maastrichtian.

"myalupensis" Churchill and Sarjeant, 1962, p.38–40, figs.5,22–23. Holotype: Churchill and Sarjeant, 1962, figs.5,22. **NOW** *Cobricosphaeridium* (Appendix A). Originally *Palaeohystrichophora*, subsequently *Aquadulcum* (Appendix A), thirdly (and now) *Cobricosphaeridium* (Appendix A). Age: Holocene.

oblongata Jiabo, 1978, p.89–90, pl.20, figs.7–8. Holotype: Jiabo, 1978, pl.20, fig.7. Age: Early Tertiary.

palaeoinfusa Fensome et al., 2009, p.51, pl.8, figs.q–t. Holotype: Fensome et al., 2009, pl.8, fig.r. Age: youngest occurrence (frequent), middle Cenomanian.

panshanensis Jiabo, 1978, p.89, pl.20, figs.1–6; text-fig.15. Holotype: Jiabo, 1978, pl.20, fig.1. Age: Early Tertiary.

"*paucisetosa*" Deflandre, 1943, p.507–508; text-fig.26. Holotype: Deflandre, 1943, text-fig.26. **Taxonomic senior synonym:** *Palaeohystrichophora infusorioides*, according to Aurisano (1989, p.170). Age: ?Senonian.

"*paucispina*" Alberti, 1961, p.19–20, pl.3, fig.25. Holotype: Alberti, 1961, pl.3, fig.25. **NOW** *Rhombodella* (Appendix A). Originally *Palaeohystrichophora*, subsequently *Palaeotetradinium*, thirdly (and now) *Rhombodella* (Appendix A). Taxonomic junior synonym: *Rhombodella natans*, according to Stover and Evitt (1978, p.71). Age: middle Albian.

"*pellifera*" Cookson and Eisenack, 1958, p.38, pl.10, fig.11. Emendation: Morgan, 1977, p.128, as *Diconodinium pelliferum*. Holotype: Cookson and Eisenack, 1958, pl.10, fig.11; Morgan, 1977, pl.1, figs.7a–b. **NOW** *Diconodinium*. Originally *Palaeohystrichophora*, subsequently (and now) *Diconodinium*. Age: Albian.

"*pikeae*" Churchill and Sarjeant, 1962, p.40–41, figs.6,24. Holotype: Churchill and Sarjeant, 1962, figs.6,24. **NOW** *Cobricosphaeridium* (Appendix A). Originally *Palaeohystrichophora*, subsequently *Aquadulcum* (Appendix A), thirdly (and now) *Cobricosphaeridium* (Appendix A). Age: Holocene.

"*spinosissima*" Deflandre, 1939a, p.179, pl.9, fig.11 ex Deflandre and Cookson, 1955, p.258. Holotype: Deflandre, 1939a, pl.9, fig.11. **NOW** *Pareodinia*?. Originally *Palaeoperidinium* (name not validly published), subsequently *Palaeohystrichophora*, thirdly *Acanthaulax*?, fourthly *Pareodinia*, fifthly (and now) *Pareodinia*?. The name *Palaeoperidinium spinosissimum* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. Age: Late Jurassic.

PALAEOPERIDINIUM Deflandre, 1934, p.968 ex Sarjeant, 1967b, p.246–247. Emendation: Evitt et al., 1998, p.46,48. Taxonomic junior synonyms: *Astrocysta*, *Morkallacysta* and *Pentagonum*, all according to Lentin and Williams (1976, p.150,160,161) — however, Stover and Evitt (1978, p.113–114) retained *Morkallacysta*. The name *Palaeoperidinium* was not validly published in Deflandre (1934) since that author did not designate a type, which he was obliged to do as he was using zoological nomenclature (I.C.Z.N. Article 13b). No type was designated until Sarjeant (1967b) did so; he also brought the generic name under the auspices of the I.C.B.N. (now the I.C.N.). This interpretation differs from that in Lentin and Williams (1993) and accords with that of Loeblich Jr. and Loeblich III (1966) and, in essence, also that of Sarjeant (1967b). In contrast to the contention of Tappan and Loeblich Jr. (1967, p.526), Deflandre (1934, p.968) did publish a description of *Palaeoperidinium* as a footnote. In validating the generic name, Sarjeant (1967b, p.246) provided an emended diagnosis. Type: Ehrenberg, 1837b, pl.1, fig.4, as *Peridinium pyrophorum*.

"*?alatum*" Conrad, 1941, p.5, pl.1, fig.C. Holotype: Conrad, 1941, pl.1, fig.C. **Name not validly published:** generic name not validly published until 1967. **NOW** *Microdinium*?. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Microdinium*?, thirdly *Palaeoperidinium*? (combination not validly published). Questionable assignment: Stover and Evitt (1978, p.218) as a problematic species. This combination was not validly published in Stover and Evitt (1978, p.218) since these authors did not fully reference the basionym. Age: Maastrichtian.

"*amplum*" (Harland, 1973, p.673–674, pl.84, figs.1,7; text-fig.8) Lentin and Williams, 1976, p.109. Holotype: Harland, 1973, pl.84, fig.1. Originally *Lejeunia* (generic name illegitimate), subsequently *Astrocysta* (combination not validly published), thirdly *Palaeoperidinium*. **Taxonomic senior synonym:** *Palaeoperidinium cretaceum*, according to Harker and Sarjeant in Harker et al. (1990, p.128). Age: late Campanian.

angularium Xu Jinli, 1987, p.153, pl.4, figs.1–5. Holotype: Xu Jinli, 1987, pl.4, fig.2. Questionable assignment: Evitt et al. (1998, p.48); however, He Chengquan et al. (2009, p.399) included this species in *Palaeoperidinium* without question. Taxonomic junior synonyms: *Palaeoperidinium? asperum* and *Palaeoperidinium? leptodermatum*, both according to He Chengquan et al. (2009, p.399–400). Age: ?middle-late Eocene.

?ariadnae Norris, 1986, p.45, pl.12, figs.10–12; pl.13, figs.1–4. Holotype: Norris, 1986, pl.13, fig.2. Questionable assignment: Evitt et al. (1998, p.48). Age: Eocene.

"articulatum" Wetzel in Eisenack, 1938b, p.187. **Name not validly published** and not intended to be formalized. Holotype: Eisenack, 1938b, fig.4; Eisenack, 1954b, pl.7, fig.3 (not pl.7, fig.1 as indicated in Eisenack, 1954b, p.90). **NOW** *Wetziella*. Originally (and now) *Wetziella*, subsequently *Palaeoperidinium* (name not validly published), thirdly *Hystrichosphaeridium*, fourthly *Wetziella* subgenus *Wetziella*. Taxonomic junior synonyms: *Wetziella echinulata*, according to Costa and Downie (1979, p.40); *Wetziella horrida*, according to Stover and Evitt (1978, p.131); *Rhombodinium* (as *Wetziella coronatum*, according to Costa and Downie (1979, p.43) — however, Iakovleva and Heilmann-Clausen (2010, p. 211,226) retained *Rhombodinium* (as *Wetziella coronatum*; *Rhombodinium pentagonum*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.244) retained *Rhombodinium pentagonum*; *Wetziella hampdenensis*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.290) retained *Wetziella hampdenensis*; *Wetziella* (now *Charlesdowniea*) *clathrata*, according to Pasteris (1948, p.42) — however, this synonymy has not been generally accepted. Age: late Eocene–early Oligocene.

"asperum" Xu Jinli, 1987, p.153, pl.4, figs.11–12. Holotype: Xu Jinli, 1987, pl.4, fig.11. Questionable assignment: Evitt et al. (1998, p.48). **Taxonomic senior synonym:** *Palaeoperidinium angularium*, according to He Chengquan et al. (2009, p.399). Age: ?middle-late Eocene.

"basilium" (Drugg, 1967, p.13, pl.1, figs.9–11; pl.9, figs.1a–b) Drugg, 1970b, p.810. Holotype: Drugg, 1967, pl.1, fig.11. Originally *Peridinium* (Appendix B), subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Peridinium* (as and now *Palaeoperidinium*) *pyrophorum*, according to Stover and Evitt (1978, p.218). Age: ?Maastrichtian–Danian.

"bicuneatum" Deflandre, 1939a, p.180, pl.8, fig.7. Holotype: Deflandre, 1939a, pl.8, fig.7. **Name not validly published:** generic name not validly published until 1967. **NOW** *Cornudinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Scrinioidinium*, thirdly *Glossodinium*, fourthly *Dinopterygium*, fifthly (and now) *Cornudinium*. Age: Oxfordian.

"carlylense" Pocock, 1972, p.146. **Name not validly published:** no description or illustration.

"castanea" Deflandre, 1935, p.229, pl.6, fig.8. Holotype: Deflandre, 1935, pl.6, fig.8; Deflandre, 1936b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.122, figs.9–10. **Name not validly published:** generic name not validly published until 1967. **NOW** *Trichodinium*. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Trichodinium*. Taxonomic senior synonyms: *Apteodinium* (as *Trichodinium ciliatum* and *Trichodinium intermedium*, both by implication in Clarke and Verdier (1967, p.19), who believed *Trichodinium castanea* to be the senior name — however, subsequent workers have retained the three species (e.g. see Morgan, 1980, p.33 and Harding, 1990b, p.38). A full description of this species is given in Deflandre (1936b, p.177). N.I.A. Age: ?Senonian (erratic).

"caulleryi" Deflandre, 1935, p.229, pl.6, fig.4. Holotype: Deflandre, 1934, fig.7; Deflandre, 1935, pl.6, fig.4; Deflandre, 1936b, pl.5, figs.5,7. **Name not validly published:** generic name not validly published until 1967. **NOW** *Diconodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Diconodinium*, thirdly (and now) *Diconodinium?*. This name was not validly published in Deflandre (1934, caption to fig.7 — p.967) additionally since no description was provided. A full description of this species was given by Deflandre (1936b, p.177). Age: Senonian.

"cayeuxii" Deflandre, 1936b, p.178–179, pl.6, figs.8–15; pl.7, fig.8. Emendation: Slimani, 1994, p.44, as *Phanerodinium cayeuxii*. Holotype: Deflandre, 1934, fig.5; Deflandre, 1935, pl.6, fig.3; Deflandre, 1936b, pl.6, figs.8–10. **Name not validly published:** generic name not validly published until 1967. **NOW** *Phanerodinium*. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Phanerodinium*. This name was not validly published in Deflandre (1934, fig.5 — p.967; 1935, p.229) additionally since no description was provided. Age: Senonian.

"chonetum" Xu Jinli, 1987, p.153–154, pl.4, figs.6–10. Holotype: Xu Jinli, 1987, pl.4, fig.6. Questionable assignment: Evitt et al. (1998, p.48). Age: ?middle-late Eocene.

?commune Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.57–58, pl.4, figs.21,22. Holotype: He Chengquan et al., 1989, pl.4, fig.22. Questionable assignment: Evitt et al. (1998, p.48). Age: Early Tertiary.

"cornutum" Vozzhennikova, 1963, text-fig.14. **Name not validly published:** no description and generic name not validly published until 1967.

"crassinervum" Deflandre, 1939b, p.144, pl.6, fig.5. Emendation: Nøhr-Hansen, 1986, p.33, as *Cribroperidinium crassinervum*. Holotype: Deflandre, 1939b, pl.6, fig.5; Jan du Chêne et al., 1986a, pl.70, figs.1–4. **Name not validly published:** generic name not validly published until 1967. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Leptodinium*, fourthly *Leptodinium?*, fifthly (and now) *Cribroperidinium*. Age: Kimmeridgian.

cretaceum (Pocock, 1962, p.80, pl.14, figs.219–221 ex Davey, 1970, p.359) Lentin and Williams, 1976, p.110. Emendations: Harding, 1990a, p.44 and Evitt et al., 1998, p.50, both as *Palaeoperidinium cretaceum*. Holotype: Pocock, 1962, pl.14, fig.219. Originally *Palaeoperidinium* (name not validly published), subsequently *Astrocysta*, thirdly *Lejeunia?* (combination illegitimate), fourthly *Subtilisphaera*, fifthly (and now) *Palaeoperidinium*. Taxonomic junior synonyms: *Lejeunia* (as *Palaeoperidinium*) *ampla*, according to Harker and Sarjeant in Harker et al. (1990, p.128); *Astrocysta* (as *Palaeoperidinium*) *manumcooksonii*, according to Lentin and Williams (1976, p.110). The name *Palaeoperidinium cretaceum* was not validly published in Pocock (1962) since the generic name *Palaeoperidinium* was not validly published until 1967. Davey (1970, p.359), while validating the name as *Astrocysta cretacea*, proposed an "emendation". Age: Aptian–Albian.

"damasii" (Lejeune-Carpentier, 1942, p.B185–B186, figs.9–14) Lentin and Williams, 1976, p.110. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.16, as *Deflandrea? damasii*. Holotype: Lejeune-Carpentier, 1942, fig.10; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.3; text-fig.9a. **NOW** *Deflandrea?*. Originally *Peridinium* (Appendix B), subsequently *Cooksoniella?*, thirdly *Palaeoperidinium*, fourthly *Deflandrea*, fifthly (and now) *Deflandrea?*. Age: Senonian.

"deflandrei" Lentin and Williams, 1973, p.105. Holotype: Deflandre, 1936b, pl.4, fig.4 as *Peridinium conicum*. **Taxonomic senior synonym:** *Peridinium* (as and now *Palaeoperidinium*) *pyrophorum*, according to Stover and Evitt (1978, p.218). Lentin and Williams (1973, p.105) erected this species to accommodate fossil specimens attributed to the modern taxon *Protoperidinium conicum* (Gran, 1900) Balech, 1974 by Deflandre (1939b, p.174), who provided a description. Age: Danian.

"subsp. *deflandrei*". Autonym. Holotype: Deflandre, 1936b, pl.4, fig.4, as *Peridinium conicum*. **Now redundant.**

"subsp. *larjakiense*" (Vozzhennikova, 1967, p.71–72, pl.16, figs.1a–b,2a–b) Lentin and Williams, 1973, p.105. Holotype: Vozzhennikova, 1967, pl.16, figs.1a–b; Lentin and Vozzhennikova, 1990, text-fig.32; lost according to Lentin and Vozzhennikova (1990, p.61). Originally *Peridinium conicum* var. *larjakiense* (Appendix B), subsequently *Palaeoperidinium deflandrei* subsp. *larjakiense*, thirdly *Cooksoniella larjakiensis*, fourthly *Palaeoperidinium larjakiense*. **Taxonomic senior synonym** (at specific rank): *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Age: Paleocene.

"dictyophorum" Deflandre, 1939a, p.178, pl.8, figs.1–3. Holotype: Deflandre, 1939a, pl.8, fig.1; Jan du Chêne et al., 1986a, pl.7, figs.1–5. **Name not validly published:** generic name not validly published until 1967. **NOW** *Scriniodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Aldorfia*, fourthly *Scriniodinium*, fifthly (and now) *Scriniodinium?*. Age: Oxfordian.

"?ellipsoideum" Deflandre, 1936b, p.178, pl.6, figs.5–7. Holotype: Deflandre, 1936b, pl.6, figs.6–7. **Name not validly published:** generic name not validly published until 1967. **NOW** *Microdinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Microdinium?*, thirdly *Microdinium*, fourthly *Palaeoperidinium?* (combination not validly published). Questionable assignment: Stover and Evitt (1978,

p.218) as a problematic species. This combination was not validly published in Stover and Evitt (1978, p.218) since these authors did not fully reference the basionym. Age: Senonian.

?*eurypylum* (Manum and Cookson, 1964, p.20–21, pl.4, figs.7–13) Evitt, 1975, p.81. Holotype: Manum and Cookson, 1964, pl.4, figs.9–10. Originally *Scriniodinium*, subsequently *Palaeoperidinium*, thirdly *Saeptodinium*, fourthly (and now) *Palaeoperidinium*?. Evitt et al. (1998, p.52) provisionally retained this species in *Palaeoperidinium*. Questionable assignment: Evitt et al. (1998, p.52). Age: Late Cretaceous.

?*granulatum* (Oleinik, 1975, p.225–226, pl.1, figs.3–5) Lentin and Williams, 1981, p.210. Holotype: Oleinik, 1975, pl.1, figs.3–5. Originally *Pentagonum granulatum* (generic name illegitimate), subsequently (and now) *Palaeoperidinium granulatum* Oleinik, thirdly *Palaeoperidinium oleinikii* (name illegitimate). Nomenclatural junior synonym: *Palaeoperidinium oleinikii*, which has the same type. Questionable assignment: Evitt et al. (1998, p.48). Lentin and Williams (1981, p.210; 1993, p.480) considered this name to be illegitimate, as a junior homonym of *Palaeoperidinium granulatum* Singh, 1964. However, Williams et al. (1998, p.456) considered the name *Palaeoperidinium granulatum* Singh to be not validly published, and hence that *Palaeoperidinium granulatum* Oleinik must be considered a validly published and legitimate name. Age: late Eocene.

"*granulatum*" Singh, 1964, p.135, pl.18, figs.2–3. Holotype: Singh, 1964, pl.18, figs.2–3. **Name not validly published:** generic name not validly published until 1967. **NOW** *Apteodinium? indicosum*. Originally *Palaeoperidinium granulatum* (name not validly published), subsequently *Gonyaulacysta indicosa*, thirdly (and now) *Apteodinium? indicosum*. Age: middle-late Albian.

?*granulosum* He Chengquan in Zheng Yahui and He Chengquan, 1984, p.97, pl.7, figs.1–10; pl.9, figs.1–4. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.7. Questionable assignment: Evitt et al. (1998, p.48). Age: Late Cretaceous.

"*hansonianum*" (Traverse, 1955, p.77–79, pl.13, fig.147) Lentin and Williams, 1973, p.105. Holotype: Traverse, 1955, pl.13, fig.147; Traverse, 1994, pl.1, fig.1. **NOW** *Saeptodinium*. Originally *Peridinium* (Appendix B), subsequently *Palaeoperidinium*, thirdly (and now) *Saeptodinium*. Evitt (1974, p.4) indicated that this species has affinities with the modern species *Peridinium limbatum* (Stokes, 1887) Lemmermann, 1899. Age: latest Oligocene (middle early Miocene, according to Traverse, 1994).

?*huanghuaense* (Jiabo, 1978, p.56, pl.1, figs.1–3) Lentin and Williams, 1981, p.210. Holotype: Jiabo, 1978, pl.1, fig.1. Originally *Pentagonum* (generic name illegitimate), subsequently (and now) *Palaeoperidinium*. Questionable assignment: Evitt et al. (1998, p.48). Age: Early Tertiary.

?*humile* Xu Jinli, 1987, p.154, pl.2, figs.6,7a–b. Holotype: Xu Jinli, 1987, pl.2, figs.7a–b. Questionable assignment: Evitt et al. (1998, p.48). Age: ?middle-late Eocene.

"*hyalodermum*" Deflandre, 1939b, p.144, pl.6, figs.3–4. Holotype: Deflandre, 1939b, pl.6, figs.3–4; Jan du Chêne et al., 1986a, pl.58, figs.1–5. **Name not validly published:** generic name not validly published until 1967. **NOW** *Impagidinium*?. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta*?, fourthly *Rhynchodiniopsis*?, fifthly (and now) *Impagidinium*?. Age: Kimmeridgian.

?*jiangsuense* He Chengquan in Zheng Yahui and He Chengquan, 1984, p.97–98, pl.7, fig.16–20. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.16. Questionable assignment: Evitt et al. (1998, p.48). Age: Late Cretaceous.

"*larjakiense*" (Vozzhennikova, 1967, p.71–72, pl.16, figs.1a–b,2a–b) Lentin and Williams, 1981, p.210. Holotype: Vozzhennikova, 1967, pl.16, figs.1a–b; Lentin and Vozzhennikova, 1990, text-fig.32; lost according to Lentin and Vozzhennikova (1990, p.61). Originally *Peridinium conicum* var. *larjakiense* (Appendix B), subsequently *Palaeoperidinium deflandrei* subsp. *larjakiense*, thirdly *Cooksoniella larjakiensis*, fourthly *Palaeoperidinium larjakiense*. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Age: Paleocene.

"*leptodermatum*" Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.58, pl.4, fig.23. Holotype: He Chengquan et al., 1989, pl.4, fig.23. Questionable assignment: Evitt et al. (1998, p.48). **Taxonomic senior synonym:** *Palaeoperidinium angularium*, according to He Chengquan et al. (2009, p.399–400). Age: Early Tertiary.

"*manumcooksonii*" (Corradini, 1973, p.176–177, pl.28, figs.4,6) Lentin and Williams, 1976, p.110. Holotype: Corradini, 1973, pl.28, fig.4. Originally *Astrocysta*, subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Palaeoperidinium cretaceum*, according to Lentin and Williams (1976, p.110). Age: Late Cretaceous–Paleocene.

"*marginatum*" (Vozzhennikova, 1967, p.107, pl.46, figs.1,3–4,6) Lentin and Williams, 1976, p.110. Holotype: Vozzhennikova, 1967, pl.46, fig.6; Lentin and Vozzhennikova, 1990, pl.7, fig.6; text-fig.33; lost according to Lentin and Vozzhennikova (1990, p.62). Originally *Pentagonum* (generic name illegitimate), subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Age: Paleocene.

"*mecsekense*" Nagy, 1969, p.292, pl.1, figs.6,8. Holotype: Nagy, 1969, pl.1, figs.6,8; Jan du Chêne et al., 1986a, pl.11, figs.10–12. **NOW** *Apteodinium*. Originally *Palaeoperidinium*, subsequently *Gonyaulacysta*?, thirdly *Millioudodinium*?, fourthly (and now) *Apteodinium*. Age: late Miocene.

"*monacanthum*" Deflandre, 1936b, p.176–177, pl.5, fig.10. Holotype: Deflandre, 1935, pl.6, fig.1; Deflandre, 1936b, pl.5, fig.10; lost according to Jan du Chêne et al. (1986a, p.48). **Name not validly published:** generic name not validly published until 1967. **NOW** *Apteodinium*?. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Apteodinium*, fifthly (and now) *Apteodinium*?. This name was not validly published in Deflandre (1935, p.227–228), since the genus *Palaeoperidinium* was not validly published until 1967 and, additionally, since that author did not provide a description. Age: Senonian.

"*mosaicum*" Downie, 1957, p.424, pl.20, fig.7; text-fig.2f. Emendation: Sarjeant, 1976c, p.6–7, as *Leptodinium mosaicum*. Holotype: Downie, 1957, pl.20, fig.7; text-fig.2f; Sarjeant, 1976c, pl.2, figs.3,5; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.70, figs.5–6. **Name not validly published:** generic name not validly published until 1967. **NOW** *Leptodinium*?. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Leptodinium*, fourthly (and now) *Leptodinium*?. N.I.A. Age: late Kimmeridgian.

"*muriciforme*" Conrad, 1941, p.7, pl.1, fig.K. Holotype: Conrad, 1941, pl.1, fig.K. **Name not validly published:** generic name not validly published until 1967. **NOW** *Palaeohystrichophora*?. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Palaeohystrichophora*?. Age: Maastrichtian.

"*nuciforme*" Deflandre, 1939a, p.180, pl.8, figs.4–6. Holotype: Deflandre, 1939a, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.11, figs.1–3. **Name not validly published:** generic name not validly published until 1967. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulax* (Appendix B), thirdly *Gonyaulacysta*, fourthly *Apteodinium*, fifthly *Millioudodinium*, sixthly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Palaeoperidinium nuciformoides*, according to Sarjeant (1968, p.227). Age: Oxfordian.

"*nuciformoides*" Górka, 1965, p.324–325, pl.2, figs.1–2. Holotype: Górka, 1965, pl.2, fig.2. **Name not validly published:** generic name not validly published until 1967. **Taxonomic senior synonym:** *Palaeoperidinium* (as *Gonyaulacysta*; now *Cribroperidinium*) *nuciforme*, according to Sarjeant (1968, p.227). Age: Astartian (late Oxfordian).

"*nudum*" Downie, 1957, p.424, pl.20, fig.11; text-fig.2e. Holotype: Downie, 1957, pl.20, fig.11. **Name not validly published:** generic name not validly published until 1967. Originally *Palaeoperidinium* (name not validly published), subsequently *Pareodinia*, thirdly *Pareodinia*?. **Taxonomic senior synonym:** *Pareodinia ceratophora*, according to Wiggins (1975, p.103) and Kunz (1990, p.13). If validated, this name would be a junior homonym of *Palaeoperidinium nudum* Nagy, 1969. Age: late Kimmeridgian.

"*nudum*" Nagy, 1969, p.291, pl.1, fig.1. Holotype: Nagy, 1969, pl.1, fig.1. **NOW** *Pyxidinospis*? *nuda*. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta*? *nuda*, fifthly *Tectatodinium*? *nudum*,

sixthly *Tectatodinium? pannonium* (name illegitimate), seventhly *Pyxidiniopsis? pannonia* (name illegitimate), eighthly (and now) *Pyxidiniopsis? nuda*. Nomenclatural junior synonym: *Palaeoperidinium* (subsequently *Phthanoperidinium*, *Tectatodinium?* and *Pyxidiniopsis?*) *pannonium*, which has the same type. See also the discussion under *Pyxidiniopsis? nuda* and *Palaeoperidinium nudum* Downie 1957. Age: late Miocene.

"*oleinikii*" Lentin and Williams, 1981, p.211. Holotype: Oleinik, 1975, pl.1, fig.3. **Name illegitimate** — **nomenclatural senior synonym:** *Palaeoperidinium granulatum* Oleinik, which has the same type. **NOW** *Palaeoperidinium granulatum* Oleinik. Originally *Pentagonum granulatum* (generic name illegitimate), subsequently (and now) *Palaeoperidinium granulatum* Oleinik, thirdly *Palaeoperidinium oleinikii* (name illegitimate). Substitute name for *Palaeoperidinium granulatum* (Oleinik, 1975, p.225–226, pl.1, figs.3–5), Lentin and Williams, 1981, p.211. See discussion under *Palaeoperidinium granulatum* Oleinik. Age: late Eocene.

?*oviforme* Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.58, pl.4, fig.20. Holotype: He Chengquan et al., 1989, pl.4, fig.20. Mao Shaozhi et al. (1995, p.99) indicated that this name should be restricted to the holotype. Questionable assignment: Evitt et al. (1998, p.48). Age: Early Tertiary.

"*paleocenicum*" (Cookson and Eisenack, 1965c, p.142–143, pl.19, figs.1–4; text-figs.2a–b) Lentin and Williams, 1976, p.110. Holotype: Cookson and Eisenack, 1965c, pl.19, figs.2–3. **NOW** *Ginginodinium*. Originally *Peridinium* (Appendix B), subsequently *Cooksoniella?*, thirdly *Palaeoperidinium*, fourthly (and now) *Ginginodinium*. Age: middle Paleocene.

"*pannonium*" Lentin and Williams, 1973, p.106. Holotype: Nagy, 1969, pl.1, fig.1. **Name illegitimate** — **nomenclatural senior synonym:** *Palaeoperidinium* (now *Pyxidiniopsis?*) *nudum* Nagy, which has the same type. **NOW** *Pyxidiniopsis? nuda*. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta? nuda*, fifthly *Tectatodinium? nudum*, sixthly *Tectatodinium? pannonium* (name illegitimate), seventhly *Pyxidiniopsis? pannonia* (name illegitimate), eighthly (and now) *Pyxidiniopsis? nuda*. See also the discussion under *Pyxidiniopsis? nuda*. Age: late Miocene.

"*paradoxum*" Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.58–59, pl.4, figs.15–17. Holotype: He Chengquan et al., 1989, pl.4, fig.17. **NOW** *Morkallacysta*. Originally *Palaeoperidinium*, subsequently (and now) *Morkallacysta*. Age: Early Tertiary.

?*parvum* (Harland, 1973, p.672–673, pl.84, figs.3,12–14; text-fig.7) Lentin and Williams, 1976, p.111. Holotype: Harland, 1973, pl.84, fig.14. Originally *Lejeunia* (generic name illegitimate), subsequently (and now) *Palaeoperidinium*. Questionable assignment: Evitt et al. (1998, p.48). Age: late Campanian.

"*pilum*" Gocht, 1959, p.56, pl.6, fig.14; pl.8, fig.8. Holotype: Gocht, 1959, pl.6, fig.14; Jan du Chêne et al., 1986a, pl.73, figs.7–8. **Name not validly published:** generic name not validly published until 1967. **NOW** *Leptodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta?*, thirdly (and now) *Leptodinium?*. N.I.A. Age: Valanginian.

"?piriforme" Conrad, 1941, p.9, pl.1, fig.G. Holotype: Conrad, 1941, pl.1, fig.G. **Name not validly published:** generic name not validly published until 1967. **NOW** *Gonyaulacysta*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta?* (combination not validly published), thirdly (and now) *Gonyaulacysta*, fourthly *Palaeoperidinium?* (combination not validly published). Questionable assignment: Stover and Evitt (1978, p.218) as a problematic species. This combination was not validly published in Stover and Evitt (1978, p.218) since these authors did not fully reference the basionym. Age: Maastrichtian.

?*primaevum* He Chengquan in Zheng Yahui and He Chengquan, 1984, p.98, pl.8, fig.21; pl.9, figs.5–6. Holotype: Zheng Yahui and He Chengquan, 1984, pl.8, fig.21. Questionable assignment: Evitt et al. (1998, p.48). Age: Late Cretaceous.

"*pyramidale*" (Harris, 1974, p.163, pl.1, figs.5–11) Lentin and Williams, 1976, p.111. Holotype: Harris, 1974, pl.1, fig.5. **NOW** *Morkallacysta*. Originally (and now) *Morkallacysta*, subsequently *Palaeoperidinium*. Age: Paleocene.

***pyrophorum** (Ehrenberg, 1837b, pl.1, figs.1,4 ex Wetzel, 1933a, p.164–165) Sarjeant, 1967b, p.246. Emendations: Sarjeant, 1967b, p.246–247; Gocht and Netzel, 1976, p.403–405; Evitt et al., 1998, p.48–49; all as *Palaeoperidinium pyrophorum*. Holotype: Ehrenberg, 1837b, pl.1, fig.4; Lejeune-Carpentier, 1938b, figs.1–4. Originally *Peridinium* (Appendix B), subsequently (and now) *Palaeoperidinium*. Taxonomic junior synonyms: *Peridinium* (as *Palaeoperidinium*) *basilium* and *Palaeoperidinium deflandrei*, both according to Stover and Evitt (1978, p.218); *Pentagonum marginatum*, *Pentagonum sibiricum*, and (at specific rank) *Peridinium conicum* subsp. *larjakiense* (subsequently *Palaeoperidinium larjakiense*), all according to Lentin and Vozzhennikova (1990, p.61). This combination was not validly published in Deflandre (1934, caption to text-fig.1) and Deflandre (1935, p.224) since the generic name was not validly published until 1967. The name *Peridinium pyrophorum* was not validly published in Ehrenberg (1837b) and Ehrenberg (1854, caption to pl.37) since no description was provided. Of Ehrenberg's (1837b) illustrations, only pl.1, fig.4 is of a single specimen, which thus has subsequently been accepted as the holotype. The specimen illustrated by Sarjeant (1967b, fig.3) as the holotype appears to be a different specimen. Age: Late Cretaceous.

"reticulatum" Valensi, 1953, p.28, pl.2, figs.4–5,14,19; pl.13, fig.6; text-fig.2d. Holotype: Valensi, 1953, pl.2, figs.4–5; Fauconnier and Masure, 2004, pl.28, figs.1–4. **Name not validly published:** generic name not validly published until 1967. **NOW** *Epiplosphaera*. Originally *Palaeoperidinium* (name not validly published), subsequently *Dictyopyxis* (generic name illegitimate), thirdly *Dictyopyxidia*, fourthly *Ellipsoidictyum*, fifthly (and now) *Epiplosphaera*. Taxonomic senior synonym: *Epiplosphaera bireticulata*, by implication in Courtinat (1989, p.176), who believed *Palaeoperidinium* (as *Epiplosphaera*) *reticulatum* to be the senior name — however, Poulsen (1992a, p.66) retained the two species. Age: Bajocian.

"rhomboidale" Górka, 1965, p.301–302, pl.1, figs.6a–b. Holotype: Górka, 1965, pl.1, figs.6a–b; Jan du Chêne et al., 1986a, pl.121, figs.14–15. **Name not validly published:** generic name not validly published until 1967. **NOW** *Trichodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Trichodinium?*. Age: early Kimmeridgian.

?rugosum He Chengquan in Zheng Yahui and He Chengquan, 1984, p.98, pl.7, figs.13–15. Holotype: Zheng Yahui and He Chengquan, 1984, pl.7, fig.15. Questionable assignment: Evitt et al. (1998, p.48). Age: Late Cretaceous.

"sibiricum" (Vozzhennikova, 1967, p.106–107, pl.46, figs.2,5) Lentin and Williams, 1976, p.111. Holotype: Vozzhennikova, 1967, pl.46, fig.2, lost according to Lentin and Vozzhennikova (1990, p.63). Lectotype: Lentin and Vozzhennikova, 1990, pl.7, fig.3; text-fig.34, designated by Lentin and Vozzhennikova (1990, p.63). Originally *Pentagonum*, subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Age: Paleocene.

?sinense He Chengquan, 1991, p.63–64, pl.1, figs.34–37. Holotype: He Chengquan, 1991, pl.1, fig.37. Questionable assignment: Evitt et al. (1998, p.48). Age: Paleocene–middle Eocene.

"spinosisimum" Deflandre, 1939a, p.179, pl.9, fig.11. Holotype: Deflandre, 1939a, pl.9, fig.11. **Name not validly published:** generic name not validly published until 1967. **NOW** *Pareodinia?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Palaeohystrichophora*, thirdly *Acanthaulax?*, fourthly *Pareodinia*, fifthly (and now) *Pareodinia?*. Age: Late Jurassic.

"spinosum" Cookson and Hughes, 1964, p.49, pl.8, figs.6–8. Holotype: Cookson and Hughes, 1964, pl.8, fig.8. **Name not validly published:** generic name not validly published until 1967. **NOW** *Epelidosphaeridia*. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Epelidosphaeridia*. Age: early Cenomanian.

?striatum He Chengquan, 1991, p.64, pl.1, figs.31–33; text-fig.7. Holotype: He Chengquan, 1991, pl.1, fig.33; text-fig.7. Questionable assignment: Evitt et al. (1998, p.48). Age: Paleocene.

?subconicoides (Lejeune-Carpentier, 1942, p.B183–B185; text-figs.1–8) Lentin and Williams, 1973, p.106. Holotype: Lejeune-Carpentier, 1942, text-figs.1–2; Strel et al., 1977, pl.2, fig.3. Originally *Peridinium* (Appendix B), subsequently (and now) *Palaeoperidinium?*. Questionable assignment: Lentin and Williams (1973, p.106). Age: Late Cretaceous.

"*tabulatum*" (Cookson and Eisenack, 1965c, p.143–144, pl.19, figs.5–8; text-fig.3) Lentin and Williams, 1976, p.111. Holotype: Cookson and Eisenack, 1965c, pl.19, figs.6–7. **NOW** *Ginginodinium*. Originally (and now) *Ginginodinium*, subsequently *Palaeoperidinium*. Age: middle Paleocene.

?*tenuis* Schumacker-Lambry, 1978, p.46–47, pl.4, figs.11–13. Holotype: Schumacker-Lambry, 1978, pl.4, fig.11. Questionable assignment: Evitt et al. (1998, p.48). Age: late Paleocene (Landenian).

"?*velatum*" Conrad, 1941, p.8–9, pl.1, fig.A. Holotype: Conrad, 1941, pl.1, fig.A. **Name not validly published:** generic name not validly published until 1967. **NOW** *Trithyrodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Scriniodinium?*, thirdly *Palaeoperidinium?* (combination not validly published), fourthly (and now) *Trithyrodinium?*. Questionable assignment: Stover and Evitt (1978, p.218) as a problematic species. This combination was not validly published in Stover and Evitt (1978, p.218) since these authors did not fully reference the basionym. Age: Maastrichtian.

"*ventriosum*" (Wetzel, 1933a, p.161–162, pl.2, figs.4–6; text-figs.1,8) Deflandre, 1935. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.5, as *Cribroperidinium ventriosum*. Holotype: Wetzel, 1933a, pl.2, fig.4; Lejeune-Carpentier, 1946, fig.2; Lejeune-Carpentier and Sarjeant, 1981, pl.1, figs.3–4; text-fig.3. **Combination not validly published:** generic name not validly published until 1967. **NOW** *Cribroperidinium*. Originally *Peridinium* (Appendix B), subsequently *Palaeoperidinium* (combination not validly published), thirdly (and now) *Cribroperidinium*. Age: Senonian.

PALAEOSPHAERIUM Górká, 1965, p.308. Type: Górká, 1965, pl.2, figs.7a–b, as *Palaeosphaerium infrequens*.

**infrequens* Górká, 1965, p.308, pl.2, figs.7a–b. Holotype: Górká, 1965, pl.2, figs.7a–b. Sarjeant (1978a, p.38) indicated that this species name should be restricted to the holotype. Age: early Kimmeridgian.

PALAEOTETRADINIUM Deflandre, 1936b, p.189. Emendations: Deflandre and Sarjeant, 1970, p.3; Stover and Evitt, 1978, p.70. Taxonomic junior synonyms: *Inversidinium* and *Rhombodella*, both according to Stover and Evitt (1978, p.70–71) — however, Duxbury (1980, p.134–135) retained *Rhombodella*. This name was not validly published in Deflandre (1934, caption to fig.6 — p.967) since no description was provided. Type: Deflandre, 1936b, pl.9, fig.11, as *Palaeotetradinium silicorum*.

caudatum (Benson, 1976, p.218,220, pl.13, figs.4–6) Stover and Evitt, 1978, p.71. Holotype: Benson, 1976, pl.13, figs.4–6. Originally *Inversidinium*, subsequently (and now) *Palaeotetradinium*. Age: late Maastrichtian–early Paleocene.

"*hermesinoides*" Wetzel, 1940, p.138–140, pl.5, fig.7. Holotype: Wetzel, 1940, pl.5, fig.7. **NOW** *Villosacapsula?* (Appendix A). Originally *Palaeotetradinium*, subsequently *Veryhachium* (Appendix A), thirdly (and now) *Villosacapsula?* (Appendix A). Age: Late Cretaceous.

"*hyalodermum*" Cookson, 1956, p.188–189, pl.1, figs.12–16. Holotype: Cookson, 1956, pl.1, figs.12–13. **NOW** *Dorsennidium* (Appendix A). Originally *Palaeotetradinium*, subsequently *Veryhachium* (Appendix A), thirdly *Goniosphaeridium* (Appendix A), fourthly (and now) *Dorsennidium* (Appendix A). Age: Albian–Cenomanian.

maastrichtiense Herngreen et al., 1986, p.57,59, pl.12, figs.1–3. Holotype: Herngreen et al., 1986, pl.12, figs.1–2. Age: Maastrichtian.

minusculum (Alberti, 1961, p.10–11, pl.1, fig.10; pl.12, fig.4) Stover and Evitt, 1978, p.71. Holotype: Alberti, 1961, pl.1, fig.10. Originally *Wetzeliiella* subgenus *Rhombodinium*, subsequently *Rhombodinium?*, thirdly *Inversidinium*, fourthly (and now) *Palaeotetradinium*. Taxonomic junior synonym: *Inversidinium exilimurum*, according to Stover and Evitt (1978, p.71). Age: early Eocene.

"*natans*" (Cookson and Eisenack, 1962b, p.496, pl.7, figs.12–13) Lentin and Williams, 1985, p.272. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.13. **Combination not validly published**: basionym not fully referenced. Originally *Rhombodella* (Appendix A), subsequently *Palaeotetradinium* (combination not validly published). **Taxonomic senior synonym**: *Palaeohystrichophora* (now *Rhombodella*) *paucispina*, according to Stover and Evitt (1978, p.71). Lentin and Williams (1985, p.272) inadvertently proposed this combination. Age: Aptian–Albian.

"*paucispinum*" (Alberti, 1961, p.19–20, pl.3, fig.25) Stover and Evitt, 1978, p.71. Holotype: Alberti, 1961, pl.3, fig.25. **NOW** *Rhombodella* (Appendix B). Originally *Palaeohystrichophora*, subsequently *Palaeotetradinium*, thirdly (and now) *Rhombodella* (Appendix B). Taxonomic junior synonym: *Rhombodella natans*, according to Stover and Evitt (1978, p.71). Age: middle Albian.

**silicorum* Deflandre, 1936b, p.189, pl.9, fig.11. Emendation: Deflandre and Sarjeant, 1970, p.4. Holotype: Deflandre, 1936b, pl.9, fig.11; Deflandre and Sarjeant, 1970, pl.1, figs.7–8. This name was not validly published in Deflandre (1934, caption to fig.6 — p.967; 1935, p.231) since no description was provided. N.I.A. Age: ?Senonian.

"*simplex*" Yu Jingxian, 1982, p.253, pl.8, figs.18–19. Holotype: Yu Jingxian, 1982, pl.8, fig.18. **NOW** *Cupritia* (Appendix A). Originally *Palaeotetradinium*, subsequently (and now) *Cupritia* (Appendix A). Age: late Kimmeridgian–Berriasian.

"**PALINOSPHERA**" Reinsch in Locker 1967, p.852. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1301, who noted that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). **Name not validly published**: see below. **Taxonomic senior synonym**: *Pithonella*, by implication in Zügel (1994, p.17), who transferred the type to that genus. Locker (1967, p.852) appears to have been first to use this generic name, although he attributed it to Reinsch (1905). Reinsch had used the informal term "Palinosphären", but did not base a generic name on the term. Locker provided a brief description and included only a single species, *Palinosphaera sphaerica*, albeit questionably. Thus, pending further information, *Lagena* (as *Palinosphaera*) *sphaerica* must be considered the type of the generic name *Palinosphaera*. Following Zügel's (1994) transfer of *Lagena sphaerica* to *Pithonella*, *Palinosphaera* must be considered a taxonomic junior synonym of *Pithonella*. On the basis that Locker (1967) was working under the I.C.Z.N., Elbrächter et al. (2008, p.1301) indicated that the generic name *Palinosphaera* is not validly published (using I.C.N. terminology) as it contravenes I.C.Z.N. Articles 13.3 and 15.1. Type: *Palinosphaera sphaerica*.

"*brezovica*" Borza, 1972, p.148,150, figs.36–42. Holotype: Borza, 1972, figs.37. **NOW** *Pithonella*. Originally *Palinosphaera*, subsequently (and now) *Pithonella*. Age: Campanian.

sphaerica*" (Kaufmann in Heer, 1865, p.196, figs.104,106a–b) Locker, 1967, p.856 — caption to pl.1, fig.3. Holotype: not designated. **NOW *Pithonella*. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly *Palinosphaera* (generic name not validly published), fourthly (and now) *Pithonella*. Questionable assignment: Locker, (1967, p.852). Taxonomic senior synonym: *Lagena* (now *Pithonella*) *ovalis*, according to Lorenz (1902, p.46) — however, Bonet (1956, p.450) retained *Lagena* (as *Stomiosphaera*) *sphaerica*. Taxonomic junior synonym: *Lagena orbularia* (Appendix A), according to Bonet (1956, p.450) — however, Masters and Scott (1978, p.215) retained the latter species as type of *Inocardion*. Locker (1967 p.856 — caption to pl.1, fig.3) gave the citation "*Palinosphaera* (?) *sphaerica*". However, as potential type of the genus, the assignment would not be questionable. Age: late Cenomanian–Turonian (based on later studies by Bolli — P. Hochuli, personal communication).

"**PALINOSPHERA**" Voigt and Häntzschel 1964, p.538. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1301, who noted that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). **Name not validly published**: on the basis that Voigt and Häntzschel (1964) were working under the I.C.Z.N., Elbrächter et al. (2008, p.1301) indicated that the generic name *Palinosphaeria* is not validly published (using I.C.N. terminology) as it contravenes I.C.Z.N. Articles 13.3 and 15.1. Type: *Palinosphaera sphaerica* — no holotype designated.

"**PALMNICKIA**" Eisenack, 1954b, p.69. **Taxonomic senior synonym:** *Samlandia*, according to Morgenroth (1966a, p.39–40). Type: Eisenack, 1954b, pl.11, fig.10, as *Palmnickia lobifera*.

"**californica**" Drugg, 1967, p.30, pl.5, figs.14–15; pl.9, fig.8. Holotype: Drugg, 1967, pl.5, fig.15. **NOW** *Danea*. Originally *Palmnickia*, subsequently *Samlandia*, thirdly (and now) *Danea*, fourthly *Damassadinium* (generic name illegitimate). Taxonomic junior synonym: *Danea mutabilis*, according to Damassa (1979b, p.193). Age: Danian.

"***lobifera**" Eisenack, 1954b, p.70, pl.11, figs.10–11. Holotype: Eisenack, 1954b, pl.11, fig.10. **Taxonomic senior synonym:** *Samlandia chlamydophora*, according to Morgenroth (1966a, p.39–40). Age: early Oligocene.

PALYNODINIUM Gocht, 1970a, p.135,137–138,140. Loeblich Jr. and Loeblich III (1971, p.312) argued that the generic name *Palynodinium* was not validly published in Gocht (1970a) since no description or diagnosis was provided. However, since Gocht (1970a) proposed the genus and a single species, and provided a description for the species, under I.C.N. Article 38.5 both the generic and specific names must be considered validly published. A generic description was given by Gocht (1973, p.456). Type: Gocht, 1970a, fig.4, nos.1a–c, as *Palynodinium grallator*.

biculleum Kirsch, 1991, p.94–95, pl.17, figs.1–6; pl.41, figs.1–12; text-figs.44a–d,45. Holotype: Kirsch, 1991, pl.17, figs.1,3. Age: late Maastrichtian.

***grallator** Gocht, 1970a, p.135,137–138,140, figs.2a–e; fig.4, nos.1a–c,2a–b,3a–b,4a–b,5a–b,6a–b,7–8; fig.5, nos.1,2a–b. Holotype: Gocht, 1970a, fig.4, nos.1a–c. Age: Late Cretaceous.

helveticum Kirsch, 1991, p.95–96, pl.18, figs.1–8. Holotype: Kirsch, 1991, pl.18, figs.6–8. Age: early-middle Campanian.

"**koshakense**" Sharafutdinova, 1992, p.97–98, pl.2, figs.1–4; pl.3, figs.1–9. Holotype: Sharafutdinova, 1992, pl.3, figs.7–9. **Name not validly published:** lodgement of type not specified. Age: Maastrichtian–Danian.

minus Willumsen, 2006, p.957–959, figs.3A–K. Holotype: Willumsen, 2006, figs.3A–B,D–E. Age: latest Maastrichtian–earliest Danian.

spongiosum Hultberg, 1985c, p.139–140, pl.8, figs.H–J. Holotype: Hultberg, 1985c, pl.8, figs.H–J. Age: late Maastrichtian.

PANDADINIUM Courtinat, 1989, p.189. Emendation: Dodekova, 1994, p.24. Type: Dodekova, 1969, pl.3, figs.2–3,5, as *Lanterna spinosa*.

"**pattei**" (Valensi, 1949, p.539–540, fig.1) Courtinat, 1989, p.189. Holotype: Valensi, 1949, fig.1; Fauconnier and Masure, 2004, pl.62, figs.8–9. **NOW** *Hystriosphæridium*. Originally (and now) *Hystriosphæridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Lanterna*, fourthly *Lanterna?*, fifthly *Pandadinium*. Age: Bathonian.

"**saturnale**" (Brideaux and Fisher, 1976, p.24–25, pl.6, figs.1–10; pl.7, figs.1–13) Courtinat, 1989, p.190. Holotype: Brideaux and Fisher, 1976, pl.6, figs.1–7. **NOW** *Epiplosphaera*. Originally *Lanterna*, subsequently *Lanterna?*, thirdly *Pandadinium*, fourthly (and now) *Epiplosphaera*. Age: late Oxfordian–late Kimmeridgian.

***spinusum** (Dodekova, 1969, p.17–18, pl.3, figs.2–3,5–6,9,12; text-figs.C, Da) Courtinat, 1989, p.190. Holotype: Dodekova, 1969, pl.3, figs.2–3,5. Originally *Lanterna*, subsequently *Lanterna?*, thirdly (and now) *Pandadinium*. Age: Tithonian.

PANNOSIELLA Batten and Lister, 1988, p.347. Type: Batten and Lister, 1988, fig.2f, as *Pannosiella perforata*.

**perforata* Batten and Lister, 1988, p.347–348, figs.2f,3g. Holotype: Batten and Lister, 1988, fig.2f. Age: Barremian.

PAPUADINIUM Davey, 1988, p.42. Type: Cookson and Eisenack, 1960b, pl.39, fig.15, as *Cannosphaeropsis apiculata*.

**apiculatum* (Cookson and Eisenack, 1960b, p.254, pl.39, fig.15) Davey, 1988, p.42. Emendation: Davey, 1988, p.42–43, as *Papuadinium apiculatum*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.15; Fensome et al., 1993a, fig.1 — p.927. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly *Rigaudella*, fourthly (and now) *Papuadinium*. Age: ?Tithonian.

PARABOHAIIDINA Jiabo, 1978, p.43. Emendations: He Chengquan, 1984b, p.155; Xu Jinli and Mao Shaozhi, 1989, p.300–301; Sun Xuekun, 1994, p.80,82; He Chengquan et al., 2009, p.464,645. Taxonomic junior synonym: *Conicoidium*, according to Sun Xuekun (1994, p.80). Type: Jiabo, 1978, pl.16, fig.9, as *Parabohaidina laevigata*.

arcteverrucosa (Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.55, pl.3, figs.7–10) He Chengquan et al., 2009, p.467. Holotype: Liu Zhili et al., 1992, pl.3, fig.7. Originally *Bohaidina*, subsequently (and now) *Parabohaidina*. Age: Early Tertiary.

arenata nom. nov. subst. pro *Parabohaidina granulata* (He Chengquan, 1984b) He Chengquan et al., 2009. *Conicoideum granulatum* He Chengquan, 1984b, p.156–157, pl.2, figs.22–27; text-fig.1. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.302. Holotype: He Chengquan, 1984b, pl.2, fig.26. Originally *Conicoidium granulatum*, subsequently *Parabohaidina granulata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Parabohaidina granulata* Jiabo), thirdly (and now) *Parabohaidina arenata*. Taxonomic senior synonym: *Parabohaidina granulata*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.454) retained this species separately. The name *Parabohaidina arenata* is proposed here as a substitute name for the illegitimate combination *Parabohaidina granulata* (He Chengquan) He Chengquan et al. The epithet derives from the Latin *arenatus*, full of sand. Age: Tertiary.

bullata nom. nov. subst. pro *Parabohaidina tuberculatus* (Jiabo, 1978) He Chengquan et al., 2009. *Conicoidium tuberculatum* Jiabo, 1978, p.46, pl.18, figs.5–10; text-fig.7. Holotype: Jiabo, 1978, pl.18, fig.7. Originally *Conicoidium tuberculatum*, subsequently *Parabohaidina tuberculata* (Jiabo) He Chengquan et al. (illegitimate name, non *Parabohaidina tuberculata* He Chengquan), thirdly (and now) *Parabohaidina bullata*. Taxonomic senior synonym: *Parabohaidina tuberculata*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.466) retained this species separately. The name *Parabohaidina bullata* is proposed here as a substitute name for the illegitimate combination *Parabohaidina tuberculata* (Jiabo) He Chengquan et al. The epithet derives from the Latin *bullata*, knob, stud. N.I.A. Age: Early Tertiary.

ceratoides Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.59, pl.14, fig.1. Holotype: He Chengquan et al., 1989, pl.14, fig.1. Age: Early Tertiary.

granorugosum (Jiabo, 1978, p.46, pl.18, figs.11–12) He Chengquan et al., 2009, p.465. Holotype: Jiabo, 1978, pl.18, fig.12. Originally *Conicoidium*, subsequently (and now) *Parabohaidina*. Taxonomic senior synonym: *Parabohaidina retirugosa*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.465) retained this species separately. Age: Early Tertiary.

"*granulata*" (He Chengquan, 1984b, p.156–157, pl.2, figs.22–27; text-fig.1) He Chengquan et al., 2009, p.465. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.302. Holotype: He Chengquan, 1984b, pl.2, fig.26. **Combination illegitimate — senior homonym:** *Parabohaidina granulata* Jiabo 1978. **NOW** *Parabohaidina arenata*. Originally *Conicoidium granulatum*, subsequently *Parabohaidina granulata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Parabohaidina granulata* Jiabo), thirdly (and now) *Parabohaidina arenata*. Taxonomic senior synonym: *Parabohaidina granulata* Jiabo, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Tertiary.

"subsp. *minor*" (Tang in Cai Zhiguo et al., 1998, p.239, pl.80, figs.8) He Chengquan et al., 2009, p.466. Holotype: Cai Zhiguo et al., 1998, pl.80, figs.8. **Name not validly published:** no English or Latin description or diagnosis. Originally *Conicoidium granulatum* subsp. *minor* (name not validly published), subsequently *Parabohaidina granulata* (He Chengquan) subsp. *minor* (name not validly published).

granulata Jiabo, 1978, p.44, pl.17, figs.4–6. Holotype: Jiabo, 1978, pl.17, fig.5. Taxonomic junior synonym: *Conicoidium granulatum*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.454) retained that species separately. Junior homonym: *Parabohaidina granulata* (He Chengquan) He Chengquan et al. 2009. Age: Early Tertiary.

subsp. *granulata*. Autonym. Holotype: Jiabo, 1978, pl.17, fig.5. Age: Early Tertiary.

subsp. *magna* Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.60, pl.15, figs.1–4 ex He Chengquan et al., 2009, p.468. Holotype: He Chengquan et al., 1989, p.60, pl.15, fig.3, designated by He Chengquan et al. (2009, p.468). This name was not validly published in He Chengquan et al. (1989) as no holotype was designated. Age: Early Tertiary.

"*laevigata*" (Jiabo, 1978, p.46, pl.18, fig.1) He Chengquan et al., 2009, 466. Holotype: Jiabo, 1978, pl.18, fig.1. **Combination illegitimate — senior homonym:** *Parabohaidina laevigata* Jiabo 1978. **NOW** *Parabohaidina runcinatus*. Originally *Conicoidium laevigatum*, subsequently *Parabohaidina laevigata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Parabohaidina laevigata* Jiabo), thirdly (and now) *Parabohaidina runcinatus*. Taxonomic senior synonym: *Parabohaidina laevigata*, according to Sun Xuekun (1994, p.82)) — however, He Chengquan et al. (2009, p.466) retained this species separately. Age: Early Tertiary.

**laevigata* Jiabo, 1978, p.43, pl.15, fig.4; pl.16, figs.1–11; pl.17, figs.1–3. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.301. Holotype: Jiabo, 1978, pl.16, fig.9. Taxonomic junior synonym: *Conicoidium laevigatum*, according to Sun Xuekun (1994, p.82)) — however, He Chengquan et al. (2009, p.466) retained this species separately. Junior homonym: *Parabohaidina laevigata* (Jiabo) He Chengquan et al. 2009. Age: Early Tertiary.

"forma *laevigata*". Autonym. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.301. Holotype: Jiabo, 1978, pl.16, fig.9. **Now redundant.**

subsp. *laevigata*. Autonym. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.301, as *Parabohaidina laevigata* forma *laevigata*. Holotype: Jiabo, 1978, pl.16, fig.9.

"forma *minor*" (Jiabo, 1978, p.44, pl.16, figs.1–6; pl.17, figs.1–3) Xu Jinli and Mao Shaozhi, 1989, p.301. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.301, as *Parabohaidina laevigata* forma *minor*. Holotype: Jiabo, 1978, pl.17, fig.1. **NOW** *Parabohaidina laevigata* subsp. *minor*. Originally (and now) *Parabohaidina laevigata* subsp. *minor*, subsequently *Parabohaidina laevigata* forma *minor*. Age: Early Tertiary.

subsp. *minor* Jiabo, 1978, p.44, pl.16, figs.1–6; pl.17, figs.1–3. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.301, as *Parabohaidina laevigata* forma *minor*. Holotype: Jiabo, 1978, pl.17, fig.1. Originally (and now) *Parabohaidina laevigata* subsp. *minor*, subsequently *Parabohaidina laevigata* forma *minor*. Lentin and Williams (1989, p.280) retained this taxon at subspecific rank. Age: Early Tertiary.

"forma *ovata*" (Jiabo, 1978, p.44, pl.15, fig.4) Xu Jinli and Mao Shaozhi, 1989, p.301. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.301–302, as *Parabohaidina laevigata* forma *ovata*. Holotype: Jiabo, 1978, pl.15, fig.4. **NOW** *Parabohaidina laevigata* subsp. *ovata*. Originally (and now) *Parabohaidina laevigata* subsp. *ovata*, subsequently *Parabohaidina laevigata* forma *ovata*. Age: Early Tertiary.

subsp. *ovata* Jiabo, 1978, p.44, pl.15, fig.4. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.301–302, as *Parabohaidina laevigata* forma *ovata*. Holotype: Jiabo, 1978, pl.15, fig.4. Originally (and now) *Parabohaidina laevigata* subsp. *ovata*, subsequently *Parabohaidina laevigata* forma *ovata*. Lentin and Williams (1989, p.280) retained this taxon at subspecific rank. Age: Early Tertiary.

operculata He Chengquan, 1984b, p.155–156, pl.1, figs.19–20. Holotype: He Chengquan, 1984b, pl.1, fig.20. Age: Oligocene.

puyangensis Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.60, pl.15, figs.7–14. Holotype: He Chengquan et al., 1989, pl.15, fig.13. Age: Early Tertiary.

retirugosa Jiabo, 1978, p.44–45, pl.17, figs.7–9. Holotype: Jiabo, 1978, pl.17, fig.7. Taxonomic junior synonym: *Conicoidium granorugosum*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p. 465) retained that species separately. Age: Early Tertiary.

runcinatus nom. nov. subst. pro *Parabohaidina laevigata* (Jiabo, 1978) He Chengquan et al., 2009.

Conicoideum laevigatum Jiabo, 1978, p.46, pl.18, fig.1.

Holotype: Jiabo, 1978, pl.18, fig.1. Originally *Conicoidium laevigatum*, subsequently *Parabohaidina laevigata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Parabohaidina laevigata* Jiabo), thirdly (and now) *Parabohaidina runcinatus*. Taxonomic senior synonym: *Parabohaidina laevigata*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.466) retained this species separately. The name *Parabohaidina runcinatus* is proposed here as a substitute name for the illegitimate combination *Parabohaidina laevigata* (Jiabo) He Chengquan et al. The epithet derives from the Latin *runcinatus*, planed off. Age: Early Tertiary.

shangsica He Chengquan, 1984b, p.156, pl.1, figs.1–3. Holotype: He Chengquan, 1984b, pl.1, fig.1. Age: Oligocene.

tuberculata He Chengquan, 1984b, p.156, pl.1, fig.9. Holotype: He Chengquan, 1984b, pl.1, fig.9. Taxonomic junior synonyms: *Conicoidium tuberculatum*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.466) retained that species separately; *Bohaidina laxituberculata*, according to He Chengquan et al., 2009, p.471. Junior homonym: *Parabohaidina tuberculata* (Jiabo) He Chengquan et al. 2009. Age: middle-late Oligocene.

"*tuberculata*" (Jiabo, 1978, p.46, pl.18, figs.5–10; text-fig.7) He Chengquan et al., 2009, p.466. Holotype: Jiabo, 1978, pl.18, fig.7. **Combination illegitimate — senior homonym:** *Parabohaidina tuberculata* He Chengquan 1984b. **NOW** *Parabohaidina bulla*. Originally *Conicoidium tuberculatum*, subsequently *Parabohaidina tuberculata* (Jiabo) He Chengquan et al. (illegitimate name, non *Parabohaidina tuberculata* He Chengquan), thirdly (and now) *Parabohaidina bulla*. Taxonomic senior synonym: *Parabohaidina tuberculata*, according to Sun Xuekun (1994, p.82) — however, He Chengquan et al. (2009, p.466) retained this species separately. Age: Early Tertiary.

verrucosa Jiabo, 1978, p.45, pl.17, fig.11. Holotype: Jiabo, 1978, pl.17, fig.11. Age: Early Tertiary.

"*verrucosa*" Jiabo, 1978, p.45, pl.17, fig.10. Holotype: Jiabo, 1978, pl.17, fig.10. **NOW** *Bohaidina*. Originally *Parabohaidina*, subsequently (and now) *Bohaidina*. Age: Early Tertiary.

"**PARABOHAININA** subgenus **CONICOIDIUM**" (Jiabo, 1978, p.45–46) He Chengquan et al., 2009, p.465.

Combination not validly published: no clear indication of rank. We assume that the rank of subgenus was implied by He Chengquan et al. (2009) and so treat it as such here; but in doing so do not intend to validate the name. He Chengquan et al. (2009, p.465–466) included the following species in this subgenus: *Parabohaidina granorugosa*, *Parabohaidina granulata* (He Chengquan) He Chengquan et al. (combination illegitimate), *Parabohaidina laevigata* (Jiabo) He Chengquan et al. (combination illegitimate) and *Parabohaidina tuberculata* (Jiabo) He Chengquan et al. (combination illegitimate). Type: Jiabo, 1978, pl.18, fig.7, as *Conicoidium tuberculatum*.

"**PARABOHAININA** subgenus **PARABOHAININA**". Autonym. **Name redundant.** He Chengquan et al. (2009, p.465–466) included the following species in this subgenus: *Parabohaidina arcteverrucosa*, *Parabohaidina ceratoides*, *Parabohaidina granulata* Jiabo, *Parabohaidina laevigata* Jiabo, *Parabohaidina operculata*, *Parabohaidina puyangensis*, *Parabohaidina retirugosa*, *Parabohaidina shangsica*, *Parabohaidina tuberculata* He Chengquan, *Parabohaidina verrucosa* and *Parabohaidina verrucosa*. Type: Jiabo, 1978, pl.16, fig.9, as *Parabohaidina laevigata*.

PARAEVANSIA Below, 1990, p.57–58. Type: Fensome, 1979, pl.4, fig.5; text-fig.11E, as *Pareodinia brachyhelis*.

**brachyhelis* (Fensome, 1979, p.29–31, pl.4, figs.3,5–7; text-figs.11A–E) Below, 1990, p.58. Emendation: Below, 1990, p.58, as *Paraevansia brachyhelis*. Holotype: Fensome, 1979, pl.4, fig.5; text-fig.11E. Originally *Pareodinia*, subsequently (and now) *Paraevansia*. Age: Bajocian–Callovian.

mammillata Quattrocchio and Sarjeant, 1992, p.83–84 (al. 2–235 — 2–236), pl.4, figs.5–9; pl.5, figs.5–10. Holotype: Quattrocchio and Sarjeant, 1992, pl.4, fig.5. Age: middle-late Tithonian.

PARAGONYAULACYSTA Johnson and Hills, 1973, p.207. Emendations: Dörhöfer and Davies, 1980, p.31; Below, 1990, p.59–60. Type: Johnson and Hills, 1973, pl.2, fig.9, as *Paragonyaulacysta calloviensis*.

?*borealis* (Brideaux and Fisher, 1976, p.21–22, pl.3, figs.3–4,6–9; pl.4, figs.1–8) Stover and Evitt, 1978, p.116. Holotype: Brideaux and Fisher, 1976, pl.3, figs.3,6,8. Originally *Pareodinia*, subsequently *Paragonyaulacysta*, thirdly (and now) *Paragonyaulacysta*?. Questionable assignment: Below (1990, p.60). Age: late Oxfordian–Berriasian.

**calloviensis* Johnson and Hills, 1973, p.207, pl.2, figs.9,15–16 (not 13,17); text-figs.9A–C. Emendation: Dörhöfer and Davies, 1980, p.31. Holotype: Johnson and Hills, 1973, pl.2, fig.9; Fensome et al., 1993a, fig.1 — p.1015. Below (1990, p.60) gave the citation "*Paragonyaulacysta calloviensis* Johnson and Hills 1973, emend.". Age: early Callovian.

capillosa (Brideaux and Fisher, 1976, p.20–21, pl.2, figs.3–10; pl.3, figs.1–2,5) Stover and Evitt, 1978, p.116. Holotype: Brideaux and Fisher, 1976, pl.2, figs.5–7. Originally *Pareodinia*, subsequently (and now) *Paragonyaulacysta*. Age: late Oxfordian–Berriasian.

?*fenesepta* Mantle, 2009a, p.47–49, pl.7, figs.1–9; text-fig.10. Holotype: Mantle, 2009a, pl.7, fig.1. Questionable assignment: Mantle (2009a, p.47). Age: Callovian–early Oxfordian.

helbyi Mantle, 2009a, p.49–51, pl.8, figs.1–7; text-fig.11. Holotype: Mantle, 2009a, pl.8, figs.1a–b. Age: Callovian–early Oxfordian.

retiphragmata Dörhöfer and Davies, 1980, p.31–32, figs.14,29D–F. Emendation: Below, 1990, p.60,62. Holotype: Dörhöfer and Davies, 1980, figs.14,29D–F. Age: Callovian.

spinisutura Below, 1990, p.62–64, pl.10, figs.1–6,12–13; text-figs.18a–f. Holotype: Below, 1990, pl.10, figs.2,5. Contrary to the opinion of Lentin and Williams (1993, p.489), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Kimmeridgian.

"**PARAIREIANA**" He Chengquan, 1984a, p.768–769,772–773. **Taxonomic senior synonym:** *Carpatella*, according to Chen et al. (1988, p.21). Type: He Chengquan, 1984a, pl.1, fig.8, as *Paraireiana sinensis*.

"*circularis*" He Chengquan, 1991, p.171, pl.8, fig.13. Holotype: He Chengquan, 1991, pl.8, fig.13. **NOW** *Carpatella*. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: Paleocene.

"*fusifformis*" He Chengquan, 1991, p.171, pl.8, fig.6–8. Holotype: He Chengquan, 1991, pl.8, fig.6. **NOW** *Carpatella*. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: middle Eocene.

"**lamprota**" He Chengquan, 1991, p.171–172, pl.8, figs.15–16. Holotype: He Chengquan, 1991, pl.8, figs.15–16. **NOW** *Carpatella*. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: early Eocene.

"**scabrota**" He Chengquan, 1991, p.172, pl.8, fig.14. Holotype: He Chengquan, 1991, pl.8, fig.14. **NOW** *Carpatella*. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: Paleocene.

"***sinensis**" He Chengquan, 1984a, p.769, pl.1, figs.8–11. Holotype: He Chengquan, 1984a, pl.1, fig.8. **NOW** *Carpatella*. Originally *Paraireiana*, subsequently (and now) *Carpatella*. Age: Paleocene–Eocene.

"**PARANETRELYTRON**" Sarjeant, 1966c, p.201. **Taxonomic senior synonym:** *Pareodinia*, according to Wiggins (1975, p.102) and Stover and Evitt (1978, p.296). Type: Sarjeant, 1966c, pl.21, fig.5; pl.23, fig.5, as *Paranetrellytron strongylum*.

"***strongylum**" Sarjeant, 1966c, p.201–202, pl.21, fig.5; pl.23, fig.5; text-fig.52. Holotype: Sarjeant, 1966c, pl.21, fig.5; pl.23, fig.5. Originally *Paranetrellytron*, subsequently *Pareodinia*. **Taxonomic senior synonym:** *Pareodinia ceratophora*, according to Wiggins (1975, p.103) and Kunz (1990, p.13). For etymology, see *Pareodinia strongyla*. Age: early Barremian.

PARAPERIDINIUM Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.60–61. Emendation: Mao Shaozhi et al., 1995, p.59. Type: He Chengquan et al., 1989, pl.1, fig.16, as *Paraperidinium bellum*.

***bellum** Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.61, pl.1, figs.1–18; pl.29, figs.5–6. Emendation: Mao Shaozhi et al., 1995, p.60. Holotype: He Chengquan et al., 1989, pl.1, fig.16. Taxonomic junior synonym: *Paraperidinium draco*, according to Mao Shaozhi et al. (1995, p.60). Age: Early Tertiary.

"**draco**" Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.61, pl.1, figs.19–25. Holotype: He Chengquan et al., 1989, pl.1, fig.19. **Taxonomic senior synonym:** *Paraperidinium bellum*, according to Mao Shaozhi et al. (1995, p.60). Age: Early Tertiary.

PARARHOMBODELLA Xu Jinli et al., 1997, p.91–92, 149–150. Emendation: He Chengquan et al., 2009, p.282, 646. Name incorrectly spelled as "*Parhombodella*" in Xu Jinli et al. (1997, p.149). Type: Jiabo, 1978, pl.24, fig.12, as *Rhombodella tubiforma*.

biformoides Xu Jinli et al., 1997, p.94–95, pl.32, figs.6a–c; text-fig.8 ex He Chengquan et al., 2009, p.282, 658. Holotype: Xu Jinli et al., 1997, pl.32, figs.6a–c; text-fig.8. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided. He Chengquan et al. (2009, p.658) validated the name by publishing an English diagnosis. Age: Oligocene.

bifurcata (Jiabo, 1978, p.50, pl.24, figs.16–17) Xu Jinli et al., 1997, p.95. Originally *Rhombodella* (Appendix A), subsequently (and now) *Pararhombodella*. Age: Early Tertiary.

***tubiforma** (Jiabo, 1978, p.50, pl.24, figs.12–13) Xu Jinli et al., 1997, p.92. Holotype: Jiabo, 1978, pl.24, fig.12. Originally *Rhombodella* (Appendix A), subsequently (and now) *Pararhombodella*. Taxonomic junior synonym: *Rhombodella symphyanthera* (Appendix A), according to Xu Jinli et al. (1997, p.92). Age: Early Tertiary.

variabilis (Jiabo, 1978, p.50, pl.24, figs.7–11) Xu Jinli et al., 1997, p.95. Holotype: Jiabo, 1978, pl.24, fig.11. Originally *Rhombodella* (Appendix A), subsequently (and now) *Pararhombodella*. Age: Early Tertiary.

verruciformis (He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.65–66, pl.19, figs.9–11) Xu Jinli et al., 1997, p.96. Holotype: He Chengquan et al., 1989, pl.19, fig.10. Originally *Rhombodella*

(Appendix A), subsequently (and now) *Pararhombodella*. Taxonomic junior synonym: *Rhombodella formosa* (Appendix A), according to Xu Jinli et al. (1997, p.96). Age: Early Tertiary.

PARASCRINIOCASSIS Below, 1990, p.27. Contrary to the opinion of Lentin and Williams (1993, p.490), this name is validly published since the name of the "type species" is validly published. Type: Below, 1990, pl.5, figs.11–15, as *Parascrinioicassis krumbeckii*.

**krumbeckii* Below, 1990, p.27–28,30, pl.5, figs.1–15; pl.4, figs.1–9; text-figs.7a–h. Holotype: Below, 1990, pl.5, figs.11–15. Contrary to the opinion of Lentin and Williams (1993, p.490), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: late Pliensbachian–early Toarcian.

PARASTOMIOSPHAERA Nowak, 1968, p.298. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1301). Type: Borza, 1964, pl.1, fig.5, as *Stomiosphaera malmica*.

**malmica* (Borza, 1964, p.192, pl.1, figs.5–6) Nowak, 1968, p.298. Holotype: Borza, 1964, pl.1, fig.5. Originally *Stomiosphaera*, subsequently *Cadosina*, thirdly (and now) *Parastomiosphaera*. Age: Kimmeridgian.

PAREODINIA Deflandre, 1947d, p.4. Emendations: Gocht, 1970b, p.153; Johnson and Hills, 1973, p.208; Wiggins, 1975, p.103; Stover and Evitt, 1978, p.116–117; Below, 1990, p.64–65. Taxonomic junior synonyms: *Paranetrellytron*, according to Wiggins (1975, p.102) and Stover and Evitt (1978, p.296); *Caddasphaera*, by implication in Prauss (1989, p.42), who transferred the "type species" of *Caddasphaera*, *Caddasphaera halosa*, to *Pareodinia*; *Netrellytron*, according to Below (1990, p.64) — however, *Netrellytron* is now considered to be a taxonomic junior synonym of *Kalyptea*; *Glomodinium*, according to Stover and Evitt (1978, p.116–117) — however, Dörhöfer and Davies (1980, p.12) retained *Glomodinium*; *Imbatodinium*, according to Wiggins (1975, p.103) and, by implication in Below (1990, p.68), who included the "type species" of *Imbatodinium*, *Imbatodinium kondratjevii*, in *Pareodinia* — however, Dörhöfer and Davies (1980, p.36–37) and Harker and Sarjeant (1991, p.708) retained *Imbatodinium*; *Pluriarvalium*, according to Wiggins (1975, p.102) — however, Lentin and Williams (1989, p.297) retained *Pluriarvalium*; *Kalyptea*, according to Gocht (1970b, p.154) — however, Lentin and Williams (1993, p.365) retained *Kalyptea*; *Broomea*, according to Wiggins (1975, p.102) — however, Lentin and Williams (1976, p.144) retained *Broomea*. Type: Deflandre, 1947d, text-fig.1, as *Pareodinia ceratophora*.

"*aceras*" (Manum and Cookson, 1964, p.27–28, pl.6, figs.9–11) Davey and Verdier, 1974, p.645. Holotype: Manum and Cookson, 1964, pl.6, fig.9. **NOW** *Caligodinium*. Originally *Kalyptea*, subsequently (and now) *Caligodinium*, thirdly *Pareodinia*. Taxonomic junior synonym: *Caligodinium amiculum*, according to Heilmann-Clausen (1985, p.18) — however, Lentin and Williams (1989, p.44) retained *Caligodinium amiculum*. Age: Cenomanian.

"*alaskensis*" Wiggins, 1975, p.104, pl.2, figs.7–8. Holotype: Wiggins, 1975, pl.2, fig.7. **NOW** *Evansia*. Originally *Pareodinia*, subsequently *Glomodinium* (combination not validly published), thirdly (and now) *Evansia*. Taxonomic junior synonyms: *Pareodinia minuta* and *Pareodinia robusta*, both according to Below (1990, p.72) — however, Poulsen (1996, p.62) retained *Pareodinia robusta*. Age: ?Callovian–mid Kimmeridgian.

?*ampullacea* Yu Jingxian, 1982, p.236, pl.1, figs.5,8. Holotype: Yu Jingxian, 1982, pl.1, fig.5. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Below (1990, p.65) as a "nomen dubium". Age: Late Jurassic–Early Cretaceous.

?*angulata* Kumar, 1987a, p.242–243, pl.1, figs.3,6,9; text-fig.5. Holotype: Kumar, 1987a, pl.1, fig.3. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Below (1990, p.65) as a "nomen dubium". Age: Kimmeridgian–Tithonian.

"*antennata*" (Gitmez and Sarjeant, 1972, p.232–233, pl.11, figs.2–3) Wiggins, 1975, p.107. Holotype: Gitmez and Sarjeant, 1972, pl.11, fig.3. **NOW** *Gochteodinia*. Originally *Imbatodinium*, subsequently *Pareodinia*, thirdly (and now) *Gochteodinia*. Age: early–late Kimmeridgian.

aphelia Cookson and Eisenack, 1958, p.60, pl.12, figs.3–4,9. Emendation: Below, 1990, p.66. Holotype: Cookson and Eisenack, 1958, pl.12, fig.4. Taxonomic senior synonym: *Pareodinia ceratophora*, according to Wiggins (1975, p.103) — however, Below (1990, p.66) retained *Pareodinia aphia*. Age: Middle Jurassic–Early Cretaceous.

?*apotomocerastes* Sarjeant, 1972, p.27–28, pl.3, fig.4. Holotype: Sarjeant, 1972, l.3, fig.4. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Stover and Evitt (1978, p.117); Below (1990, p.65) as a "nomen dubium". Age: late Bathonian–early Callovian.

arctica Wiggins, 1975, p.103, pl.2, figs.1–5. Holotype: Wiggins, 1975, pl.2, fig.1. Below (1990, p.65) suggested that this species may be a smooth variant of *Glomodinium* (now *Evansia*) *alaskense*. Age: Late Jurassic, ?Tithonian.

asperata Riley in Fisher and Riley, 1980, p.324, pl.3, figs.6,10. Holotype: Fisher and Riley, 1980, pl.3, figs.6,10. Age: Volgian.

"*barentsensis*" Smelror, 1988a, p.296, pl.3, figs.4–5; text-fig.11. Holotype: Smelror, 1988a, pl.3, fig.5. **NOW** *Evansia*. Originally *Pareodinia*, subsequently (and now) *Evansia*. Age: early Callovian–early Oxfordian.

"*borealis*" Brideaux and Fisher, 1976, p.21–22, pl.3, figs.3–4,6–9; pl.4, figs.1–8. Holotype: Brideaux and Fisher, 1976, pl.3, figs.3,6,8. **NOW** *Paragonyaulacysta*. Originally *Pareodinia*, subsequently (and now) *Paragonyaulacysta*. Age: late Oxfordian–Berriasian.

"*brachyhelis*" Fensome, 1979, p.29–31, pl.4, figs.3,5–7; text-figs.11A–E. Emendation: Below, 1990, p.58, as *Paraevansia brachyhelis*. Holotype: Fensome, 1979, pl.4, fig.5; text-fig.11E. **NOW** *Paraevansia*. Originally *Pareodinia*, subsequently (and now) *Paraevansia*. Age: Bajocian–Callovian.

brevicornis Zatonkaya, 1975, p.31, pl.1, fig.1. Holotype: Zatonkaya, 1975, pl.1, fig.1. Age: Volgian.

brevicornuta Kunz, 1990, p.12–13, pl.1, figs.13–15; text-figs.6a–b. Holotype: Kunz, 1990, pl.1, fig.13; text-fig.6a. Age: Tithonian.

"*capillosa*" Brideaux and Fisher, 1976, p.20–21, pl.2, figs.3–10; pl.3, figs.1–2,5. Holotype: Brideaux and Fisher, 1976, pl.2, figs.5–7. **NOW** *Paragonyaulacysta*. Originally *Pareodinia*, subsequently (and now) *Paragonyaulacysta*. Age: late Oxfordian–Berriasian.

**ceratophora* Deflandre, 1947d, p.4, text-figs.1–3. Emendation: Gocht, 1970b, p.153–156. Holotype: Deflandre, 1947d, text-fig.1. Taxonomic junior synonyms: *Cryptomeriapollenites coralliensis* (Appendix A), according to Sarjeant (1962b, p.263); *Kalyptea monoceras*, according to Wiggins (1975, p.103) and Below (1990, p.65); *Paranetrelytron strongylum*, according to Wiggins (1975, p.103); *Pareodinia aphia*, according to Wiggins (1975, p.103) — however, Below (1990, p.66) retained *Pareodinia aphia*; *Pareodinia nuda*, according to Wiggins (1975, p.103) and Kunz (1990, p.13). Gocht (1970b, p.154) considered *Kalyptea jurassica* and *Kalyptea diceras* to be possible taxonomic junior synonyms of *Pareodinia ceratophora*. Age: late Callovian.

subsp. *ceratophora*. Autonym. Emendation: Below, 1990, p.66–67, as *Pareodinia ceratophora* var. *ceratophora*. Holotype: Deflandre, 1947d, text-fig.1. Taxonomic junior synonyms: *Pareodinia ceratophora* subsp. *pachycera* (as *Pareodinia ceratophora* var. *pachycera*) and *Netrelytron par*, both according to Below (1990, p.65) — however, *Netrelytron parum* is now considered a taxonomic junior synonym of *Netrelytron* (as and now) *Kalyptea stegastum*.

"var. *ceratophora*". Autonym. Emendation: Below, 1990, p.66–67, as *Pareodinia ceratophora* var. *ceratophora*. Holotype: Deflandre, 1947d, text-fig.1. **Now redundant**. Taxonomic junior synonyms: *Pareodinia ceratophora* subsp. *pachycera* (as *Pareodinia ceratophora* var. *pachycera*) and *Netrelytron*

parum, both according to Below (1990, p.65) — however, *Netrelytron parum* is now considered a taxonomic junior synonym of *Netrelytron* (as and now) *Kalyptea stegastum*.

"subsp. ***pachycera***" (Sarjeant, 1959, p.337, pl.13, fig.10; text-fig.5a) Lentin and Williams, 1973, p.108. Holotype: Sarjeant, 1959, pl.13, fig.10; text-fig.5a. Originally *Pareodinia ceratophora* var. *pachycera*, subsequently *Pareodinia ceratophora* subsp. *pachycera*. **Taxonomic senior synonym:** *Pareodinia ceratophora* subsp. *ceratophora* (as *Pareodinia ceratophora* var. *ceratophora*), according to Below (1990, p.65). The derivation of the name was not stated in the protologue. Since Principle 5 of the I.C.N. states that taxa names are to be treated as Latin and since compound epithets are conventionally treated as adjectives, the epithet should be rendered as "*pachycera*" in agreement with the feminine gender of the generic name. Age: early Callovian.

"var. ***pachycera***" Sarjeant, 1959, p.337, pl.13, fig.10; text-fig.5a. Holotype: Sarjeant, 1959, pl.13, fig.10; text-fig.5a. Originally *Pareodinia ceratophora* var. *pachycera*, subsequently *Pareodinia ceratophora* subsp. *pachycera*. **Taxonomic senior synonym:** *Pareodinia ceratophora* subsp. *ceratophora* (as *Pareodinia ceratophora* var. *ceratophora*), according to Below (1990, p.65). For etymology see under *Pareodinia ceratophora* subsp. *pachycera*. Age: early Callovian.

subsp. ***scopaeus*** (Sarjeant, 1972, p.26, pl.2, fig.4) Lentin and Williams, 1973, p.108. Emendation: Below, 1990, p.67, as *Pareodinia ceratophora* var. *scopaeus*. Holotype: Sarjeant, 1972, pl.2, fig.4. Originally *Pareodinia ceratophora* var. *scopaeus*, subsequently (and now) *Pareodinia ceratophora* subsp. *scopaeus*. Below (1990, p.67–68) retained this taxon as a varietas — however, Lentin and Williams (1993, p.492) retained it at subspecific rank. N.I.A. Age: late Bathonian–early Callovian.

"var. ***scopaeus***" Sarjeant, 1972, p.26, pl.2, fig.4. Emendation: Below, 1990, p.67, as *Pareodinia ceratophora* var. *scopaeus*. Holotype: Sarjeant, 1972, pl.2, fig.4. **NOW** *Pareodinia ceratophora* subsp. *scopaeus*. Originally *Pareodinia ceratophora* var. *scopaeus*, subsequently (and now) *Pareodinia ceratophora* subsp. *scopaeus*. Age: late Bathonian–early Callovian.

cingulata He Chengquan et al., 2005a, p.51,249–250, pl.17, figs.3–5. Holotype: He Chengquan et al., 2005a, pl.17, fig.4. Age: Middle to Late Jurassic.

"?***communis***" He Chengquan, 1984b, p.159, pl.5, figs.18–20. Holotype: He Chengquan, 1984b, pl.5, fig.18. **NOW** *Pseudokomewuia*. Originally *Pareodinia*, subsequently *Pareodinia*?, thirdly (and now) *Pseudokomewuia*. Questionable assignment: Below (1990, p.66) as a "nomen dubium". Age: middle-late Oligocene.

crassicornis Zatonkaya, 1975, p.31–32, pl.1, fig.2. Holotype: Zatonkaya, 1975, pl.1, fig.2. Age: Late Jurassic.

?***curvocervicata*** Tasch in Tasch et al., 1964, p.196, pl.3, fig.1. Holotype: Tasch et al., 1964, pl.3, fig.1. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Stover and Evitt (1978, p.117) as a problematic species; Below (1990, p.66) as a "nomen dubium". Age: Albian.

"***dasyforma***" Wiggins, 1975, p.107. Emendations: Below, 1990, p.50 and Lentin and Vozzhennikova, 1990, p.85, both as *Gochteodinia villosa*. Holotype: Vozzhennikova, 1967, pl.12, figs.3a–b; pl.15, fig.1; Eisenack and Kjellström, 1975b, figure to right — p.726f; Lentin and Vozzhennikova, 1990, pl.11, figs.7–8; text-fig.47; Fensome et al., 1995, fig.1 — p.1903; Fensome et al., 1996, figs.1–3 — p.2431. **NOW** *Gochteodinia villosa*. Originally *Imbatodinium villosum*, subsequently *Pareodinia villosa* (Vozzhennikova) (combination not validly published), thirdly *Pareodinia dasyforma*, fourthly (and now) *Gochteodinia villosa*. Substitute name for *Imbatodinium villosum* Vozzhennikova, 1967, p.56, pl.12, figs.1a–b,2a–b,3a–b; pl.13, figs.1a–e,2,3a–d; pl.14, figs.1a–e,2a–i; pl.15, figs.1–2 (an illegitimate name). Age: Late Jurassic.

"***dicerus***" (Cookson and Eisenack, 1960b, p.256–257, pl.39, fig.1) Below, 1990, p.65. Emendation: Fisher and Riley, 1980, p.323, as *Kalyptea dicerus*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.1. **NOW** *Kalyptea*. Originally (and now) *Kalyptea*, subsequently *Komewuia*, thirdly *Pareodinia*. Taxonomic junior synonym: *Kalyptea jurassica*, according to Below (1990, p.65). Age: Tithonian.

elongata Yu Jingxian, 1982, p.236–237, pl.1, figs.6–7. Holotype: Yu Jingxian, 1982, pl.1, fig.6. After examining the holotype, Lentin in Lentin and Williams (1989, p.282) concluded that this species is not a dinoflagellate. Age: Late Jurassic–Early Cretaceous.

"*evittii*" (Pocock, 1972, p.94–95, pl.24, figs.6,8; text-fig.11) Wiggins, 1975, p.105. Holotype: Pocock, 1972, pl.24, fig.8, lost according to Jansonius (1986, p.208). Lectotype: Jansonius, 1986, pl.6, figs.8–9, designated by Jansonius (1986, p.208). **NOW** *Evansia*. Originally *Tenua* Eisenack, subsequently *Pareodinia*, thirdly *Glomodinium*, fourthly (and now) *Evansia*. Taxonomic junior synonyms: *Pareodinia tripartita* and (at specific rank) *Pareodinia tripartita* subsp. *rotunda*, both according to Wiggins (1975, p.105). Age: late Bajocian–Callovian.

?*gibberosa* Jiabo, 1978, p.48–49, pl.6, fig.14. Holotype: Jiabo, 1978, pl.6, fig.14. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Below (1990, p.66) as a "nomen dubium". Age: Early Tertiary.

granuloperforata Nejad et al., 1999, p.50, pl.5, fig.5; pl.7, figs.1–2; pl.18, figs.2,13; pl.28, fig.9; text-fig.6.1. Holotype: Nejad et al., 1999, pl.18, figs.2,13; text-fig.6.1. Age: early Oxfordian.

groenlandica Sarjeant, 1972, p.27, pl.2, fig.2; pl.5, fig.1. Holotype: Sarjeant, 1972, pl.5, fig.1. Age: late Bathonian–early Callovian.

halosa (Filatoff, 1975, p.91, pl.29, figs.10–12) Prauss, 1989, p.42. Emendation: Prauss, 1989, p.42, as *Pareodinia halosa*. Holotype: Filatoff, 1975, pl.29, fig.10. Originally *Kalyptea*, subsequently *Kalyptea*?, thirdly *Caddasphaera*, fourthly *Pterocystidiopsis* (Appendix A), fifthly (and now) *Pareodinia*. Age: Bajocian.

"*imbatodinensis*" (Vozzhennikova, 1967, p.55, pl.12, figs.4a–c) Lentin and Williams, 1977b, p.125. Emendation: Lentin and Vozzhennikova, 1990, p.91–92, as *Protobatioladinium imbatodinense*. Holotype: Vozzhennikova, 1967, pl.12, fig.4a; Lentin and Vozzhennikova, 1990, pl.11, figs.9–11; text-fig.50. **NOW** *Protobatioladinium*. Originally *Imbatodinium*, subsequently *Necrobroomea*?, thirdly *Pareodinia*, fourthly *Pareodinia*?, fifthly *Batioladinium*, sixthly (and now) *Protobatioladinium*, seventhly *Gochteodinia*. Questionable assignment: Stover and Evitt (1978, p.117). Age: Late Jurassic.

"*kondratjevii*" (Vozzhennikova, 1967, p.55, pl.9, figs.1,2a–c,3–9; pl.10, figs.1a–b,2a–b,3a–b,4–6; pl.11, figs.1a–e,2a–b,3; pl.15, figs.3–4) Wiggins, 1975, p.104. Emendations: Dörhöfer and Davies, 1980, p.37 and Lentin and Vozzhennikova, 1990, p.89, both as *Imbatodinium kondratjevii*; Below, 1990, p.68, as *Pareodinia kondratjevii*. Holotype: Vozzhennikova, 1967, pl.9, fig.4; pl.10, figs.1a–b; Lentin and Vozzhennikova, 1990, pl.11, figs.1–2; text-figs.48a–b. **NOW** *Imbatodinium*. Originally (and now) *Imbatodinium*, subsequently *Pareodinia*. Age: Late Jurassic.

mangaotanensis Schiøler and Crampton, 2014, p.224, figs.9A–D. Holotype: Schiøler and Crampton, 2014, fig.9C. Age: late Cenomanian.

?*microreticulata* (Jiabo, 1978, p.90, pl.6, fig.13) Lentin and Williams, 1989, p.282. Holotype: Jiabo, 1978, pl.6, fig.13. Originally *Ascodinium*?, subsequently (and now) *Pareodinia*. Questionable assignment: Lentin and Williams (1989, p.282). Jiabo (1978, p.90) gave the specific epithet as "*midroreticulatum*", but from the plate caption it is clear that they intended it to be "*microreticulatum*". Age: Early Tertiary.

?*minima* Yu Jingxian, 1982, p.237, pl.1, figs.9–10,19. Holotype: Yu Jingxian, 1982, pl.1, fig.9. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Lentin in Lentin and Williams (1989, p.282); Below (1990, p.66) as a "nomen dubium". Lentin in Lentin and Williams (1989, p.282), after examining the holotype, concluded that this species is not a dinoflagellate. Age: late Kimmeridgian–Berriasian.

"*minuta*" Wiggins, 1975, p.104, pl.2, figs.9–10. Holotype: Wiggins, 1975, pl.2, fig.9. **Taxonomic senior synonym:** *Pareodinia* (now *Evansia*) *alaskensis*, according to Below (1990, p.72). Age: Late Jurassic.

?moderna Kufferath, 1950, p.37–38; text-fig.34. Holotype: Kufferath, 1950, text-fig.34. Originally *Pareodinia*, subsequently (and now) *Pareodinia?*. Questionable assignment: Below (1990, p.66) as a "nomen dubium". Age: Holocene.

"mutabilis" Riley in Fisher and Riley, 1980, p.324–325, pl.3, figs.1–3. Emendation: Below, 1990, p.49, as *Gochteodinia mutabilis*. Holotype: Gitmez and Sarjeant, 1972, pl.11, fig.1, as *Imbatodinium cf. villosum*. **NOW** *Gochteodinia*. Originally *Pareodinia*, subsequently (and now) *Gochteodinia*. This name was not validly published in Fisher and Riley (1976, p.52), since no description was provided. Age: Volgian.

"nuda" Downie, 1957, p.424, pl.20, fig.11; text-fig.2e ex Sarjeant, 1967b, p.254. Holotype: Downie, 1957, pl.20, fig.11. Originally *Palaeoperidinium* (name not validly published), subsequently *Pareodinia*, thirdly *Pareodinia?*. Questionable assignment: Below (1990, p.66) as a "nomen dubium". **Taxonomic senior synonym:** *Pareodinia ceratophora*, according to Wiggins (1975, p.103) and Kunz (1990, p.13). The name *Palaeoperidinium nudum* Downie was not validly published in Downie (1957) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.467) accepted Sarjeant's (1967b) indirect reference to Downie (1957) as indication of a type (I.C.N. Article 40.3). Age: late Kimmeridgian.

"osmingtonensis" (Sarjeant, 1962b, p.262, pl.1, fig.5; text-fig.6) Wiggins, 1975, p.105. Holotype: Sarjeant, 1962b, pl.1, fig.5. **NOW** *Pluriarvalium*. Originally (and now) *Pluriarvalium*, subsequently *Pareodinia*. Age: late Oxfordian.

"subsp. *osmingtonensis*". Autonym. Holotype: Sarjeant, 1962b, pl.1, fig.5. **NOW** *Pluriarvalium osmingtonense* subsp. *osmingtonense*. Originally *Pareodinia osmingtonensis* subsp. *osmingtonensis*, subsequently (and now) *Pluriarvalium osmingtonense* subsp. *osmingtonense*.

"subsp. *rostrata*" Wiggins, 1975, p.106–107, pl.5, figs.1–2. Holotype: Wiggins, 1975, pl.5, fig.1. **NOW** *Pluriarvalium osmingtonense* subsp. *rostratum*. Originally *Pareodinia osmingtonensis* subsp. *rostrata*, subsequently (and now) *Pluriarvalium osmingtonense* subsp. *rostratum*. Age: Late Jurassic.

pauca Dodekova, 1994, p.36–37, pl.8, figs.7–10. Holotype: Dodekova, 1994, pl.8, figs.7–8. Age: middle to late Tithonian.

procerchagrinata Below, 1990, p.69, pl.15, figs.12–16, 21, 26–27. Holotype: Below, 1990, pl.15, figs.12, 15, 21, 26–27. Contrary to the opinion of Lentin and Williams (1993, p.494), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: late Bajocian–Callovian.

prolongata Sarjeant, 1959, p.335–336, pl.13, fig.8; text-fig.4. Holotype: Sarjeant, 1959, pl.13, fig.8. Age: early Callovian.

?pseudochyrooides (Below, 1987a, p.118–119, pl.15, figs.4–10) Lentin and Williams, 1989, p.283. Holotype: Below, 1987a, pl.15, figs.7–10; Fensome et al., 1993a, figs.3–6 — p.1291. Originally *Dodekovia*, subsequently (and now) *Pareodinia?*. Questionable assignment: Lentin and Williams (1989, p.283). Age: Toarcian.

?psilata Jain and Millepied, 1975, p.143–144, pl.3, fig.51. Holotype: Jain and Millepied, 1975, pl.3, fig.51. Originally *Pareodinia*, subsequently (and now) *Pareodinia?*. Questionable assignment: Below (1990, p.66) as a "nomen dubium". Age: Aptian–Albian.

psiloperforata Nejad et al., 1999, p.50–51, pl.8, fig.3; pl.13, fig.12; text-fig.6.2. Holotype: Nejad et al., 1999, pl.13, fig.12; text-fig.6.2. Age: early Oxfordian.

"ramosa" (Cookson and Eisenack, 1958, p.41–42, pl.6, figs.6–8) Wiggins, 1975, p.107. Holotype: Cookson and Eisenack, 1958, pl.6, fig.7. **NOW** *Broomea*. Originally (and now) *Broomea*, subsequently *Pareodinia*. Age: Middle-Late Jurassic.

?*rectangularis* Yu Jingxian, 1982, p.236, pl.1, fig.1. Holotype: Yu Jingxian, 1982, pl.1, fig.1. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Lentin and Williams (1989, p.283) and Below (1990, p.66) as a "nomen dubium". Age: late Kimmeridgian–Berriasian.

?*reticulata* (Below, 1987a, p.119, pl.15, figs.11–15) Lentin and Williams, 1989, p.283. Holotype: Below, 1987a, pl.15, figs.11–15; Fensome et al., 1993a, figs.1–5 — p.1301. Originally *Dodekovia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Lentin and Williams (1989, p.283). Age: Toarcian.

"*reticulopilosa*" (Dodekova, 1975, p.26–27, pl.5, figs.1–6) Stover and Evitt, 1978, p.117. Holotype: Dodekova, 1975, pl.5, figs.1–2. **NOW** *Evansia*. Originally *Glomodinium*, subsequently *Pareodinia*, thirdly (and now) *Evansia*. Age: late Bathonian.

robusta Wiggins, 1975, p.105, pl.3, figs.1–4. Holotype: Wiggins, 1975, pl.3, fig.1. Originally (and now) *Pareodinia*, subsequently *Pareodinia*?. Questionable assignment: Below (1990, p.65–66) as a "nomen dubium" — however, Poulsen (1996, p.62) retained the species in *Pareodinia* without question. Taxonomic senior synonym: *Pareodinia* (now *Evansia*) *alaskensis*, according to Below (1990, p.72) — however, Poulsen (1996, p.62) retained *Pareodinia robusta*. Age: Late Jurassic.

?*rostrata* Yu Jingxian, 1982, p.236, pl.1, figs.2–3. Holotype: Yu Jingxian, 1982, pl.1, fig.2. Originally *Pareodinia*, subsequently (and now) *Pareodinia*?. Questionable assignment: Lentin and Williams (1989, p.283); Below (1990, p.66) as a "nomen dubium". After examining the holotype, Lentin in Lentin and Williams (1989, p.283) concluded that this species is not a dinoflagellate. Age: late Kimmeridgian–Berriasian.

"*spinosa*" Alberti, 1961, p.24, pl.4, fig.16. Holotype: Alberti, 1961, pl.4, fig.16. **NOW** *Apteodinium?* *albertii*. Originally *Pareodinia spinosa*, subsequently *Apteodinium?* *spinosum* (combination illegitimate), thirdly (and now) *Apteodinium?* *albertii*. Age: late Barremian.

?*spinosissima* (Deflandre, 1939a, p.179, pl.9, fig.11 ex Deflandre and Cookson, 1955, p.258) Wiggins, 1975, p.107. Holotype: Deflandre, 1939a, pl.9, fig.11. Originally *Palaeoperidinium* (name not validly published), subsequently *Palaeohystrichophora*, thirdly *Acanthaulax?*, fourthly *Pareodinia*, fifthly (and now) *Pareodinia*?. Questionable assignment: Stover and Evitt (1978, p.117) and Below (1990, p.66) as a "nomen dubium". The name *Palaeoperidinium spinosissimum* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. Age: Late Jurassic.

"*stegasta*" (Sarjeant, 1961a, p.114–115, pl.15, fig.15; text-fig.14) Below, 1990, p.65. Holotype: Sarjeant, 1961a, pl.15, fig.15; text-fig.14 (left figure); Sarjeant et al., 1987, pl.1, fig.6. **NOW** *Kalyptea*. Originally *Netrelytron*, subsequently (and now) *Kalyptea*, thirdly *Pareodinia*. Taxonomic junior synonyms: *Netrelytron par* and *Netrelytron trinetrum*, both according to Poulsen (1996, p.61); *Kalyptea jurassica*, according to Wiggins (1975, p.110) and Kunz (1990 [January], p.12) — however, Below (1990 [October], p.65) considered *Kalyptea jurassica* to be a taxonomic junior synonym of *Kalyptea* (as *Pareodinia*) *dicerca*. Age: early Oxfordian.

"*strongyla*" (Sarjeant, 1966c, p.201–202, pl.21, fig.5; pl.23, fig.5; text-fig.52) Below, 1990, p.65. Holotype: Sarjeant, 1966c, pl.21, fig.5; pl.23, fig.5. Originally *Paranetrelytron*, subsequently *Pareodinia*. **Taxonomic senior synonym:** *Pareodinia ceratophora*, according to Wiggins (1975, p.103). Sarjeant (1966c) cited the epithet as "*strongylos*", the Greek adjective for "rounded". Since Principle 5 of the I.C.N. states that taxon names are to be treated as Latin, this epithet should be rendered as "*strongyla*" in agreement with the feminine gender of the generic name ("*strongylum*" would be the neuter form, and "*strongylus*" the masculine form). Age: early Barremian.

suibinensis He Chengquan and Huang Guanjun, 1997, p.27,39, pl.1, figs.11–12. Holotype: He Chengquan and Huang Guanjun, 1997, pl.1, fig.11. Age: Callovian.

"*tamarensis*" Ingram in Riding and Helby, 2001d, p.89. **Name not validly published:** no description. **Taxonomic senior synonym:** *Tabulodinium senarium*, according to Riding and Helby (2001d, p.89).

tamboviensis (Vozzhennikova, 1967, p.61, pl.41, fig.1) Lentin and Vozzhennikova, 1990, p.90. Holotype: Vozzhennikova, 1967, pl.41, fig.1; Lentin and Vozzhennikova, 1990, pl.14, fig.9; text-fig.49. Originally *Apteodinium*, subsequently *Apteodinium?*, thirdly (and now) *Pareodinia*. Age: Barremian.

"*trinetra*" (Sarjeant, 1966c, p.199–200, pl.22, fig.3; text-fig.51) Below, 1990, p.65. Holotype: Sarjeant, 1966c, pl.22, fig.3. Originally *Netrelytron*, subsequently *Kalyptea*, thirdly *Pareodinia*. **Taxonomic senior synonym:** *Netrelytron* (as and now *Kalyptea*) *stegastum*, according to Poulsen (1996, p.61). Taxonomic junior synonym: *Netrelytron parum*, according to Wiggins (1975, p.110) — however, *Netrelytron parum* is now considered a taxonomic junior synonym of *Netrelytron* (now *Kalyptea*) *stegastum*. Sarjeant (1966c) stated that the epithet was derived from the Greek tri = three and netron = spindle. Since Principle 5 of the I.C.N. states that taxon names are to be treated as Latin and since compound epithets are conventionally treated as adjectives, the epithet should be rendered as trinetra in agreement with the feminine gender of the generic name. Age: middle Barremian.

"*tripartita*" Johnson and Hills, 1973, p.208, pl.2, figs.12–14,17–18; pl.3, figs.1–2; text-figs.11A–C. Holotype: Johnson and Hills, 1973, pl.2, fig.18. Originally *Pareodinia*, subsequently *Glomodinium*, thirdly *Evansia*. **Taxonomic senior synonym:** *Tenua* (as *Pareodinia*, now *Evansia*) *evittii*, according to Wiggins (1975, p.105) and Lentin and Williams (1989, p.283). Age: late Bathonian.

"var. *acuta*" Johnson and Hills, 1973, caption to pl.2, fig.12. **Name not validly published:** no description.

"var. *obtusa*" Johnson and Hills, 1973, p.208. Holotype: Johnson and Hills, 1973, pl.2, fig.18. **Name illegitimate** — **nomenclatural senior synonym:** *Pareodinia tripartita* var. *tripartita*, which has the same holotype. Age: late Bathonian.

"subsp. *rotunda*" (Johnson and Hills, 1973, p.209, pl.3, figs.1–2; text-fig.11C) Lentin and Williams, 1975, p.2153. Holotype: Johnson and Hills, 1973, pl.3, fig.2. Originally *Pareodinia tripartita* var. *rotunda*, subsequently *Pareodinia tripartita* subsp. *rotunda*, thirdly *Evansia tripartita* subsp. *rotunda*. **Taxonomic senior synonym** (at specific rank): *Tenua* (as *Pareodinia*, now *Evansia*) *evittii*, according to Wiggins (1975, p.105) and Below (1990, p.73). Age: late Bathonian.

"var. *rotunda*" Johnson and Hills, 1973, p.209, pl.3, figs.1–2; text-fig.11C. Holotype: Johnson and Hills, 1973, pl.3, fig.2. Originally *Pareodinia tripartita* var. *rotunda*, subsequently *Pareodinia tripartita* subsp. *rotunda*, thirdly *Evansia tripartita* subsp. *rotunda*. **Taxonomic senior synonym** (at specific rank): *Tenua* (as *Pareodinia*, now *Evansia*) *evittii*, according to Wiggins (1975, p.105) and Below (1990, p.73). Age: late Bathonian.

"subsp. *tripartita*". Autonym. Holotype: Johnson and Hills, 1973, pl.2, fig.18. **Now redundant.** Originally *Pareodinia tripartita* subsp. *tripartita*, subsequently *Evansia tripartita* subsp. *tripartita*. Nomenclatural junior synonym: *Pareodinia tripartita* var. *obtusa*, which has the same holotype.

"var. *tripartita*". Autonym. Holotype: Johnson and Hills, 1973, pl.2, fig.18. **Now redundant.** Nomenclatural junior synonym: *Pareodinia tripartita* var. *obtusa*, which has the same holotype.

"*verrucosa*" (Vozzhennikova, 1967, p.56, pl.12, fig.6) Wiggins, 1975, p.105. Emendation: Lentin and Vozzhennikova, 1990, p.83–84, as *Gochteodinia verrucosa*. Holotype: Vozzhennikova, 1967, pl.12, fig.6; Lentin and Vozzhennikova, 1990 pl.11, fig.5; text-fig.46. **NOW** *Gochteodinia*. Originally *Imbatodinium*, subsequently *Pareodinia*, thirdly (and now) *Gochteodinia*. Age: Late Jurassic.

?*villosa* Tasch in Tasch et al., 1964, p.195–196, pl.1, fig.9. Holotype: Tasch et al., 1964, pl.1, fig.9. Originally *Pareodinia*, subsequently (and now) *Pareodinia?*. Questionable assignment: Stover and Evitt (1978, p.117) as a problematic species, and Below (1990, p.66) as a "nomen dubium". Age: Albian.

"*villosa*" (Vozzhennikova, 1967, p.56, pl.12, figs.1a–b,2a–b,3a–b; pl.13, figs.1a–e,2,3a–d; pl.14, figs.1a–e,2a–i; pl.15, figs.1–2) Wiggins, 1975, p.107. Emendations: Lentin and Vozzhennikova, 1990, p.85; Below, 1990, p.50, both as *Gochteodinia villosa*. Holotype: Vozzhennikova, 1967, pl.12, figs.3a–b; pl.15, fig.1; Eisenack and Kjellström, 1975b, figure to right — p.726f; Lentin and Vozzhennikova, 1990, pl.11, figs.7–8; text-fig.47; Fensome

et al., 1995, fig.1 — p.1903; Fensome et al., 1996, figs.1–3 — p.2431. **Combination not validly published:** not proposed formally. **NOW** *Gochteodinia villosa*. Originally *Imbatodinium villosum*, subsequently *Pareodinia villosa* (Vozzhennikova) (combination not validly published), thirdly *Pareodinia dasyforma*, fourthly (and now) *Gochteodinia villosa*. This combination, if validated, would be an illegitimate junior homonym of *Pareodinia villosa* Tasch. Age: Late Jurassic.

"*wigginsii*" Smelror, 1988a, p.296,298, pl.8, figs.1–2; text-fig.12. Holotype: Smelror, 1988a, pl.8, fig.2. **NOW** *Evansia*. Originally *Pareodinia*, subsequently (and now) *Evansia*. Age: early Oxfordian.

"**PAREODINIOPSIS**" Beju, 1978, p.4. **Name not validly published:** no description.

"*bimembranis*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

"**PARVOCAVATUS**" Gitmez, 1970, p.306. **Taxonomic senior synonym:** *Dingodinium*, according to Fisher and Riley (1976, p.52). Type: Gitmez, 1970, pl.6, fig.9; text-fig.31, as *Parvocavatus tuberosus*.

"*scabratus*" Kumar, 1986b, p.399, pl.5, fig.3; pl.6, figs.4,6; text-fig.9. Holotype: Kumar, 1986b, pl.6, fig.6. Originally *Parvocavatus*, subsequently *Dingodinium*. **Taxonomic senior synonym:** *Dingodinium minutum* Dodekova, according to Poulsen (1996, p.82). Age: Kimmeridgian–Tithonian.

"?*scutella*" (Eisenack, 1958a, p.385, pl.24, fig.3) Sarjeant, 1985a, p.87. Emendation: Sarjeant, 1985a, p.87–89, as *Parvocavatus? scutella*. Holotype: Eisenack, 1958a, pl.24, fig.3; Sarjeant, 1985a, pl.7, fig.3; pl.9, figs.4–6; Jan du Chêne et al., 1986a, pl.111, fig.1. **NOW** *Scriniodinium?*. Originally *Scriniodinium*, subsequently *Ellipsoidictyum*, thirdly *Parvocavatus?*, fourthly (and now) *Scriniodinium?*. Questionable assignment: Sarjeant (1985a, p.87–89). N.I.A. Age: late Aptian.

"*spinusus*" Duxbury, 1977, p.46–47, pl.9, fig.3; text-fig.17. Holotype: Duxbury, 1977, pl.9, fig.3; text-fig.17. **NOW** *Dingodinium?*. Originally *Parvocavatus*, subsequently *Dingodinium*, thirdly (and now) *Dingodinium?*. Age: late Berriasian.

"**tuberosus*" Gitmez, 1970, p.307–308, pl.6, fig.9; text-fig.31. Emendation: Poulsen, 1996, p.83, as *Dingodinium tuberosum*. Holotype: Gitmez, 1970, pl.6, fig.9; text-fig.31. **NOW** *Dingodinium*. Originally *Parvocavatus*, subsequently (and now) *Dingodinium*, thirdly *Dingodinium?*. Age: early Kimmeridgian.

PARVOCYSTA Bjaerke, 1980, p.59–60,62. **Taxonomic senior synonym:** *Dodekovia*, according to Below (1987a, p.113) — however, Lentin and Williams (1989, p.284) retained *Parvocysta*. Type: Bjaerke, 1980, pl.1, figs.4–5, as *Parvocysta bullula*.

ampulla Riding and Shaw in Riding et al., 1991, p.149, pl.1, figs.1–5; text-fig.4A. Holotype: Riding et al., 1991, pl.1, figs.1–2. N.I.A. Age: late Toarcian–Aalenian.

barbata Bjaerke, 1980, p.65, pl.1, figs.10,14–15,18; text-fig.3F. Holotype: Bjaerke, 1980, pl.1, figs.10,14–15. Age: Toarcian.

"*bjaerkei*" Smelror, 1987, p.227,230, figs.4G,8C–D; text-fig.9. Emendation: Bailey and Hogg, 1995, p.58, as *Fentonia bjaerkei*. Holotype: Smelror, 1987, fig.4G. **NOW** *Limbicysta* (Appendix A). Originally *Parvocysta*, subsequently *Fentonia* (Appendix A), thirdly (and now) *Limbicysta* (Appendix A). Age: late Callovian.

**bullula* Bjaerke, 1980, p.62,64, pl.1, figs.2–6,9; text-fig.3C. Holotype: Bjaerke, 1980, pl.1, figs.4–5; Fensome et al., 1993a, figs.4–5 — p.997. Originally (and now) *Parvocysta*, subsequently *Dodekovia*. Lentin and Williams (1989, p.284) retained this species in *Parvocysta*. N.I.A. Age: Toarcian.

"*contracta*" Bjaerke, 1980, p.64–65, pl.1, figs.7–8; text-fig.3B. Holotype: Bjaerke, 1980, pl.1, figs.7–8.

Taxonomic senior synonym: *Susadinium* (as *Dodekovia*) *scrofoides*, according to Below (1987a, p.120). Age: Toarcian.

"?*cracens*" Bjaerke, 1980, p.66, pl.4, fig.16; text-fig.3D. Emendation: Prauss, 1989, p.22, as *Reutlingia cracens*. Holotype: Bjaerke, 1980, pl.4, fig.16. **NOW** *Reutlingia*. Originally *Parvocysta*?, subsequently (and now) *Reutlingia*. Questionable assignment: Bjaerke (1980, p.66). Age: Toarcian.

nasuta Bjaerke, 1980, p.65–66, pl.1, figs.11–12; text-fig.3A. Emendation: Below, 1987a, p.139, as *Reutlingia nasuta*. Holotype: Bjaerke, 1980, pl.1, figs.11–12; Fensome et al., 1993a, figs.1–2 — p.1267; figs.1–2 — p.1271. Originally (and now) *Parvocysta*, subsequently *Reutlingia*. Lentin and Williams (1989, p.284–285) retained this species in *Parvocysta*. Age: Toarcian.

subsp. *nasuta*. Autonym. Holotype: Bjaerke, 1980, pl.1, figs.11–12; Fensome et al., 1993a, figs.1–2 — p.1267; figs.1–2 — p.1271.

subsp. *ramosa* (Below, 1987a, p.140, pl.20, figs.5–6,11–12,16,18) Lentin and Williams, 1989, p.285. Holotype: Below, 1987a, pl.20, figs.5–6,11–12,18; Fensome et al., 1993a, fig.3 — p.1267; figs.1–5 — p.1295. Originally *Reutlingia nasuta* var. *ramosa*, subsequently (and now) *Parvocysta nasuta* subsp. *ramosa*. Age: Toarcian.

?*tricornuta* Riding and Shaw in Riding et al., 1991, p.149–150,152, pl.1, figs.11–15; text-fig.4C. Holotype: Riding et al., 1991, pl.1, fig.11. Questionable assignment: Riding and Shaw in Riding et al. (1991, p.149). Age: late Toarcian–Aalenian.

?*triquetra* Riding and Shaw in Riding et al., 1991, p.152, pl.1, figs.6–10; text-fig.4B. Holotype: Riding et al., 1991, pl.1, fig.9. Questionable assignment: Riding and Shaw in Riding et al. (1991, p.152). Age: late Toarcian–Aalenian.

PARVULODINIUM Dodekova, 1975, p.29. Type: Dodekova, 1975, pl.6, figs.6–9, as *Parvulodinium penitabulatum*.

**clavatum* Dodekova, 1975, p.30, pl.6, figs.4–9; text-fig.8. Holotype: Dodekova, 1975, pl.6, figs.6–9. Age: late Bathonian.

"*penitabulatum*" Davies, 1983, p.27–28, pl.9, figs.9–11,13–15,17–19; text-fig.24. Holotype: Davies, 1983, pl.9, figs.9–11,13–15; text-fig.24. **Taxonomic senior synonym:** *Mancodinium semitabulatum*, according to Prauss (1989, p.25). Age: Toarcian–early Bajocian.

PAUCIBUCINA Jiabo, 1978, p.73–74. Emendation: Mao Shaozhi et al., 1995, p.44. Chen et al. (1988, p.22) considered this to be an acritarch genus. However, Lentin in Lentin and Williams (1989, p.285) examined the type and determined it to be a dinoflagellate cyst. Type: Jiabo, 1978, pl.24, fig.1; text-fig.14, as *Paucibucina dongyingensis*.

**dongyingensis* Jiabo, 1978, p.74, pl.24, fig.1; text-fig.14. Holotype: Jiabo, 1978, pl.24, fig.1; text-fig.14. Age: Early Tertiary.

liaoningensis Jiabo, 1978, p.74, pl.24, fig.2. Holotype: Jiabo, 1978, pl.24, fig.2. Age: Early Tertiary.

pylophora Lang Yan et al., 1999, p.378,388, pl.2, figs.9–10. Holotype: Lang Yan et al., 1999, pl.2, fig.9. Age: Early Cretaceous.

simplex Jiabo, 1978, p.74, pl.24, figs.3–4. Holotype: Jiabo, 1978, pl.24, fig.3. Age: Early Tertiary.

PAUCISPHAERIDIUM Bujak et al., 1980, p.30,32. Type: Davey and Williams, 1966b, pl.12, fig.3, as *Litosphaeridium? inversibuccinum*.

cylindratum Islam, 1983b, p.342, pl.1, figs.12–14. Holotype: Islam, 1983b, pl.1, fig.12. Age: early Eocene.

hexagonum He Chengquan, 1991, p.174–175, pl.15, fig.11. Holotype: He Chengquan, 1991, pl.15, fig.11. Age: Paleocene.

**inversibuccinum* (Davey and Williams, 1966b, p.82, pl.12, fig.3) Bujak et al., 1980, p.32. Emendation: Bujak et al., 1980, p.32, as *Paucisphaeridium inversibuccinum*. Holotype: Davey and Williams, 1966b, pl.12, fig.3; Eisenack and Kjellström, 1972, p.781; Bujak et al., 1980, pl.2, figs.4–5; Fensome et al., 1995, fig.1 — p.1567; Fauconnier and Masure, 2004, pl.63, fig.1. Originally *Litosphaeridium?*, subsequently (and now) *Paucisphaeridium*. Age: early Eocene.

"forma *bipolare*" de Coninck, 1986b, p.17, pl.6, figs.31–32,40–41. **Name not validly published**: holotype not designated. **NOW** *Paucisphaeridium inversibuccinum* subsp. *bipolare*. Originally *Paucisphaeridium inversibuccinum* forma *bipolare* (name not validly published), subsequently (and now) *Paucisphaeridium inversibuccinum* subsp. *bipolare*. Age: middle Eocene–early Oligocene (Bartonian–Tongrian).

subsp. *bipolare* de Coninck, 1986b, p.17, pl.6, figs.31–32,40–41 ex Masure and Courtinat in Fauconnier and Masure, 2004, p.437. Holotype: de Coninck, 1986b, pl.6, figs.31–32, designated by Masure and Courtinat in Fauconnier and Masure (2004, p.437); Fauconnier and Masure, 2004, pl.63, figs.2–7. Originally *Paucisphaeridium inversibuccinum* forma *bipolare* (name not validly published), subsequently (and now) *Paucisphaeridium inversibuccinum* subsp. *bipolare*. The name *Paucisphaeridium inversibuccinum* forma *bipolare* was not validly published in de Coninck (1986b) since no holotype was designated. Age: middle Eocene–early Oligocene (Bartonian–Tongrian).

subsp. *inversibuccinum*. Autonym. Holotype: Davey and Williams, 1966b, pl.12, fig.3; Eisenack and Kjellström, 1972, p.781; Bujak et al., 1980, pl.2, figs.4–5; Fensome et al., 1995, fig.1 — p.1567; Fauconnier and Masure, 2004, pl.63, fig.1. Age: early Eocene.

PELTIPHORIDIUM Xu Jinli et al., 1997, p.84,148–149. Type: Jiabo, 1978, pl.29, fig.2, as *Bipolaribucina oblongata*.

abbreviatum Xu Jinli et al., 1997, p.85, pl.20, fig.4; pl.21, figs.3–4,11 ex He Chengquan et al., 2009, p.358,659. Holotype: Xu Jinli et al., 1997, pl.21, fig.3. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided. He Chengquan et al. (2009, p.659) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

liaoningense (Jiabo, 1978, p.58, pl.29, figs.6–8) Xu Jinli et al., 1997, p.85. Holotype: Jiabo, 1978, pl.29, fig.7. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Peltiphoridium*. Age: Early Tertiary.

**oblongatum* (Jiabo, 1978, p.58, pl.29, figs.1–3) Xu Jinli et al., 1997, p.85. Holotype: Jiabo, 1978, pl.29, fig.2. Originally *Bipolaribucina oblongata*, subsequently *Impletosphaeridium oblongatum* (combination illegitimate), thirdly *Impletosphaeridium elongatum*, fourthly (and now) *Peltiphoridium oblongatum*. Age: Early Tertiary.

PENTADINELLUM Keupp, 1991a, p.283–284. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1301). Type: Wall and Dale, 1968b, pl.172, fig.20, as "oblate-type cyst", now *Pentadinellum oblatum*.

cretaceum Keupp, 1992b, p.131–132, pl.5, figs.6–10. Holotype: Keupp, 1992b, pl.5, figs.6–7. Age: middle Aptian.

***oblatum** Keupp, 1991a, p.282–283. Holotype: Wall and Dale, 1968b, pl.172, fig.20, as "oblate-type cyst". Motile equivalent: probably *Enciculifera mexicana* Balech, 1967, according to Wall et al. (1970, p.155). Motile equivalent: *Enciculifera* sp. cf. *E. mexicana* Balech, 1967, according to Streng et al. (2004, p.482). Age: Quaternary.

vimineum (Keupp, 1987, p.49–50, pl.13, figs.7–12; pl.14, figs.1–8) Keupp, 1992b, p.132. Holotype: Keupp, 1987, pl.13, figs.7–8. Originally *Carinellum*, subsequently (and now) *Pentadinellum*. Keupp (1995, p.158) placed the generic name in quotes. Age: middle Albian–early Cenomanian.

PENTADINIUM Gerlach, 1961, p.164–165. Emendation: Benedek et al., 1982, p.266–268. Taxonomic junior synonyms: *Planinosphaeridium*, according to Stover and Evitt (1978, p.179–180); *Toenisbergia*, according to Lentin and Williams (1985, p.356). Type: Gerlach, 1961, pl.26, figs.5–6; text-figs.6–7, as *Pentadinium laticinctum*.

alabamense Quaijtaal and Brinkhuis, 2012, p.50,52–53, pl.1, figs.1A–L; pl.2, figs.A–F; text-figs.3A–B. Holotype: Quaijtaal and Brinkhuis, 2012, pl.1, figs.A–D. Age: early Oligocene.

?circumsutum (Morgenroth, 1966b, p.5, pl.1, figs.3–4) Stover and Evitt, 1978, p.180. Holotype: Morgenroth, 1966b, pl.1, fig.3. Originally *Pterodinium*, subsequently (and now) *Pentadinium*?. Questionable assignment: Stover and Evitt (1978, p.180). Age: early Oligocene.

corium Schiøler, 2005, p.29–30, pl.8, figs.11–12,16–18; text-fig.6. Holotype: Schiøler, 2005, pl.8, figs.17–18. Age: Rupelian–Chattian.

favatum Edwards, 1982, p.113, pl.1, figs.4,7,10–13; pl.2, figs.1–12. Holotype: Edwards, 1982, pl.1, figs.4,7,10; Jan du Chêne et al., 1986a, pl.82, figs.1–5. Age: middle Eocene.

galileoi Sancay et al., 2007, p.537–538,540, pl.1, figs.1–20, text-fig.4. Holotype: Sancay et al., 2007, pl.1, figs.1–4. Age: Maastrichtian.

goniferum Edwards, 1982, p.114,116, pl.4, figs.1–9. Holotype: Edwards, 1982, pl.4, figs.1–2,4–5,7–8; Jan du Chêne et al., 1986a, pl.82, figs.6–8,11–12. Age: middle Eocene.

imaginatum (Benedek, 1972, p.43–44, pl.2, figs.11a–b; pl.6, figs.9a–b) Stover and Hardenbol, 1994, p.33. Holotype: Benedek, 1972, pl.6, figs.9a–b; Benedek et al., 1982, figs.6A,C,E,8A–B. Originally *Pentadinium laticinctum* subsp. *imaginatum*, subsequently (and now) *Pentadinium imaginatum*. Taxonomic senior synonym: *Pentadinium taeniagerum* subsp. *imaginatum* (as *Toenisbergia imaginatum*), according to Benedek et al. (1982, p.279) — however, Lentin and Williams (1985, p.279) retained *Pentadinium imaginatum* (as *Pentadinium laticinctum* subsp. *imaginatum*). Age: late Oligocene.

***laticinctum** Gerlach, 1961, p.165–166, pl.26, figs.5–6; text-figs.6–7. Emendation: Benedek et al., 1982, p.268–272. Holotype: Gerlach, 1961, pl.26, figs.5–6; text-figs.6–7; Benedek et al., 1982, text-figs.3E–F; Jan du Chêne et al., 1986a, pl.80, fig.3. Age: middle Oligocene–middle Miocene.

subsp. **granobaculatum** He Chengquan, 1991, p.123, pl.5, figs.38–39. Holotype: He Chengquan, 1991, pl.5, figs.38–39. Age: middle Eocene.

subsp. **granulatum** Gocht, 1969, p.29–30, pl.9, figs.17–18; text-fig.20. Holotype: Gocht, 1969, pl.9, fig.18; text-fig.20c. Age: middle Oligocene.

"subsp. **imaginatum**" Benedek, 1972, p.43–44, pl.2, figs.11a–b; pl.6, figs.9a–b. Holotype: Benedek, 1972, pl.6, figs.9a–b; Benedek et al., 1982, figs.6A,C,E,8A–B. **NOW** *Pentadinium imaginatum*. Originally *Pentadinium laticinctum* subsp. *imaginatum*, subsequently (and now) *Pentadinium imaginatum*. Taxonomic senior synonym: *Pentadinium taeniagerum* subsp. *imaginatum* (as *Toenisbergia imaginatum*), according to Benedek et al. (1982, p.279) — however, Lentin and Williams (1985, p.279) retained *Pentadinium laticinctum* subsp. *imaginatum*. Age: late Oligocene.

subsp. *laticinctum*. Autonym. Holotype: Gerlach, 1961, pl.26, figs.5–6; text-figs.6–7; Benedek et al., 1982, text-figs.3E–F; Jan du Chêne et al., 1986a, pl.80, fig.3.

"subsp. *lophophorum*" Benedek, 1972, p.44, pl.6, figs.8a–b; text-fig.19. Emendation: Benedek et al., 1982, p.275, as *Pentadinium lophophorum*. Holotype: Benedek, 1972, pl.6, figs.8a–b; text-fig.19; Benedek et al., 1982, text-figs.5A–B,7B,D,F. **NOW** *Pentadinium lophophorum*. Originally *Pentadinium laticinctum* subsp. *lophophorum*, subsequently (and now) *Pentadinium lophophorum*. Taxonomic junior synonym (at specific and subspecific ranks): *Pentadinium taeniagerum* subsp. *lophophorum*, according to Benedek et al. (1982, p.275). Age: middle Oligocene.

lophophorum (Benedek, 1972, p.44, pl.6, figs.8a–b; text-fig.19) Benedek et al., 1982, p.275–279. Emendation: Benedek et al., 1982, p.275, as *Pentadinium lophophorum*. Holotype: Benedek, 1972, pl.6, figs.8a–b; text-fig.19; Benedek et al., 1982, text-figs.5A–B,7B,D,F. Originally *Pentadinium laticinctum* subsp. *lophophorum*, subsequently (and now) *Pentadinium lophophorum*. Taxonomic junior synonym (at specific and subspecific ranks): *Pentadinium taeniagerum* subsp. *lophophorum*, according to Benedek et al. (1982, p.275). Age: middle Oligocene.

membranaceum (Eisenack, 1965b, p.151, pl.14, fig.4; pl.15, fig.6; text-fig.1) Stover and Evitt, 1978, p.180. Holotype: Eisenack, 1965b, pl.14, fig.4; text-fig.1; Jan du Chêne et al., 1986a, pl.80, figs.4–7. Originally *Planinosphaeridium*, subsequently (and now) *Pentadinium*. Taxonomic junior synonym: *Ataxiodinium choane*, according to Dale (1976, p.45; footnote to table II) — however, Edwards and Andrieu (1992, p.265) retained *Ataxiodinium choane*. Age: late Eocene–early Oligocene.

netangei Zhao Yunyun and Morzadec-Kerfourn, 1994, p.266,268, pl.1, figs.4a–c,5a–b,6a–b,7; pl.2, figs.4–8. Holotype: Zhao Yunyun and Morzadec-Kerfourn, 1994, pl.1, figs.4a–c. Age: Pleistocene.

omasum Harding, 1990b, p.36–37, pl.17, figs.1–14 ex Harding in Williams et al., 1998, p.473. Holotype: Harding, 1990b, pl.17, figs.1,3. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). N.I.A. Age: late Barremian.

polypodium Edwards, 1982, p.113–114, pl.3, figs.1–12. Holotype: Edwards, 1982, pl.3, figs.1–2,4–5,7. Age: middle Eocene.

sabulum Fensome et al., 2009, p.54, pl.9, figs.i–o. Holotype: Fensome et al., 2009, pl.9, figs.k–l. Age: youngest occurrence, middle Aquitanian.

spinulum Strauss and Lund, 1992, p.168–169, pl.4, figs.1–3,6. Holotype: Strauss and Lund, 1992, pl.4, figs.1–3. Age: middle Miocene.

taeniagerum Gerlach, 1961, p.167–168, pl.26, figs.8–9,12,15; text-fig.8. Holotype: Gerlach, 1961, pl.26, fig.8; text-fig.8; Benedek et al., 1982, text-fig.4D; Fensome et al., 1995, fig.1 — p.1841; figs.1–2 — p.1845. Benedek et al. (1982, p.275) suggested "that this name be restricted to the holotype and [one of the] paratype[s]...." Age: middle Oligocene–middle Miocene.

subsp. *imaginatum* Benedek, 1972, p.45–46, pl.6, figs.12a–b. Emendation: Benedek et al., 1982, p.279,281, as *Toenisbergia imaginata*. Holotype: Benedek, 1972, pl.6, figs.12a–b; Eisenack and Kjellström, 1975a, first page labelled "nach S.646"; Benedek et al., 1982, figs.7A,C,E,8C–D (not 8A–B); Fensome et al., 1995, figs.1–4 — p.1557. Originally (and now) *Pentadinium taeniagerum* subsp. *imaginatum*, subsequently *Toenisbergia imaginatum*. Lentin and Williams (1985, p.279) retained this taxon as *Pentadinium laticinctum* subsp. *imaginatum*. Taxonomic junior synonym: *Pentadinium laticinctum* subsp. *imaginatum*, according to Benedek et al. (1982, p.279) — however, Lentin and Williams (1985, p.279) retained *Pentadinium laticinctum* subsp. *imaginatum*. Age: late Oligocene.

"subsp. *lophophorum*" Benedek, 1972, p.45, pl.6, figs.13a–b. Holotype: Benedek, 1972, pl.6, figs.13a–b; Eisenack and Kjellström, 1975a, second page labelled "nach S.646"; Fensome et al., 1995, figs.1–4 — p.1609. **Taxonomic senior synonym** (at specific and subspecific ranks): *Pentadinium laticinctum* subsp.

lophophorum (now *Pentadinium lophophorum*), according to Benedek et al. (1982, p.275). Age: middle Oligocene.

subsp. *taeniagerum*. Autonym. Holotype: Gerlach, 1961, pl.26, fig.8; text-fig.8; Benedek et al., 1982, text-fig.4D; Fensome et al., 1995, fig.1 — p.1841; figs.1–2 — p.1845.

PENTAFIDIA Backhouse, 1988, p.103–104 Type: Backhouse, 1988, pl.50, figs.1–3; text-figs.31A–C, as *Pentafidia charlottensis*.

**charlottensis* Backhouse, 1988, p.104–105, pl.37, figs.8–16; pl.50, figs.1–3; text-figs.31A–C. Holotype: Backhouse, 1988, pl.37, fig.8; text-fig.31B; Fensome et al., 1993a, fig.1 — p.1045. Age: Berriasian–?earliest Valanginian.

punctata Backhouse, 1988, p.105, pl.38, figs.1–7; pl.50, figs.4–6 (not figs.3–4); text-figs.31D–E. Holotype: Backhouse, 1988, pl.38, fig.1; text-fig.31D; Fensome et al., 1996, figs.1,9 — p.2307. Age: late Tithonian–?earliest Valanginian.

"**PENTAGONUM**" Vozzhennikova, 1963 ex Vozzhennikova, 1967

"*conicoides*" Vozzhennikova, 1963, caption to text-fig.17 — p.185. **Name not validly published:** orthographic error. The name appears only in the description for text-fig.17, there it is erroneously used for *Pentagonum sibiricum*, according to Vozzhennikova in Lentin and Williams (1993, p.500).

"*granulatum*" Oleinik, 1975, p.225–226, pl.1, figs.3–5. Holotype: Oleinik, 1975, pl.1, fig.3. **NOW** *Palaeoperidinium granulatum* Oleinik. Originally *Pentagonum granulatum* (generic name illegitimate), subsequently (and now) *Palaeoperidinium granulatum* Oleinik, thirdly *Palaeoperidinium oleinikii* (name illegitimate). Following I.C.N. Article 55.1, the species name *Pentagonum granulatum* is validly published even though the generic name *Pentagonum* is illegitimate. Age: late Eocene.

"*huanghuaense*" Jiabo, 1978, p.56, pl.1, figs.1–3. Holotype: Jiabo, 1978, pl.1, fig.1. **NOW** *Palaeoperidinium*. Originally *Pentagonum* (generic name illegitimate), subsequently (and now) *Palaeoperidinium*. Following I.C.N. Article 55.1, the species name *Pentagonum huanghuaense* is validly published even though the generic name *Pentagonum* is illegitimate. Age: Early Tertiary.

"*marginatum*" Vozzhennikova, 1967, p.107, pl.46, figs.1,3–4,6. Holotype: Vozzhennikova, 1967, pl.46, fig.6; Lentin and Vozzhennikova, 1990, pl.7, fig.6; text-fig.33; lost according to Lentin and Vozzhennikova (1990, p.62). Originally *Pentagonum* (generic name illegitimate), subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Following I.C.N. Article 55.1, the species name *Pentagonum marginatum* is validly published even though the generic name *Pentagonum* is illegitimate. Age: Paleocene.

"**sibiricum*" Vozzhennikova, 1967, p.106–107, pl.46, figs.2,5. Holotype: Vozzhennikova, 1967, pl.46, fig.2, lost according to Lentin and Vozzhennikova (1990, p.63). Lectotype: Lentin and Vozzhennikova, 1990, pl.7, fig.3; text-fig.34, designated by Lentin and Vozzhennikova (1990, p.63). Originally *Pentagonum* (generic name illegitimate), subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Following I.C.N. Article 55.1, the specific name *Pentagonum sibiricum* was validly published in Vozzhennikova (1967) even though the generic name *Pentagonum* is illegitimate. As indicated by Vozzhennikova (1963, p.183) and confirmed by Vozzhennikova (1967, p.106), the specimens illustrated in Vozzhennikova (1963, text-figs.17a–b) are specimens of *Pentagonum sibiricum*, even though the caption identifies them as *Pentagonum conicoides*. The name *Pentagonum sibiricum* was not validly published in Vozzhennikova (1963) since no holotype was designated. Age: Paleocene.

PERIDICTYOCYSTA Cookson and Eisenack, 1974, p.70. Type: Cookson and Eisenack, 1958, pl.8, fig.3, as *Cannosphaeropsis mirabilis*.

?*bamburiensis* Mungai in Jiang Qinghua et al., 1992, p.90, pl.3, figs.4–6; text-figs.4a–b. Holotype: Jiang Qinghua et al., 1992, pl.3, fig.4. Questionable assignment: Mungai in Jiang Qinghua et al. (1992, p.90); and Fauconnier in Fauconnier and Masure (2004, p.440) as a problematic species. Age: Tithonian.

**mirabilis* (Cookson and Eisenack, 1958, p.48, pl.8, figs.3–5) Cookson and Eisenack, 1974, p.70. Holotype: Cookson and Eisenack, 1958, pl.8, fig.3. Originally *Cannosphaeropsis*, subsequently (and now) *Peridictyocysta*. Age: Late Jurassic.

PERIDINITES Lefèvre, 1933b, p.221. Emendation: Harding and Lewis, 1994, p.834. Siliceous dinoflagellate genus. Taxonomic senior synonym: *Lithoperidinium*, by implication in Deflandre (1945b, cards 806–809), who believed *Peridinites* to be the senior name — however, Harding and Lewis (1994, p.834) retained *Peridinites*. This name was not validly published in Lefèvre (1933a) since no validly published species were assigned to it. For a full discussion, see Fensome et al. (1993b, p.137). Type: Lefèvre, 1933b, text-fig.7, as *Peridinites parvulus*.

"*barbadensis*" Lefèvre, 1933b, p.222–223, text-figs.9–12. Holotype: Lefèvre, 1933b, text-fig.9. **NOW** *Lithoperidinium*. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. This name was not validly published in Lefèvre (1933a, p.416) since no illustrations were provided. Age: Early Tertiary.

"*diodos*" Lefèvre, 1933b, p.227, text-fig.23. Holotype: Lefèvre, 1933b, text-fig.23. **NOW** *Lithoperidinium*. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. This name was not validly published in Lefèvre (1933a, p.417–418) since no illustrations were provided. N.I.A. Age: Early Tertiary.

"*globosus*" Lefèvre, 1933b, p.224, text-figs.15–16. Holotype: Lefèvre, 1933b, text-fig.15. **NOW** *Lithoperidinium*. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. This name was not validly published in Lefèvre (1933a, p.416) since no illustrations were provided. Age: Early Tertiary.

"*maculatus*" (Vozzhennikova, 1967, p.117–118, pl.49, figs.1–12; pl.50, figs.1–8) Lentin and Williams, 1973, p.110. **Name not validly published:** holotype not designated. Originally *Lithoperidinium* (name not validly published), subsequently *Peridinites* (name not validly published). Age: early Oligocene.

"*oamaruensis*" (Deflandre, 1933, p.273, text-figs.1–7) Deflandre, 1945b, cards 806–809. Holotype: Deflandre, 1933, text-figs.1–7. **NOW** *Lithoperidinium*. Originally (and now) *Lithoperidinium*, subsequently *Peridinites*. Age: Tertiary.

"*ovalis*" Lefèvre, 1933b, p.226, text-figs.21–22. Holotype: Lefèvre, 1933b, text-figs.21–22. **NOW** *Lithoperidinium*. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. This name was not validly published in Lefèvre (1933a, p.417) since no illustrations were provided. Age: Early Tertiary.

**parvulus* Lefèvre, 1933b, p.221–222, text-figs.6–8. Holotype: Lefèvre, 1933b, text-fig.7, according to Eisenack and Klement (1964, p.657). Originally (and now) *Peridinites*, subsequently *Lithoperidinium*. This species was retained in *Peridinites* by Harding and Lewis (1994, p.834). This name was not validly published in Lefèvre (1933a, p.416) since no illustrations were provided. Age: Early Tertiary.

"*perforatus*" Lefèvre, 1933b, p.227–228, text-figs.25–30. Holotype: Lefèvre, 1933b, text-figs.29–30. **NOW** *Lithoperidinium*. Originally *Peridinites*, subsequently (and now) *Lithoperidinium*. This name was not validly published in Lefèvre (1933a, p.418) since no illustrations were provided. Age: Early Tertiary.

piriformis Lefèvre, 1933b, p.225, text-figs.17–20. Emendation: Harding and Lewis, 1994, p.834–835, as *Peridinites piriformis*. Holotype: Lefèvre, 1933b, text-fig.17. Originally (and now) *Peridinites*, subsequently *Lithoperidinium*. This species was retained in *Peridinites* by Harding and Lewis (1994, p.834). This name was not validly published in Lefèvre (1933a, p.417) since no illustrations were provided. Age: Early Tertiary.

subsp. **compactus** (Lefèvre, 1933b, p.225, text-figs.19–20) Lentin and Williams, 1973, p.110. Holotype: Lefèvre, 1933b, text-figs.19–20. Originally *Peridinites piriformis* var. *compactus*, subsequently (and now) *Peridinites piriformis* subsp. *compactus*, thirdly (and now) *Lithoperidinium piriforme* subsp. *compactum*. Age: Early Tertiary.

"var. **compactus**" Lefèvre, 1933b, p.225, text-figs.19–20. Holotype: Lefèvre, 1933b, text-figs.19–20. **NOW** *Peridinites piriformis* subsp. *compactus*. Originally *Peridinites piriformis* var. *compactus*, subsequently (and now) *Peridinites piriformis* subsp. *compactus*, thirdly *Lithoperidinium piriforme* subsp. *compactum*. This name was not validly published in Lefèvre (1933a, p.417) since no illustrations were provided. Age: Early Tertiary.

subsp. **piriformis**. Autonym. Holotype: Lefèvre, 1933b, text-fig.17. Originally (and now) *Peridinites piriformis* subsp. *piriformis*, subsequently *Lithoperidinium piriforme* subsp. *piriforme*.

"var. **piriformis**". Autonym. Holotype: Lefèvre, 1933b, text-fig.17. **Now redundant.**

"**rossicus**" (Deflandre, 1940, p.266, text-figs.1–4) Deflandre, 1945b, cards 817–818. Holotype: Deflandre, 1940, text-figs.1–4. **NOW** *Lithoperidinium*. Originally (and now) *Lithoperidinium*, subsequently *Peridinites*. Age: Eocene.

sphaericus Lefèvre, 1933b, p.223–224, text-figs.13–14,24. Emendation: Harding and Lewis, 1994, p.835–836, as *Peridinites sphaericus*. Holotype: Lefèvre, 1933b, text-figs.13–14. Originally (and now) *Peridinites*, subsequently *Lithoperidinium*. This species was retained in *Peridinites* by Harding and Lewis (1994, p.835). Taxonomic junior synonym (at specific rank): *Peridinites sphaericus* var. *minus*, according to Harding and Lewis (1994, p.837). This name was not validly published in Lefèvre (1933a, p.416–417) since no illustrations were provided. Age: Early Tertiary.

"subsp. **minor**" (Lefèvre, 1933b, p.224; text-fig.24) Lentin and Williams, 1973, p.111. Holotype: Lefèvre, 1933b, text-fig.24. Originally *Peridinites sphaericus* var. *minor*, subsequently *Peridinites sphaericus* subsp. *minor*, thirdly *Lithoperidinium sphaericum* subsp. *minus*. **Taxonomic senior synonym** (at specific rank): *Peridinites sphaericus*, according to Harding and Lewis (1994, p.837). Age: Early Tertiary.

"var. **minor**" Lefèvre, 1933b, p.224; text-fig.24. Holotype: Lefèvre, 1933b, text-fig.24. Originally *Peridinites sphaericus* var. *minor*, subsequently *Peridinites sphaericus* subsp. *minor*, thirdly *Lithoperidinium sphaericum* subsp. *minus*. **Taxonomic senior synonym** (at specific rank): *Peridinites sphaericus*, according to Harding and Lewis (1994, p.837). Age: Early Tertiary.

"subsp. **sphaericus**". Autonym. Holotype: Lefèvre, 1933b, text-figs.13–14. **Now redundant.** Originally *Peridinites sphaericus* subsp. *sphaericus*, subsequently *Lithoperidinium sphaericum* subsp. *sphaericum*.

"var. **sphaericus**". Autonym. Holotype: Lefèvre, 1933b, text-figs.13–14. **Now redundant.**

PERISSEIASPHAERIDIUM Davey and Williams, 1966b, p.78. Type: Davey and Williams, 1966b, pl.11, fig.8, as *Perisseiasphaeridium pannosum*.

"**eisenackii**" Davey and Williams, 1969, p.6. Holotype: Eisenack, 1958a, pl.26, fig.1, as *Hystrichosphaeridium anthophorum*. **Taxonomic senior synonym:** *Hystrichosphaerina schindewolfii*, according to Davey and Verdier (1974, p.640). Age: late Aptian.

ingerdiae Nøhr-Hansen, 1986, p.35–36, pl.3, fig.11; pl.4, figs.8–9; text-fig.6. Holotype: Nøhr-Hansen, 1986, pl.3, fig.11; Stancliffe and Sarjeant, 1990, pl.3, fig.2. Age: early Kimmeridgian.

insolitum Davey, 1982b, p.19–20, pl.4, figs.8–10. Holotype: Davey, 1982b, pl.4, fig.8; Fauconnier and Masure, 2004, pl.64, figs.6–8. Age: early Portlandian–early Ryazanian.

inusitatum Stevens and Helby, 1987, p.179,181, figs.13A–C,14A–G. Holotype: Stevens and Helby, 1987, figs.14A–B,E–F; Helby et al., 1987, fig.23C; Fensome et al., 1996, figs.1–3,6 — p.2169. Age: early Berriasian.

**pannosum* Davey and Williams, 1966b, p.78–79, pl.3, fig.5; pl.11, fig.8; text-fig.15. Holotype: Davey and Williams, 1966b, pl.11, fig.8; Bujak et al., 1980, pl.2, figs.7–8. Age: Early Eocene — possibly reworked Jurassic, according to Fensome (1979, p.60–61).

PERNAMBUGIA Janofske and Karwath, 2000, p.114. Emendation: Streng et al., 2004, p.471–472. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1301). Type: Kamptner, 1963, pl.4, fig.26, as *Thoracosphaera tuberosa*.

?*patata* Streng et al., 2004, p.472–473, fig.12, nos.1–10. Holotype: Streng et al., 2004, fig.12, no.1. Questionable assignment: Streng et al. (2004, p.472). Age: early Oligocene–early Miocene.

**tuberosa* (Kamptner, 1963, p.179, fig.26) Janofske and Karwath, 2000, p.114. Emendation: Janofske and Karwath, 2000, p.114–115, as *Pernambugia tuberosa*. Holotype: Kamptner, 1963, fig.26. Originally *Thoracosphaera*, subsequently *Sphaerodinella* (combination not validly published), thirdly *Sphaerodinella?*, fourthly (and now) *Pernambugia*. Taxonomic junior synonyms: *Thoracosphaera candora* and *Thoracosphaera narena*, both according to Fütterer (1976, p.132). Age: Pleistocene.

"forma *elongata*" (Hildebrand-Habel et al., 1999, p.83, pl.5, figs.5–7; text-fig.6A–B) Fensome and Williams, 2004, p. 516. Holotype: Hildebrand-Habel et al., 1999, pl.5, figs.5–6. **NOW** *Calciodinellum elongatum*. Originally *Sphaerodinella? tuberosa* forma *elongata*, subsequently *Calciodinellum elongatum* (combination not validly published), thirdly *Pernambugia tuberosa* forma *elongata*, fourthly (and now) *Calciodinellum elongatum*. Age: middle Eocene.

"forma *tuberosa*". Autonym. Holotype: Kamptner, 1963, fig.26. **Now redundant.** Originally *Sphaerodinella tuberosa* forma *tuberosa*, subsequently *Pernambugia tuberosa* forma *tuberosa*.

"forma *variospinosa*" (Hildebrand-Habel et al., 1999, p.83–84, pl.5, figs.8–15, text-fig.7A–C) Fensome and Williams, 2004, p.516. Holotype: Hildebrand-Habel et al., 1999, pl.5, figs.8–11. **NOW** *Calciodinellum levantinum* forma *variospinosum*. Originally *Sphaerodinella? tuberosa* forma *variospinosa*, subsequently *Pernambugia tuberosa* forma *variospinosa*, thirdly (and now) *Calciodinellum levantinum* forma *variospinosum*. Age: middle Eocene.

PERVOSPHAERIDIUM Yun Hyesu, 1981, p.26–27. Type: Deflandre, 1937b, pl.15 (al. pl.12), fig.3, as *Hystrichosphaeridium pseudhystrichodinium*.

brevispinum (Norvick, 1976, p.53, pl.4, figs.5–6) Below, 1982c, p.27. Holotype: Norvick, 1976, pl.4, figs.5–6. Originally *Exochosphaeridium*, subsequently *Exochosphaeridium?*, thirdly (and now) *Pervosphaeridium*. Age: Cenomanian.

cenomaniense (Norvick, 1976, p.52–53, pl.4, figs.4,8) Below, 1982c, p.27. Holotype: Norvick, 1976, pl.4, fig.4. Originally *Exochosphaeridium*, subsequently *Exochosphaeridium?*, thirdly (and now) *Pervosphaeridium*. Age: Cenomanian.

elegans Louwye, 1997, p.152, pl.2, figs.10–11. Holotype: Louwye, 1997, pl.2, figs.10–11. Taxonomic junior synonym: *Cleistosphaeridium hallembayense* (name not validly published), according to Slimani (2001a, p.193). Age: Campanian.

granaculare Fensome et al., 2009, p.54, pl.9, figs.p–s. Holotype: Fensome et al., 2009, pl.9, figs. Age: youngest occurrence, early Campanian.

?granulosum (Jain and Millepied, 1975, p.151–152, pl.5, figs.69–70) Masure in Fauconnier and Masure, 2004, p.164. Holotype: Jain and Millepied, 1975, pl.5, fig.69. Originally *Polysphaeridium*, subsequently *Dapsilidium*, thirdly (and now) *Pervosphaeridium?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.164). Age: Campanian–Maastrichtian.

intervelum Kirsch, 1991, p.73–74, pl.27, figs.7,9–12; pl.40, figs.5–6; text-figs.40,41a–b. Holotype: Kirsch, 1991, pl.27, figs.10–12; pl.40, fig.5; text-figs.41a–b. Age: early-middle Campanian.

mediterraneum (Corradini, 1973, p.137–138, pl.19, figs.5a–b; text-fig.4) Masure in Fauconnier and Masure, 2004, p.346. Holotype: Corradini, 1973, text-fig.4. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Pervosphaeridium*. Age: Late Cretaceous.

monasteriense Yun Hyesu, 1981, p.27–28, pl.5, figs.3,5,8; text-fig.7. Holotype: Yun Hyesu, 1981, pl.5, fig.3; Fensome et al., 1991, fig.1 — p.681. Age: early Santonian.

morgenrothii (Corradini, 1973, p.155, pl.23, fig.1) Kirsch, 1991, p.74. Holotype: Corradini, 1973, pl.23, fig.1. Originally *Lanternosphaeridium*, subsequently *Fibrocyta*, thirdly (and now) *Pervosphaeridium*. Age: Senonian.

multispinum Slimani, 1994, p.81–82, pl.12, figs.10–14. Holotype: Slimani, 1994, pl.12, figs.10–12. Age: late Campanian–Danian.

paucispinum (Eisenack and Cookson, 1960, p.5–6, pl.2, fig.7) Jan du Chêne et al., 1986a, p.369. Emendation: Jan du Chêne et al., 1986a, p.369, as *Pervosphaeridium paucispinum*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.7; Jan du Chêne et al., 1986a, pl.122, fig.13. Originally *Trichodinium*, subsequently *Occisucyta*, thirdly (and now) *Pervosphaeridium*. Age: Albanian.

***pseudhystrichodinium** (Deflandre, 1937b, p.73, pl.15 [al. pl.12], figs.3–4) Yun Hyesu, 1981, p.29. Emendation: Davey, 1969a, p.163, as *Exochosphaeridium pseudhystrichodinium*. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.3; Eisenack and Kjellström, 1972, p.415; Fensome et al., 1995, fig.1 — p.1705. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Exochosphaeridium*, fourthly (and now) *Pervosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (al. *Exochosphaeridium*) *palmatum*, according to Yun Hyesu (1981, p.29). Ziaja (1989, p.214) considered *Exochosphaeridium muelleri* to be a possible taxonomic junior synonym of *Pervosphaeridium pseudhystrichodinium*. Yun Hyesu (1981, p.29) considered *Xanthidium hirsutum* of Ehrenberg, 1837b (name not validly published) to be a possible taxonomic junior synonym of this species. Age: Late Cretaceous.

septatum Slimani, 1996, p.378–379, pl.2, figs.J–L; pl.4, figs.C–D ex Slimani, 2001b, p.8, pl.1, figs.3,6–9. Holotype: Slimani, 1996, pl.2, figs.J–L; Slimani, 2001b, pl.1, figs.7–9. This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Age: early–late Campanian.

truncatum (Davey, 1969a, p.164–166, pl.7, figs.1–3) Below, 1982c, p.27. Emendations: Masure, 1988b, p.129; Harker and Sarjeant in Harker et al., 1990, p.73–74, both as *Pervosphaeridium truncatum*. Holotype: Davey, 1969a, pl.7, fig.2; Masure, 1988b, pl.4, figs.6A–B; text-fig.5, nos.1–2. Originally *Exochosphaeridium striolatum* var. *truncatum*, subsequently *Exochosphaeridium striolatum* subsp. *truncatum*, thirdly *Exochosphaeridium?* *truncatum*, fourthly (and now) *Pervosphaeridium truncatum*. Age: Cenomanian.

"?truncigerum" (Deflandre, 1937b, p.71–72, pl.13 [al. pl.10], figs.6–7) Yun Hyesu, 1981, p.27. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. **NOW** *Raetiaedinium*. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium?*, seventhly *Florentinia*, eighthly *Pervosphaeridium?*, ninthly (and now) *Raetiaedinium*. Questionable assignment: Stover and Williams (1987, p.176). Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes*, by implication in Yun Hyesu (1981, p.27), who considered *Pervosphaeridium?* *truncigerum* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Pervosphaeridium?* *truncigerum*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

tubuloaculeatum Slimani, 1994, p.82–83, pl.12, figs.24–28. Holotype: Slimani, 1994, pl.12, figs.27–28. Age: early Maastrichtian–earliest Danian.

PETALODINIUM Williams et al., 2015, p.307. Type: Williams and Downie, 1966b, pl.20, fig.1, as *Wetzeliella condylos*.

***condylos** (Williams and Downie, 1966b, p.193–194, pl.20, figs.1–2) Williams et al., 2015, p.308. Holotype: Williams and Downie, 1966b, pl.20, fig.1. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. N.I.A. Age: early Eocene.

crassithecum (Vozzhennikova, 1967, p.170, pl.91, figs.1–2,4–6) Williams et al., 2015, p.308. Holotype: Vozzhennikova, 1967, pl.91, fig.1; Lentin and Vozzhennikova, 1990, text-fig.40; lost according to Lentin and Vozzhennikova (1990, p.76). Originally *Rhombodinium glabrum* forma *crassithecum*, subsequently *Rhombodinium glabrum* subsp. *crassithecum*, thirdly (and now) *Petalodinium crassithecum*. According to Lentin and Vozzhennikova (1990, p.76), no potential lectotype is available. These authors recommended that this name be restricted to the type. Age: late Eocene–early Oligocene.

laszczynskii (Gedl, 1995, p.205, pl.7, figs.11,13) Williams et al., 2015, p.308. Holotype: Gedl, 1995, pl.7, fig.13. Originally *Dracodinium*, subsequently (and now) *Petalodinium*. Age: early-middle Eocene.

lenisium Iakovleva, 2016, p.11 (on PDF initially published online), pl.7, figs.1–2; text-fig.4a (part). Holotype: Iakovleva, 2016, pl.7, figs.1–2. Age: earliest Eocene.

rhomboideum (Alberti, 1961, p.10, pl.1, figs.1–5; pl.12, fig.9) Williams et al., 2015, p.308. Holotype: Alberti, 1961, pl.1, fig.3; pl.12, fig.9. Originally *Wetzeliella* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: late Eocene.

subsp. **ovale** (Andreeva-Grigorovich and Savitskaya, 1993, p.44–45, pl.1, figs.5,7–8) Williams et al., 2015, p.308. Holotype: Andreeva-Grigorovich and Savitskaya, 1993, pl.1, fig.5; Andreeva-Grigorovich et al., 2011, pl.20, fig.2. Originally *Dracodinium rhomboideum?* subsp. *ovale*, subsequently (and now) *Petalodinium rhomboideum?* subsp. *ovale*. Questionable assignment: Williams et al. (2015, p.308). Andreeva-Grigorovich and Savitskaya (1993) cited this taxon as "*Dracodinium rhomboideum* subsp. *ovale* (Grigorovich, 1971) emend. Andreeva-Grigorovich and Savitskaya". However, *Rhombodinium rhomboideum* forma *ovale* was not validly published in Grigorovich (1971), since that author did not provide a description. Age: early Eocene.

subsp. **rhomboideum**. Autonym. Holotype: Alberti, 1961, pl.1, fig.3; pl.12, fig.9.

rugosum (Michoux, 1988, p.30–31, pl.3, figs.1–9; text-figs.8A–B) Williams et al., 2015, p.308. Holotype: Michoux, 1988, pl.3, figs.1–5; text-figs.8A–B. Originally *Rhombodinium*, subsequently (and now) *Petalodinium*. Age: early Eocene.

sheppeyense Williams et al., 2015, p.307–308. Holotype: Williams and Downie, 1966b, pl.20, fig.10, as *Wetzeliella (Rhombodinium) glabra*. Age: Ypresian.

spinulum (Islam, 1983a, p.236, pl.2, fig.4) Williams et al., 2015, p.308. Holotype: Islam, 1983a, pl.2, fig.4. Originally *Dracodinium politum* subsp. *spinulum*, subsequently (and now) *Petalodinium spinulum*. Age: early Eocene.

waipawaense (Wilson, 1967c, p.493–494, figs.18,20) Williams et al., 2015, p.308. Holotype: Wilson, 1967c, fig.18. Originally *Wetzeliella* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: early Eocene.

PHALLOCYSTA Dörhöfer and Davies, 1980, p.26–27. Emendations: Riding, 1984b, p.117; Below, 1987a, p.132. Taxonomic junior synonym: *Andreedinium*, according to Riding (1994, p.13). Type: Dörhöfer and Davies, 1980, fig.26K (not 29K), as *Phallocysta eumekes*.

arctica (Below, 1987a, p.112–113, pl.22, figs.1–8; text-fig.64) Riding, 1994, p.14. Holotype: Below, 1987a, pl.22, figs.1–3,6,8; Fensome et al., 1993a, figs.1–3,5 — p.929. Originally *Andreedinium*, subsequently (and now) *Phallocysta*. Age: Toarcian.

elongata (Beju, 1971, p.289–290, pl.3, figs.7–10; text-figs.6A–E) Riding, 1994, p.16. Emendations: Feist-Burkhardt and Monteil, 1994, p.9, as *Andreedinium elongatum*; Riding, 1994, p.16, as *Phallocysta elongata*. Holotype: Beju, 1971, pl.3, fig.7; text-fig.6A. Originally *Fromea* (Appendix A), subsequently *Fromea?* (Appendix A), thirdly *Wallodinium*, fourthly *Palaeostomocystis* (Appendix A), fifthly *Andreedinium*, sixthly (and now) *Phallocysta*. Nomenclatural junior synonym: *Phallocysta minuta*, which see for details. Taxonomic senior synonym: *Prismatocystis* (now *Wallodinium*) *cylindrica*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Phallocysta* (as *Andreedinium*) *elongata*. Taxonomic junior synonym: *Phallocysta subconica*, according to Riding (1994, p.16). Age: Bajocian–Oxfordian.

irregulensis (Filatoff, 1975, p.90, pl.29, figs.12–14) Stover and Helby, 1987a, p.111. Emendation: Stover and Helby, 1987a, p.111, as *Phallocysta irregulensis*, as a revised description. Holotype: Filatoff, 1975, pl.29, fig.14; Stover and Helby, 1987a, figs.11L–M. Originally *Evansia*, subsequently *Evansia?*, thirdly *Phallocysta*, fourthly *Andreedinium*, fifthly (and now) *Phallocysta?*. This species was retained in *Phallocysta* by Riding (1994, p.14). Questionable assignment: Riding (1994, p.14). Age: Bajocian.

***eumekes** Dörhöfer and Davies, 1980, p.27, figs.12,24D–E,G,26H,J–K,27A–I. Emendation: Riding, 1984b, p.119. Holotype: Dörhöfer and Davies, 1980, fig.26K (not 29K); Fensome et al., 1993a, fig.1 — p.1155. Age: Toarcian–Bajocian/Bathonian.

frommernensis Below, 1987a, p.132–133, pl.22, figs.9–18; text-fig.70. Holotype: Below, 1987a, pl.22, figs.10–13,18; Fensome et al., 1993a, figs.2–5,7 — p.1205. Age: Aalenian.

granosa Riding and Helby 2001c, p.61–62, figs.1A–I. Holotype: Riding and Helby 2001c, figs.1G–I. Age: Bathonian.

"minuta" Prauss 1989, p.20–21, pl.2, figs.1–4; text-fig.5. Holotype: Prauss 1989, pl.2, fig.3; text-fig.5. **Name illegitimate** — **nomenclatural senior synonym:** *Fromea elongata*, since Prauss (1989, p.20) included the holotype of *Fromea elongata* in synonymy with *Phallocysta minuta*. Substitute name: *Phallocysta subconica*. Originally *Phallocysta minuta* (name illegitimate), subsequently *Phallocysta subconica*. Age: late Toarcian–early Bajocian.

"subconica" Lentin and Williams, 1993, p.507. Holotype: Prauss, 1989, pl.2, fig.3; text-fig.5. Originally *Phallocysta minuta* (name illegitimate), subsequently *Phallocysta subconica*. Substitute name for *Phallocysta minuta* Prauss, 1989, p.20–21, pl.2, figs.1–4; text-fig.5 (an illegitimate name). **Taxonomic senior synonym:** *Fromea* (as and now *Phallocysta*) *elongata*, according to Riding (1994, p.16). The name *Phallocysta minuta* is illegitimate since, in proposing it, Prauss (1989, p.20) included in synonymy the holotype of *Fromea elongata*. However, Riding et al. (1991, p.153) argued that the form described by Prauss as *Phallocysta minuta* is distinct from *Fromea elongata*. Hence, Lentin and Williams (1993, p.507) proposed the name *Phallocysta subconica* to accommodate Prauss's material. Age: late Toarcian–early Bajocian.

thomasii Smelror, 1991, p.175, pl.1, figs.11–20. Holotype: Smelror, 1991, pl.1, fig.16. Age: Aalenian–Bajocian.

PHANERODINIUM Deflandre, 1937a, p.110. Emendations: Below, 1987b, p.36–38; Slimani, 1994, p.43. Taxonomic junior synonyms: *Fibradinium*, *Microdinium*, *Rhiptocorys* and *Subtilidinium*, all according to Below (1987b, p.36) — however, Lentin and Williams (1989, p.135,243,316,354) retained all four genera. Stover and Evitt (1978, p.236) noted that the type of *Phanerodinium*, *Phanerodinium cayeuxii*, is embedded in flint so the nature of the archeopyle is uncertain. Accordingly, Lentin and Williams (1989, p.289) recommended that only

Phanerodinium cayeuxii and *Phanerodinium setiferum* be included in *Phanerodinium*. Type: Deflandre, 1935, pl.6, fig.3, as *Palaeoperidinium cayeuxii* (name not validly published).

"*angulare*" Below, 1987b, p.39–40, pl.12, figs.12–13; pl.13, figs.11–15; pl.16, fig.12. Holotype: Below, 1987b, pl.13, figs.11–15; Fensome et al., 1993a, figs.1–4 — p.913. **NOW** *Microdinium*. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: middle Albian.

"*annetorpense*" (Morgenroth, 1968, p.538, pl.42, figs.4–7; text-figs.1–2) Below, 1987b, p.38. Holotype: Morgenroth, 1968, pl.42, fig.4. **NOW** *Fibradinium*. Originally (and now) *Fibradinium*, subsequently *Phanerodinium*. Age: Danian.

"*balteus*" Below, 1987b, p.40, pl.15, figs.11–15. Holotype: Below, 1987b, pl.15, figs.11–15; Fensome et al., 1993a, figs.1–5 — p.959. **NOW** *Microdinium*. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. N.I.A. Age: middle-late Albian.

belgicum Slimani and Louwye, 2011, p.48, pl.2, figs.12–18. Holotype: Slimani and Louwye, 2011, pl.2, figs.12–14. Age: late Maastrichtian.

"*carinatum*" Below, 1987b, p.41–43, pl.10, figs.1–10; text-figs.10a–f. Holotype: Below, 1987b, pl.10, figs.1–5; Fensome et al., 1993a, figs.1–4 — p.1035. **NOW** *Microdinium*. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: late Campanian.

"*cassiculus*" (Wilson, 1984c, p.552, figs.6–10) Below, 1987b, p.38. Holotype: Wilson, 1984c, figs.6–7. **NOW** *Microdinium*. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. N.I.A. Age: Maastrichtian.

**cayeuxii* Deflandre, 1936b, p.178–179, pl.6, figs.8–15; pl.7, fig.8 ex Deflandre, 1937a, p.110–112. Emendation: Slimani, 1994, p.44, as *Phanerodinium cayeuxii*. Holotype: Deflandre, 1934, fig.5; Deflandre, 1935, pl.6, fig.3; Deflandre, 1936b, pl.6, figs.8–10. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Phanerodinium*. The name *Palaeoperidinium cayeuxii* was not validly published in Deflandre (1936b) since the generic name *Palaeoperidinium* was not validly published until 1967. Age: Senonian.

"subsp. *cayeuxii*". Autonym. Holotype: Deflandre, 1935, pl.6, fig.3; Deflandre, 1936b, pl.6, figs.8–10. **Now redundant.**

"var. *cayeuxii*". Autonym. Holotype: Deflandre, 1935, pl.6, fig.3; Deflandre, 1936b, pl.6, figs.8–10. **Now redundant.**

"subsp. *laeve*" (Lejeune-Carpentier, 1951, p.B310–B311; text-fig.6) Lentin and Williams, 1973, p.112. Emendation: Lejeune-Carpentier and Sarjeant, 1983, p.4, as *Druggidium laeve*. Holotype: Lejeune-Carpentier, 1951, text-fig.6. **NOW** *Druggidium? laeve*. Originally *Phanerodinium cayeuxii* var. *laeve*, subsequently *Phanerodinium cayeuxii* subsp. *laeve*, thirdly *Druggidium laeve*, fourthly (and now) *Druggidium? laeve*. Age: Senonian.

"var. *laeve*" Lejeune-Carpentier, 1951, p.B310–B311; text-fig.6. Emendation: Lejeune-Carpentier and Sarjeant, 1983, p.4, as *Druggidium laeve*. Holotype: Lejeune-Carpentier, 1951, text-fig.6. **NOW** *Druggidium? laeve*. Originally *Phanerodinium cayeuxii* var. *laeve*, subsequently *Phanerodinium cayeuxii* subsp. *laeve*, thirdly *Druggidium laeve*, fourthly (and now) *Druggidium? laeve*. Age: Senonian.

"*consaeptum*" Below, 1987b, p.43–44, pl.14, figs.1–5,7–12. Holotype: Below, 1987b, pl.14, figs.2–5; Fensome et al., 1993a, figs.1–2 — p.1075; figs.2–5 — p.1079. **NOW** *Microdinium*. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: middle Albian.

"var. *baculatum*" Below, 1987b, p.43–44, pl.14, figs.7–12. Holotype: Below, 1987b, pl.14, figs.7–10; Fensome et al., 1993a, figs.1–4 — p.953; fig.3 — p.1075. **NOW** *Microdinium consaeptum* subsp. *baculatum*. Originally *Phanerodinium consaeptum* var. *baculatum*, subsequently (and now) *Microdinium consaeptum* subsp. *baculatum*. Age: middle-late Albian.

"var. **consaeptum**". Autonym. Holotype: Below, 1987b, pl.14, figs.2–5; Fensome et al., 1993a, figs.1–2 — p.1075; figs.2–5 — p.1079. **Now redundant**.

"?**crinitum**" (Davey, 1969a, p.137, pl.2, figs.7–8) Below, 1987b, p.38. Emendation: Below, 1987b, p.38, as *Phanerodinium? crinitum*. Holotype: Davey, 1969a, pl.2, fig.8. **NOW Microdinium?**. Originally (and now) *Microdinium?*, subsequently *Phanerodinium?*. Questionable assignment: Below (1987b, p.38). Age: Cenomanian.

"**densibaculatum**" Below, 1987b, p.44, pl.12, figs.4,9. Holotype: Below, 1987b, pl.12, figs.4,9; Fensome et al., 1993a, figs.1–2 — p.1115. **NOW Fibradinium?**. Originally *Phanerodinium*, subsequently (and now) *Fibradinium?*. Age: middle-late Albian.

"**densigranulatum**" Below, 1987b, p.44–45, pl.13, figs.6–10; pl.14, figs.13–15. Holotype: Below, 1987b, pl.13, figs.6–10; Fensome et al., 1993a, figs.1–5 — p.1119. **NOW Microdinium**. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: middle-late Albian.

"**dentatum**" (Vozzhennikova, 1967, p.94–95, pl.38, figs.2a–e) Below, 1987b, p.38. Emendations: Fechner, 1985, p.120; Lentin and Vozzhennikova, 1990, p.104–105, both as *Microdinium dentatum*; Below, 1987b, p.45–46, as *Phanerodinium dentatum*. Holotype: Vozzhennikova, 1967, pl.38, figs.2a–e; Lentin and Vozzhennikova, 1990, pl.12, figs.5–7; text-fig.59. **NOW Microdinium**. Originally (and now) *Microdinium*, subsequently *Microdinium?*, thirdly *Phanerodinium*. Age: Late Cretaceous.

"**diatretiforme**" Below, 1987b, p.46–47, pl.12, figs.2,7. Holotype: Below, 1987b, pl.12, figs.2,7; Fensome et al., 1993a, figs.1–2 — p.1123. **NOW Fibradinium?**. Originally *Phanerodinium*, subsequently (and now) *Fibradinium?*. Age: Oligocene.

"**distinctum**" (Davey, 1969a, p.133–135, pl.2, figs.9–11; text-figs.13D–E,I) Below, 1987b, p.38. Holotype: Davey, 1969a, pl.2, figs.9–10; text-figs.13D–E. **NOW Microdinium**. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: early Cenomanian.

"**exilimuratum**" (Schumacker-Lambry, 1978, p.37, pl.2, figs.5–8) Below, 1987b, p.38. Holotype: Schumacker-Lambry, 1978, pl.2, figs.5–6. **NOW Cladopyxidium**. Originally (and now) *Cladopyxidium*, subsequently *Phanerodinium*. Age: late Paleocene (Landenian).

"**foliis**" Below, 1987b, p.47–48, pl.9, figs.1–6. Holotype: Below, 1987b, pl.9, figs.1–5; Fensome et al., 1993a, figs.1–5 — p.1197. **NOW Fibradinium?**. Originally *Phanerodinium*, subsequently (and now) *Fibradinium?*. N.I.A. Age: late Bajocian–middle Callovian.

"**fourmarieri**" Lejeune-Carpentier, 1951, p.B311; text-fig.7. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.2, as *Druggidium fourmarieri*; Slimani and Louwye, 2011, p.48, as *Phanerodinium fourmarieri*. Holotype: Lejeune-Carpentier, 1951, text-fig.7; Streel et al., 1977, pl.2, fig.10. Originally (and now) *Phanerodinium* subsequently *Druggidium*, thirdly *Druggidium*. Age: Late Cretaceous.

"**glabrum**" (Cookson and Eisenack, 1974, p.53, pl.20, fig.19) Below, 1987b, p.38. Holotype: Cookson and Eisenack, 1971, pl.7, fig.11, as *Microdinium* sp. **NOW Microdinium**. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Age: Senonian.

"**granocarinatedum**" Below, 1987b, p.48–49, pl.16, figs.7–10,14–15. Holotype: Below, 1987b, pl.16, figs.7,10,15; Fensome et al., 1993a, figs.1,4–6 — p.1219. **NOW Microdinium**. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: late early–late Campanian.

"**horridum**" Below, 1987b, p.49–50, pl.17, figs.1–6; text-figs.11a–h. Holotype: Below, 1987b, pl.17, figs.1–6; Fensome et al., 1993a, figs.1–4 — p.1229. **NOW Microdinium?**. Originally *Phanerodinium*, subsequently (and now) *Microdinium?*. Age: middle Albian–early Cenomanian.

"lacertum" Below, 1987b, p.50–51, pl.9, figs.7–10; pl.12, fig.5. Holotype: Below, 1987b, pl.9, figs.7–10; Fensome et al., 1993a, figs.1–5 — p.1247. **NOW** *Fibradinium?*. Originally *Phanerodinium*, subsequently (and now) *Fibradinium?*. Age: middle Albian.

"minutum" (Morgenroth, 1968, p.539–540, pl.42, figs.8–9; pl.43, figs.1–2; text-figs.3–4) Below, 1987b, p.38. Holotype: Morgenroth, 1968, pl.42, figs.8–9. **NOW** *Subtilidinium*. Originally (and now) *Subtilidinium*, subsequently *Phanerodinium*. Age: Danian.

"opacum" (Brideaux, 1971, p.76–77, pl.21, figs.19–22; text-figs.7d–e) Below, 1987b, p.38. Holotype: Brideaux, 1971, pl.21, figs.21–22; text-figs.7d–e. **NOW** *Microdinium*. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Taxonomic junior synonym: *Microdinium spinosum*, according to Below (1987b, p.38). Age: middle-late Albian.

"ornatum" (Cookson and Eisenack, 1960a, p.6–7, pl.2, figs.3–8; text-figs.2–4) Below, 1987b, p.38. Holotype: Cookson and Eisenack, 1960a, pl.2, figs.3–4; text-fig.2. **NOW** *Microdinium*. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Age: Albian–Turonian.

ovum Slimani, 1994, p.46–47, pl.7, figs.5–6,33–38. Holotype: Slimani, 1994, pl.7, figs.5–6,33–35. N.I.A. Age: late Campanian–earliest Danian.

"reteinvolvatum" Below, 1987b, p.51–52, pl.12, figs.3,8. Holotype: Below, 1987b, pl.12, fig.3; Fensome et al., 1993a, fig.1 — p.1297. **NOW** *Microdinium?*. Originally *Phanerodinium*, subsequently (and now) *Microdinium?*. Age: middle-late Albian.

"senticetum" Below, 1987b, p.52, pl.9, figs.11–15. Holotype: Below, 1987b, pl.9, figs.11–15; Fensome et al., 1993a, figs.1–4 — p.1329. **NOW** *Eisenackia?*. Originally *Phanerodinium*, subsequently (and now) *Eisenackia?*. N.I.A. Age: late Albian.

septatum Slimani, 1994, p.47–48, pl.7, figs.13–14,39–43. Holotype: Slimani, 1994, pl.7, figs.13–14,39–41. Age: late Campanian–late Maastrichtian.

"septofibrosus" Below, 1987b, p.52–53, pl.13, figs.1–5. Holotype: Below, 1987b, pl.13, figs.1–5; Fensome et al., 1993a, figs.1–5 — p.1337. **NOW** *Microdinium*. Originally *Phanerodinium*, subsequently (and now) *Microdinium*. Age: late Albian.

setiferum Deflandre, 1937a, p.112–114; text-fig.5. Holotype: Deflandre, 1937a, text-fig.5. Age: Senonian.

"setosum" (Sarjeant, 1966b, p.151, pl.16, figs.9–10; text-fig.39) Below, 1987b, p.38. Emendation: Below, 1987b, p.53–54, as *Phanerodinium setosum*. Holotype: Sarjeant, 1966b, pl.16, figs.9–10. **NOW** *Microdinium*. Originally (and now) *Microdinium*, subsequently *Phanerodinium*. Taxonomic junior synonym: *Microdinium echinatum*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"?sonciniae" Marheinecke, 1992, p.110–111, pl.25, figs.1–4. Holotype: Marheinecke, 1992, pl.25, figs.1–2. **NOW** *Microdinium*. Originally *Phanerodinium?*, subsequently (and now) *Microdinium*. Questionable assignment: Marheinecke (1992, p.110). Taxonomic junior synonym: *Microdinium perplexum* (name not validly published), according to Slimani (2001a, p.193). Contrary to the opinion of Lentin and Williams (1993, p.509), Williams et al. (1998, p.480) considered this name to be validly published. Age: late early–late Maastrichtian.

"squamosum" Below, 1987b, p.54–56, pl.11, figs.1–15; pl.12, figs.1,6,11; pl.16, fig.13. Holotype: Below, 1987b, pl.11, figs.1,3–6; Fensome et al., 1993a, figs.1,3–6 — p.1355. **NOW** *Fibradinium?*. Originally *Phanerodinium*, subsequently (and now) *Fibradinium?*. Age: early Oligocene.

?turnhoutensis Slimani, 1994, p.49–50, pl.7, figs.7–8,27–32. Holotype: Slimani, 1994, pl.7, figs.7–8,27–28. Questionable assignment: Slimani (1994, p.49). Age: early Campanian–earliest Danian.

"*veligerum*" (Deflandre, 1937b, p.81, pl.12 [al. pl.9], fig.9) Below, 1987b, p.38. Emendations: Lejeune-Carpentier, 1943, p.B24–B25, as *Ceratocorys veligera*; Lejeune-Carpentier and Sarjeant, 1983, p.5–6, as *Rhaptocorys veligera*. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), fig.9; Fensome et al., 1995, fig.1 — p.1885. **NOW** *Rhaptocorys*. Originally *Michrystidium* (Appendix A), subsequently *Ceratocorys* (Appendix B), thirdly *Microdinium*, fourthly *Microdinium?*, fifthly (and now) *Rhaptocorys*, sixthly *Phanerodinium*, seventhly *Phanerodinium?*. Questionable assignment: Marheinecke (1992, p.110). Taxonomic junior synonyms: *Microdinium irregulare* and *Ceratocorys* (as *Microdinium*, now *Rhaptocorys*) *smolenskiensis*, both according to Below (1987b, p.56) — however, Lentin and Vozzhennikova (1990, p.112) retained *Ceratocorys* (now *Rhaptocorys*) *smolenskiensis*. Age: Senonian.

PHELODINIUM Stover and Evitt, 1978, p.117–118. Emendation: Mao Shaozhi and Norris, 1988, p.51–52. Type: Corradini, 1973, pl.28, fig.3, as *Deflandrea pentagonalis*.

africanum Biffi and Grignani, 1983, p.140, pl.6, figs.1–6. Holotype: Biffi and Grignani, 1983, pl.6, fig.4. Age: Oligocene.

anisum Mao Shaozhi and Norris, 1988, p.52, pl.15, figs.14–16. Holotype: Mao Shaozhi and Norris, 1988, pl.15, fig.16. Age: late Paleocene–late Eocene.

boldii Wrenn and Hart, 1988, p.365, fig.33, nos.1,4. Holotype: Wrenn and Hart, 1988, fig.33, nos.1,4. Age: late Paleocene–Eocene.

"*boloniense*" (Riegel, 1974, p.354–355, pl.1, figs.6–10; text-fig.3) Riegel and Sarjeant, 1982, p.296. Emendation: Riegel and Sarjeant, 1982, p.297, as *Phelodinium boloniense*. Holotype: Riegel, 1974, pl.1, fig.7; Sarjeant et al., 1987, pl.2, fig.2. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly *Senegalinium*, fourthly *Phelodinium*, fifthly (and now) *Cerodinium*. Age: ?Senonian.

cranwelliae Hannah et al., 1998, p.537, figs.6c–f. Holotype: Hannah et al., 1998, figs.6c–d. Age: early Miocene.

elongatum Slimani et al., 2010, p.117–118, pl.3, fig.11: pl.7, figs.9–10; pl.8, figs.2–3. Holotype: Slimani et al., 2010, pl.8, figs.2–3. Age: late Maastrichtian–early Danian.

exilicornutum Smith, 1992, p.345,348, figs.8c,g–i. Holotype: Smith, 1992, fig.8c. Age: late Campanian–early Maastrichtian.

gaditanum (Riegel, 1974, p.356–357, pl.2, figs.8–9; pl.3, figs.1–2) Lentin and Williams, 1981, p.223. Emendation: Riegel and Sarjeant, 1982, p.297–299, as *Phelodinium gaditanum*. Holotype: Riegel, 1974, pl.2, figs.8–9; Riegel and Sarjeant, 1982, fig.7D. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Lejeunia* (combination illegitimate), fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Riegel and Sarjeant (1982, p.297) also proposed this combination. Age: ?Senonian.

harringtonii Levy and Harwood, 2000, p.212,214, pl.8, figs.a–d. Holotype: Levy and Harwood, 2000, pl.8, fig.a. Age: middle-late Eocene.

kozłowskii (Górka, 1963, p.41, pl.5, fig.4) Lindgren, 1984, p.181. Holotype: Górka, 1963, pl.5, fig.4. Originally *Lejeunia* (generic name illegitimate), subsequently *Astrocysta*, thirdly *Senegalinium*, fourthly (and now) *Phelodinium*. Taxonomic senior synonym: *Peridinium* (as *Lejeunia*, now *Phelodinium*) *tricuspe*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Phelodinium kozłowskii*. Age: late Maastrichtian.

longicorne He Chengquan, 1991, p.69, pl.2, figs.28–29. Holotype: He Chengquan, 1991, pl.2, fig.29. Age: Paleocene.

magnificum (Stanley, 1965, p.218–219, pl.20, figs.1–6) Stover and Evitt, 1978, p.118. Holotype: Stanley, 1965, pl.20, figs.4–6. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Taxonomic junior synonym (at specific rank): *Peridinium*

crassipes forma *altum*, according to Sarjeant (1985b, p.159) and Lentin and Williams (1993, p.503). Age: Paleocene.

nigericum Biffi and Grignani, 1983, p.140, pl.3, figs.3,5. Holotype: Biffi and Grignani, 1983, pl.3, fig.3. Age: Oligocene.

pachyceras Liengjarern et al., 1980, p.486–487, pl.54, fig.4. Holotype: Liengjarern et al., 1980, pl.54, fig.4. Williams et al. (1998, p.481) were incorrect in rendering the epithet as "*pachycerum*". As a Greek compound noun, it should be cited as *pachyceras*, as in Liengjarern et al. (1980). N.I.A. Age: late Eocene–early Oligocene.

**pentagonale* (Corradini, 1973, p.175, pl.28, fig.3) Stover and Evitt, 1978, p.118. Holotype: Corradini, 1973, pl.28, fig.3; Eisenack and Kjellström, 1981a, page labelled "nach S.208"; Fensome et al., 1995, fig.1 — p.1649. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: Senonian.

pumilum Liengjarern et al., 1980, p.487, pl.54, fig.2. Holotype: Liengjarern et al., 1980, pl.54, fig.2. Age: late Eocene.

?*spinatum* He Chengquan, 1991, p.69–70, pl.2, figs.24–27. Holotype: He Chengquan, 1991, pl.2, fig.25. Questionable assignment: He Chengquan (1991, p.69–70). Age: Paleocene.

spinocapitatum He Chengquan, 1991, p.70, pl.2, figs.30–31. Holotype: He Chengquan, 1991, pl.2, fig.30. Age: Paleocene.

tricuspe (Wetzel, 1933a, p.166, pl.2, fig.14) Stover and Evitt, 1978, p.118. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.20, as *Lejeunecysta tricuspis*. Holotype: Wetzel, 1933a, pl.2, fig.14; Lejeune-Carpentier, 1942, fig.21; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.5. Originally *Peridinium* (Appendix B), subsequently *Lejeunia* (combination illegitimate), thirdly *Astrocysta*, fourthly *Senegalinium*, fifthly *Lejeunecysta*, sixthly (and now) *Phelodinium*. Taxonomic junior synonym: *Lejeunia* (now *Phelodinium*) *kozłowskii*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Phelodinium kozłowskii*. Age: Senonian.

"subsp. *divaricans*" (Wetzel, 1933a, p.165–166, text-fig.2) Lentin and Williams, 1985, p.284. Holotype: Wetzel, 1933a, text-fig.2. Originally *Peridinium pedunculatum* forma *divaricans* (Appendix B), subsequently *Phelodinium tricuspis* subsp. *divaricans*. **Taxonomic senior synonym** (at specific rank): *Deflandrea* (as *Ceratiopsis*, now *Cerodinium*) *albertii*, according to Sarjeant (1985b, p.158) and Lentin and Williams (1993, p.504,511). Age: Late Cretaceous.

"subsp. *tricuspe*". Autonym. Holotype: Wetzel, 1933a, pl.2, fig.14; Lejeune-Carpentier, 1942, fig.21; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.5. **Now redundant.**

PHOBEROCYSTA Millioud, 1969, p.431–432. Emendation: Helby, 1987, p.307. Taxonomic senior synonym: *Muderongia*, according to Monteil (1991b, p.470) — however, Poulsen (1996, p.56) retained *Phoberocysta*. Taxonomic junior synonym: *Xenascus*, by implication in Davey and Verdier (1971, p.27), who considered the "type species" of *Xenascus*, *Xenascus australensis*, to be a taxonomic junior synonym of *Phoberocysta* (now *Xenascus*) *ceratioides* — however, Lentin and Williams (1973, p.143) retained *Xenascus*. Type: Gocht, 1957, pl.19, fig.1; text-fig.7, as *Wetzeliella? neocomica*.

"*burgeri*" Helby, 1987, p.307–309, figs.10A–F,11,12A–C. Holotype: Helby, 1987, figs.10A–C,11; Fensome et al., 1996, figs.1–3,7–8 — p.2073. **Taxonomic senior synonym**: *Muderongia testudinaria*, according to Monteil (1991b, p.476). Age: latest Valanginian–Hauterivian.

"*ceratioides*" (Deflandre, 1937b, p.66–67, pl.12 [al. pl.9], figs.7–8) Davey and Verdier, 1971, p.26. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), figs.7–8; Fensome et al., 1991, fig.1 — p.601; fig.1 — p.605. **NOW** *Xenascus*. Originally *Hystriochosphaera*, subsequently *Pseudoceratium*, thirdly *Spiniferites*, fourthly *Phoberocysta*, fifthly (and now) *Xenascus*. Taxonomic junior synonyms: *Endoceratium* (now *Xenascus*) *perforatum*, according to Davey and

Verdier (1971, p.27) — however, Yun Hyesu (1981, p.62) retained *Xenascus perforatus*; *Xenascus australensis*, according to Davey and Verdier (1971, p.26) — however, Lentin and Williams (1985, p.374) retained *Xenascus australensis*; *Odontochitina blastema*, according to Davey and Verdier (1971, p.27) — however, Stover and Helby (1987a, p.128) retained *Odontochitina* (as *Xenascus*) *blastema*. This combination was not validly published in Millioud (1969, p.432), since that author did not clearly use the name *Phoberocysta ceratioides*. Age: Senonian.

"*dubia*" Corradini, 1973, p.182, pl.29, figs.6a–b. Holotype: Corradini, 1973, pl.29, figs.6a–b. **NOW** *Xenascus*?. Originally *Phoberocysta*?, subsequently (and now) *Xenascus*?. Questionable assignment: Corradini (1973, p.182). Age: Senonian.

"*edgellii*" Helby, 1987, p.309–310, figs.12D–F, 13A–I. Holotype: Helby, 1987, figs.12D–F; Fensome et al., 1996, figs.1–3 — p.2119. **Taxonomic senior synonym:** *Muderongia testudinaria*, according to Monteil (1991b, p.476). Age: Hauterivian.

"*gochtii*" Corradini, 1973, p.179–181, pl.29, figs.1a–b, 3; text-fig.9. Holotype: Corradini, 1973, pl.29, figs.1a–b; text-fig.9. **NOW** *Xenascus*. Originally *Phoberocysta*, subsequently (and now) *Xenascus*. Age: Senonian.

"*lowryi*" Backhouse, 1987, p.219, 221, figs.7A–B, 12A–D, 14C. Holotype: Backhouse, 1987, figs.7A–B, 12C–D; Fensome et al., 1996, figs.3–6 — p.2211. **Taxonomic senior synonym:** *Muderongia testudinaria*, according to Monteil (1991b, p.476). Age: Hauterivian.

**neocomica* (Gocht, 1957, p.172–178, pl.19, figs.1–5; pl.20, figs.1–7; text-figs.7–16) Millioud, 1969, p.432. Emendation: Helby, 1987, p.310–313, as *Phoberocysta neocomica*. Holotype: Gocht, 1957, pl.19, fig.1; text-fig.7. Originally *Wetzeliella*?, subsequently (and now) *Phoberocysta*, thirdly *Muderongia*. Poulsen (1996, p.59) retained this species in *Phoberocysta*. Taxonomic junior synonym: *Muderongia tomaszowensis*, by implication in Monteil (1991b, p.477), who considered *Muderongia tomaszowensis* to be the senior name — however, this synonymy has not been generally followed. Age: Hauterivian.

"subsp. *circulata*" (Gocht, 1957, p.178; text-fig.14) Lentin and Williams, 1973, p.112. Holotype: Gocht, 1957, text-fig.14. Originally *Wetzeliella? neocomica* forma *circulata*, subsequently *Phoberocysta neocomica* subsp. *circulata*. **Taxonomic senior synonym:** *Phoberocysta neocomica* subsp. *neocomica* (now redundant), by implication in Monteil (1991b, p.477), who listed this taxon as a taxonomic junior synonym of *Phoberocysta neocomica*. Age: Hauterivian.

"subsp. *convexa*" (Gocht, 1957, p.178, pl.20, figs.1–2) Lentin and Williams, 1973, p.112. Holotype: not designated. Lectotype: Gocht, 1957, pl.20, fig.1, designated by Lentin and Williams (1989, p.294). Originally *Wetzeliella? neocomica* forma *convexa*, subsequently *Phoberocysta neocomica* subsp. *convexa*. **Taxonomic senior synonym** (at specific rank): *Phoberocysta* (as *Muderongia*) *tabulata*, according to Monteil (1991b, p.476). Age: Hauterivian.

"subsp. *cruciformis*" (Gocht, 1957, p.176–177, pl.19, fig.5; pl.20, fig.3; text-figs.9–10) Lentin and Williams, 1973, p.112. Holotype: not designated. Lectotype: Gocht, 1957, pl.20, fig.1, designated by Lentin and Williams (1989, p.294). Originally *Wetzeliella? neocomica* forma *cruciformis*, subsequently *Phoberocysta neocomica* subsp. *cruciformis*. **Taxonomic senior synonym:** *Phoberocysta neocomica* subsp. *neocomica* (now redundant), by implication in Monteil (1991b, p.477), who listed this taxon as a taxonomic junior synonym of *Phoberocysta neocomica*. Age: Hauterivian.

"subsp. *dedecosa*" (Gocht, 1957, p.177; text-fig.11) Lentin and Williams, 1973, p.112. Holotype: Gocht, 1957, text-fig.11. Originally *Wetzeliella? neocomica* forma *dedecosa*, subsequently *Phoberocysta neocomica* subsp. *dedecosa*. **Taxonomic senior synonym:** *Phoberocysta neocomica* subsp. *neocomica* (now redundant), by implication in Monteil (1991b, p.477), who listed this taxon as a taxonomic junior synonym of *Phoberocysta neocomica*. Age: Hauterivian.

"subsp. *neocomica*". Autonym. Holotype: Gocht, 1957, pl.19, fig.1; text-fig.7. **Now redundant.** Taxonomic junior synonyms: *Wetzeliella? neocomica* forma *circulata* (subsequently *Phoberocysta neocomica* subsp. *circulata*), *Wetzeliella? neocomica* forma *cruciformis* (subsequently *Phoberocysta*

neocomica subsp. *cruciformis*) and *Wetziella? neocomica* forma *dedecosa* (subsequently *Phoberocysta neocomica* subsp. *dedecosa*), by implication in Monteil (1991b, p.477), who listed these taxa as taxonomic junior synonyms of *Phoberocysta neocomica*.

"subsp. *pteridia*" (Gocht, 1957, p.178, pl.20, fig.5) Lentin and Williams, 1973, p.112. Holotype: Gocht, 1957, pl.20, fig.5. Originally *Wetziella? neocomica* forma *pteridia*, subsequently *Phoberocysta neocomica* subsp. *pteridia*. **Taxonomic senior synonym** (at specific rank): *Phoberocysta* (as *Muderongia*) *tabulata*, according to Monteil (1991b, p.476). Age: Hauterivian.

"subsp. *subovalis*" (Gocht, 1957, p.177; text-figs.12–13) Lentin and Williams, 1973, p.113. Holotype: not designated. Lectotype: Gocht, 1957, text-fig.13, designated by Lentin and Williams (1989, p.294). Originally *Wetziella? neocomica* forma *subovalis*, subsequently *Phoberocysta neocomica* subsp. *subovalis*. **Taxonomic senior synonym** (at specific rank): *Phoberocysta* (as *Muderongia*) *tabulata*, according to Monteil (1991b, p.476). Age: Hauterivian.

rariornata Prössl, 1990, p.98–99, pl.2, figs.3,9 ex Prössl, 1992b, p.113,115. Holotype: Prössl, 1990, pl.2, fig.3. Taxonomic senior synonym: *Muderongia mcwhaei*, according to Monteil (1991b, p.473) — however, Prössl (1992b, p.115) retained *Phoberocysta rariornata*. This name was not validly published in Prössl (1990, p.98–99), since that author did not specify the lodgment of the holotype. Age: early Hauterivian.

"*sarjeantii*" Corradini, 1973, p.181, pl.29, figs.2a–b,4a–b; pl.37, fig.3. Holotype: Corradini, 1973, pl.29, figs.2a–b. **NOW** *Xenascus*. Originally *Phoberocysta*, subsequently (and now) *Xenascus*. Age: Senonian.

"*serpaglii*" Corradini, 1973, p.181–182, pl.29, figs.5,7a–b; pl.37, fig.4. Holotype: Corradini, 1973, pl.29, figs.7a–b. **NOW** *Xenascus*. Originally *Phoberocysta*, subsequently (and now) *Xenascus*. Age: Senonian.

tabulata Raynaud, 1978, p.393–394, pl.1, figs.1–2. Emendation: Monteil, 1991b, p.476, as *Muderongia tabulata*. Holotype: Raynaud, 1978, pl.1, fig.1. Originally (and now) *Phoberocysta*, subsequently *Muderongia*. Poulsen (1996, p.59) retained this species in *Phoberocysta*. Taxonomic junior synonyms (at specific rank): *Phoberocysta neocomica* subsp. *convexa*, *Phoberocysta neocomica* subsp. *pteridia* and *Phoberocysta neocomica* subsp. *subovalis*, all according to Monteil (1991b, p.476). Age: Berriasian–Valanginian.

"**PHOREISA**" Courteville 1948, p.10. Calcareous dinoflagellate genus (see Elbrächter et al. 2008, p.1301). **Name not validly published**: no description, diagnosis or illustration.

"*concentrica*" Courteville 1948, p.10. **Name not validly published**: no description, diagnosis or illustration, and generic name not validly published. Age: Cretaceous.

"*ovata*" Courteville 1948, p.10. **Name not validly published**: no description, diagnosis or illustration, and generic name not validly published. Age: Cretaceous.

"*punctata*" Courteville 1948, p.10. **Name not validly published**: no description, diagnosis or illustration, and generic name not validly published. Age: Cretaceous.

PTHANOPERIDINIUM Drugg and Loeblich Jr., 1967, p.182. Emendations: Edwards and Bebout, 1981, p.36; Islam, 1982, p.306. Taxonomic junior synonym: *Vectidinium*, according to Islam (1982, p.313) — however, Lentin and Williams (1989, p.381) retained *Vectidinium*. Type: Drugg and Loeblich Jr., 1967, pl.1, fig.4, as *Phthanoperidinium amoenum*.

alectrolophum Eaton, 1976, p.295,298, pl.17, figs.10–11; text-fig.23A. Holotype: Eaton, 1976, pl.17, fig.11; Bujak et al., 1980, pl.5, fig.9. Age: ?middle Eocene (see Aubry, 1986).

amiculum Liengjarern et al., 1980, p.487–488, pl.53, fig.4. Holotype: Liengjarern et al., 1980, pl.53, fig.4. Age: late Eocene.

- *amoenum** Drugg and Loeblich Jr., 1967, p.182, pl.1, figs.1,2a–b,3a–b,4–5; text-fig.1. Holotype: Drugg and Loeblich Jr., 1967, pl.1, fig.4. Age: Oligocene.
- antarcticum** Mao Shaozhi and Mohr, 1995, p.249,251, pl.1, figs.1–7,9–10; pl.7, figs.3,6–7. Holotype: Mao Shaozhi and Mohr, 1995, pl.1, fig.1. Age: middle Eocene.
- bennettii** Matsuoka and Bujak, 1988, p.66–67, pl.9, figs.4–9; text-figs.13A–B. Holotype: Matsuoka and Bujak, 1988, pl.9, fig.4; text-fig.13A. Age: early Oligocene.
- "biconicum"** Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.62, pl.7, figs.1–6; text-fig.9. Holotype: He Chengquan et al., 1989, pl.7, fig.6; text-fig.9. **NOW** *Diconodinium*. Originally *Phthanoperidinium*, subsequently (and now) *Diconodinium*. Age: Early Tertiary.
- brooksii** Edwards and Bebout, 1981, p.38,40, pl.1, figs.1–9; pl.2, figs.1–9; text-figs.2–4. Holotype: Edwards and Bebout, 1981, pl.1, figs.1–3. Age: middle-late Eocene.
- ?campoense** Caro, 1973, p.359–360, pl.4, fig.7. Holotype: Caro, 1973, pl.4, fig.7. Originally *Phthanoperidinium*, subsequently (and now) *Phthanoperidinium?*. Questionable assignment: Stover and Evitt (1978, p.119). Age: early Eocene.
- chalossense** Michoux, 1985, p.146–147, pl.3, figs.6–8,15. Holotype: Michoux, 1985, pl.3, figs.6–8. Age: middle Eocene.
- clithridium** Bujak, 1994, p.127,129, pl.4, figs.1–3. Holotype: Bujak, 1994, pl.4, figs.1–2. Age: Lutetian.
- comatum** (Morgenroth, 1966b, p.1, pl.1, figs.1–2) Eisenack and Kjellström, 1972, p.907. Holotype: Morgenroth, 1966b, pl.1, fig.1. Originally *Peridinium* (Appendix B), subsequently (and now) *Phthanoperidinium*. Taxonomic junior synonyms: *Phthanoperidinium tritonium*, according to Bujak in Bujak et al. (1980, p.72) — however, Fensome et al. (2009, p.54–55) considered *Phthanoperidinium tritonium* to be a taxonomic junior synonym of *Phthanoperidinium coreoides*; *Hystrichogonyaulax* (now *Phthanoperidinium*) *coreoides*, according to Stover and Evitt (1978, p.118) — however, Benedek and Sarjeant (1981, p.328–330) retained *Phthanoperidinium coreoides*. Eaton (1976, p.294) also proposed this combination. Age: early Oligocene.
- coreoides** (Benedek, 1972, p.20, pl.9, figs.4a–c) Lentin and Williams, 1976, p.76. Emendation: Benedek and Sarjeant, 1981, p.328–330, as *Phthanoperidinium coreoides*. Holotype: Benedek, 1972, pl.9, figs.4a–c; Benedek and Sarjeant, 1981, fig.3, nos.2,4; fig.5. Originally *Hystrichogonyaulax*, subsequently (and now) *Phthanoperidinium*. Taxonomic senior synonym: *Peridinium* (now *Phthanoperidinium*) *comatum*, according to Stover and Evitt (1978, p.118) — however, Benedek and Sarjeant (1981, p.328–330) retained *Phthanoperidinium coreoides*. Taxonomic junior synonym *Phthanoperidinium tritonium*, according to Fensome et al. (2009, p.54–55), which species had previously been considered a taxonomic junior synonym of *Phthanoperidinium comatum* by Bujak in Bujak et al. (1980, p.72). Age: middle Oligocene.
- coriciterium** Islam, 1982, p.307–309, pl.1, figs.6,8–11; text-fig.1. Holotype: Islam, 1982, pl.1, fig.8. Age: early Eocene.
- cornutum** Heilmann-Clausen and Van Simaey, 2005, p.178, pl.9, figs.1–5. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.9, fig.1–2. Age: middle Eocene.
- crenulatum** (de Coninck, 1975, p.96, pl.17, figs.5–7,12–15) Lentin and Williams, 1977b, p.131. Emendation: Heilmann-Clausen, 1985, p.24–25, as *Phthanoperidinium crenulatum*. Holotype: de Coninck, 1975, pl.17, figs.12–13. Originally *Peridinium*, subsequently (and now) *Phthanoperidinium*. Age: early Eocene (Ypresian).
- delicatum** Michoux, 1985, p.147–148, pl.2, figs.1–4; pl.3, figs.1–5,13–14; text-fig.7. Holotype: Michoux, 1985, pl.2, figs.1–4; text-fig.7. Age: early-middle Eocene.

"?*diamantum*" (Churchill and Sarjeant, 1962, p.34–36, pl.1, fig.19; text-fig.3) Lentin and Williams, 1973, p.113. Holotype: Churchill and Sarjeant, 1962, pl.1, fig.19; text-fig.3. **NOW** *Gonyaulacysta*. Originally *Peridinium?* (Appendix B), subsequently *Phthanoperidinium?*, thirdly (and now) *Gonyaulacysta*. Questionable assignment: Lentin and Williams (1973, p.113). Age: Holocene.

distinctum Bujak, 1994, p.129, pl.4, figs.7–12. Holotype: Bujak, 1994, pl.4, figs.7–8. Age: Lutetian.

"*echinatum*" Eaton, 1976, p.298–299, pl.17, figs.8–9,12; text-fig.23B. Holotype: Eaton, 1976, pl.17, figs.8–9; Bujak et al., 1980, pl.5, figs.10–12. **Taxonomic senior synonym:** *Peridinium* (now *Phthanoperidinium*) *stockmansii*, according to de Coninck (1977, p.40) and by implication in Islam (1982, p.315), who considered *Phthanoperidinium echinatum* to be the senior name. Taxonomic junior synonym: *Phthanoperidinium? pseudoechinatum*, according to Islam (1982, p.309). Age: early-middle Eocene (see Aubry, 1986).

?*eocenicum* (Cookson and Eisenack, 1965a, p.119–120, pl.11, figs.1–5) Lentin and Williams, 1973, p.113. Holotype: Cookson and Eisenack, 1965a, pl.11, figs.1–2. Originally *Peridinium* (Appendix B), subsequently (and now) *Phthanoperidinium?*. Questionable assignment: Lentin and Williams (1973, p.113). Stover and Evitt (1978, p.119) considered *Phthanoperidinium stockmansii* and *Phthanoperidinium resistente* to be possible taxonomic junior synonyms of *Phthanoperidinium? eocenicum*. Eaton (1976, p.294) also proposed this combination. Age: late Eocene.

filigranum (Benedek, 1972, p.12–13, pl.4, figs.3a–b) Benedek and Sarjeant, 1981, p.325–327. Holotype: Benedek, 1972, pl.4, figs.3a–b; Benedek and Sarjeant, 1981, figs.4,8, nos.1–2. Originally *Deflandrea?*, subsequently *Vozzhennikovia?*, thirdly *Dioxya*, fourthly (and now) *Phthanoperidinium*. Bujak and Davies (1983, p.163) also proposed this combination. Age: middle Oligocene.

flebile Liengjarern et al., 1980, p.488–489, pl.54, fig.6. Holotype: Liengjarern et al., 1980, pl.54, fig.6. Age: early Oligocene.

geminatum Bujak in Bujak et al., 1980, p.72,74, pl.19, figs.8–12; text-figs.20D,22A. Holotype: Bujak et al., 1980, pl.19, figs.9–11. Age: middle Eocene (see Aubry, 1986).

?*illustrans* (Wetzel, 1933a, p.167, pl.2, fig.15) Lentin and Williams, 1973, p.113. Holotype: Wetzel, 1933a, pl.2, fig.15. Originally *Peridinium* (Appendix B), subsequently (and now) *Phthanoperidinium?*. Questionable assignment: Lentin and Williams (1973, p.113); Stover and Evitt (1978, p.119) as a problematic species. Age: Senonian.

indistinctum Islam, 1982, p.311, pl.2, figs.1–5; text-fig.2. Holotype: Islam, 1982, pl.2, fig.1. Age: middle Eocene.

?*lambdoideum* (E. Nagy, 1966, p.39–40, pl.1, figs.1–3; text-figs.1a–b) Eisenack and Kjellström, 1972, p.909. Holotype: E. Nagy, 1966, pl.1, figs.1–3; text-figs.1a–b. Originally *Peridinium* (Appendix B), subsequently *Phthanoperidinium*, thirdly (and now) *Phthanoperidinium?*. Questionable assignment: Stover and Evitt (1978, p.119) as a problematic species. Age: early Pliocene.

levimurum Bujak in Bujak et al., 1980, p.74, pl.19, figs.13–16; text-figs.20E,22B. Holotype: Bujak et al., 1980, pl.19, fig.13. Age: middle Eocene (see Aubry, 1986).

multispinum Bujak in Bujak et al., 1980, p.74, pl.19, figs.17–19; text-fig.20F. Holotype: Bujak et al., 1980, pl.19, fig.18. Age: middle Eocene (see Aubry, 1986).

obscurum Harland and Sharp, 1980, p.291,293–295, pl.1, figs.1–9, pl.2, figs.1–6; text-figs.3A–C. Holotype: Harland and Sharp, 1980, pl.1, figs.1–2. Age: late Eocene.

ovoideum He Chengquan, 1991, p.71, pl.2, fig.14; text-fig.8. Holotype: He Chengquan, 1991, pl.2, fig.14; text-fig.8. Age: late Eocene.

paleocenicum Lucas-Clark, 2006, p.196,198, pl.2, figs.10–17; pl.3, figs.1–3; text-figs.5A–B. Holotype: Lucas-Clark, pl.2, figs.10–12. Age: Paleocene.

"pannonium" (Lentin and Williams, 1973, p.106) Harker and Sarjeant, 1975, p.224. Holotype: Nagy, 1969, pl.1, fig.1. **Name illegitimate** — **nomenclatural senior synonym**: *Palaeoperidinium* (now *Pyxidinospis?*) *nudum* Nagy, which has the same type. **NOW** *Pyxidinospis? nuda*. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta nuda*, fifthly *Tectatodinium nudum*, sixthly *Tectatodinium? pannonium* (name illegitimate), seventhly *Pyxidinospis? pannonia* (name illegitimate), eighthly *Pyxidinospis? nuda*. See also the discussion under *Pyxidinospis? nuda*. Age: late Miocene.

polytrix (Benedek, 1972, p.20, pl.6, figs.1a–b) Lentin and Williams, 1976, p.76. Emendation: Benedek and Sarjeant, 1981, p.330–333, as *Phthanoperidinium polytrix*. Holotype: Benedek, 1972, pl.6, figs.1a–b; Benedek and Sarjeant, 1981, fig.2, nos.4,6, fig.6. Originally *Hystriochogonyaulax*, subsequently *Phthanoperidinium?*, thirdly (and now) *Phthanoperidinium*. Questionable assignment: Lentin and Williams (1976, p.76) — however, Benedek and Sarjeant (1981, p.330) included the species in *Phthanoperidinium* without question. Age: middle Oligocene.

powellii Bujak, 1994, p.129–130, pl.3, figs.7–9. Holotype: Bujak, 1994, pl.3, fig.8. Age: Lutetian.

"?pseudoechinatum" Bujak in Bujak et al., 1980, p.75–76, pl.19, fig.20; text-fig.20C. Holotype: Bujak et al., 1980, pl.19, fig.20. Questionable assignment: Bujak in Bujak et al. (1980, p.75). **Taxonomic senior synonym**: *Peridinium* (now *Phthanoperidinium*) *stockmansii*, by implication in Islam (1982, p.309), who considered *Phthanoperidinium? pseudoechinatum* to be a taxonomic junior synonym of *Phthanoperidinium echinatum*, which is now a taxonomic junior synonym of *Peridinium* (now *Phthanoperidinium*) *stockmansii*. Age: middle Eocene (see Aubry, 1986).

regale Bujak, 1994, p.130, pl.4, figs.4–6. Holotype: Bujak, 1994, pl.4, figs.4–5. Age: Lutetian.

resistente (Morgenroth, 1966a, p.5, pl.2, figs.1–2) Eisenack and Kjellström, 1972, p.911. Holotype: Morgenroth, 1966a, pl.2, figs.1–2. Originally *Peridinium* (Appendix B), subsequently (and now) *Phthanoperidinium*. Stover and Evitt (1978, p.119) considered this species to be a possible taxonomic junior synonym of *Phthanoperidinium eocenicum*. Eaton (1976, p.294) also proposed this combination. Age: early Eocene.

rhomboidale He Chengquan, 1991, p.71–72, pl.2, fig.12. Holotype: He Chengquan, pl.2, fig.12. Age: late Eocene.

rothmaniae Stotland in Andreeva-Grigorovich et al., 2011, p.36–38, pl.53, figs.1–9; pl.54, figs.1–3. Holotype: Andreeva-Grigorovich et al., 2011, pl.53, figs.1–9. Age: Rupelian.

?schizokeras (de Coninck, 1975, p.97, pl.17, figs.16–17) Lentin and Williams, 1977b, p.131. Holotype: de Coninck, 1975, pl.17, figs.16–17. Originally *Peridinium* (Appendix B), subsequently *Phthanoperidinium*, thirdly (and now) *Phthanoperidinium?*. Questionable assignment: Stover and Evitt (1978, p.119). Age: Ypresian.

stockmansii (de Coninck, 1975, p.97–98, pl.17, figs.18–37) Lentin and Williams, 1977b, p.131. Holotype: de Coninck, 1975, pl.17, figs.26–27. Originally *Peridinium* (Appendix B), subsequently *Phthanoperidinium*. Taxonomic junior synonyms: *Phthanoperidinium echinatum*, according to de Coninck (1977, p.40) and by implication in Islam (1982, p.315), who considered *Phthanoperidinium echinatum* to be the senior name; *Phthanoperidinium? pseudoechinatum*, by implication in Islam (1982, p.309), who considered *Phthanoperidinium? pseudoechinatum* to be a taxonomic junior synonym of *Phthanoperidinium echinatum*. Stover and Evitt (1978, p.119) considered this species to be a possible taxonomic junior synonym of *Phthanoperidinium eocenicum*. Age: Ypresian.

"stoveri" (Liengjareern et al., 1980, p.490–491, pl.54, fig.7) Islam, 1982, p.313. Holotype: Liengjareern et al., 1980, pl.54, fig.7; Fensome et al., 1995, fig.1 — p.1807. **NOW** *Vectidinium*. Originally (and now) *Vectidinium*, subsequently *Phthanoperidinium*. Age: late Eocene–early Oligocene.

tenellum Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.62–63, pl.6, fig.22. Holotype: He Chengquan et al., 1989, pl.6, fig.22. Age: Early Tertiary.

"tritonium" Eaton, 1976, p.299–300, pl.17, figs.2–3,6–7; text-figs.23C,24A–B. Holotype: Eaton, 1976, pl.17, fig.3; text-figs.24A–B; Bujak et al., 1980, pl.5, figs.7–8. **Taxonomic senior synonym:** *Hystrichogonyaulax* (now *Phthanoperidinium*) *coroides*, according to Fensome et al. (2009, p.54–55). Bujak in Bujak et al. (1980, p.72) considered *Phthanoperidinium tritonium* to be a taxonomic junior synonym of *Phthanoperidinium comatum*. Age: early-middle Eocene (see Aubry, 1986).

vozhennikovae Stotland in Andreeva-Grigorovich et al., 2011, p.38–39, pl.55, figs.1–9; pl.56, figs.1–3. Holotype: Andreeva-Grigorovich et al., 2011, pl.55, figs.1–9. Age: Rupelian.

zosimovichi Stotland in Andreeva-Grigorovich et al., 2011, p.39–40, pl.57, figs.1–9,2a,4a,9a; pl.58, figs.1a–d,2a–d,3a–d. Holotype: Andreeva-Grigorovich et al., 2011, pl.57, figs.1–9,2a,4a,9a. Age: early Oligocene.

PHYSALOCYSTA Xu Jinli et al., 1997, p.121,154. Type: Xu Jinli et al., 1997, pl.22, fig.13; text-fig.14, as *Physalocysta rotunda*.

oblongata Xu Jinli et al., 1997, p.122, pl.21, figs.12–15 ex He Chengquan et al., 2009, p.659. Holotype: Xu Jinli et al., 1997, pl.21, fig.12. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.659) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

quadrata Xu Jinli et al., 1997, p.122–123, pl.23, figs.3–4,7–8 ex He Chengquan et al., 2009, p.360,660. Holotype: Xu Jinli et al., 1997, pl.23, fig.3. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.660) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

***rotunda** Xu Jinli et al., 1997, p.121–122,154–155, pl.22, figs.12–15; pl.23, figs.12–14; text-fig.14. Holotype: Xu Jinli et al., 1997, pl.22, fig.13; text-fig.14. Age: early-middle Eocene.

simplex Xu Jinli et al., 1997, p.123, pl.41, figs.8–10 ex He Chengquan et al., 2009, p.361,660. Holotype: Xu Jinli et al., 1997, pl.41, fig.9. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.660) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

"PICCOLADINIUM" Versteegh and Zevenboom in Versteegh, 1995, p.91. **Taxonomic senior synonym:** *Hapsocysta*, by implication in Heilmann-Clausen and Van Simaey (2005, p.166), who transferred the type of the genus to *Hapsocysta*. Versteegh and Zevenboom (1995, p.223) also proposed this name. Type: Versteegh, 1995, pl.4, figs.1,4, as *Piccoladinium fenestratum*.

***"fenestratum"** Versteegh and Zevenboom in Versteegh, 1995, p.91–92, pl.4, figs.1–7. Holotype: Versteegh, 1995, pl.4, figs.1,4; **NOW** *Hapsocysta*. Originally *Piccoladinium*, subsequently (and now) *Hapsocysta*. Versteegh and Zevenboom (1995, p.223–224) also proposed this name. Age: early Chattian–mid Piacenzian.

PIERCEITES Habib and Drugg, 1987, p.761. Type: Habib and Drugg, 1987, pl.6, fig.1, as *Pierceites schizocystis*.

?chiemgoviensis Kirsch, 1991, p.111, pl.18, figs.11–13; text-fig.55. Holotype: Kirsch, 1991, pl.18, fig.11; text-fig.55. Questionable assignment: Kirsch (1991, p.111). Age: early Maastrichtian.

pentagonus (May, 1980, p.87–88, pl.10, figs.13–14) Habib and Drugg, 1987, p.762. Holotype: May, 1980, pl.10, figs.13–14. Originally *Trithyrodinium*, subsequently (and now) *Pierceites*. Age: early Maastrichtian.

**schizocystis* Habib and Drugg, 1987, p.761–762, pl.6, figs.1–6. Holotype: Habib and Drugg, 1987, pl.6, fig.1; Fensome et al., 1995, fig.1 — p.1769. Age: ?Cenomanian.

PILADINIUM Williams et al., 2015, p.308–309. Type: Michoux, 1988, pl.1, figs.2–3, as *Kisselevia columna*.

**columna* (Michoux, 1988, p.28,30, pl.1, figs.2–3,5–6; pl.2, figs.3–5; text-figs.7A–B) Williams et al., 2015, p.309. Holotype: Michoux, 1988, pl.1, figs.2–3. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Piladinium*. N.I.A. Age: early Eocene.

edwardsii (Wilson, 1967c, p.477, figs.8–9) Williams et al., 2015, p.309. Holotype: Wilson, 1967c, fig.8. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Piladinium*. Age: early Eocene.

PILOSIDIINIUM Courtinat, 1989, p.190. Type: Gitmez and Sarjeant, 1972, pl.1, fig.1, as *Tenua echinata*.

aptiense (Burger, 1980a, p.76, pl.23, figs.1,5; pl.24, fig.1) Courtinat in Fauconnier and Masure, 2004, p.447. Holotype: Burger, 1980a, pl.23, fig.1; Fauconnier and Masure, 2004, pl.63, figs.11–13. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Taxonomic junior synonym: *Tenua* (as *Sentusidinium*) *microrobusta*, according to Backhouse (1988, p.107). Age: Aptian.

asymmetricum (Pocock, 1972, p.107, pl.26, figs.29–30) Courtinat in Fauconnier and Masure, 2004, p.447. Holotype: Pocock, 1972, pl.26, fig.29; Fauconnier and Masure, pl.63, fig.15. Originally *Leiosphaeridia* (Appendix A), subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Taxonomic junior synonym: *Sentusidinium* (as *Pilosidinium*) *fibrosum*, according to Courtinat in Fauconnier and Masure, 2004, p.447. Age: late Bajocian–early Bathonian.

asymmetrum (Fenton et al., 1980, p.160,162, pl.16, figs.1,3,5) Courtinat in Fauconnier and Masure, 2004, p.447. Holotype: Fenton et al., 1980, pl.16, fig.3. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Age: late Bajocian–early Bathonian.

cactosum Quattrocchio and Sarjeant, 1992, p.91–92 (al. 2–243 — 2–244), pl.6, fig.2, pl.8, fig.6. Holotype: Quattrocchio and Sarjeant, 1992, pl.6, fig.2. Age: middle-late Tithonian.

capillatum (Davey, 1975, p.155–156, pl.2, figs.4,7) Courtinat in Fauconnier and Masure, 2004, p.448. Holotype: Davey, 1975, pl.2, fig.7. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Age: Senonian (?Campanian).

densicomatum (Maier, 1959, p.307–308, pl.29, figs.7–8) Courtinat in Fauconnier and Masure, 2004, p.448. Emendation: Sarjeant, 1983, p.111–113, as *Sentusidinium densicomatum*. Holotype: Maier, 1959, pl.29, fig.7. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Impletosphaeridium?*, fifthly *Sentusidinium*, sixthly (and now) *Pilosidinium*. Age: middle Oligocene–middle Miocene.

**echinatum* (Gitmez and Sarjeant, 1972, p.190, pl.1, figs.1,9) Courtinat, 1989, p.190. Holotype: Gitmez and Sarjeant, 1972, pl.1, fig.1; Fauconnier and Masure, 2004, pl.63, fig.14. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Age: early–late Kimmeridgian.

fensomei Courtinat, 1989, p.190–191, pl.21, figs.2–3,5,7; pl.23, fig.15. Holotype: Courtinat, 1989, pl.21, fig.7; Fauconnier and Masure, pl.64, fig.1. Age: Oxfordian.

"*fibrosum*" (Kumar, 1987a, p.243–244, pl.1, figs.5,7–8,11; text-fig.6) Courtinat in Fauconnier and Masure 2004, p.447. Holotype: Kumar, 1987a, pl.1, fig.5. **Combination not validly published:** not accepted as a correct name by its author. Originally *Sentusidinium*, subsequently *Pilosidinium* (combination not validly published). **Taxonomic senior synonym:** *Leiosphaeridia* (now *Pilosidinium*) *asymmetrica*, according to Courtinat in

Fauconnier and Masure (2004, p.447,449). Courtinat in Fauconnier and Masure (2004, p.447,449) proposed this combination while simultaneously considering it to be a junior synonym. Age: early Kimmeridgian–Tithonian.

filium (Davies, 1983, p.29–30, pl.10, figs.5–6,8–9; text-fig.27) Courtinat, 1989, p.191. Holotype: Davies, 1983, pl.10, fig.8; Fauconnier and Masure, 2004, pl.64, figs.2–3. Originally *Sentusidinium*, subsequently (and now) *Pilosidinium*. Age: late Oxfordian–Valanginian.

microcystum (Bujak in Bujak et al., 1980, p.88,90, pl.22, figs.2–5) Courtinat in Fauconnier and Masure 2004, p.448. Holotype: Bujak et al., 1980, pl.22, figs.2–3; Fauconnier and Masure, 2004, pl.64, figs.4–5. Originally *Tenua* Eisenack, subsequently *Cleistosphaeridium*, thirdly *Sentusidinium*, fourthly (and now) *Pilosidinium*. Age: middle Eocene (see Aubry, 1986).

myriatrichum (Fensome, 1979, p.12–13, pl.2, fig.7; text-fig.5A) Courtinat, 1989, p.191. Holotype: Fensome, 1979, pl.2, fig.7; text-fig.5A; Fauconnier and Masure, 2004, pl.63, fig.16. Originally *Sentusidinium*, subsequently (and now) *Pilosidinium*. Age: late Oxfordian–mid Kimmeridgian.

neophytensum (Ioannides et al., 1977, p.463, pl.5, figs.5,8–9) Courtinat, 1989, p.191. Holotype: Ioannides et al., 1977, pl.5, fig.5. Originally *Tenua* Eisenack, subsequently *Sentusidinium*?, thirdly (and now) *Pilosidinium*. Age: middle Kimmeridgian.

PIRUMELLA Bolli, 1980, p.528. Emendation: Streng et al., 2009, p.242. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482–483 and Elbrächter et al., 2008, p.1301). Taxonomic senior synonym: *Pithonella*, by implication in Keupp (1981, p.44), who considered the "type species" of *Pirumella*, *Pirumella edithvincentiae*, to be a taxonomic junior synonym of *Pithonella* (now *Pirumella*) *thayeri* — however, Lentin and Williams (1993, p.577) retained *Pirumella*. Taxonomic junior synonym: *Obliquipithonella*, according to Streng et al. (2004, p.482), who included the type of *Obliquipithonella* in *Pirumella*; see also Fensome and Williams (2004, p.461). Type: Bolli, 1980, pl.4, figs.1–2, as *Pirumella edithvincentiae*.

albiensis (Keupp and Kowalski, 1992, p.222–223, pl.8, figs.13–15) Williams et al., 1998, p.487. Holotype: Keupp and Kowalski, 1992, pl.8, fig.13. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: middle-late Albian.

amplificrystallina (Pflaumann and Krasheninnikov, 1978, p.820, pl.3, figs.4a–c,5a–d,6a–d — not 7a–d) Lentin and Williams, 1993, p.517. Holotype: Pflaumann and Krasheninnikov, 1978, pl.3, figs.5a–c. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Maastrichtian.

bassriverensis (Olsson and Youssefnia, 1979, p.1090, pl.1, figs.13–16) Lentin and Williams, 1993, p.517. Holotype: Olsson and Youssefnia, 1979, pl.1, fig.16. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Cenomanian.

bilamellata (Pflaumann and Krasheninnikov, 1978, p.822, pl.5, figs.5,6a–d, pl.6, figs.1a–b,2a–b) Lentin and Williams, 1993, p.517. Holotype: Pflaumann and Krasheninnikov, 1978, pl.5, figs.6a–d. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Willems (1992, p.160) considered *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *krasheninnikovii* to be the possible taxonomic senior synonym of this species. Age: Campanian–early Maastrichtian.

"carteri" (Bolli, 1974, p.852, pl.1, figs.1–4; pl.8, figs.1–3; pl.21, fig.1) Lentin and Williams, 1993, p.517. Holotype: Bolli, 1974, pl.1, figs.1–2; pl.21, fig.1. **NOW** *Pirumella multistrata* forma *carteri*. Originally *Pithonella carteri*, subsequently *Obliquipithonella carteri*, thirdly *Pirumella carteri*, fourthly *Obliquipithonella multistrata* forma *carteri*, fifthly (and now) *Pirumella multistrata* forma *carteri*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1992a, p.500) — however, Kohring (1993a, p.65) retained *Pithonella carteri* (as *Obliquipithonella multistrata* forma *carteri*). Taxonomic junior synonym (at specific rank): *Pithonella woodburyensis*, according to Kohring (1993a, p.65) — however, *Pithonella woodburyensis* is now considered a taxonomic junior synonym of *Pithonella* (now *Pirumella*) *tanyphloia*. Age: Tithonian.

cookii (Bolli, 1974, p.856, pl.6, figs.9–12; pl.18, figs.3–9; pl.23, fig.6) Lentin and Williams, 1993, p.517. Holotype: Bolli, 1974, pl.6, fig.9; pl.23, fig.6. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Orthopithonella* (combination not validly published), fourthly (and now) *Pirumella*. Willems (1992, p.160) considered *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *krasheninnikovii* to be the possible taxonomic senior synonym of this species. Age: Coniacian–Santonian.

cumulosa (Zügel, 1994, p.73–74, pl.16, figs.14–15) Williams et al., 1998, p.487. Holotype: Zügel, 1994, pl.16, fig.14. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

cylindrica (Pflaumann and Krasheninnikov, 1978, p.822, pl.5, figs.1a–c,2a–b,3a–c,4a–c) Lentin and Williams, 1993, p.517. Holotype: Pflaumann and Krasheninnikov, 1978, pl.5, figs.4a–c. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Willems (1992, p.160) considered *Pithonella* (as and now *Obliquipithonella*) *krasheninnikovii* to be the possible taxonomic senior synonym of this species. Age: Campanian–Maastrichtian.

echinosa (Keupp, 1982, p.331–332, pl.6.2–7, figs.10–12; pl.6.2–8, figs.1–2) Lentin and Williams, 1993, p.517. Holotype: Keupp, 1982, pl.6.2–7, figs.11–12; pl.6.2–8, fig.2. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: early Albanian.

edgarii (Bolli, 1974, p.854, pl.4, figs.1–4; pl.13, figs.3–7; pl.22, fig.4) Lentin and Williams, 1993, p.518. Holotype: Bolli, 1974, pl.4, figs.1–2; pl.13, fig.3; pl.22, fig.4. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonym: *Pithonella titanoplax*, according to Keupp (1981, p.64) — however, Kohring (1993a, p.74) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *titanoplax*. Age: Albanian.

"**edithvincentiae*" Bolli, 1980, p.528, pl.4, figs.1–12. Holotype: Bolli, 1980, pl.4, figs.1–2. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *thayeri*, according to Keupp (1981, p.44). The nomenclatural type of the genus *Pirumella* remains the holotype of *Pirumella edithvincentiae*. Age: late Hauterivian.

fragilis Hildebrand-Habel and Willems, 1997, p.183, pl.2, fig.7 ex Hildebrand-Habel and Willems 2004, p.183,185. Holotype: Hildebrand-Habel and Willems, 1997, pl.2, fig.7, as *Obliquipithonella fragilis* and Hildebrand-Habel and Willems, 2004, pl.1, figs.1–3. Originally *Obliquipithonella* (name not validly published), subsequently (and now) *Pirumella*. Age: middle Coniacian–early Santonian.

fusiformis (Rögl, 1976, p.702, pl.1, figs.12–14; pl.2, figs.9–12) Lentin and Williams, 1993, p.518. Holotype: Rögl, 1976, pl.1, fig.12; pl.2, figs.9–10. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: early Paleocene (Danian).

heirtzleri (Bolli, 1974, p.855, pl.5, figs.5–8; pl.15, figs.7–12; pl.16, figs.1–4; pl.23, fig.2) Lentin and Williams, 1993, p.518. Holotype: Bolli, 1974, pl.5, fig.5; pl.23, fig.2. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albanian.

hystrichosphaeroidea (Zügel, 1994, p.76, pl.18, figs.1–6) Williams et al., 1998, p.488. Holotype: Zügel, 1994, pl.18, figs.1–2. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

irregularis (Akselman and Keupp, 1990, p.172–173,175–178, pl.1, figs.1–19; text-fig.2) Williams et al., 1998, p.488. Holotype: Akselman and Keupp, 1990, pl.1, fig.3. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Motile equivalent: *Scrippsiella patagonica* Akselman and Keupp, 1990, according to Akselman and Keupp (1990, p.169). Age: extant.

johnstonei (Bolli, 1974, p.856, pl.6, figs.5–8; pl.18, figs.1–2; pl.23, fig.5) Lentin and Williams, 1993, p.518. Holotype: Bolli, 1974, pl.6, figs.5–6; pl.18, fig.1; pl.23, fig.5. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Thoracosphaera* (now *Orthopithonella*) *deflandrei*, according to Kohring (1993a, p.30) — however, Streng et al. (2004, p.482) retained *Pithonella* (as *Pirumella*) *johnstonei*. Age: Coniacian–Santonian.

krasheninnikovii (Bolli, 1974, p.856, pl.7, figs.1–5; pl.18, figs.10–12; pl.19, figs.1–12; pl.20, figs.1–4; pl.24, figs.1–2) Lentin and Williams, 1993, p.518. Holotype: Bolli, 1974, pl.7, figs.1–2; pl.18, fig.10; pl.24, fig.1. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Willems (1992, p.160) considered *Pithonella* (now *Pirumella*) *cookii*, *Pithonella* (now *Pirumella*) *bilamellata* and *Pithonella* (now *Pirumella*) *cylindrica* to be possible taxonomic junior synonyms of this species. Fütterer (1990, p.540) and Willems (1992, p.160) also proposed this combination. Age: Coniacian–Santonian.

labyrinthica (Zügel, 1994, p.75, pl.17, figs.10–15) Williams et al., 1998, p.488. Holotype: Zügel, 1994, pl.17, figs.10–12. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: middle Cenomanian.

laquaeta (Keupp and Mutterlose, 1994, p.755, figs.9.6–9.8) Williams et al., 1998, p.488. Holotype: Keupp and Mutterlose, 1994, fig.9.7. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early Aptian.

lepidota (Keupp, 1982, p.330–331, pl.6.2–7, figs.2–7) Lentin and Williams, 1993, p.518. Holotype: Keupp, 1982, pl.6.2–7, figs.2,7. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Aptian–early Albian.

loeblichii (Bolli, 1974, p.853–854, pl.3, figs.1–4; pl.11, figs.9–12; pl.12, figs.1–3; pl.22, fig.1) Lentin and Williams, 1993, p.518. Holotype: Bolli, 1974, pl.3, figs.1–2; pl.11, figs.9–10; pl.22, fig.1. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella helentappaniae*, according to Keupp (1979c, p.23) — however, Keupp (1981, p.60) retained *Pirumella* (as *Pithonella*) *loeblichii*. Taxonomic junior synonyms: *Pithonella bollii*, *Pithonella megalithica* and *Pithonella nonarenziae*, all according to Keupp (1981, p.60) — however, Zügel (1994, p.66) retained *Pithonella* (as *Obliquipithonella*) *nonarenziae*. Age: ?late Aptian–middle Albian.

longiporosa (Pflaumann and Krasheninnikov, 1978, p.820, pl.2, figs.1a–c,2a–c,3a–b) Lentin and Williams, 1993, p.519. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.1a–c. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian–Cenomanian.

loricata (Krasheninnikov and Basov, 1983, p.982, pl.3, figs.1–7) Lentin and Williams, 1993, p.519. Holotype: Krasheninnikov and Basov, 1983, pl.3, figs.1,4. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

mcnightii (Bolli, 1974, p.852–853, pl.1, figs.5–8; pl.8, figs.4–8; pl.21, fig.2) Lentin and Williams, 1993, p.519. Holotype: Bolli, 1974, pl.1, figs.5–6; pl.8, fig.4; pl.21, fig.2. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Tithonian.

microspinosa (Zügel, 1994, p.74–75, pl.17, figs.1–8) Williams et al., 1998, p.489. Holotype: Zügel, 1994, pl.17, figs.1–2. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early Cenomanian.

miniaperta (Krasheninnikov and Basov, 1983, p.983, pl.5, figs.1–8) Lentin and Williams, 1993, p.519. Holotype: Krasheninnikov and Basov, 1983, pl.5, figs.1,7. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

multistrata (Pflaumann and Krasheninnikov, 1978, p.821, pl.7, figs.3a–f,4a–b,5a–b,6a–b) Lentin and Williams, 1993, p.519. Holotype: Pflaumann and Krasheninnikov, 1978, pl.7, figs.3a–f. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonyms: *Pithonella carteri*, according to Keupp (1992a, p.500) — however, Kohring (1993a, p.65) retained *Pithonella carteri* (as *Obliquipithonella multistrata* forma *carteri*); *Pithonella atlantica*, *Pithonella excentrica* and *Pithonella hannoverana*, all according to Keupp (1981, p.29–30) — however, Kohring (1993a, p.66) retained *Pithonella excentrica* (as *Obliquipithonella multistrata* forma *excentrica*). Age: Valanginian–Barremian.

forma **carteri** (Bolli, 1974, p.852, pl.1, figs.1–4; pl.8, figs.1–3; pl.21, fig.1) Williams et al., 1998, p.489. Holotype: Bolli, 1974, pl.1, figs.1–2; pl.21, fig.1. Originally *Pithonella carteri*, subsequently *Obliquipithonella carteri*, thirdly *Pirumella carteri*, fourthly *Obliquipithonella multistrata* forma *carteri*, fifthly (and now) *Pirumella multistrata* forma *carteri*. Taxonomic senior synonym: *Pithonella* (now

Pirumella multistrata, according to Keupp (1992a, p.500) — however, Kohring (1993a, p.65) retained *Pithonella carteri* (as *Obliquipithonella multistrata* forma *carteri*). Taxonomic junior synonym (at specific rank): *Pithonella woodburyensis*, according to Kohring (1993a, p.65) — however, *Pithonella woodburyensis* is now considered a taxonomic junior synonym of *Pithonella* (now *Pirumella*) *tanyphloia*. Age: Tithonian.

forma ***continga*** (Kohring, 1993a, p.69–70, pl.30, figs.a–p) Williams et al., 1998, p.489. Holotype: Kohring, 1993a, pl.30, figs.a,c,e. Originally *Obliquipithonella multistrata* forma *continga*, subsequently (and now) *Pirumella multistrata* forma *continga*. Age: middle Oligocene.

forma ***excentrica*** (Keupp, 1979c, p.660, pl.6, figs.6–12) Williams et al., 1998, p.489. Holotype: Keupp, 1979c, pl.6, figs.7–8,11. Originally *Pithonella excentrica*, subsequently *Obliquipithonella multistrata* forma *excentrica*, thirdly (and now) *Pirumella multistrata* forma *excentrica*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1981, p.30) — however, Kohring (1993a, p.66) retained *Pithonella excentrica* (as *Obliquipithonella multistrata* forma *excentrica*). Age: late Hauterivian.

forma ***multistrata***. Autonym. Holotype: Pflaumann and Krasheninnikov, 1978, pl.7, figs.3a–f. Originally *Obliquipithonella multistrata* forma *multistrata*, subsequently (and now) *Pirumella multistrata* forma *multistrata*.

forma ***patriciagreeleyae*** (Bolli, 1974, p.853, pl.2, figs.9–12; pl.11, figs.1–8; pl.21, fig.6) Williams et al., 1998, p.489–490. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. Originally *Pithonella patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae*, fourthly *Obliquipithonella multistrata* forma *patriciagreeleyae*, fifthly (and now) *Pirumella multistrata* forma *patriciagreeleyae*. Taxonomic junior synonym: *Pithonella francadecimae*, according to Keupp (1981, p.41). Age: Barremian–Albian.

forma ***tanyphloia*** (Keupp, 1979a, p.29–30, pl.6, figs.1–8) Weinkauff et al., 2013, p.249. Holotype: Keupp, 1979a, pl.6, figs.1–3. Originally *Pithonella tanyphloia*, subsequently *Obliquipithonella tanyphloia*, thirdly *Pirumella tanyphloia*, fourthly (and now) *Pirumella multistrata* forma *tanyphloia*. Taxonomic junior synonym: *Pithonella woodburyensis*, according to Keupp (1981, p.36–38). Age: early Barremian.

nonarenziae (Bolli, 1974, p.853, pl.2, figs.5–8; pl.10, figs.9–12; pl.21, fig.5) Williams et al., 1998, p.490. Holotype: Bolli, 1974, pl.2, fig.5; pl.21, fig.5. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *loeblichii*, according to Keupp (1981, p.60) — however, Zügel (1994, p.66) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *nonarenziae*. Taxonomic junior synonym: *Pithonella sheilasantawae*, according to Zügel (1994, p.66). Age: Barremian–Albian.

"operculata" (Bramlette and Martini, 1964, p.305–306, pl.5, figs.3–7) Williams et al., 1998, p.490. Emendation: Streng et al., 2004, p.467, as *Cervisiella operculata*. Holotype: Bramlette and Martini, 1964, pl.5, figs.4–5. **NOW** *Cervisiella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Pirumella*, fourthly *Operculodinella*, fifthly (and now) *Cervisiella*. Taxonomic junior synonym: *Thoracosphaera atlantica*, according to Fütterer (1990, p.540). Age: Maastrichtian–Paleocene.

ossis (Kienel, 1994, p.45–46, pl.8, figs.7–15) Williams et al., 1998, p.490. Holotype: Kienel, 1994, pl.8, figs.7–10. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. N.I.A. Age: Danian.

pachystrata (Zügel, 1994, p.37–38, pl.5, figs.1–12) Williams et al., 1998, p.490. Holotype: Zügel, 1994, pl.5, figs.1–3. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: Danian.

paradoxa (Keupp, 1991b, p.132, pl.3, figs.7–12) Williams et al., 1998, p.490. Holotype: Keupp, 1991b, pl.3, figs.7–9. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

parva (Fütterer, 1984, p.536–537, pl.3, figs.1–10; pl.4, figs.8–9) Lentin and Williams, 1993, p.519. Holotype: Fütterer, 1984, pl.3, figs.3,6,10. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Danian–early Pleistocene.

"patriciagreeleyae" (Bolli, 1974, p.853, pl.2, figs.9–12; pl.11, figs.1–8; pl.21, fig.6) Lentin and Williams, 1993, p.519. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. **NOW** *Pirumella multistrata* forma *patriciagreeleyae*. Originally *Pithonella patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae*, fourthly *Obliquipithonella multistrata* forma *patriciagreeleyae*, fifthly (and now) *Pirumella multistrata* forma *patriciagreeleyae*. Taxonomic junior synonym: *Pithonella francadecimae*, according to Keupp (1981, p.41). Age: Barremian–Albian.

"subsp. **ovata**" (Keupp, 1979a, p.32, pl.6, fig.10; pl.7, figs.1–3) Lentin and Williams, 1993, p.519–520. Holotype: Keupp, 1979a, pl.7, figs.1–2. Originally *Pithonella patriciagreeleyae* subsp. *ovata*, subsequently *Obliquipithonella patriciagreeleyae* subsp. *ovata*, thirdly *Pirumella patriciagreeleyae* subsp. *ovata*. **Taxonomic senior synonym** (at specific rank): *Pithonella sliteri*, according to Keupp (1982, p.334). Age: early Barremian.

"subsp. **patriciagreeleyae**". Autonym. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. **Now redundant**. Originally *Pithonella patriciagreeleyae* subsp. *patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae* subsp. *patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae* subsp. *patriciagreeleyae*.

pinguis (Keupp and Ilg, 1989, p.173, pl.11, figs.1–6) Lentin and Williams, 1993, p.520. Holotype: Keupp and Ilg, 1989, pl.11, figs.1–2. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early-middle Oxfordian.

piriformis (Keupp, 1977, p.66–67, pl.23, figs.1–5; text-fig.7) Lentin and Williams, 1993, p.520. Holotype: information not available. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. This combination was not validly published in Bolli (1980, p.528), since that author did not fully reference the basionym. Age: Tithonian.

porosa (Pflaumann and Krasheninnikov, 1978, p.820, pl.2, figs.4a–b,5a–c,6a–b,7) Lentin and Williams, 1993, p.520. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.4a–b. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian–Cenomanian.

subsp. **obturata** (Pflaumann and Krasheninnikov, 1978, p.820, pl.3, figs.1a–b,2a–b,3) Lentin and Williams, 1993, p.520. Holotype: Pflaumann and Krasheninnikov, 1978, pl.3, figs.1a–b. Originally *Pithonella porosa* forma *obturata*, subsequently *Obliquipithonella porosa* forma *obturata*, thirdly (and now) *Pirumella porosa* subsp. *obturata*. Age: latest Albian–Cenomanian.

subsp. **porosa**. Autonym. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.4a–b.

prasina (Janofske, 1992, p.14, pl.4, figs.1a–h; pl.5, figs.1a–h,2a–c; pl.6, figs.1a–f,2a–d; pl.19, figs.4–5) Williams et al., 1998, p.491. Holotype: Janofske, 1992, pl.4, figs.1a–h; pl.19, fig.5. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: Carnian.

quiltyi (Bolli, 1974, p.855–856, pl.6, figs.1–4; pl.17, figs.1–12; pl.23, fig.4) Lentin and Williams, 1993, p.520. Holotype: Bolli, 1974, pl.6, fig.1; pl.23, fig.4. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

rhombica (Janofske, 1987, p.50, pl.1, fig.5) Lentin and Williams, 1993, p.520. Holotype: Janofske, 1987, pl.1, fig.5. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: Rhaetian.

robinsonii (Bolli, 1974, p.854, pl.4, figs.5–8; pl.13, figs.8–12; pl.14, figs.1–3; pl.22, fig.5) Lentin and Williams, 1993, p.520. Holotype: Bolli, 1974, pl.4, figs.5–6; pl.13, figs.8–9; pl.22, fig.5. Originally *Pithonella*, subsequently

Obliquipithonella, thirdly (and now) *Pirumella*. Taxonomic junior synonym: *Pithonella trilamellata*, according to Keupp (1982, p.325). Age: Albian.

subsp. *coalita* (Keupp, 1979a, p.27, pl.4, figs.9–10) Lentin and Williams, 1993, p.521. Holotype: Keupp, 1979a, pl.4, figs.9–10. Originally *Pithonella robinsonii* subsp. *coalita*, subsequently *Obliquipithonella robinsonii* subsp. *coalita*, thirdly (and now) *Pirumella robinsonii* subsp. *coalita*. Age: early Barremian.

subsp. *robinsonii*. Autonym. Holotype: Bolli, 1974, pl.4, figs.5–6; pl.13, figs.8–9; pl.22, fig.5. Originally *Pithonella robinsonii* subsp. *robinsonii*, subsequently *Obliquipithonella robinsonii* subsp. *robinsonii*, thirdly (and now) *Pirumella robinsonii* subsp. *robinsonii*. Age: Albian.

rockeri (Bolli, 1974, p.854, pl.3, figs.5–8; pl.12, figs.4–6; pl.22, fig.2) Lentin and Williams, 1993, p.521. Holotype: Bolli, 1974, pl.3, fig.5; pl.22, fig.2. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: ?late Aptian–middle Albian.

"*saxea*" (Stradner, 1961, p.84, fig.71) Williams et al., 1998, p.491. Holotype: Stradner, 1961, fig.71. **NOW** *Cervisiella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella* (combination not validly published), thirdly *Pirumella*, fourthly (and now) *Cervisiella*. Age: Danian.

scobidota (Zügel, 1994, p.70, pl.15, figs.13–15) Williams et al., 1998, p.491. Holotype: Zügel, 1994, pl.15, figs.13–15. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

"*sheilasantawae*" (Bolli, 1974, p.854–855, pl.4, figs.9–12; pl.14, figs.4–9; pl.22, fig.6) Lentin and Williams, 1993, p.521. Holotype: Bolli, 1974, pl.4, figs.9–10; pl.14, figs.7–8; pl.22, fig.6. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Pirumella*. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *nonarenziae*, according to Zügel (1994, p.66). Taxonomic junior synonym: *Thoracosphaera thoracata*, according to Keupp (1981, p.63). Age: Albian.

sicelis (Kohring, 1993b, p.17, pl.2, figs.10–15) Williams et al., 1998, p.491. Holotype: Kohring, 1993b, pl.2, figs.10–11. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early Pliocene.

sliteri Bolli, 1980, p.528, pl.5, figs.1–12; pl.6, figs.1–6. Holotype: Bolli, 1980, pl.5, figs.1–2. Originally (and now) *Pirumella*, subsequently *Pithonella*, thirdly *Obliquipithonella*. Taxonomic junior synonym (at specific rank): *Pithonella* (subsequently *Pirumella*) *patriciagreeleyae* subsp. *ovata*, according to Keupp (1982, p.334). Age: late Hauterivian.

spathulata (Keupp and Ilg, 1989, p.172–173, pl.8, fig.15; pl.9, figs.1–15) Lentin and Williams, 1993, p.521. Holotype: Keupp and Ilg, 1989, pl.9, figs.1–3. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Callovian–early Oxfordian.

sphenifera (Keupp, 1987, p.52, pl.19, figs.7–12) Lentin and Williams, 1993, p.521. Holotype: Keupp, 1987, pl.19, figs.7–8. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: early Cenomanian.

spinosa (Keupp, 1979a, p.17–18, pl.1, fig.6) Lentin and Williams, 1993, p.521. Holotype: Keupp, 1979a, pl.1, fig.6. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

squalida (Krasheninnikov and Basov, 1983, p.982, pl.4, figs.1–8) Lentin and Williams, 1993, p.521. Holotype: Krasheninnikov and Basov, 1983, pl.4, figs.3–4,6. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Earliest late Cenomanian.

squamosa (Krasheninnikov and Basov, 1983, p.983, pl.6, figs.1–6) Lentin and Williams, 1993, p.521–522. Holotype: Krasheninnikov and Basov, 1983, pl.6, figs.3,5. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

stellata (Zügel, 1994, p.40, pl.6, figs.4–6) Williams et al., 1998, p.492. Holotype: Zügel, 1994, pl.6, figs.4–5. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: late Cenomanian.

strobila (Keupp, 1979a, p.18, pl.2, figs.1–3) Lentin and Williams, 1993, p.522. Holotype: Keupp, 1979a, pl.2, figs.1–2. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

"*tanyphloia*" (Keupp, 1979a, p.29–30, pl.6, figs.1–8) Lentin and Williams, 1993, p.522. Holotype: Keupp, 1979a, pl.6, figs.1–3. **NOW** *Pirumella multistrata* forma *tanyphloia*. Originally *Pithonella tanyphloia*, subsequently *Obliquipithonella tanyphloia*, thirdly *Pirumella tanyphloia*, fourthly (and now) *Pithonella multistrata* forma *tanyphloia*. Taxonomic junior synonym: *Pithonella woodburyensis*, according to Keupp (1981, p.36–38). Age: early Barremian.

+*thayeri* (Bolli, 1974, p.853, pl.1, figs.9–12; pl.8, figs.9–12; pl.9, figs.1–12; pl.21, fig.3) Lentin and Williams, 1993, p.522. Holotype: Bolli, 1974, pl.1, fig.9; pl.21, fig.3. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonyms: *Pirumella edithvincentiae*, *Pithonella guttula*, *Pithonella helentappaniae*, and *Pithonella oviformis*, all according to Keupp (1981, p.43–44). The nomenclatural type of the genus *Pirumella* remains the holotype of *Pirumella edithvincentiae*. Age: Oxfordian–Tithonian.

titanoplax (Rögl, 1976, p.701–702, pl.1, figs.5–9; pl.2, figs.5–8) Williams et al., 1998, p.492. Holotype: Rögl, 1976, pl.1, fig.5; pl.2, figs.5–6. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *edgarii*, according to Keupp (1981, p.64) — however, Kohring (1993a, p.74) retained *Obliquipithonella* (now *Pirumella*) *titanoplax*. Age: Danian.

toichhadra (Keupp, 1995, p.162–163, pl.7, figs.7–9) Williams et al., 1998, p.492. Holotype: Keupp and Kowalski, 1992, pl.8, fig.8, as *Obliquipithonella* sp. cf. *williamsenonii*. Originally *Obliquipithonella*, subsequently (and now) *Pirumella*. Age: Albanian.

transitoria (Krasheninnikov and Basov, 1983, p.983, pl.7, figs.1–6) Lentin and Williams, 1993, p.522. Holotype: Krasheninnikov and Basov, 1983, pl.7, figs.1,6. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Campanian.

usherii (Krasheninnikov and Basov, 1983, p.983, pl.7, figs.7–9; pl.8, figs.1–2) Lentin and Williams, 1993, p.522. Holotype: Krasheninnikov and Basov, 1983, pl.7, fig.7; pl.8, fig.1. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Maastrichtian.

williamsenonii (Bolli, 1978b, p.912–913, pl.2, figs.1–12; pl.3, figs.1–12) Williams et al., 1998, p.492–493. Holotype: Bolli, 1978b, pl.2, figs.1–3. Originally *Bonetocardiella*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly *Orthopithonella*, fifthly (and now) *Pirumella*. Age: Oxfordian–Kimmeridgian.

zuegelii Williams et al., 1998, p.493. Holotype: Zügel, 1994, pl.16, fig.10. Originally *Obliquipithonella squamosa* (name illegitimate), subsequently (and now) *Pirumella zuegelii*. This is the substitute name for *Obliquipithonella squamosa* Zügel, 1994, p.72–73, pl.16, figs.10–13; the name *Pirumella squamosa* is preoccupied. Age: late Cenomanian.

PITHONELLA Lorenz, 1902, p.46. Emendations: Bignot and Lezard, 1964, p.140; Villain, 1977, p.144; Masters and Scott, 1978, p.215; Keupp, 1987, p.39; Zügel, 1994, p.24. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1301, the latter noting that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable — see also below). Taxonomic junior synonyms: *Pirumella*, by implication in Keupp (1981, p.44), who considered the "type species" of *Pirumella*, *Pirumella edithvincentiae*, to be a taxonomic junior synonym of *Pithonella* (now *Pirumella*) *thayeri* — however, Lentin and Williams (1993, p.517) retained *Pirumella*; *Palinosphaera*, by implication in Zügel (1994, p.17), who transferred the type of that genus to *Pithonella* — see under *Palinosphaera* for a full discussion; *Cadosinella*, according to Wendler et al. (2013, p.1098), although these authors did not propose any related species transfers; *Calcisphaerula*, according to Villain (1977, p.144) and Wendler et al. (2013, p.1098) (but see Elbrächter et al., 2008, p.1299); *Andriella* and *Wallia*, both according to

Wendler et al. (2013, p.1098). Keupp in Keupp and Mutterlose (1984) included in *Pithonella* forms of unknown affinity only; forms which are demonstrably dinoflagellates were included in *Obliquipithonella* and *Orthopithonella*. However, Willems (1995a, p.61) considered *Pithonella* to represent calcareous dinoflagellate cysts. Wendler et al. (2013, p.1098) considered that *Pithonella* has probable affiliation with dinoflagellates, although they confusingly listed the genus under both Calcitarcha (see Versteegh et al., 2009) and Division Dinoflagellata; for the present we provisionally retain it as a dinoflagellate. Type: not designated; "type species" — *Pithonella ovalis*.

"**amplicrystallina**" Pflaumann and Krasheninnikov, 1978, p.820, pl.3, figs.4a–c,5a–d,6a–d (not 7a–d). Holotype: Pflaumann and Krasheninnikov, 1978, pl.3, figs.5a–c. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Maastrichtian.

antarctica Rögl, 1976, p.702, pl.3, figs.1–6; pl.4, figs.1–12. Holotype: Rögl, 1976, pl.3, fig.1; pl.4, figs.1–3. Keupp in Lentini and Williams (1989, p.401) suggested that this species may be a foraminifer. Age: Danian.

"**atlantica**" Olsson and Youssefina, 1979, p.1090, pl.2, figs.7–12. Holotype: Olsson and Youssefina, 1979, pl.2, fig.8. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1981, p.30). Age: early Campanian.

atopa Keupp and Kienel, 1994, p.204–205, pl.3, figs.1–15. Holotype: Keupp and Kienel, 1994, pl.3, figs.1–2,13. Age: late Albian.

"**bassriverensis**" Olsson and Youssefina, 1979, p.1090, pl.1, figs.13–16. Holotype: Olsson and Youssefina, 1979, pl.1, fig.16. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Cenomanian.

"**bilamellata**" Pflaumann and Krasheninnikov, 1978, p.822, pl.5, figs.5,6a–d; pl.6, figs.1a–b,2a–b. Holotype: Pflaumann and Krasheninnikov, 1978, pl.5, figs.6a–d. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Campanian–early Maastrichtian.

"**bollii**" Rögl, 1976, p.701, pl.1, figs.1–4; pl.2, figs.1–4. Holotype: Rögl, 1976, pl.1, fig.1; pl.2, figs.1–3. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *loeblichii*, according to Keupp (1981, p.60). Taxonomic senior synonym: *Pithonella helentappaniae*, according to Keupp (1979a, p.23). Age: Danian.

brezovica (Borza, 1972, p.148,150, figs.36–42) Fensome and Williams, 2004, p.534. Holotype: Borza, 1972, figs.37. Originally *Palinosphaera*, subsequently (and now) *Pithonella*. Age: Campanian.

cardiiformis Zügel, 1994, p.23–24, pl.1, figs.12–15; pl.2, figs.1–2; text-figs.11b,13. Holotype: Zügel, 1994, pl.1, figs.12–13. Age: middle Turonian.

"**carteri**" Bolli, 1974, p.852, pl.1, figs.1–4; pl.8, figs.1–3; pl.21, fig.1. Holotype: Bolli, 1974, pl.1, figs.1–2; pl.21, fig.1. **NOW** *Pirumella multistrata* forma *carteri*. Originally *Pithonella carteri*, subsequently *Obliquipithonella carteri*, thirdly *Pirumella carteri*, fourthly *Obliquipithonella multistrata* forma *carteri*, fifthly (and now) *Pirumella multistrata* forma *carteri*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1992a, p.500) — however, Kohring (1993a, p.65) retained *Pithonella carteri* (as *Obliquipithonella multistrata* forma *carteri*). Taxonomic junior synonym: *Pithonella woodburyensis*, according to Kohring (1993a, p.65); however, *Pithonella woodburyensis* is now considered a taxonomic junior synonym of *Pithonella* (now *Pirumella*) *tanyphloia*. Age: Tithonian.

caucasia Keller, 1946, p.95, pl.3, fig.2. Holotype: Keller, 1946, pl.3, fig.2. Andri (1972, p.22) considered this species to be a possible taxonomic synonym of *Pithonella perlonga* (name not validly published). Age: information not available.

caucasic Keller, 1946, p.95, pl.3, fig.2. Holotype: Keller, 1946, pl.3, fig.2. Originally (and now) *Pithonella*, subsequently *Inocardion*. This species was retained in *Pithonella* by Streng et al. (2004, p.483). Andri (1972, p.22) considered this species to be a possible taxonomic synonym of *Pithonella perlonga*. Age: information not available.

"*compsa*" Keupp, 1982, p.318–319, pl.3, figs.5–8. Holotype: Keupp, 1982, pl.3, figs.6–8. **NOW** *Orthopithonella*. Originally *Pithonella*, subsequently (and now) *Orthopithonella*. Age: late Aptian–Campanian.

"*cookii*" Bolli, 1974, p.856, pl.6, figs.9–12; pl.18, figs.3–9; pl.23, fig.6. Holotype: Bolli, 1974, pl.6, fig.9; pl.23, fig.6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Orthopithonella* (combination not validly published), fourthly (and now) *Pirumella*. Age: Coniacian–Santonian.

"*cylindrica*" Pflaumann and Krasheninnikov, 1978, p.822, pl.5, figs.1a–c,2a–b,3a–c,4a–c. Holotype: Pflaumann and Krasheninnikov, 1978, pl.5, figs.4a–c. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Campanian–Maastrichtian.

diconica Wendler and Wendler in Wendler et al., 2013, p.1098, 1104, fig.18, nos.3–4. Holotype: Wendler et al., 2013, fig.18, no.3. Age: middle Turonian.

discoidea Willems, 1992, p.165–166, pl.6, figs.3–7. Holotype: Willems, 1992, pl.6, figs.3–5. Age: early Maastrichtian.

"*echinosa*" Keupp, 1982, p.331–332, pl.6.2–7, figs.10–12; pl.6.2–8, figs.1–2. Holotype: Keupp, 1982, pl.6.2–7, figs.11–12; pl.6.2–8, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: early Albian.

"*edgarii*" Bolli, 1974, p.854, pl.4, figs.1–4; pl.13, figs.3–7; pl.22, fig.4. Holotype: Bolli, 1974, pl.4, figs.1–2; pl.13, fig.3; pl.22, fig.4. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonym: *Pithonella titanoplax*, according to Keupp (1981, p.64) — however, Kohring (1993a, p.74) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *titanoplax*. Age: Albian.

"*excentrica*" Keupp, 1979c, p.660, pl.6, figs.6–12. Holotype: Keupp, 1979c, pl.6, figs.7–8,11. **NOW** *Pirumella multistrata* forma *excentrica*. Originally *Pithonella excentrica*, subsequently *Obliquipithonella multistrata* forma *excentrica*, thirdly (and now) *Pirumella multistrata* forma *excentrica*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1981, p.30) — however, Kohring (1993a, p.66) retained *Pithonella excentrica* (as *Obliquipithonella multistrata* forma *excentrica*). Age: late Hauterivian.

"*francadecimae*" Bolli, 1974, p.855, pl.5, figs.1–4; pl.14, figs.10–12; pl.15, figs.1–6; pl.23, fig.1. Holotype: Bolli, 1974, pl.5, figs.1–2; pl.23, fig.1. **Taxonomic senior synonym:** *Pithonella patriciagreeleyae* (now *Pirumella multistrata* forma *patriciagreeleyae*), according to Keupp (1981, p.41). Age: Albian.

"*fusifformis*" Rögl, 1976, p.702, pl.1, figs.12–14; pl.2, figs.9–12. Holotype: Rögl, 1976, pl.1, fig.12; pl.2, figs.9–10. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: early Paleocene (Danian).

"*globosa*" Fütterer, 1984, p.536, pl.2, figs.1–9. Holotype: Fütterer, 1984, pl.2, figs.1–3. **NOW** *Orthopithonella*?. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Orthopithonella*?. Age: middle Maastrichtian–early Danian.

"*globulus*" (Wetzel, 1933b, p.29, pl.4, fig.12) Sarjeant, 1985b, p.159. Holotype: Wetzel, 1933b, pl.4, fig.12; Sarjeant, 1985b, pl.2, fig.3; Dietz et al., 1999, fig.10, no.4. **NOW** *Pleurozonaria* (Appendix A). Originally (and now) *Pleurozonaria* (Appendix A), subsequently *Tasmanites* (Appendix A), thirdly *Pithonella*. N.I.A. Age: Late Cretaceous.

"*gustafsonii*" Bolli, 1974, p.854, pl.3, figs.9–12; pl.12, figs.7–12; pl.13, figs.1–2; pl.22, fig.3. Holotype: Bolli, 1974, pl.3, fig.9; pl.12, fig.9; pl.22, fig.3. **NOW** *Orthopithonella*. Originally *Pithonella*, subsequently (and now) *Orthopithonella*. Taxonomic junior synonyms: *Pithonella paratabulata*, according to Keupp (1981, p.20); *Pithonella pycnothecata* and *Pithonella tithonica*, both according to Willems (1988, p.437) — however, Kohring (1993a, p.35) retained *Pithonella* (as and now *Orthopithonella*) *pycnothecata*. Age: middle Maastrichtian–early Danian.

"*guttula*" Pflaumann and Krasheninnikov, 1978, p.821–822, pl.8, figs.1a–e,2a–c,3a–b,4a–b. Holotype: Pflaumann and Krasheninnikov, 1978, pl.8, figs.1a–e. Originally *Pithonella*, subsequently *Obliquipithonella*. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *thayeri*, according to Keupp (1981, p.43). Age: Valanginian–Hauterivian.

"*hannoverana*" Keupp, 1979a, p.27–29, pl.5, figs.1–9. Holotype: Keupp, 1979a, pl.5, figs.1–3. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *multistrata*, according to Keupp (1981, p.29). Age: early Barremian.

"*heirtzleri*" Bolli, 1974, p.855, pl.5, figs.5–8; pl.15, figs.7–12; pl.16, figs.1–4; pl.23, fig.2. Holotype: Bolli, 1974, pl.5, fig.5; pl.23, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albanian.

"*helentappaniae*" Bolli, 1974, p.853, pl.2, figs.1–4; pl.10, figs.1–8; pl.21, fig.4. Holotype: Bolli, 1974, pl.2, fig.1; pl.21, fig.4. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *thayeri*, according to Keupp (1981, p.43–44). Taxonomic junior synonyms: *Pithonella bollii* and *Pithonella* (now *Pirumella*) *loeblichii*, both according to Keupp (1979a, p.23) — however, Keupp (1981, p.60) retained *Pithonella loeblichii* with *Pithonella bollii* as its taxonomic junior synonym. Age: Barremian–Albian.

innominata (Bonet, 1956, p.443–447, pl.22, fig.1 [part]; pl.24, figs.1–2; pl.27, fig.1 [part]) Villain, 1977, p.147. Emendation: Villain, 1977, p.147, as *Pithonella innominata*. Holotype: not designated. Originally *Calcisphaerula*, subsequently (and now) *Pithonella*. As this name was published under the I.C.Z.N., it can be considered valid even though it lacks a holotype. Age: Albian–Santonian.

"*johnstonei*" Bolli, 1974, p.856, pl.6, figs.5–8; pl.18, figs.1–2; pl.23, fig.5. Holotype: Bolli, 1974, pl.6, figs.5–6; pl.18, fig.1; pl.23, fig.5. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Pirumella*. Taxonomic senior synonym: *Thoracosphaera* (now *Orthopithonella*) *deflandrei*, according to Kohring (1993a, p.30) — however, Streng et al. (2004, p.482) retained *Pithonella* (as *Pirumella*) *johnstonei*. Age: Coniacian–Santonian.

"*krasheninnikovii*" Bolli, 1974, p.856, pl.7, figs.1–5; pl.18, figs.10–12; pl.19, figs.1–12; pl.20, figs.1–4; pl.24, figs.1–2. Holotype: Bolli, 1974, pl.7, figs.1–2; pl.18, fig.10; pl.24, fig.1. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Coniacian–Santonian.

lamellata Keupp and Kienel, 1994, p.205–206, pl.4, figs.1–15; pl.5, figs.1–10. Holotype: Keupp and Kienel, 1994, pl.4, fig.1. Age: late Albian.

"*lepidota*" Keupp, 1982, p.330–331, pl.6.2–7, figs.2–7. Holotype: Keupp, 1982, pl.6.2–7, figs.2,7. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: late Aptian–early Albian.

"*loeblichii*" Bolli, 1974, p.853–854, pl.3, figs.1–4; pl.11, figs.9–12; pl.12, figs.1–3; pl.22, fig.1. Holotype: Bolli, 1974, pl.3, figs.1–2; pl.11, figs.9–10; pl.22, fig.1. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella helentappaniae*, according to Keupp (1979a, p.23) — however, Keupp (1981, p.60) retained *Pithonella* (now *Pirumella*) *loeblichii*. Taxonomic junior synonyms: *Pithonella bollii*, *Pithonella megalithica* and *Pithonella nonarenziae*, all according to Keupp (1981, p.60) — however, Zügel (1994, p.66) retained *Pithonella* (as *Obliquipithonella*) *nonarenziae*. Age: ?late Aptian–middle Albian.

"*longiporosa*" Pflaumann and Krasheninnikov, 1978, p.820, pl.2, figs.1a–c,2a–c,3a–b. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.1a–c. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: latest Albian–Cenomanian.

"*loricata*" Krasheninnikov and Basov, 1983, p.982, pl.3, figs.1–7. Holotype: Krasheninnikov and Basov, 1983, pl.3, figs.1,4. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

"*mcnightii*" Bolli, 1974, p.852–853, pl.1, figs.5–8; pl.8, figs.4–8; pl.21, fig.2. Holotype: Bolli, 1974, pl.1, figs.5–6; pl.8, fig.4; pl.21, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Tithonian.

"*megalithica*" Keupp, 1979a, p.25–26, pl.4, figs.1–2,4; text-fig.2. Holotype: Keupp, 1979a, pl.4, fig.1. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *loeblichii*, according to Keupp (1981, p.60). Age: early Barremian.

melloi* (Keupp, 1990) Williams and Fensome, 2016, p.141. Holotype: Keupp, 1990, pl.14, figs.1–3. **NOW *Pithonella*. Originally *Wallia*, subsequently (and now) *Pithonella*. Taxonomic junior synonym: *Wallia jakei* (name not validly published), according to Keupp (1990, p.49). This combination was not validly published in Wendler et al. (2013, p.1098) as the basionym was not fully cited. Age: middle Campanian.

"*microgranula*" Zügel, 1994, p.20–24, pl.1, figs.8–11; text-figs.7b,13. Holotype: Zügel, 1994, pl.1, figs.8–9. Age: earliest Turonian.

"*miniaperta*" Krasheninnikov and Basov, 1983, p.983, pl.5, figs.1–8. Holotype: Krasheninnikov and Basov, 1983, pl.5, figs.1,7. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

"*multicava*" Borza, 1972, p.144,146, text-figs.13–35. Holotype: Borza, 1972, text-fig.13. **Taxonomic senior synonym:** *Pithonella perlonga*, according to Villain (1977, p.146). Age: Campanian.

"*multistrata*" Pflaumann and Krasheninnikov, 1978, p.821, pl.7, figs.3a–f,4a–b,5a–b,6a–b. Holotype: Pflaumann and Krasheninnikov, 1978, pl.7, figs.3a–f. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonyms: *Pithonella carteri*, according to Keupp (1992a, p.500) — however, Kohring (1993a, p.65) retained *Pithonella carteri* (as *Obliquipithonella multistrata* forma *carteri*); *Pithonella atlantica*, *Pithonella excentrica* and *Pithonella hannoverana*, all according to Keupp (1981, p.29–30) — however, Kohring (1993a, p.66) retained *Pithonella excentrica* (as *Obliquipithonella multistrata* forma *excentrica*). Age: Valanginian–Barremian.

"*nonarenziae*" Bolli, 1974, p.853, pl.2, figs.5–8; pl.10, figs.9–12; pl.21, fig.5. Holotype: Bolli, 1974, pl.2, fig.5; pl.21, fig.5. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *loeblichii*, according to Keupp (1981, p.60) — however, Zügel (1994, p.66) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *nonarenziae*. Taxonomic junior synonym: *Pithonella sheilasantawae*, according to Zügel (1994, p.66). Age: Barremian–Albian.

"*organica*" Hultberg, 1985a, p.26–28,30, figs.1A–D,2A–D,3A–H. Holotype: Hultberg, 1985a, fig.1A; Hultberg, 1985d, fig.1A. Hultberg (1985d, p.116–117,119) also proposed this name. Age: early Paleocene.

**ovalis* (Kaufmann in Heer, 1865, p.196–197, figs.107a–b) Lorenz, 1902, p.46. Holotype: not designated. Neotype: Wendler et al., 2013, fig.9, no.2; fig.17. Emendation: Wendler et al., 2013, p.1101–1102 as a "Diagnosis", implied to be an emendation on their p.1104. Originally *Lagena* (Appendix A), subsequently (and now) *Pithonella*, thirdly *Fissurina* (Appendix A). Colom (1955, p.121) retained this species in *Pithonella*. Taxonomic junior synonym: *Lagena* (now *Pithonella*) *sphaerica*, according to Lorenz (1902, p.46) — however, Bonet (1956, p.450) and Wendler et al. (2013, p.1098) retained *Lagena* (as *Stomiosphaera*) *sphaerica*. Wendler et al. (2013, p.1101) cited this combination as new. Age: late Cenomanian–Turonian (based on later studies by Bolli — P. Hochuli, personal communication).

"*oviformis*" Keupp, 1979a, p.32–33, pl.8, figs.1–5. Holotype: Keupp, 1979a, pl.8, figs.1–2. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *thayeri*, according to Keupp (1981, p.43). Age: early Barremian.

"*paratabulata*" Keupp, 1980b, p.242–244, pl.30, figs.1–9, pl.31, figs.1–12. Holotype: Keupp, 1980b, pl.30, fig.1. **Taxonomic senior synonym:** *Pithonella* (now *Orthopithonella*) *gustafsonii*, according to Keupp (1981, p.20). Age: late Aptian.

"*parva*" Fütterer, 1984, p.536–537, pl.3, figs.1–10; pl.4, figs.8–9. Holotype: Fütterer, 1984, pl.3, figs.3,6,10. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Danian–early Pleistocene.

"*patriciagreeleyae*" Bolli, 1974, p.853, pl.2, figs.9–12; pl.11, figs.1–8; pl.21, fig.6. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. **NOW** *Pirumella multistrata* forma *patriciagreeleyae*. Originally *Pithonella patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae*, fourthly *Obliquipithonella multistrata* forma *patriciagreeleyae*, fifthly (and now) *Pirumella multistrata* forma *patriciagreeleyae*. Taxonomic junior synonym: *Pithonella francadecimae*, according to Keupp (1981, p.41). Age: Barremian–Albian.

"subsp. *ovata*" Keupp, 1979a, p.32, pl.6, fig.10; pl.7, figs.1–3. Holotype: Keupp, 1979a, pl.7, figs.1–2. Originally *Pithonella patriciagreeleyae* subsp. *ovata*, subsequently *Obliquipithonella patriciagreeleyae* subsp. *ovata*, thirdly *Pirumella patriciagreeleyae* subsp. *ovata*. **Taxonomic senior synonym** (at specific rank): *Pirumella* (as *Pithonella*) *sliteri*, according to Keupp (1982, p.334). Age: early Barremian.

"subsp. *patriciagreeleyae*". Autonym. Holotype: Bolli, 1974, pl.2, figs.9–10; pl.21, fig.6. **Now redundant**. Originally *Pithonella patriciagreeleyae* subsp. *patriciagreeleyae*, subsequently *Obliquipithonella patriciagreeleyae* subsp. *patriciagreeleyae*, thirdly *Pirumella patriciagreeleyae* subsp. *patriciagreeleyae*.

perlonga Andri, 1972, p.22–24, pl.3, figs.2–6; text-fig.9, nos.1–20. Holotype: not designated. Taxonomic junior synonym: *Pithonella multicava*, according to Villain (1977, p.146). Andri (1972, p.22) considered this species to be a possible taxonomic synonym of *Cadosinella gracillimoides* (Appendix A) and *Pithonella caucasica*. As this name was published under the I.C.Z.N., it can be considered valid even though it lacks a holotype. Age: late Cenomanian–?early Turonian.

"*piriformis*" Keupp, 1977, p.66–67, pl.23, figs.1–5; text-fig.7. Holotype: information not available. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Tithonian.

"*porata*" Keupp, 1982, p.316–318, pl.6.2–2, fig.12; pl.6.2–3, figs.1–4,10. Holotype: Keupp, 1982, pl.6.2–3, figs.1–2. **NOW** ?*Orthopithonella*. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly (and now) ?*Orthopithonella*. Age: early Barremian–early Albian.

"*porosa*" Pflaumann and Krasheninnikov, 1978, p.820, pl.2, figs.44a–b,5a–c,6a–b,7; pl.3, figs.1a–b,2a–b,3. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.4a–b. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian–Cenomanian.

"forma *obturata*" Pflaumann and Krasheninnikov, 1978, p.820, pl.3, figs.1a–b,2a–b,3. Holotype: Pflaumann and Krasheninnikov, 1978, pl.3, figs.1a–b. **NOW** *Pirumella porosa* subsp. *obturata*. Originally *Pithonella porosa* forma *obturata*, subsequently *Obliquipithonella porosa* subsp. *obturata*, thirdly (and now) *Pirumella porosa* subsp. *obturata*. Age: latest Albian–Cenomanian.

"forma *porosa*". Autonym. Holotype: Pflaumann and Krasheninnikov, 1978, pl.2, figs.4a–b. **Now redundant**. Originally *Pithonella porosa* forma *porosa*, subsequently *Obliquipithonella porosa* forma *porosa*.

"*pycnothecata*" Keupp, 1978, p.94, figs.11–12. Holotype: Keupp, 1978, fig.11. **NOW** ?*Orthopithonella*. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly (and now) ?*Orthopithonella*. Taxonomic senior synonym: *Pithonella* (as and now *Orthopithonella*) *gustafsonii*, according to Willems (1988, p.437) — however, Kohring (1993a, p.35) retained *Pithonella* (as and now *Orthopithonella*) *pycnothecata*. Age: Tithonian.

pyramidalis Willems, 1995a, p.63,65–66, pl.2, figs.1–7. Holotype: Willems, 1995a, pl.2, figs.1,4–6. Age: latest early Campanian–earliest late Campanian.

"*quiltyi*" Bolli, 1974, p.855–856, pl.6, figs.1–4; pl.17, figs.1–12; pl.23, fig.4. Holotype: Bolli, 1974, pl.6, fig.1; pl.23, fig.4. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albanian.

"*robinsonii*" Bolli, 1974, p.854, pl.4, figs.5–8; pl.13, figs.8–12; pl.14, figs.1–3; pl.22, fig.5. Holotype: Bolli, 1974, pl.4, figs.5–6; pl.13, figs.8–9; pl.22, fig.5. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonym: *Pithonella trilamellata*, according to Keupp (1982, p.325). Age: Albanian.

"subsp. *coalita*" Keupp, 1979a, p.27, pl.4, figs.9–10. Holotype: Keupp, 1979a, pl.4, figs.9–10. **NOW** *Pirumella robinsonii* subsp. *coalita*. Originally *Pithonella robinsonii* subsp. *coalita*, subsequently *Obliquipithonella robinsonii* subsp. *coalita*, thirdly (and now) *Pirumella robinsonii* subsp. *coalita*. Age: early Barremian.

"subsp. *robinsonii*". Autonym. Holotype: Bolli, 1974, pl.4, figs.5–6; pl.13, figs.8–9; pl.22, fig.5. **NOW** *Pirumella robinsonii* subsp. *robinsonii*. Originally *Pithonella robinsonii* subsp. *robinsonii*, subsequently *Obliquipithonella robinsonii* subsp. *robinsonii*, thirdly (and now) *Pirumella robinsonii* subsp. *robinsonii*.

"*rockeri*" Bolli, 1974, p.854, pl.3, figs.5–8; pl.12, figs.4–6; pl.22, fig.2. Holotype: Bolli, 1974, pl.3, fig.5; pl.22, fig.2. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: ?late Aptian–middle Albanian.

"*sheilasantawae*" Bolli, 1974, p.854–855, pl.4, figs.9–12; pl.14, figs.4–9; pl.22, fig.6. Holotype: Bolli, 1974, pl.4, figs.9–10; pl.14, figs.7–8; pl.22, fig.6. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly *Pirumella*. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *nonarenziae*, according to Zügel (1994, p.66). Taxonomic junior synonym: *Thoracosphaera thoracata*, according to Keupp (1981, p.63). Age: Albanian.

"*siniformis*" Řehánek and Mišík, 1991, p.113–114, 116, pl.1, figs.1–9; text-figs.2,3A. Holotype: Řehánek and Mišík, 1991, pl.1, fig.1. Age: Campanian.

"*sliteri*" (Bolli, 1980, p.528, pl.5, figs.1–12; pl.6, figs.1–6) Keupp, 1982, p.334–335. Holotype: Bolli, 1980, pl.5, figs.1–2. **NOW** *Pirumella*. Originally (and now) *Pirumella*, subsequently *Pithonella*, thirdly *Obliquipithonella*. Taxonomic junior synonym (at specific rank): *Pithonella* (subsequently *Pirumella*) *patriciagreeleyae* subsp. *ovata*, according to Keupp (1982, p.334). Age: late Hauterivian.

"*sphaerica*" (Kaufmann in Heer, 1865, p.196, figs.104, 106a–b) Zügel, 1994, p.17. Holotype: not designated. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly *Palinosphaera* (generic name not validly published), fourthly (and now) *Pithonella*. Taxonomic senior synonym: *Lagena* (now *Pithonella*) *ovalis*, according to Lorenz (1902, p.46) — however, Bonet (1956, p.450) and Wendler et al. (2013, p.1098) retained *Lagena* (as *Stomiosphaera*) *sphaerica*. Taxonomic junior synonym: *Lagena orbularia*, according to Bonet (1956, p.450). This combination was not validly published in Villain (1977, p.147), Masters and Scott (1978, caption to pl.1, fig.3 — p.216), Bolli (1978a, p.822), Keupp (1987, p.52), Willems (1992, p.164), Kohring (1993a, p.95), and Monnet (1993, p.45), since these authors did not fully reference the basionym. Villain (1977, p.147) included the prasinophyte name *Pleurozonaria globulus* Wetzel, 1933b in synonymy with this species, but apparently he did not intend to implicate the holotype of *Pleurozonaria globulus*. Age: late Cenomanian–Turonian (based on later studies by Bolli — P. Hochuli, personal communication).

"*spinosa*" (Keupp, 1979a, p.17–18, pl.1, fig.6) Keupp, 1981, p.65. Holotype: Keupp, 1979a, pl.1, fig.6. **NOW** *Pirumella*. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

"*squalida*" Krasheninnikov and Basov, 1983, p.982, pl.4, figs.1–8. Holotype: Krasheninnikov and Basov, 1983, pl.4, figs.3–4, 6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: earliest late Cenomanian.

"*squamosa*" Krasheninnikov and Basov, 1983, p.983, pl.6, figs.1–6. Holotype: Krasheninnikov and Basov, 1983, pl.6, figs.3,5. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Albian.

"*strobila*" (Keupp, 1979a, p.18, pl.2, figs.1–3) Keupp, 1981, p.64. Holotype: Keupp, 1979a, pl.2, figs.1–2. **NOW** *Pirumella*. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

"*tanyphloia*" Keupp, 1979a, p.29–30, pl.6, figs.1–8. Holotype: Keupp, 1979a, pl.6, figs.1–3. **NOW** *Pirumella multistrata* forma *tanyphloia*. Originally *Pithonella tanyphloia*, subsequently *Obliquipithonella tanyphloia*, thirdly *Pirumella tanyphloia*, fourthly (and now) *Pithonella multistrata* forma *tanyphloia*. Taxonomic junior synonym: *Pithonella woodburyensis*, according to Keupp (1981, p.36–38). Age: early Barremian.

"*thayeri*" Bolli, 1974, p.853, pl.1, figs.9–12; pl.8, figs.9–12; pl.9, figs.1–12; pl.21, fig.3. Holotype: Bolli, 1974, pl.1, fig.9; pl.21, fig.3. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic junior synonyms: *Pithonella edithvincentiae*, *Pithonella guttula*, *Pirumella helentappaniae* and *Pithonella oviformis*, all according to Keupp (1981, p.43–44). Age: Oxfordian–Tithonian.

"*titanoplax*" Rögl, 1976, p.701–702, pl.1, figs.5–9; pl.2, figs.5–8. Holotype: Rögl, 1976, pl.1, fig.5; pl.2, figs.5–6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Taxonomic senior synonym: *Pithonella* (now *Pirumella*) *edgarii*, according to Keupp (1981, p.64) — however, Kohring (1993a, p.74) retained *Pithonella* (as *Obliquipithonella*, now *Pirumella*) *titanoplax*. Age: Danian.

"*tithonica*" Keupp, 1978, p.90,92, figs.7–10. Holotype: Keupp, 1978, fig.7. Originally *Pithonella*, subsequently *Orthopithonella*. **Taxonomic senior synonym:** *Pithonella* (as and now *Orthopithonella*) *gustafsonii*, according to Willems (1988, p.437). Age: Tithonian.

"*transitoria*" Krasheninnikov and Basov, 1983, p.983, pl.7, figs.1–6. Holotype: Krasheninnikov and Basov, 1983, pl.7, figs.1,6. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Campanian.

trejoi Bonet, 1956, p.459–461, pl.27, figs.1–part,2. Holotype: not designated. Originally (and now) *Pithonella*, subsequently *Andriella*. This species was retained in *Pithonella* by implication in Wendler et al. (2013) when they considered *Andriella* to be a taxonomic junior synonym of *Pithonella*. As this name was published under the I.C.Z.N., it can be considered valid even though it lacks a holotype. Age: late Albian–Turonian.

"*trilamellata*" Pflaumann and Krasheninnikov, 1978, p.821, pl.6, figs.3a–c,4a–b,5a–c,7a–b; pl.7, figs.1a–c,2. Holotype: Pflaumann and Krasheninnikov, 1978, pl.6, figs.3a–c. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *robinsonii*, according to Keupp (1982, p.325). Age: Valanginian–?Aptian–Albian.

"*tuberculata*" Pflaumann and Krasheninnikov, 1978, p.820–821, pl.1, figs.7a–c,8. Holotype: Pflaumann and Krasheninnikov, 1978, pl.1, figs.7a–c. **NOW** *Alasphaera*. Originally *Pithonella*, subsequently (and now) *Alasphaera*. Taxonomic junior synonyms: *Alasphaera verrucosa*, according to Keupp (1981, p.55); *Alasphaera caudata*, according to Monnet (1993, p.41), who considered *Alasphaera caudata* to be the senior name. Age: late Valanginian–early Hauterivian.

"*usherii*" Krasheninnikov and Basov, 1983, p.983, pl.7, figs.7–9; pl.8, figs.1–2. Holotype: Krasheninnikov and Basov, 1983, pl.7, fig.7; pl.8, fig.1. **NOW** *Pirumella*. Originally *Pithonella*, subsequently *Obliquipithonella*, thirdly (and now) *Pirumella*. Age: Maastrichtian.

"*veeversii*" Bolli, 1974, p.855, pl.5, figs.9–12; pl.16, figs.5–12; pl.23, fig.3. Holotype: Bolli, 1974, pl.5, figs.9–10; pl.23, fig.3. **NOW** ?*Orthopithonella*. Originally *Pithonella*, subsequently *Orthopithonella*, thirdly (and now) ?*Orthopithonella*. Age: Albian.

velardei Trejo, 1983, p.9–10, pl.56, figs.2–6; pl.57, fig.1; pl.59, fig.5. Holotype: Trejo, 1983, pl.56, fig.2. Age: Late Cretaceous.

"*williamsonii*" (Bolli, 1978b, p.912–913, pl.2, figs.1–12; pl.3, figs.1–12) Keupp, 1981, p.65. Holotype: Bolli, 1978b, pl.2, figs.1–3. **NOW** *Pirumella*. Originally *Bonetocardiella*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly *Orthopithonella*, fifthly (and now) *Pirumella*. Age: Oxfordian–Kimmeridgian.

"*woodburyensis*" Olsson and Youssefnia, 1979, p.1091, pl.1, fig.11; pl.2, figs.1–6. Holotype: Olsson and Youssefnia, 1979, pl.2, fig.3. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *tanyphloia*, according to Keupp (1981, p.36–38). Taxonomic senior synonym (at specific rank): *Pithonella carteri* (now *Pirumella multistrata* forma *carteri*), according to Kohring (1993a, p.65). Age: Santonian–Campanian.

"**PLANINOSPHERIDIUM**" Eisenack, 1965b, p.151. **Taxonomic senior synonym:** *Pentadinium*, according to Stover and Evitt (1978, p.179–180). Taxonomic junior synonym: *Ataxiodinium*, by implication in Wall et al. (1977, p.149), who transferred the "type species" of *Ataxiodinium*, *Ataxiodinium choane*, to *Planinosphaeridium* — however, Edwards and Andrlé (1992, p.265) retained *Ataxiodinium*. Type: Eisenack, 1965b, pl.14, fig.4; text-fig.1, as *Planinosphaeridium membranaceum*.

"*choane*" (Reid, 1974, p.588–589, pl.1, figs.1–2) Wall et al., 1977, p.149. Holotype: Reid, 1974, pl.1, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.1053. **NOW** *Ataxiodinium*. Originally (and now) *Ataxiodinium*, subsequently *Planinosphaeridium*. Taxonomic senior synonym: *Planinosphaeridium* (now *Pentadinium*) *membranaceum*, according to Dale (1976, p.45; footnote to table II) — however, Edwards and Andrlé (1992, p.265) retained *Ataxiodinium choane*. N.I.A. Age: Holocene.

"**membranaceum*" Eisenack, 1965b, p.151, pl.14, fig.4; pl.15, fig.6; text-fig.1. Holotype: Eisenack, 1965b, pl.14, fig.4; text-fig.1; Jan du Chêne et al., 1986a, pl.80, figs.4–7. **NOW** *Pentadinium*. Originally *Planinosphaeridium*, subsequently (and now) *Pentadinium*. Taxonomic junior synonym: *Ataxiodinium choane*, according to Dale (1976, p.45; footnote to table II) — however, Edwards and Andrlé (1992, p.265) retained *Ataxiodinium choane*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45). Age: late Eocene–early Oligocene.

PLANOPERIDINIUM de Coninck, 1986b, p.18. Type: de Coninck, 1986b, pl.8, figs.1–3, as *Planoperidinium gracile*.

**gracile* de Coninck, 1986b, p.18, pl.6, fig.44; pl.8, figs.1–10. Holotype: de Coninck, 1986b, pl.8, figs.1–3; Fensome et al., 1995, figs.1–3 — p.1521. Age: Rupelian.

"**PLETHYSYRINX**" Sarjeant, 1981, p.106. **Taxonomic senior synonym:** *Disphaerogena*, by implication in Stover and Williams (1987, p.179), who considered *Plethysyrinx* to be a taxonomic junior synonym of *Cyclapophysis*, which is now considered to be a taxonomic junior synonym of *Disphaerogena*. Type: Corradini, 1973, pl.22, fig.5, as *Cordosphaeridium lemniscatum*.

"*lata*" (Klumpp, 1953, p.392, pl.18, figs.8–10) Sarjeant, 1981, p.106. Emendation: Sarjeant, 1981, p.106–107, as *Plethysyrinx lata* — however, see Lentin and Williams (1985, p.72). Holotype: Klumpp, 1953, pl.18, figs.8–9. **NOW** *Cordosphaeridium latum*. Originally *Hystrichosphaeridium diktyoplokum* subsp. *latum*, subsequently *Cordosphaeridium diktyoplokum* subsp. *latum*, thirdly *Areosphaeridium diktyoplokum* subsp. *latum*, fourthly *Plethysyrinx lata*, fifthly (and now) *Cordosphaeridium latum*. Age: Eocene.

"**lemniscata*" (Corradini, 1973, p.152–153, pl.22, figs.4a–b,5; pl.33, figs.2,4; pl.39, fig.2) Sarjeant, 1981, p.106. Holotype: Corradini, 1973, pl.22, fig.5; Fensome et al., 1995, fig.3 — p.1601. **NOW** *Disphaerogena*. Originally *Cordosphaeridium*, subsequently *Cordosphaeridium?*, thirdly *Plethysyrinx*, fourthly *Cyclapophysis*, fifthly (and now) *Disphaerogena*. Age: Late Cretaceous–Paleocene.

PLURIARVALIUM Sarjeant, 1962b, p.260. Taxonomic senior synonym: *Pareodinia*, according to Wiggins (1975, p.102) — however, Stover and Evitt (1978, p.119) retained *Pluriarvalium*. Type: Sarjeant, 1962b, pl.1, fig.5, as *Pluriarvalium osmingtonense*.

**osmingtonense* Sarjeant, 1962b, p.262, pl.1, fig.5; text-fig.6. Holotype: Sarjeant, 1962b, pl.1, fig.5. Originally (and now) *Pluriarvalium*, subsequently *Pareodinia*. Stover and Evitt (1978, p.119) retained this species in *Pluriarvalium*. Age: late Oxfordian.

subsp. *osmingtonense*. Autonym. Holotype: Sarjeant, 1962b, pl.1, fig.5. Originally *Pareodinia osmingtonensis* subsp. *osmingtonensis*, subsequently (and now) *Pluriarvalium osmingtonense* subsp. *osmingtonense*.

subsp. *rostratum* (Wiggins, 1975, p.106–107, pl.5, figs.1–2) Stover and Evitt, 1978, p.119. Holotype: Wiggins, 1975, pl.5, fig.1. Originally *Pareodinia osmingtonensis* subsp. *rostrata*, subsequently (and now) *Pluriarvalium osmingtonense* subsp. *rostratum*. Age: Late Jurassic.

"**POCOCKIA**" Lentin and Williams, 1973, p.114. Substitute name for *Evittia* Pocock, 1972, p.93 (an illegitimate name). **Taxonomic senior synonym:** *Ovoidinium*, according to Lentin and Williams (1976, p.162; 1989, p.269). Taxonomic senior synonym: *Ascodinium*, according to Helenes (1983, p.258) — however *Ovoidinium* is now generally retained, with *Deflandrea* (as *Ovoidinium*) *cincta* assigned to it. Type: Cookson and Eisenack, 1958, pl.4, fig.3, as *Deflandrea cincta*.

*"*cincta*" (Cookson and Eisenack, 1958, p.26, pl.4, figs.1–3) Lentin and Williams, 1973, p.114. Holotype: Cookson and Eisenack, 1958, pl.4, fig.3. **NOW** *Ovoidinium*. Originally *Deflandrea*, subsequently *Evittia* Pocock (combination illegitimate), thirdly *Pocockia*, fourthly (and now) *Ovoidinium*, fifthly *Ascodinium*. Age: late Neocomian–early Aptian.

"*waltonii*" (Pocock, 1972, p.93, pl.22, figs.13–14) Lentin and Williams, 1973, p.114. Holotype: Pocock, 1972, pl.22, fig.14. **NOW** *Ovoidinium*. Originally *Evittia* Pocock (generic name illegitimate), subsequently *Pocockia*, thirdly (and now) *Ovoidinium*, fourthly *Ascodinium*. The stratigraphic range is as given by Jansonius (1986, p.202). Age: ?Toarcian–?Bajocian.

POLYGONIFERA Habib, 1972, p.376. Emendation: Mehrotra and Sarjeant, 1984c, p.46. Taxonomic junior synonyms: *Ambonosphaera*, according to Brenner (1988, p.68) — however, Prauss (1989, p.31) retained *Ambonosphaera*; *Leberidocysta*, according to Mehrotra and Sarjeant (1984c, p.46) — however, Lentin and Williams (1985, p.214) retained *Leberidocysta*. Type: Habib, 1972, pl.5, figs.1a–b, as *Polygonifera evittii*.

?*aspera* Dodekova, 1990, p.40–41, pl.4, figs.3,11–16. Holotype: Dodekova, 1990, pl.4, fig.13. Questionable assignment: Dodekova (1990, p.40). Age: middle Callovian.

bavarica (Lund and Ecke, 1988, p.348,351, pl.1, figs.2a–b,4; text-figs.3a–b) Stancliffe, 1991, p.190. Holotype: Lund and Ecke, 1988, pl.1, figs.2a–b; text-fig.3a. Originally *Ambonosphaera*, subsequently (and now) *Polygonifera*. Dodekova (1992, p.46) also proposed this combination. Age: ?late middle Oxfordian.

"*calloviana*" (Fensome, 1979, p.51–54, pl.7, figs.3,5–6,8–9; text-figs.16A–D,17A–B) Brenner, 1988, p.69. Holotype: Fensome, 1979, pl.7, figs.3,6,9; text-figs.16B–C; Fensome et al., 1993a, figs.1–3,7–8 — p.1007. **NOW** *Ambonosphaera*. Originally (and now) *Ambonosphaera*, subsequently *Polygonifera*. Age: early Callovian.

"*chlamydata*" (Cookson and Eisenack, 1962b, p.496, pl.7, figs.1–3,5–8) Mehrotra and Sarjeant, 1984c, p.48. Emendations: Fechner, 1985, p.119 and Marheinecke, 1992, p.88, both as *Leberidocysta chlamydata*. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.2. **NOW** *Leberidocysta*. Originally *Hexagonifera*, subsequently *Hexagonifera?*, thirdly (and now) *Leberidocysta*, fourthly *Polygonifera*. Age: Albian–Cenomanian.

"*eisenackii*" Mehrotra and Sarjeant, 1984c, p.46–48, pl.1, figs.1–7; pl.2, figs.1–7; text-figs.1a–d,2a–c,3a–b. Holotype: Mehrotra and Sarjeant, 1984c, pl.1, fig.6; text-fig.1c. **NOW** *Platycystidia* (Appendix A). Originally *Polygonifera*, subsequently *Leberidocysta*?, thirdly (and now) *Platycystidia* (Appendix A). Age: Aptian.

**evittii* Habib, 1972, p.376, pl.5, figs.1a–b,2. Holotype: Habib, 1972, pl.5, figs.1a–b; Fensome et al., 1993a, figs.1–2 — p.1159. Age: Oxfordian–Kimmeridgian.

"*staffinensis*" (Gitmez, 1970, p.276–278, pl.3, fig.1; text-figs.20A–B) Davey, 1982b, p.31. Emendation: Poulsen and Riding, 1992, p.26, as *Ambonosphaera?* *staffinensis*. Holotype: Gitmez, 1970, pl.3, fig.1; text-figs.20A–B; Poulsen and Riding, 1992, pl.1, fig.6; text-figs.1A–B. **NOW** *Ambonosphaera?*. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly *Polygonifera*, fourthly (and now) *Ambonosphaera?*, fifthly *Lithodinia?*. Taxonomic junior synonyms: *Senoniasphaera?* *frisica*, according to Poulsen and Riding (1992, p.26); *Hexagonifera* (now *Senoniasphaera*) *jurassica*, according to Williams et al. (1993, p.32) — however, elsewhere in the same publication, Williams et al. (1993, p.56) retained *Hexagonifera* (now *Senoniasphaera*) *jurassica*. Age: early Kimmeridgian.

POLYSPHAERIDIUM Davey and Williams, 1966b, p.91–92. Emendation: Bujak et al., 1980, p.32,34. Taxonomic senior synonym: *Pyrodinium* Plate, 1906, an extant dinoflagellate genus, according to Fensome et al. (1993b, p.111) — however, Head (1996b, p.1231) retained *Polysphaeridium*. Taxonomic junior synonym: *Hemicystodinium*, according to Bujak et al. (1980, p.34). Type: Davey and Williams, 1966b, pl.11, fig.1, as *Polysphaeridium subtile*.

"?*amalthei*" (Wetzel, 1966, p.317, pl.31, figs.2,2a–b) Riley and Sarjeant, 1972, p.2. Holotype: Wetzel, 1966, pl.31, figs.2,2a. **NOW** *Dapsilidinium?*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*, thirdly *Polysphaeridium?*, fourthly (and now) *Dapsilidinium?*. Questionable assignment: Stover and Evitt (1978, p.76). Age: late Toarcian.

"*ambiguum*" (Deflandre, 1937b, p.81, pl.16 [al. pl.13], figs.8–9) Yun Hyesu, 1981, p.44. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. **NOW** *Sepispinula?*. Originally *Micrhystridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Polysphaeridium*, fourthly *Chlamydophorella*, fifthly *Dapsilidinium*, sixthly *Gorgonisphaeridium* (Appendix A), seventhly (and now) *Sepispinula?*. Taxonomic junior synonyms: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) and *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, both according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499–500) retained *Sepispinula ancorifera* and *Sepispinula?* *huguoniotii*. Age: Late Cretaceous.

asperum (Maier, 1959, p.319, pl.33, fig.2) Davey and Williams, 1969, p.6. Emendation: Sarjeant, 1983, p.113–114, as *Polysphaeridium asperum*. Holotype: Maier, 1959, pl.33, fig.2. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium*, fourthly (and now) *Polysphaeridium*. Questionable assignment: Davey and Williams (1969, p.6) — however, Sarjeant (1983, p.113–114) retained this species in *Polysphaeridium* without question. This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: middle Miocene.

"*assamicum*" Mehrotra, 1983, p.18, pl.5, figs.4,8–9. Holotype: Mehrotra, 1983, pl.5, fig.4. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. This name was not validly published in Mehrotra and Sah (1982, p.129; pl.3, figs.1–2), since these authors did not provide a description. Age: Early Tertiary.

belgicum Sarjeant, 1969, p.15. Holotype: Pastiels, 1948, pl.3, fig.16, as *Hystrichosphaeridium fluctuans*, lost according to Sarjeant (1986, p.18). Originally (and now) *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*. Questionable assignment: Stover and Evitt (1978, p.76) — however, Sarjeant (1986, p.18) retained this species in *Polysphaeridium* without question. Sarjeant (1969, p.15) based this species on material described by Pastiels (1948, p.40, pl.3, fig.16) as *Hystrichosphaeridium fluctuans*. Age: early Eocene.

biformum Islam, 1983b, p.342–343, pl.4, figs.3,6. Holotype: Islam, 1983b, pl.4, fig.6. Age: middle Eocene.

"?*caminuspinum*" (Wall, 1965a, p.165, pl.9, fig.4) Riley and Sarjeant, 1972, p.3. Holotype: Wall, 1965a, pl.9, fig.4. **NOW** *Beaumontella*?. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?, fourthly (and now) *Beaumontella*?. Questionable assignment: Riley and Sarjeant (1972, p.3). Taxonomic junior synonym: *Cleistosphaeridium mojsisovicsii*, according to Below (1987a, p.70). Age: early Sinemurian.

"*cephalum*" Kar, 1979, p.34, pl.4, figs.66a–b,67. Holotype: Kar, 1979, p.34, pl.4, figs.66a–b,67. Originally *Polysphaeridium*, subsequently *Sumatradinium*, thirdly *Batiacasphaera*?. **Taxonomic senior synonym:** *Operculodinium placitum*, according to Jain and Garg (1991, p.81). N.I.A. Age: Oligocene.

"*chems*" Below, 1982c, p.27–28, pl.2, figs.8a–b; text-fig.6b. Holotype: Below, 1982c, pl.2, figs.8a–b; Fauconnier and Masure, 2004, pl.19, figs.12–13. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. N.I.A. Age: late Hauterivian.

congregatum (Stover, 1977, p.79, pl.3, figs.39–44) Bujak et al., 1980, p.34. Holotype: Stover, 1977, pl.3, figs.39–42. Originally *Hemicystodinium*, subsequently (and now) *Polysphaeridium*. Age: middle Oligocene.

"?*conispinum*" (Davey and Verdier, 1973, p.193–194, pl.4, figs.4,6,8–9) Stover and Evitt, 1978, p.76. Emendation: Lucas-Clark, 1984, p.187, as *Litosphaeridium conispinum*. Holotype: Davey and Verdier, 1973, pl.4, fig.8. **NOW** *Litosphaeridium*. Originally (and now) *Litosphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?. Questionable assignment: Stover and Evitt (1978, p.76) as a problematic species. Age: late Albian.

"?*daveyi*" Boltenhagen, 1977, p.37–38,40, pl.2, figs.3–4. Holotype: Boltenhagen, 1977, pl.2, fig.3; Fauconnier and Masure, 2004, pl.20, fig.3. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*?, subsequently (and now) *Dapsilidinium*. Questionable assignment: Boltenhagen (1977, p.37). Age: late Cenomanian–Turonian.

"?*deflandrei*" (Valensi, 1947, p.817; text-fig.3) Davey and Williams, 1969, p.6. Holotype: Valensi, 1947, text-fig.3; Fauconnier and Masure, 2004, pl.21, figs.1–4. **NOW** *Dapsilidinium*?. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?, thirdly (and now) *Dapsilidinium*?. Questionable assignment: Davey and Williams (1969, p.6). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Middle Jurassic.

"*duma*" Below, 1982c, p.28, pl.2, figs.9a–b,10a–b,11–12; text-fig.6a. Holotype: Below, 1982c, pl.2, figs.9a–b; Fauconnier and Masure, 2004, pl.19, figs.14–15. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. N.I.A. Age: Hauterivian–Albian.

"?*elegantulum*" (Lejeune-Carpentier, 1940, p.B222; text-figs.11–12) Davey and Williams, 1966b, p.95. Holotype: Lejeune-Carpentier, 1940, text-fig.11; Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.3–4. **Combination not validly published:** basionym not fully referenced. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?. Questionable assignment: Davey and Williams (1966b, p.95). **Taxonomic senior synonym:** *Xanthidium* (now *Oligosphaeridium*) *complex*, according to Deflandre (1946b, p.111). Age: Turonian–Senonian.

"?*elongatum*" Jain and Millepied, 1975, p.150–151, pl.5, figs.73–74. Holotype: Jain and Millepied, 1975, pl.5, fig.74. **NOW** *Exochosphaeridium*. Originally *Polysphaeridium*, subsequently *Polysphaeridium*?, thirdly *Dapsilidinium*?, fourthly (and now) *Exochosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.76). Age: Maastrichtian.

"?*fabium*" (Tasch in Tasch et al., 1964, p.195, pl.2, fig.5) Davey and Williams, 1969, p.6. Holotype: Tasch et al., 1964, pl.2, fig.5. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?. Questionable assignment: Davey and Williams (1969, p.6). **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.76). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Albian.

"?*flexuosum*" (Davey et al., 1966, p.169, pl.2, fig.5) Below, 1982c, p.28. Emendation: Sarkar and Singh, 1988, p.39, as *Cleistosphaeridium flexuosum*. Holotype: Davey et al., 1966, pl.2, fig.5; Fauconnier and Masure, 2004, pl.23, fig.8. **NOW** *Downiesphaeridium*. Originally *Cleistosphaeridium*?, subsequently *Polysphaeridium*?, thirdly

Cleistosphaeridium, fourthly (and now) *Downiesphaeridium*. Questionable assignment: Below (1982c, p.28). Age: Cenomanian.

"*?fluctuans*" (Eisenack, 1938c, p.230–231, pl.16, figs.1–3) Davey and Williams, 1966b, p.95. Holotype: Eisenack, 1938c, pl.16, fig.3. **Name not validly published**: basionym not fully referenced. **NOW** *Baltisphaeridium* (Appendix A). Originally *Bion* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?* (combination not validly published), fourthly (and now) *Baltisphaeridium* (Appendix A). Questionable assignment: Davey and Williams (1966b, p.95). Age: Silurian.

"*?follium*" (Tasch in Tasch et al., 1964, p.195, pl.1, fig.8) Davey and Williams, 1969, p.6. Holotype: Tasch et al., 1964, pl.1, fig.8. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*. **Taxonomic senior synonym**: *Hystrichosphaeridium* (as and now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.76). Questionable assignment: Davey and Williams (1969, p.6). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Albian.

"*?fucosum*" (Valensi, 1955a, p.40; text-fig.2b) Davey and Williams, 1969, p.6. Holotype: Valensi, 1955a, text-fig.2b; Fauconnier and Masure, 2004, pl.52, figs.8–11. **NOW** *Litosphaeridium*. Originally *Micrhystridium*, subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?*, fourthly *Dapsilidinium?*, fifthly (and now) *Litosphaeridium*. Questionable assignment: Davey and Williams (1969, p.6). Taxonomic junior synonyms: *Hystrichosphaeridium tubiferum* var. *brevispinum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.190) retained *Hystrichosphaeridium tubiferum* var. *brevispinum* (as *Hystrichosphaeridium tubiferum* subsp. *brevispinum*); *Hystrichosphaeridium* (as and now *Litosphaeridium*) *arundum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.227) retained *Litosphaeridium arundum*. This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*?giganteum*" Caro, 1973, p.360–361, pl.2, fig.12. Holotype: Caro, 1973, pl.2, fig.12; Fauconnier and Masure, 2004, pl.49, figs.13–14. **NOW** *Exochosphaeridium*. Originally *Polysphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Impletosphaeridium*, fourthly (and now) *Exochosphaeridium*. Age: early Eocene.

"*?granulosum*" Jain and Millepied, 1975, p.151–152, pl.5, figs.69–70. Holotype: Jain and Millepied, 1975, pl.5, fig.69. **NOW** *Pervosphaeridium?*. Originally *Polysphaeridium*, subsequently *Dapsilidinium*, thirdly (and now) *Pervosphaeridium?*. Age: Campanian–Maastrichtian.

"*?laminaspinosum*" Davey and Williams, 1966b, p.94–95, pl.8, fig.8. Holotype: Davey and Williams, 1966b, pl.8, fig.8; Fauconnier and Masure, 2004, pl.19, fig.16. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Age: Cenomanian.

"*?langii*" (Wall, 1965a, p.165, pl.6, figs.9–11; pl.9, fig.9) Riley and Sarjeant, 1972, p.3. Emendations: Morbey, 1975, p.41–42, as *Hystrichosphaeridium langii*; Below, 1987a, p.70–71, as *Beaumontella langii*. Holotype: Wall, 1965a, pl.6, fig.9; pl.9, fig.9; Fensome et al., 1995, figs.1–2 — p.1595. **NOW** *Beaumontella*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Beaumontella*. Questionable assignment: Riley and Sarjeant (1972, p.3). Age: Hettangian–early Sinemurian.

"*?majus*" (Lejeune-Carpentier, 1940, p.B220–B221; text-fig.13) Davey and Williams, 1969, p.6. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.12, as *Amphorosphaeridium majus*. Holotype: Lejeune-Carpentier, 1940, text-fig.13; Strel et al., 1977, pl.1, fig.7; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.6–7; text-fig.7. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Dapsilidinium?* (combination not validly published), fifthly *Amphorosphaeridium*, sixthly (and now) *Exochosphaeridium*. Questionable assignment: Davey and Williams (1969, p.6). Taxonomic junior synonyms: *Baltisphaeridium* (as *Exochosphaeridium*) *bifidum* and *Exochosphaeridium bifidum* var. *involutum* (as *Exochosphaeridium bifidum* subsp. *involutum*), both according to Peyrot (2011, p.284). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*marsupium*" (Tasch in Tasch et al., 1964, p.193, pl.3, fig.16) Davey and Williams, 1969, p.6. Holotype: Tasch et al., 1964, pl.3, fig.16. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?. Questionable assignment: Davey and Williams (1969, p.6). **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Kiokansium unituberculatum*, according to Stover and Evitt (1978, p.76). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Albian.

"*microtriainum*" (Klumpp, 1953, p.390, pl.17, figs.6–7) Kar, 1979, p.33. Emendation: Sarjeant, 1981, p.110–112, as *Achomosphaera microtriaina*. Holotype: Klumpp, 1953, pl.17, figs.6–7; Sarjeant, 1981, pl.2, figs.1–2; text-fig.2. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Cordosphaeridium*, thirdly *Cordosphaeridium*?, fourthly *Polysphaeridium*, fifthly *Achomosphaera*, sixthly (and now) *Operculodinium*. Age: late Eocene.

"*multispinosum*" Davey, 1974, p.60, pl.7, fig.4. Holotype: Davey, 1974, pl.7, fig.4. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Age: early–late Barremian.

"*ornamentum*" Jain and Tandon, 1981, p.12–13, pl.2, fig.35. Holotype: Jain and Tandon, 1981, pl.2, fig.35. **NOW** *Operculodinium*. Originally *Polysphaeridium*, subsequently (and now) *Operculodinium*. Age: middle Eocene.

"*pachydermum*" (Cookson and Eisenack, 1960b, p.251–252, pl.38, fig.5; text-fig.5) Eisenack and Kjellström, 1975b, p.397 [al. p.922A]. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.5; Fauconnier and Masure, 2004, pl.48, fig.10. **NOW** *Impletosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*, thirdly *Hystrichosphaeridium*?, fourthly *Dapsilidinium*, fifthly (and now) *Impletosphaeridium*. Age: Oxfordian–Tithonian.

parvum (Huang Tsengchieng, 1981, p.50, pl.2, figs.1–2) Lentin and Williams, 1993, p.533. Holotype: Huang Tsengchieng, 1981, pl.2, figs.1–2. Age: Miocene.

"*pastielsii*" Davey and Williams, 1966b, p.92–93, pl.4, fig.10. Holotype: Davey and Williams, 1966b, pl.4, fig.10; Eisenack and Kjellström, 1972, p.923; Bujak et al., 1980, pl.6, figs.6,9; Fensome et al., 1995, fig.1 — p.1647; Fauconnier and Masure, 2004, pl.19, figs.17–19. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Taxonomic junior synonym: *Polysphaeridium* (now *Dapsilidinium*) *pseudocolligerum* according to Mertens et al. (2014, p.532) — however, Fensome et al., in press retained *Dapsilidinium pseudocolligerum* as a separate species. Age: early Eocene.

"*paulinae*" (Valensi, 1953, p.48, pl.12, fig.6) Davey and Williams, 1969, p.6. Holotype: Valensi, 1953, pl.12, fig.6. **NOW** *Dapsilidinium*?. Originally *Micrhystridium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium*?, fourthly (and now) *Dapsilidinium*?. Questionable assignment: Davey and Williams (1969, p.6). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Middle Jurassic.

"*perovatum*" (Tasch in Tasch et al., 1964, p.194, pl.3, fig.13) Davey and Williams, 1969, p.6. Holotype: Tasch et al., 1964, pl.3, fig.13. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Kiokansium unituberculatum*, according to Stover and Evitt (1978, p.76). Questionable assignment: Davey and Williams (1969, p.6). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Albian.

"*polypes*" (Cookson and Eisenack, 1962b, p.491–492, pl.4, figs.11–13) Davey and Williams, 1966b, p.95. Emendation: Duxbury, 1983, p.49, as *Kiokansium polypes*. Holotype: Cookson and Eisenack, 1962b, pl.4, figs.11–13; Fensome et al., 1996, figs.1–3 — p.2283. Originally *Hystrichosphaeridium recurvatum* subsp. *polypes*, subsequently *Polysphaeridium? polypes* (combination not validly published), thirdly *Cleistosphaeridium polypes*, fourthly *Bacchidinium polypes*, fifthly *Impletosphaeridium polypes*, sixthly *Kiokansium polypes*. Questionable assignment: Davey and Williams (1966b, p.95). **Taxonomic senior synonym** (at specific rank): *Hystrichosphaeridium* (as and now *Kiokansium unituberculatum*, by implication in Duxbury (1983, p.49), who considered *Hystrichosphaeridium recurvatum* subsp. *polypes* (as *Kiokansium polypes*) to be the senior name.

Taxonomic junior synonym: *Cleistosphaeridium? solidum*, according to Below (1982c, p.16). Age: Albian–Cenomanian.

"*pseudocolligerum*" Stover, 1977, p.74–75, pl.1, figs.14–19. Holotype: Stover, 1977, pl.1, figs.14–16. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Taxonomic senior synonym: *Polysphaeridium* (now *Dapsilidinium*) *pastielsii* according to Mertens et al. (2014, p.532) — however, Fensome et al., in press, retained *Dapsilidinium pseudocolligerum* as a separate species. Age: early Oligocene–early Miocene.

"*pumilum*" Davey and Williams, 1966b, p.93–94, pl.7, figs.3–4. Holotype: Davey and Williams, 1966b, pl.7, fig.3; Fauconnier and Masure, 2004, pl.20, fig.2. **NOW** *Dapsilidinium?*. Originally *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly (and now) *Dapsilidinium?*. Questionable assignment: Stover and Evitt (1978, p.76). Age: Cenomanian.

"*punctatum*" Jain and Millepied, 1975, p.151, pl.5, figs.71–72. Holotype: Jain and Millepied, 1975, pl.5, fig.72. **NOW** *Exochosphaeridium?*. Originally *Polysphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Exochosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.76). Age: Maastrichtian.

"*rhabdophorum*" (Valensi, 1955b, p.593, pl.3, fig.7) Davey and Williams, 1969, p.7. Holotype: Valensi, 1955b, pl.3, fig.7; Fauconnier and Masure, 2004, pl.20, figs.10–11. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium?*, thirdly *Dapsilidinium?*, fourthly (and now) *Exochosphaeridium*. Questionable assignment: Davey and Williams (1969, p.7). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*simplex*" (White, 1842, p.38, pl.4, fig.3, fig.10) Davey and Williams, 1969, p.7. Holotype: White, 1842, pl.4, fig.10. **NOW** *Dapsilidinium simplex*. Originally *Xanthidium tubiferum* var. *simplex* (Appendix A), subsequently *Xanthidium simplex* (Appendix A), thirdly *Hystrichosphaeridium simplex*, fourthly *Polysphaeridium? simplex*, fifthly (and now) *Dapsilidinium simplex*. Questionable assignment: Davey and Williams (1969, p.7). This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Late Cretaceous.

**subtile* Davey and Williams, 1966b, p.92, pl.11, fig.1. Emendation: Bujak et al., 1980, p.34. Holotype: Davey and Williams, 1966b, pl.11, fig.1; Bujak et al., 1980, pl.3, figs.9,12. Taxonomic senior synonym: *Hystrichosphaeridium* (as and now *Polysphaeridium*) *zoharyi*, according to Islam (1983b, p.343) — however, Bujak in Lentin and Williams (1989, p.300) retained *Polysphaeridium subtile*. Taxonomic junior synonym: *Tenua* (as *Hemicystodinium?*) *taugourdeaui*, according to Lentin and Williams (1993, p.275). Age: early Eocene.

"subsp. *ktana*" (Rossignol, 1964, p.88, pl.2, figs.6–7,10; pl.3, fig.11) Islam, 1983b, p.343. Holotype: Rossignol, 1964, pl.2, fig.7. **NOW** *Polysphaeridium zoharyi* subsp. *ktana*. Originally *Hystrichosphaeridium zoharyi* var. *ktana*, subsequently *Hemicystodinium zoharyi* var. *ktana* (combination not validly published), thirdly *Hemicystodinium zoharyi* subsp. *ktana*, fourthly (and now) *Polysphaeridium zoharyi* subsp. *ktana*, fifthly *Polysphaeridium subtile* subsp. *ktana*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium? breviatum*, according to Islam (1983b, p.343) — however, Masure and Foucher in Fauconnier and Masure (2004, p.309–310) retained *Hystrichosphaeridium? breviatum*. Age: Pleistocene.

"subsp. *subtile*". Autonym. Holotype: Davey and Williams, 1966b, pl.11, fig.1. **Now redundant.**

"*sulaimenii*" Beju, 1978, p.4. **Name not validly published:** no description or illustration. Questionable assignment: Beju (1978, p.4).

taiwanianum (Huang Tsengchieng, 1981, p.50, pl.2, figs.3–4) Lentin and Williams, 1993, p.535. Holotype: designated but not identified to an illustration. Age: Miocene.

tianshanense He Chengquan, 1991, p.129, pl.28, fig.13; text-fig.21. Holotype: He Chengquan, 1991, pl.28, fig.13; text-fig.21. Age: Paleocene.

"?*tribrachiosum*" (Tasch in Tasch et al., 1964, p.195, pl.1, fig.3) Davey and Williams, 1969, p.7. Holotype: Tasch et al., 1964, pl.1, fig.3. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*?. Questionable assignment: Davey and Williams (1969, p.7). **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Kiokansium*) *unituberculatum*, according to Stover and Evitt (1978, p.76). This combination was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Albian.

"*trompetum*" Cookson and Eisenack, 1982, p.47, pl.4, fig.22. Holotype: Cookson and Eisenack, 1982, pl.4, fig.22. **NOW** *Cordosphaeridium*?. Originally *Polysphaeridium*, subsequently (and now) *Cordosphaeridium*?. N.I.A. Age: Paleocene.

variabile He Chengquan, 1991, p.129, pl.28, figs.14–15; pl.58, figs.5–6. Holotype: He Chengquan, 1991, pl.28, fig.15. Age: Paleocene.

"*warreni*" Habib, 1976, p.383, pl.2, figs.4,6a–b. Holotype: Habib, 1976, pl.2, figs.6a–b. **NOW** *Dapsilidinium*. Originally *Polysphaeridium*, subsequently (and now) *Dapsilidinium*. Age: Berriasian–Aptian?.

"*williamsii*" Boltenhagen, 1977, p.41–42, pl.2, figs.6–7. Holotype: Boltenhagen, 1977, pl.2, fig.6; Fauconnier and Masure, 2004, pl.50, fig.6. **NOW** *Impletosphaeridium*. Originally *Polysphaeridium*, subsequently *Cleistosphaeridium*?, thirdly (and now) *Impletosphaeridium*. Age: Cenomanian–early Turonian.

"*williereae*" Boltenhagen, 1977, p.42–43, pl.3, figs.3a–b,4–6. Holotype: Boltenhagen, 1977, pl.3, figs.3a–b. **NOW** *Apectodinium*?. Originally *Polysphaeridium*, subsequently (and now) *Apectodinium*?. Age: Paleocene.

zoharyi (Rossignol, 1962, p.132, pl.2, fig.10) Bujak et al., 1980, p.34. Holotype: Rossignol, 1962, pl.2, fig.10. Originally *Hystrichosphaeridium*, subsequently *Polysphaeridium*? (combination not validly published), thirdly *Hemicystodinium*, fourthly (and now) *Polysphaeridium*. Taxonomic junior synonyms: *Polysphaeridium subtile*, according to Islam (1983b, p.343) — however, Lentin and Williams (1989, p.300) retained *Polysphaeridium subtile*; *Tenua* (as *Hemicystodinium*?) *taugourdeau*, according to Lentin and Williams (1981, p.27,127) — however, *Tenua taugourdeau* is now considered a taxonomic junior synonym of *Polysphaeridium subtile*; *Membranilarnacia delicata*, according to Jain and Garg (1991, p.82). Motile equivalent: *Pyrodinium bahamense* Plate, 1906, according to Wall and Dale (1969, p.140); *Pyrodinium bahamense* var. *compressum* (Böhm, 1931) Steidinger et al., 1980, according to Matsuoka (1989, p.220). Matsuoka (1983a, p.16) considered *Hystrichosphaera* (as *Hystrichosphaeridium*) *intermedia* to be the possible taxonomic senior synonym of this species. This combination, as a questionable assignment, was not validly published in Davey and Williams (1966b, p.95), since these authors did not fully reference the basionym. Age: Pleistocene.

subsp. *ktana* (Rossignol, 1964, p.88, pl.2, figs.6–7,10; pl.3, fig.11) Lentin and Williams, 1981, p.232. Holotype: Rossignol, 1964, pl.2, fig.7. Originally *Hystrichosphaeridium zoharyi* var. *ktana*, subsequently *Hemicystodinium zoharyi* var. *ktana* (combination not validly published), thirdly *Hemicystodinium zoharyi* subsp. *ktana*, fourthly (and now) *Polysphaeridium zoharyi* subsp. *ktana*, fifthly *Polysphaeridium subtile* subsp. *ktana*. Lentin and Williams (1989, p.300) retained this taxon as a subspecies of *Polysphaeridium zoharyi*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium? breviatum*, according to Islam (1983b, p.343) — however, Masure and Foucher in Fauconnier and Masure (2004, p.309–310) retained *Hystrichosphaeridium? breviatum*. Age: Pleistocene.

subsp. *zoharyi*. Autonym. Holotype: Rossignol, 1962, pl.2, fig.10. Originally *Hemicystodinium zoharyi* subsp. *zoharyi*, subsequently (and now) *Polysphaeridium zoharyi* subsp. *zoharyi*.

POLYSTEPHANEPHORUS Sarjeant, 1961b, p.1096. Emendation: Stancliffe and Sarjeant, 1990, p.205. Taxonomic senior synonyms: *Hystrichosphaerina*, according to Duxbury (1980, p.125–126) — however, Lentin and Williams (1981, p.232) and Davey (1982b, p.20) retained *Polystephanephorus*; *Systematophora*, according to

Brenner (1988, p.83) — however, Stancliffe and Sarjeant (1990, p.205) retained *Polystephanephorus*. Type: Sarjeant, 1961a, pl.14, fig.7; text-fig.7, as *Polystephanosphaera calatha*.

"**anthophorus**" (Cookson and Eisenack, 1958, p.43, pl.11, figs.12–13; text-figs.16–18) Davey, 1979c, p.65. Holotype: Cookson and Eisenack, 1958, pl.11, fig.12; Fauconnier and Masure, 2004, pl.73, figs.5–6. **NOW** *Stiphrosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly *Polystephanephorus*, fourthly *Hystrichosphaerina*, fifthly (and now) *Stiphrosphaeridium*. Taxonomic junior synonym: *Hystrichosphaerina schindewolfii*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Hystrichosphaerina schindewolfii*. Age: Aptian–Albian.

***calathus** (Sarjeant, 1961a, p.104, pl.14, fig.7; text-fig.7) Sarjeant, 1961b, p.1096. Emendation: Stancliffe and Sarjeant, 1990, p.205, as *Polystephanephorus calathus*. Holotype: Sarjeant, 1961a, pl.14, fig.7; text-fig.7; Stancliffe and Sarjeant, 1990, pl.2, figs.1,4; text-fig.1. Originally *Polystephanosphaera*, subsequently (and now) *Polystephanephorus*, thirdly *Hystrichosphaerina*. Lentin and Williams (1981, p.232) retained this species in *Polystephanephorus*. Although Sarjeant (1961b, p.1096) did not fully reference the basionym when he proposed this combination, he was clearly using zoological nomenclature, which does not require basionym citations. Age: early Oxfordian.

"**caulleryi**" (Deflandre, 1939a, p.138, pl.11, figs.2–3) Courtinat, 1989, p.171. Emendation: Stancliffe and Sarjeant, 1990, p.200, as *Adnatosphaeridium caulleryi*. Holotype: Deflandre, 1939a, pl.11, fig.2; Stancliffe and Sarjeant, 1990, pl.1, figs.3–4; Fauconnier and Masure, 2004, pl.1, figs.7–8. **NOW** *Adnatosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly (and now) *Adnatosphaeridium*, fourthly *Polystephanephorus*. Age: early Oxfordian.

euryanthus Cookson and Eisenack, 1974, p.70–71, pl.24, fig.14. Holotype: Cookson and Eisenack, 1974, pl.24, fig.14; Fauconnier and Masure, 2004, pl.65, fig.4. Age: ?Neocomian–Albian.

paracalathus (Sarjeant, 1960a, p.143–144, pl.6, fig.4; text-fig.3b) Sarjeant, 1961b, p.1096. Emendation: Stancliffe and Sarjeant, 1990, p.206, as *Polystephanephorus paracalathus*. Holotype: Sarjeant, 1960a, pl.6, fig.4; text-fig.3b; Stancliffe and Sarjeant, 1990, pl.2, figs.2–3,5; text-fig.2. Originally *Polystephanosphaera*, subsequently (and now) *Polystephanephorus*, thirdly *Hystrichosphaerina*. Lentin and Williams (1981, p.232) retained this species in *Polystephanephorus*. Although Sarjeant (1961b, p.1096) did not fully reference the basionym when he proposed this combination, he was clearly using zoological nomenclature, which does not require basionym citations. Age: middle Callovian.

"**sarjeantii**" Gitmez, 1970, p.291–292, pl.11, fig.4; text-fig.25. Holotype: Gitmez, 1970, pl.11, fig.4; text-fig.25; Fauconnier and Masure, 2004, pl.26, fig.7. **NOW** *Emmetrocyta*. Originally *Polystephanephorus*, subsequently (and now) *Emmetrocyta*, thirdly *Hystrichosphaerina*, fourthly *Stiphrosphaeridium*. Age: early Kimmeridgian.

"?**sarrisii**" Archangelsky, 1969a, p.411, pl.2, figs.5–7. Holotype: Archangelsky, 1969a, pl.2, figs.6–7. **NOW** *Senoniasphaera?*. Originally *Polystephanephorus?*, subsequently (and now) *Senoniasphaera?*. Questionable assignment: Archangelsky (1969a, p.411). Age: Eocene.

"**schindewolfii**" (Alberti, 1961, p.38–39, pl.10, figs.1–3,6–7) Yun Hyesu, 1981, p.36. Holotype: Alberti, 1961, pl.10, figs.2–3; Eisenack and Kjellström, 1972, p.1009; Fensome et al., 1995, figs.2–3 — p.1765. **NOW** *Hystrichosphaerina*. Originally (and now) *Hystrichosphaerina*, subsequently *Systematophora*, thirdly *Polystephanephorus*. Taxonomic senior synonym: *Hystrichosphaeridium* (as *Oligosphaeridium*) *anthophorum*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Polystephanephorus* (as *Hystrichosphaerina*) *schindewolfii*. Taxonomic junior synonym: *Perisseiasphaeridium eisenackii*, according to Davey and Verdier (1974, p.640). Age: late Barremian–Turonian.

"**speciosus**" (Alberti, 1961, p.37, pl.9, fig.13) Riley and Sarjeant, 1972, p.3. Holotype: Alberti, 1961, pl.9, fig.13; Stancliffe and Sarjeant, 1990, pl.5, fig.6. **NOW** *Adnatosphaeridium?*. Originally *Cannosphaeropsis*, subsequently *Polystephanephorus*, thirdly *Cannosphaeropsis?*, fourthly (and now) *Adnatosphaeridium?*. Age: Bathonian–Callovian.

"*turonica*" (Alberti, 1961, p.39, pl.10, figs.4a–b) Yun Hyesu, 1981, p.36. Holotype: Alberti, 1961, pl.10, figs.4a–b. **NOW** *Hystriosphera*. Originally (and now) *Hystriosphera*, subsequently *Systematophora*, thirdly *Polystephanophorus*. Age: Turonian.

"*urnaformis*" (Cookson, 1953, p.118, pl.2, figs.41–43) Sarjeant, 1961b, p.1096. Holotype: Cookson, 1953, pl.2, figs.41–42. **NOW** *Emmetrocyta*. Originally *Cannospheropsis*, subsequently *Polystephanophorus*, thirdly (and now) *Emmetrocyta*. Although Sarjeant (1961b, p.1096) did not fully reference the basionym when he proposed this combination, he was clearly using zoological nomenclature, which does not require basionym citations. Age: Oligocene.

"**POLYSTEPHANOSPHAERA**" Sarjeant, 1960a, p.140–142. **Taxonomic senior synonym:** *Systematophora*, according to Sarjeant (1961b, p.1095–1096). Taxonomic junior synonym: *Surculosphaeridium*, by implication in Courtinat (1989, p.173), who considered the "type species", *Polystephanosphaera valensii* to be a taxonomic junior synonym of *Hystriosphera* (as and now *Surculosphaeridium*) *vestitum* — however, Stancliffe and Sarjeant (1990, p.207–208) retained the two species, as well as the genus *Surculosphaeridium*. Type: Sarjeant, 1960a, pl.6, fig.4; text-fig.3b, as *Polystephanosphaera valensii*.

"*calatha*" Sarjeant, 1961a, p.104, pl.14, fig.7; text-fig.7. Emendation: Stancliffe and Sarjeant, 1990, p.205, as *Polystephanophorus calathus*. Holotype: Sarjeant, 1961a, pl.14, fig.7; text-fig.7; Stancliffe and Sarjeant, 1990, pl.2, figs.1,4; text-fig.1. **NOW** *Polystephanophorus*. Originally *Polystephanosphaera*, subsequently (and now) *Polystephanophorus*, thirdly *Hystriosphera*. Age: early Oxfordian.

"*paracalatha*" Sarjeant, 1960a, p.143–144, pl.6, fig.4; text-fig.3b. Emendation: Stancliffe and Sarjeant, 1990, p.206, as *Polystephanophorus paracalathus*. Holotype: Sarjeant, 1960a, pl.6, fig.4; text-fig.3b; Stancliffe and Sarjeant, 1990, pl.2, figs.2,3,5; text-fig.2. **NOW** *Polystephanophorus*. Originally *Polystephanosphaera*, subsequently (and now) *Polystephanophorus*, thirdly *Hystriosphera*. Age: middle Callovian.

"**valensii*" Sarjeant, 1960a, p.142–143, pl.6, figs.5–7; text-fig.3c. Holotype: Sarjeant, 1960a, pl.6, fig.6; text-fig.3c; Eisenack and Kjellström, 1972, p.143; Stancliffe and Sarjeant, 1990, pl.3, figs.5,7,10; Fensome et al., 1995, figs.2,4 — p.1871. **NOW** *Systematophora*. Originally *Polystephanosphaera*, subsequently (and now) *Systematophora*. Taxonomic senior synonym: *Hystriosphera* (as and now *Surculosphaeridium*?) *vestitum*, according to Courtinat (1989, p.173) — however, Stancliffe and Sarjeant (1990, p.209) retained *Polystephanosphaera* (as and now *Systematophora*) *valensii*. Age: late Oxfordian.

"**PONTIADINIUM**" Stover and Evitt, 1978, p.180. **Taxonomic senior synonym:** *Komewuia*, according to Chen (1982, p.36). Type: Balteş, 1971, pl.2, fig.2, as *Diconodinium inequicornutum* (name not validly published).

"**inequicornutum*" Balteş, 1971, p.5, pl.1, figs.8–12; pl.2, figs.1–3 ex Stover and Evitt, 1978, p.180. Holotype: Balteş, 1971, pl.2, fig.2; Fensome et al., 1996, fig.5 — p.2161; designated as a lectotype by Stover and Evitt, 1978, p.180. **NOW** *Komewuia*. Originally *Diconodinium* (name not validly published), subsequently *Pontiadinium*, thirdly (and now) *Komewuia*. Age: early Pliocene.

"*obesum*" Sütő-Szentai, 1982a, p.210–211, 218–219, pl.4, fig.1 (two illustrations), fig.2 (three illustrations); text-fig.5. Holotype: Sütő-Szentai, 1982a, pl.4, fig.2 (three illustrations); text-fig.5. **NOW** *Impagidinium*?. Originally *Pontiadinium*, subsequently (and now) *Impagidinium*?. Age: late Miocene.

"*pecsvaradense*" Sütő-Szentai, 1982a, p.209–210, 218, pl.3, figs.1 (two illustrations), 2–3; text-fig.4. Holotype: Sütő-Szentai, 1982a, pl.3, figs.1 (two illustrations); text-fig.4. **NOW** *Impagidinium*?. Originally *Pontiadinium*, subsequently (and now) *Impagidinium*?. Age: late Miocene.

"**POSONIELLA**" Streng et al., 2009, p.233–234. Calcareous dinoflagellate genus (see Gottschling and Soehner, 2013, p.127). Type: Versteegh, 1993, pl.1, figs.4–5, as *Bicarinellum tricarinelloides*.

campestris Streng et al., 2009, p.234–235, pl.6, figs.1–6; text-figs.5C,F,G. Holotype: Streng et al., 2009, pl.6, fig.1. Age: middle Miocene.

pustulata Streng et al., 2009, p.234, pl.5, figs.1–8; text-figs.5B,E,G. Holotype: Streng et al., 2009, pl.5, fig.1. Age: middle Miocene.

**tricarinelloides* (Versteegh, 1993, p.357,359,360, pl.1, figs.1–12; text-figs.4A–D) Streng et al., 2009, p.234. Holotype: Versteegh, 1993, pl.1, figs.4–5. Originally *Bicarinellum*, subsequently (and now) *Posoniella*. Age: late Pliocene–late Pleistocene.

PRAECALCIGONELLUM Keupp and Versteegh, 1989, p.211. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1301). Although the "type species", *Praecalcionellum polymorphum*, was not validly transferred by Keupp and Versteegh (1989, p.211), the generic name *Praecalcionellum* was validly published by these authors since it is based on a previously validly published species name (I.C.N. Article 40.3). Type: Keupp, 1980a, pl.15, figs.7–8, as *Calcigonellum polymorphum*.

dolium (Keupp, 1979a, p.39–40, pl.9, figs.7–9) Streng et al., 2004, p.474. Holotype: Keupp, 1979a, pl.9, figs.7–9. Originally *Calcigonellum*, subsequently (and now) *Praecalcionellum*. Age: early Barremian.

duopylum Willems, 1995b, p.146,148–150, figs.1a–e; fig.2, nos.1–6; fig.3, nos.1–7. Holotype: Willems, 1995b, fig.2, nos.1–4; fig.3, nos.5–6. Age: earliest Danian.

mutterlosei (Keupp, 1979a, p.41, pl.10, figs.11–12; pl.11, figs.1–5) Lentin and Williams, 1993, p.538. Holotype: Keupp, 1979a, pl.11, figs.1–3. Originally *Calcicarpinum*, subsequently *Calcigonellum*, thirdly (and now) *Praecalcionellum*. This combination was not validly published in Keupp and Versteegh (1989, p.218, pl.2, fig.11), since these authors did not fully reference the basionym. Age: early Barremian.

**polymorphum* (Keupp, 1980a, p.128,130–131, pl.15, figs.7–15; pl.16, figs.1–6) Lentin and Williams, 1993, p.538. Holotype: Keupp, 1980a, pl.15, figs.7–8. Originally *Calcigonellum*, subsequently (and now) *Praecalcionellum*. This combination was not validly published in Keupp and Versteegh (1989, p.211,218, pl.2, fig.10), since these authors did not fully reference the basionym. Age: late Aptian–early Albian.

subsp. *dentatum* (Keupp, 1980a, p.131, pl.15, figs.13–15; pl.16, fig.1) Lentin and Williams, 1993, p.538. Holotype: Keupp, 1980a, pl.15, fig.13. Originally *Calcigonellum polymorphum* subsp. *dentatum*, subsequently (and now) *Praecalcionellum polymorphum* subsp. *dentatum*. Age: late Gargasian.

subsp. *polymorphum*. Autonym. Holotype: Keupp, 1980a, pl.15, figs.7–8. Originally *Calcigonellum polymorphum* subsp. *polymorphum*, subsequently (and now) *Praecalcionellum polymorphum* subsp. *polymorphum*.

subsp. *tenue* (Keupp, 1980a, p.131–132, pl.16, figs.2–6) Lentin and Williams, 1993, p.538. Holotype: Keupp, 1980a, pl.16, figs.2–3. Originally *Calcigonellum polymorphum* subsp. *tenue*, subsequently (and now) *Praecalcionellum polymorphum* subsp. *tenue*. Age: late Aptian.

schizosaeptum Versteegh, 1993, p.376–377, pl.8, figs.1–8; text-figs.8A–E. Holotype: Versteegh, 1993, pl.8, figs.1–5,7–8. Age: late Pliocene–late Pleistocene.

sulcatum (Keupp, 1979c, p.658, pl.6, figs.16–21) Streng et al., 2004, p.474. Holotype: Keupp, 1979c, pl.2, figure labelled as "*C. sulcatum*". Originally *Calcigonellum*, subsequently (and now) *Praecalcionellum*. Age: early Hauterivian.

triangulare (Keupp, 1980a, p.134–135, pl.17, figs.10–15) Keupp, 1992b, p.126. Holotype: Keupp, 1980a, pl.17, figs.10–13. Originally *Echinodinella*, subsequently (and now) *Praecalcionellum*. Age: late Gargasian.

PRAECALCISPHAERULA Trejo, 1983, p.5. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1301, who noted that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). Type: Trejo, 1983, pl.21, fig.3, as *Praecalcisphaerula primula*.

**primula* Trejo, 1983, p.5–6, pl.20, figs.1–3; pl.21, figs.2–10; pl.22, figs.1–4. Holotype: Trejo, 1983, pl.21, fig.3. Age: Albian.

PRAUSSIA Williams et al. 1998, p.507. Substitute name for *Hyalosphaera* Prauss, 1989, p.23 (an illegitimate name). Type: Prauss, 1989, pl.5, fig.11; text-fig.6, as *Hyalosphaera ephemera*.

**ephemera* (Prauss, 1989, p.23–24, pl.5, figs.11–12,15–18; text-fig.6) Williams et al., 1998, p.507. Holotype: Prauss, 1989, pl.5, fig.11; text-fig.6. Originally *Hyalosphaera* (generic name illegitimate), subsequently (and now) *Praussia*. Age: late Toarcian.

PRIONODINIUM Leffingwell and Morgan, 1977, p.293–294. Type: Leffingwell and Morgan, 1977, pl.1, figs.2a–b, as *Prionodinium alaskense*.

**alaskense* Leffingwell and Morgan, 1977, p.294–295, pl.1, figs.1a–b,2a–b,3; pl.2, figs.1–4,5a–b; pl.3, figs.4a–b; text-figs.4a–b. Holotype: Leffingwell and Morgan, 1977, pl.1, figs.2a–b; Jan du Chêne et al., 1986a, pl.84, figs.10–15; Fensome et al., 1993a, figs.1–2 — p.891. Age: Hauterivian–Barremian.

alveolatum Leffingwell and Morgan, 1977, p.295–297, pl.1, figs.4a–b,5,6a–b; pl.2, figs.6a–b,7–8; text-figs.5a–b. Holotype: Leffingwell and Morgan, 1977, pl.1, figs.4a–b; Jan du Chêne et al., 1986a, pl.84, figs.4–9. Age:Hauterivian–Barremian.

PRODUCTODINIUM Davey, 1988, p.43–44. Type: Davey, 1988, pl.8, fig.6, as *Productodinium chenii*.

**chenii* Davey, 1988, p.44, pl.8, figs.4–6,9. Holotype: Davey, 1988, pl.8, fig.6; Fensome et al., 1993a, fig.2 — p.1047. Age: early Oxfordian–early Kimmeridgian.

"**PROLATODINIUM**" Beju, 1978, p.4. **Name not validly published:** no description.

"*prolatum*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

PROLIXOSPHAERIDIUM Davey et al., 1966, p.171. Emendation: Davey, 1969a, p.160. Type: Davey et al., 1966, pl.3, fig.2; text-fig.45, as *Prolixosphaeridium deirense*.

anasillum Erkmen and Sarjeant, 1980, p.64–65, pl.4, figs.2,9; pl.5, fig.3. Holotype: Erkmen and Sarjeant, 1980, pl.4, fig.2; Fauconnier and Masure, 2004, pl.65, figs.1–2. Taxonomic senior synonym: *Hystrichosphaeridium xanthiopyxides* var. *granulosum* (as and now *Prolixosphaeridium granulosum*), according to Lentin and Williams (1993, p.539) — however, this synonymy was based on a mis-reading of Erkmen and Sarjeant (1980). Taxonomic junior synonym (at specific rank): *Baltisphaeridium pilosum* var. *longispinosum* (as *Tenua pilosa* subsp. *longispinosa*), according to Erkmen and Sarjeant (1980, p.64). Age: late Callovian–late Kimmeridgian.

"*apiculatum*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

basifurcatum Dodekova, 1969, p.21–22, pl.5, figs.1–6; text-fig.G. Holotype: Dodekova, 1969, pl.5, figs.1–2,4. Taxonomic senior synonym: *Baltisphaeridium* (now *Prolixosphaeridium*) *mixtispinosum*, according to Courtinat (1989, p.182) — however, Fauconnier and Monteil in Fauconnier and Masure (2004, p.461) retained *Prolixosphaeridium basifurcatum*. Age: Tithonian.

"capitatum" (Cookson and Eisenack, 1960b, p.252, pl.39, fig.9) Singh, 1971, p.342. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.9; Fauconnier and Masure, 2004, pl.66, fig.1. **NOW** *Barbatacysta*. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium*, thirdly *Tenua* Eisenack, fourthly *Batiacasphaera*, fifthly (and now) *Barbatacysta*. Age: Oxfordian–Kimmeridgian.

conulum Davey, 1969a, p.160–161, pl.8, figs.5–6. Holotype: Davey, 1969a, pl.8, fig.5. Age: Cenomanian.

***deirens** Davey et al., 1966, p.171–172, pl.3, fig.2; text-fig.45. Emendation: Harding, 1990b, p.46–47, as *Prolixosphaeridium deirens*. Holotype: Davey et al., 1966, pl.3, fig.2; text-fig.45; Fauconnier and Masure, 2004, pl.65, fig.3. Originally (and now) *Prolixosphaeridium deirens*, subsequently *Prolixosphaeridium parvispinum* subsp. *deirens*. Lentin and Williams (1985, p.294) retained this taxon at specific rank. Taxonomic senior synonym (at specific and varietal ranks): *Hystrichosphaeridium xanthiopyxides* var. *parvispinum* (as and now *Prolixosphaeridium parvispinum*), according to Davey and Verdier (1974, p.636–637) — however, Harding (1990b, p.46) retained *Prolixosphaeridium deirens*. Age: middle Barremian.

"elongatum" Jain, 1977b, p.185, pl.4, figs.48–49. Holotype: Jain, 1977b, pl.4, fig.48. **Taxonomic senior synonym** (at specific and varietal ranks): *Hystrichosphaeridium xanthiopyxides* var. *parvispinum* (as and now *Prolixosphaeridium parvispinum*), according to Lentin and Williams (1985, p.294). Age: early Albian.

floccus Stancliffe, 1991, p.194, 196, pl.2, figs.2–3, 8–9; text-figs.8A–B. Holotype: Stancliffe, 1991, pl.2, figs.2–3; text-figs.8A–B. N.I.A. Age: late Oxfordian.

?foratum Dodekova, 1994, p.26–27, pl.5, figs.3–4, 10, 13. Holotype: Dodekova, 1994, pl.5, figs.3–4. Questionable assignment: Dodekova (1994, p.26). Age: late Tithonian–Berriasian.

granulosum (Deflandre, 1937b, p.77, pl.16 [al. pl.13], fig.4) Davey et al., 1966, p.172. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.4; Fauconnier and Masure, 2004, pl.66, fig.4. Originally *Hystrichosphaeridium xanthiopyxides* var. *granulosum*, subsequently *Baltisphaeridium xanthiopyxides* var. *granulosum* (combination not validly published, Appendix A), thirdly *Baltisphaeridium granulosum* (Appendix A), fourthly (and now) *Prolixosphaeridium granulosum*. Taxonomic junior synonyms (at specific rank): *Baltisphaeridium pilosum* var. *longispinosum* (as *Tenua pilosa* subsp. *longispinosa*), according to Sarjeant (1976c, p.19) — however, Erkmen and Sarjeant (1980, p.64) considered *Baltisphaeridium pilosum* var. *longispinosum* to be a taxonomic junior synonym (at specific rank) of *Prolixosphaeridium anasillum*, not of *Hystrichosphaeridium xanthiopyxides* var. *granulosum* (as *Prolixosphaeridium granulosum*); *Prolixosphaeridium anasillum*, according to Lentin and Williams (1993, p.539) — however, this synonymy was based on a mis-reading of Erkmen and Sarjeant (1980). Age: Senonian.

inequiornatum Stover and Helby, 1987c, p.246, figs.18A–H. Holotype: Stover and Helby, 1987c, figs.18C–E; Fensome et al., 1996, figs.3–5 — p.2165. Age: late Hauterivian–Barremian.

mixtispinosum (Klement, 1960, p.58–59, pl.6, figs.17–19) Davey et al., 1969, p.17. Holotype: Klement, 1960, pl.6, figs.17–18; Sarjeant, 1984a, pl.4, fig.4; Fauconnier and Masure, 2004, pl.66, figs.2–3. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Prolixosphaeridium*. Taxonomic junior synonym: *Prolixosphaeridium basifurcatum*, according to Courtinat (1989, p.182) — however, Fauconnier and Monteil in Fauconnier and Masure (2004, p.461) retained *Prolixosphaeridium basifurcatum*. This combination was not validly published in Davey et al. (1966, p.173), since these authors did not fully reference the basionym. Age: early Kimmeridgian.

?nanus (Wetzel, 1933b, p.43, pl.4, fig.23; text-fig.13 ex Lentin and Williams, 1985, p.322) Sarjeant, 1985b, p.145. Emendation: Sarjeant, 1985b, p.145, as *Prolixosphaeridium nanus*. Holotype: Wetzel, 1933b, pl.4, fig.23; Sarjeant, 1985b, pl.2, figs.6–7. Originally *Hystrichosphaera pilosa* forma *nanus* (name not validly published), subsequently *Sentusidinium pilosum?* subsp. *nanus*, thirdly *Prolixosphaeridium nanus*, fourthly (and now) *Prolixosphaeridium?* *nanus*. Questionable assignment: Fauconnier and Monteil in Fauconnier and Masure (2004, p.462–463). The name *Hystrichosphaera pilosa* forma *nanus* was not validly published in Wetzel (1933b) since the species combination *Hystrichosphaera pilosa* was not validly published. N.I.A. Age: Late Cretaceous.

parvispinum (Deflandre, 1937b, p.77, pl.16 [al. pl.13], fig.5) Davey et al., 1969, p.17. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.5; Fauconnier and Masure, 2004, pl.66, figs.5–6. Originally *Hystrichosphaeridium*

xanthiopyxides var. *parvispinum*, subsequently *Hystrichosphaeridium parvispinum*, thirdly *Baltisphaeridium parvispinum* (Appendix A), fourthly (and now) *Prolixosphaeridium parvispinum*. Taxonomic junior synonyms (at specific and varietal ranks): *Prolixosphaeridium deirense*, according to Davey and Verdier (1974, p.636–637) — however, Harding (1990b, p.46) retained *Prolixosphaeridium deirense*; *Prolixosphaeridium elongatum*, according to Lentin and Williams (1985, p.294). This combination was not validly published in Davey et al. (1966, p.173), since these authors did not fully reference the basionym. Age: late Aptian.

"subsp. *deirense*" (Davey et al., 1966, p.171–172, pl.3, fig.2; text-fig.45) Below, 1982c, p.31. Emendation: Harding, 1990b, p.46–47, as *Prolixosphaeridium deirense*. Holotype: Davey et al., 1966, pl.3, fig.2; text-fig.45; Fauconnier and Masure, 2004, pl.65, fig.3. **NOW** *Prolixosphaeridium deirense*. Originally (and now) *Prolixosphaeridium deirense*, subsequently *Prolixosphaeridium parvispinum* subsp. *deirense*. Taxonomic senior synonym (at specific and varietal ranks): *Hystrichosphaeridium xanthiopyxides* var. *parvispinum* (now *Prolixosphaeridium parvispinum*), according to Davey and Verdier (1974, p.636–637) — however, Harding (1990b, p.46) retained *Prolixosphaeridium parvispinum* subsp. *deirense* (as *Prolixosphaeridium deirense*). Age: middle Barremian.

"subsp. *parvispinum*". Autonym. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.5; Fauconnier and Masure, 2004, pl.66, figs.5–6. **Now redundant.**

perforospineum Dodekova, 1994, p.27, pl.5, figs.9,12,16–18. Holotype: Dodekova, 1994, pl.5, figs.16–18. Age: middle-late Tithonian.

"?*spissum*" (McIntyre and Brideaux, 1980, p.20, pl.7, figs.1–9) Lentin and Williams, 1981, p.234. Holotype: McIntyre and Brideaux, 1980, pl.7, figs.1–4. **NOW** *Prolixosphaeridiopsis* (Appendix A). Originally *Cleistosphaeridium*, subsequently *Prolixosphaeridium?*, thirdly (and now) *Prolixosphaeridiopsis* (Appendix A). Questionable assignment: Lentin and Williams (1981, p.234). Age: Valanginian.

"?*toryna*" (Cookson and Eisenack, 1960b, p.252, pl.38, figs.6,15) Eisenack and Kjellström, 1972, p.951. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.15. **NOW** *Egmontodinium*. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium?*, thirdly *Tanyosphaeridium*, fourthly (and now) *Egmontodinium*. Questionable assignment: Eisenack and Kjellström (1972, p.951). N.I.A. Age: Tithonian–Neocomian.

"?*xanthiopyxides*" (Wetzel, 1933b, p.44–45, pl.4, fig.25 ex Deflandre, 1937b, p.77) Davey et al., 1969, p.17. Emendations: Morgenroth, 1968, p.556, as *Hystrichosphaeridium? xanthiopyxides*; Sarjeant, 1985b, p.142–144, as *Tanyosphaeridium xanthiopyxides*. Holotype: Wetzel, 1933b, pl.4, fig.25, Morgenroth, 1968, pl.48, fig.5; Sarjeant, 1985b, pl.3, figs.2–3; Dietz et al., 1999, fig.10, no.8. **NOW** *Tanyosphaeridium*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Baltisphaeridium* (Appendix A), fifthly *Prolixosphaeridium?*, sixthly (and now) *Tanyosphaeridium*. Questionable assignment: Davey et al. (1969, p.17). Taxonomic junior synonym: *Hystrichosphaeridium* (as *Tanyosphaeridium*) *magdaliium*, according to Stover and Evitt (1978, p.85). This combination was not validly published in Davey et al. (1966, p.173), since these authors did not fully reference the basionym. Age: Late Cretaceous (?Maastrichtian, according to Sarjeant, 1985b, p.143).

"**PROMINANGULARIA**" Jiabo, 1978, p.47. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.303. **Taxonomic senior synonym:** *Bohaidina*, according to Sun Xuekun (1994, p.70). Chen et al. (1988, p.23) included this genus in the acritarchs; however, Lentin in Lentin and Williams (1989, p.304) considered it to be a freshwater ceratioid dinoflagellate cyst. He Chengquan et al. (2009, p.453) considered *Prominangularia* to be a subgenus of *Bohaidina*. Type: Jiabo, 1978, pl.19, fig.7, as *Prominangularia granulata*.

"*dongyingensis*" Jiabo, 1978, p.48, pl.19, figs.13–17. Holotype: Jiabo, 1978, pl.19, fig.14. **NOW** *Bohaidina*. Originally *Prominangularia*, subsequently (and now) *Bohaidina*. Taxonomic senior synonym: *Bohaidina granulata*, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.453) retained the species separately as *Bohaidina dongyingensis*. Age: Early Tertiary.

"**granulata*" Jiabo, 1978, p.47–48, pl.19, figs.7–12; pl.46, figs.1a–b; text-fig.8. Emendation: Xu Jinli and Mao Shaozhi, 1989, p.303. Holotype: Jiabo, 1978, pl.19, fig.7. **NOW** *Bohaidina arenula*. Originally *Prominangularia granulata*, subsequently *Bohaidina granulata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Bohaidina granulata* Jiabo), thirdly (and now) *Bohaidina arenula*. Taxonomic senior synonym: *Bohaidina granulata* Jiabo, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Early Tertiary.

"*laevigata*" Jiabo, 1978, p.48, pl.19, figs.5–6. Holotype: Jiabo, 1978, pl.19, fig.6. **NOW** *Bohaidina enodis*. Originally *Prominangularia laevigata*, subsequently *Bohaidina laevigata* (Jiabo) He Chengquan et al. (illegitimate combination, non *Bohaidina laevigata* Jiabo), thirdly (and now) *Bohaidina enodis*. Taxonomic senior synonym: *Bohaidina laevigata* Jiabo, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Early Tertiary.

"*micirugosa*" He Chengquan, 1984b, p.158, pl.2, figs.12–17. Holotype: He Chengquan, 1984b, pl.2, fig.14. **NOW** *Bohaidina*. Originally *Prominangularia*, subsequently (and now) *Bohaidina*. Taxonomic senior synonym: *Bohaidina rugosa*, according to Sun Xuekun (1994, p.71) — however, He Chengquan et al. (2009, p.454) retained this species separately. Age: Tertiary.

"*reticulata*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.79–80, pl.5, figs.14–17; text-fig.7. Holotype: Liu Zhili et al., 1992, pl.5, fig.17. **NOW** *Bohaidina*. Originally *Prominangularia*, subsequently (and now) *Bohaidina*. Age: Early Tertiary.

PROTOBATIOLADINIUM Nøhr-Hansen, 1986, p.36–37. Type: Nøhr-Hansen, 1986, pl.3, fig.5; text-fig.7, as *Protobatioladinium westburiense*.

elatmaense Riding and Ilyina, 1996, p.150, figs.1a–d. Holotype: Riding and Ilyina, 1996, fig.1a. Age: early-middle Bathonian.

?*elongatum* Riding and Ilyina, 1998, p.86, figs.1a–d. Holotype: Riding and Ilyina, 1998, fig.1a. Age: late Bathonian.

imbatodinense (Vozzhennikova, 1967, p.55, pl.12, figs.4a–c) Lentin and Vozzhennikova, 1990, p.91. Emendation: Lentin and Vozzhennikova, 1990, p.92, as *Protobatioladinium imbatodinense*. Holotype: Vozzhennikova, 1967, pl.12, fig.4a; Lentin and Vozzhennikova, 1990, pl.11, figs.9–11; text-fig.50. Originally *Imbatodinium*, subsequently *Necrobroomea*?, thirdly *Pareodinia*, fourthly *Pareodinia*?, fifthly *Batioladinium*, sixthly (and now) *Protobatioladinium*, seventhly *Gochteodinia*. Lentin and Williams (1993, p.541) retained this species in *Protobatioladinium*. Age: Late Jurassic.

lindiense Schrank, 2005, p.72, pl.10, figs.4–8; text-fig.2. Holotype: Schrank, 2005, pl.10, fig.4. Age: Tithonian.

lunare Monteil, 1992a, p.276–277, pl.6, figs.1–6; pl.7, figs.1–2. Holotype: Monteil, 1992a, pl.6, figs.1–3. Age: early Tithonian.

mercieri Feist-Burkhardt and Pross, 1999, p.107–108, pl.1, figs.1–6; pl.2, figs.1–6; pl.7, figs.1–6; pl.11, figs.1–9; pl.12, figs.1–9; text-fig.1, nos.1a–b,2; text-fig.2, nos.1a–b,2a–b,3a–b. Holotype: Feist-Burkhardt and Pross, 1999, pl.1, figs.1–6; pl.7, figs.1–3; pl.11, figs.1–6; text-fig.1, no.1. Age: late Bajocian–early Bathonian.

rossicum (Iosifova, 1992, p.59–61, pl.9, figs.2a–b; pl.10, figs.1a–b; text-fig.1e) Iosifova, 1996, p.227. Holotype: Iosifova, 1992, pl.10, figs.1a–b; Iosifova, 1996, pl.7, figs.4a–c; text-figs.10A–B. Originally *Batioladinium*, subsequently (and now) *Protobatioladinium*. Age: Ryazanian.

**westburiense* Nøhr-Hansen, 1986, p.37–38, pl.3, figs.5–8; text-fig.7. Holotype: Nøhr-Hansen, 1986, pl.3, fig.5; text-fig.7; Fensome et al., 1995, figs.1,5–6 — p.1911. Age: early Kimmeridgian.

PROTOELLIPSODINIUM Davey and Verdier, 1971, p.28. Type: Davey and Verdier, 1971, pl.5, fig.2, as *Protoellipsodinium spinocristatum*.

clavulus Davey and Verdier, 1974, p.637–638, pl.93, fig.7. Emendation: Duxbury, 1983, p.53. Holotype: Davey and Verdier, 1974, pl.93, fig.7. Taxonomic junior synonym: *Operculodinium?* (as *Protoellipsodinium*) *spinigerum*, according to Duxbury (1983, p.53). N.I.A. Age: Aptian.

"**corollum**" Hasenboehler in Masure, 1984, p.95. **Name not validly published**: no description. Age: early Albian–Cenomanian.

densispinum Morgan, 1980, p.30–31, pl.24, figs.1–3. Holotype: Morgan, 1980, pl.24, figs.2–3. Age: middle Aptian–Cenomanian.

fibratum (Batten and Lister, 1988, p.345,347, figs.2g–h)Wan Chuanbiao et al., 1997, p.412. Holotype: Batten and Lister, 1988, figs.2g–h. Originally *Microdinium?*, subsequently (and now) *Protoellipsodinium*. Age: Barremian.

"**longispinosum**" Prössl, 1990, p.105, pl.6, figs.5–7 ex Prössl, 1992b, p.113,115–116. Holotype: Prössl, 1990, pl.6, figs.5–6. **Taxonomic senior synonym**: *Protoellipsodinium spinosum*, according to Heilmann-Clausen and Thomsen (1995, p.306). This name was not validly published in Prössl (1990, p.105), since that author did not specify the lodgment of the holotype. Age: late Hauterivian–early Barremian.

minutum Sun Xuekun, 1994, p.82, pl.3, fig.11. Holotype: Sun Xuekun, 1994, pl.3, fig.11. Age: Eocene.

"**rarispinum**" Prössl, 1990, p.105–106, pl.5, figs.9,12–13 ex Prössl, 1992b, p.113,116. Holotype: Prössl, 1990, pl.5, fig.9. **Taxonomic senior synonym**: *Protoellipsodinium spinosum*, according to Heilmann-Clausen and Thomsen (1995, p.306). This name was not validly published in Prössl (1990, p.105–106), since that author did not specify the lodgment of the holotype. Age: early Hauterivian–late Barremian.

seghire Below, 1981a, p.110–111, pl.11, figs.9,10a–b,11,13a–c,14–15; pl.15, figs.17–19; text-fig.71 (part). Holotype: Below, 1981a, pl.11, figs.10a–b; Fensome et al., 1991, figs.1–2 — p.733; figs.1–2 — p.737. Age: late Aptian.

subsp. **medaure** Below, 1981a, p.110–111, pl.11, figs.9,13a–c,14–15; pl.15, figs.17–18; text-fig.71 (part). Holotype: Below, 1981a, pl.11, figs.13a–c; Fensome et al., 1991, figs.1–3 — p.675; figs.3–4 — p.737. Age: Hauterivian.

subsp. **seghire**. Autonym. Holotype: Below, 1981a, pl.11, figs.10a–b.

"**spinigerum**" (Brideaux, 1977, p.30, pl.12, figs.8–9; pl.13, figs.1–11) Lentin and Williams, 1981, p.235. Holotype: Brideaux, 1977, pl.12, figs.8–9; pl.13, figs.1–4. Originally *Operculodinium?*, subsequently *Protoellipsodinium*. **Taxonomic senior synonym**: *Protoellipsodinium clavulum*, according to Duxbury (1983, p.53). Age: Barremian.

***spinocristatum** Davey and Verdier, 1971, p.28–29, pl.5, figs.2,5,11. Holotype: Davey and Verdier, 1971, pl.5, fig.2. Age: early–late Albian.

spinosum Davey and Verdier, 1971, p.29–30, pl.5, fig.10. Holotype: Davey and Verdier, 1971, pl.5, fig.10. Taxonomic junior synonyms: *Protoellipsodinium longispinosum* and *Protoellipsodinium rarispinum*, both according to Heilmann-Clausen and Thomsen (1995, p.306). Age: early–late Albian.

touile Below, 1981a, p.111–112, pl.11, figs.8,16a–c,17a–b; pl.15, figs.15–16; text-fig.71 (part). Holotype: Below, 1981a, pl.11, figs.16a–c; Fensome et al., 1991, figs.1–3 — p.761; figs.1–3 — p.765. Age: Aptian.

subsp. **mugataë** Below, 1981a, p.112, pl.11, figs.8,17a–b; pl.15, figs.15–16; text-fig.71 (part). Holotype: Below, 1981a, pl.11, figs.17a–b; Fensome et al., 1991, figs.2–3 — p.687; figs.5–6 — p.761. Age: Hauterivian.

subsp. *touile*. Autonym. Holotype: Below, 1981a, pl.11, figs.16a–c; Fensome et al., 1991, figs.1–3 — p.761; figs.1–3 — p.765.

verrucosum Yu Jingxian, 1982, p.248, pl.8, figs.6,11. Holotype: Yu Jingxian, 1982, pl.8, fig.11. Age: Late Jurassic–Early Cretaceous.

PSALIGONYAULAX Sarjeant, 1966b, p.136. Emendation: Sarjeant, 1982b, p.44–45. Taxonomic senior synonym: *Gonyaulacysta*, according to Below (1981a, p.52) — however, Lentin and Williams (1981, p.235) retained *Psaligonyaulax*. Type: Sarjeant, 1966b, pl.14, figs.7–8; text-fig.35, as *Psaligonyaulax deflandrei*.

"*apatela*" (Cookson and Eisenack, 1960b, p.249, pl.37, figs.12–13) Sarjeant, 1969, p.15. Emendation: Sarjeant, 1982b, p.42, as *Tubotuberella apatela*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.12; Jan du Chêne et al., 1986a, pl.124, figs.1–2; Fensome et al., 1993a, fig.1 — p.921. **NOW** *Tubotuberella*. Originally *Scriniodinium*, subsequently *Psaligonyaulax*, thirdly (and now) *Tubotuberella*, fourthly *Glabridinium*. Age: Late Jurassic.

"*australica*" Cookson and Eisenack, 1982, p.37–38, pl.2, figs.13–15. Holotype: Cookson and Eisenack, 1982, pl.2, fig.14, lost according to Jan du Chêne et al. (1986a, p.266). **Taxonomic senior synonym:** *Psaligonyaulax* (as and now *Gonyaulacysta*) *dualis*, according to Brenner (1988, p.54). Taxonomic senior synonym: *Scriniodinium?* *ceratophorum*, according to Jan du Chêne et al. (1986a, p.266). Age: Oxfordian–early Kimmeridgian.

circularis He Chengquan, 1991, p.122, pl.29, fig.11. Holotype: He Chengquan, 1991, pl.29, fig.11. Age: Paleocene.

?*cypraea* Ioannides et al., 1977, p.460, pl.4, figs.5–8; text-fig.12. Holotype: Ioannides et al., 1977, pl.4, fig.5; text-fig.12; Jan du Chêne et al., 1986a, pl.85, figs.1–2; pl.86, figs.9–11. Originally *Psaligonyaulax*, subsequently (and now) *Psaligonyaulax?*, thirdly *Gonyaulacysta*. Jan du Chêne et al. (1986a, p.266) questionably retained this species in *Psaligonyaulax*. Questionable assignment: Stover and Evitt (1978, p.182). Age: Kimmeridgian.

**deflandrei* Sarjeant, 1966b, p.137–138, pl.14, figs.7–8; text-fig.35. Emendation: Sarjeant, 1982b, p.45–46, as *Psaligonyaulax deflandrei*. Holotype: Sarjeant, 1966b, pl.14, figs.7–8; text-fig.35; Jan du Chêne et al., 1986a, pl.85, figs.3–4; pl.86, figs.1–3. Originally (and now) *Psaligonyaulax*, subsequently *Gonyaulacysta* (combination illegitimate). Lentin and Williams (1981, p.235) retained this species in *Psaligonyaulax*. Taxonomic junior synonym: *Gonyaulacysta extensa*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"*dualis*" Brideaux and Fisher, 1976, p.18–20, pl.1, figs.4–6,8–12; pl.2, figs.1–2. Holotype: Brideaux and Fisher, 1976, pl.1, figs.4–5; Jan du Chêne et al., 1986a, pl.37, figs.11–12. **NOW** *Gonyaulacysta*. Originally *Psaligonyaulax*, subsequently (and now) *Gonyaulacysta*. Taxonomic senior synonym: *Gonyaulax* (as and now *Gonyaulacysta*) *jurassica*, according to Sarjeant (1982b, p.29) — however, Jan du Chêne et al. (1986a, p.131) retained *Gonyaulacysta dualis*. Taxonomic junior synonym: *Psaligonyaulax australis*, according to Brenner (1988, p.54). Age: late Oxfordian–late Kimmeridgian.

"*galeata*" (Cookson and Eisenack, 1960a, p.3–4, pl.1, figs.16–18) Davey and Verdier, 1973, p.195. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.16; Jan du Chêne et al., 1986a, pl.48, figs.11–13; Helby et al., 1987, fig.38L. **NOW** *Hystrichosphaeropsis*. Originally *Scriniodinium*, subsequently *Psaligonyaulax*, thirdly (and now) *Hystrichosphaeropsis*. Age: Albian–Cenomanian.

"*simplicia*" (Cookson and Eisenack, 1961b, p.42, pl.2, figs.3–4; text-figs.1e–f) Sarjeant, 1969, p.15. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.3–4; text-figs.1e–f; Jan du Chêne et al., 1986a, pl.54, figs.1–5. **NOW** *Impagidinium?*. Originally *Rottnestia*, subsequently *Psaligonyaulax*, thirdly (and now) *Impagidinium?*. This combination was not validly published in Sarjeant (1966b, p.138), since that author did not fully reference the basionym. Age: Eocene.

PSEUDOALTERBIA Mao Shaozhi and Norris, 1988, p.53. Type: Mao Shaozhi and Norris, 1988, pl.16, fig.4, as *Pseudoalterbia concinna*.

**concinna* Mao Shaozhi and Norris, 1988, p.53, pl.16, figs.4–6. Holotype: Mao Shaozhi and Norris, 1988, pl.16, fig.4; Fensome et al., 1993a, fig.1 — p.1067. Age: Turonian–Santonian.

"*PSEUDOBOHAIDINA*" Xu Jinli et al., 1997, p.48,144. **Taxonomic senior synonym:** *Batiacasphaera*, according to He Chengquan et al. (2009, p.326). Type: Xu Jinli et al., 1997, pl.42, fig.1, as *Pseudobohaidina granulata*.

"**granulata*" Xu Jinli et al., 1997, p.48,144, pl.42, figs.1–2,4–5. Holotype: Xu Jinli et al., 1997, pl.42, fig.1. **Taxonomic senior synonym:** *Batiacasphaera macrogranulata*, according to He Chengquan et al. (2009, p.331). Age: middle-late Eocene.

"*oblongata*" Xu Jinli et al., 1997, p.49, pl.42, fig.6. Holotype: Xu Jinli et al., 1997, pl.42, fig.6. **Name not validly published:** no English or Latin description. **NOW** *Batiacasphaera*. Originally *Pseudobohaidina* (name not validly published), subsequently (and now) *Batiacasphaera*. Age: middle-late Eocene.

"*retirugosa*" Xu Jinli et al., 1997, p.48–49, pl.42, fig.3. Holotype: Xu Jinli et al., 1997, pl.42, fig.3. **Name not validly published:** no English or Latin description. **NOW** *Batiacasphaera*. Originally *Pseudobohaidina* (name not validly published), subsequently (and now) *Batiacasphaera*. Age: middle-late Eocene.

PSEUDOCERATIUM Gocht, 1957, p.166. Emendations: Dörhöfer and Davies, 1980, p.39; Bint, 1986, p.144; Helby, 1987, p.313–315. Taxonomic junior synonyms: *Aptea* and *Doidyx*, both according to Bint (1986, p.144) — however, Quattrocchio and Sarjeant (1992, p.2–234) retained *Aptea*; *Eopseudoceratium*, according to Stover and Evitt (1978, p.77); *Endoceratium*, according to Helby (1987, p.313–315) — however, Lentin and Williams (1989, p.125) retained *Endoceratium*. Type: Gocht, 1957, pl.18, fig.1, as *Pseudoceratium pelliferum*.

almohadense (Below, 1984, p.635, pl.1, figs.5A–B,6–7) Lentin and Williams, 1989, p.306. Holotype: Below, 1984, pl.1, figs.5A–B. Originally *Aptea*, subsequently (and now) *Pseudoceratium*. Age: middle-late Aptian.

anaphrissum (Sarjeant, 1966c, p.206, pl.22, fig.8; pl.23, fig.6; text-fig.55) Bint, 1986, p.145. Emendation: Harding, 1990b, p.17–18, as *Pseudoceratium anaphrissum*. Holotype: Sarjeant, 1966c, pl.22, fig.8; text-fig.55. Originally *Doidyx*, subsequently *Tenua* Eisenack, thirdly *Aptea*, fourthly (and now) *Pseudoceratium*. Age: early Barremian.

aulaeum Harding, 1990b, p.18, pl.1, figs.1–6 ex Harding in Williams et al., 1998, p.512. Holotype: Harding, 1990b, pl.1, fig.1. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). N.I.A. Age: late Barremian.

australiense Fensome and Williams 2004, p.554. Substitute name for *Pseudoceratium robustum* Riding and Helby, 2001g, p.208,210,212, figs.15A–L. Holotype: Riding and Helby, 2001g, figs.15J–K. Originally *Pseudoceratium robustum* Riding and Helby (name illegitimate), subsequently (and now) *Pseudoceratium australiense*. Age: Tithonian.

brevicornutum Herngreen et al., 2000, p.50, pl.9, figs.6–7. Holotype: Herngreen et al., 2000, pl.9, fig.6. Taxonomic junior synonym: *Pseudoceratium eopelliferum* (name not validly published), according to Herngreen et al. (2000, p.50). Age: late Ryazanian–early Hauterivian.

"*ceratioides*" (Deflandre, 1937b, p.66–67, pl.12 [al. pl.9], figs.7–8) Clarke and Verdier, 1967, p.60. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), figs.7–8; Fensome et al., 1991, fig.1 — p.601; fig.1 — p.605. **NOW** *Xenascus*. Originally *Hystrichosphaera*, subsequently *Pseudoceratium*, thirdly *Spiniferites*, fourthly *Phoberocysta*, fifthly (and now) *Xenascus*. Taxonomic junior synonyms: *Endoceratium* (now *Xenascus*) *perforatum*, according to Davey and Verdier (1971, p.27) — however, Yun Hyesu (1981, p.62) retained *Endoceratium* (as *Xenascus*) *perforatum*; *Xenascus australensis*, according to Davey and Verdier (1971, p.26) — however, Lentin and Williams (1985, p.374) retained *Xenascus australensis*; *Odontochitina blastema*, according to Davey and Verdier (1971, p.27) — however, Stover and Helby (1987a, p.128) retained *Odontochitina* (as *Xenascus*) *blastema*. This combination was not validly published in Deflandre (1966, p.6), since that author did not fully reference the basionym. Age: Senonian.

"*dettmanniae*" Cookson and Hughes, 1964, p.51–52, pl.7, figs.1–4. Emendation: Harding and Hughes, 1990, p.312,314, as *Endoceratium dettmanniae*. Holotype: Cookson and Hughes, 1964, pl.7, fig.1. **NOW** *Endoceratium*. Originally *Pseudoceratium*, subsequently (and now) *Endoceratium*. Age: late Albian–early Cenomanian.

distinctum Duxbury, 2001, p.111–112, fig.11, nos.1–4. Holotype: Duxbury, 2001, fig.11, no.1. Age: late Aptian.

eisenackii (Davey, 1969a, p.170–171, pl.8, figs.3–4; pl.9, fig.4; text-figs.16A–B [not 17A–B]) Bint, 1986, p.145. Holotype: Davey, 1969a, pl.8, fig.4. Originally *Cyclonephelium*, subsequently *Aptea*, thirdly (and now) *Pseudoceratium*. Taxonomic senior synonym: *Aptea* (now *Pseudoceratium*) *polymorpha*, according to Cookson and Eisenack (1974, p.74) — however, Below (1981a, p.7) retained *Aptea eisenackii*. Age: late Albian.

"*eopelliferum*" Herngreen et al., 1994, p.386. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Pseudoceratium brevicornutum*, according to Herngreen et al. (2000, p.50).

expoliturum Brideaux, 1971, p.102–103, pl.30, figs.105–106,108. Holotype: Brideaux, 1971, pl.30, fig.106. Taxonomic junior synonym: *Pseudoceratium regium*, according to Harker and Sarjeant (1975, p.226). Age: middle-late Albian.

"*exquisitum*" (Morgan, 1980, p.22, pl.10, figs.11–12) Helby, 1987, p.315. Holotype: Morgan, 1980, pl.10, figs.11–12; Helby et al., 1987, fig.29I. **NOW** *Endoceratium*. Originally (and now) *Endoceratium*, subsequently *Pseudoceratium*. Age: Albian.

gochtii Neale and Sarjeant, 1962, p.446–448, pl.20, figs.3–4; text-figs.5a–c. Holotype: Neale and Sarjeant, 1962, pl.20, fig.3; text-fig.5a. Originally *Pseudoceratium* subgenus *Eopseudoceratium*, subsequently *Eopseudoceratium*, thirdly (and now) *Pseudoceratium*. Lentin and Williams (1985, p.297) retained this species in *Pseudoceratium*. Junior homonym: *Pseudoceratium gochtii* Pocock, 1962. Age: late Hauterivian–mid Barremian.

"*gochtii*" Pocock, 1962, p.79, pl.14, figs.213–214. Holotype: Pocock, 1962, pl.14, fig.213, lost according to Jansonius (1986, p.222). **Name illegitimate** — **senior homonym**: *Pseudoceratium gochtii* Neale and Sarjeant, 1962. Substitute name: *Pseudoceratium hansgochtii*. Originally *Pseudoceratium gochtii* Pocock, 1962 (name illegitimate), subsequently *Pseudoceratium hansgochtii*. **Taxonomic senior synonym**: *Broomea* (now *Batioladinium*) *jaegeri*, according to Singh (1971, p.320). Age: late Albian–early Cenomanian.

"*hansgochtii*" Lentin and Williams, 1981, p.236. Holotype: Pocock, 1962, pl.14, fig.213, lost according to Jansonius (1986, p.222). Originally *Pseudoceratium gochtii* Pocock, 1962 (name illegitimate), subsequently *Pseudoceratium hansgochtii*. Substitute name for *Pseudoceratium gochtii* Pocock, 1962, p.79, pl.14, figs.213–214 (an illegitimate name). **Taxonomic senior synonym**: *Broomea* (now *Batioladinium*) *jaegeri*, according to Singh (1971, p.320). Age: late Albian–early Cenomanian.

iehiense Helby and May in Helby, 1987, p.315–316, figs.16A–K,17. Holotype: Helby, 1987, figs.16I–J; Fensome et al., 1996, figs.1–2 — p.2153. Age: late Tithonian–early Berriasian.

interiorensense Bint, 1986, p.146,148, pl.3, figs.3–4,9–15; pl.7, figs.9–10. Holotype: Bint, 1986, pl.3, figs.3,9. Age: late Albian.

iveri Nøhr-Hansen, 1993, p.100–102, pl.19, figs.1–8; text-figs.13–15. Holotype: Nøhr-Hansen, 1993, pl.19, fig.1; text-fig.13. Age: latest Barremian.

"*ludbrookiae*" (Cookson and Eisenack, 1958, p.52–54, pl.5, figs.7–8) Eisenack, 1961, p.290. Emendation: Morgan, 1980, p.23, as *Endoceratium ludbrookiae*. Holotype: Cookson and Eisenack, 1958, pl.5, fig.7. **NOW** *Endoceratium*. Originally *Ceratocystidiopsis* (Appendix A), subsequently *Pseudoceratium*, thirdly (and now) *Endoceratium*. Age: Albian.

"?*nudum*" Gocht, 1957, p.168, pl.18, figs.3–4,6. Holotype: Gocht, 1957, pl.18, fig.3. **NOW** *Odontochitina*. Originally *Pseudoceratium*?, subsequently (and now) *Odontochitina*. Questionable assignment: Gocht (1957, p.168). Age: late Hauterivian.

?*parvum* Michael, 1964, p.28, pl.2, fig.1. Holotype: Michael, 1964, pl.2, fig.1. Originally *Pseudoceratium*, subsequently (and now) *Pseudoceratium*?. Questionable assignment: Bint (1986, p.145) as a problematic species. Age: early Barremian.

**pelliferum* Gocht, 1957, p.166–168, pl.18, figs.1–2; text-figs.1–3. Emendation: Dörhöfer and Davies, 1980, p.39. Holotype: Gocht, 1957, pl.18, fig.1. Age: Valanginian–late Hauterivian.

"subsp. *pelliferum*". Autonym. Holotype: Gocht, 1957, pl.18, fig.1. **Now redundant.**

"var. *pelliferum*". Autonym. Holotype: Gocht, 1957, pl.18, fig.1. **Now redundant.**

"subsp. *solocispinum*" (Davey, 1974, p.68, pl.9, fig.6) Lentin and Williams, 1975, p.2154. Emendation: Harding, 1990b, p.19, as *Pseudoceratium solocispinum*. Holotype: Davey, 1974, pl.9, fig.6. **NOW** *Pseudoceratium solocispinum*. Originally *Pseudoceratium pelliferum* var. *solocispinum*, subsequently *Pseudoceratium pelliferum* subsp. *solocispinum*, thirdly (and now) *Pseudoceratium solocispinum*. Age: middle-late Barremian.

"var. *solocispinum*" Davey, 1974, p.68, pl.9, fig.6. Emendation: Harding, 1990b, p.19, as *Pseudoceratium solocispinum*. Holotype: Davey, 1974, pl.9, fig.6. **NOW** *Pseudoceratium solocispinum*. Originally *Pseudoceratium pelliferum* var. *solocispinum*, subsequently *Pseudoceratium pelliferum* subsp. *solocispinum*, thirdly (and now) *Pseudoceratium solocispinum*. Age: middle-late Barremian.

plerum (Duxbury, 1983, p.22,25, pl.1, figs.7–8,11; pl.10, fig.3; text-figs.5–6) Bint, 1986, p.145. Holotype: Duxbury, 1983, pl.1, fig.7. Originally *Aptea*, subsequently (and now) *Pseudoceratium*. Age: early Aptian.

"*polymorphum*" (Eisenack, 1958a, p.394, pl.22, figs.5–12; pl.24, fig.5) Bint, 1986, p.145. Emendation: Dörhöfer and Davies, 1980, p.34–36, as *Aptea polymorpha*. Holotype: Eisenack, 1958a, pl.22, fig.5; Sarjeant, 1985a, pl.7, fig.4. **NOW** *Aptea*. Originally (and now) *Aptea*, subsequently *Pseudoceratium*. Taxonomic junior synonym: *Aptea* (now *Pseudoceratium*) *eisenackii*, according to Cookson and Eisenack (1974, p.74) — however, Below (1981a, p.7) retained *Aptea eisenackii*. Age: Aptian.

"*regium*" Singh, 1971, p.375–376, pl.66, figs.2–4; pl.67, figs.1–2. Holotype: Singh, 1971, pl.66, figs.2–3. **Taxonomic senior synonym:** *Pseudoceratium expolitum*, according to Harker and Sarjeant (1975, p.226). Age: middle-late Albanian.

retusum Brideaux, 1977, p.14–15, pl.4, figs.10–12; pl.5, figs.1–2,5–10. Holotype: Brideaux, 1977, pl.4, figs.10–12. Age: Barremian–Aptian.

?*robustum* Michael, 1964, p.29, pl.2, fig.2. Holotype: Michael, 1964, pl.2, fig.2. Originally *Pseudoceratium*, subsequently (and now) *Pseudoceratium*?. Questionable assignment: Bint (1986, p.145) as a problematic species. Junior homonym: *Pseudoceratium robustum* Riding and Helby, 2001g. Age: early Barremian.

"*robustum*" Riding and Helby, 2001g, p.208,210,212, figs.15A–L. Holotype: Riding and Helby, 2001g, figs.15J–K. **Name illegitimate — senior homonym:** *Pseudoceratium? robustum* Michael, 1964. **Substitute name:** *Pseudoceratium australiense*. Originally *Pseudoceratium robustum* Riding and Helby (name illegitimate), subsequently (and now) *Pseudoceratium australiense*. Age: Tithonian.

securigerum (Davey and Verdier, 1974, p.642–643, pl.91, figs.2–3; text-fig.5(vii)) Bint, 1986, p.145. Holotype: Davey and Verdier, 1974, pl.91, fig.3. Originally *Aptea*, subsequently (and now) *Pseudoceratium*. Age: early Aptian.

solocispinum (Davey, 1974, p.68, pl.9, fig.6) Harding, 1990b, p.19. Emendation: Harding, 1990b, p.19, as *Pseudoceratium solocispinum*. Holotype: Davey, 1974, pl.9, fig.6. Originally *Pseudoceratium pelliferum* var. *solocispinum*, subsequently *Pseudoceratium pelliferum* subsp. *solocispinum*, thirdly (and now) *Pseudoceratium solocispinum*. Age: middle-late Barremian.

spitiense Jain and Garg in Jain et al., 1984, p.72, pl.3, figs.41–42. Holotype: Jain et al., 1984, pl.3, fig.42. Age: Kimmeridgian–early Tithonian.

"***tetracanthum***" Gocht, 1957, p.168, pl.18, figs.7–9; text-fig.5. Emendation: Monteil, 1991b, p.476–477, as *Muderongia tetracantha*. Holotype: Gocht, 1957, pl.18, fig.7. **NOW** *Muderongia*. Originally *Pseudoceratium*?, subsequently (and now) *Muderongia*. Questionable assignment: Gocht (1957, p.168). Taxonomic junior synonym: *Muderongia crucis*, according to Morgan (1980, p.28) — however, Jansonius (1982, p.16) retained *Muderongia crucis*. Age: late Hauterivian.

toveae Nøhr-Hansen, 1993, p.108,110, pl.21, fig.11; pl.22, figs.1–7. Holotype: Nøhr-Hansen, 1993, pl.22, fig.1. Age: late Barremian–?earliest Aptian.

"***turneri***" Cookson and Eisenack, 1958, p.55, pl.5, figs.2–6. Holotype: Cookson and Eisenack, 1958, pl.5, fig.3. **NOW** *Endoceratium*. Originally *Pseudoceratium*, subsequently (and now) *Endoceratium*. Age: Aptian–Albian.

weymouthense Helby, 1987, p.316–317, figs.19A–C,20A–D. Holotype: Helby, 1987, figs.19A–B; Fensome et al., 1996, figs.1–2 — p.2443. Age: late Tithonian–early Berriasian.

"**PSEUDOCERATIUM** subgenus **EOPSEUDOCERATIUM**" Neale and Sarjeant, 1962, p.446. Originally *Pseudoceratium* subgenus *Eopseudoceratium*, subsequently *Eopseudoceratium*. **Taxonomic senior synonym:** *Pseudoceratium*, according to Stover and Evitt (1978, p.77). Type: Neale and Sarjeant, 1962, pl.20, fig.3; text-fig.5, as *Pseudoceratium (Eopseudoceratium) gochtii*.

"**PSEUDOCERATIUM** subgenus **PSEUDOCERATIUM**". Autonym. **Now redundant.** Type: Gocht, 1957, pl.18, fig.1, as *Pseudoceratium pelliferum*.

PSEUDODEFLANDREA Alberti, 1959a, p.91–92. Type: Alberti, 1959a, text-fig.1, as *Pseudodeflandrea gigantea*.

****gigantea*** Alberti, 1959a, p.92; text-fig.1. Holotype: Alberti, 1959a, text-fig.1. Lentin and Williams (1976, p.125) suggested that this species may be a form of *Odontochitinospis* or *Xenascus*. Age: middle Oligocene.

PSEUDOKOMEWUIA He Chengquan, 1980, p.1–2. Chen et al. (1988, p.23) considered that this genus was not effectively published, because He Chengquan (1980) was distributed as a handout at the Fifth International Palynological Conference in 1980 at Cambridge, England. However, according to Jansonius in Lentin and Williams (1989, p.307–308), this distribution was sufficient to satisfy the requirements of the I.C.N. (although I.C.N. Article 30.1 may shed doubt on this assessment). Type: He Chengquan, 1980, pl.1, fig.1, as *Pseudokomewuia laevigata*.

cerciata He Chengquan, 1980, p.3–4, pl.1, figs.7–8. Holotype: He Chengquan, 1980, pl.1, fig.7. Age: Oligocene.

communis (He Chengquan, 1984b, p.159, pl.5, figs.18–20) He Chengquan et al., 2009, p.534. Holotype: He Chengquan, 1984b, pl.5, fig.18. Originally *Pareodinia*, subsequently *Pareodinia*?, thirdly (and now) *Pseudokomewuia*. Age: middle-late Oligocene.

granulata He Chengquan, 1980, p.4, pl.1, figs.9–12. Holotype: He Chengquan, 1980, pl.1, fig.10. Age: Oligocene.

****laevigata*** He Chengquan, 1980, p.2–3, pl.1, figs.1–6; text-figs.1–3. Holotype: He Chengquan, 1980, pl.1, fig.1. Age: Oligocene.

subsp. *fusifformis* He Chengquan, 1984b, p.165, pl.3, figs.5–9. Holotype: He Chengquan, 1984b, pl.3, fig.6. Age: Tertiary.

subsp. *laevigata*. Autonym. Holotype: He Chengquan, 1980, pl.1, fig.1.

subsp. *subtilis* He Chengquan, 1984b, p.165, pl.3, figs.10–13; text-fig.4. Holotype: He Chengquan, 1984b, pl.3, fig.12; text-fig.4. Age: Tertiary.

longangulata Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.81, pl.7, fig.4. Holotype: Liu Zhili et al., 1992, pl.7, fig.4. Liu Zhili and Zheng Yuefang in Liu Zhili et al. (1992, p.81) included this species in *Pseudokomewuia* subgenus *Condocorpidia*. Age: Early Tertiary.

minuticornicula Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.81, pl.7, fig.1. Holotype: Liu Zhili et al., 1992, pl.7, fig.1. Liu Zhili and Zheng Yuefang in Liu Zhili et al. (1992, p.81) included this species in *Pseudokomewuia* subgenus *Pseudokomewuia*. Age: Early Tertiary.

radiata He Chengquan, 1984b, p.167, pl.5, fig.14. Holotype: He Chengquan, 1984b, pl.5, fig.14. He Chengquan (1984b, p.167) included this species in *Pseudokomewuia* subgenus *Condocorpidia*. Age: Tertiary.

retirugosa He Chengquan, 1980, p.5–6, pl.1, figs.15–16. Holotype: He Chengquan, 1980, pl.1, fig.16. He Chengquan (1980, p.5) included this species in *Pseudokomewuia* subgenus *Condocorpidia*. Age: Oligocene.

subsp. *pygmea* He Chengquan, 1984b, p.168, pl.5, figs.16–17; text-fig.8. Holotype: He Chengquan, 1984b, pl.5, fig.17; text-fig.8. Age: Tertiary.

subsp. *retirugosa*. Autonym. Holotype: He Chengquan, 1980, pl.1, fig.16.

shangsica He Chengquan, 1984b, p.168–169, pl.4, figs.14–20; pl.5, figs.1–6; text-fig.9. Holotype: He Chengquan, 1984b, pl.4, fig.14. He Chengquan (1984b, p.168) included this species in *Pseudokomewuia* subgenus *Condocorpidia*. Age: Tertiary.

subsp. *pygmea* He Chengquan, 1984b, p.169, pl.5, figs.1–6. Holotype: He Chengquan, 1984b, pl.5, fig.1. Age: Tertiary.

subsp. *shangsica*. Autonym. Holotype: He Chengquan, 1984b, pl.4, fig.14.

sparsa He Chengquan, 1991, p.60–61, pl.12, figs.3–4. Holotype: He Chengquan, 1991, pl.12, fig.3. He Chengquan (1991, p.60) did not include this species in a subgenus. Age: late Turonian–early Senonian.

tuberculata He Chengquan, 1984b, p.169, pl.5, fig.15. Holotype: He Chengquan, 1984b, pl.5, fig.15. He Chengquan (1984b, p.169) included this species in *Pseudokomewuia* subgenus *Condocorpidia*. Age: Tertiary.

unicornis He Chengquan, 1980, p.5, pl.1, figs.13–14; text-fig.4. Holotype: He Chengquan, 1980, pl.1, fig.14. Age: Oligocene.

PSEUDOKOMEWUIA subgenus **CONDOPIDIA** He Chengquan, 1980, p.4. He Chengquan (1980 and 1984b) included the following species in this subgenus: *Pseudokomewuia radiata*, *Pseudokomewuia retirugosa*, *Pseudokomewuia shangsica*, *Pseudokomewuia tuberculata*, and *Pseudokomewuia unicornis*. Liu Zhili and Zheng Yuefang in Liu Zhili et al. (1992, p.81) included *Pseudokomewuia longangulata* in this subgenus. He Chengquan et al. (2009, p.534–537) included the following species in this subgenus: *Pseudokomewuia communis*, *Pseudokomewuia longangulata*, *Pseudokomewuia radiata*, *Pseudokomewuia retirugosa*, *Pseudokomewuia shangsica*, *Pseudokomewuia tuberculata* and *Pseudokomewuia unicornis*. Type: He Chengquan, 1980, pl.1, fig.14, as *Pseudokomewuia unicornis*.

PSEUDOKOMEWUIA subgenus **PSEUDOKOMEWUIA**. Autonym. All species not assigned to *Pseudokomewuia* subgenus *Condocorpidia* are included in the type subgenus. Liu Zhili and Zheng Yuefang in Liu Zhili et al. (1992, p.81) specifically included *Pseudokomewuia minuticornicula* in this subgenus. He Chengquan et al. (2009, p.537–540) included the following species in this subgenus: *Pseudokomewuia cerciata*, *Pseudokomewuia granulata*, *Pseudokomewuia laevigata*, *Pseudokomewuia minuticornicula* and *Pseudokomewuia sparsa*. Type: He Chengquan, 1980, pl.1, fig.1, as *Pseudokomewuia laevigata*.

"PSEUDOMUDERONGIA" Jain and Khowaja-Ateequzzaman, 1984, p.40. **Taxonomic senior synonym:** *Muderongia*, according to Helby (1987, p.297) and Stover and Williams (1987, p.181). Type: Burger, 1980b, fig.9B, as *Muderongia testudinaria*.

"asymmetrica" (Brideaux, 1977, p.40, pl.15, figs.9–10; pl.16, fig.1) Jain and Khowaja-Ateequzzaman, 1984, p.40. Emendation: Monteil, 1991b, p.472, as *Muderongia asymmetrica*. Holotype: Brideaux, 1977, pl.15, fig.9; pl.16, fig.1. **NOW** *Muderongia*. Originally (and now) *Muderongia*, subsequently *Pseudomuderongia*. Age: Aptian–early Albian.

"*testudinaria" (Burger, 1980b, p.274–275, figs.9B,10A–E) Jain and Khowaja-Ateequzzaman, 1984, p.40. Holotype: Burger, 1980b, fig.9B; Fensome et al., 1996, fig.1 — p.2401. **NOW** *Muderongia*. Originally (and now) *Muderongia*, subsequently *Pseudomuderongia*. Taxonomic junior synonyms: *Phoberocysta lowryi*, *Phoberocysta burgeri* and *Phoberocysta edgellii*, all according to Monteil (1991b, p.476). Age: ?Hauterivian.

PSEUDOPITHONELLA Versteegh, 1993, p.373,376. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1298, the latter noting that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). See also *Pseudopithonella* Trejo in Appendix A. Type: Versteegh, 1993, pl.9, figs.3–4, as *Pseudopithonella striatula*.

***striatula** Versteegh, 1993, p.376, pl.9, figs.1–6. Holotype: Versteegh, 1993, pl.9, figs.3–4. Age: late Pleistocene.

PSEUDORHOMBODINIUM Wrenn, 1996, p.212,214. Type: Wrenn, 1996, pl.3, fig.4, as *Pseudorhombodinium lisbonense*.

***lisbonense** Wrenn, 1996, p.214,216,218, pl.1, figs.1–4; pl.2, figs.1–5; pl.3, figs.1–4. Holotype: Wrenn, 1996, pl.3, fig.4. Age: middle Eocene.

"PSEUDOSPINIFERITES" Lund, 2002, p.87. **Taxonomic senior synonym:** *Spiniferites*, by implication in Schiøler (2005, p.30), who transferred the type, *Pseudospiniferites manumii*, to *Spiniferites*. Type: Lund, 2002, pl.1, figs.1–2, as *Pseudospiniferites manumii*.

"*manumii" Lund, 2002, p.87–88, pl.1, figs.1–7. Emendation: Schiøler, 2005, p.30, as *Spiniferites manumii*. Holotype: Lund, 2002, pl.1, figs.1–2. **NOW** *Spiniferites*. Originally *Pseudospiniferites*, subsequently (and now) *Spiniferites*. Age: early Oligocene.

PSEUDOSTEPHODINIUM Yu Jingxian et al., 1981, p.262. Type: Yu Jingxian et al., 1981, pl.1, fig.34, as *Pseudostephodinium sanshuiense*.

***sanshuiense** Yu Jingxian et al., 1981, p.262, pl.1, figs.33–34; text-fig.4. Holotype: Yu Jingxian et al., 1981, pl.1, fig.34. Age: Late Cretaceous.

"**PTEROCOCCUS**" Lohmann, 1904, p.47. **Name illegitimate** — **senior homonyms**: *Pterococcus* Pallas, 1773 and *Pterococcus* Hasskarl, 1842. Substitute name: *Coccopterum*. **Taxonomic senior synonym**: *Nematosphaeropsis*, by implication in Reid (1977, p.592) and Fensome et al. (1993b, p.93), who included the "type species" of *Pterococcus*, *Pterococcus labyrinthus*, in *Nematosphaeropsis*. Type: Ostenfeld, 1903, fig.127, as *Pterosperma labyrinthus*.

"**labyrinthus*" (Ostenfeld, 1903, p.578, fig.127) Lohmann, 1904, p.47. Holotype: Ostenfeld, 1903, fig.127. **Combination illegitimate**: generic name illegitimate. **NOW** *Nematosphaeropsis*. Originally *Pterosperma* (Appendix A), subsequently *Pterococcus* (combination illegitimate), thirdly *Coccopterum*, fourthly (and now) *Nematosphaeropsis*. Taxonomic junior synonym: *Nematosphaeropsis balcombiana*, according to Reid (1974, p.592) — however, Wrenn (1988, p.139) retained *Nematosphaeropsis balcombiana*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). N.I.A. Age: extant.

PTEROCYSTA Rochon in Rochon et al., 2003, p.97. Type: Rochon et al., 2003, pl.1, figs.1,4, as *Pterocysta cruciformis*.

**cruciformis* Rochon in Rochon et al., 2003, p.97–98,100,102, pl.1, figs.1–9; pl.2, figs.1–9; text-fig.2A–D. Holotype: Rochon et al., 2003, pl.1, figs.1,4. Age: late Pleistocene.

PTERODINIUM Eisenack, 1958a, p.395. Emendations: Yun Hyesu, 1981, p.12; Sarjeant, 1985a, p.70–72 — however, see Jan du Chêne et al. (1986a, p.273). Type: Eisenack, 1958a, pl.24, fig.6; text-fig.6, as *Pterodinium aliferum*.

agadirensis Below, 1981a, p.112–113, pl.3, figs.9a–b. Holotype: Below, 1981a, pl.3, figs.9a–b; Jan du Chêne et al., 1986a, pl.87, figs.13–14; Fensome et al., 1991, figs.1–3 — p.565. Age: Aptian (Gargasian).

"*alectrolophum*" (Sarjeant, 1966b, p.134–135, pl.15, figs.3–6; text-fig.34) Below, 1982d, p.352–353. Holotype: Sarjeant, 1966b, pl.15, figs.5–6; Jan du Chêne et al., 1986a, pl.54, figs.15–16. **NOW** *Impagidinium*. Originally *Leptodinium*, subsequently (and now) *Impagidinium*, thirdly *Pterodinium*. Age: middle Barremian.

**aliferum* Eisenack, 1958a, p.395–396, pl.24, fig.6; text-fig.6. Emendation: Sarjeant, 1985a, p.72–74 — however, see Jan du Chêne et al. (1986a, p.273). Holotype: Eisenack, 1958a, pl.24, fig.6; text-fig.6; Sarjeant, 1985a, pl.5, figs.1–2; text-fig.5; Jan du Chêne et al., 1986a, pl.87, figs.1–6. Age: late Aptian.

ayachense Guédé and Slimani in Guédé et al., 2014, p.298, figs.6A–P. Holotype: Guédé et al., 2014, figs.6A–D. Age: Maastrichtian–Selandian.

bab Below, 1981a, p.113, pl.7, figs.10a–b,11a–c; pl.14, figs.9,12a–c,13; text-figs.72a–d,73a–c. Holotype: Below, 1981a, pl.7, figs.11a–c; Jan du Chêne et al., 1986a, pl.87, fig.8; Fensome et al., 1991, figs.1–3 — p.581. Originally (and now) *Pterodinium*, subsequently *Leptodinium*. Jan du Chêne et al. (1986a, p.273) retained this species in *Pterodinium*. Below (1981a, p.113) named this species *Pterodinium bab*; "bab" is the Arabic for door. Head et al. (1989b, p.458), citing the then active I.C.B.N. Article 73.10, latinized the epithet "bab" to "babatum". However, I.C.N. Article 60.1 indicates that the spelling of a name/epithet such as "bab" must not be changed. N.I.A. Age: Hauterivian.

cingulatum (Wetzel, 1933b, p.28, pl.4, fig.10) Below, 1981a, p.114. Holotype: Wetzel, 1933b, pl.4, fig.10. Originally *Cymatiosphaera* (Appendix A), subsequently *Hystrichosphaera*, thirdly *Spiniferites*, fourthly *Spiniferites?*, fifthly (and now) *Pterodinium*. Taxonomic junior synonym: *Cymatiosphaera* (as *Spiniferites?*) *ptero*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *ptero*. Age: Senonian.

subsp. *cingulatum*. Autonym. Holotype: Wetzel, 1933b, pl.4, fig.10. Originally *Spiniferites cingulatus* subsp. *cingulatus*, subsequently *Spiniferites? cingulatus* subsp. *cingulatus*, thirdly (and now) *Pterodinium cingulatum* subsp. *cingulatum*.

subsp. *conterminatum* Marheinecke, 1992, p.39–40, pl.5, figs.10–12. Holotype: Marheinecke, 1992, pl.5, figs.10–12. Contrary to the opinion of Lentin and Williams (1993, p.551), Williams et al. (1998, p.517) considered this name to be validly published. Age: early Maastrichtian.

subsp. *danicum* Jan du Chêne, 1988, p.163–164, pl.19, figs.7–13; text-figs.6A–B. Holotype: Jan du Chêne, 1988, pl.19, figs.7–9. Age: Danian.

subsp. *exile* Marheinecke, 1992, p.40, pl.5, figs.7–9. Holotype: Marheinecke, 1992, pl.5, figs.7–9. Contrary to the opinion of Lentin and Williams (1993, p.551), Williams et al. (1998, p.517) considered this name to be validly published. Age: late early–early late Maastrichtian.

subsp. *granulatum* (Clarke and Verdier, 1967, p.45–46, pl.9, figs.5–6; text-fig.18) Lentin and Williams, 1981, p.238. Holotype: Clarke and Verdier, 1967, pl.9, fig.5; Jan du Chêne et al., 1986a, pl.88, figs.5–8. Originally *Hystrichosphaera cingulata* var. *granulata*, subsequently *Spiniferites cingulatus* subsp. *granulatus*, thirdly *Spiniferites? cingulatus* subsp. *granulatus*, fourthly (and now) *Pterodinium cingulatum* subsp. *granulatum*. Age: Cenomanian.

subsp. *intermedium* (Cookson and Eisenack, 1974, p.64, pl.23, figs.8–9,11) Lentin and Williams, 1981, p.238. Holotype: Cookson and Eisenack, 1974, pl.23, fig.8, lost according to Jan du Chêne et al. (1986a, p.274). Originally *Spiniferites cingulatus* var. *intermedius*, subsequently *Spiniferites cingulatus* subsp. *intermedius*, thirdly *Spiniferites? cingulatus* subsp. *intermedius*, fourthly (and now) *Pterodinium cingulatum* subsp. *intermedium*. Age: Senonian.

subsp. *ovale* (Cookson and Eisenack, 1974, p.64–65, pl.23, fig.12a–b) Lentin and Williams, 1981, p.238. Holotype: Cookson and Eisenack, 1974, pl.23, fig.12a–b, lost according to Jan du Chêne et al. (1986a, p.274). Originally *Spiniferites cingulatus* var. *ovalis*, subsequently *Spiniferites cingulatus* subsp. *ovalis*, thirdly *Spiniferites? cingulatus* subsp. *ovalis*, fourthly (and now) *Pterodinium cingulatum* subsp. *ovale*. Age: Paleocene.

subsp. *polygonale* (Clarke and Verdier, 1967, p.47, pl.8, figs.7–8; text-fig.20) Paul et al., 1994, p.722. Holotype: Clarke and Verdier, 1967, pl.8, fig.7; Jan du Chêne et al., 1986a, pl.89, figs.7–9. Originally *Hystrichosphaera cingulata* var. *polygonalis*, subsequently *Spiniferites cingulatus* subsp. *polygonalis*, thirdly *Spiniferites? cingulatus* subsp. *polygonalis*, fourthly (and now) *Pterodinium cingulatum* subsp. *polygonale*. Taxonomic senior synonyms (at specific rank): *Hystrichosphaera* (now *Spiniferites*) *crassimurata*, according to Clarke et al. (1968, p.181) and *Cymatiosphaera* (now *Pterodinium?*) *pterota*, according to Pavlishina (1990, p.95) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* subsp. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Cenomanian.

subsp. *reticulatum* (Davey and Williams, 1966a, p.39, pl.1, fig.10; pl.2, fig.4) Lentin and Williams, 1981, p.238. Holotype: Davey and Williams, 1966a, pl.1, fig.10; pl.2, fig.4. Originally *Hystrichosphaera cingulata* var. *reticulata*, subsequently *Spiniferites cingulatus* subsp. *reticulatus*, thirdly *Spiniferites? cingulatus* subsp. *reticulatus*, fourthly (and now) *Pterodinium cingulatum* subsp. *reticulatum*. Taxonomic junior synonym: *Hystrichosphaera cingulata* var. *perforata*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"*circumsutum*" Morgenroth, 1966b, p.5, pl.1, figs.3–4. Holotype: Morgenroth, 1966b, pl.1, fig.3. **NOW** *Pentadinium?*. Originally *Pterodinium*, subsequently (and now) *Pentadinium?*. Age: early Oligocene.

?*cornutum* Cookson and Eisenack, 1962b, p.490, pl.3, figs.1–6. Holotype: Cookson and Eisenack, 1962b, pl.3, figs.1–3; Jan du Chêne et al., 1986a, pl.90, fig.1. Originally *Pterodinium*, subsequently (and now) *Pterodinium?*, thirdly *Gonyaulacysta*. Jan du Chêne et al. (1986a, p.274) questionably retained this species in *Pterodinium*. Questionable assignment: Stover and Evitt (1978, p.183). Age: Aptian–?Albian.

"*crassimuratum*" (Davey and Williams, 1966a, p.39, pl.1, fig.11) Thurow et al., 1988, p.624. Holotype: Davey and Williams, 1966a, pl.1, fig.11. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly *Pterodinium*. **Taxonomic senior synonym:** *Cymatiosphaera* (as *Spiniferites?*, now *Pterodinium*) *pterota*, according to Kjellström

(1973, p.44) and Pavlishina (1990, p.95). Taxonomic junior synonym (at specific rank): *Hystrichosphaera cingulata* var. *polygonalis*, according to Clarke et al. (1968, p.181) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* var. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Cenomanian.

cretaceum Slimani et al., 2008, p.334, figs.4A–F. Holotype: Slimani et al., 2008, figs.4A–D. Age: late Maastrichtian.

eisenackii Jain, 1977b, p.178, pl.6, fig.73. Holotype: Jain, 1977b, pl.6, fig.73; Jan du Chêne et al., 1986a, pl.90, figs.6–7. Age: early Albian.

"**magnoserratum**" Cookson and Eisenack, 1962b, p.490, pl.3, figs.7–8. Holotype: Cookson and Eisenack, 1962b, pl.3, figs.7–8. **NOW** *Spiniferites*?. Originally *Pterodinium*, subsequently (and now) *Spiniferites*?, thirdly *Gonyaulacysta*. Age: Aptian–?Albian.

?**makropterum** (Cookson and Eisenack, 1982, p.47–48, pl.7, figs.1–3) Lentin and Williams, 1985, p.300. Holotype: Cookson and Eisenack, 1982, pl.7, fig.2. Originally *Spiniferites*, subsequently (and now) *Pterodinium*?. Questionable assignment: Lentin and Williams (1985, p.300). Age: Middle Cretaceous.

mamounia Below, 1981a, p.116–117, pl.7, figs.9a–d; pl.15, fig.14; text-figs.77a–b. Holotype: Below, 1981a, pl.7, figs.9a–d; Jan du Chêne et al., 1986a, pl.87, fig.7; Fensome et al., 1991, figs.1–4 — p.667. N.I.A. Age: Aptian (Gargasian).

"?**perforatum**" (Clarke and Verdier, 1967, p.36–37, pl.6, figs.1–3; text-fig.15) Davey and Verdier, 1971, p.30–31. Emendations: Davey and Verdier, 1971, p.30, as *Pterodinium perforatum*; Below, 1981a, p.23–24; Masure, 1988a, p.363–364, both as *Maghrebina perforata*. Holotype: Clarke and Verdier, 1967, pl.6, figs.1–2; Masure, 1988a, pl.1, figs.1–9; text-figs.1a–b; Fensome et al., 1995, figs.1–2 — p.1653; Fauconnier and Masure, 2004, pl.10, figs.5–6. **NOW** *Atopodinium*. Originally *Dinopterygium*, subsequently *Pterodinium*, thirdly *Pterodinium*?, fourthly *Maghrebina*, fifthly (and now) *Atopodinium*. Questionable assignment: Stover and Evitt (1978, p.183). Age: early Cenomanian.

premon Duxbury, 1980, p.131, pl.3, figs.1–2. Holotype: Duxbury, 1980, pl.3, figs.1–2; Jan du Chêne et al., 1986a, pl.87, figs.9–10. N.I.A. Age: middle Barremian.

?**pterotum** (Cookson and Eisenack, 1958, p.50, pl.11, fig.7) Pavlishina, 1990, p.95. Emendation: Pavlishina, 1990, p.95, as *Pterodinium? pterotum*. Holotype: Cookson and Eisenack, 1958, pl.11, fig.7. Originally *Cymatiosphaera* (Appendix A), subsequently *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Spiniferites*?, fifthly (and now) *Pterodinium*?. Questionable assignment: Pavlishina (1990, p.95). Taxonomic senior synonym: *Cymatiosphaera* (as and now *Pterodinium*) *cingulata*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *pteroata*. Taxonomic junior synonyms: *Hystrichosphaera* (as *Spiniferites*) *crassimurata*, according to Kjellström (1973, p.44) and Pavlishina (1990, p.95); (at specific rank) *Hystrichosphaera cingulata* var. *polygonalis*, according to Pavlishina (1990, p.95) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* subsp. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Albian–Maastrichtian.

?**reticulatum** Singh, 1971, p.358–359, pl.60, figs.6–7. Holotype: Singh, 1971, pl.60, figs.6–7; Jan du Chêne et al., 1986a, pl.90, figs.4–5. Originally *Pterodinium*, subsequently (and now) *Pterodinium*?. Questionable assignment: Stover and Evitt (1978, p.183). Age: middle Albian.

"**striatum**" (Clarke and Verdier, 1967, p.31, pl.4, figs.11–13; pl.5, fig.15; text-fig.12) Yun Hyesu, 1981, p.12. Holotype: Clarke and Verdier, 1967, pl.4, figs.11–13; Jan du Chêne et al., 1986a, pl.88, figs.9–11. **NOW** *Dimidium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Impagidinium*, fourthly *Pterodinium*, fifthly (and now) *Dimidium*. Age: Santonian.

tuberculatum Khowaja-Ateequzaman and Jain, 1992, p.172,174, pl.8, fig.5. Holotype: Khowaja-Ateequzaman and Jain, 1992, pl.8, fig.5. Age: Hauterivian–Barremian.

"**verrucosum**" Brideaux and McIntyre, 1975, p.30, pl.9, figs.1–8. Holotype: Brideaux and McIntyre, 1975, pl.9, figs.1–4; Jan du Chêne et al., 1986a, pl.64, figs.16–19. **NOW** *Impagidinium*. Originally *Pterodinium*, subsequently (and now) *Impagidinium*. Age: middle Albian.

PULCHRASPHERA Schiøler et al., 1997, p.89. Type: Schiøler et al., 1997, pl.1, figs.1–3, as *Pulchraspera minuscula*.

***minuscula** Schiøler et al., 1997, p.89, pl.1, figs.1–6; pl.2, figs.1–8. Holotype: Schiøler et al., 1997, pl.1, figs.1–3. Taxonomic junior synonym: *Nexosispinum? complicatum*, according to Slimani (2001b, p.5). Age: late Maastrichtian.

"**PYLOMACYSTION**" Warren in Brideaux and McIntyre, 1973, p.400. **Name not validly published**: no description. **Taxonomic senior synonym**: *Lunatadinium*, according to Brideaux and McIntyre (1973, p.400).

"**californicum**" Warren in Brideaux and McIntyre, 1973, p.400. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Lunatadinium dissolutum*, according to Brideaux and McIntyre (1973, p.400).

"**PYRAMIDIUM**" Clarke and Verdier, 1967, p.39–40. **Name illegitimate** — **nomenclatural senior synonym**: *Xiphophoridium*, which has the same type. Taxonomic senior synonym: *Oodnadattia*, according to Below (1981a, p.64) — however, Lentin and Williams (1981, p.238,294) retained *Xiphophoridium*. Type: Cookson and Eisenack, 1962b, pl.2, fig.1, as *Hystrichodinium alatum*.

***alatum** (Cookson and Eisenack, 1962b, p.487–488, pl.2, figs.1–4) Clarke and Verdier, 1967, p.40. Emendation: Sarjeant, 1966b, p.147, as *Xiphophoridium alatum*. Holotype: Cookson and Eisenack, 1962b, pl.2, fig.1; Fensome et al., 1993a, fig.1 — p.893; Fauconnier and Masure, 2004, pl.80, fig.6. **NOW** *Dinopterygium*. Originally *Hystrichodinium*, subsequently *Xiphophoridium*, thirdly *Pyramidium* (generic name illegitimate), fourthly *Oodnadattia*, fifthly (and now) *Dinopterygium*. Age: Albian–Cenomanian.

PYXIDIELLA Cookson and Eisenack, 1958, p.51. Type: Cookson and Eisenack, 1958, pl.6, fig.10, as *Pyxidiella pandora*.

"**limata**" Beju, 1978, p.4. **Name not validly published**: no description or illustration.

***pandora** Cookson and Eisenack, 1958, p.52, pl.6, figs.10–11. Holotype: Cookson and Eisenack, 1958, pl.6, fig.10. Age: Late Jurassic.

?**scrobiculata** (Deflandre and Cookson, 1955, p.291, pl.3, fig.3; text-fig.57) Cookson and Eisenack, 1958, p.52. Holotype: Deflandre and Cookson, 1955, pl.3, fig.3. Originally *Leiosphaera* (Appendix A), subsequently *Pyxidiella*, thirdly *Leiosphaeridia* (Appendix A), fourthly *Palaeostomocystis* (Appendix A), fifthly (and now) *Pyxidiella?*, sixthly *Batiacasphaera*. De Coninck (1986b, p.18) questionably retained this species in *Pyxidiella*. Questionable assignment: Stover and Evitt (1978, p.120). Age: Santonian–Eocene.

?**simplex** Harland, 1979b, p.537–538, pl.3, figs.12–15. Holotype: Harland, 1979b, pl.3, fig.12. Originally (and now) *Pyxidiella?*, subsequently *Tectatodinium*. Lentin and Williams (1985, p.301) questionably retained this species in *Pyxidiella*. Questionable assignment: Harland (1979b, p.537). Age: late Miocene.

triangularis Yu Jingxian, 1982, p.257, pl.6, figs.14–16. Holotype: Yu Jingxian, 1982, pl.6, fig.15. Age: Late Jurassic–Early Cretaceous.

tumida Stover and Helby, 1987d, p.271, figs.9A–U. Holotype: Stover and Helby, 1987d, figs.9A–E; Fensome et al., 1996, figs.1–5 — p.2413. Age: Barremian–early Aptian.

PYXIDINOPSIS Habib, 1976, p.382. Type: Habib, 1976, pl.1, figs.1a–b, as *Pyxidinospis challengerensis*.

ardonensis Jan du Chêne, 1988, p.164, pl.14, figs.1–9. Holotype: Jan du Chêne, 1988, pl.14, figs.1–3. Age: Danian.

asperata (Jiabo, p.110, pl.41, figs.18–20) He Chengquan et al., 2009, p.240. Holotype: Jiabo, pl.41, fig.18. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: late Eocene–early Oligocene.

bakonyensis (Góczán, 1962, p.193–194,200, pl.3, figs.4–10) Stover and Evitt, 1978, p.184. Holotype: Góczán, 1962, pl.3, figs.4–5. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Maastrichtian.

brabantiana Louwye, 2001, p.129, fig.7, nos.1–11. Holotype: Louwye, 2001, fig.7, nos.1–3. Age: early-middle Miocene.

braboi De Schepper et al., 2004, p.628,631, fig.6, nos.1–12. Holotype: De Schepper et al., 2004, fig.6, nos.1–6. Age: late early–early late Pliocene.

***challengerensis** Habib, 1976, p.382, pl.1, figs.1a–b; pl.3, figs.1–2. Holotype: Habib, 1976, pl.1, figs.1a–b; Fensome et al., 1993a, figs.1–2 — p.1043. Age: Berriasian–Hauterivian.

circulareticulata (Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.90, pl.20, figs.7–9) He Chengquan et al., 2009, p.241. Holotype: Liu Zhili et al. 1992, pl.20, fig.8. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Oligocene.

composita He Chengquan, 1991, p.118, pl.7, figs.1–5. Holotype: He Chengquan, 1991, pl.7, fig.1. Age: middle Eocene.

"consolida" Pan Zhaoren in Xu Jinli et al., 1997, p.72, pl.37, fig.12; pl.38, figs.11,16. Holotype: Xu Jinli et al., 1997, pl.37, fig.12. **Name not validly published:** no English or Latin description. **NOW** *Batiacasphaera*. Originally *Pyxidinospis* (name not validly published), subsequently (and now) *Batiacasphaera*. Age: Oligocene.

crassimurata Wilson, 1988, p.27, pl.17, figs.1a–b,2,3a–c. Holotype: Wilson, 1988, pl.17, figs.3a–c; Fensome et al., 1996, figs.4–6 — p.2095. Age: middle Eocene.

debiliconspicuta (Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.90, pl.20, figs.4–6) He Chengquan et al., 2009, p. 241. Holotype: Liu Zhili et al. 1992, pl.20, fig.4. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Oligocene.

delicata Wilson, 1988, p.27–28, pl.17, figs.6,7a–b. Holotype: Wilson, 1988, pl.17, figs.7a–b; Fensome et al., 1996, figs.2–3 — p.2103. Age: early to middle Eocene.

densepunctata de Coninck, 1985, p.68, pl.2, figs.20–21. Holotype: de Coninck, 1985, pl.2, fig.20. Age: middle Eocene.

densureticulata (Zheng Yuefang and Liu Zhili in Liu Zhili et al. 1992, p.90–91, pl.21, figs.6) He Chengquan et al., 2009, p.242. Holotype: Liu Zhili et al. 1992, pl.21, figs.6. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"diallengerensis" Kedves, 1992, p.54. **Name not validly published:** no description or illustration. Presumably a misspelling of *Pyxidinospis challengerensis*.

elliptica Biffi and Manum, 1988, p.210, pl.14, figs.6–8. Holotype: Biffi and Manum, 1988, pl.14, fig.7. Age: Oligocene–early Miocene.

- epakros* Willumsen, 2011, p.226,228, figs.12G–J. Holotype: Willumsen, 2011, fig.12H. N.I.A. Age: late Maastrichtian–earliest Paleocene.
- everriculum* Willumsen, 2011, p.228,230, figs.13C–F. Holotype: Willumsen, 2011, fig.13F. N.I.A. Age: late Maastrichtian–earliest Paleocene.
- fairhavenensis* de Verteuil and Norris, 1996a, p.148, pl.11, figs.9–20; pl.12, figs.1–8. Holotype: de Verteuil and Norris, 1996a, pl.11, figs.9–11. Age: early Miocene.
- "*granospinosa*" Pan Zhaoren in Xu Jinli et al., 1997, p.71, pl.38, figs.21–24. Holotype: Xu Jinli et al., 1997, pl.38, fig.21. **Name not validly published:** no English or Latin description. **Taxonomic senior synonym:** *Pyxidinospis pylomica*, according to He Chengquan et al. (2009, p.245). Age: Oligocene.
- granulata* (Ioannides et al., 1977, p.462, pl.4, figs.18–19) Lentin and Williams, 1985, p.301. Holotype: Ioannides et al., 1977, pl.4, fig.18. Originally *Tapeinosphaeridium*, subsequently *Tectatodinium?*, thirdly (and now) *Pyxidinospis*. Age: middle Kimmeridgian.
- jiaboi* (Fensome et al., 1990, p.195) Fensome and Williams, 2004, p.563. Holotype: Jiabo, 1978, pl.41, fig.17. Originally *Dictyotidium reticulatum* Jiabo (name illegitimate; Appendix A), subsequently *Dictyotidium jiaboi* (Appendix A), thirdly *Pyxidinospis reticulata* (Jiabo, 1978) (name illegitimate), fourthly (and now) *Pyxidinospis jiaboi*. *Dictyotidium jiaboi* is a substitute name for *Dictyotidium reticulatum* Jiabo, 1978. Age: late Eocene–early Oligocene.
- laminata* (Davies, 1983, p.21, pl.6, figs.1–5,21; text-fig.16) Lentin and Williams, 1985, p.302. Holotype: Davies, 1983, pl.6, fig.21; text-fig.16. Originally *Tectatodinium*, subsequently (and now) *Pyxidinospis*. Age: late Oxfordian–late Tithonian.
- macroreticulata* (Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.91, pl.21, figs.4–5) He Chengquan et al. 2009, p.243. Holotype: Liu Zhili et al. 1992, pl.21, fig.4. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Oligocene.
- meadensis* Willumsen, 2011, p.230,233, figs.12A–D. Holotype: Willumsen, 2011, figs.12A–B. Age: late Maastrichtian–early Paleocene.
- microgranulata* Pan Zhaoren in Xu Jinli et al., 1997, p.68–69, pl.38, figs.17–19 ex He Chengquan et al., 2009, p.243, 661. Holotype: Xu Jinli et al., 1997, pl.38, fig.17. Originally *Granoreticella* (name not validly published), subsequently (and now) *Pyxidinospis*. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.661) validated the name by publishing an English diagnosis. Age: Oligocene.
- microreticulata* (Jiabo, 1978, p.111, pl.41, figs.6–9) Pan Zhaoren in Xu Jinli et al., 1997, p.71. Holotype: Jiabo, 1978, pl.4, fig.8. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Oligocene.
- minor* He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.63, pl.7, figs.17–19. Holotype: He Chengquan et al., 1989, pl.7, fig.18. Taxonomic junior synonym: *Pyxidinospis rugireticulatum*, according to He Chengquan et al. (2009, p. 244). Age: Early Tertiary.
- naturalis* Pan Zhaoren in Xu Jinli et al., 1997, p.72, pl.39, figs.8–9 ex He Chengquan et al., 2009, p.661. Holotype: Xu Jinli et al., 1997, pl.39, fig.9. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.661) validated the name by publishing an English diagnosis. Age: Oligocene.
- ?*nuda* (Nagy, 1969, p.291, pl.1, fig.1) Williams et al., 1998, p.520–521. Holotype: Nagy, 1969, pl.1, fig.1. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta? nuda*, fifthly *Tectatodinium? nudum*,

sixthly *Tectatodinium pannonium* (name illegitimate), seventhly *Pyxidinospis? pannonia* (name illegitimate), eighthly (and now) *Pyxidinospis? nuda*. Questionable assignment: Head (1994a, p.308), for *Pyxidinospis? pannonia*. Nomenclatural junior synonym: *Palaeoperidinium* (subsequently *Phthanoperidinium*, *Tectatodinium?* and *Pyxidinospis?*) *pannonium*, which has the same type. Lentin and Williams (1973, p.106) proposed the name *Palaeoperidinium pannonium* for *Palaeoperidinium nudum* Nagy in the belief that the latter was an illegitimate junior homonym of *Palaeoperidinium nudum* Downie. However, Williams et al. (1998, p.521) re-interpreted *Palaeoperidinium nudum* Downie to be an invalid name; thus, *Palaeoperidinium nudum* Nagy must be considered as a validly published and legitimate name. In light of this, Williams et al. (1998, p.520–521) proposed the combination *Pyxidinospis? nuda*. Age: late Miocene.

"*ovis*" Zevenboom and Santarelli in Zevenboom, 1995, p.153–154, pl.9, figs.1–3. Holotype: Zevenboom, 1995, pl.9, figs.1–3. **Name not validly published:** considered a manuscript name. Age: earliest early Miocene–late Miocene.

pachyderma (Jiabo, 1978, p.111, pl.41, figs.10–12; pl.46, figs.2a–b) Pan Zhaoren in Xu Jinli et al., 1997, p.71. Holotype: Jiabo, 1978, pl.41, fig.12. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: late Oligocene.

"*?pannonia*" (Lentin and Williams, 1973, p.106) Head, 1994a, p.308. Holotype: Nagy, 1969, pl.1, fig.1. **Name illegitimate — nomenclatural senior synonym:** *Palaeoperidinium* (now *Pyxidinospis?*) *nudum*, which has the same holotype. **NOW** *Pyxidinospis? nuda*. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta? nuda*, fifthly *Tectatodinium? nudum*, sixthly *Tectatodinium pannonium* (name illegitimate), seventhly *Pyxidinospis? pannonia* (name illegitimate), eighthly (and now) *Pyxidinospis? nuda*. Questionable assignment: Head (1994a, p.308). See also the discussion under *Pyxidinospis? nuda*. Age: late Miocene.

pastilliformis Head in Matsuoka and Head, 1992, p.168–170, pl.2, figs.1–15, 18–19; pl.3, figs.1–5, 7–8, 10–12. Holotype: Head et al., 1989a, pl.1, figs.9–10 (as *Batiacasphaera/Cerebrocysta?* Group A); Matsuoka and Head, 1992, pl.2, figs.7–10, 13. Age: late Miocene.

"*protospinosus*" Zevenboom and Santarelli in Zevenboom, 1995, p.154, pl.9, figs.4–8. Holotype: Zevenboom, 1995, pl.9, figs.7–8. **Name not validly published:** considered a manuscript name. The epithet is correctly rendered as "*protospinosus*", not "*protospinosis*". Age: late early Miocene–earliest middle Miocene.

pseudodictyota He Chengquan, 1991, p.118–119, pl.7, figs.6–8. Holotype: He Chengquan, 1991, pl.7, fig.7. Age: middle Eocene.

psilata (Wall and Dale in Wall et al., 1973, p.22–23, pl.1, figs.9–15; pl.3, figs.1–6) Head, 1994a, p.308. Holotype: Wall et al., 1973, pl.1, fig.9; Head, 1994b, pl.5, figs.8–10. Originally *Tectatodinium*, subsequently (and now) *Pyxidinospis*. Age: Holocene.

pylomica (Jiabo, 1978, p.103, pl.39, figs.11–14) He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.63–64. Holotype: Jiabo, 1978, pl.39, fig.14. Originally *Granodiscus* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*reticulata*" (Jiabo, 1978, p.111, pl.41, figs.13–17) Pan Zhaoren in Xu Jinli et al., 1997, p.72. Holotype: Jiabo, 1978, pl.41, fig.17. **Name illegitimate: senior homonym:** *Pyxidinospis reticulata* McMinn and Sun Xuekun, 1994. **NOW** *Pyxidinospis jiaboi*. Originally *Dictyotidium reticulatum* Jiabo (name illegitimate; Appendix A), subsequently *Dictyotidium jiaboi* (Appendix A), thirdly *Pyxidinospis reticulata* (name illegitimate), fourthly (and now) *Pyxidinospis jiaboi*. Age: late Eocene–early Oligocene.

reticulata McMinn and Sun Xuekun, 1994, p.48,50, pl.3, figs.1–4. Emendation: Marret and de Vernal, 1997, p.387. Holotype: McMinn and Sun Xuekun, 1994, pl.3, figs.3–4. Junior homonym: *Pyxidinospis reticulata* (Jiabo 1978) Pan Zhaoren in Xu Jinli et al. Age: Holocene.

?*retiola* Dodekova, 1994, p.42–43, pl.12, figs.1–2,4,7. Holotype: Dodekova, 1994, pl.12, fig.1. Questionable assignment: Dodekova (1994, p.42). Age: early to middle Tithonian.

spinoreticulatum (Jiabo, 1978, p.111–112, pl.42, figs.5–6) Pan Zhaoren in Xu Jinli et al., 1997, p.72. Holotype: Jiabo, 1978, pl.42, fig.5. Originally *Dictyotidium* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: late Eocene–early Oligocene.

"*spinosus*" Zevenboom and Santarelli in Zevenboom, 1995, p.155, pl.9, figs.9–11. Holotype: Zevenboom, 1995, pl.9, figs.9–11. **Name not validly published:** considered a manuscript name. The epithet is correctly rendered as "*spinosus*", not "*spinosis*". Age: middle Miocene–earliest late Miocene.

suibinensis (Sun Xuekun and He Chengquan, 1992, p.197,204, pl.2, figs.4–5) He Chengquan et al., 2009, p.246. Holotype: Sun Xuekun and He Chengquan, 1992, pl.2, figs.4–5. Originally *Chytroeisphaeridia*, subsequently (and now) *Pyxidinospis*. Age: Late Jurassic.

tuberculata Versteegh and Zevenboom in Versteegh, 1995, p.92–93, pl.5, figs.1–6. Holotype: Versteegh, 1995, pl.5, figs.1–3; Versteegh and Zevenboom, 1995, pl.5, figs.1–3. Versteegh and Zevenboom (1995, p.225) also proposed this name. Age: Aquitanian–Piacenzian.

vesiculata Head and Norris, 2003, p.8,11, fig.8, nos.1–20. Holotype: Head and Norris, 2003, fig.8, nos.6–9. Age: late Miocene–early early Pliocene.

vesiculus (Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.96, pl.22, figs.5–9) He Chengquan et al., 2009, p.246. Holotype: Liu Zhili et al. 1992, pl.22, fig.7. Originally *Granodiscus* (Appendix A), subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*waipawaensis*" Wilson, 1988, p.28, pl.17, figs.4,5a–b. Holotype: Wilson, 1988, pl.17, fig.5a–b; Fensome et al., 1996, figs.2–3 — p.2441. **NOW** *Cerebrocysta*. Originally *Pyxidinospis*, subsequently (and now) *Cerebrocysta*. Age: middle to late Eocene.

QUANTOUENDINIUM Mao Shaozhi et al., 1999, p.155–156. Type: He Chengquan et al., 1992, pl.1, fig.1, as *Nyktericysta dictyophora*.

dictyophorum (He Chengquan et al., 1992, p.184,190–191, pl.1, figs.1–9) Mao Shaozhi et al., 1999, p.156. Emendation: Mao Shaozhi et al., 1999, p.156, as *Quantouendinium dictyophorum*. Holotype: He Chengquan et al., 1992, pl.1, fig.1; Gao Ruiqi et al., 1992b, pl.1, fig.1; Gao Ruiqi et al., 1992c, pl.1, fig.8; Mao Shaozhi et al., 1999, pl.5, fig.2. Taxonomic junior synonyms: *Nyktericysta dictyophora* subsp. *circularis* and *Nyktericysta fusiformis*, both according to Mao Shaozhi et al. (1999, p.156); however, He Chengquan et al. (2009, p.304) retained the two taxa as *Quantouendinium dictyophorum* subsp. *circularis* and *Quantouendinium fusiforme* respectively. Age: Albian.

subsp. *circularis* (He Chengquan et al., 1992, p.185,191, pl.1, figs.7–9) He Chengquan et al., 2009, p. 304. Holotype: He Chengquan et al., 1992, pl.1, fig.7; Gao Ruiqi et al., 1992b, pl.2, fig.4. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *dictyophora*, according to Mao Shaozhi et al. (1999, p.156) — however, He Chengquan et al. (2009, p.304) retained this taxon as *Quantouendinium dictyophorum* subsp. *circularis*. Originally *Nyktericysta dictyophora* subsp. *circularis*, subsequently (and now) *Quantouendinium dictyophorum* subsp. *circularis*. Age: Albian.

subsp. *dictyophorum*. Autonym. Holotype: He Chengquan et al., 1992, pl.1, fig.1; Gao Ruiqi et al., 1992b, pl.1, fig.1; Gao Ruiqi et al., 1992c, pl.1, fig.8. Originally *Nyktericysta dictyophora* subsp. *dictyophora*, subsequently (and now) *Quantouendinium dictyophorum* subsp. *dictyophorum*.

fusiforme (He Chengquan et al., 1992, p.185,191–192, pl.1, fig.16; pl.2, figs.1–3) He Chengquan et al., 2009, p.304. Holotype: He Chengquan et al., 1992, pl.2, fig.2; Gao Ruiqi et al., 1992b, pl.4, fig.6. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *dictyophora*, according to Mao Shaozhi et al. (1999, p.156); however, He

Chengquan et al. (2009, p.304) retained this species as *Quantouendinium fusiforme*. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Age: Albanian.

microreticulatum (He Chengquan et al., 1992, p.185–186,192, pl.1, figs.10–15) Mao Shaozhi et al., 1999, p.157. Emendation: Mao Shaozhi et al., 1999, p.157, as *Quantouendinium microreticulatum*. Holotype: He Chengquan et al., 1992, pl.1, fig.10; Gao Ruiqi et al., 1992b, pl.3, fig.1. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Taxonomic junior synonyms: *Nyktericysta microreticulata* subsp. *circularis* and *Nyktericysta symmetrica*, both according to Mao Shaozhi et al. (1999, p.156); however, He Chengquan et al. (2009, p.305–306) retained the two taxa as *Quantouendinium microreticulata* subsp. *circularis* and *Quantouendinium symmetricum* respectively. Age: Albanian.

subsp. **circularis** (He Chengquan et al., 1992, p.186,193, pl.1, figs.13–15) He Chengquan et al. 2009, p.305. Holotype: He Chengquan et al., 1992, pl.1, fig.13; Gao Ruiqi et al., 1992b, pl.3, fig.7. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *microreticulata*, according to Mao Shaozhi et al. (1999, p.157); however, He Chengquan et al. (2009, p.305) retained this taxon as *Quantouendinium microreticulatum* subsp. *circularis*. Originally *Nyktericysta microreticulata* subsp. *circularis*, subsequently (and now) *Quantouendinium microreticulatum* subsp. *circularis*. Age: Albanian.

subsp. **microreticulata**. Autonym. Holotype: He Chengquan et al., 1992, pl.1, fig.10; Gao Ruiqi et al., 1992b, pl.3, fig.1. Originally *Nyktericysta microreticulata* subsp. *microreticulata*, subsequently (and now) *Quantouendinium microreticulatum* subsp. *microreticulatum*.

"spinosum" (Gao Ruiqi et al., 1992a, p.18,24, pl.1, figs.17–18) Mao Shaozhi et al., 1999, p.157. Emendation: Mao Shaozhi et al., 1999, p.157, as *Quantouendinium spinosum*. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.17; Gao Ruiqi et al., 1992b, pl.8, fig.1; Mao Shaozhi et al., 1999, pl.4, fig.2. **NOW** *Nyktericysta*. Originally *Balmula*, subsequently *Quantouendinium*, thirdly (and now) *Nyktericysta*. Age: Campanian.

symmetricum (He Chengquan et al., 1992, p.186–187,193, pl.2, figs.4–6) He Chengquan et al., 2009, p.306. Holotype: He Chengquan et al., 1992, pl.2, fig.4; Gao Ruiqi et al., 1992b, pl.2, fig.5. Taxonomic senior synonym: *Nyktericysta* (now *Quantouendinium*) *microreticulata*, according to Mao Shaozhi et al. (1999, p.157); however, He Chengquan et al. (2009, p.306) retained this species as *Quantouendinium symmetricum*. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Age: Albanian.

trigonum (Lang Yan et al., 1999, p.375,387–388, pl.3, figs.1–7) He Chengquan et al., 2009, p.306. Holotype: Lang Yan et al., 1999, pl.3, fig.3. Originally *Nyktericysta*, subsequently (and now) *Quantouendinium*. Age: Early Cretaceous.

QUINQUECUSPIS Harland, 1977b, p.106. Emendation: Harland, 1982, p.396–397, as *Protoperidinium* subgenus *Protoperidinium* section *Quinquecuspis* (name not validly published). Originally (and now) *Quinquecuspis*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Quinquecuspis* (name not validly published). Taxonomic junior synonym: *Lejeunecysta*, by implication in Matsuoka (1987, p.57), who incorrectly considered *Lejeunecysta* to be the senior name — however, this synonymy has not been generally followed. Harland (1982, p.396–397) considered *Quinquecuspis* Harland, 1977b to be not validly published, since it lacked a Latin diagnosis. As noted by Fensome et al. (1991, p.434), this was not necessary since the cysts are considered fossil and a Latin diagnosis is not required. Head (1993, p.31) contended that *Quinquecuspis* was not validly published in Harland (1977b) because as its type he designated a then unpublished species name, *Trinovantedinium concretum* Reid, 1977. Head believed that the paper by Reid (1977) was not published until 1978. However, although the journal in which Reid's paper appeared did indeed not come out until 1978, preprints of Reid's paper did appear in 1977 (P.C. Reid, personal communication, 1997). Accordingly *Quinquecuspis* was validly published in Harland (1977b). Type: Reid, 1977, pl.1, figs.9–11, as *Trinovantedinium concretum*.

chinensis He Chengquan and Sun Xuekun, 1991, p.292–293, pl.1, figs.3–4 ex He Chengquan et al., 2009, p.517–518. Holotype: He Chengquan and Sun Xuekun, 1991, p.292–293, pl.1, fig.3, designated by He Chengquan et al. (2009, p.518). This name was not validly published in He Chengquan and Sun Xuekun (1991) as no holotype was

designated. Motile equivalent: *Protoperidinium latissimum* (Kofoid, 1907a) Balech, 1974, according to He Chengquan and Sun Xuekun (1991, p.292). Age: Quaternary.

***concreta** (Reid, 1977, p.438–439, pl.1, figs.9–11) Harland, 1977b, p.107. Holotype: Reid, 1977, pl.1, figs.9–11; Fensome et al., 1993a, figs.1–3 — p.1069. Originally *Trinovantedinium*, subsequently (and now) *Quinquecuspis*, thirdly *Lejeunecysta*. This species was retained in *Quinquecuspis* by Head (1996b, p.1231). Motile equivalent: *Protoperidinium leonis* (Pavillard, 1916) Balech, 1974, according to Harland (1981, p.68) and Lewis et al. (1984, p.30). Head (1993, p.31) also proposed this combination. Age: Holocene.

RAETIAEDINIUM Kirsch, 1991, p.125. Type: Kirsch, 1991, pl.28, figs.2–4, as *Raetiaedinium evittigratia*.

belgium Slimani, 1994, p.84–85, pl.12, figs.5–9. Holotype: Slimani, 1994, pl.12, figs.5–7. Age: late Campanian.

***evittigratia** Kirsch, 1991, p.126, pl.28, figs.2–4, 7–8; text-figs.58a–b, 59. Holotype: Kirsch, 1991, pl.28, figs.2–4. The epithet, meaning "with thanks to Evitt", should be cited as a noun in apposition. N.I.A. Age: middle Campanian.

fibrostriatum Slimani, 1994, p.85–86, pl.13, figs.7–11. Holotype: Slimani, 1994, pl.13, figs.7–10. Age: late Maastrichtian.

laevigatum Slimani, 1994, p.86–87, pl.12, figs.1–3. Holotype: Slimani, 1994, pl.12, figs.1–2. Age: early Campanian–earliest Danian.

punctulatum Slimani, 1994, p.87–88, pl.13, figs.12–15. Holotype: Slimani, 1994, pl.13, figs.14–15. Age: late Campanian–earliest Danian.

truncigerum (Deflandre, 1937b, p.71–72, pl.13 [al. pl.10], figs.6–7) Kirsch, 1991, p.126. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium?*, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium?*, seventhly *Florentinia*, eighthly *Pervosphaeridium?*, ninthly (and now) *Raetiaedinium*. Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes*, by implication in Yun Hyesu (1981, p.27), who considered *Hystrichosphaeridium* (as *Pervosphaeridium*, now *Raetiaedinium*) *truncigerum* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Hystrichosphaeridium* (as *Pervosphaeridium*, now *Raetiaedinium*) *truncigerum*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

RAMIDINIUM Guerstein et al., 1998, p.28. Type: Guerstein et al., 1998, pl.1, figs.4–5, text-figs.2D–E, as *Ramidinium tridens*.

***tridens** Guerstein et al., 1998, p.28–29, 31–32, pl.1, figs.1–15; text-figs.2A–I, 3A–I. Holotype: Guerstein et al., 1998, pl.1, figs.4–5; text-figs.2D–E. Age: Burdigalian–Langhian.

RAPHIDODINIUM Deflandre, 1936b, p.184–185. Emendations: Sarjeant and Downie, 1982, p.116–117; Below, 1987b, p.57–58. Taxonomic junior synonym: *Druggidium*, according to Below (1987b, p.57) — however, Lentin and Williams (1989, p.121) retained *Druggidium*. Type: Deflandre, 1936b, pl.10, figs.1–2, 7, as *Raphidodinium fucatum*.

"**apicopaucicum**" (Habib, 1973, p.51–52, pl.1, figs.1–3; pl.3, figs.1–3; text-fig.3) Below, 1987b, p.58. Holotype: Habib, 1973, pl.1, fig.3; text-fig.3. **NOW** *Druggidium*. Originally (and now) *Druggidium*, subsequently *Raphidodinium*. Age: Berriasian–Barremian.

"*augustum*" (Harding, 1986b, p.20–21, pl.2, figs.1–9; text-fig.3) Below, 1987b, p.58. Holotype: Harding, 1986b, pl.2, figs.1–2. **NOW** *Druggidium*. Originally (and now) *Druggidium*, subsequently *Raphidodinium*. Age: late Hauterivian–early Barremian.

"*deflandrei*" (Millioud, 1969, p.429–430, pl.2, figs.5–7) Below, 1987b, p.58. Emendations: Habib, 1973, p.52, as *Druggidium deflandrei*; Below, 1987a, p.58–59, as *Raphidodinium deflandrei*. Holotype: Millioud, 1969, pl.2, figs.5–6. **NOW** *Druggidium*. Originally *Microdinium*, subsequently (and now) *Druggidium*, thirdly *Raphidodinium*. Age: Barremian.

**fucatum* Deflandre, 1936b, p.185–186, pl.10, figs.1–7. Emendation: Sarjeant and Downie, 1982, p.117–118. Holotype: Deflandre, 1936b, pl.10, figs.1–2,7. Age: ?Senonian.

subsp. *compactum* Marheinecke, 1992, p.79, pl.16, figs.1–2. Holotype: Marheinecke, 1992, pl.16, figs.1–2. Contrary to the opinion of Lentin and Williams (1993, p.557), Williams et al. (1998, p.525) considered this name to be validly published. Age: early–late Maastrichtian.

subsp. *fucatum*. Autonym. Holotype: Deflandre, 1936b, pl.10, figs.1–2,7.

subsp. *forma* Deflandre, 1943, p.504–505, pl.17, fig.9; text-fig.27. Holotype: Deflandre, 1943, pl.17, fig.9; text-fig.27. The rank of this taxon was not specified in the protologue but, since this was not a requirement until 1953 (I.C.N. Article 37.1), the name is validly published. Williams et al. (1998, p.525–526) arbitrarily assigned it to the rank of subspecies. N.I.A. Age: Late Cretaceous.

"*rhabdoreticulatum*" (Habib, 1973, p.53, pl.2, figs.3–7) Below, 1987b, p.58. Holotype: Habib, 1973, pl.2, fig.6. **NOW** *Druggidium*. Originally (and now) *Druggidium*, subsequently *Raphidodinium*. Age: Valanginian–Albian.

?*singulare* (Firtion, 1952, p.160, pl.8, figs.1–2) Stancliffe and Sarjeant, 1996, p.162. Originally *Micrhystridium* (Appendix A), subsequently *Veryhachium* (Appendix A), thirdly (and now) *Raphidodinium*?. Questionable assignment: Stancliffe and Sarjeant (1996, p.162). Taxonomic junior synonym: *Baltisphaeridium crameri* Singh, 1971, an acritarch species, according to Burger (1980a, p.91). Age: early Cenomanian.

RENIDINIUM Morgenroth, 1968, p.551–552. Type: Morgenroth, 1968, pl.47, fig.1, as *Renidinium membraniferum*.

gracile Hultberg and Malmgren, 1985, p.49–50, figs.11E–I. Holotype: Hultberg and Malmgren, 1985, figs.11H–I. Hultberg (1985c, p.143) also proposed this name. Age: late Maastrichtian–Danian.

**membraniferum* Morgenroth, 1968, p.552–553, pl.46, fig.9; pl.47, figs.1–3. Holotype: Morgenroth, 1968, pl.47, fig.1. Age: Danian.

rigidum Prince et al., 1999, p.163–164, pl.1, figs.13–15,17–19. Holotype: Prince et al., 1999, pl.1, figs.13,17–19. Age: early middle Santonian.

vitulare (Cookson, 1965b, p.138–139, pl.24, figs.1–7) Stover and Evitt, 1978, p.79. Holotype: Cookson, 1965b, pl.24, figs.1–2. Originally *Cyclonephelium*, subsequently (and now) *Renidinium*. Age: Paleocene.

RESTICULASPHAERA Harding, 1990b, p.44 ex Harding in Williams et al. 1998, p.526. This name was not validly published in Harding (1990b) since the name of the "type species" was not validly published. Type: Harding, 1990b, pl.27, fig.1, as *Resticulasphaera medusae*.

**medusae* Harding, 1990b, p.44–45, pl.27, figs.1–8 ex Harding in Williams et al. 1998, p.526. Holotype: Harding, 1990b, pl.27, fig.1. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Hauterivian–late Barremian.

RETESPHAERA Hildebrand-Habel et al., 1999, p.81. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1301). Type: Hildebrand-Habel et al., 1999, pl.2, figs.11–13, as *Retesphaera diadema*.

**diadema* Hildebrand-Habel et al., 1999, p.81, pl.2, figs.11–17; text-fig.5A–C. Holotype: Hildebrand-Habel et al., 1999, pl.2, figs.11–13. N.I.A. Age: Maastrichtian.

RETICULATOSPHAERA Matsuoka, 1983b, p.116. Emendation: Bujak and Matsuoka, 1986, p.238. Type: Matsuoka, 1983b, pl.4, fig.8, as *Reticulosphaera stellata*.

+*actinocoronata* (Benedek, 1972, p.34, pl.12, fig.13; text-fig.13) Bujak and Matsuoka, 1986, p.238. Emendation: Bujak and Matsuoka, 1986, p.238–239, as *Reticulosphaera actinocoronata*. Holotype: Benedek, 1972, pl.12, fig.13; Benedek and Sarjeant, 1981, fig.10, no.5; text-fig.11; Sarjeant et al., 1987, pl.2, fig.4; Fensome et al., 1993a, fig.1 — p.879. Originally *Cleistosphaeridium*, subsequently *Areosphaeridium?*, thirdly (and now) *Reticulosphaera*. Taxonomic junior synonym: *Reticulosphaera stellata*, according to Bujak and Matsuoka (1986, p.238). The nomenclatural type of the genus *Reticulosphaera* remains the holotype of *Reticulosphaera stellata*. Age: middle-late Oligocene.

"*pseudoursulae*" Waagstein and Heilmann-Clausen, 1995, p.188. **Name not validly published**: no description or illustration.

"**stellata*" Matsuoka, 1983b, p.116–117, pl.4, figs.8–11; text-fig.10. Holotype: Matsuoka, 1983b, pl.4, fig.8; Fensome et al., 1995, fig.1 — p.1801. **Taxonomic senior synonym**: *Cleistosphaeridium* (as and now *Reticulosphaera*) *actinocoronatum*, according to Bujak and Matsuoka (1986, p.238). The nomenclatural type of the genus *Reticulosphaera* remains the holotype of *Reticulosphaera stellata*. Age: Pliocene or younger.

REUTLINGIA Drugg, 1978, p.72. Emendation: Below, 1987a, p.133–134. Taxonomic junior synonym: *Facetodinium*, according to Below (1987a, p.133) — however, Lentin and Williams (1989, p.135) retained *Facetodinium* as a taxonomic junior synonym of *Susadinium*. Type: Drugg, 1978, pl.7, figs.8–10, as *Reutlingia gochtii*.

cardobarbata Below, 1987a, p.134–135, pl.20, figs.7–10,13–15. Holotype: Below, 1987a, pl.20, fig.7; Fensome et al., 1993a, fig.1 — p.1031. Age: Toarcian.

cracens (Bjaerke, 1980, p.66, pl.4, fig.16; text-fig.3D) Prauss, 1989, p.22. Emendation: Prauss, 1989, p.22, as *Reutlingia cracens*. Holotype: Bjaerke, 1980, pl.4, fig.16. Originally *Parvocysta?*, subsequently (and now) *Reutlingia*. Age: Toarcian.

"*delmensis*" Below, 1987a, p.135–136, pl.18, figs.1–3,6,8–9. Holotype: Below, 1987a, pl.18, figs.1,8; Fensome et al., 1993a, figs.1,4 — p.1111. **NOW** *Susadinium*. Originally *Reutlingia*, subsequently (and now) *Susadinium*. Age: Toarcian.

"*fausta*" (Bjaerke, 1980, p.69, pl.2, figs.1–6; text-figs.4A–D) Below, 1987a, p.136. Emendation: Below, 1987a, p.136–137, as *Reutlingia fausta*. Holotype: Bjaerke, 1980, pl.2, figs.1–3; Fensome et al., 1993a, figs.1–3 — p.1175. **NOW** *Susadinium*. Originally *Facetodinium*, subsequently (and now) *Susadinium*, thirdly *Reutlingia*. Age: Toarcian.

**gochtii* Drugg, 1978, p.72–73, pl.7, figs.7–10. Emendation: Below, 1987a, p.137–138. Holotype: Drugg, 1978, pl.7, figs.8–10; Fensome et al., 1995, figs.2–4 — p.1517. Age: late Callovian.

hirsuta Below, 1987a, p.138–139, pl.19, figs.13–17. Holotype: Below, 1987a, pl.19, figs.13,15; Fensome et al., 1993a, figs.1,3 — p.1227. Age: Toarcian.

"*nasuta*" (Bjaerke, 1980, p.65–66, pl.1, figs.11–12; text-fig.3A) Below, 1987a, p.139. Emendation: Below, 1987a, p.139, as *Reutlingia nasuta*. Holotype: Bjaerke, 1980, pl.1, figs.11–12; Fensome et al., 1993a, figs.1–2 — p.1267; figs.1–2 — p.1271. **NOW** *Parvocysta*. Originally (and now) *Parvocysta*, subsequently *Reutlingia*. Age: Toarcian.

"var. *nasuta*". Autonym. Holotype: Bjaerke, 1980, pl.1, figs.11–12; Fensome et al., 1993a, figs.1–2 — p.1267; figs.1–2 — p.1271. **Now redundant.**

"var. *ramosa*" Below, 1987a, p.140, pl.20, figs.5–6,11–12,16,18. Holotype: Below, 1987a, pl.20, figs.5–6,11–12,18; Fensome et al., 1993a, fig.3 — p.1267; figs.1–5 — p.1295. **NOW** *Parvocysta nasuta* subsp. *ramosa*. Originally *Reutlingia nasuta* var. *ramosa*, subsequently (and now) *Parvocysta nasuta* subsp. *ramosa*. Age: Toarcian.

sekheladonensis Smelror and Lominadze, 1989, p.164–165, fig.4A,5, nos.1–4. Holotype: Smelror and Lominadze, 1989, fig.5, nos.1–3. Age: middle Callovian.

RHADINODINIUM Williams et al., 2015, p.309. Type: Williams and Downie, 1966b, pl.20, fig.9. as *Wetzeliella* (*Rhombodinium*) *glabra*.

glabrum (Cookson, 1956, p.186, pl.2, figs.1–5) Williams et al., 2015, p.309. Holotype: Cookson, 1956, pl.2, fig.1. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly *Rhombodinium?*, fifthly (and now) *Rhadinodinium*. Age: Eocene.

**politum* (Bujak et al., 1980, p.29, pl.11, fig.1) Williams et al., 2015, p.309. Holotype: Williams and Downie, 1966b, pl.19, fig.9 (see discussion below), as *Wetzeliella glabra*; not Bujak et al., 1980, pl.11, fig.1 as indicated by Williams et al. (1998, p.204). Originally *Dracodinium*, subsequently (and now) *Rhadinodinium*. Aside from the fact that the holotype of *Dracodinium* (now *Rhadinodinium*) *politum* was incorrectly indicated in Williams et al. (1998), confusion is caused by the fact that the plates and captions in the originally-issued protologue publication were mixed up. Hence, in Williams and Downie (1966b, original issue), the holotype appears as pl.19, fig.9, opposite the caption labelled plate 19 but clearly intended for the plate labelled 20; the correct caption for the plate labelled 19 is opposite the plate labelled 20. In the 1983 issue of the monograph, these problems were corrected and the holotype of *Dracodinium* (now *Rhadinodinium*) *politum* is pl.20, fig.9. Age: early Eocene.

RHAETOGONYAULAX Sarjeant, 1966b, p.152–153. Emendations: Harland et al., 1975, p.860; Fisher and van Helden, 1979, p.270,272; Below, 1987a, p.101–102. Taxonomic junior synonym: *Shublikodinium*, according to Stover and Evitt (1978, p.218) and Lentin and Williams (1989, p.338). Type: Sarjeant, 1963b, text-figs.1–2 (left), as *Gonyaulax rhaetica*.

arctica (Wiggins, 1973, p.4, pl.1, figs.1–14; pl.2, figs.1–9; text-figs.2a–d) Stover and Evitt, 1978, p.219. Emendation: Below, 1987a, p.103–105, as *Rhaetogonyaulax arctica*. Holotype: Wiggins, 1973, pl.1, figs.1–2. Originally *Shublikodinium*, subsequently (and now) *Rhaetogonyaulax*. Taxonomic junior synonyms: *Shublikodinium acanthocomum*, *Shublikodinium armatum*, *Shublikodinium setigerum*, *Shublikodinium spinulosum*, *Shublikodinium verrucosum*, and (at specific rank) *Shublikodinium verrucosum* subsp. *exsculptum*, all according to Stover and Evitt (1978, p.219). Age: Carnian.

subsp. *arctica*. Autonym. Holotype: Wiggins, 1973, pl.1, figs.1–2. Originally *Shublikodinium arcticum* subsp. *arcticum*, subsequently (and now) *Rhaetogonyaulax arctica* subsp. *arctica*.

subsp. *maculata* (Wiggins, 1973, p.4–5, pl.2, figs.10–12) Stover and Evitt, 1978, p.219. Holotype: Wiggins, 1973, pl.2, fig.10. Originally *Shublikodinium arcticum* var. *maculatum*, subsequently *Shublikodinium arcticum* subsp. *maculatum*, thirdly (and now) *Rhaetogonyaulax arctica* subsp. *maculata*. Age: Carnian.

"*chaloneri*" (Sarjeant, 1963b, p.354; text-figs.2 [right]-3), Sarjeant, 1969, p.15. Holotype: Sarjeant, 1963b, text-figs.2(right)-3. **NOW** *Rhaetogonyaulax rhaetica* subsp. *chaloneri*. Originally *Gonyaulax chaloneri* (Appendix B),

subsequently *Rhaetogonyaulax chaloneri*, thirdly *Rhaetogonyaulax rhaetica* var. *chaloneri*, fourthly (and now) *Rhaetogonyaulax rhaetica* subsp. *chaloneri*. This combination was not validly published in Sarjeant (1966b, p.153), since that author did not fully reference the basionym. Age: Carnian.

dilatata (Wiggins, 1973, p.6, pl.5, figs.3–4) Stover and Evitt, 1978, p.219. Holotype: Wiggins, 1973, pl.5, fig.3. Originally *Shublikodinium*, subsequently (and now) *Rhaetogonyaulax*. Taxonomic junior synonyms: *Shublikodinium echinoverrucatum*, *Shublikodinium granulatum*, and *Shublikodinium scaberrimum*, all according to Stover and Evitt (1978, p.219). Age: Carnian.

**rhaetica* (Sarjeant, 1963b, p.353; text-figs.1–2 [left]) Loeblich Jr. and Loeblich III, 1968, p.212. Emendations: Harland et al., 1975, p.862; Fisher and van Helden, 1979, p.270; Below, 1987a, p.105–106, all as *Rhaetogonyaulax rhaetica*. Holotype: Sarjeant, 1963b, text-figs.1–2 (left). Originally *Gonyaulax* (Appendix B), subsequently (and now) *Rhaetogonyaulax*. Taxonomic junior synonym: *Rhaetogonyaulax testacea*, *Rhaetogonyaulax tortuosa*, and *Rhaetogonyaulax uncinata*, all according to Below (1987a, p.105). Age: Carnian.

subsp. *chaloneri* (Sarjeant, 1963b, p.354, text-figs.2 [right]–3) Lentin and Williams, 1977b, p.138. Holotype: Sarjeant, 1963b, text-figs.2(right)–3. Originally *Gonyaulax chaloneri* (Appendix B), subsequently *Rhaetogonyaulax chaloneri*, thirdly *Rhaetogonyaulax rhaetica* var. *chaloneri*, fourthly (and now) *Rhaetogonyaulax rhaetica* subsp. *chaloneri*. Age: Carnian.

"var. *chaloneri*" (Sarjeant, 1963b, p.354, text-figs.2 [right]–3) Harland et al., 1975, p.863. Holotype: Sarjeant, 1963b, text-figs.2(right)–3. **NOW** *Rhaetogonyaulax rhaetica* subsp. *chaloneri*. Originally *Gonyaulax chaloneri* (Appendix B), subsequently *Rhaetogonyaulax chaloneri*, thirdly *Rhaetogonyaulax rhaetica* var. *chaloneri*, fourthly (and now) *Rhaetogonyaulax rhaetica* subsp. *chaloneri*. Age: Carnian.

subsp. *rhaetica*. Autonym. Holotype: Sarjeant, 1963b, text-figs.1–2 (left).

"var. *rhaetica*". Autonym. Holotype: Sarjeant, 1963b, text-figs.1–2 (left). **Now redundant.**

"*testacea*" Fisher and van Helden, 1979, p.272, pl.1, figs.1–6; text-fig.1E. Holotype: Fisher and van Helden, 1979, pl.1, figs.1–4. **Taxonomic senior synonym:** *Gonyaulax* (as and now *Rhaetogonyaulax*) *rhaetica*, according to Below (1987a, p.105). Age: middle Norian–Rhaetian.

"*tortuosa*" Fisher and van Helden, 1979, p.274,276, pl.2, fig.7; pl.3, figs.2,6–7; pl.4, figs.1–8. Holotype: Fisher and van Helden, 1979, pl.4, figs.4,6. **Taxonomic senior synonym:** *Gonyaulax* (as and now *Rhaetogonyaulax*) *rhaetica*, according to Below (1987a, p.105). Age: Carnian–Rhaetian.

"*uncinata*" Fisher and van Helden, 1979, p.274, pl.2, figs.3–8; pl.3, figs.1,3–5. Holotype: Fisher and van Helden, 1979, pl.2, figs.3–5. **Taxonomic senior synonym:** *Gonyaulax* (as and now *Rhaetogonyaulax*) *rhaetica*, according to Below (1987a, p.105). Age: middle Norian–Rhaetian.

wigginsii (Stover and Helby, 1987a, p.120, figs.18A–B,19A–I,20) Lentin and Williams, 1989, p.316. Holotype: Stover and Helby, 1987a, figs.19A–B; Fensome et al., 1996, figs.1–2 — p.2445. Originally *Shublikodinium*, subsequently (and now) *Rhaetogonyaulax*. Age: late Carnian.

RHIPTOCORYS Lejeune-Carpentier and Sarjeant, 1983, p.5. Emendations: Lentin and Vozzhennikova, 1990, p.110–111; Slimani, 1994, p.51. Taxonomic senior synonym: *Phanerodinium*, according to Below (1987b, p.36) — however, Lentin and Williams (1989, p.316) retained *Rhiptocorys*. Type: Deflandre, 1937b, pl.12 (al. pl.9), fig.9, as *Michrhystridium veligerum*.

smolenskiensis (Vozzhennikova, 1967, p.93, pl.34, figs.1–6; pl.35, fig.6; pl.36, fig.4) Lentin and Vozzhennikova, 1990, p.112. Emendation: Lentin and Vozzhennikova, 1990, p.112, as *Rhiptocorys smolenskiensis*. Holotype: Vozzhennikova, 1967, pl.36, fig.4, lost according to Lentin and Vozzhennikova (1990, p.112). Lectotype: Lentin and Vozzhennikova, 1990, pl.13, figs.1–3; text-fig.65, designated by Lentin and Vozzhennikova (1990, p.112). Originally *Ceratocorys* (Appendix B), subsequently *Microdinium*, thirdly *Microdinium?*, fourthly (and now)

Rhiptocorys. Taxonomic senior synonym: *Micrhystridium* (as *Phanerodinium*; now *Rhiptocorys*) *veligerum*, according to Below (1987b, p.39) — however, Lentin and Vozzhennikova (1990, p.112) retained *Rhiptocorys smolenskiensis*. Age: Late Cretaceous.

**veligera* (Deflandre, 1937b, p.81, pl.12 [al. pl.9], fig.9) Lejeune-Carpentier and Sarjeant, 1983, p.5. Emendations: Lejeune-Carpentier, 1943, p.B24–B25, as *Ceratocorys veligera*; Lejeune-Carpentier and Sarjeant, 1983, p.5–6, as *Rhiptocorys veligera*. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), fig.9; Fensome et al., 1995, fig.1 — p.1885. Originally *Micrhystridium* (Appendix A), subsequently *Ceratocorys* (Appendix B), thirdly *Microdinium*, fourthly *Microdinium?*, fifthly (and now) *Rhiptocorys*, sixthly *Phanerodinium*, seventhly *Phanerodinium?*. Lentin and Williams (1993, p.560) retained this species in *Rhiptocorys*. Taxonomic junior synonyms: *Microdinium irregulare* and *Ceratocorys* (as *Microdinium*, now *Rhiptocorys*) *smolenskiensis*, both according to Below (1987b, p.56) — however, Lentin and Vozzhennikova (1990, p.112) retained *Ceratocorys* (as *Rhiptocorys*) *smolenskiensis*. Age: Senonian.

RHOMBODINIUM Gocht, 1955, p.85. Emendations: Bujak, 1979, p.313–314 — however, see Lentin and Vozzhennikova (1989, p.218–219); Williams, Damassa, Fensome and Guerstein in Fensome et al., 2009, p.57. Originally (and now) *Rhombodinium*, subsequently *Wetzeliella* subgenus *Rhombodinium*. Lentin and Williams (1977b, p.139) retained *Rhombodinium* at generic rank. Type: Gocht, 1955, text-fig.1c, as *Rhombodinium draco*.

aidae Iakovleva in Oreshkina et al., 2015, p.74, fig.16, nos.1–11,13–15,17–20; text-fig.23. Holotype: Oreshkina et al., 2015, fig.16, nos.13–15. Age: Bartonian–Priabonian.

"*antonescui*" Ionescu, 2003, p.40–41, pl.2, figs.1–2,6. **Name not validly published**: lodgement of holotype not indicated. Holotype: Ionescu, 2003, pl.2, fig.1. Age: Bartonian–Priabonian.

cerciatum He Chengquan, 1991, p.94–95, pl.36, fig.8. Holotype: He Chengquan, 1991, pl.36, fig.8. Age: late Eocene.

"*cingulatum*" Goodman in Michoux, 1988, p.31. **Name not validly published**: no description.

"*condylos*" (Williams and Downie, 1966b, p.193–194, pl.20, figs.1–2) Lentin and Williams, 1976, p.128. Holotype: Williams and Downie, 1966b, pl.20, fig.1. **NOW** *Petalodinium*. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. N.I.A. Age: early Eocene.

"*coronatum*" Vozzhennikova, 1967, p.170–171, pl.89, figs.1–3,5; pl.90, figs.1–5. Holotype: Vozzhennikova, 1967, pl.89, fig.1; pl.90, fig.4; Lentin and Vozzhennikova, 1990, text-fig.43; lost according to Lentin and Vozzhennikova (1990, p.80). Neotype: Iakovleva and Heilmann-Clausen, 2010, pl.12, fig.4, designated by Iakovleva and Heilmann-Clausen (2010, p.211). **NOW** *Dracodinium*. Originally *Rhombodinium*, subsequently *Wetzeliella*, thirdly (and now) *Dracodinium*. Taxonomic senior synonym: *Wetzeliella articulata*, according to Costa and Downie (1979, p.430) — however, Iakovleva and Heilmann-Clausen (2010, p. 211,226) retained *Rhombodinium* (as *Wetzeliella*) *coronatum*. Age: Ypresian.

denticulatum He Chengquan, 1991, p.95, pl.36, figs.6–7. Holotype: He Chengquan, 1991, pl.36, fig.7. Age: middle-late Eocene.

**draco* Gocht, 1955, p.86, text-figs.1a–c. Holotype: Gocht, 1955, text-fig.1c. Originally (and now) *Rhombodinium*, subsequently *Wetzeliella* subgenus *Rhombodinium*. Vozzhennikova (1967, p.168) retained this species in *Rhombodinium*. N.I.A. Age: middle Oligocene.

"forma *draco*". Autonym. Holotype: Gocht, 1955, text-fig.1c. **Now redundant**.

subsp. *draco*. Autonym. Holotype: Gocht, 1955, text-fig.1c.

"forma *freienwaldense*" Gocht, 1955, p.87; text-figs.2a–b. Holotype: Gocht, 1955, text-fig.2b. **NOW** *Rhombodinium?* *freienwaldense*. Originally *Rhombodinium draco* forma *freienwaldense*, subsequently

Rhombodinium draco subsp. *freienwaldense*, thirdly (and now) *Rhombodinium? freienwaldense*. Taxonomic senior synonym (at specific rank): *Rhombodinium rotundatum*, by implication in Costa and Downie (1979, p.44), who believed *Rhombodinium freienwaldense* to be the senior name — however, Grabowska in Malinowskiej and Piwockiego (1996, p.343) retained *Rhombodinium draco* forma *freienwaldense* (as *Rhombodinium freienwaldense*). Age: middle Oligocene.

"subsp. *freienwaldense*" (Gocht, 1955, p.87; text-figs.2a–b) Lentin and Williams, 1973, p.120. Holotype: Gocht, 1955, text-fig.2b. **NOW** *Rhombodinium? freienwaldense*. Originally *Rhombodinium draco* forma *freienwaldense*, subsequently *Rhombodinium draco* subsp. *freienwaldense*, thirdly (and now) *Rhombodinium? freienwaldense*. Taxonomic senior synonym (at specific rank): *Rhombodinium rotundatum*, by implication in Costa and Downie (1979, p.44), who believed *Rhombodinium freienwaldense* to be the senior name — however, Grabowska in Malinowskiej and Piwockiego (1996, p.343) retained *Rhombodinium draco* subsp. *freienwaldense* (as *Rhombodinium freienwaldense*). Age: middle Oligocene.

subsp. *quadratum* He Chengquan, 1991, p.96, pl.38, figs.1–5. Holotype: He Chengquan, 1991, pl.38, fig.1. Age: late Eocene.

elegans He Chengquan, 1991, p.97, pl.39, figs.1–8. Holotype: He Chengquan, 1991, pl.39, fig.8. Age: middle Eocene.

elongatum He Chengquan, 1991, p.97–98, pl.40, figs.1–5,7–8; pl.41, figs.1–6. Holotype: He Chengquan, 1991, pl.41, fig.1. Age: middle Eocene.

subsp. *elongatum*. Autonym. Holotype: He Chengquan, 1991, pl.41, fig.1.

subsp. *spinale* He Chengquan, 1991, p.98, pl.40, figs.1–5. Holotype: He Chengquan, 1991, pl.40, fig.1. Age: middle Eocene.

fimbriatum Vasilyeva, 2013, p.122, pl.4, figs.5–10. Holotype : Vasilyeva, 2013, pl.4, fig.5. Age: Bartonian–Priabonian.

?*fornicale* (Yu Jingxian, 1989, p.155, pl.58, figs.1,3) He Chengquan et al., 2009, p.495. Holotype: Yu Jingxian, 1989, pl.58, fig.1. Originally *Gochtodinium*, subsequently *Wetzeliella*, thirdly (and now) *Rhombodinium?* Questionable assignment: Williams et al. (2015, p.311). Williams et al. (2015, p.311) also proposed this combination. Age: Eocene.

?*freienwaldense* (Gocht, 1955, p.87; text-figs.2a–b) Costa and Downie, 1979, p.44. Holotype: Gocht, 1955, text-fig.2b. Originally *Rhombodinium draco* forma *freienwaldense*, subsequently *Rhombodinium draco* subsp. *freienwaldense*, thirdly (and now) *Rhombodinium? freienwaldense*. Questionable assignment: Williams et al. (2015, p.311). Taxonomic senior synonym (at specific rank): *Rhombodinium rotundatum*, by implication in Costa and Downie (1979, p.44), who believed *Rhombodinium freienwaldense* to be the senior name — however, Grabowska in Malinowskiej and Piwockiego (1996, p.343) retained *Rhombodinium freienwaldense*. Grabowska in Malinowskiej and Piwockiego (1996, p.343) also proposed this combination. Age: middle Oligocene.

"?*glabrum*" (Cookson, 1956, p.186, pl.2, figs.1–5) Vozzhennikova, 1967, p.169. Holotype: Cookson, 1956, pl.2, fig.1. **NOW** *Rhadinodinium*. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly *Rhombodinium?*, fifthly (and now) *Rhadinodinium*. Questionable assignment: Head and Norris (1989, p.532). Age: Eocene.

"forma *crassithecum*" Vozzhennikova, 1967, p.170, pl.91, figs.1–2,4–6. Holotype: Vozzhennikova, 1967, pl.91, fig.1; Lentin and Vozzhennikova, 1990, text-fig.40; lost according to Lentin and Vozzhennikova (1990, p.76). **NOW** *Petalodinium crassithecum*. Originally *Rhombodinium glabrum* forma *crassithecum*, subsequently *Rhombodinium glabrum* subsp. *crassithecum*, thirdly (and now) *Petalodinium crassithecum*. According to Lentin and Vozzhennikova (1990, p.76), no potential lectotype is available. These authors recommended that this name be restricted to the type. Age: late Eocene–early Oligocene.

"subsp. *crassithecum*" (Vozzhennikova, 1967, p.170, pl.91, figs.1–2,4–6) Lentin and Williams, 1973, p.120. Holotype: Vozzhennikova, 1967, pl.91, fig.1; Lentin and Vozzhennikova, 1990, text-fig.40; lost according to Lentin and Vozzhennikova (1990, p.76). **NOW** *Petalodinium crassithecum*. Originally *Rhombodinium glabrum* forma *crassithecum*, subsequently *Rhombodinium glabrum* subsp. *crassithecum*, thirdly (and now) *Petalodinium crassithecum*. According to Lentin and Vozzhennikova (1990, p.76), no potential lectotype is available. These authors recommended that this name be restricted to the type. Age: late Eocene–early Oligocene.

"forma *glabrum*". Autonym. Holotype: Cookson, 1956, pl.2, fig.1. **Now redundant.**

subsp. *glabrum*. Autonym. Holotype: Cookson, 1956, pl.2, fig.1.

"subsp. *granulatum*" (Wilson, 1967c, p.493, figs.29–30) Lentin and Williams, 1973, p.120. Holotype: Wilson, 1967c, fig.30. **NOW** *Epelidinium granulatum*. Originally *Wetzelia* subgenus *Rhombodinium glabra* var. *granulata*, subsequently *Rhombodinium glabrum* subsp. *granulatum*, thirdly *Dracodinium granulatum*, fourthly (and now) *Epelidinium granulatum*. Age: late Eocene.

"*intermedium*" (Cookson and Eisenack, 1961b, p.40, pl.1, figs.5–6) Lentin and Williams, 1973, p.120. Holotype: Cookson and Eisenack, 1961b, pl.1, fig.5. **NOW** *Castellodinium*. Originally *Wetzelia*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly (and now) *Castellodinium*. Age: Eocene.

"*irtichense*" Ilyina et al., 1994, p.104. **Name not validly published:** no description or illustration. This name may refer to *Wetzelia irtyschensis*.

irtyschense (Alberti, 1961, p.8, pl.1, figs.11–12; pl.12, fig.8) Williams et al., 2015, p.311. Holotype: Alberti, 1961, pl.1, fig.12. Originally *Wetzelia*, subsequently (and now) *Rhombodinium*. Age: Priabonian.

?*kunlunense* He Chengquan, 1991, p.98–99, pl.37, figs.3–6. Holotype: He Chengquan, 1991, pl.37, fig.6. Questionable assignment: Williams et al. (2015, p.311). Age: late Turonian–middle Eocene.

?*longimanum* Vozzhennikova, 1967, p.171, pl.92, figs.1–3; pl.93, figs.1–6; pl.94, figs.1–3. Holotype: Vozzhennikova, 1967, pl.92, fig.1; pl.93, fig.1; Lentin and Vozzhennikova, 1990, pl.7, figs.1,3; text-fig.41. Questionable assignment: Williams et al. (2015, p.311). Lentin and Vozzhennikova (1990, p.77–78) provided an "expanded description" for this species. Age: Priabonian.

magnum Vasilyeva, 2013, p.121–122, pl.4, figs.1–3 ex Williams and Fensome, 2016, p.14. Holotype: Vasilyeva, 2013, pl.4, fig.1, designated by Williams and Fensome (2016, p.141). The name *Rhombodinium magnum* was not validly published in Vasilyeva (2013), since that author referred to two separate specimens as the holotype (on p. 121 as pl.4, fig. 3 and in the plate caption as pl.4, fig.1). Age: Bartonian.

?*majus* Yu Jingxian, 1982, p.257, pl.8, fig.8. Holotype: Yu Jingxian, 1982, pl.8, fig.8. Questionable assignment: Lentin and Williams (1985, p.307). Williams et al. (2015, p.311) recommended that the name be restricted to the holotype. Age: Late Jurassic–Early Cretaceous.

?*minus* He Chengquan, 1991, p.99, pl.36, fig.5. Holotype: He Chengquan, 1991, pl.36, fig.5. Questionable assignment: Williams et al. (2015, p.311). Age: middle Eocene.

"?*minusculum*" (Alberti, 1961, p.10–11, pl.1, fig.10; pl.12, fig.4) Lentin and Williams, 1973, p.120. Holotype: Alberti, 1961, pl.1, fig.10. **NOW** *Palaeotetradinium*. Originally *Wetzelia* subgenus *Rhombodinium*, subsequently *Rhombodinium?*, thirdly *Inversidinium*, fourthly (and now) *Palaeotetradinium*. Questionable assignment: Lentin and Williams (1976, p.128). Taxonomic junior synonym: *Inversidinium exilimurum*, according to Stover and Evitt (1978, p.71). Age: early Eocene.

mirabile He Chengquan, 1991, p.99, pl.35, figs.7–9. Holotype: He Chengquan, 1991, pl.35, fig.7. Age: middle Eocene.

?*oravense* Grigorovich, 1971, p.94, pl.2, fig.6. Holotype: Grigorovich, 1971, pl.2, fig.6. Questionable assignment: Williams et al. (2015, p.311). Age: Eocene.

ornatum (Vozzhennikova, 1967, p.103–104, pl.42, figs.1–3; pl.43, figs.1–4; pl.44, figs.1–12; pl.45, figs.1–3) Williams et al., 2015, p.311. Emendations: Lentin and Vozzhennikova, 1989, p.223; Vasilyeva in Andreeva-Grigorovich et al., 2011, p.53. Holotype: Vozzhennikova, 1967, pl.44, fig.6, lost according to Lentin and Vozzhennikova (1989, p.223). Lectotype: Vozzhennikova, 1967, pl.44, fig.1 (as holotype of *Kisselevia ornata* forma *reticulata*); Lentin and Vozzhennikova, 1989, pl.1, figs.1–2; Lentin and Vozzhennikova, 1990, pl.9, fig.1; designated by Lentin and Vozzhennikova (1989, p.223). Originally *Kisselevia*, subsequently (and now) *Rhombodinium*. Age: Eocene.

?*pentagonum* Vozzhennikova, 1967, p.171–172, pl.89, fig.4; pl.95, figs.1–5; pl.96, figs.1–6. Holotype: Vozzhennikova, 1967, pl.96, fig.3, lost according to Lentin and Vozzhennikova (1990, p.78). Lectotype: Lentin and Vozzhennikova, 1990, pl.7, fig.4; text-fig.42, designated by Lentin and Vozzhennikova (1990, p.78). Originally *Rhombodinium*, subsequently *Wetzeliiella*, thirdly (and now) *Rhombodinium*?. Stover and Evitt (1978, p.121) retained this species in *Rhombodinium*. Questionable assignment: Lentin and Vozzhennikova (1990, p.79). Taxonomic senior synonym: *Wetzeliiella articulata*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.244) retained *Rhombodinium pentagonum*. Lentin and Vozzhennikova (1990, p.79) provided an "expanded description" for this species. Age: late Eocene–early Oligocene.

perforatum (Jan du Chêne and Châteauneuf, 1975, p.30–31, pl.1, figs.8–14; pl.3, figs.7–10) Lentin and Williams, 1977b, p.139. Holotype: Jan du Chêne and Châteauneuf, 1975, pl.1, figs.8–9. Originally *Wetzeliiella* subgenus *Rhombodinium*, subsequently (and now) *Rhombodinium*. Age: middle Lutetian–late Priabonian.

porosum Bujak, 1979, p.314–315, pl.1, figs.3,5–8; pl.2, fig.11; text-fig.8C. Holotype: Bujak, 1979, pl.1, figs.5–6; Bujak et al., 1980, pl.20, fig.8. Age: middle Eocene.

?*pustulosum* Châteauneuf, 1980, p.150, pl.29, figs.5–7,10. Holotype: Châteauneuf, 1980, pl.29, figs.6–7. Questionable assignment: Williams et al. (2015, p.311). Age: late Eocene (Auversian).

"*rhomboideum*" (Alberti, 1961, p.10, pl.1, figs.1–5; pl.12, fig.9) Lentin and Williams, 1973, p.121. Holotype: Alberti, 1961, pl.1, fig.3; pl.12, fig.9. **NOW** *Petalodinium*. Originally *Wetzeliiella* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: late Eocene.

"forma *ovale*" Grigorovich, 1971, pl.1, fig.4. **Name not validly published**: no description. Age: early-middle Eocene.

?*rotundatum* Balteş, 1969, p.35, pl.5, fig.10 ex Lentin and Williams, 1973, p.121. Holotype: Balteş, 1969, pl.5, fig.10. Originally *Wetzeliiella* (name not validly published), subsequently (and now) *Rhombodinium*. Questionable assignment: Williams et al. (2015, p.311). Taxonomic junior synonym (at specific rank): *Rhombodinium draco* forma *freienwaldense* (as *Rhombodinium freienwaldense*), by implication in Costa and Downie (1979, p.44), who believed *Rhombodinium freienwaldense* to be the senior name — however, Grabowska in Malinowskiej and Piwockiego (1996, p.343) retained *Rhombodinium freienwaldense*. This name was not validly published in Balteş (1969) since that author considered it a provisional designation. Age: Oligocene.

"*rugosum*" Michoux, 1988, p.30–31, pl.3, figs.1–9; text-figs.8A–B. Holotype: Michoux, 1988, pl.3, figs.1–5; text-figs.8A–B. **NOW** *Petalodinium*. Originally *Rhombodinium*, subsequently (and now) *Petalodinium*. Age: early Eocene.

sinense He Chengquan, 1991, p.99–100, pl.42, figs.1–6. Holotype: He Chengquan, 1991, pl.42, fig.3. Age: middle Eocene.

spinula (Bujak, 1979, p.313, pl.2, figs.3–9; text-fig.8E) Williams et al., 2015, p.311. Holotype: Bujak, 1979, pl.2, figs.3–5; Bujak et al., 1980, pl.15, fig.6. Originally *Gochtodinium*, subsequently *Wetzeliiella*, thirdly (and now) *Rhombodinium*. N.I.A. Age: middle Eocene (see Aubry, 1986).

subtile Wilson, 1988, p.28, pl.18, figs.1a–b,2. Holotype: Wilson, 1988, pl.18, fig.2; Fensome et al., 1996, fig.3 — p.2383. Age: early Eocene.

"translucidum" Michoux, 1988, p.31–32, pl.4, figs.1–5,7–8; text-fig.9. Holotype: Michoux, 1988, pl.4, fig.4. **NOW** *Epelidinium?* Originally *Rhombodinium*, subsequently (and now) *Epelidinium?* Age: early Eocene.

tuberculatum He Chengquan, 1991, p.100, pl.37, figs.1–2. Holotype: He Chengquan, 1991, pl.37, fig.1. Age: middle Eocene.

turgaicum Vasilyeva in Vasilyeva et al., 2001, p.72, pl.3, figs.4–6 ex Vasilyeva in Andreeva-Grigorovich et al., 2011, p.57–58, pl.25, figs.3,5. Holotype: Vasilyeva et al., 2001, pl.3, fig.5; Andreeva-Grigorovich et al., 2011, pl.25, fig.3. This name was not validly published in Vasilyeva et al. (2001), since no English or Latin diagnosis was provided. Age: Bartonian.

variabile (He Chengquan, 1991, p.92, pl.35, fig.1; text-fig.12) Williams et al., 2015, p.311. Holotype: He Chengquan, 1991, pl.35, fig.1; text-fig.12. Originally *Dracodinium*, subsequently (and now) *Rhombodinium*. Age: late Eocene.

vialovii Oleinik, 1976, p.85–86, pl.1, figs.7–9. Holotype: Oleinik, 1976, pl.1, fig.7. Age: late Eocene.

?**vozzhennikovae** Williams et al., 2015, p.311. Holotype: Vozzhennikova, 1960, pl.3, fig.1, lost according to Lentin and Vozzhennikova (1989, p.215–216). Substitute name for *Kisselevia major* Vozzhennikova, 1967, p.104–105. Originally *Kisselevia major*, subsequently (and now) *Rhombodinium? vozzhennikovae*. Questionable assignment: Williams et al. (2015, p.311). Williams et al. (2015) proposed *Rhombodinium? vozzhennovae* as a substitute name for *Kisselevia major* Vozzhennikova, 1967, p.104–105 as the epithet *majus* (al. *major*) is already occupied by *Rhombodinium? majus* Yu Jingxian. Fensome and Williams (2004, p.382) did not follow Lentin and Vozzhennikova (1989) in considering the name *Kisselevia major* to be not validly published; Vozzhennikova (1967) provided a description and designated a holotype from Vozzhennikova (1960). That the holotype is lost has no bearing on the validity of the name. Lentin and Vozzhennikova (1989) noted that no potential lectotype is available. The name *Kisselevia major* was not validly published in Vozzhennikova (1963, fig.15) since that author did not provide a description. Age: Eocene.

"waipawaense" (Wilson, 1967c, p.493–494, figs.18,20) Lentin and Williams, 1973, p.121. Holotype: Wilson, 1967c, fig.18. **NOW** *Petalodinium*. Originally *Wetzelilla* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: early Eocene.

wuqaiense He Chengquan, 1991, p.100, pl.36, figs.1–3. Holotype: He Chengquan, 1991, pl.36, fig.1. Age: middle Eocene.

RHYNCHODINIOPSIS Deflandre, 1935, p.231. Emendations: Below, 1981a, p.117; Sarjeant, 1982b, p.34–35; Jan du Chêne et al., 1985b, p.116,118,120. Taxonomic junior synonym: *Gonyaulacysta*, by implication in Millioud (1969, p.428), who illegitimately transferred the "type species" of *Rhynchodiniopsis*, *Rhynchodiniopsis aptiana*, to the junior name *Gonyaulacysta* — however, Lentin and Williams (1973, p.58,121) retained *Gonyaulacysta*. Type: Deflandre, 1935, pl.5, fig.10; pl.8, figs.7–9, as *Rhynchodiniopsis aptiana*.

"ambigua" (Deflandre, 1939a, p.144, pl.6, fig.2) Sarjeant, 1982b, p.35. Holotype: Deflandre, 1939a, pl.6, fig.2; Jan du Chêne et al., 1986a, pl.68, figs.1–3. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Leptodinium*. Age: Kimmeridgian.

"angulosa" (Gitmez, 1970, p.252, pl.2, figs.4–5; text-figs.7A–B) Courtinat, 1989, p.203. Holotype: Gitmez, 1970, pl.2, figs.4–5; text-figs.7A–B; Jan du Chêne et al., 1986a, pl.2, figs.11–15. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Acanthaulax*, thirdly *Meristaulax* Sarjeant, fourthly *Acanthaulax?*, fifthly *Rhynchodiniopsis*, sixthly (and now) *Cribroperidinium*. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*,

now *Cribroperidinium*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*; now *Rhynchodiniopsis*) *angulosa*. Age: early Kimmeridgian.

**aptiana* Deflandre, 1935, p.231, pl.5, fig.10; pl.8, figs.7–10. Emendation: Sarjeant, 1982b, p.36–37. Holotype: Deflandre, 1935, pl.5, fig.10; pl.8, figs.7–9; Deflandre, 1936b, pl.7, figs.2–4. Originally (and now) *Rhynchodiniopsis*, subsequently *Gonyaulacysta*. Lentin and Williams (1973, p.121) retained this species in *Rhynchodiniopsis*. Taxonomic junior synonym: *Gonyaulacysta fimbriata*, according to Below (1981a, p.118) — however, Sarjeant (1982b, p.35) retained *Gonyaulacysta* (as *Rhynchodiniopsis*) *fimbriata*. Jan du Chêne et al. (1986a, p.286) indicated that this species was emended by Stover and Evitt (1978, p.278–279); however, those authors did not indicate that they were emending the species. Age: Senonian.

"?*bacculata*" (Balteş, 1971, p.3, pl.1, figs.4–5) Sarjeant, 1982b, p.36. Holotype: Balteş, 1971, pl.1, figs.4–5. **NOW** *Leptodinium*?. Originally *Leptodinium*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*?, fourthly (and now) *Leptodinium*?. Questionable assignment: Sarjeant (1982b, p.36). Age: early Pliocene.

"*canadensis*" (Pocock, 1972, p.89, pl.24, figs.1–2; text-fig.4) Jansonius, 1986, p.214. Holotype: Pocock, 1972, pl.24, fig.1; Jan du Chêne et al., 1986a, pl.97, figs.1–4. Originally *Gonyaulacysta*, subsequently *Hystrichogonyaulax*, thirdly *Rhynchodiniopsis*. **Taxonomic senior synonym:** *Gonyaulax* (as *Gonyaulacysta*; now *Rhynchodiniopsis*) *cladophora*, according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: Oxfordian–Kimmeridgian.

"*cauda*" (Gitmez and Sarjeant, 1972, p.193–194, pl.2, figs.1–2,4–5) Sarjeant, 1982b, p.35. Holotype: Gitmez and Sarjeant, 1972, pl.2, figs.1–2. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribroperidinium*?. **Taxonomic senior synonym:** *Gonyaulacysta globata*, according to Poulsen (1996, p.72). N.I.A. Age: early–late Kimmeridgian.

cladophora (Deflandre, 1939a, p.173–176, pl.7, figs.1–5; text-figs.5–6) Below, 1981a, p.118. Holotype: Deflandre, 1939a, pl.7, fig.1; Jan du Chêne et al., 1986a, pl.94, fig.6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. Taxonomic junior synonyms: *Gonyaulacysta gottisii*, according to Jan du Chêne et al. (1986a, p.48) and Jan du Chêne and Fauconnier (1986, p.55); *Gonyaulacysta downiei* and *Gonyaulacysta* (as *Hystrichogonyaulax*) *canadensis*, both according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: early Oxfordian.

subsp. ***cladophora***. Autonym. Holotype: Deflandre, 1939a, pl.7, fig.1. Originally *Gonyaulax cladophora* subsp. *cladophora* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *cladophora*, thirdly *Hystrichogonyaulax cladophora* subsp. *cladophora*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *cladophora*. Taxonomic junior synonyms: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *extensa*, *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *hemipolyedrica* and *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *isovalvata*, all by implication in Brenner (1988, p.72), who listed these subspecies as taxonomic junior synonyms of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained all three subspecies. Age: early Oxfordian.

subsp. ***extensa*** (Klement, 1960, p.36–37, pl.4, figs.1–4; text-fig.16) Below, 1981a, p.118. Holotype: Klement, 1960, pl.4, figs.1–3; Jan du Chêne et al., 1986a, pl.95, figs.4–5. Originally *Gonyaulax cladophora* subsp. *extensa* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *extensa*, thirdly *Hystrichogonyaulax cladophora* subsp. *extensa*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *extensa*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *extensa*. Age: early Kimmeridgian.

subsp. ***hemipolyedrica*** (Klement, 1960, p.36, pl.3, figs.10–12; text-figs.14–15) Below, 1981a, p.118. Holotype: Klement, 1960, pl.3, figs.10–11. Originally *Gonyaulax cladophora* subsp. *hemipolyedrica* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *hemipolyedrica*, thirdly *Hystrichogonyaulax cladophora* subsp. *hemipolyedrica*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp.

hemipolyedrica. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *hemipolyedrica*. Age: early Kimmeridgian.

subsp. *isovalvata* (Klement, 1960, p.37–38, pl.4, figs.5–9; text-fig.17) Below, 1981a, p.118. Holotype: Klement, 1960, pl.4, figs.5–6. Originally *Gonyaulax cladophora* subsp. *isovalvata* (Appendix B), subsequently *Gonyaulacysta cladophora* subsp. *isovalvata*, thirdly *Hystrichogonyaulax cladophora* subsp. *isovalvata*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *isovalvata*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *isovalvata*. Age: early Kimmeridgian.

"?*confusa*" (Vozzhennikova, 1967, p.80, pl.17, figs.1a–b; pl.25, figs.4–5; pl.27, figs.3–4) Sarjeant, 1982b, p.36. Holotype: Vozzhennikova, 1967, pl.25, fig.5, lost according to Lentin and Vozzhennikova (1990, p.93). **NOW** *Apteodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Apteodinium*. Questionable assignment: Sarjeant (1982b, p.36). Age: Late Jurassic.

"*crassicornuta*" (Klement, 1960, p.38–39, pl.5, figs.1–3) Below, 1981a, p.118. Emendation: Sarjeant, 1984a, p.158–160, as *Rhynchodiniopsis crassicornuta*. Holotype: Klement, 1960, pl.5, fig.1; Sarjeant, 1984a, pl.2, figs.1–2; text-fig.2; Jan du Chêne et al., 1986a, pl.45, figs.1–4. **NOW** *Gonyaulacysta?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Gonyaulacysta?*, fourthly *Rhynchodiniopsis*. Age: early Kimmeridgian.

"?*downiei*" (Pocock, 1972, p.87, pl.22, figs.1–2; text-fig.2) Sarjeant, 1982b, p.36. Holotype: Pocock, 1972, pl.22, figs.1–2; Jan du Chêne et al., 1986a, pl.97, figs.7–12. Originally *Gonyaulacysta*, subsequently *Hystrichosphaeropsis*, thirdly *Rhynchodiniopsis?*, fourthly *Rhynchodiniopsis*. Questionable assignment: Sarjeant (1982b, p.36). **Taxonomic senior synonym:** *Gonyaulacysta* (as *Hystrichogonyaulax*, now *Rhynchodiniopsis*) *cladophora*, according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: Oxfordian–Kimmeridgian.

"*episoma*" (Sarjeant, 1966b, p.118–119, pl.13, figs.9–10; text-fig.27) Sarjeant, 1982b, p.35. Holotype: Sarjeant, 1966b, pl.13, figs.9–10; text-fig.27; Jan du Chêne et al., 1986a, pl.67, figs.15–16. **NOW** *Leptodinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium*. Age: late Barremian.

fimbriata (Duxbury, 1980, p.123, pl.1, figs.1–3) Sarjeant, 1982b, p.35. Holotype: Duxbury, 1980, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.98, figs.1–2. Originally *Gonyaulacysta*, subsequently (and now) *Rhynchodiniopsis*. Taxonomic senior synonym: *Rhynchodiniopsis aptiana*, according to Below (1981a, p.118) — however, Sarjeant (1982b, p.36) retained *Rhynchodiniopsis fimbriata*. Age: middle Barremian.

foveata Snape, 1992, p.277, figs.7h,k,n. Holotype: Snape, 1992, fig.7h. Age: middle Tithonian.

"?*giuseppei*" (Morgenroth, 1966a, p.5, pl.2, figs.3–6) Sarjeant, 1982b, p.36. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Cribroperidinium*. Questionable assignment: Sarjeant (1982b, p.36). Age: early Eocene.

"subsp. *giuseppei*". Autonym. **Now redundant.** Originally *Gonyaulax giuseppei* subsp. *giuseppei* (Appendix B), subsequently *Gonyaulacysta giuseppei* subsp. *giuseppei*, thirdly *Millioudodinium?* *giuseppei* subsp. *giuseppei*, fourthly *Rhynchodiniopsis?* *giuseppei* subsp. *giuseppei*, fifthly *Cribroperidinium giuseppei* subsp. *giuseppei*. Taxonomic junior synonym: *Gonyaulax* (as *Cribroperidinium*) *giuseppei* subsp. *major*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81).

"subsp. *major*" (Morgenroth, 1966a, p.6, pl.2, figs.5–6) Sarjeant, 1982b, p.36. Holotype: Morgenroth, 1966a, pl.2, figs.5–6. Originally *Gonyaulax giuseppeii* subsp. *major* (Appendix B), subsequently *Gonyaulacysta giuseppeii* subsp. *major*, thirdly *Millioudodinium?* *giuseppeii* subsp. *major*, fourthly *Rhynchodiniopsis?* *giuseppeii* subsp. *major*, fifthly *Cribroperidinium giuseppeii* subsp. *majus*. **Taxonomic senior synonym:** *Rhynchodiniopsis* (as *Cribroperidinium*) *giuseppeii* subsp. *giuseppeii*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81). Age: early Eocene.

"*globata*" (Gitmez and Sarjeant, 1972, p.195,197, pl.3, figs.1–2; text-figs.5A–B) Sarjeant, 1982b, p.35. Holotype: Gitmez and Sarjeant, 1972, pl.3, fig.1; text-fig.5A; Jan du Chêne et al., 1986a, pl.29, fig.3. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly *Cribroperidinium?*, fifthly (and now) *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulacysta cauda* and *Gonyaulacysta systremmata*, both according to Poulsen (1996, p.72). Age: middle-late Kimmeridgian.

gochtii (Pocock, 1972, p.90, pl.22, fig.12; text-fig.6) Jansonius in Jan du Chêne et al., 1986a, p.287. Holotype: Pocock, 1972, pl.22, fig.12; Jan du Chêne et al., 1986a, pl.93, figs.4–8; Jansonius, 1986, pl.1, figs.1–3; text-fig.14. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly *Endoscrinium*, fourthly (and now) *Rhynchodiniopsis*. Jansonius (1986, p.218) also proposed this combination. Age: late Bajocian.

gongylos (Sarjeant, 1966b, p.111–113, pl.13, figs.1–2; text-fig.23) Sarjeant, 1982b, p.35. Holotype: Sarjeant, 1966b, pl.13, figs.1–2; text-fig.23; Jan du Chêne et al., 1986a, pl.93, figs.10–13. Originally *Gonyaulacysta*, subsequently *Leptodinium?*, thirdly (and now) *Rhynchodiniopsis*. N.I.A. Age: early Oxfordian.

"*granulata*" (Klement, 1960, p.39–41, pl.4, figs.10–13; text-figs.18–20) Sarjeant, 1982b, p.35. Emendation: Sarjeant, 1984a, p.161–162, as *Meristaulax granulata*. Holotype: Klement, 1960, pl.4, figs.10–11; text-figs.18–20; Fensome et al., 1995, figs.1–2 — p.1525; disintegrated according to Sarjeant (1984a, p.162). Lectotype (designated by Sarjeant, 1984a, p.162): Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2a–b; Fensome et al., 1995, figs.5–6 — p.1525 — however, Brenner (1988, p.35) argued that this specimen is not conspecific with the holotype. Lectotype (designated by Brenner, 1988, p.35): Brenner, 1988, pl.1, figs.3a–c; Fensome et al., 1995, figs.7–9 — p.1525. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Meristaulax* Sarjeant, sixthly *Acanthaulax*. Poulsen (1996, p.73) retained this species in *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *venusta*, according to Schrank (2005, p.56); *Gonyaulax* (now *Cribroperidinium*) *granuligera*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156–158) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*; *Gonyaulacysta* (as *Acanthaulax?*, now *Cribroperidinium*) *angulosa*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*) *angulosa*. For further discussion, see *Cribroperidinium granulatum*. Age: middle Oxfordian–early Kimmeridgian.

"*granuligera*" (Klement, 1960, p.41–42, pl.5, figs.4–5) Sarjeant, 1982b, p.35. Emendation: Sarjeant, 1984a, p.156, as *Cryptarchaeodinium granuligerum*. Holotype: Klement, 1960, pl.5, figs.4–5; Sarjeant, 1984a, pl.1, figs.3–4; text-fig.1; Jan du Chêne et al., 1986a, pl.27, figs.11–14. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Cryptarchaeodinium*, sixthly *Acanthaulax*. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*) *granulata*, according to Fisher and Riley (1980, p.121) — however, Sarjeant (1984a, p.156) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*. Age: middle Oxfordian–early Kimmeridgian.

"*hadra*" (Sarjeant, 1966b, p.119–121, pl.14, fig.1; text-fig.28) Sarjeant, 1982b, p.35. Holotype: Sarjeant, 1966b, pl.14, fig.1. **NOW** *Leptodinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Leptodinium?*. Age: late Barremian.

hermii Kirsch, 1993, p.48,50, pl.3, figs.10–17. Holotype: Kirsch, 1993, pl.3, figs.12–13. Age: Barremian.

"*hyaloderma*" (Deflandre, 1939b, p.144, pl.6, figs.3–4 ex Sarjeant, 1967b, p.252) Sarjeant, 1982b, p.36. Holotype: Deflandre, 1939b, pl.6, figs.3–4; Jan du Chêne et al., 1986a, pl.58, figs.1–5. **NOW** *Impagidinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly

Rhynchodiniopsis?, fifthly (and now) *Impagidinium?*. Questionable assignment: Sarjeant (1982b, p.36). Age: Kimmeridgian.

"*hyalodermopsis*" (Cookson and Eisenack, 1958, p.34, pl.3, figs.11–12; text-figs.5–6) Sarjeant, 1982b, p.35. Holotype: Cookson and Eisenack, 1958, pl.3, figs.11–12; text-figs.5–6; Jan du Chêne et al., 1986a, pl.74, figs.9–10. **NOW** *Leptodinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Leptodinium?*, fourthly *Rhynchodiniopsis*. Age: Neocomian–Aptian.

?*italica* (Corradini, 1973, p.132–133, pl.19, figs.8a–b; pl.33, figs.5a–b; text-figs.3a–d) Jan du Chêne et al., 1985b, p.120. Holotype: Corradini, 1973, pl.19, figs.8a–b; text-figs.3a–d; Jan du Chêne et al., 1986a, pl.98, fig.11. Originally *Gonyaulacysta*, subsequently *Millioudodinium?*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis?*. Questionable assignment: Jan du Chêne et al. (1985b, p.120). Age: Late Cretaceous–Paleocene.

"?*mamillifera*" (Deflandre, 1939b, p.143, pl.6, fig.1) Sarjeant, 1982b, p.36. Holotype: Deflandre, 1939b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.72, figs.1–8. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Leptodinium*. Questionable assignment: Sarjeant (1982b, p.36). Age: Kimmeridgian.

martonensis Bailey et al., 1997, p.239, figs.4a–b. Holotype: Bailey et al., 1997, fig.4a. Age: late Kimmeridgian.

?*microceras* (Eisenack, 1958a, p.391, pl.21, fig.13) Sarjeant, 1985a, p.66. Emendation: Sarjeant, 1985a, p.67, as *Rhynchodiniopsis microceras*. Holotype: Eisenack, 1958a, pl.21, fig.13; Sarjeant, 1985a, pl.6, figs.5–6; pl.7, fig.6; text-fig.4; Jan du Chêne et al., 1986a, pl.99, figs.5–6. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Rhynchodiniopsis?*. Questionable assignment: Jan du Chêne et al. (1986a, p.287). Age: late Aptian.

"?*nannotrix*" (Deflandre, 1939b, p.143, pl.6, fig.7) Sarjeant, 1982b, p.36. Holotype: Deflandre, 1939b, pl.6, fig.7; Jan du Chêne et al., 1986a, pl.69, figs.4–6. **NOW** *Leptodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Leptodinium*. Questionable assignment: Sarjeant (1982b, p.36). Age: Kimmeridgian.

?*nealei* (Sarjeant, 1962a, p.480–481, pl.69, fig.1; text-fig.2) Jan du Chêne et al., 1985b, p.120. Holotype: Sarjeant, 1962a, pl.69, fig.1; text-fig.2. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Hystrichogonyaulax*, fourthly *Hystrichogonyaulax?*, fifthly *Rhynchodiniopsis*, sixthly (and now) *Rhynchodiniopsis?*. Questionable assignment: Jan du Chêne et al. (1986a, p.287–288). Age: Oxfordian.

"*obesa*" (Brideaux, 1971, p.82, pl.23, fig.39; text-figs.8a–b) Sarjeant, 1982b, p.35. Holotype: Brideaux, 1971, pl.23, fig.39; text-figs.8a–b; Jan du Chêne et al., 1986a, pl.30, fig.9. **NOW** *Cribroperidinium?*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Cribroperidinium?*. Age: late Albian.

"*palla*" (Sarjeant, 1966b, p.113–114, pl.13, figs.3–4; text-fig.24) Sarjeant, 1982b, p.35. Holotype: Sarjeant, 1966b, pl.13, figs.3–4; Jan du Chêne et al., 1986a, pl.27, figs.15–17. **NOW** *Cribroperidinium*. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Cribroperidinium*. Age: early Barremian.

"*pectinigera*" Prauss, 1990, p.281. **Name not validly published**: no description. This name presumably refers to *Gonyaulacysta pectinigera*.

pennata (Riley in Fisher and Riley, 1980, p.321–322, pl.1, figs.10–11) Jan du Chêne et al., 1985b, p.118. Holotype: Fisher and Riley, 1980, pl.1, figs.10–11; Jan du Chêne et al., 1986a, pl.98, fig.5. Originally *Gonyaulacysta*, subsequently *Hystrichogonyaulax*, thirdly *Millioudodinium*, fourthly (and now) *Rhynchodiniopsis*. Age: late Kimmeridgian.

"*perforans*" (Cookson and Eisenack, 1958, p.30–32, pl.2, figs.1–4, 7–8; text-figs.8–9) Sarjeant, 1982b, p.35. Holotype: Cookson and Eisenack, 1958, pl.2, fig.1; text-figs.8–9; Jan du Chêne et al., 1986a, pl.32, fig.2. **NOW**

Cribroperidinium?. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Leptodinium?*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium*, sixthly (and now) *Cribroperidinium?*. Age: Late Jurassic.

?*regalis* (Gocht, 1970b, p.139–140, pl.33, figs.5–7; text-fig.10) Jan du Chêne et al., 1985b, p.120. Holotype: Gocht, 1970b, pl.33, fig.6; text-fig.10; Jan du Chêne et al., 1986a, pl.98, figs.6–10. Originally *Leptodinium*, subsequently *Hystrichogonyaulax*, thirdly (and now) *Rhynchodiniopsis?*. Questionable assignment: Jan du Chêne et al. (1985b, p.120). Age: early Bathonian.

"*saepita*" (Ashraf, 1979, p.128, pl.2, fig.27; pl.3, figs.1–3,5) Jan du Chêne et al., 1985b, p.120. Holotype: Ashraf, 1979, pl.3, fig.2. **NOW** *Leptodinium*. Originally (and now) *Leptodinium*, subsequently *Hystrichogonyaulax*, thirdly *Rhynchodiniopsis*, fourthly *Ctenidodinium*. Age: Late Jurassic (Malm).

saliorum Louwye, 1997, p.152–153, pl.2, figs.1–2,4,9. Holotype: Louwye, 1997, pl.2, figs.1–2,4. The epithet is in the genitive plural case and would not change its ending if transferred to a genus of different gender. Age: Campanian.

"*sarjeantii*" (Vozzhennikova, 1967, p.87–89, pl.25, figs.1–2; pl.28, fig.4; pl.31, figs.1–3; pl.32, figs.1–4) Sarjeant, 1982b, p.35. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3?; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium?*, sixthly (and now) *Cribroperidinium*. Age: Tithonian.

"subsp. *sarjeantii*". Autonym. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3?; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **NOW** *Cribroperidinium sarjeantii* subsp. *sarjeantii*. Originally *Gonyaulacysta sarjeantii* subsp. *sarjeantii*, subsequently *Millioudodinium sarjeantii* subsp. *sarjeantii*, thirdly *Rhynchodiniopsis sarjeantii* subsp. *sarjeantii*, fourthly *Cribroperidinium? sarjeantii* subsp. *sarjeantii*, fifthly (and now) *Cribroperidinium sarjeantii* subsp. *sarjeantii*.

"subsp. *sphaerica*" (Vozzhennikova, 1967, p.89, pl.25, figs.1–2; pl.28, fig.4; pl.32, figs.1–4) Sarjeant, 1982b, p.35. Holotype: Vozzhennikova, 1967, pl.28, fig.4; Jan du Chêne et al., 1986a, pl.20, fig.9; lost according to Lentin and Vozzhennikova (1990, p.97). Lectotype: Lentin and Vozzhennikova, 1990, pl.16, figs.1–2, designated by Lentin and Vozzhennikova (1990, p.97). **NOW** *Cribroperidinium sarjeantii* subsp. *sphaericum*. Originally *Gonyaulax sarjeantii* var. *sphaerica* (Appendix B), subsequently *Gonyaulacysta sarjeantii* subsp. *sphaerica*, thirdly *Millioudodinium sarjeantii* subsp. *sphaericum*, fourthly *Rhynchodiniopsis sarjeantii* subsp. *sphaerica*, fifthly *Cribroperidinium? sarjeantii* subsp. *sphaericum*, sixthly (and now) *Cribroperidinium sarjeantii* subsp. *sphaericum*. Age: Tithonian.

serrata (Cookson and Eisenack, 1958, p.34, pl.3, fig.2; text-figs.12–14) Jan du Chêne et al., 1985b, p.120. Holotype: Cookson and Eisenack, 1958, pl.3, fig.2; Jan du Chêne et al., 1986a, pl.99, figs.3–4. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. Age: Late Jurassic–Neocomian.

"*setcheyensis*" (Sarjeant, 1976c, p.4–6, pl.1, fig.7; text-fig.1) Sarjeant, 1982b, p.36. Holotype: Sarjeant, 1976c, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.74, figs.1–4. **NOW** *Impagidinium*. Originally *Gonyaulacysta*, subsequently *Leptodinium*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Impagidinium*. Age: Kimmeridgian.

"*tenuitabulata*" (Gerlach, 1961, p.159, pl.25, figs.10–11; text-figs.1–3) Sarjeant, 1984b, p.76. Holotype: Gerlach, 1961, pl.25, figs.10–11. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribroperidinium*, fifthly *Rhynchodiniopsis*. Age: middle Oligocene–middle Miocene.

"*whitei*" (Sarjeant, 1966b, p.126–128, pl.14, fig.2; text-fig.32) Sarjeant, 1982b, p.36. Holotype: Sarjeant, 1966b, pl.14, fig.2. **NOW** *Impagidinium?*. Originally *Gonyaulacysta*, subsequently (and now) *Impagidinium?*, thirdly *Rhynchodiniopsis*. Age: Cenomanian.

RIASANODINIUM Iosifova, 1992, p.62. Type: Iosifova, 1992, pl.9, figs.1a–b; text-figs.1a–b, as *Riasanodinium fedorovae*.

**fedorovae* Iosifova, 1992, p.62–63, pl.9, figs.1a–c (not fig.5); text-figs.1a–b. Holotype: Iosifova, 1992, pl.9, figs.1a–b; text-figs.1a–b; Iosifova, 1996, pl.13, figs.4a–c; text-figs.11A–B. Age: Ryazanian.

RICULACYSTA Stover, 1977, p.76–77. Type: Stover, 1977, pl.2, figs.22–24, as *Riculacysta perforata*.

amplexa Kirsch, 1991, p.127–128, pl.33, figs.1,5–6,9–13; pl.43, figs.1,4,7; text-figs.60a–b. Holotype: Kirsch, 1991, pl.33, figs.5,9; Fauconnier and Masure, 2004, pl.67, figs.7–8. Age: late Maastrichtian.

?*pala* Kirsch, 1991, p.128–129. pl.32, figs.11–13; pl.33, figs.2–4,7–8; text-figs.61a–c. Holotype: Kirsch, 1991, pl.32, figs.11–13; text-figs.61a–c; Fauconnier and Masure, 2004, pl.67, figs.1–3. Questionable assignment: Kirsch (1991, p.128). N.I.A. Age: Maastrichtian.

**perforata* Stover, 1977, p.77–78, pl.2, figs.22–31. Holotype: Stover, 1977, pl.2, figs.22–24; Fensome et al., 1995, figs.1–3 — p.1651. Taxonomic junior synonym: *Cyclonephelium semitectum*, according to Köthe (1990, p.50) — however, Kirsch (1991, p.129) retained *Cyclonephelium* (as *Riculacysta*, now *Glaphyrocysta*) *semitectum*. Age: middle-late Oligocene.

"*semitecta*" (Bujak in Bujak et al., 1980, p.46,48,50, pl.14, figs.2–9; text-fig.13) Kirsch, 1991, p.129. Holotype: Bujak et al., 1980, pl.14, figs.4–6; Fauconnier and Masure, 2004, pl.33, figs.10–11. **Combination not validly published**: basionym not fully referenced. **NOW** *Glaphyrocysta*. Originally *Cyclonephelium*, subsequently (and now) *Glaphyrocysta*, thirdly *Riculacysta* (combination not validly published). Taxonomic senior synonym: *Riculacysta perforata*, according to Köthe (1990, p.50) — however, Kirsch (1991, p.129) retained *Cyclonephelium* (as *Riculacysta*, now *Glaphyrocysta*) *semitectum*. Age: middle Eocene (see Aubry, 1986).

shauka Slimani et al., 2012, p.348–349, fig.7A–I. Holotype: Slimani et al., 2012, fig.7A–E. Age: late Maastrichtian–Thanetian.

RIGAUDELLA Below, 1982b, p.138–139. Type: Deflandre, 1939a, pl.11, fig.1, as *Hystrichosphaeridium aemulum*.

**aemula* (Deflandre, 1939a, p.187–189, pl.9, fig.12; pl.10, figs.5–8; pl.11, figs.1,7) Below, 1982b, p.139. Emendation: Below, 1982b, p.139–140, as *Rigaudella aemula*. Holotype: Deflandre, 1939a, pl.11, fig.1; Eisenack and Kjellström, 1972, figure to left — p.43; Fensome et al., 1995, fig.1 — p.1473; fig.2 — p.1477. Originally *Hystrichosphaeridium*, subsequently *Cannosphaeropsis*, thirdly *Adnatosphaeridium*, fourthly (and now) *Rigaudella*. Taxonomic junior synonym: *Cannosphaeropsis paucispina*, according to Below (1982b, p.139). Age: Oxfordian.

subsp. *aemula*. Autonym. Holotype: Deflandre, 1939a, pl.11, fig.1; Eisenack and Kjellström, 1972, figure to left — p.43; Fensome et al., 1995, fig.1 — p.1473; fig.2 — p.1477. Originally *Cannosphaeropsis aemula* subsp. *aemula*, subsequently *Adnatosphaeridium aemulum* subsp. *aemulum*, thirdly (and now) *Rigaudella aemula* subsp. *aemula*.

subsp. *fenestrata* Nejad et al., 1999, p.51–52, pl.15, figs.3,10; text-fig.6.3. Holotype: Nejad et al., 1999, pl.15, fig.10; text-fig.6.3. Age: early Oxfordian.

subsp. *integra* (Cookson and Eisenack, 1958, p.47, pl.7, figs.6–7) Below, 1982b, p.147. Holotype: Cookson and Eisenack, 1958, pl.7, fig.6; Fensome et al., 1995, fig.1 — p.1565; Fauconnier and Masure,

2004, pl.68, figs.8–9. Originally *Cannosphaeropsis aemula* subsp. *integra*, subsequently *Adnatosphaeridium aemulum* subsp. *integrum*, thirdly (and now) *Rigaudella aemula* subsp. *integra*. Age: Late Jurassic.

apenninica (Corradini, 1973, p.163–164, pl.25, figs.4a–b; pl.36, figs.1a–b) Below, 1982b, p.148. Holotype: Corradini, 1973, pl.25, figs.4a–b; Fauconnier and Masure, 2004, pl.68, figs.10–12. Originally *Adnatosphaeridium*, subsequently (and now) *Rigaudella*. Age: Campanian–?Paleocene.

"*apiculata*" (Cookson and Eisenack, 1960b, p.254, pl.39, fig.15) Below, 1982b, p.148. Emendation: Davey, 1988, p.43–44, as *Papuadinium apiculatum*. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.15; Fensome et al., 1993a, fig.1 — p.927. **NOW** *Papuadinium*. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly *Rigaudella*, fourthly (and now) *Papuadinium*. Age: ?Tithonian.

filamentosa (Cookson and Eisenack, 1958, p.47–48, pl.7, figs.8–9; pl.8, figs.1–2) Below, 1982b, p.148. Holotype: Cookson and Eisenack, 1958, pl.7, fig.9. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly (and now) *Rigaudella*. Taxonomic junior synonym: *Cannosphaeropsis* (subsequently *Rigaudella*) *perforata*, according to Stancliffe and Sarjeant (1990, p.206). Age: Middle-Late Jurassic.

"*perforata*" (Alberti, 1961, p.37, pl.9, fig.14) Below, 1982b, p.149. Holotype: Alberti, 1961, pl.9, fig.14. Originally *Cannosphaeropsis*, subsequently *Adnatosphaeridium*, thirdly *Rigaudella*. **Taxonomic senior synonym:** *Cannosphaeropsis* (now *Rigaudella*) *filamentosa*, according to Stancliffe and Sarjeant (1990, p.206). Fauconnier and Ogg in Fauconnier and Masure (2004, p.479–480) listed this taxon as a provisional species but accepted the synonymy cited above. Age: ?Callovian.

"*separata*" Parker in Riding and Helby, 2001g, p.184. **Name not validly published:** no description. **Taxonomic senior synonym:** *Balcattia cheleusis*, according to Riding and Helby (2001g, p.184).

RIPEA Batten, 1985, p.431. Type: Batten, 1985, text-figs.3B,5A, as *Ripea sussexensis*.

**sussexensis* Batten, 1985, p.431–432, text-figs.3A–C,4A–L,5A–F. Emendation: Batten and Lister, 1988, p.354. Holotype: Batten, 1985, text-figs.3B,5A; Fensome et al., 1995, figs.4,8 — p.1815. Age: ?late Hauterivian.

RISSERELLA Trejo, 1983, p.8. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1301, who noted that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). Type: Trejo, 1983, pl.45, fig.3, as *Risserella rablingae*.

cordobaensis Trejo, 1983, p.9, pl.47, figs.1–6. Holotype: Trejo, 1983, pl.47, fig.6. Age: Cenomanian–Turonian.

**rablingae* Trejo, 1983, p.8–9, pl.45, fig.3; pl.46, figs.3–8. Holotype: Trejo, 1983, pl.45, fig.3. Age: Cenomanian–Turonian.

"**RIVERNOOKIA**" Cookson and Eisenack, 1982, p.56. **Taxonomic senior synonym:** *Hafniasphaera*, by implication in Lentin and Williams (1985, p.163), who included the "type species" of *Rivernookia*, *Rivernookia septata*, in *Hafniasphaera*. Taxonomic senior synonym: *Spiniferites*, according to Stover and Williams (1987, p.195). Type: Cookson and Eisenack, 1967b, pl.42, fig.6, as *Baltisphaeridium septata*.

septata* (Cookson and Eisenack, 1967b, p.253–254, pl.42, figs.6–10; text-fig.1) Cookson and Eisenack, 1982, p.56. Emendation: McLean, 1971, p.730, as *Spiniferites septatus*. Holotype: Cookson and Eisenack, 1967b, pl.42, fig.6; Eisenack and Kjellström, 1975b, uppermost figure — p.984w; Fensome et al., 1996, fig.1 — p.2355. **NOW *Hafniasphaera*. Originally *Baltisphaeridium* (Appendix A), subsequently *Spiniferites*, thirdly (and now) *Hafniasphaera*, fourthly *Achomosphaera*, fifthly *Rivernookia*. Age: late Paleocene.

ROMANODINIUM Balteş, 1971, p.8–9. Type: see discussion under *Romanodinium areolatum*; "type species" — *Romanodinium areolatum*.

***areolatum** Balteş, 1971, p.9, pl.3 (not pl.5), figs.1–2. Holotype: designated by Balteş (1971), but not clearly related to an illustration. Age: early Pliocene.

ROSSWANGIA Wille and Gocht, 1985, p.123,125,127,129. Taxonomic junior synonym: *Dinaurelia*, according to Below (1987b, p.29) — however, Stover and Williams (1987, p.79) and Lentin and Williams (1989, p.110) retained *Dinaurelia*. Type: Wille and Gocht, 1985, pl.5, figs.7a–b, as *Rosswangia simplex*.

holotabulata (Davies, 1983, p.14–15, pl.1, figs.9–19; text-fig.7) Below, 1987b, p.30. Emendation: Below, 1987b, p.30, as *Rosswangia holotabulata*. Holotype: Davies, 1983, pl.1, figs.9–11. Originally *Dapcodinium*, subsequently (and now) *Rosswangia*. Age: Toarcian–Bathonian.

"**pyrgos**" (Wille and Gocht, 1985, p.129–131,133–135, pl.1, figs.1a–d,2–3; pl.2, figs.1a–d,2a–b,3,4a–b; pl.3, figs.1a–b,2–5; pl.4, figs.1a–b,2,3a–c,4a–b,5; pl.5, figs.1a–b; text-figs.1A–C,2A–B,3A–B,4A–B,5A–B,6B) Below, 1987b, p.30. Holotype: Wille and Gocht, 1985, pl.1, figs.1a–d; text-figs.2A–B; Fensome et al., 1995, figs.1–4,10 — p.1719. **NOW** *Dinaurelia*. Originally (and now) *Dinaurelia*, subsequently *Rosswangia*. N.I.A. Age: late Bajocian.

***simplex** Wille and Gocht, 1985, p.123,125,127,129, pl.5, figs.2–3,4a–b,5–6,7a–b; text-fig.6A. Holotype: Wille and Gocht, 1985, pl.5, figs.7a–b; Fensome et al., 1995, figs.5–6 — p.1789. Age: middle Callovian.

ROTOSPHAEROPSIS Davey, 1988, p.45. Type: Davey, 1988, pl.10, figs.1,5, as *Rotosphaeropsis muna*.

***munu** Davey, 1988, p.45–46, pl.10, figs.1–3,5. Holotype: Davey, 1988, pl.10, figs.1,5; Fensome et al., 1996, figs.1–2 — p.2237. N.I.A. Age: Valanginian.

thule (Davey, 1982b, p.26–27, pl.8, figs.7–11) Riding and Davey, 1989, p.109. Emendation: Riding and Davey, 1989, p.109,112, as *Rotosphaeropsis thule*. Holotype: Davey, 1982b, pl.8, figs.8–11; Riding and Davey, 1989, pl.1, fig.4. Originally *Cannosphaeropsis*, subsequently (and now) *Rotosphaeropsis*. N.I.A. Age: latest Kimmeridgian–late Ryazanian.

ROTTNESTIA Cookson and Eisenack, 1961b, p.40,42. Taxonomic senior synonyms: *Hystrichosphaeropsis*, according to Sarjeant (1966b, p.139) — however, Stover and Evitt (1978, p.185) retained *Rottnestia*; *Triblastula*, according to Yun Hyesu (1981, p.22) — however, Jan du Chêne et al. (1986a, p.309) retained *Rottnestia*. Jan du Chêne et al. (1986a, p.309) referred to the description of this genus by Stover and Evitt (1978, p.185) as an emendation, although the latter authors did not indicate it to be an emendation. Type: Eisenack, 1954b, pl.9, fig.5, as *Hystrichosphaera borussica*.

amphicavata Dobell and Norris in Harland et al., 1980, p.218–220, text-figs.4A–N,5–7. Holotype: Harland et al., 1980, text-figs.4A–C. Taxonomic senior synonym: *Spiniferites frigidus*, according to Bujak (1984, p.191) — however, de Vernal et al. (1992, p.324) retained *Rottnestia amphicavata*. Age: Holocene.

***borussica** (Eisenack, 1954b, p.62, pl.9, figs.5a–b,6–7) Cookson and Eisenack, 1961b, p.42. Holotype: Eisenack, 1954b, pl.9, fig.5a–b. Originally *Hystrichosphaera*, subsequently (and now) *Rottnestia*, thirdly *Triblastula*, fourthly *Hystrichosphaeropsis* (combination not validly published). Eisenack (1969a, p.105–108) and Jan du Chêne et al. (1986a, p.309) retained this species in *Rottnestia*. Taxonomic junior synonym: *Hystrichosphaeropsis jubata* (name not validly published), according to May (1980, p.24). Age: early Oligocene.

subsp. **borussica**. Autonym. Holotype: Eisenack, 1954b, pl.9, fig.5.

subsp. **granulata** Heilmann-Clausen in Heilmann-Clausen and Costa, 1989, p.470–471, pl.17, figs.5,9–11. Holotype: Heilmann-Clausen and Costa, 1989, pl.17, fig.9. Age: early Eocene (Ypresian).

granulata Hultberg, 1985c, p.143–144, pl.9, fig.J. Holotype: Hultberg, 1985c, pl.9, fig.J. Age: late Maastrichtian–early Paleocene.

ovata Matsuoka and Bujak, 1988, p.69–70, pl.10, figs.1a–b,2; text-fig.14. Holotype: Matsuoka and Bujak, 1988, pl.10, figs.1a–b; text-fig.14. Age: late Oligocene–early Miocene.

"*simplicia*" Cookson and Eisenack, 1961b, p.42, pl.2, figs.3–4; text-figs.1e–f. Holotype: Cookson and Eisenack, 1961b, pl.2, figs.3–4; text-figs.1e–f; Jan du Chêne et al., 1986a, pl.54, figs.1–5. **NOW** *Impagidinium?*. Originally *Rottnestia*, subsequently *Psaligonyaulax*, thirdly (and now) *Impagidinium?*. Age: Eocene.

wetzelii (Deflandre, 1937b, p.65, pl.11 [al. pl.8], figs.6,8) Slimani, 1994, p.59. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), figs.6,8. Originally *Hystrichosphaera*, subsequently *Hystrichosphaeropsis* (combination not validly published), thirdly *Spiniferites*, fourthly (and now) *Rottnestia*. Taxonomic junior synonym: *Hystrichosphaeropsis forficata* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

subsp. *brevispinosa* Slimani, 1994, p.58–59, pl.9, figs.7–13. Holotype: Slimani, 1994, pl.9, figs.12–13. Taxonomic junior synonym: *Hystrichosphaeropsis jubata* (name not validly published), according to Slimani (1994, p.58)– however, Slimani did not acknowledge the synonymy of *Hystrichosphaeropsis jubata* with *Hystrichosphaera* (now *Rottnestia*) *borussica* by May (1980). Age: late Campanian.

subsp. *wetzelii*. Autonym. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), figs.6,8. Slimani (1994, p.59–60) and Schiøler et al. (1997, p.89–90) proposed emendations of this taxon.

"**ROTUNDUS**" Koppelhus and Nielsen, 1994, p.175. **Name not validly published**: no description.

"*granulatus*" Koppelhus and Nielsen, 1994, p.175. **Name not validly published**: no description or illustration.

RUEGENIA Willems, 1992, p.157–158. Emendations: Kienel, 1994, p.40; Hildebrand-Habel and Willems 2004, p.185. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1301). Type: Willems, 1992, pl.1, figs.1–5, as *Ruegenia inaequilamellata*.

areata Keupp et al., 1992, p.196–198, pl.2, figs.1–14. Holotype: Keupp et al., 1992, pl.2, figs.1–3. Age: late Albian.

crassa Kienel, 1994, p.40–42, pl.6, figs.7–15; pl.7, figs.1–4; text-fig.15. Holotype: Kienel, 1994, pl.6, figs.7–9. Age: Maastrichtian.

hadra Keupp et al., 1992, p.198–199, pl.3, figs.3–9. Holotype: Keupp et al., 1992, pl.3, figs.3–7. Age: early Aptian.

**inaequilamellata* Willems, 1992, p.158–159, pl.1, figs.1–5. Holotype: Willems, 1992, pl.1, figs.1–5. Age: early Maastrichtian.

kyrta Keupp et al., 1992, p.195–196, pl.1, figs.1–13. Holotype: Keupp et al., 1992, pl.1, figs.1–2. Age: middle to late Albian.

nodosa Keupp et al., 1992, p.198, pl.1, figs.14–15. Holotype: Keupp et al., 1992, pl.1, figs.14–15. Age: middle Albian.

oranensis Keupp and Kohring, 1993, p.30–31, pl.3, figs.1–7. Holotype: Keupp and Kohring, 1993, pl.3, figs.4–5,7. Age: late Miocene.

quinqueangulata Hildebrand-Habel and Willems, 1997 p.185–186, pl.3, figs.12–15 ex Hildebrand-Habel and Willems, 2004, p.185, pl.2, figs.4–11. Holotype: Hildebrand-Habel and Willems, 1997, pl.3, figs.12–14; Hildebrand-Habel and Willems, 2004, pl.2, figs.4–11. This name was not validly published in Hildebrand-Habel and Willems (1997), since the authors did not designate a holotype and referred it to a submitted manuscript. Age: middle Coniacian–early Santonian.

SAEPTODINIUM Harris, 1974, p.162. Taxonomic junior synonym: *Sanshuia*, according to Lentin and Williams (1989, p.326) — however, Mao Shaozhi et al. (1995, p.50) retained *Sanshuia*. Type: Harris, 1974, pl.1, fig.2, as *Saeptodinium gravattense*.

circulare Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.66, pl.2, figs.16–18. Holotype: He Chengquan et al., 1989, pl.2, fig.17. Age: Eocene.

"*dalangshanense*" (Yu Jingxian et al., 1981, p.259, pl.1, figs.7–10,15–16) Lentin and Williams, 1989, p.325. Holotype: Yu Jingxian et al., 1981, pl.1, fig.7. **NOW** *Morkallacysta*. Originally *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*, fourthly (and now) *Morkallacysta*. Age: Late Cretaceous.

eminens (Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.48, pl.5, figs.17–18) Mao Shaozhi et al., 1995, p.49. Holotype: He Chengquan et al., 1989, pl.5, fig.17. Originally *Laciniadinium*, subsequently (and now) *Saeptodinium*. Age: Early Tertiary.

"*eurypylum*" (Manum and Cookson, 1964, p.20–21, pl.4, figs.7–13) Stover and Evitt, 1978, p.220. Holotype: Manum and Cookson, 1964, pl.4, figs.9–10. **NOW** *Palaeoperidinium*? Originally *Scriniodinium*, subsequently *Palaeoperidinium*, thirdly *Saeptodinium*, fourthly (and now) *Palaeoperidinium*? Age: Late Cretaceous.

fibrirugulare (Yu Jingxian et al., 1981, p.260, pl.1, figs.11–12) Lentin and Williams, 1989, p.325. Holotype: Yu Jingxian et al., 1981, pl.1, fig.11. Originally *Sanshuia*, subsequently *Geiselodinium*, thirdly (and now) *Saeptodinium*. Age: Late Cretaceous.

**gravattense* Harris, 1974, p.162–163, pl.1, figs.1–4. Holotype: Harris, 1974, pl.1, fig.2. Age: Paleocene.

hansonianum (Traverse, 1955, p.77–79, pl.13, fig.147) Stover and Evitt, 1978, p.220. Holotype: Traverse, 1955, pl.13, fig.147; Traverse, 1994, pl.1, fig.1. Originally *Peridinium* (Appendix B), subsequently *Palaeoperidinium*, thirdly (and now) *Saeptodinium*. This combination was not validly published in Harris (1974, p.162), since that author did not fully reference the basionym. Evitt (1974, p.4) indicated that this species has affinities with the modern species *Peridinium limbatum* (Stokes, 1887) Lemmermann, 1899. Age: latest Oligocene (middle early Miocene, according to Traverse, 1994).

"*micropodum*" (Yu Jingxian et al., 1981, p.259–260, pl.1, figs.3–4) Lentin and Williams, 1989, p.325. Emendation: Mao Shaozhi et al., 1995, p.50–51, as *Sanshuia micropodum*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.3. **NOW** *Sanshuia*. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Age: Late Cretaceous.

"*minus*" (Yu Jingxian et al., 1981, p.260, pl.1, figs.13–14) Lentin and Williams, 1989, p.325. Emendation: Mao Shaozhi et al., 1995, p.50, as *Sanshuia minor*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.13. **NOW** *Sanshuia*. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Age: Late Cretaceous.

minutum (Jiabo, 1978, p.83, pl.3, figs.10–11) Lentin and Williams, 1989, p.325. Holotype: Jiabo, 1978, pl.3, fig.11. Originally *Deflandrea*, subsequently *Sanshuia*, thirdly *Geiselodinium*, fourthly (and now) *Saeptodinium*. Age: Early Tertiary.

"*ovatum*" (Jiabo, 1978, p.84, pl.4, figs.1–3) Lentin and Williams, 1989, p.325. Emendation: Mao Shaozhi et al., 1995, p.51, as *Sanshuia ovata*. Holotype: Jiabo, 1978, pl.4, fig.2. **NOW** *Sanshuia*. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Sanshuia*, fourthly *Geiselodinium*, fifthly *Saeptodinium*. Age: Early Tertiary.

skipseaense Hunt in Hunt et al., 1985, p.103, pl.1, figs.1–9; pl.2, figs.1–3; text-fig.2. Holotype: Hunt et al., 1985, pl.1, figs.2,5,8. Age: late Quaternary.

"*sphaericum*" (Yu Jingxian et al., 1981, p.259, pl.1, figs.1–2,6) Lentin and Williams, 1989, p.325. Emendation: Mao Shaozhi et al., 1995, p.52, as *Sanshuia sphaerica*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.1. **NOW** *Sanshuia*. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Age: Late Cretaceous.

tasmaniense Harris, 1974, p.163, pl.1, fig.12; pl.2, figs.1–6. Holotype: Harris, 1974, pl.2, fig.1. Age: late Oligocene–early Miocene.

tiandongense He Chengquan and Qian Zeshu, 1979, p.177, pl.1, figs.6–7a–b. Holotype: He Chengquan and Qian Zeshu, 1979, pl.1, fig.7. Age: late Eocene–Oligocene.

SAGENODINIUM Williams et al., 2015, p.311–312. Type: Damassa, 1979a, pl.8, fig.8, as *Kisselevia crassoramosa*.

**franciscanum* Williams et al., 2015, p.312, pl.2, figs.15–16. Holotype: Damassa, 1979a, pl.8, fig.8, as *Kisselevia crassoramosa*. Age: Eocene.

SAHULIDINIUM Stover and Helby, 1987a, p.113. Type: Stover and Helby, 1987a, figs.13I–J, as *Sahulidinium ottii*.

**ottii* Stover and Helby, 1987a, p.113–114, figs.12A–B,13A–N. Holotype: Stover and Helby, 1987a, figs.13I–J; Fensome et al., 1996, figs.4–5 — p.2251. Age: Anisian–Ladinian.

SAMLANDIA Eisenack, 1954b, p.76. Taxonomic junior synonym: *Palmnickia*, according to Morgenroth (1966a, p.39–40). Type: Eisenack, 1954b, pl.11, fig.12, as *Samlandia chlamydophora*.

"*angustivela*" (Deflandre and Cookson, 1955, p.290, pl.7, figs.4–5) Eisenack, 1963a, p.102. Holotype: Deflandre and Cookson, 1955, pl.7, fig.4; McMinn, 1988, fig.8C. **NOW** *Membranilarnacia*. Originally *Membranilarnax*, subsequently *Samlandia*, thirdly (and now) *Membranilarnacia*. Questionable assignment: Stover and Evitt (1978, p.186). Taxonomic junior synonym: *Samlandia solida* (name not validly published), according to May (1980, p.24) — however, see discussion under *Samlandia solida*. Age: Eocene.

"*californica*" (Drugg, 1967, p.30, pl.5, figs.14–15; pl.9, fig.8) Lentin and Williams, 1977b, p.141. Holotype: Drugg, 1967, pl.5, fig.15. **NOW** *Danea*. Originally *Palmnickia*, subsequently *Samlandia*, thirdly (and now) *Danea*, fourthly *Damassadinium* (generic name illegitimate). Taxonomic junior synonym: *Danea mutabilis*, according to Damassa (1979b, p.193). Age: Danian.

carnarvonensis McMinn, 1988, p.150, figs.7A–C. Holotype: McMinn, 1988, figs.7A–C; Fensome et al., 1996, figs.1–3 — p.2081. Age: late Campanian–early Maastrichtian.

**chlamydophora* Eisenack, 1954b, p.76, pl.11, figs.12–15. Holotype: Eisenack, 1954b, pl.11, fig.12. Taxonomic junior synonym: *Palmnickia lobifera*, according to Morgenroth (1966a, p.39–40) and Benedek (1972, p.36). Age: early Oligocene.

delicata Wilson, 1988, p.29, pl.19, figs.2,3a–b,4a–b. Holotype: Wilson, 1988, pl.19, figs.3a–b; Fensome et al., 1996, figs.2–3 — p.2105. Age: early Eocene.

mayi McMinn, 1988, p.150–152, figs.7D–F. Holotype: McMinn, 1988, figs.7D–E; Fensome et al., 1996, figs.1–2 — p.2225. Taxonomic junior synonym: *Samlandia solida* (name not validly published), according to Slimani (2001a, p.194). See discussion under *Samlandia solida*. Age: late Campanian.

mirifica He Chengquan, 1991, p.126–127, pl.7, fig.9; pl.51, fig.17. Holotype: He Chengquan, 1991, pl.7, fig.9. Age: middle Eocene.

pseudoreticulata Slimani, 1994, p.117–118, pl.14, figs.23–30. Holotype: Slimani, 1994, pl.14, figs.25–30. Age: latest Maastrichtian–Danian.

reticulifera Cookson and Eisenack, 1965a, p.126–127, pl.15, figs.10–15. Holotype: Cookson and Eisenack, 1965a, pl.15, fig.10. Age: late Eocene.

septata Wilson, 1988, p.29, pl.19, figs.5a–b,6,7a–b. Holotype: Wilson, 1988, pl.19, figs.5a–b; Fensome et al., 1996, figs.1–2 — p.2351. Age: early Eocene.

"*solida*" Wilson in May, 1980, p.24. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Samlandia mayi*, according to Slimani (2001a, p.194). May (1980, p.24) considered this name to be a synonym of *Membranilarnax* (as *Samlandia*, now *Membranilarnacia*) *angustivela*; however, McMinn (1988, p.150–152) assigned May's specimens of *Samlandia angustivela* to a new species, *Samlandia mayi*.

spongia Yu Jingxian, 1989, p.128, pl.39, figs.5–6,8; text-fig.2. Holotype: Yu Jingxian, 1989, pl.39, fig.6. Age: Eocene.

vermicularia McMinn, 1988, p.152, figs.7G–I. Holotype: McMinn, 1988, fig.7G; Fensome et al., 1996, fig.1 — p.2425. Age: early Maastrichtian.

"*SAMSONIA*" Morgan in Riding and Helby, 2001d, p.95. **Name not validly published:** no description. **Taxonomic senior synonym:** *Voodooia*, by implication in Riding and Helby (2001d, p.95), who included the only species name, *Samsonia tabulata* (name not validly published), in synonymy with *Voodooia tabulata*.

"*tabulata*" Morgan in Riding and Helby, 2001d, p.95. **Name not validly published:** no description. **Taxonomic senior synonym:** *Voodooia tabulata*, according to Riding and Helby (2001d, p.95).

SANSHUIA Yu Jingxian et al., 1981, p.259. Taxonomic senior synonyms: *Geiselodinium*, according to Chen et al. (1988, p.27) and *Saeptodinium*, according to Lentin and Williams (1989, p.326) — however, Mao Shaozhi et al. (1995, p.50) retained *Sanshuia*. Type: Yu Jingxian et al., 1981, pl.1, fig.1, as *Sanshuia sphaerica*.

"*dalangshanensis*" Yu Jingxian et al., 1981, p.259, pl.1, figs.7–10,15–16. Holotype: Yu Jingxian et al., 1981, pl.1, fig.7. **NOW** *Morkallacysta*. Originally *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*, fourthly (and now) *Morkallacysta*. Age: Late Cretaceous.

"*fibrirugularis*" Yu Jingxian et al., 1981, p.260, pl.1, figs.11–12. Holotype: Yu Jingxian et al., 1981, pl.1, fig.11. **NOW** *Saeptodinium*. Originally *Sanshuia*, subsequently *Geiselodinium*, thirdly (and now) *Saeptodinium*. Age: Late Cretaceous.

micropoda Yu Jingxian et al., 1981, p.259–260, pl.1, figs.3–4. Emendation: Mao Shaozhi et al., 1995, p.50–51, as *Sanshuia micropoda*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.3. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Mao Shaozhi et al. (1995, p.50) retained this species in *Sanshuia*. Age: Late Cretaceous.

minor Yu Jingxian et al., 1981, p.260, pl.1, figs.13–14. Emendation: Mao Shaozhi et al., 1995, p.50, as *Sanshuia minor*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.13. Originally (and now) *Sanshuia*, subsequently

Geiselodinium, thirdly *Saeptodinium*. Mao Shaozhi et al. (1995, p.50) retained this species in *Sanshuia*. Age: Late Cretaceous.

"*minuta*" (Jiabo, 1978, p.83, pl.3, figs.10–11) Lentin and Williams, 1985, p.313. Holotype: Jiabo, 1978, pl.3, fig.11. **NOW** *Saeptodinium*. Originally *Deflandrea*, subsequently *Sanshuia*, thirdly *Geiselodinium*, fourthly (and now) *Saeptodinium*. This combination was not validly published in Yu Jingxian et al. (1981, p.260), since these authors did not fully reference the basionym. Age: Early Tertiary.

ovata (Jiabo, 1978, p.84, pl.4, figs.1–3) Lentin and Williams, 1985, p.313. Emendation: Mao Shaozhi et al., 1995, p.51, as *Sanshuia ovata*. Holotype: Jiabo, 1978, pl.4, fig.2. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Sanshuia*, fourthly *Geiselodinium*, fifthly *Saeptodinium*. Mao Shaozhi et al. (1995, p.51) retained this species in *Sanshuia*. This combination was not validly published in Yu Jingxian et al. (1981, p.260), since these authors did not fully reference the basionym. Age: Early Tertiary.

**sphaerica* Yu Jingxian et al., 1981, p.259, pl.1, figs.1–2,6. Emendation: Mao Shaozhi et al., 1995, p.52, as *Sanshuia sphaerica*. Holotype: Yu Jingxian et al., 1981, pl.1, fig.1. Originally (and now) *Sanshuia*, subsequently *Geiselodinium*, thirdly *Saeptodinium*. Mao Shaozhi et al. (1995, p.52) retained this species in *Sanshuia*. Age: Late Cretaceous.

SATURNODINIUM Brinkhuis et al., 1992, p.242,244. Type: Brinkhuis et al., 1992, pl.7, fig.1, as *Saturnodinium perforatum*.

pansum (Stover, 1977, p.78–79, pl.2, figs.32–38) Brinkhuis et al., 1992, p.246. Holotype: Stover, 1977, pl.2, figs.34–36. Originally *Thalassiphora?*, subsequently (and now) *Saturnodinium*. Age: middle-late Oligocene.

**perforatum* Brinkhuis et al., 1992, p.244,246, pl.4, figs.1–5; pl.7, figs.1–4. Holotype: Brinkhuis et al., 1992, pl.7, fig.1. Age: latest Oligocene–earliest Miocene.

SATYRODINIUM Lentin and Manum, 1986, p.112,114. Type: Lentin and Manum, 1986, pl.1, figs.1–3, as *Satyrodinium bengalense*.

**bengalense* Lentin and Manum, 1986, p.114–116, pl.1, figs.1–9; text-figs.2,4A. Holotype: Lentin and Manum, 1986, pl.1, figs.1–3; Fensome et al., 1993a, figs.1–2 — p.969. Age: Campanian.

haumuriense (Wilson, 1984c, p.554, figs.14–21) Lentin and Manum, 1986, p.114. Holotype: Wilson, 1984c, figs.14–15; Lentin and Manum, 1986, text-fig.4B; Fensome et al., 1996, figs.1–2 — p.2147. Originally *Isabelidinium*, subsequently *Isabelidinium?*, thirdly (and now) *Satyrodinium*. Age: Maastrichtian.

SAUMURIA Zügel, 1994, p.47. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1301). Type: Zügel, 1994, pl.9, figs.1–2, as *Saumuria distincta*.

cingulofera Zügel, 1994, p.51, pl.9, figs.13–15. Holotype: Zügel, 1994, pl.9, figs.13–14. Age: late Cenomanian.

**distincta* Zügel, 1994, p.47–50, pl.9, figs.1–7; text-figs.15,17a. Holotype: Zügel, 1994, pl.9, figs.1–2. Age: late Cenomanian.

obscura Zügel, 1994, p.50, pl.9, figs.8–12; text-fig.17b. Holotype: Zügel, 1994, pl.9, figs.8–10. Age: late Cenomanian.

SAXODINIUM Below, 1990, p.23–24. Contrary to the opinion of Lentin and Williams (1993, p.577), this name is validly published since the name of the "type species" is validly published. This generic name was not validly

published in Below (1987a, pl.26, fig.d), who did not provide a description. Type: Below, 1990, pl.3, figs.6–10, as *Saxodinium moorbergense*.

"*maubeugii*" Below, 1987a, pl.26, fig.d. **Name not validly published:** no description. See also *Lotharingia maubeugii*.

**moorbergense* Below, 1990, p.24–26, pl.3, figs.1–15; text-figs.6a–f. Holotype: Below, 1990, pl.3, figs.6–10. Contrary to the opinion of Lentin and Williams (1993, p.578), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: Aalenian.

SCALDECYSTA De Schepper et al., 2004, p.641. Type: De Schepper et al., 2004, fig.12, nos.1–4, as *Scaldecysta doelensis*.

**doelensis* De Schepper et al., 2004, p.641, fig.12, nos.1–12; fig.13, nos.1–8. Holotype: De Schepper et al., 2004, fig.12, nos.1–4. Age: Pliocene.

SCHEMATOPHORA Deflandre and Cookson, 1955, p.262. This name was not validly published in Deflandre and Cookson (1954, p.1237), since no description was provided. Type: Deflandre and Cookson, 1955, pl.6, figs.11–12, as *Schematophora speciosa*.

amabilis Stevens, 1987, p.193, figs.3H–M,8A–C. Holotype: Stevens, 1987, figs.3I–K,8A–B; Fensome et al., 1996, figs.1–3,7–8 — p.2023. Age: early Berriasian.

obscura Wilson, 1988, p.29–30, pl.20, figs.1a–b,2a–b,3a–b. Holotype: Wilson, 1988, pl.20, figs.1a–b; Fensome et al., 1996, figs.1–2 — p.2247; Fauconnier and Masure, 2004, pl.71, figs.1–2. Age: early Eocene.

**speciosa* Deflandre and Cookson, 1955, p.262–263, pl.6, figs.11–13; pl.7, fig.11. Emendation: Stover, 1975, p.39. Holotype: Deflandre and Cookson, 1955, pl.6, figs.11–12. Age: Eocene–Miocene.

SCRINIOCASSIS Gocht, 1964, p.121. Emendations: Prauss, 1989, p.29; Below, 1990, p.30. Taxonomic junior synonym: *Eyachia*, according to Prauss (1989, p.29) and Below (1990, p.30). Type: Gocht, 1964, pl.17, figs.2a–c, as *Scriniocassis weberi*.

"*dictyotus*" (Cookson and Eisenack, 1960b, p.248–249, pl.37, figs.8–9) Beju, 1971, p.299. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.9; Jan du Chêne et al., 1986a, pl.5, fig.1; pl.7, fig.6. **NOW** *Scriniodinium*. Originally (and now) *Scriniodinium*, subsequently *Scriniocassis*, thirdly *Aldorfia*. Age: Oxfordian–Tithonian.

"subsp. *dictyotus*". Autonym. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.9; Jan du Chêne et al., 1986a, pl.5, fig.1; pl.7, fig.6. **NOW** *Scriniodinium dictyotum* subsp. *dictyotum*. Originally (and now) *Scriniodinium dictyotum* subsp. *dictyotum*, subsequently *Scriniocassis dictyota* subsp. *dictyota*, thirdly *Aldorfia dictyota* subsp. *dictyota*.

"subsp. *osmingtonensis*" (Gitmez, 1970, p.310–311, pl.1, fig.3; pl.8, fig.12) Lentin and Williams, 1975, p.2154. Holotype: Gitmez, 1970, pl.8, fig.12; Jan du Chêne et al., 1986a, pl.7, figs.10–11. **NOW** *Scriniodinium dictyotum* subsp. *osmingtonense*. Originally (and now) *Scriniodinium dictyotum* subsp. *osmingtonense*, subsequently *Scriniocassis dictyota* subsp. *osmingtonensis*, thirdly *Aldorfia dictyota* subsp. *osmingtonensis*. Taxonomic senior synonym: *Scriniocassis weberi*, according to Davies (1983, p.24) — however, Jan du Chêne et al. (1986a, p.35) retained *Scriniocassis dictyotus* subsp. *osmingtonensis* (as *Aldorfia dictyota* subsp. *osmingtonensis*). Age: early Kimmeridgian.

"subsp. *papillatus*" (Gitmez, 1970, p.311, pl.9, fig.11) Lentin and Williams, 1975, p.2154. Holotype: Gitmez, 1970, pl.9, fig.11. **NOW** *Scriniodinium dictyotum* subsp. *papillatum*. Originally (and now) *Scriniodinium dictyotum* subsp. *papillatum*, subsequently *Scriniocassis dictyotus* subsp. *papillatus*, thirdly *Scriniocassis papillatus*, fourthly *Aldorfia dictyota* subsp. *papillata*. Age: early Kimmeridgian.

"subsp. *pyrum*" (Gitmez, 1970, p.311,313, pl.10, fig.1; pl.13, figs.1–2; text-figs.33a–b) Lentin and Williams, 1975, p.2154. Holotype: Gitmez, 1970, pl.13, figs.1–2; text-fig.33a; Jan du Chêne et al., 1986a, pl.7, figs.7–8. **NOW** *Scriniodinium dictyotum* subsp. *pyrum*. Originally (and now) *Scriniodinium dictyotum* subsp. *pyrum*, subsequently *Scriniocassis dictyota* subsp. *pyrum*, thirdly *Scriniocassis pyrum*, fourthly *Aldorfia dictyota* subsp. *pyrum*. N.I.A. Age: early Kimmeridgian.

?*downiei* Kumar, 1986b, p.402, pl.4, fig.7; text-fig.11. Holotype: Kumar, 1986b, pl.4, fig.7. Originally *Scriniocassis*, subsequently (and now) *Scriniocassis*?. Questionable assignment: Below (1990, p.31) as a "nomen dubium". Age: Kimmeridgian–Tithonian.

"*klementii*" (Pocock, 1972, p.91, pl.23, figs.1–2; text-fig.7) Jansonius, 1986, p.218. Holotype: Pocock, 1972, pl.23, figs.1–2; Jan du Chêne et al., 1986a, pl.108, figs.5–8. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently *Scriniodinium*?, thirdly (and now) *Endoscrinium*, fourthly *Scriniocassis*. Age: Callovian.

"*limbatus*" Lund, 1996, p.136. **Name not validly published**: no description or illustration.

limbicavatus Prauss, 1989, p.29–31, pl.4, figs.1–9,12; text-fig.8. Holotype: Prauss, 1989, pl.4, figs.7–9; text-fig.8. Age: late Toarcian–early Aalenian.

"*papillatus*" (Gitmez, 1970, p.311, pl.9, fig.11) Davies, 1983, p.24. Holotype: Gitmez, 1970, pl.9, fig.11. **NOW** *Scriniodinium dictyotum* subsp. *papillatum*. Originally (and now) *Scriniodinium dictyotum* subsp. *papillatum*, subsequently *Scriniocassis dictyotus* subsp. *papillatus*, thirdly *Scriniocassis papillatus*, fourthly *Aldorfia dictyota* subsp. *papillata*. Age: early Kimmeridgian.

priscus (Gocht, 1979, p.308,310,312–317; figs.1a–d,2a–b,3a–e,4a–d,5–6,7a–d,8a–b,9a–c,10) Below, 1990, p.31. Emendation: Below, 1990, p.32, as *Scriniocassis priscus*. Holotype: Gocht, 1979, figs.9a–c; Fensome et al., 1995, figs.1–2 — p.1687. Originally *Eyachia*, subsequently (and now) *Scriniocassis*. This combination was not validly published in Below (1987a, p.58) and Prauss (1989, p.29–30), since these authors did not fully reference the basionym. N.I.A. Age: Aalenian.

"*pyrum*" (Gitmez, 1970, p.311,313, pl.10, fig.1; pl.13, figs.1–2; text-figs.33a–b) Davies, 1983, p.24. Holotype: Gitmez, 1970, pl.13, figs.1–2; text-fig.33a; Jan du Chêne et al., 1986a, pl.7, figs.7–8. **NOW** *Scriniodinium dictyotum* subsp. *pyrum*. Originally (and now) *Scriniodinium dictyotum* subsp. *pyrum*, subsequently *Scriniocassis dictyota* subsp. *pyrum*, thirdly *Scriniocassis pyrum*, fourthly *Aldorfia dictyota* subsp. *pyrum*. N.I.A. Age: early Kimmeridgian.

"*reticulatus*" (Pocock, 1972, p.91–92, pl.23, fig.3) Jansonius, 1986, p.219. Holotype: Pocock, 1972, pl.23, fig.3; Jan du Chêne et al., 1986a, pl.108, figs.1–4. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently *Scriniodinium*?, thirdly *Scriniocassis*, fourthly (and now) *Endoscrinium*. Age: Callovian.

**weberi* Gocht, 1964, p.121, pl.17, figs.1a–d,2a–c,3a–c,4a–b; text-fig.39. Emendation: Below, 1990, p.36. Holotype: Gocht, 1964, pl.17, figs.2a–c; text-fig.39. Taxonomic junior synonym (at specific rank): *Scriniodinium* (as *Scriniocassis*; now *Scriniodinium*) *dictyotum* subsp. *osmingtonense*, according to Davies (1983, p.24) — however, Jan du Chêne et al. (1986a, p.35) retained *Scriniodinium dictyotum* subsp. *osmingtonense* (as *Aldorfia dictyota* subsp. *osmingtonensis*). Age: late Toarcian–early Bajocian.

SCRINIODINIUM Klement, 1957, p.409–410. Emendations: Prauss, 1989, p.45; Riding and Fensome, 2003, p.9–10. Taxonomic junior synonyms: *Endoscrinium*, according to Stover and Evitt (1978, p.187) and Dodekova (1990, p.30–31) — however, Lentin and Williams (1993, p.207) retained *Endoscrinium*; *Athigmatocysta*, according to Stover and Williams (1987, p.27) and Brenner (1988, p.72) — however, Harding (1990b, p.28) retained

Athigmatocysta. Although the "type species", *Scriniodinium crystallinum*, was not validly transferred to *Scriniodinium* by Klement (1957), the generic name *Scriniodinium* was validly published, since it is based on a previously validly published species name, *Gymnodinium crystallinum*. Type: Deflandre, 1939a, pl.5, figs.1–2, as *Gymnodinium crystallinum*.

"*acroferum*" Prauss, 1989, p.45–46, pl.9, figs.1–2, pl.14, figs.17–22; text-fig.21. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Holotype: Prauss, 1989, pl.14, figs.19–21; text-fig.21. Age: late Bathonian–late Callovian.

?*amalthei* (Wetzel, 1966, p.318, pl.31, fig.6) Sarjeant, 1980b, p.117. Emendation: Sarjeant, 1980b, p.117, as *Scriniodinium amalthei*. Holotype: Wetzel, 1966, pl.31, fig.6. Originally *Membranilarnacia*, subsequently *Membranilarnacia*?, thirdly *Scriniodinium*, fourthly *Endoscrinium*, fifthly (and now) *Scriniodinium*?. Questionable assignment: Jan du Chêne et al. (1986a, p.317). Riding and Fensome (2003, p.13) implied effectively that the use of this name be restricted to the holotype. Age: late Pliensbachian.

anceps (Raynaud, 1978, p.392, pl.1, fig.17) Jan du Chêne et al., 1986a, p.315. Holotype: Raynaud, 1978, pl.1, fig.17; Jan du Chêne et al., 1986a, pl.110, figs.6–8. Originally *Endoscrinium*, subsequently (and now) *Scriniodinium*. Riding and Fensome (2003, p.13) also proposed this combination. Jan du Chêne et al. (1986a, p.315) indicated that this species was originally included in *Scriniodinium*; however, the original assignment was *Endoscrinium*. Age: late Kimmeridgian.

"*apatelum*" Cookson and Eisenack, 1960b, p.249, pl.37, figs.12–13. Emendation: Sarjeant, 1982b, p.42, as *Tubotuberella apatela*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.12; Jan du Chêne et al., 1986a, pl.124, figs.1–2; Fensome et al., 1993a, fig.1 — p.921. **NOW** *Tubotuberella*. Originally *Scriniodinium*, subsequently *Psalignonyaulax*, thirdly (and now) *Tubotuberella*, fourthly *Glabridinium*. Age: Late Jurassic.

"*asymmetricum*" (Riding, 1987a, p.261, fig.7, nos.1–2,5; fig.12) Dodekova, 1990, p.30. Holotype: Riding, 1987a, fig.7, no.1. **NOW** *Endoscrinium*. Originally (and now) *Endoscrinium*, subsequently *Scriniodinium*. Age: late Bathonian.

"*attadalense*" (Cookson and Eisenack, 1958, p.25, pl.1, fig.7) Eisenack, 1967, p.193 (748a). Holotype: Cookson and Eisenack, 1958, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.112, figs.4–7; Riding and Fensome, 2003, text-fig.4B. **NOW** *Endoscrinium*. Originally *Gymnodinium* (Appendix B), subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*. Age: Aptian.

"*australiense*" (Deflandre and Cookson, 1955, p.248, pl.5, fig.1) Cookson and Eisenack, 1965a, p.122. Holotype: Deflandre and Cookson, 1955, pl.5, fig.1. **NOW** *Apteodinium*. Originally *Gymnodinium* (Appendix B), subsequently *Emslandia* (combination not validly published), thirdly *Scriniodinium*, fourthly (and now) *Apteodinium*. Taxonomic junior synonym: *Emslandia crassimurata*, according to Lucas-Clark (1987, p.174). Eisenack (1967, p.195 [al.748b]) also proposed this combination. Age: middle Miocene.

barremianum Duxbury, 2001, p.112–113, fig.12, nos.1–2. Holotype: Duxbury, 2001, fig.12, no.1. Age: late Barremian (holotype caved into middle Barremian according to Duxbury, 2001, p.112).

"*bessebae*" (Below, 1981a, p.48–49, pl.7, figs.4–6,7a–b,8; pl.14, figs.6,7a–b,8; text-figs.48a–b,49a–b,50–51,52a–d) Jan du Chêne et al., 1986a, p.315. Holotype: Below, 1981a, pl.7, figs.7a–b; Jan du Chêne et al., 1986a, pl.104, figs.12–13; Fensome et al., 1991, figs.4–7 — p.589. **NOW** *Endoscrinium*. Originally (and now) *Endoscrinium*, subsequently *Scriniodinium*. N.I.A. Age: Barremian.

"*bicuneatum*" Deflandre, 1939a, p.180, pl.8, fig.7 ex Sarjeant, 1967b, p.248. Holotype: Deflandre, 1939a, pl.8, fig.7. **NOW** *Cornudinium*. Originally *Palaeoperidinium*, subsequently *Scriniodinium*, thirdly *Glossodinium*, fourthly *Dinopterygium*, fifthly (and now) *Cornudinium*. The name *Palaeoperidinium bicuneatum* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.546) accepted Sarjeant's (1967b) indirect reference to Deflandre (1939a), in which the name *Palaeoperidinium bicuneatum* was first proposed, as indication of a type (I.C.N. Article 40.3). Age: Oxfordian.

bucinatum Brenner, 1988, p.72–74, pl.12, figs.1–2. Holotype: Brenner, 1988, pl.12, fig.1. Age: early Kimmeridgian.

subsp. **bucinatum**. Autonym. Holotype: Brenner, 1988, pl.12, fig.1.

subsp. **labyrinthus** Brenner, 1988, p.73–74, pl.12, fig.2. Holotype: Brenner, 1988, pl.12, fig.2. N.I.A. Age: early Kimmeridgian.

campanula Gocht, 1959, p.61–62, pl.4, fig.6; pl.5, figs.1a–b. Holotype: Gocht, 1959, pl.5, figs.1a–b; Jan du Chêne et al., 1986a, pl.110, figs.1–5; Fensome et al., 1991, figs.1–3 — p.593; figs.1–5 — p.597. Originally (and now) *Scriniodinium*, subsequently *Endoscrinium*, thirdly *Scriniodinium*?. Questionable assignment: Stover and Evitt (1978, p.187); however, Riding and Fensome (2003, p.13–14) retained this species without question in *Scriniodinium*. Taxonomic junior synonym: *Gonyaulacysta fragosa*, according to Harker and Sarjeant (1975, p.224) and Brideaux and McIntyre (1975, p.33). N.I.A. Age: Hauterivian.

subsp. **campanula**. Autonym. Holotype: Gocht, 1959, pl.5, figs.1a–b; Jan du Chêne et al., 1986a, pl.110, figs.1–5; Fensome et al., 1991, figs.1–3 — p.593; figs.1–5 — p.597. Originally *Endoscrinium campanula* subsp. *campanula*, subsequently *Scriniodinium*? *campanula* subsp. *campanula*, thirdly (and now) *Scriniodinium campanula* subsp. *campanula*. N.I.A.

subsp. **nichan** (Below, 1981a, p.50–51, pl.7, fig.2) Jan du Chêne et al., 1986a, p.317. Holotype: Below, 1981a, pl.7, fig.2; Jan du Chêne et al., 1986a, pl.110, figs.9–10; Fensome et al., 1991, figs.4–5 — p.593; figs.1–3 — p.695. Originally *Endoscrinium campanula* subsp. *nichan*, subsequently *Scriniodinium*? *campanula* subsp. *nichan*, thirdly (and now) *Scriniodinium campanula* subsp. *nichan*. Riding and Fensome (2003, p.14) retained this taxon as *Scriniodinium capanula* subsp. *nichan*. N.I.A. Age: Hauterivian.

"?**ceratophorum**" Cookson and Eisenack, 1960b, p.249, pl.37, fig.7. Emendation: Riding, 2005a, p.14,16,18, as *Gonyaulacysta ceratophora*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.7; Jan du Chêne et al., 1986a, pl.112, fig.1; Helby et al., 1987, fig.18C; Riding, 2005a, text-figs.2A–B. **NOW** *Gonyaulacysta*. Originally *Scriniodinium*, subsequently *Scriniodinium*?, thirdly (and now) *Gonyaulacysta*. Questionable assignment: Stover and Evitt (1978, p.187). Taxonomic junior synonym: *Psaligonyaulax australica*, according to Jan du Chêne et al. (1986a, p.266) — however, *Psaligonyaulax australica* is now considered a taxonomic junior synonym of *Psaligonyaulax* (as *Gonyaulacysta*) *dualis*. Age: Oxfordian–early Kimmeridgian.

"**cooksoniae**" Anderson, 1960, p.30, pl.9, figs.1–3. Holotype: Anderson, 1960, pl.9, figs.2–3. **Taxonomic senior synonym:** *Deflandrea* (now *Subtilisphaera*) *perlucida*, by implication since Fensome et al. (2009, p.60) considered *Subtilisphaera perlucida* to be a taxonomic senior synonym of *Subtilisphaera pirnaensis*, which Sarjeant and Anderson (1969, p.232–233) considered to be the taxonomic senior synonym of *Scriniodinium cooksoniae*. Age: Late Cretaceous.

***crystallinum** (Deflandre, 1939a, p.165, pl.5, figs.1–3) Klement, 1960, p.18. Emendation: Riding and Fensome, 2003, p.12–13. Holotype: Deflandre, 1939a, pl.5, figs.1–2; Jan du Chêne et al., 1986a, pl.104, figs.1–4. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Scriniodinium*. Taxonomic junior synonym: *Scriniodinium playfordii*, according to Jan du Chêne et al. (1986a, p.316) — however, Brenner (1988, p.79) retained *Scriniodinium playfordii*. This combination was not validly published in Klement (1957, p.409), since that author did not fully reference the basionym. Riding and Fensome (2003, p.18) considered this species to be the possible taxonomic senior synonym of *Scriniodinium oxfordianum*. Age: Oxfordian.

?**dictyophorum** (Deflandre, 1939a, p.178, pl.8, figs.1–3 ex Sarjeant, 1967b, p.249–250) Brenner, 1988, p.74. Holotype: Deflandre, 1939a, pl.8, fig.1; Jan du Chêne et al., 1986a, pl.7, figs.1–5. The name *Palaeoperidinium dictyophorum* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. In validating the name *Gonyaulacysta dictyophora*, Sarjeant (1967b, p.249–250) provided an "emended diagnosis". Age: Oxfordian.

dictyotum Cookson and Eisenack, 1960b, p.248–249, pl.37, figs.8–9. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.9; Jan du Chêne et al., 1986a, pl.5, fig.1; pl.7, fig.6. Originally (and now) *Scriniodinium*, subsequently *Scriniocassis*, thirdly *Aldorfia*. This species was retained in *Scriniodinium* by Riding and Fensome (2003, p.16). Age: Oxfordian–Tithonian.

subsp. **dictyotum**. Autonym. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.9; Jan du Chêne et al., 1986a, pl.5, fig.1; pl.7, fig.6. Originally (and now) *Scriniodinium dictyotum* subsp. *dictyotum*, subsequently *Scriniocassis dictyota* subsp. *dictyota*, thirdly *Aldorfia dictyota* subsp. *dictyota*.

subsp. **osmingtonense** Gitmez, 1970, p.310–311, pl.1, fig.3; pl.8, fig.12. Holotype: Gitmez, 1970, pl.8, fig.12; Jan du Chêne et al., 1986a, pl.7, figs.10–11. Originally (and now) *Scriniodinium dictyotum* subsp. *osmingtonense*, subsequently *Scriniocassis dictyota* subsp. *osmingtonensis*, thirdly *Aldorfia dictyota* subsp. *osmingtonensis*. This subspecies is retained here since the species is now retained in *Scriniodinium*. Taxonomic senior synonym (at specific rank): *Scriniocassis weberi*, according to Davies (1983, p.24) — however, Jan du Chêne et al. (1986a, p.35) retained *Scriniodinium dictyotum* subsp. *osmingtonense* (as *Aldorfia dictyota* subsp. *osmingtonensis*). Age: early Kimmeridgian.

subsp. **papillatum** Gitmez, 1970, p.311, pl.9, fig.11. Holotype: Gitmez, 1970, pl.9, fig.11. Originally (and now) *Scriniodinium dictyotum* subsp. *papillatum*, subsequently *Scriniocassis dictyotus* subsp. *papillatus*, thirdly *Scriniocassis papillatus*, fourthly *Aldorfia dictyota* subsp. *papillata*. This subspecies is retained here since the species is now retained in *Scriniodinium*. Age: early Kimmeridgian.

subsp. **pyrum** Gitmez, 1970, p.311,313, pl.10, fig.1; pl.13, figs.1–2; text-figs.33a–b. Holotype: Gitmez, 1970, pl.13, figs.1–2; text-fig.33a; Jan du Chêne et al., 1986a, pl.7, figs.7–8. Originally (and now) *Scriniodinium dictyotum* subsp. *pyrum*, subsequently *Scriniocassis dictyota* subsp. *pyrum*, thirdly *Scriniocassis pyrum*, fourthly *Aldorfia dictyota* subsp. *pyrum*. This subspecies is retained here since the species is now retained in *Scriniodinium*. N.I.A. Age: early Kimmeridgian.

?**echinatum** Jain and Garg in Jain et al., 1984, p.73, pl.2, fig.21; pl.3, fig.45. Holotype: Jain et al., 1984, pl.2, fig.21. Questionable assignment: Riding and Fensome (2003, p.16). Age: Kimmeridgian–early Tithonian.

?**eocaenicum** Olaru, 1978a, p.86, pl.12, fig.13. Holotype: Olaru, 1978a, pl.12, fig.13. Originally *Scriniodinium*, subsequently (and now) *Scriniodinium*?. Questionable assignment: Jan du Chêne et al. (1986a, p.317). Age: late Eocene.

"**eurypylum**" Manum and Cookson, 1964, p.20–21, pl.4, figs.7–13. Holotype: Manum and Cookson, 1964, pl.4, figs.9–10. **NOW** *Palaeoperidinium*? Originally *Scriniodinium*, subsequently *Palaeoperidinium*, thirdly *Saeptodinium*, fourthly (and now) *Palaeoperidinium*? Age: Late Cretaceous.

"**galeatum**" Cookson and Eisenack, 1960a, p.3–4, pl.1, figs.16–18. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.16; Jan du Chêne et al., 1986a, pl.48, figs.11–13; Helby et al., 1987, fig.38L. **NOW** *Hystrichosphaeropsis*. Originally *Scriniodinium*, subsequently *Psaligonyaulax*, thirdly (and now) *Hystrichosphaeropsis*. Age: Albanian–Cenomanian.

"**galeritum**" (Deflandre, 1939a, p.167, pl.5, figs.7–9; pl.6, fig.1) Klement, 1960, p.22. Holotype: Deflandre, 1939a, pl.5, figs.7–8; Eisenack and Klement, 1964, p.759,761; Jan du Chêne et al., 1986a, pl.104, figs.10–11; Fensome et al., 1995, fig.1 — p.1501; figs.1–2 — p.1505. **NOW** *Endoscrinium*. Originally *Gymnodinium* (Appendix B), subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*. Age: Oxfordian.

"subsp. **fornicatum**" Klement, 1960, p.25–26, pl.1, figs.7–12. Holotype: Klement, 1960, pl.1, figs.7–8; Jan du Chêne et al., 1986a, pl.107, figs.4–6; Fensome et al., 1995, figs.1–2 — p.1489. **NOW** *Endoscrinium galeritum* subsp. *fornicatum*. Originally *Scriniodinium galeritum* subsp. *fornicatum*, subsequently (and now) *Endoscrinium galeritum* subsp. *fornicatum*. Age: middle Oxfordian.

"subsp. **galeritum**". Autonym. Holotype: Deflandre, 1939a, pl.5, figs.7–8; Eisenack and Klement, 1964, p.759,761; Jan du Chêne et al., 1986a, pl.104, figs.10–11; Fensome et al., 1995, fig.1 — p.1501; figs.1–2

— p.1505. **NOW** *Endoscrinium galeritum* subsp. *galeritum*. Originally *Scriniodinium galeritum* subsp. *galeritum*, subsequently (and now) *Endoscrinium galeritum* subsp. *galeritum*.

"subsp. ***reticulatum***" Klement, 1960, p.26–27, pl.2, figs.1–2. Holotype: Klement, 1960, pl.2, figs.1–2; Eisenack and Klement, 1964, p.765; Jan du Chêne et al., 1986a, pl.108, figs.9–10; Fensome et al., 1995, figs.1–2 — p.1739. **NOW** *Endoscrinium galeritum* subsp. *reticulatum*. Originally *Scriniodinium galeritum* subsp. *reticulatum*, subsequently (and now) *Endoscrinium galeritum* subsp. *reticulatum*. Age: middle Oxfordian.

"***glabrum***" (Duxbury, 1977, p.24, pl.11, figs.1,6; text-fig.3) Jan du Chêne et al., 1986a, p.316. Holotype: Duxbury, 1977, pl.11, figs.1,6; text-fig.3; Jan du Chêne et al., 1986a, pl.111, figs.9–10; Fensome et al., 1995, figs.1–2 — p.1511. **NOW** *Athigmatocysta*. Originally (and now) *Athigmatocysta*, subsequently *Endoscrinium*, thirdly *Scriniodinium*. Stover and Williams (1987, p.27) also proposed this combination. Age: late Berriasian–mid Barremian.

"?***globosum***" (Olaru, 1978a, p.81, pl.12, fig.14; pl.15, fig.23) Lentin and Williams, 1985, p.316. Holotype: Olaru, 1978a, pl.12, fig.14. **NOW** *Leptodinium?*. Originally *Leptodinium*, subsequently (and now) *Leptodinium?*, thirdly *Scriniodinium*. Questionable assignment: Lentin and Williams (1985, p.316). Lentin and Williams (1985, p.316) inadvertently listed this species under *Scriniodinium*. Age: late Eocene.

"?***gochtii***" Pocock, 1972, p.90, pl.22, fig.12; text-fig.6. Holotype: Pocock, 1972, pl.22, fig.12; Jan du Chêne et al., 1986a, pl.93, figs.4–8. **NOW** *Rhynchodiniopsis*. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly *Endoscrinium*, fourthly (and now) *Rhynchodiniopsis*. Questionable assignment: Stover and Evitt (1978, p.187). Age: late Bajocian.

"***granulatum***" (Raynaud, 1978, p.391–392, pl.2, figs.6,12) Jan du Chêne et al., 1986a, p.316. Holotype: Raynaud, 1978, pl.2, fig.6; Jan du Chêne et al., 1986a, pl.111, figs.13–14. **NOW** *Endoscrinium*. Originally *Athigmatocysta*, subsequently (and now) *Endoscrinium*, thirdly *Scriniodinium*. Age: late Kimmeridgian–Portlandian.

"***hauterivianum***" Duxbury, 2001, p.113–114, fig.13, nos.1–3. Holotype: Duxbury, 2001, fig.13, no.2. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: early–early late Hauterivian.

"***heikeae***" Prössl, 1990, p.106, pl.12, figs.1–2,4–5,9 ex Prössl, 1992b, p.113,116. Holotype: Prössl, 1990, pl.12, figs.1,4,9. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. This name was not validly published in Prössl (1990, p.106), since that author did not specify the lodgment of the holotype. Age: Albian.

?***heusseri*** Habib, 1970, p.366–368, pl.8, fig.4. Holotype: Habib, 1970, pl.8, fig.4. Originally *Scriniodinium*, subsequently (and now) *Scriniodinium?*. Questionable assignment: Jan du Chêne et al. (1986a, p.317). Age: Albian–Cenomanian.

"***indicum***" Jain and Garg in Jain et al., 1984, p.72–73, pl.2, figs.22–23. Holotype: Jain et al., 1984, pl.2, fig.22. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: Kimmeridgian–early Tithonian.

inritibile Riley in Fisher and Riley, 1980, p.322–323, pl.2, figs.7,9. Holotype: Fisher and Riley, 1980, pl.2, figs.7,9; Jan du Chêne et al., 1986a, pl.111, fig.5. This species name was not validly published in Fisher and Riley (1976, p.52) and Riley (1979, p.220), since no description was provided. Age: late Kimmeridgian.

"?***irisiae***" Kjellström, 1973, p.40–42, fig.34. Holotype: Kjellström, 1973, fig.34; Jan du Chêne et al., 1986a, pl.46, fig.8. **NOW** *Hystrichosphaeropsis*. Originally *Scriniodinium?*, subsequently (and now) *Hystrichosphaeropsis*. Questionable assignment: Kjellström (1973, p.40). Age: middle-late Maastrichtian.

"?***irregulare***" (Cookson and Eisenack, 1958, p.28–29, pl.10, figs.1–2) Stover and Evitt, 1978, p.188. Holotype: Cookson and Eisenack, 1958, pl.10, fig.1; Jan du Chêne et al., 1986a, pl.109, figs.1–2. **NOW** *Endoscrinium*. Originally *Wetzeliella*, subsequently *Wetzeliopsis* (name not validly published), thirdly *Scriniodinium?*, fourthly

Tubotuberella, fifthly (and now) *Endoscrinium*. Questionable assignment: Stover and Evitt (1978, p.188). Taxonomic junior synonym: *Wetzeliella meckelfeldensis*, according to Costa and Downie (1979, p.43) — however, Lentin and Williams (1981, p.290) retained *Wetzeliella meckelfeldensis*. Age: Late Jurassic.

"*kempiae*" Stover and Helby, 1987a, p.114–115, figs.14A–B,15A–F,16A–I. Holotype: Stover and Helby, 1987a, figs.15A–F; Fensome et al., 1996, figs.1–6 — p.2183. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: Callovian.

"*klementii*" Pocock, 1972, p.91, pl.23, figs.1–2; text-fig.7. Holotype: Pocock, 1972, pl.23, figs.1–2; Jan du Chêne et al., 1986a, pl.108, figs.5–8. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Endoscrinium*, fourthly *Scrinioicassis*. Questionable assignment: Stover and Evitt (1978, p.188) — however, Below (1990, p.31) retained this species in *Scriniodinium* without question. Age: Callovian.

"*luridum*" (Deflandre, 1939a, p.166, pl.5, figs.4–6) Klement, 1960, p.20. Holotype: Deflandre, 1939a, pl.5, figs.4–5; Jan du Chêne et al., 1986a, pl.109, figs.6–8. **NOW** *Endoscrinium*. Originally *Gymnodinium*, subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*, fourthly *Tubotuberella*. Age: early Oxfordian.

"subsp. *largocavatum*" Beju, 1978, p.4. **Name not validly published**: no description or illustration.

"*nilsii*" Kjellström, 1973, p.42, fig.35. Holotype: Kjellström, 1973, fig.35. **Taxonomic senior synonym**: *Epicephalopyxis* (as and now *Paralecaniella*) *indentata* (Appendix A), according to Jan du Chêne et al. (1986a, p.318). Questionable assignment: Kjellström (1973, p.42). Age: middle-late Maastrichtian.

"*novissimum*" Morgenroth, 1968, p.540–541, pl.43, figs.3–4. Holotype: Morgenroth, 1968, pl.43, fig.4. **NOW** *Endoscrinium?*. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Endoscrinium?*. Questionable assignment: Stover and Evitt (1978, p.188). Age: Danian.

"*obscurum*" Manum and Cookson, 1964, p.21–22, pl.4, figs.5–6. Holotype: Manum and Cookson, 1964, pl.4, fig.6. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Endoscrinium*. Questionable assignment: Stover and Evitt (1978, p.188). Age: Late Cretaceous.

oxfordianum Sarjeant, 1962a, p.485, pl.69, figs.13–14. Holotype: Sarjeant, 1962a, pl.69, fig.14. Originally *Scriniodinium*, subsequently *Endoscrinium*, thirdly *Sirmiodinium*, fourthly (and now) *Scriniodinium?*. Questionable assignment: Riding and Fensome (2003, p.18), who questionably retained this species in *Scriniodinium*. Riding and Fensome (2003, p.18) considered this species to be a possible junior synonym of *Scriniodinium crystallinum*. Age: Oxfordian.

parvmarginatum (Cookson and Eisenack, 1958, p.24, pl.1, fig.6) Eisenack, 1967, p.201 (770a). Holotype: Cookson and Eisenack, 1958, pl.1, fig.6; Jan du Chêne et al., 1986a, pl.112, figs.10–12. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Scriniodinium*. Age: Late Jurassic.

pharo (Duxbury, 1977, p.32, pl.9, fig.5; text-fig.8) Davey, 1982b, p.31. Holotype: Duxbury, 1977, pl.9, fig.5; Jan du Chêne et al., 1986a, pl.111, figs.11–12. Originally *Endoscrinium*, subsequently (and now) *Scriniodinium*. Jan du Chêne et al. (1986a, p.316) and Woollam and Riding (1983, p.7) also proposed this combination. N.I.A. Age: late Berriasian–early Valanginian.

playfordii Cookson and Eisenack, 1960b, p.248, pl.37, fig.6. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.6, lost according to Jan du Chêne et al. (1986a, p.316). Taxonomic senior synonym: *Gymnodinium* (as and now *Scriniodinium*) *crystallinum*, according to Jan du Chêne et al. (1986a, p.316) — however, Brenner (1988, p.79) retained *Scriniodinium playfordii*. Age: Oxfordian–Tithonian.

"*pontianum*" Balteş, 1969, p.35–36, pl.3 [not pl.4], fig.15 ex Lentin and Williams, 1973, p.123. Holotype: Balteş, 1969, pl.3, fig.15, designated by Lentin and Williams (1973, p.123). **NOW** *Hystrichosphaeropsis*. Originally *Scriniodinium*, subsequently (and now) *Hystrichosphaeropsis*. This name was not validly published in Balteş (1969, p.35) since that author considered it to be a provisional designation. Age: early Pliocene.

prolatum Stevens, 1987, p.193–195, figs.9A–J. Holotype: Stevens, 1987, figs.9A–C; Fensome et al., 1996, figs.1–3 — p.2299. Originally (and now) *Scriniodinium*, subsequently *Endoscrinium*. Riding and Fensome (2003, p.18) retained this species in *Scriniodinium*. Age: early Berriasian.

"pseudocrystallinum" Beju, 1971, p.295–297, pl.7, figs.1–3; text-fig.7. Holotype: Beju, 1971, pl.7, fig.1. Originally *Scriniodinium*, subsequently *Sirmiodinium*. **Taxonomic senior synonym:** *Sirmiodinium grossii*, according to Drugg (1978, p.73) and Kunz (1990, p.39). Age: Oxfordian–Kimmeridgian.

"reticulatum" Pocock, 1972, p.91–92, pl.23, fig.3. Holotype: Pocock, 1972, pl.23, fig.3; Jan du Chêne et al., 1986a, pl.108, figs.1–4. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly *Scriniocassis*, fourthly (and now) *Endoscrinium*. Questionable assignment: Stover and Evitt (1978, p.188) — however, Below (1990, p.31) retained this species in *Scriniodinium* without question. Age: Callovian.

"rostratum" Brideaux and McIntyre, 1975, p.33–34, pl.10, figs.6–14; pl.11, figs.1–3. Holotype: Brideaux and McIntyre, 1975, pl.10, figs.12–14; Jan du Chêne et al., 1986a, pl.111, figs.2–4. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: middle Albian.

?scutella Eisenack, 1958a, p.385, pl.24, fig.3. Emendation: Sarjeant, 1985a, p.87–89, as *Parvocavatus? scutella*. Holotype: Eisenack, 1958a, pl.24, fig.3; Sarjeant, 1985a, pl.7, fig.3; pl.9, figs.4–6; Jan du Chêne et al., 1986a, pl.111, fig.1. Originally *Scriniodinium*, subsequently *Ellipsoidictyum*, thirdly *Parvocavatus?*, fourthly (and now) *Scriniodinium?*. Jan du Chêne et al. (1986a, p.318) retained the species in *Scriniodinium*. Questionable assignment: Jan du Chêne et al. (1986a, p.318). N.I.A. Age: late Aptian.

?speciosum He Chengquan in Zheng Yahui and He Chengquan, 1984, p.100, pl.6, figs.21–22; pl.10, fig.6. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.21. Questionable assignment: Riding and Fensome (2003, p.19), who stated that this species may be assignable to *Senegalinium*. Age: Late Cretaceous.

"subvallare" Sarjeant, 1962b, p.262–263, pl.1, fig.10; text-fig.7. Holotype: Sarjeant, 1962b, pl.1, fig.10; text-fig.7. **NOW** *Endoscrinium*. Originally *Scriniodinium*, subsequently (and now) *Endoscrinium*. Age: late Oxfordian.

?torulosum (Deflandre, 1943, p.504–505, pl.17, figs.7–8; text-figs.17–25) Lentin and Williams, 1973, p.124. Holotype: Deflandre, 1943, pl.17, figs.7–8; text-figs.17–20; Jan du Chêne et al., 1986a, pl.104, figs.5–6. Originally *Gymnodinium* (Appendix B), subsequently (and now) *Scriniodinium?*. Questionable assignment: Lentin and Williams (1973, p.124). Stover and Evitt (1978, p.188) suggested that this species represents acritarchs; however, Riding and Fensome (2003, p.19) considered it to represent dinoflagellates, albeit as a questionable species of *Scriniodinium*. Age: Senonian.

"trabeculosum" Gocht, 1959, p.62, pl.4, fig.5. Emendation: Harding, 1996, p.359,361,363, as *Gardodinium trabeculosum*. Holotype: Gocht, 1959, pl.4, fig.5; Harding, 1996, pl.3, figs.1,6–7. **NOW** *Gardodinium*. Originally *Scriniodinium*, subsequently (and now) *Gardodinium*, thirdly *Chlamydothorella*. Taxonomic junior synonyms: *Gardodinium eisenackii*, according to Davey (1974, p.51); *Gardodinium albertii* and *Gardodinium pyriforme*, both according to Harding (1996, p.350); *Gardodinium elongatum*, by implication in Brideaux and McIntyre (1975, p.33), who considered *Gardodinium elongatum* to be a taxonomic junior synonym of *Gardodinium eisenackii*. Age: Hauterivian.

"?velatum" Conrad, 1941, p.8–9, pl.1, fig.A ex Sarjeant, 1967b, p.256. Holotype: Conrad, 1941, pl.1, fig.A. **NOW** *Trithyrodinium?*. Originally *Palaeoperidinium* (name not validly published), subsequently *Scriniodinium?*, thirdly *Palaeoperidinium?* (combination not validly published), fourthly (and now) *Trithyrodinium?*. Questionable assignment: Sarjeant (1967b, p.256). The name *Palaeoperidinium velatum* was not validly published in Conrad (1941) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.550) accepted Sarjeant's (1967b) indirect reference to Conrad (1941) as indication of a type (I.C.N. Article 40.3). Lentin and Williams (1976, p.111) also proposed this name, as a new combination. Age: Maastrichtian.

"?verrucosum" Heisecke, 1970, p.232,234, pl.9, figs.2–3; pl.10, fig.3. Holotype: Heisecke, 1970, pl.9, fig.2; pl.10, fig.3. **NOW** *Cerodinium*. Originally *Scriniodinium*, subsequently *Scriniodinium?*, thirdly (and now) *Cerodinium*. Questionable assignment: Stover and Evitt (1978, p.188). Age: Danian.

"*SCRINIODINIUM* subgenus *ENDOSCRINIUM*" Klement, 1960, p.18. **NOW** *Endoscrinium*. Originally *Scriniodinium* subgenus *Endoscrinium*, subsequently *Endoscrinium*. Type: Deflandre, 1939a, pl.5, figs.7–8, as *Gymnodinium galearium*.

"*SCRINIODINIUM* subgenus *SCRINIODINIUM*". Autonym. **Now redundant**. Type: Deflandre, 1939a, pl.5, figs.1–2, as *Gymnodinium crystallinum*.

SELENOPEMPHIX Benedek, 1972, p.47. Emendations: Bujak in Bujak et al., 1980, p.82; Head, 1993, p.32, both as *Selenopemphix*. Originally (and now) *Selenopemphix*, subsequently *Protopteridinium* subgenus *Protopteridinium* section *Selenopemphix* (name not validly published). Taxonomic junior synonyms: *Omanodinium*, according to Bradford and Wall (1984, p.49) and Head (1993, p.32); *Multispinula*, according to Matsuoka (1985a, p.51) and Head (1993, p.31–32). Head (1993, p.32) considered by implication that the acritarch genus *Margosphaera* Nagy, 1965, is the possible taxonomic senior synonym of this genus. Type: Benedek, 1972, pl.11, fig.13, as *Selenopemphix nephroides*.

alticincta (Bradford, 1975, p.3070,3072, figs.23–28) Matsuoka, 1985a, p.52. Holotype: Bradford, 1975, figs.23–26; Fensome et al., 1993a, figs.1–4 — p.907. Originally *Omanodinium*, subsequently (and now) *Selenopemphix*. Head (1993, p.32), by considering *Omanodinium* to be a taxonomic junior synonym of *Selenopemphix*, effectively retained this species in *Selenopemphix*. Motile equivalent: *Protopteridinium subinerme* (Paulsen, 1904) Loeblich III, 1970, according to Bradford (1975, p.3070) and Matsuoka (1984b, p.2) — however, see Head (1996b, p.1215). Age: Holocene.

antarctica Marret and de Vernal, 1997, p.389,391, pl.5, figs.1–5. Holotype: Marret and de Vernal, 1997, pl.5, fig.2. Age: Holocene.

armageddonensis de Verteuil and Norris, 1992, p.398–399, pl.1, figs.1–4; text-fig.4. Holotype: de Verteuil and Norris, 1992, pl.1, figs.1–2; text-fig.4. Age: late Miocene.

armata Bujak in Bujak et al., 1980, p.83–84, pl.21, figs.1–3; text-figs.23D,24. Holotype: Bujak et al., 1980, pl.21, figs.1–3. Age: middle Eocene (see Aubry, 1986).

bothrion Harland and Pudsey, 2002, p.273,275, pl.2, figs.1–4; pl.3, figs.7–8; pl.4, figs.1–2. Holotype: Harland and Pudsey, 2002, pl.2, figs.1–2. N.I.A. Age: late Miocene.

brevispinosa Head et al., 1989c, p.494, pl.7, figs.1–2,5. Holotype: Head et al., 1989c, pl.7, fig.5. Age: middle or early late? Miocene.

subsp. "*brevispinosa*". Autonym. Holotype: Head et al., 1989c, pl.7, fig.5. **Now redundant**.

subsp. *conspicua* de Verteuil and Norris, 1992, p.399–401, pl.2, figs.2–8; pl.10, figs.1–4; pl.11, figs.1–2; text-fig.5. Holotype: de Verteuil and Norris, 1992, pl.2, figs.2–3. Age: late middle-late Miocene.

"subsp. *conspicua*" de Verteuil and Norris, 1992, p.399–401, pl.2, figs.2–8; pl.10, figs.1–4; pl.11, figs.1–2; text-fig.5. Holotype: de Verteuil and Norris, 1992, pl.2, figs.2–3. **NOW** *Selenopemphix conspicua*. Originally *Selenopemphix brevispinosa* subsp. *conspicua*, subsequently (and now) *Selenopemphix conspicua*. Age: late middle-late Miocene.

conspicua (de Verteuil and Norris, 1992, p.399–401, pl.2, figs.2–8; pl.10, figs.1–4; pl.11, figs.1–2; text-fig.5) Louwye et al. 2004, p.378. Holotype: de Verteuil and Norris, 1992, pl.2, figs.2–3. Originally *Selenopemphix brevispinosa* subsp. *conspicua*, subsequently (and now) *Selenopemphix conspicua*. Age: late middle-late Miocene.

- coronata* Bujak in Bujak et al., 1980, p.84, pl.21, figs.4–5; text-figs.17B,23C. Holotype: Bujak et al., 1980, pl.21, figs.4–5. Age: middle Eocene (see Aubry, 1986).
- crenata* Matsuoka and Bujak, 1988, p.70–72, pl.10, figs.6a–b,7; text-fig.15. Holotype: Matsuoka and Bujak, 1988, pl.10, figs.6a–b; text-fig.15; Head, 1994b, pl.2, figs.1–3; text-fig.2A. Age: late Miocene.
- dionaeacysta* Head et al., 1989b, p.459–460, pl.1, figs.3–4,7. Holotype: Head et al., 1989b, pl.1, fig.7. Taxonomic junior synonym: *Selenopemphix harpeza*, according to Head (1993, p.36). Age: late Miocene–early Pliocene.
- elegantula* (Williams, 1978, p.797–798, pl.7, figs.4,7–9 [not only figs.7–9]) Bujak in Bujak et al., 1980, p.84. Holotype: Williams, 1978, pl.7, fig.8. Originally *Vozzhennikovia?*, subsequently (and now) *Selenopemphix*. Age: middle Eocene.
- "*harpeza*" (Harland in Harland et al., 1991, p.653–654, fig.4f) Lentin and Williams, 1993, p.587. Holotype: Harland et al., 1991, fig.4f. Originally *Protopteridinium* subgenus *Protopteridinium* section *Selenopemphix* (section name not validly published; Appendix B), subsequently (and now) *Selenopemphix*. **Taxonomic senior synonym:** *Selenopemphix dionaeacysta*, according to Head (1993, p.36). N.I.A. Age: early Pleistocene.
- ?*indentata* Head et al., 1989b, p.460, pl.1, figs.1–2,5–6. Holotype: Head et al., 1989b, pl.1, fig.1. Questionable assignment: Head et al. (1989b, p.460). Age: late Miocene.
- islandensis* Verhoeven and Louwye, 2012, p.13–16,18, pl.1, figs.1–12; pl.2, figs.1–12; text-figs.3A–B,4A. Holotype: Verhoeven and Louwye, 2012, pl.1, figs.1–3. Age: early Pliocene.
- kepion* Harland and Pudsey, 2002, p.275–278, pl.3, figs.1–6; pl.5, figs.1–8; text-fig.4. Holotype: Harland and Pudsey, 2002, pl.5, figs.1–2. N.I.A. Age: late Miocene.
- maastrichta* Kumar et al., 1993, p.141–143, pl.1, figs.1–8; text-fig.2. Holotype: Kumar et al., 1993, pl.1, fig.1. Age: late Maastrichtian.
- minusa* Harland and Pudsey, 2002, p.278–279, pl.4, figs.5–7. Holotype: Harland and Pudsey, 2002, pl.4, fig.7. Based on Greek, this epithet is correctly rendered as *minusa* when feminine, *minys* (as cited in Harland and Pudsey) when masculine, and *minym* when neuter. Age: late Miocene.
- **nephroides* Benedek, 1972, p.47–48, pl.11, fig.13; pl.16, figs.1–4. Emendations: Bujak in Bujak et al., 1980, p.84; Benedek and Sarjeant, 1981, p.333–334,336 — however, see Head (1993, p.36). Holotype: Benedek, 1972, pl.11, fig.13; Benedek and Sarjeant, 1981, fig.8, nos.5–6; Head, 1993, fig.20, no.12. Taxonomic junior synonym: *Lejeunia* (now *Lejeunecysta*) *psilodora*, according to Benedek and Sarjeant (1981, p.333) — however, Lentin and Williams (1985, p.217) and Head (1993, p.36) retained *Lejeunia* (as *Lejeunecysta*) *psilodora*. Motile equivalent: *Protopteridinium subinermis* (Paulsen, 1904) Loeblich III, 1970, according to Harland (1982, p.396) — however, see Head (1993, p.36; 1996b, p.1215). Age: middle-late Oligocene.
- porcupensis* Louwye et al., 2008, p.136,138, pl.3, figs.1–9. Holotype: Louwye et al., 2008, pl.3, figs.1–5. Age: late Burdigalian–Langhian.
- prionota* Levy and Harwood, 2000, p.216, pl.8, figs.k–l. Holotype: Levy and Harwood, 2000, pl.8, fig.k. Age: middle-late Eocene.
- quanta* (Bradford, 1975, p.3067,3069, figs.5–7) Matsuoka, 1985a, p.51. Holotype: Bradford, 1975, fig.5; Fensome et al., 1995, fig.1 — p.1725. Originally *Multispinula*, subsequently (and now) *Selenopemphix*. This species was retained in *Selenopemphix* by Head (1993, p.36). Motile equivalent: *Protopteridinium conicum* (Gran, 1900) Balech, 1974, according to Harland (1981, p.68) — however, see Head (1993, p.37). Age: Holocene.
- selenoides* Benedek, 1972, p.48, pl.11, fig.15; pl.16, figs.5–8; text-fig.22. Emendations: Bujak in Bujak et al., 1980, p.86; Benedek and Sarjeant, 1981, p.336–338. Holotype: Benedek, 1972, pl.11, fig.15; Benedek and Sarjeant, 1981, fig.9, nos.6–7; Head, 1993, fig.20, no.1. Taxonomic junior synonym: *Lejeunia* (as *Lejeunecysta*) *paratenella*,

according to Benedek and Sarjeant (1981, p.336–338). Motile equivalent: "some specimens" of *Protopteridinium subinerme* (Paulsen, 1904) Loeblich III, 1970, according to Lewis et al. (1984, p.31). Age: middle-late Oligocene.

septum Heilmann-Clausen and Van Simaey, 2005, p.178,180, pl.11, figs.8–10. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.11, fig.8. N.I.A. Age: ?earliest Oligocene.

tholus (Bradford, 1975, p.3072,3074, figs.17–22) Head, 1996b, p.1231. Holotype: Bradford, 1975, fig.17. Originally *Omanodinium*, subsequently *Protopteridinium* subgenus *Protopteridinium* section *Selenopemphix* (combination not validly published), thirdly (and now) *Selenopemphix*. This combination was not validly published in Lentin and Williams (1989, p.333), since these authors did not intend to propose it. N.I.A. Age: Holocene.

undulata Verleye et al., 2011, p.71–72, pl.1, figs.1–9; p.2, figs.1–3. Holotype: Verleye et al., 2011, pl.1, figs.2–3. Age: Holocene.

warriensis Biffi and Grignani, 1983, p.143, pl.7, figs.4,7–8,10–14. Holotype: Biffi and Grignani, 1983, pl.7, fig.4. Age: Oligocene.

weileri Pross, 1997, p.125–126, pl.12, figs.10–11; text-fig.32B. Holotype: Pross, 1997, pl.12, fig.10. Age: middle Rupelian.

"*SEMBARIDINIUM*" Beju, 1978, p.4. **Name not validly published:** no description.

"*ornatum*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

"*sembarii*" Beju, 1978, p.4. **Name not validly published:** no description or illustration.

SEMICAVIDINIUM Dodekova, 1994, p.28. Type: Dürr, 1987, pl.4, fig.2, as *Meiourogonyaulax mitra*.

**mitra* (Dürr, 1987, p.74,77, figs.3a–b; fig.4, nos.3–6; fig.6, nos.1–3,5) Dodekova, 1994, p.28. Holotype: Dürr, 1987, fig.4, no.3; Dürr, 1988, pl.1, fig.5. Originally *Meiourogonyaulax*, subsequently *Lithodinia*, thirdly (and now) *Semicavidinium*. N.I.A. Age: middle Kimmeridgian.

SENEGALINIUM Jain and Millepie, 1973, p.22–23. Emendation: Stover and Evitt, 1978, p.122–123. Taxonomic senior synonym: *Deflandrea*, according to Hergreen (1975, p.60–61) — however, Lentin and Williams (1977b, p.144) retained *Senegalinium*. Nomenclatural junior synonym: *Alterbia*, by implication in Lentin and Williams (1976, p.49), who illegitimately included the "type species" of the senior generic name *Senegalinium*, *Senegalinium bicavatatum*, in *Alterbia*. See the discussion under *Alterbia*. Type: Jain and Millepie, 1973, pl.1, figs.1–3, as *Senegalinium bicavatatum*.

"*acuminatum*" (Cookson and Eisenack, 1958, p.27, pl.4, figs.5–8) Loeblich Jr. and Tappan, 1977, p.368. Holotype: Cookson and Eisenack, 1958, pl.4, fig.5. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*, fourthly (and now) *Isabelidinium*. Age: Cenomanian–early Turonian.

aenigmaticum (Boltenhagen, 1977, p.86–88, pl.14, figs.5a–b,6–10) Lentin and Williams, 1981, p.250. Holotype: Boltenhagen, 1977, pl.14, figs.5a–b. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: latest Albian–Turonian.

"*albertii*" (Corradini, 1973, p.174–175, pl.27, figs.7a–b,8; pl.28, fig.2) Harland, 1977a, p.189. Holotype: Corradini, 1973, pl.27, figs.7a–b. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*?, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Taxonomic junior synonym (at specific rank): *Peridinium pedunculatum* forma *divaricans* (subsequently *Phelodinium tricuspae* subsp. *divaricans*),

according to Sarjeant (1985b, p.158) and Lentin and Williams (1993, p.504,511). Questionable assignment: Harland (1977a, p.189). Age: Late Cretaceous–Paleocene.

?*ambiguum* He Chengquan in Zheng Yahui and He Chengquan, 1984, p.100, pl.6, figs.29–30. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.30. Questionable assignment: He Chengquan in Zheng Yahui and He Chengquan (1984, p.100). Age: Late Cretaceous.

"?*asymmetricum*" (Wilson, 1967a, p.62–63, figs.17–21) Stover and Evitt, 1978, p.123. Holotype: Wilson, 1967a, figs.19–21. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*?, fourthly (and now) *Alterbidinium*, fifthly *Magallanesium*. Questionable assignment: Stover and Evitt (1978, p.123). Age: ?Eocene (erratic).

**bicavatum* Jain and Millepied, 1973, p.23, pl.1, figs.1–4; text-fig.1B. Holotype: Jain and Millepied, 1973, pl.1, figs.1–3; Fensome et al., 1993a, figs.1–2 — p.975. Originally (and now) *Senegalinium*, subsequently *Deflandrea*, thirdly *Alterbia* (combination illegitimate). Lentin and Williams (1977b, p.144) retained this species in *Senegalinium*. Age: Campanian–Maastrichtian.

"*boloniense*" (Riegel, 1974, p.354–355, pl.1, figs.6–10; text-fig.3) Harland, 1977a, p.189. Emendation: Riegel and Sarjeant, 1982, p.296–297, as *Phelodinium boloniense*. Holotype: Riegel, 1974, pl.1, fig.7; Sarjeant et al., 1987, pl.2, fig.2. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Ceratiopsis* (combination illegitimate), thirdly *Senegalinium*, fourthly *Phelodinium*, fifthly (and now) *Cerodinium*. Stover and Evitt (1978, p.123) also proposed this combination. Age: ?Senonian.

cuvillieri (Boltenhagen, 1977, p.99–100, pl.17, figs.3,4a–b,5a–b,6) Lentin and Williams, 1980, p.41. Holotype: Boltenhagen, 1977, pl.17, fig.3. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: Campanian.

?*dilwynense* (Cookson and Eisenack, 1965c, p.141, pl.18, figs.6–9) Stover and Evitt, 1978, p.123. Holotype: Cookson and Eisenack, 1965c, pl.18, figs.7–8. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly *Senegalinium*?. Questionable assignment: Stover and Evitt (1978, p.123). Age: Paleocene.

"*dubium*" Jain and Millepied, 1973, p.25, pl.2, figs.12–13. Emendation: Masare et al., 1996, p.180, as *Andalusiella dubia*. Holotype: Jain and Millepied, 1973, pl.2, fig.13. **NOW** *Andalusiella*. Originally *Senegalinium*, subsequently *Deflandrea*, thirdly *Deflandrea*?, fourthly *Andalusiella*?, fifthly (and now) *Andalusiella*. Age: Maastrichtian.

ectorugosum (Archangelsky, 1969b, p.192, pl.1, figs.5–7) Stover and Evitt, 1978, p.123. Holotype: Archangelsky, 1969b, pl.1, figs.5–6. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Eocene.

"*gaditanum*" (Riegel, 1974, p.356–357, pl.2, figs.8–9; pl.3, figs.1–2) Harland, 1977a, p.189. Emendation: Riegel and Sarjeant, 1982, p.297–299, as *Phelodinium gaditanum*. Holotype: Riegel, 1974, pl.2, figs.8–9; Riegel and Sarjeant, 1982, fig.7D. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Lejeunia* (combination illegitimate), fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: ?Senonian.

"*granulostriatum*" Jain and Millepied, 1973, p.24–25, pl.1, figs.7–11; pl.2, fig.18; pl.3, fig.29. Holotype: Jain and Millepied, 1973, pl.1, fig.7. **NOW** *Cerodinium*. Originally *Senegalinium*, subsequently *Deflandrea*, thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Age: Maastrichtian.

"*ingramii*" (Cookson and Eisenack, 1970a, p.143, pl.12, figs.7–9) Loeblich Jr. and Tappan, 1977, p.368. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.9; Eisenack and Kjellström, 1975a, figure to left — p.190a; Fensome et al., 1996, fig.3 — p.2167. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Senegalinium*, thirdly *Alterbia* (combination illegitimate), fourthly (and now) *Eurydinium*. Age: Albian–Cenomanian.

iterlaaense Nøhr-Hansen and Heilmann-Clausen, 2001, p.164,166–168, fig.6, nos.1–6. Holotype: Nøhr-Hansen and Heilmann-Clausen, 2001, fig.6, nos.1–3. Fensome and Williams (2004, p.596) were incorrect in attributing this name to Hansen. Age: middle Danian–early Selandian.

"kozłowskii" (Górka, 1963, p.41, pl.5, fig.4) Harland, 1977a, p.189. Holotype: Górka, 1963, pl.5, fig.4. **NOW** *Phelodinium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Astrocysta*, thirdly *Senegalinium*, fourthly (and now) *Phelodinium*. Taxonomic senior synonym: *Peridinium* (as *Lejeunia*, now *Phelodinium*) *tricuspe*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Lejeunia* (as *Phelodinium*) *kozłowskii*. Age: late Maastrichtian.

laevigatum (Malloy, 1972, p.64, pl.1, figs.1–7) Bujak and Davies, 1983, p.163. Holotype: Malloy, 1972, pl.1, fig.5. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Andalusiella*, fourthly *Lejeunecysta*, fifthly (and now) *Senegalinium*. Taxonomic junior synonym: *Senegalinium psilatum*, according to Herngreen (1975, p.61). Age: Senonian.

macrocystum (Cookson and Eisenack, 1960a, p.3, pl.1, figs.7–8) Stover and Evitt, 1978, p.123. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.7. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Campanian.

"magnificum" (Stanley, 1965, p.218–219, pl.20, figs.1–6) Harland, 1977a, p.188. Holotype: Stanley, 1965, pl.20, figs.4–6. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Taxonomic junior synonym (at specific rank): *Peridinium crassipes* forma *altum*, according to Sarjeant (1985b, p.159) and Lentin and Williams (1993, p.503). Age: Paleocene.

maxicavernum Beilstein, 1994, p.191–192, pl.29, figs.3–4. Holotype: Beilstein, 1994, pl.29, fig.3. Age: Campanian.

microgranulatum (Stanley, 1965, p.219, pl.19, figs.4–6) Stover and Evitt, 1978, p.123. Holotype: Stanley, 1965, pl.19, figs.4–5. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Paleocene.

microspinosum (Boltenhagen, 1977, p.98–99, pl.17, figs.1a–c, 2a–b) Lentin and Williams, 1980, p.41. Holotype: Boltenhagen, 1977, pl.17, figs.1a–c. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: Campanian–Maastrichtian.

obscurum (Drugg, 1967, p.17, pl.2, figs.8–9; pl.9, fig.5) Stover and Evitt, 1978, p.123. Holotype: Drugg, 1967, pl.2, fig.8. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Senegalinium*. Age: Maastrichtian–Danian.

orei (Jan du Chêne and Adediran, 1985, p.29, pl.1, figs.2–4) Stover and Williams, 1987, p.148. Holotype: Jan du Chêne and Adediran, 1985, pl.1, fig.3. Originally *Lentinia*, subsequently (and now) *Senegalinium*. Age: late Paleocene–early Eocene.

pallidum Lucas-Clark, 2006, p.200, pl.3, figs.10–11, 13–14. Holotype: Lucas-Clark, 2006, pl.3, figs.10–11. Age: late Paleocene.

"?pannuceum" (Stanley, 1965, p.220, pl.22, figs.1–4, 8–10) Harland, 1977a, p.189. Holotype: Stanley, 1965, pl.22, figs.3–4. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium?*, thirdly *Deflandrea?*, fourthly *Ceratiopsis* (combination illegitimate), fifthly (and now) *Cerodinium*. Questionable assignment: Harland (1977a, p.189). Age: Paleocene.

"pentagonale" (Corradini, 1973, p.175, pl.28, fig.3) Harland, 1977a, p.189. Holotype: Corradini, 1973, pl.28, fig.3; Eisenack and Kjellström, 1981a, page labelled "nach S.208"; Fensome et al., 1995, fig.1 — p.1649. **NOW** *Phelodinium*. Originally *Deflandrea*, subsequently *Lejeunia* (combination illegitimate), thirdly *Senegalinium*, fourthly *Lejeunecysta*, fifthly (and now) *Phelodinium*. Age: Senonian.

"*psilatum*" Jain and Millepied, 1973, p.23–24, pl.1, figs.5–6; text-fig.1A. Holotype: Jain and Millepied, 1973, pl.1, fig.6. **Taxonomic senior synonym:** *Deflandrea* (now *Senegalinium*) *laevigata*, according to Herngreen (1975, p.61). Age: Campanian–Maastrichtian.

sergipense (Herngreen, 1975, p.61, pl.3, figs.13–15) Lentin and Williams, 1980, p.41. Holotype: Herngreen, 1975, pl.3, figs.14–15. Originally *Deflandrea*, subsequently (and now) *Senegalinium*. Age: late Senonian.

?*simplex* Lucas-Clark, 2006, p.200–202, pl.3, figs.15–16; pl.4, figs.1–4. Holotype: Lucas-Clark, 2006, pl.3, figs.15–16. Questionable assignment: Lucas-Clark (2006, p.200). Age: Paleocene.

"?*subquadrum*" (Corradini, 1973, p.175–176, pl.28, fig.1) Harland, 1977a, p.189. Holotype: Corradini, 1973, pl.28, fig.1. **NOW** *Cerodinium*. Originally *Deflandrea*, subsequently *Senegalinium*? (combination illegitimate), thirdly *Ceratiopsis* (combination illegitimate), fourthly (and now) *Cerodinium*. Questionable assignment: Harland (1977a, p.189). Age: Senonian.

"*tricuspe*" (Wetzel, 1933a, p.166, pl.2, fig.14) Harland, 1977a, p.188. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.20, as *Lejeunecysta tricuspis*. Holotype: Wetzel, 1933a, pl.2, fig.14; Lejeune-Carpentier, 1942, fig.21; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.5. **NOW** *Phelodinium*. Originally *Peridinium* (Appendix B), subsequently *Lejeunia* (combination illegitimate), thirdly *Astrocysta*, fourthly *Senegalinium*, fifthly *Lejeunecysta*, sixthly (and now) *Phelodinium*. Taxonomic junior synonym: *Lejeunia* (now *Phelodinium*) *kozlowskii*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Lejeunia* (as *Phelodinium*) *kozlowskii*. Age: Senonian.

"*trisinum*" Jain and Millepied, 1973, p.25, pl.2, fig.16. Holotype: Jain and Millepied, 1973, pl.2, fig.16. **Taxonomic senior synonym:** *Svalbardella* (now *Andalusiella*) *polymorpha*, according to Lentin and Williams (1976, p.164). Age: Maastrichtian.

SENONIASPHAERA Clarke and Verdier, 1967, p.61. Type: Clarke and Verdier, 1967, pl.14, fig.8, as *Senoniasphaera protrusa*.

clavellii Bailey et al., 1997, p.236,239, figs.4d–h. Holotype: Bailey et al., 1997, fig.4d (not figs.3d–h). Age: late Kimmeridgian.

edenensis Marshall, 1990a, p.18, figs.9A–E,15L–W. Holotype: Marshall, 1990a, figs.9A–B,15R–T; Fensome et al., 1996, figs.1–3,9 — p.2115. Age: Campanian.

"?*frisica*" Raynaud, 1978, p.394, pl.1, fig.11. Holotype: Raynaud, 1978, pl.1, fig.11. Originally *Senoniasphaera*?, subsequently *Sirmiodiniopsis*. Questionable assignment: Raynaud (1978, p.394). **Taxonomic senior synonym:** *Meiourogonyaulax* (as *Ambonosphaera*?) *staffinensis*, according to Poulsen and Riding (1992, p.26). Age: Oxfordian–mid Valanginian.

inornata (Drugg, 1970b, p.811–812, figs.3C–F) Stover and Evitt, 1978, p.80. Holotype: Drugg, 1970b, fig.3C. Originally *Chiropteridium*, subsequently (and now) *Senoniasphaera*. Age: Danian.

jurassica (Gitmez and Sarjeant, 1972, p.240–241, pl.14, figs.5,8) Lentin and Williams, 1976, p.85. Emendation: Poulsen and Riding, 1992, p.28, as *Senoniasphaera jurassica*. Holotype: Gitmez and Sarjeant, 1972, pl.14, fig.5; Poulsen and Riding, 1992, text-figs.3C–D. Originally *Hexagonifera*, subsequently (and now) *Senoniasphaera*, thirdly *Ambonosphaera*. Lentin and Williams (1981, p.11) retained this species in *Senoniasphaera*. Taxonomic senior synonym: *Meiourogonyaulax* (now *Lithodinia*?) *staffinensis*, according to Williams et al. (1993, p.32) — however, elsewhere in the same publication, Williams et al. (1993, p.56) retained *Hexagonifera* (now *Senoniasphaera*) *jurassica*. Age: Kimmeridgian.

lordii (Cookson and Eisenack, 1968, p.112, figs.11–K) Lentin and Williams, 1976, p.102. Holotype: Cookson and Eisenack, 1968, fig.1J. Originally *Ascodinium*, subsequently (and now) *Senoniasphaera*. Age: Santonian–early Campanian.

macroreticulata Prince et al., 2008, p.90, pl.1, fig.7–10. Holotype: Prince et al., 2008, pl.1, figs.7–8. Age: late Santonian–early Campanian.

microreticulata Brideaux and McIntyre, 1975, p.35, pl.11, figs.7–12; pl.12, figs.1–8. Holotype: Brideaux and McIntyre, 1975, pl.11, figs.7–9; pl.12, fig.1. Originally (and now) *Senoniasphaera*, subsequently *Canningia*. Lentin and Williams (1981, p.33) retained this species in *Senoniasphaera*. Age: middle Albian.

palla Louwye, 1997, p.153, pl.2, figs.3,6. Holotype: Louwye, 1997, pl.2, figs.3,6. Age: Turonian.

**protrusa* Clarke and Verdier, 1967, p.61–62, pl.14, figs.7–9; text-fig.24. Emendation: Prince et al., 1999, p.161. Holotype: Clarke and Verdier, 1967, pl.14, fig.8. Age: Santonian.

subsp. *congreusa* Prince et al., 2008, p.90, pl.2, figs.1–3. Holotype: Prince et al., 2008, pl.2, figs.1–2. Age: middle Santonian–early Campanian.

subsp. *protrusa*. Autonym. Holotype: Clarke and Verdier, 1967, pl.14, fig.8.

ptomatis Helby, May and Partridge in Helby, 1987, p.319–321, figs.25A–S,26. Holotype: Helby, 1987, figs.25A–D; Fensome et al., 1996, figs.1–4 — p.2303. N.I.A. Age: middle Berriasian.

?*reticulata* (Khanna and Singh, 1981b, p.391, fig.1, nos.4,6; text-fig.3) Lentin and Williams, 1993, p.591. Holotype: Khanna and Singh, 1981b, fig.1, no.4. Originally *Hexagonifera*, subsequently (and now) *Senoniasphaera*?. Questionable assignment: Lentin and Williams (1993, p.591). This name was not validly published in Singh et al. (1979, p.35–36), Khanna (1979, p.216) and Khanna et al. (1981, p.261), since no description was provided. Age: early-middle Eocene.

"?*reticulata*" Wilson in Masure, 1985, caption to fig.1b — p.202. **Name not validly published:** no description or illustration. Questionable assignment: Wilson in Masure (1985, caption to fig.1b — p.202).

rotundata Clarke and Verdier, 1967, p.62–63, pl.14, figs.1–3; text-fig.25. Emendation: Prince et al., 1999, p.162. Holotype: Clarke and Verdier, 1967, pl.14, fig.2. Age: Santonian–Campanian.

"subsp. *alveolata*" Pearce et al., 2003, p.301–302, pl.2, figs.6–7. Holotype: Pearce et al., 2003, pl.2, figs.6–7. **Taxonomic senior synonym:** *Senoniasphaera turonica*, according to Pearce et al. (2011, p.92). Age: early Turonian–early Coniacian.

"subsp. *rotundata*". Autonym. Holotype: Clarke and Verdier, 1967, pl.14, fig.2. **Now redundant.**

?*sarrisii* (Archangelsky, 1969a, p.411, pl.2, figs.5–7) Stover and Evitt, 1978, p.80. Holotype: Archangelsky, 1969a, pl.2, figs.6–7. Originally *Polystephanephorus*?, subsequently (and now) *Senoniasphaera*?. Questionable assignment: Stover and Evitt (1978, p.80). Age: Eocene.

stagonoides (Benedek, 1972, p.10, pl.2, fig.12; text-fig.5) Helenes, 1983, p.262. Emendation: Benedek and Sarjeant, 1981, p.324, as *Ascodinium stagonoides*. Holotype: Benedek, 1972, pl.2, fig.12; Benedek and Sarjeant, 1981, fig.3, nos.1,3. Originally *Ascodinium*, subsequently *Deflandrea*, thirdly (and now) *Senoniasphaera*. Age: late Oligocene.

"*tabulata*" Backhouse and Helby in Helby, 1987, p.317–319, figs.21A–G,22A–C,23. Holotype: Helby, 1987, figs.21A–B; Fensome et al., 1996, figs.1–2 — p.2395. **Taxonomic senior synonym:** *Muderongia simplex*, according to Riding et al. (2001), p.29. Age: Hauterivian.

turensis Vasilyeva in Andreeva-Grigorovich et al., 2011, p.34, pl.2, fig.6. Holotype: Andreeva-Grigorovich et al., 2011, pl.2, fig.6. Age: Danian.

turonica (Prössl, 1990, p.108–109, pl.16, figs.1–2,6–7 ex Prössl, 1992b, p.113–114) Pearce et al., 2011, p.92. Holotype: Prössl, 1990, pl.16, figs.1–2. Originally *Craspedodinium*, subsequently (and now) *Senoniasphaera*. Taxonomic junior synonym: *Senoniasphaera rotundata* subsp. *alveolata*, according to Pearce et al. (2011, p.92). Age: middle Cenomanian–late Turonian.

whitenessensis Prince et al., 2008, p.91, pl.1, figs.11–12. Holotype: Prince et al., 2008, pl.1, figs. 11–12. As the epithet was avowedly named after a place and not a person, the spelling is corrected here from *whitenessii* to *whitenessensis*. Age: late Santonian.

SENTUSIDINIUM Sarjeant and Stover, 1978, p.49–50. Emendation: Courtinat, 1989, p.192. Taxonomic senior synonym: *Batiacasphaera*, according to Dörrhöfer and Davies (1980, p.40) — however, Lentin and Williams (1981, p.24,253) retained *Sentusidinium*. Nomenclatural junior synonym: *Tenua* Davey, which has the same type. Type: Sarjeant, 1968, pl.1, fig.22; pl.2, fig.1, as *Tenua rioultii*.

"aptiense" (Burger, 1980a, p.76, pl.23, figs.1,5; pl.24, fig.1) Burger, 1980b, p.277. Holotype: Burger, 1980a, pl.23, fig.1; Fauconnier and Masure, 2004, pl.63, figs.11–13. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Taxonomic junior synonym: *Tenua* (as *Sentusidinium*) *microrobusta*, according to Backhouse (1988, p.107). Age: Aptian.

"asymmetricum" (Pocock, 1972, p.107, pl.26, figs.29–30) Jansonius, 1986, p.219. Holotype: Pocock, 1972, pl.26, fig.29; Fauconnier and Masure, 2004, pl.63, fig.15. **NOW** *Pilosidinium*. Originally *Leiosphaeridia* (Appendix A), subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Taxonomic junior synonym: *Sentusidinium* (as *Pilosidinium*) *fibrosum*, according to Courtinat in Fauconnier and Masure, 2004, p.447. Age: late Bajocian–early Bathonian.

"asymmetrum" (Fenton et al., 1980, p.160,162, pl.16, figs.1,3,5) Lentin and Williams, 1981, p.253. Holotype: Fenton et al., 1980, pl.16, fig.3. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Age: late Bajocian.

"atlanticum" (Habib, 1972, p.375, pl.4, figs.2,5) Sarjeant and Stover, 1978, p.50. Holotype: Habib, 1972, pl.4, fig.2. **NOW** *Valvaeodinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*?, thirdly *Fromea* (Appendix A), fourthly *Kylindrocysta*, fifthly (and now) *Valvaeodinium*. Questionable assignment: Sarjeant and Stover (1978, p.50). Taxonomic junior synonym: *Fromea complicata* (Appendix A), according to Davies (1983, p.31) — however, Jansonius (1989, p.65) retained *Fromea complicata*. Age: Callovian–Oxfordian.

"baculatum" (Dodekova, 1975, p.28–29, pl.6, figs.1–3; text-fig.7) Sarjeant and Stover, 1978, p.50. Holotype: Dodekova, 1975, pl.6, figs.1–3. **NOW** *Barbatacysta*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Barbatacysta*. Age: late Bathonian.

"bellulum" (Jiabo, 1978, p.51, pl.23, figs.14–16) Xu Jinli et al., 1997, p.46. Holotype: Jiabo, 1978, pl.23, fig.15. **NOW** *Batiacasphaera*? Originally *Tenua* Eisenack, subsequently *Kallosphaeridium*?, thirdly *Batiacasphaera*, fourthly (and now) *Batiacasphaera*?, fifthly *Sentusidinium*. Age: Early Tertiary.

?bifidum (Jiabo, 1978, p.51–52, pl.22, figs.7–16) He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.66–67, pl.16, figs.17–23. Holotype: Jiabo, 1978, pl.22, fig.8. Originally *Tenua* Eisenack, subsequently *Cleistosphaeridium*?, thirdly (and now) *Sentusidinium*. Questionable assignment: Xu Jinli et al. (1997, p.46); and Courtinat in Fauconnier and Masure (2004, p.486) as a problematic species. Islam (1993, p.87) also proposed this combination. Age: Early Tertiary.

biornatum (Jiabo, 1978, p.52, pl.22, figs.21–29; pl.23, figs.1–4) He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.67. Holotype: Jiabo, 1978, pl.22, fig.24. Originally *Tenua biornata*, subsequently *Kallosphaeridium biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum*, fourthly *Batiacasphaera biornata*, fifthly (and now) *Sentusidinium biornatum*. Lentin and Williams (1993, p.53) retained this species in *Batiacasphaera*, but He Chengquan et al. (2009, p.249) retained it in *Sentusidinium*. Age: Early Tertiary.

subsp. *biornatum*. Autonym. Holotype: Jiabo, 1978, pl.22, fig.24. Originally *Tenua biornata* subsp. *biornata*, subsequently *Kallosphaeridium biornatum* subsp. *biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *biparatum*, fourthly *Batiacasphaera biornata* subsp. *biornata*, fifthly (and now) *Sentusidinium biornatum* subsp. *biornatum*.

"subsp. *conspiculum*" Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.84–85, pl.9, figs.10–11. Holotype: Liu Zhili et al., 1992, pl.9, fig.11. **NOW** *Batiacasphaera conspicula*. Originally *Sentusidinium biornatum* subsp. *conspiculum*, subsequently *Batiacasphaera biornata* subsp. *conspicula*, thirdly (and now) *Batiacasphaera conspicula*. Age: Early Tertiary.

subsp. *crassum* (Jiabo, 1978, p.52, pl.23, figs.1–4) He Chengquan et al., 2009, p. 250. Holotype: Jiabo, 1978, pl.23, fig.3. Originally *Tenua biornata* subsp. *crassa*, subsequently *Kallosphaeridium biornatum* subsp. *crassum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *crassum*, fourthly *Batiacasphaera biornata* subsp. *crassa*, fifthly (and now) *Sentusidinium biornatum* subsp. *crassum*. He Chengquan et al. (2009, p.250) implied that this combination was proposed by He Chengquan et al. (1989, p.67), but we have been unable to verify this. Age: Early Tertiary.

"*brachyspinosum*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.85, pl.18, figs.12–17. Holotype: Liu Zhili et al., 1992, pl.18, fig.16. **NOW** *Batiacasphaera*. Originally *Sentusidinium*, subsequently (and now) *Batiacasphaera*. Age: Early Tertiary.

"*brevispinosum*" Courtinat in Courtinat and Gaillard, 1980, p.60, pl.9, figs.4,7,11; text-fig.10e. Holotype: Courtinat and Gaillard, 1980, pl.9, fig.7; Fauconnier and Masure, 2004, pl.11, fig.1. **NOW** *Barbatacysta*. Originally *Sentusidinium*, subsequently (and now) *Barbatacysta*. Taxonomic junior synonym: *Barbatacysta lemoignei*, according to Courtinat in Fauconnier and Masure (2004, p.83). Junior homonym: *Sentusidinium? brevispinosum* (Jain and Millepied, 1975) Islam, 1993. Age: late Oxfordian.

"*?brevispinosum*" (Jain and Millepied, 1975, p.150, pl.5, figs.80–82) Islam, 1993, p.87. Holotype: Jain and Millepied, 1975, pl.5, figs.80–81; Fauconnier and Masure, 2004, pl.69, fig.6. **Combination illegitimate — senior homonym:** *Sentusidinium brevispinosum* Courtinat in Courtinat and Gaillard, 1980. **Substitute name:** *Sentusidinium? millepiedii*. Originally *Cleistosphaeridium? brevispinosum*, subsequently *Sentusidinium brevispinosum* (combination illegitimate), thirdly *Sentusidinium? brevispinosum* (combination illegitimate), fourthly (and now) *Sentusidinium? millepiedii*. Questionable assignment: Courtinat in Fauconnier and Masure (2004, p.486) as a problematic species. Age: Aptian.

"*capillatum*" (Davey, 1975, p.155–156, pl.2, figs.4,7) Lentin and Williams, 1981, p.253. Holotype: Davey, 1975, pl.2, fig.7. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Age: Senonian, ?Campanian.

conispinosum Xu Jinli et al., 1997, p.47, pl.34, figs.6a–b; pl.35, figs.14a–b,16a–b; pl.36, figs.15a–b ex He Chengquan et al., 2009, p.662. Holotype: Xu Jinli et al., 1997, pl.35, figs.16a–b. The name was not validly published in Xu Jinli et al. (1997), since they did not provide an English or a Latin description: He Chengquan et al. (2009, p.662) validated it by publishing a diagnosis in English. Age: Oligocene.

"*creberbarbatum*" Erkmén and Sarjeant, 1980, p.52–54, text-fig.2. Holotype: Fensome, 1979, pl.1, fig.3 (as *Sentusidinium pilosum*); Erkmén and Sarjeant, 1980, text-fig.2. **NOW** *Barbatacysta*. Originally *Sentusidinium*, subsequently (and now) *Barbatacysta*. Taxonomic junior synonym: *Sentusidinium parvum*, according to Courtinat in Fauconnier and Masure (2004, p.83–84). Age: Oxfordian–Kimmeridgian.

"*?cuculliforme*" Davies, 1983, p.29, pl.10, figs.1–4; text-fig.26. Holotype: Davies, 1983, pl.10, figs.3–4; Fauconnier and Masure, 2004, pl.69, figs.1–3. Originally *Sentusidinium*, subsequently *Sentusidinium?*, thirdly *Cyclonephelium*. Questionable assignment: Courtinat (1989, p.192). **Taxonomic senior synonym:** *Cleistosphaeridium* (now *Sentusidinium*) *separatum*, according to Courtinat in Fauconnier and Masure (2004, p.486). Courtinat in Fauconnier and Masure (2004, p.487) simultaneously considered this to be a problematic species of *Sentusidinium*. Age: Berriasian–Valanginian.

"densicomatum" (Maier, 1959, p.307–308, pl.29, figs.7–8) Sarjeant, 1983, p.111. Emendation: Sarjeant, 1983, p.111–113, as *Sentusidinium densicomatum*. Holotype: Maier, 1959, pl.29, fig.7. **NOW** *Pilosidinium*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Impletosphaeridium?*, fifthly *Sentusidinium*, sixthly (and now) *Pilosidinium*. Age: middle Oligocene–middle Miocene.

"densispinum" He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.67, pl.17, figs.1–3. Holotype: He Chengquan et al., 1989, pl.17, fig.3. Age: Early Tertiary.

"echinatum" (Gitmez and Sarjeant, 1972, p.190, pl.1, figs.1,9) Sarjeant and Stover, 1978, p.50. Holotype: Gitmez and Sarjeant, 1972, pl.1, fig.1; Fauconnier and Masure, 2004, pl.63, fig.14. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Age: early–late Kimmeridgian.

"eisenackii" (Boltenhagen, 1977, p.56–58, pl.5, figs.5a–b,6a–b,7a–b,8a–b) Lentin and Williams, 1981, p.253. Holotype: Boltenhagen, 1977, pl.5, figs.5a–b; Fauconnier and Masure, 2004, pl.69, fig.4. Originally *Tenua* Eisenack, subsequently (and now) *Sentusidinium*. Taxonomic junior synonym: *Sentusidinium spiculatum*, according to Courtinat in Fauconnier and Masure (2004, p.485). Age: Cenomanian–Turonian.

subsp. **"eisenackii"**. Autonym. Holotype: Boltenhagen, 1977, pl.5, figs.5a–b; Fauconnier and Masure, 2004, pl.69, fig.4.

?subsp. **"vermiculatum"** (Boltenhagen, 1977, p.57–58, pl.5, figs.7a–b,8a–b) Lentin and Williams, 1981, p.253. Holotype: Boltenhagen, 1977, pl.5, figs.7a–b; Fauconnier and Masure, 2004, pl.70, fig.6. Originally *Tenua eisenackii* var. *vermiculata*, subsequently *Sentusidinium eisenackii* subsp. *vermiculatum*, thirdly (and now) *Sentusidinium eisenackii?* subsp. *vermiculatum*. Questionable assignment: Courtinat in Fauconnier and Masure (2004, p.487) as a problematic taxon. Age: Cenomanian–Turonian.

"erythrocomum" Erkmen and Sarjeant, 1980, p.56,58, pl.2, fig.11; pl.3, figs.1–6,8–11; pl.4, fig.5; text-fig.5. Holotype: Erkmen and Sarjeant, 1980, pl.4, fig.5; Fauconnier and Masure, 2004, pl.69, fig.7. Age: late Callovian.

?**"fibrillosum"** Backhouse, 1988, p.107–108, pl.41, figs.3a–b,4a–b,5a–b,6. Holotype: Backhouse, 1988, pl.41, figs.4a–b; Fensome et al., 1996, figs.3–4 — p.2123; Fauconnier and Masure, 2004, pl.70, figs.7–8. Questionable assignment: Backhouse (1988, p.107). Age: late Valanginian–Hauterivian.

"fibrosum" Kumar, 1987a, p.243–244, pl.1, figs.5,7–8,11; text-fig.6. Holotype: Kumar, 1987a, pl.1, fig.5. Originally *Sentusidinium*, subsequently *Pilosidinium* (combination not validly published). **Taxonomic senior synonym:** *Leiosphaeridia* (now *Pilosidinium*) *asymmetrica*, according to Courtinat in Fauconnier and Masure (2004, p.447,449). Age: early Kimmeridgian–Tithonian.

"filiatum" Davies, 1983, p.29–30, pl.10, figs.5–6,8–9; text-fig.27. Holotype: Davies, 1983, pl.10, fig.8; Fauconnier and Masure, 2004, pl.64, figs.2–3. **NOW** *Pilosidinium*. Originally *Sentusidinium*, subsequently (and now) *Pilosidinium*. Age: late Oxfordian–Valanginian.

"fungosum" Harding, 1990b, p.43–44, pl.25, figs.1–9 ex Harding in Williams et al., 1998, p.557. Holotype: Harding, 1990b, pl.25, fig.1. Originally *Cleistosphaeridium* (name not validly published), subsequently (and now) *Sentusidinium*. The name *Cleistosphaeridium fungosum* was not validly published in Harding (1990b) since the lodgment of the holotype was not specified. Age: early Barremian.

"granulatum" (Courtinat in Courtinat and Gaillard, 1980, p.13–14, pl.1, figs.4,6; text-fig.2b) Brenner, 1988, p.80. Holotype: Courtinat and Gaillard, 1980, pl.1, fig.6. **NOW** *Escharisphaeridia*. Originally *Chytroeisphaeridia*, subsequently (and now) *Escharisphaeridia*, thirdly *Sentusidinium*. Age: late Oxfordian.

"hexagonale" Kumar, 1986b, p.400–401, pl.1, figs.5,7; text-fig.10. Holotype: Kumar, 1986b, pl.1, fig.5. **Taxonomic senior synonym:** *Sentusidinium sparsibarbatum*, according to Courtinat in Fauconnier and Masure

(2004, p.486). Courtinat in Fauconnier and Masure (2004, p.487) simultaneously considered this to be a problematic species of *Sentusidinium*. Age: early Kimmeridgian–Tithonian.

"*microcystum*" (Bujak in Bujak et al., 1980, p.88,90, pl.22, figs.2–5) Islam, 1993, p.88. Holotype: Bujak et al., 1980, pl.22, figs.2–3; Fauconnier and Masure, 2004, pl.64, figs.4–5. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Cleistosphaeridium*, thirdly *Sentusidinium*, fourthly (and now) *Pilosidinium*. Age: middle Eocene (see Aubry, 1986).

"*microrobustum*" (Morgan, 1980, p.33, pl.29, figs.15–16) Lentin and Williams, 1985, p.321. Holotype: Morgan, 1980, pl.29, figs.15–16. Originally *Tenua* Eisenack, subsequently *Sentusidinium*. **Taxonomic senior synonym:** *Tenua* (as *Batiacasphaera*, now *Pilosidinium*) *aptiensis*, according to Backhouse (1988, p.107). Courtinat in Fauconnier and Masure (2004, p.487) simultaneously considered this to be a problematic species of *Sentusidinium*. Age: late Neocomian–late Albian.

?*millepedii* Fensome and Williams, 2004, p.601. Substitute name for *Sentusidinium? brevispinosum* (Jain and Millepied, 1975, p.150, pl.5, figs.80–82) Islam, 1993, p.87. Holotype: Jain and Millepied, 1975, pl.5, figs.80–81; Fauconnier and Masure, 2004, pl.69, fig.6. Originally *Cleistosphaeridium? brevispinosum*, subsequently *Sentusidinium brevispinosum* (combination illegitimate), thirdly *Sentusidinium? brevispinosum* (combination illegitimate), fourthly (and now) *Sentusidinium? millepedii*. Questionable assignment: Courtinat in Fauconnier and Masure (2004, p.486), who considered *Sentusidinium brevispinosum* (Jain and Millepied) to be a problematic species. Age: Aptian.

minus (Jiabo, 1978, p.52–53, pl.23, figs.5–7) He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.68. Holotype: Jiabo, 1978, pl.23, fig.5. Originally *Tenua hystrix* subsp. *minor*, subsequently *Kallosphaeridium? minus*, thirdly *Batiacasphaera minor* (combination illegitimate), fourthly *Batiacasphaera sinensis*, fifthly *Batiacasphaera jiaboi* (name not validly published), sixthly (and now) *Sentusidinium minus*. Lentin and Williams (1993, p.56) retained this species in *Batiacasphaera*, but He Chengquan et al. (2009, p.251) retained it in *Sentusidinium*. Age: Early Tertiary.

minutum He Chengquan, 1991, p.59, pl.15, fig.4. Holotype: He Chengquan, 1991, pl.15, fig.4. Age: late Senonian–early Eocene.

"*myriatrichum*" Fensome, 1979, p.12–13, pl.2, fig.7; text-fig.5A. Holotype: Fensome, 1979, pl.2, fig.7; text-fig.5A; Fauconnier and Masure, 2004, pl.63, fig.16. **NOW** *Pilosidinium*. Originally *Sentusidinium*, subsequently (and now) *Pilosidinium*. Age: late Oxfordian–mid Kimmeridgian.

"?*neophytensum*" (Ioannides et al., 1977, p.463, pl.5, figs.5,8–9) Sarjeant and Stover, 1978, p.50. Holotype: Ioannides et al., 1977, pl.5, fig.5. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium?*, thirdly (and now) *Pilosidinium*. Questionable assignment: Sarjeant and Stover (1978, p.50). Age: middle Kimmeridgian.

"*ornatum*" Courtinat in Courtinat and Gaillard, 1980, p.61–62, pl.9, figs.2–3,5; text-fig.10a. Holotype: Courtinat and Gaillard, 1980, pl.9, fig.2; Fauconnier and Masure, 2004, pl.28, figs.5–10. Originally *Sentusidinium*, subsequently *Epiplosphaera*. **Taxonomic senior synonym:** *Epiplosphaera reticulospinosa*, according to Courtinat (1989, p.176). Age: late Oxfordian.

?*panshanense* (Jiabo, 1978, p.63, pl.22, figs.1–6) Islam, 1993, p.88. Holotype: Jiabo, 1978, pl.22, fig.1. Originally *Cleistosphaeridium*, subsequently (and now) *Sentusidinium*. Questionable assignment: Courtinat in Fauconnier and Masure (2004, p.487) as a problematic species. Age: Early Tertiary.

"*parvum*" Kunz, 1990, p.33–34, pl.8, figs.14a–c,15a–c,16a–b; text-fig.11. Holotype: Kunz, 1990, pl.8, figs.14a–c; text-fig.11. Originally *Sentusidinium*, subsequently *Barbatacysta* (name not validly published). **Taxonomic senior synonym:** *Sentusidinium* (now *Barbatacysta*) *creberbarbatum*, according to Courtinat in Fauconnier and Masure (2004, p.83–84). Age: late Oxfordian.

"*pelionense*" Fensome, 1979, p.13–15, pl.1, figs.5–9; text-fig.5B. Holotype: Fensome, 1979, pl.1, figs.5,7; text-fig.5B; Fauconnier and Masure, 2004, pl.11, fig.4. **NOW** *Barbatacysta*. Originally *Sentusidinium*, subsequently (and now) *Barbatacysta*. Age: Bajocian–Bathonian.

perforoconum (Yun Hyesu, 1981, p.43, pl.15, figs.1–4) Islam, 1993, p.88. Holotype: Yun Hyesu, 1981, pl.15, fig.4; Fensome et al., 1991, fig.4 — p.707; Fauconnier and Masure, 2004, pl.70, figs.2–3. Originally *Cleistosphaeridium*, subsequently (and now) *Sentusidinium*. Age: early Santonian.

"*pilosum*" (Ehrenberg, 1854, pl.37, section 8, fig.4) Sarjeant and Stover, 1978, p.50. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. Age: Oxfordian.

"forma ?*nanus*" Wetzel, 1933b, p.43, pl.4, fig.23; text-fig.13 ex Lentin and Williams, 1985, p.322. Emendation: Sarjeant, 1985b, p.145, as *Prolixosphaeridium nanus*. Holotype: Wetzel, 1933b, pl.4, fig.23; Sarjeant, 1985b, pl.2, figs.6–7. **NOW** *Prolixosphaeridium? nanus*. Originally *Hystrichosphaera pilosa* forma *nanus* (name not validly published), subsequently *Sentusidinium pilosum?* subsp. *nanus*, thirdly *Prolixosphaeridium nanus*, fourthly (and now) *Prolixosphaeridium? nanus*. Questionable assignment: Lentin and Williams (1985, p.322). The name *Hystrichosphaera pilosa* forma *nanus* was not validly published in Wetzel (1933b) since the species combination *Hystrichosphaera pilosa* was not validly published. N.I.A. Age: Late Cretaceous.

"forma *pilosum*". Autonym. Holotype: Ehrenberg, 1854, pl.37, section 8, no.4. **Now redundant**. Originally *Hystrichosphaera pilosa* forma *pilosa*, subsequently *Sentusidinium pilosum* forma *pilosum*.

qingzangense He Chengquan et al., 2005a, p.64–65,250, pl.21, figs.13–15. Holotype: He Chengquan et al., 2005a, pl.21, fig.15. Age: Late Jurassic (Kimmeridgian according to He Chengquan et al., 2009, p.253).

reticuloides Xu Jinli et al., 1997, p.47, pl.16, figs.3–4; pl.17, figs.3–4; pl.18, figs.12–15; pl.19, figs.7–9 ex He Chengquan et al., 2009, p.662. Holotype: Xu Jinli et al., 1997, pl.18, fig.12. This name (as *Sentusidinium reticuloidum*) was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.662) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

**rioultii* (Sarjeant, 1968, p.231, pl.1, figs.12,22; pl.2, figs.1–2,4) Sarjeant and Stover, 1978, p.50. Emendation: Courtinat, 1989, p.192, as *Sentusidinium rioultii*. Holotype: Sarjeant, 1968, pl.1, fig.22; pl.2, fig.1; Eisenack and Kjellström, 1972, figure to left — p.1043; Fensome et al., 1995, fig.1 — p.1743; Fauconnier and Masure, 2004, pl.70, fig.4. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly (and now) *Sentusidinium*, fourthly *Tenua* Davey (combination illegitimate). Age: late Callovian.

separatum (McIntyre and Brideaux, 1980, p.19–20, pl.6, figs.4–5,7–8) Lentin and Williams, 1981, p.254. Holotype: McIntyre and Brideaux, 1980, pl.6, figs.4–5. Originally *Cleistosphaeridium*, subsequently (and now) *Sentusidinium*. Taxonomic junior synonym: *Sentusidinium cuculliforme*, according to Courtinat in Fauconnier and Masure (2004, p.486). Age: Valanginian.

shenxianense He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.68, pl.17, figs.6–10; text-fig.10. Holotype: He Chengquan et al., 1989, pl.17, fig.7; text-fig.10. Age: Early Tertiary.

sparsibarbatum Erkmen and Sarjeant, 1980, p.54–56, pl.2, figs.2–8; pl.6, fig.9; text-figs.4a–c. Holotype: Erkmen and Sarjeant, 1980, pl.6, fig.9; text-fig.4a; Fauconnier and Masure, 2004, pl.69, fig.8; pl.70, fig.1. Taxonomic junior synonym: *Sentusidinium hexagonale*, according to Courtinat in Fauconnier and Masure (2004, p.486). Age: Callovian.

spatiosum Dodekova, 1994, p.33, pl.5, figs.6–8,11. Holotype: Dodekova, 1994, pl.5, figs.7–8. Age: early to middle Tithonian.

"*spiculatum*" Yu Jingxian and Zhang Wangping, 1980, p.107, pl.1, figs.15–16. Holotype: Yu Jingxian and Zhang Wangping, 1980, pl.1, fig.16. **Taxonomic senior synonym:** *Sentusidinium eisenackii*, according to Courtinat in Fauconnier and Masure (2004, p.485). Courtinat in Fauconnier and Masure (2004, p.487) simultaneously considered this to be a problematic species of *Sentusidinium*. Age: Campanian–Maastrichtian.

stipulatum Mao Shaozhi and Norris, 1988, p.40–41, pl.8, figs.21–22. Holotype: Mao Shaozhi and Norris, 1988, pl.8, fig.22. Age: late Eocene–early Oligocene.

"?*varispinosum*" (Sarjeant, 1959, p.338–340, pl.13, fig.7; text-fig.6) Sarjeant and Stover, 1978, p.50. Holotype: Sarjeant, 1959, pl.13, fig.7; text-fig.6; Fauconnier and Masure, 2004, pl.49, fig.8. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Tenua* Eisenack, thirdly *Sentusidinium*, fourthly *Sentusidinium?*, fifthly *Cleistosphaeridium*, sixthly (and now) *Impletosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.81). Age: early Callovian.

"?*verrucatum*" Xu Jinli et al., 1997, p.47, pl.35, figs.12a–b,13a–b,15a–b,16a–b,17–20,21a–b. Holotype: Xu Jinli et al., 1997, pl.35, figs.15a–b. **Name not validly published:** no English or Latin description. **NOW** *Batiacasphaera*. Originally *Sentusidinium?* (name not validly published), subsequently (and now) *Batiacasphaera*. Questionable assignment: Xu Jinli et al. (1997, p.47). Age: Oligocene.

"*verrucosum*" (Sarjeant, 1968, p.232, pl.1, fig.17; pl.2, figs.3,6) Sarjeant and Stover, 1978, p.50. Holotype: Sarjeant, 1968, pl.1, fig.17; pl.2, figs.3,6; Fauconnier and Masure, 2004, pl.11, figs.2–3. **NOW** *Barbatacysta*. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly *Sentusidinium*, fourthly (and now) *Barbatacysta*. Age: late Callovian.

villersense (Sarjeant, 1968, p.231–232, pl.1, fig.16; pl.2, figs.5–10) Sarjeant and Stover, 1978, p.50. Holotype: Sarjeant, 1968, pl.1, fig.16; Fauconnier and Masure, 2004, pl.70, fig.5. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly (and now) *Sentusidinium*. Age: early Callovian–early Oxfordian.

SEPISPINULA Islam, 1993, p.88. Taxonomic senior synonym: *Chlamydophorella*, by implication in Schiøler and Wilson (1998, p.328), who considered the type, *Sepispinula ancorifera*, to be a taxonomic junior synonym of *Chlamydophorella ambigua* — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula*. Type: Cookson and Eisenack, 1960a, pl.2, fig.11, as *Hystrichosphaeridium ancoriferum*.

?*ambigua* (Deflandre, 1937b, p.81, pl.16 [al. pl.13], figs.8–9) Masure in Fauconnier and Masure, 2004, p.500. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. Originally *Micrhystridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Polysphaeridium*, fourthly *Chlamydophorella*, fifthly *Dapsilidinium*, sixthly *Gorgonisphaeridium* (Appendix A), seventhly *Sepispinula?*. Taxonomic junior synonyms: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) and *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, both according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499–500) retained *Hystrichosphaeridium* (as and now *Sepispinula*) *ancoriferum* and *Hystrichosphaeridium* (as and now *Sepispinula?*) *huguoniotii*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.500) as a problematic species. Age: Late Cretaceous.

**ancorifera* (Cookson and Eisenack, 1960a, p.8, pl.2, fig.11) Islam, 1993, p.88. Emendation: Cookson and Eisenack, 1968, p.119–120, as *Cleistosphaeridium ancoriferum*. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.11. Originally *Hystrichosphaeridium*, subsequently *Cleistosphaeridium*, thirdly (and now) *Sepispinula*. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula?*) *ambiguum*, according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula ancorifera*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Sepispinula ancorifera*. Age: Albian–Cenomanian.

?*huguoniotii* (Valensi, 1955a, p.38–39, text-fig.2a) Islam, 1993, p.88. Holotype: Valensi, 1955a, text-fig.2a; Fauconnier and Masure, 2004, pl.72, figs.1–3. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Chlamydophorella*, sixthly *Sepispinula*, seventhly (and now) *Sepispinula?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.500) as a problematic species. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula?*) *ambiguum*, according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.500) retained *Hystrichosphaeridium* (as and now *Sepispinula?*) *huguoniotii*. Taxonomic junior synonym: *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Hystrichosphaeridium* (as and now *Sepispinula*) *ancoriferum*. Age: Late Cretaceous.

"subsp. *huguoniotii*". Autonym. Holotype: Valensi, 1955a, text-fig.2a; Fauconnier and Masure, 2004, pl.72, figs.1–3. **Now redundant**. Originally *Cleistosphaeridium huguoniotii* subsp. *huguoniotii*, subsequently *Cleistosphaeridium? huguoniotii* subsp. *huguoniotii*, thirdly *Sepispinula huguoniotii* subsp. *huguoniotii*.

"subsp. *pertusa*" (Davey, 1969a, p.156–157, pl.7, figs.6–7,9) Islam, 1993, p.88. Holotype: Davey, 1969a, pl.7, fig.7. **NOW** *Sepispinula pertusa*. Originally *Cleistosphaeridium huguoniotii* var. *pertusum*, subsequently *Cleistosphaeridium huguoniotii* subsp. *pertusum*, thirdly *Cleistosphaeridium? huguoniotii* subsp. *pertusum*, fourthly *Dapsilidinium ambiguum* subsp. *pertusum*, fifthly *Sepispinula huguoniotii* subsp. *pertusa*, sixthly (and now) *Sepispinula pertusa*. Age: late Cenomanian.

pertusa (Davey, 1969a, p.156–157, pl.7, figs.6–7,9) Masure in Fauconnier and Masure, 2004, p.499. Holotype: Davey, 1969a, pl.7, fig.7. Originally *Cleistosphaeridium huguoniotii* var. *pertusum*, subsequently *Cleistosphaeridium huguoniotii* subsp. *pertusum*, thirdly *Cleistosphaeridium? huguoniotii* subsp. *pertusum*, fourthly *Dapsilidinium ambiguum* subsp. *pertusum*, fifthly *Sepispinula huguoniotii* subsp. *pertusum*, sixthly (and now) *Sepispinula pertusa*. Age: late Cenomanian.

"?*regulatum*" (Zhou Heyi, 1985, p.7, pl.1, figs.16–17,19–21) Masure in Fauconnier and Masure, 2004, p.499. Holotype: Zhou Heyi, 1985, pl.1, fig.16. **NOW** *Cleistosphaeridium*. Originally (and now) *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly *Sepispinula?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.499). Age: middle Oligocene.

?*tenu* (Harris, 1974, p.164, pl.2, figs.7–9) Masure in Fauconnier and Masure, 2004, p.499. Holotype: Harris, 1974, pl.2, figs.8–9. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Sepispinula?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.499). Age: Paleocene.

SEPTIAREATA Kienel, 1994, p.55. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1301, the latter noting that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). Type: Kienel, 1994, pl.15, figs.10–14, as *Septiareata pyramiforma*.

**pyramiforma* Kienel, 1994, p.55–56, pl.15, figs.9–15. Holotype: Kienel, 1994, pl.15, figs.10–14. Age: late Maastrichtian.

SERILIODINIUM Eaton, 1996, p.152–153. Type: Eaton, 1996, pl.1, figs.1–2; text-figs.2A–B,5A–B, as *Seriliodinium explicatum*.

**explicatum* Eaton, 1996, p.153,155–157,159,161,163,166, pl.1, figs.1–6; pl.2, figs.1–6; pl.3, figs.1–6; pl.4, figs.1–8; text-figs.2A–D,3A–D,4A–D,5A–H,6A–D,7A–C. Holotype: Eaton, 1996, pl.1, figs.1–2; text-figs.2A–B,5A–B. Age: Pliocene–Pleistocene.

SHANDONGIDIUM Xu Jinli et al., 1997, p.54,147–148. Type: Xu Jinli et al., 1997, pl.4, figs.6a–b, as *Shandongidium ellipticum*.

baculatum Xu Jinli et al., 1997, p.56, pl.5, figs.2–3; pl.52, figs.3a–b ex He Chengquan et al., 2009, p.663. Holotype: Xu Jinli et al., 1997, pl.5, fig.3. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.663) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

bellulum Xu Jinli et al., 1997, p.56, pl.5, figs.1a–b,4a–c; pl.51, figs.1a–b,4 ex He Chengquan et al., 2009, p.663. Holotype: Xu Jinli et al., 1997, pl.5, figs.4a–c. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.663) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

***ellipticum** Xu Jinli et al., 1997, p.55,148, pl.4, figs.6a–b,7a–b,8a–b,9a–b,10a–b,11a–b; pl.50, figs.1–4; pl.51, figs.2,3a–b; text-fig.3. Holotype: Xu Jinli et al., 1997, pl.4, figs.6a–b. Age: middle-late Eocene.

helimithoideum Xu Jinli et al., 1997, p.56–57, pl.5, figs.6–7 ex He Chengquan et al., 2009, p.364–365,664. Holotype: Xu Jinli et al., 1997, pl.5, fig.6. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.664) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

retirugosum Xu Jinli et al., 1997, p.57, pl.6, figs.3–4,5a–b,8 ex He Chengquan et al., 2009, p.664. Holotype: Xu Jinli et al., 1997, pl.6, fig.8. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.664) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

variabile Xu Jinli et al., 1997, p.57, pl.5, fig.5; pl.52, figs.2a–b; pl.53, figs.1a–c ex He Chengquan et al., 2009, p.365,665. Holotype: Xu Jinli et al., 1997, pl.5, fig.5. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.665) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

"**SHUBLIKODINIUM**" Wiggins, 1973, p.2–4. Emendation: Stover and Helby, 1987a, p.118–119, as a revised description. **Taxonomic senior synonym:** *Rhaetogonyaulax*, according to Stover and Evitt (1978, p.218) and Lentin and Williams (1989, p.338). Type: Wiggins, 1973, pl.1, figs.1–2, as *Shublikodinium arcticum*.

"**acanthocomum**" Wiggins, 1973, p.5, pl.4, figs.5–6. Holotype: Wiggins, 1973, pl.4, figs.5–6. **Taxonomic senior synonym:** *Shublikodinium* (as and now *Rhaetogonyaulax*) *arcticum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"***arcticum**" Wiggins, 1973, p.4, pl.1, figs.1–14; pl.2, figs.1–9; text-figs.2a–d. Emendation: Below, 1987a, p.103–105, as *Rhaetogonyaulax arctica*. Holotype: Wiggins, 1973, pl.1, figs.1–2. **NOW** *Rhaetogonyaulax*. Originally *Shublikodinium*, subsequently (and now) *Rhaetogonyaulax*. Taxonomic junior synonyms: *Shublikodinium acanthocomum*, *Shublikodinium armatum*, *Shublikodinium setigerum*, *Shublikodinium spinulosum*, *Shublikodinium verrucosum*, and (at specific rank) *Shublikodinium verrucosum* subsp. *exculptum*, all according to Stover and Evitt (1978, p.219). Age: Carnian.

"subsp. **arcticum**". Autonym. Holotype: Wiggins, 1973, pl.1, figs.1–2. **NOW** *Rhaetogonyaulax arctica* subsp. *arctica*. Originally *Shublikodinium arcticum* subsp. *arcticum*, subsequently (and now) *Rhaetogonyaulax arctica* subsp. *arctica*.

"var. **arcticum**". Autonym. Holotype: Wiggins, 1973, pl.1, figs.1–2. **Now redundant.**

"subsp. **maculatum**" (Wiggins, 1973, p.4–5, pl.2, figs.10–12) Lentin and Williams, 1973, p.125. Holotype: Wiggins, 1973, pl.2, fig.10. **NOW** *Rhaetogonyaulax arctica* subsp. *maculata*. Originally *Shublikodinium*

arcticum var. *maculatum*, subsequently *Shublikodinium arcticum* subsp. *maculatum*, thirdly (and now) *Rhaetogonyaulax arctica* subsp. *maculata*. Age: Carnian.

"var. **maculatum**" Wiggins, 1973, p.4–5, pl.2, figs.10–12. Holotype: Wiggins, 1973, pl.2, fig.10. **NOW** *Rhaetogonyaulax arctica* subsp. *maculata*. Originally *Shublikodinium arcticum* var. *maculatum*, subsequently *Shublikodinium arcticum* subsp. *maculatum*, thirdly (and now) *Rhaetogonyaulax arctica* subsp. *maculata*. Age: Carnian.

"**armatum**" Wiggins, 1973, p.6, pl.5, fig.1. Holotype: Wiggins, 1973, pl.5, fig.1. **Taxonomic senior synonym:** *Shublikodinium* (as and now *Rhaetogonyaulax*) *arcticum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"**dilatatum**" Wiggins, 1973, p.6, pl.5, figs.3–4. Holotype: Wiggins, 1973, pl.5, fig.3. **NOW** *Rhaetogonyaulax*. Originally *Shublikodinium*, subsequently (and now) *Rhaetogonyaulax*. Taxonomic junior synonyms: *Shublikodinium echinoverrucatum*, *Shublikodinium granulatum*, and *Shublikodinium scaberrimum*, all according to Stover and Evitt (1978, p.219). Age: Carnian.

"**echinoverrucatum**" Wiggins, 1973, p.6–7, pl.5, figs.5–6. Holotype: Wiggins, 1973, pl.5, fig.5. **Taxonomic senior synonym:** *Shublikodinium* (as and now *Rhaetogonyaulax*) *dilatatum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"**granulatum**" Wiggins, 1973, p.6, pl.5, fig.2. Holotype: Wiggins, 1973, pl.5, fig.2. **Taxonomic senior synonym:** *Shublikodinium* (as and now *Rhaetogonyaulax*) *dilatatum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"**scaberrimum**" Wiggins, 1973, p.7, pl.5, fig.6. Holotype: Wiggins, 1973, pl.5, fig.6. **Taxonomic senior synonym:** *Shublikodinium* (as *Rhaetogonyaulax*) *dilatatum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"**setigerum**" Wiggins, 1973, p.5–6, pl.4, figs.10–11. Holotype: Wiggins, 1973, pl.4, figs.10–11. **Taxonomic senior synonym:** *Shublikodinium* (as and now *Rhaetogonyaulax*) *arcticum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"**spinulosum**" Wiggins, 1973, p.5, pl.4, figs.7–9. Holotype: Wiggins, 1973, pl.4, fig.7. **Taxonomic senior synonym:** *Shublikodinium* (as and now *Rhaetogonyaulax*) *arcticum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"**verrucosum**" Wiggins, 1973, p.5, pl.3, figs.1–11; pl.4, figs.1–3. Holotype: Wiggins, 1973, pl.3, fig.3. **Taxonomic senior synonym:** *Shublikodinium* (as and now *Rhaetogonyaulax*) *arcticum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"subsp. **exsculptum**" (Wiggins, 1973, p.5, pl.4, fig.4) Lentin and Williams, 1973, p.125. Holotype: Wiggins, 1973, pl.4, fig.4. Originally *Shublikodinium verrucosum* var. *exsculptum*, subsequently *Shublikodinium verrucosum* subsp. *exsculptum*. **Taxonomic senior synonym** (at specific rank): *Shublikodinium* (as and now *Rhaetogonyaulax*) *arcticum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"var. **exsculptum**" Wiggins, 1973, p.5, pl.4, fig.4. Holotype: Wiggins, 1973, pl.4, fig.4. Originally *Shublikodinium verrucosum* var. *exsculptum*, subsequently *Shublikodinium verrucosum* subsp. *exsculptum*. **Taxonomic senior synonym** (at specific rank): *Shublikodinium* (as and now *Rhaetogonyaulax*) *arcticum*, according to Stover and Evitt (1978, p.219). Age: Late Triassic.

"subsp. **verrucosum**". Autonym. Holotype: Wiggins, 1973, pl.3, fig.3. **Now redundant.**

"var. **verrucosum**". Autonym. Holotype: Wiggins, 1973, pl.3, fig.3. **Now redundant.**

"*wigginsii*" Stover and Helby, 1987a, p.120, figs.18A–B,19A–I,20. Holotype: Stover and Helby, 1987a, figs.19A–B; Fensome et al., 1996, figs.1–2 — p.2445. **NOW** *Rhaetogonyaulax*. Originally *Shublikodinium*, subsequently (and now) *Rhaetogonyaulax*. Age: late Carnian.

"**SILICISPHAERA**" Davey and Verdier, 1976, p.320–321. **Taxonomic senior synonym:** *Florentinia*, according to Duxbury (1980, p.119) and Lentin and Williams (1989, p.339). Type: Deflandre, 1937b, pl.14 (al. pl.11), figs.3–4, as *Hystrichosphaeridium ferox*.

"*buspina*" Davey and Verdier, 1976, p.321–322, pl.2, figs.1–6; text-fig.3. Holotype: Davey and Verdier, 1976, pl.2, figs.1–3. **NOW** *Florentinia*. Originally *Silicisphaera*, subsequently (and now) *Florentinia*. Age: Senonian.

"**ferox*" (Deflandre, 1937b, p.72, pl.14 [al. pl.11], figs.3–4) Davey and Verdier, 1976, p.322. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.3–4. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma*, fourthly *Silicisphaera*, fifthly (and now) *Florentinia*. Age: Senonian.

"?*flosculus*" (Deflandre, 1937b, p.75, pl.15 [al. pl.12], figs.5–6) Davey and Verdier, 1976, p.330. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.5. **NOW** *Florentinia*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published, Appendix A), thirdly *Litosphaeridium*?, fourthly *Silicisphaera*?, fifthly (and now) *Florentinia*?. Questionable assignment: Davey and Verdier (1976, p.330). Taxonomic junior synonym: *Eurysphaeridium fibratum* (name not validly published), according to Slimani (2001a, p.192). N.I.A. Age: Senonian.

"*ramulus*" May, 1980, p.66–67, pl.2, figs.13–16. Holotype: May, 1980, pl.2, figs.13–14. **NOW** *Florentinia*. Originally *Silicisphaera*, subsequently (and now) *Florentinia*. N.I.A. (Williams et al., 1998, p.561, incorrectly cited the epithet as "*ramula*"). Age: Maastrichtian.

"*tenera*" Davey and Verdier, 1976, p.326–327, pl.3, figs.8–12; text-fig.6. Holotype: Davey and Verdier, 1976, pl.3, figs.8–11. **NOW** *Florentinia*. Originally *Silicisphaera*, subsequently (and now) *Florentinia*. Age: Senonian.

"?*torulosa*" Davey and Verdier, 1976, p.328, pl.4, figs.10–12. Holotype: Davey and Verdier, 1976, pl.4, figs.10–11. **NOW** *Florentinia*?. Originally *Silicisphaera*?, subsequently (and now) *Florentinia*?. Questionable assignment: Davey and Verdier (1976, p.328). Age: Turonian.

"*tridactylites*" (Valensi, 1955a, p.37–38, fig.1D) Davey and Verdier, 1976, p.330. Holotype: Valensi, 1955a, fig.1D. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Hystrichokolpoma* (combination not validly published), fourthly *Achomosphaera*, fifthly *Silicisphaera*, sixthly (and now) *Florentinia*. Age: Cretaceous.

"**SINOCYSTA**" He Chengquan, 1984a, p.769,773. **Taxonomic senior synonym:** *Laciniadinium*, according to Chen et al. (1988, p.28). Type: He Chengquan, 1984a, pl.1, fig.5; text-fig.1, as *Sinocysta minuta*.

"*granulata*" He Chengquan, 1991, p.64, pl.1, figs.1–6,30. Holotype: He Chengquan, 1991, pl.1, fig.1. **NOW** *Laciniadinium*. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: late Turonian–early Senonian.

"*macrocephala*" Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.69, pl.6, figs.23–25. Holotype: He Chengquan et al., 1989, pl.6, fig.24. **NOW** *Laciniadinium*. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: Early Tertiary.

"**minuta*" He Chengquan, 1984a, p.769–770, pl.1, figs.5–7; text-fig.1. Holotype: He Chengquan, 1984a, pl.1, fig.5; text-fig.1. **NOW** *Laciniadinium*. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: Late Cretaceous.

"*subtilis*" He Chengquan, 1991, p.65, pl.1, figs.19–23. Holotype: He Chengquan, 1991, pl.1, fig.19. **NOW** *Laciniadinium*. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: late Turonian–Eocene.

"*tianshanensis*" He Chengquan, 1991, p.65, pl.2, figs.8–9. Holotype: He Chengquan, 1991, pl.2, fig.8. **NOW** *Laciniadinium*. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: late Eocene.

"*xinjiangensis*" He Chengquan, 1991, p.65, pl.1, figs.7–12. Holotype: He Chengquan, 1991, pl.1, fig.11. **NOW** *Laciniadinium*. Originally *Sinocysta*, subsequently (and now) *Laciniadinium*. Age: Paleocene–Eocene.

SIRMIODINIOPSIS Drugg, 1978, p.73. Taxonomic junior synonym: *Arkellidium*, according to Lentin and Williams (1981, p.21). Type: Drugg, 1978, pl.7, fig.11, as *Sirmiodiniopsis orbis*.

"*frisias*" (Raynaud, 1978, p.394, pl.1, fig.11) Lentin and Williams, 1981, p.256. Holotype: Raynaud, 1978, pl.1, fig.11. Originally *Senoniasphaera*?, subsequently *Sirmiodiniopsis*. **Taxonomic senior synonym:** *Meiourogonyaulax* (as *Ambonosphaera*?) *staffinensis*, according to Poulsen and Riding (1992, p.26). Age: Oxfordian–mid Valanginian.

**orbis* Drugg, 1978, p.73–74, pl.7, fig.11; pl.8, figs.1–4. Holotype: Drugg, 1978, pl.7, fig.11; Fensome et al., 1995, fig.1 — p.1631. Taxonomic junior synonym: *Arkellidium* (as *Sirmiodiniopsis*) *triapertum*, according to Riley and Fenton (1982, p.199). Age: Callovian.

"*triaperta*" (Beju, 1979, p.4–5, fig.1, nos.1–6; figs.2A–A',B–E) Lentin and Williams, 1981, p.256. Holotype: Beju, 1979, fig.1, no.1; figs.2A–A'; Fensome et al., 1995, figs.1,7–8 — p.1847. Originally *Arkellidium*, subsequently *Sirmiodiniopsis*. **Taxonomic senior synonym:** *Sirmiodiniopsis orbis*, according to Riley and Fenton (1982, p.199). Age: late Callovian.

SIRMIODINIUM Alberti, 1961, p.22. Emendation: Warren, 1973, p.104. Type: Alberti, 1961, pl.7, fig.6, as *Sirmiodinium grossii*.

**grossii* Alberti, 1961, p.22, pl.7, figs.5–7; pl.12, fig.5. Emendation: Warren, 1973, p.104–105. Holotype: Alberti, 1961, pl.7, fig.6. Taxonomic junior synonym: *Scriniodinium* (subsequently *Sirmiodinium*) *pseudocrystallinum*, according to Drugg (1978, p.73) and Kunz (1990, p.39). Age: late Hauterivian–late Barremian.

"*oxfordianum*" (Sarjeant, 1962a, p.485, pl.69, figs.13–14) Courtinat in Courtinat and Gaillard, 1980, p.52. Holotype: Sarjeant, 1962a, pl.69, fig.14. **NOW** *Scriniodinium*?. Originally *Scriniodinium*, subsequently *Endoscrinium*, thirdly *Sirmiodinium*, fourthly (and now) *Scriniodinium*?. Age: Oxfordian.

"*pseudocrystallinum*" (Beju, 1971, p.295–297, pl.7, figs.1–3; text-fig.7) Courtinat, 1989, p.218. Holotype: Beju, 1971, pl.7, fig.1. Originally *Scriniodinium*, subsequently *Sirmiodinium*. **Taxonomic senior synonym:** *Sirmiodinium grossii*, according to Drugg (1978, p.73) and Kunz (1990, p.39). Age: Oxfordian–Kimmeridgian.

"**SKUACERATOPSIS**" Helby in Riding and Helby, 2001a, p.15. **Name not validly published:** no description. **Taxonomic senior synonym:** *Skuadinium*, by implication in Riding and Helby (2001a, p.15). Riding and Helby indicated that *Skuaceratopsis* is an unpublished synonym for *Skuadinium asymmetricum*.

SKUADINIUM Riding and Helby, 2001a, p.14–15. Taxonomic junior synonym: *Skuaceratopsis* (name not validly published), by implication in Riding and Helby (2001a, p.15). Riding and Helby indicated that *Skuaceratopsis* is an unpublished synonym for *Skuadinium asymmetricum*. Type: Riding and Helby, 2001a, fig.8M, as *Skuadinium biturbinatum*.

asymmetricum Riding and Helby, 2001a, p.15,17, figs.9A–I. Holotype: Riding and Helby, 2001a, figs.9H–I. Age: early Toarcian.

**biturbinatum* Riding and Helby, 2001a, p.15, figs.8A–P. Holotype: Riding and Helby, 2001a, fig.8M. Age: early Toarcian.

reticulatum Riding and Helby, 2001a, p.17, figs.10A–I. Holotype: Riding and Helby, 2001a, fig.10G–H. Age: early Toarcian.

SLITERIA Krasheninnikov and Basov, 1983, p.984. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1301). Type: Krasheninnikov and Basov, 1983, pl.11, fig.4, as *Sliteria pentagonalis*.

**pentagonalis* Krasheninnikov and Basov, 1983, p.984, pl.11, figs.4–9; pl.12, figs.1–8. Holotype: Krasheninnikov and Basov, 1983, pl.11, fig.4. Age: Turonian–early Campanian.

SMOLENSKIELLA Vozzhennikova, 1967, p.181–182. Emendation: Lentin and Vozzhennikova, 1990, p.64. Type: Vozzhennikova, 1967, pl.105, fig.4; pl.106, fig.4, as *Smolenskiella crassitheca*.

bicornis Zatonkaya, 1975, p.32, pl.1, fig.3. Holotype: Zatonkaya, 1975, pl.1, fig.3. Age: Berriasian.

**crassitheca* Vozzhennikova, 1967, p.182–183, pl.105, figs.1a–b,2,3a–b,4,6; pl.106, figs.1–4; text-figs.17a–b. Emendation: Lentin and Vozzhennikova, 1990, p.64–65. Holotype: Vozzhennikova, 1967, pl.105, fig.4; pl.106, fig.4; Lentin and Vozzhennikova, 1990, pl.8, figs.1–3; text-fig.35. Age: Late Cretaceous.

SOANIELLA Vozzhennikova, 1967, p.108. Emendation: Lentin and Vozzhennikova, 1990, p.66. Lentin and Williams (1976, p.165) indicated *Soaniella* to be a superfluous name, citing I.C.B.N. Article 69 of the 1972 Code (Stafleu et al., 1972), equivalent to I.C.N. Article 57.1). However, that article is not pertinent here and *Soaniella* is a validly published name. Type: Vozzhennikova, 1967, pl.116, figs.1–2, as *Soaniella granulata* (which see for lectotype).

**granulata* Vozzhennikova, 1967, p.108–109, pl.116, figs.1–12. Emendation: Lentin and Vozzhennikova, 1990, p.67–68. Holotype: Vozzhennikova, 1967, pl.116, figs.1–2, lost according to Lentin and Vozzhennikova (1990, p.67). Lectotype: Vozzhennikova, 1967, pl.116, fig.7; Lentin and Vozzhennikova, 1990, pl.10, fig.1; text-fig.36; designated by Lentin and Vozzhennikova (1990, p.67). Lentin and Williams (1976, p.165) designated this species as a "*nomen ambiguum*"; however, this is not a formal status under the I.C.N. Age: Eocene–early Oligocene.

kulkovae Vasilyeva, 2013, p.119, pl.2, figs.25–29. Holotype: Vasilyeva, 2013, pl.2, figs.25–26. Age: Ypresian–Lutetian.

SOKOLOVIDINIUM Lentin and Vozzhennikova, 1990, p.113–114. Type: Vozzhennikova, 1967, pl.38, figs.1a–b, as *Microdinium dentatum* forma *sphaericum*.

**sphaericum* (Vozzhennikova, 1967, p.95–96, pl.36, figs.2a–b; pl.38, figs.1a–b) Lentin and Vozzhennikova, 1990, p.114–116. Emendation: Lentin and Vozzhennikova, 1990, p.115, as *Sokolovidinium sphaericum*. Holotype: Vozzhennikova, 1967, pl.38, figs.1a–b; Lentin and Vozzhennikova, 1990, pl.13, figs.5–6; text-fig.67. Originally *Microdinium dentatum* forma *sphaericum*, subsequently *Microdinium dentatum* subsp. *sphaericum*, thirdly (and now) *Sokolovidinium sphaericum*. Age: Late Cretaceous (Senonian).

SONGIELLA Sun Xuekun, 1994, p.84. Emendation: Xu Jinli et al., 1997, p.58. Type: Jiabo, 1978, pl.29, fig.9, as *Bipolaribucina huanghuaensis*.

?*biornata* (He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.39, pl.22, figs.18–19) He Chengquan et al., 2009, p.366. Holotype: He Chengquan et al., 1989, pl.22, fig.18. Originally *Bipolaribucina*?,

subsequently *Distatodinium*, thirdly (and now) *Songiella*. Taxonomic senior synonym: *Membranilarnacia paucitubata*, according to Mao Shaozhi et al. (1995, p.44) — however, He Chengquan et al. (2009, p.366) retained this species as *Songiella biornata*. Age: Early Tertiary.

brachypoda Xu Jinli et al., 1997, p.58–59, pl.2, figs.5a–b ex He Chengquan et al., 2009, p.366–367,665. Holotype: Xu Jinli et al., 1997, pl.2, figs.5a–b. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.665) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

crassa Xu Jinli et al., 1997, p.59; pl.2, figs.8,9a–b ex He Chengquan et al., 2009, p.367,666. Holotype: Xu Jinli et al., 1997, pl.2, fig.8. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.666) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

ephippioidea Xu Jinli et al., 1997, p.59, pl.2, fig.7; pl.6, figs.1–2; pl.48, figs.3a–b ex He Chengquan et al., 2009, p.367,666–667. Holotype: Xu Jinli et al., 1997, pl.2, fig.7. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.666–667) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

foveolata Xu Jinli et al., 1997, p.59–60, pl.3, figs.4a–b,6a–b,7a–b ex He Chengquan et al., 2009, p.368,667. Holotype: Xu Jinli et al., 1997, pl.3, figs.4a–b. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.667) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

globola Xu Jinli et al., 1997, p.60, pl.3, figs.12a–b,13; pl.4, figs.4–5 ex He Chengquan et al., 2009, p.368,667–668. Holotype: Xu Jinli et al., 1997, pl.3, figs.12a–b. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.668) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

****huanghuaensis*** (Jiabo, 1978, p.57, pl.29, figs.9–10) Sun Xuekun, 1994, p.84. Holotype: Jiabo, 1978, pl.29, fig.9. Originally *Bipolaribucina*, subsequently *Impletosphaeridium*, thirdly (and now) *Songiella*. Age: Early Tertiary.

intacta Xu Jinli et al., 1997, p.60, pl.3, figs.8–9; pl.49, figs.1a–d ex He Chengquan et al., 2009, p.369,668. Holotype: Xu Jinli et al., 1997, pl.49, figs.1a–d. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.668) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

leptocaulis Xu Jinli et al., 1997, p.61, pl.2, figs.6a–b; pl.3, figs.10–11,14; pl.49, figs.2a–b ex He Chengquan et al., 2009, p.369–370,669. Holotype: Xu Jinli et al., 1997, pl.2, figs.6a–b. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.669) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

longicaulis Xu Jinli et al., 1997, p.61–62, pl.2, figs.4a–b; pl.3, figs.5a–b; pl.48; figs.1a–b,2; text-fig.4 ex He Chengquan et al., 2009, p.370,669. Holotype: Xu Jinli et al., 1997, pl.2, figs.4a–b; text-fig.4. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.669–670) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

SOPHISMATIA Williams et al., 2015, p.312–313. Type: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49, as *Wetziella tenuivirgula*.

conopia (Williams and Downie, 1966b, p.184, pl.18, fig.5) Williams et al., 2015, p.313. Holotype: Williams and Downie, 1966b, pl.18, fig.5. Originally *Wetziella articulata* var. *conopia*, subsequently *Wetziella articulata* subsp. *conopia*, thirdly *Kisselevia tenuivirgula* subsp. *conopia*, fourthly *Charlesdowniea tenuivirgula* subsp. *conopia*, fifthly (and now) *Sophismatia conopia*. Age: early Eocene.

crassoramosa (Williams and Downie, 1966b, p.189–190; pl.19, figs.1,5,7; text-fig.50) Williams et al., 2015, p.313. Holotype: Williams and Downie, 1966b, pl.19, fig.7. Originally *Wetzeliiella tenuivirgula* var. *crassoramosa*, subsequently *Wetzeliiella tenuivirgula* subsp. *crassoramosa*, thirdly *Kisselevia tenuivirgula* subsp. *crassoramosa*, fourthly *Kisselevia crassoramosa*, fifthly *Charlesdowniea crassoramosa*, sixthly (and now) *Sophismatia crassoramosa*. In most uses subsequent to the protologue, the epithet has been spelled "*crassiramosa*", but it was spelled as "*crassoramosa*" in the protologue. Herein, we revert to the original spelling and treat the other spelling as a typographic error. Age: early Eocene.

?***exouros*** (Islam, 1983c, p.88, pl.3, figs.3–4) Williams et al., 2015, p.313. Holotype: Islam, 1983c, pl.3, fig.3. Originally *Kisselevia tenuivirgula* subsp. *exouros*, subsequently *Charlesdowniea tenuivirgula* subsp. *exouros*, thirdly (and now) *Sophismatia? exouros*. Questionable assignment: Williams et al. (2015, p.313). Age: middle Eocene.

?***insolens*** (Eaton, 1976, p.292–293, pl.18, figs.1–2) Williams et al., 2015, p.313. Holotype: Eaton, 1976, pl.18, fig.2; Bujak et al., 1980, pl.11, fig.4. Originally *Kisselevia*, subsequently *Kisselevia?*, thirdly (and now) *Sophismatia?*. Questionable assignment: Williams et al. (2015, p.313). Age: early Eocene.

reticulata (Williams and Downie, 1966b, p.187–188, pl.19, figs.3,6; text-fig.48) Williams et al., 2015, p.313. Holotype: Williams and Downie, 1966b, pl.19, figs.3,6; text-fig.48. Originally *Wetzeliiella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

****tenuivirgula*** (Williams and Downie, 1966b, p.188–189, pl.19, figs.1–2,4–5,7; text-figs.49–50) Williams et al., 2015, p.313. Holotype: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49. Originally *Wetzeliiella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

"**SPEETONIA**" Duxbury, 1977, p.48–49. **Name illegitimate** — **senior homonym**: *Speetonia* Black, 1971. **Substitute name**: *Lagenorhytis*. Type: Duxbury, 1977, pl.12, fig.4, as *Speetonia delicatula*.

****delicatula***" Duxbury, 1977, p.49, pl.12, figs.1–2,4–5; text-fig.18. Emendation: Piasecki, 1984, p.149–150, as *Lagenorhytis delicatula*. Holotype: Duxbury, 1977, pl.12 (not pl.2), fig.4; Fensome et al., 1993a, fig.3 — p.1107. **NOW** *Lagenorhytis*. Originally *Speetonia* (generic name illegitimate), subsequently (and now) *Lagenorhytis*. Age: early Valanginian.

"**SPHAERELLA**" Keller 1946, p.95,97,107. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1301–1302). **Name illegitimate**: senior homonym *Sphaerella* Sommerfelt 1824, a chlorophycean. **Substitute name**: *Inocardion*. Type: not designated; "type species" *Lagena* (now *Inocardion*) *orbularia*.

****orbularia*** (de Lapparent, 1918, p.20, pl.2, figs.1–part,2–part; pl.3, fig.2–part) Keller 1946, p.95,107. Holotype: not designated. **NOW** *Inocardion*. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly *Sphaerella* (generic name illegitimate), fourthly *Stomiodinium?*, fifthly (and now) *Inocardion*. Taxonomic senior synonym: *Lagena* (now *Pithonella*) *sphaerica*, according to Bonet (1956, p.450) — however, Masters and Scott (1978, p.215) retained this species as the type of *Inocardion*. Age: Late Cretaceous.

"**SPHAERODICTYON**" Wilson in Slimani, 2003, p.273. **Name not validly published**: no description. **Taxonomic senior synonym**: *Neosphaerodictyon*, according to Slimani (2003, p.273).

"***filosum***" Wilson in Slimani, 2003, p.274. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Neosphaerodictyon filosum*, according to Slimani (2003, p.274).

"**SPHAERODINELLA**" Keupp and Versteegh, 1989, p.209–210. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1302). **Taxonomic senior synonym**: *Calciodinellum*, by implication in Janofske and Karwath (2000,

p.100), who transferred the type, *Sphaerodinella albatrosiana*, to *Calciodinellum*. Type: Kamptner, 1963, pl.5, fig.30, as *Thoracosphaera albatrosiana*.

"**albatrosiana*" (Kamptner, 1963, p.177–178, pl.5, fig.30) Keupp and Versteegh, 1989, p.209. Holotype: Kamptner, 1963, pl.5, fig.30. **NOW** *Calciodinellum*. Originally *Thoracosphaera*, subsequently *Orthopithonella*, thirdly *Sphaerodinella*, fourthly (and now) *Calciodinellum*. Taxonomic junior synonyms: *Thoracosphaera ricolosa*, according to Fütterer (1976, p.134); and *Thoracosphaera rela* according to Fütterer (1978, p.716). Age: Pleistocene.

"var. *albatrosiana*". Autonym. Holotype: Kamptner, 1963, pl.5, fig.30. **NOW** *Calciodinellum albatrosianum* var. *albatrosianum*. Originally *Sphaerodinella albatrosiana* var. *albatrosiana*, subsequently (and now) *Calciodinellum albatrosianum* var. *albatrosianum*.

"var. *spinulosa*" Versteegh, 1993, p.377–378, pl.4, figs.12–16. Holotype: Versteegh, 1993, pl.4, figs.12–13,16. **NOW** *Calciodinellum albatrosianum* var. *spinulosum*. Originally *Sphaerodinella albatrosiana* var. *spinulosa*, subsequently (and now) *Calciodinellum albatrosianum* var. *spinulosum*. Age: late Pliocene.

"*arctica*" (Gilbert and Clark, 1983, p.400, pl.1, figs.1–15) Keupp and Kohring, 1993, p.29. Holotype: Gilbert and Clark, 1983, pl.1, fig.1. **NOW** *Caracomia*. Originally *Thoracosphaera*, subsequently *Sphaerodinella*, thirdly (and now) *Caracomia*. This combination was not validly published in Keupp and Versteegh (1989, p.210), since these authors did not fully reference the basionym. Age: late Miocene–Holocene.

"*tuberosa*" (Kamptner, 1963, p.179, fig.26) Hildebrand-Habel et al., 1999, p.82. Emendation: Janofske and Karwath, 2000, p.114–115, as *Pernambugia tuberosa*. Holotype: Kamptner, 1963, fig.26. **NOW** *Pernambugia*. Originally *Thoracosphaera*, subsequently *Sphaerodinella* (combination not validly published), thirdly *Sphaerodinella?*, fourthly (and now) *Pernambugia*. Taxonomic junior synonyms: *Thoracosphaera candora* and *Thoracosphaera narena*, both according to Fütterer (1976, p.132). Questionable assignment: Hildebrand-Habel et al. (1999, p.82). This combination was not validly published in Keupp and Versteegh (1989, p.210), since these authors did not fully reference the basionym. Age: Pleistocene.

"forma *elongata*" Hildebrand-Habel et al., 1999, p.83, pl.5, figs.5–7; text-fig.6A–B. Holotype: Hildebrand-Habel et al., 1999, pl.5, figs.5–6. **NOW** *Calciodinellum elongatum*. Originally *Sphaerodinella? tuberosa* forma *elongata*, subsequently *Calciodinellum elongatum* (combination not validly published), thirdly *Pernambugia tuberosa* forma *elongata*, fourthly (and now) *Calciodinellum elongatum*. Age: middle Eocene.

"forma *tuberosa*". Autonym. Holotype: Kamptner, 1963, fig.26. **NOW** *Pernambugia tuberosa* forma *tuberosa*. Originally *Sphaerodinella tuberosa* forma *tuberosa*, subsequently (and now) *Pernambugia tuberosa* forma *tuberosa*.

"forma *variospinosa*" Hildebrand-Habel et al., 1999, p.83–84, pl.5, figs.8–15, text-fig.7A–C. Holotype: Hildebrand-Habel et al., 1999, pl.5, figs.8–11. **NOW** *Calciodinellum levantinum* forma *variospinosum*. Originally *Sphaerodinella? tuberosa* forma *variospinosa*, subsequently *Pernambugia tuberosa* forma *variospinosa*, thirdly (and now) *Calciodinellum levantinum* forma *variospinosum*. Age: middle Eocene.

SPINIDIINIUM Cookson and Eisenack, 1962b, p.489. Emendations: Lentin and Williams, 1976, p.62–63; Quattrocchio and Sarjeant, 2003, p.134–135; Sluijs et al., 2009, p.46. Taxonomic junior synonyms: *Magallanesium*, according to Fensome et al. (2009 [February], p.59) and Sluijs et al. (2009 [April], p.46); *Volkheimeridium*, according to Sluijs et al., (2009, p.46). Type: Cookson and Eisenack, 1962b, pl.1, figs.1–2, as *Spinidinium styloniferum*

"*apertura*" Wilson, 1967a, p.64–65, figs.3–5,8. Holotype: Wilson, 1967a, figs.3–4; Fensome et al., 1993a, figs.1–2 — p.925. **NOW** *Vozzhennikovia*. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*, thirdly *Dioxya*. N.I.A. Age: Paleocene–Oligocene.

argentinium Lentin and Williams, 1985, p.325. Holotype: Pöthe de Baldis and Ramos, 1983, pl.2, figs.7,11. Originally *Dioxya denticulata*, subsequently (and now) *Spinidinium argentinium*, thirdly *Magallanesium denticulatum*. Substitute name for *Dioxya denticulata* Pöthe de Baldis and Ramos, 1983, p.438, pl.2, figs.7,11; pl.4, fig.2. This species was retained in *Spinidinium* by Sluijs et al. (2009, p.46). Age: early Aptian.

balmei (Cookson and Eisenack, 1962b, p.486) Ioannides, 1986, p.35. Emendation: Morgan, 1977, p.130, as *Alterbia minor*. Holotype: Cookson and Eisenack, 1960a, pl.1, fig.1; Morgan, 1977, text-fig.2. Originally *Deflandrea minor* (name illegitimate), subsequently *Deflandrea balmei*, thirdly *Alterbia balmei* (combination illegitimate), fourthly *Isabelidinium balmei*, fifthly (and now) *Spinidinium balmei*, sixthly *Magallanesium balmei*. Taxonomic senior synonym: *Palaeohystrichophora* (as *Diconodinium*) *minuta*, according to Morgan (1977, p.130) — however, Lentin and Williams (1981, p.156) retained *Deflandrea* (as *Isabelidinium*, now *Spinidinium*) *balmei*. Sluijs et al. (2009, p.47) retained this species in *Spinidinium*. Age: Late Cretaceous.

bellum Lucas-Clark, 2006, p.202,204, pl.4, figs.5–9. Holotype: Lucas-Clark, 2006, pl.4, figs.5–7. Age: Paleocene.

"boydii" Morgan, 1975, p.159–160, pl.1, figs.3a–d. Holotype: Morgan, 1975, pl.1, figs.3a–d; Helby et al., 1987, fig.29D. **NOW** *Chichaouadinium*. Originally *Spinidinium*, subsequently (and now) *Chichaouadinium*. Age: late Aptian–Albian.

?clavus Harland, 1973, p.674–675, pl.84, figs.5–6,10; text-fig.9. Holotype: Harland, 1973, pl.84, fig.6. Originally (and now), *Spinidinium*, subsequently *Spinidinium?*, thirdly *Volkheimeridium*. Questionable assignment: Stover and Evitt (1978, p.125). Sluijs et al. (2009, p.47) questionably retained this species in *Spinidinium*. N.I.A. Age: late Campanian.

colemanii Wrenn and Hart, 1988, p.366–367, fig.36, nos.1–2; fig.39, no.2. Holotype: Wrenn and Hart, 1988, fig.36, nos.1–2. Age: late Paleocene–Eocene.

delicatum Slimani and Louwye, 2013, p.19, pl.4, figs.11–18. Holotype: Slimani and Louwye, 2013, pl.4, figs.11–14. Age: latest Maastrichtian.

densispinatum Stanley, 1965, p.226–227, pl.21, figs.1–5. Holotype: Stanley, 1965, pl.21, figs.1–3. Originally (and now) *Spinidinium*, subsequently *Magallanesium*. Taxonomic junior synonym: *Spinidinium microceratum*, according to Stone (1973, p.53–54). Sluijs et al. (2009, p.47) retained this species in *Spinidinium*. Age: Paleocene.

denticulatum Pöthe de Baldis and Ramos, 1983, p.441, pl.2, figs.3,8. Holotype: Pöthe de Baldis and Ramos, 1983, pl.2, figs.3,8. Originally (and now) *Spinidinium*, subsequently *Spinidinium?* Quattrocchio and Sarjeant (2003, p.136) questionably retained this species in *Spinidinium*; however, Sluijs et al. (2009, p.47) retained the species in *Spinidinium* without question. Age: early Aptian.

echinoideum (Cookson and Eisenack, 1960a, p.2, pl.1, figs.5–6) Lentin and Williams, 1976, p.64. Emendation: Sverdløve and Habib, 1974, p.58, as *Deflandrea echinoidea*. Holotype: Cookson and Eisenack, 1960a, pl.1, figs.5. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Vozzhennikovia*, fourthly *Spinidinium?* Questionable assignment: Quattrocchio and Sarjeant (2003, p.136); however, Sluijs et al. (2009, p.47) retained the species in *Spinidinium* without question. Age: Santonian–Campanian.

subsp. **echinoideum**. Autonym. Holotype: Cookson and Eisenack, 1960a, pl.1, figs.5–6.

subsp. **rhombicum** (Cookson and Eisenack, 1974, p.49–50, pl.20, figs.5–9) Lentin and Williams, 1976, p.64. Holotype: Cookson and Eisenack, 1974, pl.20, fig.7. Originally *Deflandrea rhombica*, subsequently (and now) *Spinidinium echinoideum* subsp. *rhombicum*, thirdly *Spinidinium rhombicum*. Lentin and Williams (1981, p.257) retained this taxon as *Spinidinium echinoideum* subsp. *rhombicum*. Age: Albian–Cenomanian.

eggeri Kirsch, 1991, p.113, pl.23, figs.1–3; text-figs.56a–e. Holotype: Kirsch, 1991, pl.23, fig.1; text-figs.56a–b. Age: late Santonian.

essoii Cookson and Eisenack, 1967a, p.135, pl.19, figs.1–8. Holotype: Cookson and Eisenack, 1967a, pl.19, figs.1–2. Originally (and now) *Spinidinium*, subsequently *Magallanesium*. Sluijs et al. (2009, p.47) retained this species in *Spinidinium*. Age: late Paleocene.

"*gallium*" (Davey and Verdier, 1973, p.196–197, pl.3, figs.1–4) Lentin and Williams, 1976, p.64. Holotype: Davey and Verdier, 1973, pl.3, figs.1.3. **NOW** *Isabelidinium*. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly (and now) *Isabelidinium*. Age: late Albian–early Cenomanian.

"*gerhardii*" Kirsch, 2000, p.42–43, pl.4, figs.15–16; text-fig.10. Holotype: Kirsch, 2000, pl.4, fig.15. **Name not validly published**: no English or Latin description. Age: ?middle-late Campanian.

?*irmoechinatum* (Heisecke, 1970, p.230, pl.1, fig.3; pl.2, figs.2–3) Stover and Evitt, 1978, p.125. Holotype: Heisecke, 1970, pl.1, fig.3; pl.2, figs.2–3. Originally *Deflandrea*, subsequently *Gonyaulacysta*, thirdly (and now) *Spinidinium*?, fourthly *Volkheimeridium*. Questionable assignment: Stover and Evitt (1978, p.125). Sluijs et al. (2009, p.47) questionably retained this species in *Spinidinium*. Age: early Paleocene.

lanterna Cookson and Eisenack, 1970a, p.144–145, pl.12, figs.1–3. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.2. Originally (and now) *Spinidinium*, subsequently *Volkheimeridium*. Sluijs et al. (2009, p.47) retained this species in *Spinidinium*. N.I.A. Age: Late Cretaceous.

luciae Wrenn and Hart, 1988, p.368, fig.35, nos.1–3, fig.38, nos.1–5; fig.39, no.4. Holotype: Wrenn and Hart, 1988, fig.35, nos.1–3. Originally (and now) *Spinidinium*, subsequently *Volkheimeridium*. Sluijs et al. (2009, p.47) retained this species in *Spinidinium*. Age: early Eocene.

macmurdoense (Wilson, 1967a, p.60–62, figs.11–16,22; text-fig.2a) Lentin and Williams, 1976, p.64. Holotype: Wilson, 1967a, figs.11–13. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Magallanesium*. Sluijs et al. (2009, p.47–48) retained this species in *Spinidinium*. Age: Early Tertiary.

"*mariae*" Aurisano, 1984, p.5,7, figs.4E–G. Holotype: Aurisano, 1984, figs.4E–F. **NOW** *Vozzhennikovia*. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*. Age: early Santonian–late early Campanian.

"*microceratum*" Stanley, 1965, p.227–228, pl.22, figs.5–6. Holotype: Stanley, 1965, pl.22, fig.6. **Taxonomic senior synonym**: *Spinidinium* (now *Magallanesium*) *densispinatum*, according to Stone (1973, p.53–54). Age: Paleocene.

"*microechinatum*" Ilyina et al., 1994, p.100. **Name not validly published**: no description or illustration. Ilyina et al. (1994) attributed this name to Stover and Evitt.

"*minus*" He Chengquan and Wang Kede, 1990, p.417,423,424, pl.4, figs.10–11. Holotype: designated but not identified in illustrations. **NOW** *Vozzhennikovia*. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*. Age: Eocene.

"*montanaense*" (Harland, 1977a, p.184–185, pl.25, figs.4,6–7,10–12) Lentin and Williams, 1977b, p.147. Holotype: Harland, 1977a, pl.25, fig.4. **NOW** *Alterbidinium*. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Alterbia* (combination illegitimate), fourthly (and now) *Alterbidinium*. Age: late Campanian–Maastrichtian.

?*ornatum* (May, 1980, p.77–78, pl.9, figs.3–5) Lentin and Williams, 1981, p.258. Holotype: May, 1980, pl.9, figs.3–4. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Spinidinium*? Questionable assignment: Sluijs et al. (2009, p.48). Age: Campanian–basal Maastrichtian.

ovale (Vozzhennikova, 1967, p.99, pl.40, figs.1a–b,2a–b) Lentin and Williams, 1977b, p.147. Holotype: Vozzhennikova, 1967, pl.40, figs.1a–b, lost according to Lentin and Vozzhennikova (1990, p.69), who stated that no potential lectotype is available. Originally *Canninginopsis*, subsequently *Spinidinium*?, thirdly (and now) *Spinidinium*. Questionable assignment: Lentin and Williams (1977b, p.147): however, Sluijs et al. (2009, p.48) retained this species in *Spinidinium* without question. Age: Paleocene–Eocene.

pentagonum Kurita, 2004, p.36,38,40,42, pl.1, figs.1–16. Holotype: Kurita, 2004, pl.1, figs.1–4. Age: late middle to ?late Eocene.

?pilatum (Stanley, 1965, p.222, pl.21, figs.12–16) Costa and Downie, 1979, p.43. Holotype: Stanley, 1965, pl.21, figs.14–16. Originally *Wetzeliiella*, subsequently *Wetzeliiella?*, thirdly (and now) *Spinidinium?*, fourthly *Magallanesium*. Questionable assignment: Costa and Downie (1979, p.43). Sluijs et al. (2009, p.48) questionably retained this species in *Spinidinium*. Age: Paleocene.

?pulchrum (Benson, 1976, p.194, pl.9, figs.4–9) Lentin and Williams, 1977b, p.147. Holotype: Benson, 1976, pl.9, figs.4–7. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly *Magallanesium*, fourthly (and now) *Spinidinium?* Questionable assignment: Sluijs et al. (2009, p.48), who retained the species in *Spinidinium*. Age: early Paleocene.

?rallum Heisecke, 1970, p.226,228, pl.1, figs.1–2; pl.2, fig.1. Originally *Spinidinium*, subsequently *Magallanesium*, thirdly (and now) *Spinidinium?* Questionable assignment: Sluijs et al. (2009, p.48). Age: Danian.

"rhombicum" (Cookson and Eisenack, 1974, p.49–50, pl.20, figs.5–9) Stover and Evitt, 1978, p.124. Holotype: Cookson and Eisenack, 1974, pl.20, fig.7. **NOW** *Spinidinium echinoideum* subsp. *rhombicum*. Originally *Deflandrea rhombica*, subsequently (and now) *Spinidinium echinoideum* subsp. *rhombicum*, thirdly *Spinidinium rhombicum*. Age: Albian–Cenomanian.

"rotundum" Wilson, 1967a, p.65–66, figs.6–7. Holotype: Wilson, 1967a, fig.6. **NOW** *Vozzhennikovia*. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*, thirdly *Dioxya*. Age: Eocene.

rugosum (Stanley, 1965, p.222–223, pl.21, figs.6–11) Costa and Downie, 1979, p.45. Holotype: Stanley, 1965, pl.21, figs.10–11. Originally *Wetzeliiella*, subsequently *Wilsonidium?*, thirdly *Wetzeliiella?*, fourthly (and now) *Spinidinium*. Williams et al. (2015, p.318) retained this species in *Spinidinium*. Age: Paleocene.

?sagittula (Drugg, 1970b, p.809–810, figs.1A–C) Lentin and Williams, 1976, p.64. Holotype: Drugg, 1970b, fig.1A. Originally *Deflandrea*, subsequently *Spinidinium*, thirdly (and now) *Spinidinium?* Questionable assignment: Sluijs et al. (2009, p.48). N.I.A. Age: early Eocene.

schellenbergii Sluijs et al., 2009, p.46, pl.4, figs.6–9; pl.6, figs.3–4. Holotype: Sluijs et al., 2009, pl.4, figs.6–7. Age: middle-late Eocene.

stellatum Soncini, 1992, p.333,335–337, pl.3, figs.1–14; text-figs.7,8a–b. Holotype: Soncini, 1992, pl.3, figs.1–3. Age: Thanetian–Ypresian.

***styloniferum** Cookson and Eisenack, 1962b, p.489, pl.1, figs.1–5. Holotype: Cookson and Eisenack, 1962b, pl.1, figs.1–2. Age: Aptian–?Albian.

sverdrupianum (Manum, 1963, p.59–60, pl.2, figs.6–15; text-fig.3) Lentin and Williams, 1976, p.64. Emendation: Lebedeva in Ilyina et al., 1994, p.64, as *Spinidinium sverdrupianum*. Holotype: Manum, 1963, pl.2, figs.12–13. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Subtilisphaera*, fourthly *Cooksoniella* (combination not validly published). Lentin and Williams (1977b, p.157) retained this species in *Spinidinium*. Age: Cenomanian.

?tabulare He Chengquan, 1991, p.88, pl.2, figs.15–17. Holotype: He Chengquan, 1991, pl.2, fig.16. Questionable assignment: Sluijs et al. (2009, p.48). Age: Paleocene.

?taiwanianum Shaw Chenglong, 1999b, p.158–159, figs.1–3. Holotype: Shaw Chenglong, 1999b, figs.1–3. Questionable assignment: Sluijs et al. (2009, p.48). Age: Eocene.

?tripylum Kurita, 2004, p.42, pl.2, figs.1–13; text-fig.10b. Holotype: Kurita, 2004, pl.2, figs.1–4,13. Questionable assignment: Kurita (2004, p.42). Age: late Oligocene.

uncinatum May, 1980, p.85–86, pl.10, figs.5–7; pl.13, figs.9–10. Holotype: May, 1980, pl.10, figs.5–7. Age: late Campanian–early Maastrichtian.

"*vestitum*" Brideaux, 1971, p.99–101, pl.29, figs.99–103; text-figs.10a,d. Holotype: Brideaux, 1971, pl.29, figs.99,102–103; text-figs.10a,d. **NOW** *Chichaouadinium*. Originally *Spinidinium*, subsequently *Deflandrea*, thirdly *Spinidinium?*, fourthly (and now) *Chichaouadinium*. Questionable assignment: Stover and Evitt (1978, p.125). Taxonomic junior synonym: *Deflandrea limpida*, according to Lentin and Williams (1973, p.43). Age: late Albian–early Cenomanian.

SPINIFERELLA Stover and Hardenbol, 1994, p.38–39. Type: Gerlach, 1961, pl.27, figs.10–12, as *Hystrichosphaera cornuta*.

**cornuta* (Gerlach, 1961, p.180, pl.27, figs.10–12) Stover and Hardenbol, 1994, p.38. Emendation: Stover and Hardenbol, 1994, p.38–39, as *Spiniferella cornuta*. Holotype: Gerlach, 1961, pl.27, figs.10–12. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferella*. Age: middle Oligocene–middle Miocene.

subsp. *cornuta*. Autonym. Holotype: Gerlach, 1961, pl.27, figs.10–12. Taxonomic junior synonyms (at subspecific rank): *Spiniferites cornutus* var. *opisthophorus* (as *Spiniferites cornutus* subsp. *opisthophorus*), according to Below (1982c, p.33); *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*), according to Cookson and Eisenack (1974, p.62) — however, Below (1982c, p.33) retained *Spiniferites cornutus* subsp. *laevimurus* (now *Spiniferella cornuta* subsp. *laevimura*).

subsp. *flexa* (He Chengquan, 1991, p.151, pl.22, fig.4) Williams et al., 1998, p.566. Holotype: He Chengquan, 1991, pl.22, fig.4. Originally *Spiniferites cornutus* subsp. *flexus*, subsequently (and now) *Spiniferella cornuta* subsp. *flexa*. Age: Paleocene.

subsp. *kasira* Slimani et al., 2012, p.344, fig.4K–T. Holotype: Slimani et al., 2012, fig.4M–O. Age: early Danian.

subsp. *laevimura* (Davey and Williams, 1966a, p.44–45, pl.4, fig.5) Williams et al., 1998, p.566. Holotype: Davey and Williams, 1966a, pl.4, fig.5; Bujak et al., 1980, pl.4, figs.9,12. Originally *Hystrichosphaera cornuta* var. *laevimura*, subsequently *Spiniferites cornutus* subsp. *laevimurus*, thirdly (and now) *Spiniferella cornuta* subsp. *laevimura*. Taxonomic senior synonyms (at subspecific rank): *Hystrichosphaera cornuta* var. *cornuta* (as *Spiniferites cornutus* subsp. *cornutus*, now *Spiniferella cornuta* subsp. *cornuta*), according to Cookson and Eisenack (1974, p.62) — however, Below (1982c, p.33) retained *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*). Taxonomic junior synonyms (as subspecific rank): *Spiniferites cornutus* var. *crassifurcatus* (as *Spiniferites cornutus* subsp. *crassifurcatus*), and *Spiniferites cornutus* var. *normalis* (as *Spiniferites cornutus* subsp. *normalis*), both according to Below (1982c, p.33). Age: early Eocene.

subsp. *ovalis* (He Chengquan, 1991, p.151–152, pl.22, figs.1–2) Williams et al., 1998, p.566). Holotype: He Chengquan, 1991, pl.22, figs.1–2. Originally *Spiniferites cornutus* subsp. *ovalis*, subsequently (and now) *Spiniferella cornuta* subsp. *ovalis*. Age: Paleocene.

SPINIFERITES Mantell, 1850, p.191. Emendation: Sarjeant, 1970, p.75. Taxonomic junior synonyms: *Hafniasphaera*, according to Stover and Williams (1987, p.117) — however, Edwards (1996, p.989) retained *Hafniasphaera*; *Hystrichosphaera*, according to Sarjeant (1970, p.75); *Hystrichokibotium*, by implication in Gocht (1969, p.32), who considered *Hystrichokibotium* to be a taxonomic junior synonym of *Hystrichosphaera*; *Rivernookia*, according to Stover and Williams (1987, p.195) — however, *Rivernookia* is now considered a taxonomic junior synonym of *Hafniasphaera*; *Achomosphaera*, according to Duxbury (1983, p.54–55) — however, Lentin and Williams (1989, p.3) retained *Achomosphaera*; *Pseudospiniferites*, by implication in Schiøler (2005,

p.30), who transferred the type, *Pseudospiniferites manumii*, to *Spiniferites*. Loeblich Jr. and Loeblich III (1966, p.56–57) designated *Spiniferites ramosus* as the "type species" of *Spiniferites*. Fensome et al. (1993b, p.93) considered *Spiniferites* to be the possible taxonomic senior synonym of *Gonyaulax*. I.C.N. Article 11.7 now stipulates that names based on extant types take priority over names based on fossil types, so if the two genera are considered synonymous, *Gonyaulax* should now have priority. However, I.C.N. Article 11.1 makes allowance for dual taxonomy for fossils (see Introduction). Type: Ehrenberg, 1837b, pl.1, fig.15, as *Xanthidium ramosum* — lectotype designated by Davey and Williams (1966a, p.32).

adnatus Matsuoka and Bujak, 1988, p.72–74, pl.10, figs.8a–b,9; pl.11, figs.1a–b,2–3; pl.19, fig.8; text-fig.16. Holotype: Matsuoka and Bujak, 1988, pl.10, figs.8a–b. Age: late Oligocene.

"subsp. **adnatus**". Autonym. Holotype: Matsuoka and Bujak, 1988, pl.10, figs.8a–b. **Now redundant.**

"subsp. **puyangensis**" (He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.70, pl.21, figs.1–11) Mao Shaozhi et al., 1995, p.35. Holotype: He Chengquan et al., 1989, pl.21, fig.4. **NOW** *Spiniferites puyangensis*. Originally (and now) *Spiniferites puyangensis*, subsequently *Spiniferites adnatus* subsp. *puyangensis*. He Chengquan et al. (2009, p.208) retained this taxon at specific rank. Age: Early Tertiary.

alaskensis Marret et al., 2001, p.384–386, pl.1, figs.1–9 ex Marret in Fensome and Williams, 2004, p.613. Holotype: Marret et al., 2001, pl.1, figs.7–9. This name was not validly published in Marret et al. (2001) since these authors did not indicate which of the illustrations represented the holotype. Age: late Pleistocene.

alatus Duxbury, 1977, p.49, pl.5, fig.4. Holotype: Duxbury, 1977, pl.5, fig.4. Age: late Berriasian–early Valanginian.

aliger Singh, 1983, p.143–144, pl.50, figs.1–6; pl.51, fig.1. Holotype: Singh, 1983, pl.50, fig.1. This epithet, meaning winged, is correctly rendered as *aliger* when masculine, *aligera* when feminine and *aligerum* when neuter. Age: early Cenomanian.

ancorifer Cookson and Eisenack, 1974, p.58, pl.21, figs.4–5. Holotype: Cookson and Eisenack, 1974, pl.21, fig.4. This epithet, meaning anchor-bearing, is correctly rendered as "*ancorifer*" when masculine, "*ancorifera*" when feminine, and "*ancoriferum*" when neuter. Age: Middle-late Cretaceous.

subsp. **ancorifer**. Autonym. Holotype: Cookson and Eisenack, 1974, pl.21, fig.4.

subsp. **ghiran** Below, 1982c, p.32, pl.7, figs.6a–c,8,9a–b. Holotype: Below, 1982c, pl.7, figs.6a–c. Age: Aptian (Gargasian).

"**andalousiensis**" (Jan du Chêne, 1977, p.112, pl.1, figs.1–4) Strauss in Strauss and Lund, 1992, p.169. Emendation: Jan du Chêne and Londeix, 1988, p.239, as *Achomosphaera andalousiensis*. Holotype: Jan du Chêne, 1977, pl.1, fig.1, lost according to Jan du Chêne and Londeix (1988, p.237). Lectotype: Jan du Chêne and Londeix, 1988, pl.1, figs.1–3, designated by Jan du Chêne and Londeix (1988, p.244). **NOW** *Achomosphaera*. Originally (and now) *Achomosphaera*, subsequently *Spiniferites*. Taxonomic junior synonyms: *Spiniferites septentrionalis*, according to Harland (1983, p.103–104) — however, Londeix et al. (2009, p.67–68) retained *Spiniferites septentrionalis*; *Spiniferites aquilonius*, according to Strauss in Strauss and Lund (1992, p.169). Age: late Miocene (Andalusian).

antistatus Islam, 1983a, p.244, pl.4, figs.4–6; text-fig.4. Holotype: Islam, 1983a, pl.4, figs.4–5. Age: early Eocene.

"**aquilonius**" Matsuoka and Bujak, 1988, p.74–76, pl.11, figs.6a–d; pl.12, figs.1a–b; pl.19, figs.4a–c,7; text-figs.17A–E. Holotype: Matsuoka and Bujak, 1988, pl.11, figs.6a–d; text-fig.17A. **Taxonomic senior synonym:** *Achomosphaera* (as *Spiniferites*) *andalousiensis*, according to Strauss in Strauss and Lund (1992, p.169). Matsuoka in Head and Wrenn (1992, p.26) considered this species to be a possible taxonomic junior synonym of *Spiniferites septentrionalis*, but not of *Achomosphaera andalousiensis*. Age: late Miocene.

aracajuensis (Regali et al., 1974, p.291, pl.24, fig.6) Lentin and Williams, 1981, p.259. Holotype: Regali et al., 1974, pl.24, fig.6. Originally *Hystrichosphaeridium*, subsequently (and now) *Spiniferites*. Age: Paleocene–early Eocene.

asperulus Matsuoka, 1983b, p.131–132, pl.12, figs.2,3a–b,4; text-figs.17A–B. Holotype: Matsuoka, 1983b, pl.12, fig.2. Age: Pliocene or younger.

assamicus (Kar et al., 1972, p.147, pl.1, figs.6–7) Lentin and Williams, 1973, p.126. Holotype: Kar et al., 1972, pl.1, fig.6. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. Jain (1982, p.52) recommended that this name be restricted to the holotype. Questionable assignment: Stover and Evitt (1978, p.190). Age: Tertiary.

"*balcanicus*" (Balteş, 1971, p.6, pl.3, figs.3–7) Sütő-Szentai, 2000, p.162. Holotype: Balteş, 1971, pl.3, figs.3–7. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*, thirdly *Subathua* (combination not validly published), fourthly *Spiniferites*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora pelagica*, according to Stover and Evitt (1978, p.194) — however, Sütő-Szentai (2000, p.162) retained *Thalassiphora* (as *Spiniferites balcanica*). This combination was not validly published in Sütő-Szentai (1988, p.356; 1991, p.188) and Sütő (1994, captions to pls.5–6 — p.470) since these authors did not fully reference the basionym. Age: early Pliocene.

bejui Masare et al., 1998, p.266, pl.3, figs.3–4; text-fig.6. Holotype: Masare et al., 1998, pl.3, figs.3–4. Age: Coniacian?–Santonian.

belerius Reid, 1974, p.596–598, pl.2, figs.12–13. Holotype: Reid, 1974, pl.2, figs.12–13. Motile equivalent: *Gonyaulax scrippsiae* Kofoid, 1911, according to Reid (1974, p.596). Age: Holocene.

bentorii (Rossignol, 1964, p.84–85, pl.1, figs.3,3bis,5–8; pl.3, figs.1–3; text-figs.A–F) Wall and Dale, 1970, p.47–48. Holotype: Rossignol, 1964, pl.1, figs.3,7–8. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Taxonomic junior synonyms: *Hystrichosphaera* (as *Spiniferites nodosa*, according to Reid (1974, p.598) and Harland (1977b, p.98–99) — however, Lentin and Williams (1981, p.264) retained *Hystrichosphaera* (as *Spiniferites nodosa*); and *Leptodinium churchillii*, according to Harland (1977b, p.98–99) — however, the latter is now generally considered a taxonomic junior synonym of *Hystrichosphaera* (now *Spiniferites nodosa*). The name *Hystrichosphaera bentorii* was not validly published in Rossignol (1961, pl.1, figs.7–8), who did not provide a description, and in Rossignol (1962, p.132), who did not illustrate this taxon or provide a reference to an illustration. Motile equivalent: *Gonyaulax digitalis* (Pouchet, 1883) Kofoid, 1911, according to Wall and Dale (1967, p.352) and Dodge (1989, p.283). Age: Pleistocene–Holocene.

subsp. *bentorii*. Autonym. Holotype: Rossignol, 1964, pl.1, figs.3,7–8.

var. *bentorii*. Autonym. Holotype: Rossignol, 1964, pl.1, figs.3,7–8.

subsp. *budajenoensis* Sütő-Szentai, 1986, p.34–35, pl.1, fig.5. Holotype: Sütő-Szentai, 1986, pl.1, fig.5. This name was not validly published in Sütő-Szentai (1983, p.18, pl.2, fig.2) since that author did not give a description. Age: late Miocene.

"subsp. *coniunctus*" Sütő-Szentai, 1990, p.846–847, pl.5, fig.1. Holotype: Sütő-Szentai, 1990, pl.5, fig.1. **Name not validly published:** lodgement of holotype not specified (I.C.N. Article 40.7). This name was also not validly published in Sütő-Szentai (1988, p.355, pl.2, fig.5) since that author did not provide a description. Age: late Miocene.

var. *globus* Morzadec-Kerfourn, 1979, p.222,224, pl.31, fig.10. Holotype: Morzadec-Kerfourn, 1979, pl.31, fig.10. Age: Quaternary.

subsp. *granulatus* Fuchs and Sütő-Szentai, 1991, p.24, pl.9, figs.1,2 (two illustrations),3; text-fig.2, no.4 (two illustrations). Holotype: Fuchs and Sütő-Szentai, 1991, pl.9, fig.3; text-fig.2, no.4 (two illustrations).

This name was not validly published in Sütő-Szentai (1988, p.344, pl.2, fig.3) since that author did not provide a description. Age: late Miocene.

"subsp. *matraensis*" Sütő-Szentai, 1988, p.344. **Name not validly published:** no description. Age: late Miocene.

subsp. *oblongus* Sütő-Szentai, 1986, p.36–37, pl.2, fig.3; pl.3, fig.1. Holotype: Sütő-Szentai, 1986, pl.2, fig.3. This name was not validly published in Sütő-Szentai (1983, p.18, pl.2, fig.5) and Sütő-Szentai (1984, p.72) since these authors did not give a description. Age: late Miocene.

subsp. *pannonicus* Sütő-Szentai, 1986, p.35–36, pl.2, figs.1 (two illustrations), 2. Holotype: Sütő-Szentai, 1986, pl.2, fig.1 (two illustrations). This name was not validly published in Sütő-Szentai (1983, p.18, pl.2, fig.3; pl.3, fig.2) and Sütő-Szentai (1984, p.62) since these authors did not give a description. Age: late Miocene.

"subsp. *piriformis*" Sütő-Szentai, 1988, p.344. **Name not validly published:** no description. Age: late Miocene.

"subsp. *pseudooblongus*" Sütő-Szentai, 1983, p.18, pl.2, fig.6. **Name not validly published:** no description.

subsp. *truncatus* (Rossignol, 1964, p.85, pl.1, figs.5–6; pl.3, fig.1) Lentin and Williams, 1973, p.126. Holotype: Rossignol, 1964, pl.1, figs.5–6. Originally *Hystrichosphaera bentorii* var. *truncata*, subsequently (and now) *Spiniferites bentorii* subsp. *truncatus*. Age: Quaternary.

binxianensis Xu Jinli et al., 1997, p.103, pl.15, figs.2,5–8,11; pl.16, figs.1–2; pl.17, figs.1–2,9 ex He Chengquan et al., 2009, p.670. Holotype: Xu Jinli et al., 1997, pl.15, fig.6. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.670) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

"*buccina*" (Davey and Williams, 1966a, p.42–43, pl.4, fig.1; text-figs.10–11) Sarjeant, 1970, p.75. Holotype: Davey and Williams, 1966a, pl.4, fig.1; text-fig.10. Originally *Hystrichosphaera*, subsequently *Spiniferites*. **Taxonomic senior synonym:** *Hystrichokibotium* (now *Spiniferites*) *pseudofurcatus*, according to Lentin and Williams (1973, p.126). N.I.A. Age: Eocene.

bullatus Beilstein, 1994, p.171–172, pl.26, figs.6–8. Holotype: Beilstein, 1994, pl.26, figs.6–7. Age: Campanian.

bulloideus (Deflandre and Cookson, 1955, p.264, pl.5, figs.3–4) Sarjeant, 1970, p.75. Holotype: Deflandre and Cookson, 1955, pl.5, figs.3–4. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Taxonomic senior synonym: *Xanthidium* (as and now *Spiniferites*) *ramosus*, according to Harland (1977b, p.101–102) — however, Lentin and Williams (1981, p.259) retained *Hystrichosphaera* (as *Spiniferites*) *bulloidea*. Taxonomic junior synonym: *Spiniferites nanus*, according to Matsuoka (1983a, p.23) — however, Matsuoka (1991, table 2 — p.8) retained *Spiniferites nanus*. Motile equivalent: *Gonyaulax scrippsae* Kofoid, 1911, according to Wall and Dale (1967, p.352; 1968c, p.270) — however, see Head (1996b, p.1205). Age: Eocene–Miocene.

"*cambrus*" (Sah et al., 1970, p.144, pl.1, fig.3) Stover and Evitt, 1978, p.190. Holotype: Sah et al., 1970, pl.1, fig.3. Originally *Achomosphaera*, subsequently *Spiniferites*. **Taxonomic senior synonym:** *Galea* (now *Spiniferites*) *twistringiensis*, by implication in Jain (1982, p.51), who considered *Achomosphaera cambra* to be a taxonomic junior synonym (at subspecific rank) of *Hystrichosphaera ramosa* var. *multibrevis* (as *Spiniferites ramosus* subsp. *multibrevis*), which is now considered to be a taxonomic junior synonym (at specific rank) of *Galea* (now *Spiniferites*) *twistringiensis*. Age: Late Cretaceous.

"*ceratioides*" (Deflandre, 1937b, p.66–67, pl.12 [al. pl.9], figs.7–8) Sarjeant, 1970, p.76. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), figs.7–8; Fensome et al., 1991, fig.1 — p.601; fig.1 — p.605. **NOW** *Xenascus*. Originally *Hystrichosphaera*, subsequently *Pseudoceratium*, thirdly *Spiniferites*, fourthly *Phoberocysta*, fifthly (and now) *Xenascus*. Taxonomic junior synonyms: *Endoceratium* (now *Xenascus*) *perforatum*, according to Davey and

Verdier (1971, p.27) — however, Yun Hyesu (1981, p.62) retained *Xenascus perforatus*; *Xenascus australensis*, according to Davey and Verdier (1971, p.26) — however, Lentin and Williams (1985, p.374) retained *Xenascus australensis*; *Odontochitina blastema*, according to Davey and Verdier (1971, p.27) — however, Stover and Helby (1987a, p.128) retained *Odontochitina* (as *Xenascus*) *blastema*. Age: Senonian.

chebca (Below, 1982c, p.35, pl.8, figs.7,8a–c,9) Lentin and Williams, 1993, p.604. Holotype: Below, 1982c, pl.8, figs.8a–c. Originally *Spiniferites multibrevis* subsp. *chebca*, subsequently (and now) *Spiniferites chebca*. N.I.A. Age: Hauterivian–Aptian.

choanus Matsuoka and Bujak, 1988, p.76–77, pl.14, figs.2,3a–b; text-fig.18. Holotype: Matsuoka and Bujak, 1988, pl.14, figs.3a–b; text-fig.18. Age: late Oligocene–early Miocene.

"?*cingulatus*" (Wetzel, 1933b, p.28, pl.4, fig.10) Sarjeant, 1970, p.76. Holotype: Wetzel, 1933b, pl.4, fig.10. **NOW** *Pterodinium*. Originally *Cymatiosphaera* (Appendix A), subsequently *Hystrichosphaera*, thirdly *Spiniferites*, fourthly *Spiniferites?*, fifthly (and now) *Pterodinium*. Questionable assignment: Stover and Evitt (1978, p.190). Taxonomic junior synonym: *Cymatiosphaera* (as *Spiniferites?*) *pteroata*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *pteroata*. Age: Senonian.

"subsp. *cingulatus*". Autonym. Holotype: Wetzel, 1933b, pl.4, fig.10. **NOW** *Pterodinium cingulatum* subsp. *cingulatum*. Originally *Spiniferites cingulatus* subsp. *cingulatus*, subsequently *Spiniferites? cingulatus* subsp. *cingulatus*, thirdly (and now) *Pterodinium cingulatum* subsp. *cingulatum*.

"var. *cingulatus*". Autonym. Holotype: Wetzel, 1933b, pl.4, fig.10. **Now redundant**. Originally *Hystrichosphaera cingulata* var. *cingulata*, subsequently *Spiniferites cingulatus* var. *cingulatus*.

"subsp. *granulatus*" (Clarke and Verdier, 1967, p.45–46, pl.9, figs.5–6; text-fig.18) Lentin and Williams, 1973, p.127. Holotype: Clarke and Verdier, 1967, pl.9, fig.5; Jan du Chêne et al., 1986a, pl.88, figs.5–8. **NOW** *Pterodinium cingulatum* subsp. *granulatum*. Originally *Hystrichosphaera cingulata* var. *granulata*, subsequently *Spiniferites cingulatus* subsp. *granulatus*, thirdly *Spiniferites? cingulatus* subsp. *granulatus*, fourthly (and now) *Pterodinium cingulatum* subsp. *granulatum*. Age: Cenomanian.

"subsp. *intermedius*" (Cookson and Eisenack, 1974, p.64, pl.23, figs.8–9,11) Lentin and Williams, 1977b, p.149. Holotype: Cookson and Eisenack, 1974, pl.23, fig.8, lost according to Jan du Chêne et al. (1986a, p.274). **NOW** *Pterodinium cingulatum* subsp. *intermedium*. Originally *Spiniferites cingulatus* var. *intermedius*, subsequently *Spiniferites cingulatus* subsp. *intermedius*, thirdly *Spiniferites? cingulatus* subsp. *intermedius*, fourthly (and now) *Pterodinium cingulatum* subsp. *intermedium*. Age: Senonian.

"var. *intermedius*" Cookson and Eisenack, 1974, p.64, pl.23, figs.8–9,11. Holotype: Cookson and Eisenack, 1974, pl.23, fig.8, lost according to Jan du Chêne et al. (1986a, p.274). **NOW** *Pterodinium cingulatum* subsp. *intermedium*. Originally *Spiniferites cingulatus* var. *intermedius*, subsequently *Spiniferites cingulatus* subsp. *intermedius*, thirdly *Spiniferites? cingulatus* subsp. *intermedius*, fourthly (and now) *Pterodinium cingulatum* subsp. *intermedium*. Age: Senonian.

"subsp. *ovalis*" (Cookson and Eisenack, 1974, p.64–65, pl.23, fig.12a–b) Lentin and Williams, 1977b, p.149. Holotype: Cookson and Eisenack, 1974, pl.23, fig.12a–b, lost according to Jan du Chêne et al. (1986a, p.274). **NOW** *Pterodinium cingulatum* subsp. *ovale*. Originally *Spiniferites cingulatus* var. *ovalis*, subsequently *Spiniferites cingulatus* subsp. *ovalis*, thirdly *Spiniferites? cingulatus* subsp. *ovalis*, fourthly (and now) *Pterodinium cingulatum* subsp. *ovale*. Age: Paleocene.

"var. *ovalis*" Cookson and Eisenack, 1974, p.64–65, pl.23, fig.12a–b. Holotype: Cookson and Eisenack, 1974, pl.23, fig.12a–b, lost according to Jan du Chêne et al. (1986a, p.274). **NOW** *Pterodinium cingulatum* subsp. *ovale*. Originally *Spiniferites cingulatus* var. *ovalis*, subsequently *Spiniferites cingulatus* subsp. *ovalis*, thirdly *Spiniferites? cingulatus* subsp. *ovalis*, fourthly (and now) *Pterodinium cingulatum* subsp. *ovale*. Age: Paleocene.

"subsp. *perforatus*" (Clarke and Verdier, 1967, p.46–47, pl.9, figs.2–4; text-fig.19) Lentin and Williams, 1973, p.127. Holotype: Clarke and Verdier, 1967, pl.9, figs.2–3; Jan du Chêne et al., 1986a, pl.89, figs.1–3. Originally *Hystrichosphaera cingulata* var. *perforata*, subsequently *Spiniferites cingulatus* subsp. *perforatus*, thirdly *Spiniferites?* *cingulatus* subsp. *perforatus*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera cingulata* var. *reticulata* (now *Pterodinium cingulatum* subsp. *reticulatum*), according to Clarke et al. (1968, p.181). Age: Cenomanian–mid Senonian.

"subsp. *polygonalis*" (Clarke and Verdier, 1967, p.47, pl.8, figs.7–8; text-fig.20) Lentin and Williams, 1973, p.127. Holotype: Clarke and Verdier, 1967, pl.8, fig.7; Jan du Chêne et al., 1986a, pl.89, figs.7–9. **NOW** *Pterodinium cingulatum* subsp. *polygonale*. Originally *Hystrichosphaera cingulata* var. *polygonalis*, subsequently *Spiniferites cingulatus* subsp. *polygonalis*, thirdly *Spiniferites?* *cingulatus* subsp. *polygonalis*, fourthly (and now) *Pterodinium cingulatum* subsp. *polygonale*. Taxonomic senior synonyms (at specific rank): *Hystrichosphaera* (now *Spiniferites*) *crassimurata*, according to Clarke et al. (1968, p.181) and *Cymatiosphaera* (now *Pterodinium?*) *pterota*, according to Pavlishina (1990, p.95) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* subsp. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Cenomanian.

"var. *prominoseptatus*" Wilson in Slimani, 1994, p.104. **Name not validly published**: no description or illustration. **Taxonomic senior synonym**: *Impagidinium rigidaseptatum*, according to Slimani (2001a, p.193).

"subsp. *reticulatus*" (Davey and Williams, 1966a, p.39, pl.1, fig.10; pl.2, fig.4) Lentin and Williams, 1973, p.127. Holotype: Davey and Williams, 1966a, pl.1, fig.10; pl.2, fig.4. **NOW** *Pterodinium cingulatum* subsp. *reticulatum*. Originally *Hystrichosphaera cingulata* var. *reticulata*, subsequently *Spiniferites cingulatus* var. *reticulatus*, thirdly *Spiniferites cingulatus* subsp. *reticulatus*, fourthly *Spiniferites?* *cingulatus* subsp. *reticulatus*, fifthly (and now) *Pterodinium cingulatum* subsp. *reticulatum*. Taxonomic junior synonym: *Hystrichosphaera cingulata* var. *perforata*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"var. *reticulatus*" (Davey and Williams, 1966a, p.39, pl.1, fig.10; pl.2, fig.4) Davey and Verdier, 1971, p.33. Holotype: Davey and Williams, 1966a, pl.1, fig.10; pl.2, fig.4. **NOW** *Pterodinium cingulatum* subsp. *reticulatum*. Originally *Hystrichosphaera cingulata* var. *reticulata*, subsequently *Spiniferites cingulatus* var. *reticulatus*, thirdly *Spiniferites cingulatus* subsp. *reticulatus*, fourthly *Spiniferites?* *cingulatus* subsp. *reticulatus*, fifthly (and now) *Pterodinium cingulatum* subsp. *reticulatum*. Taxonomic junior synonym: *Hystrichosphaera cingulata* var. *perforata*, according to Clarke et al. (1968, p.181). Age: Cenomanian.

"var. *spinatus*" Song Zhichen in Song Zhichen et al., 1985, p.43, pl.2, fig.5. Holotype: Song Zhichen et al., 1985, pl.2, fig.5; He Chengquan et al., 2009, pl.133, fig.7. **NOW** *Spiniferites spinatus*. Originally *Spiniferites cingulatus* var. *spinatus*, subsequently (and now) *Spiniferites spinatus*. Age: early-middle Pleistocene.

compactus Cookson and Eisenack, 1974, p.59, pl.21, fig.11. Holotype: Cookson and Eisenack, 1974, pl.21, fig.11. Age: ?Aptian–Albian.

confossus Davey, 1979b, p.559, pl.8, figs.1–4. Holotype: Davey, 1979b, pl.8, figs.1–3. Age: late Aptian.

coniconcavus De Schepper et al., 2004, p.628, figs.5.1–20. Holotype: De Schepper et al., figs.5.1–6. Age: late early–early late Pliocene.

cooksoniae Lentin and Williams, 1977b, p.149. Holotype: Cookson and Eisenack, 1974, pl.27, fig.7. Originally *Spiniferites granulatus* (name illegitimate), subsequently (and now) *Spiniferites cooksoniae*. Substitute name for *Spiniferites granulatus* Cookson and Eisenack, 1974, p.59, pl.27, fig.7 (an illegitimate name). Age: ?Aptian–Albian.

?**corniger** (Wetzel, 1933b, p.39, pl.5, fig.6 ex Deflandre, 1937b, p.66) Sarjeant, 1970, p.76. Holotype: Wetzel, 1933b, pl.5, fig.6. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*.

Questionable assignment: Stover and Evitt (1978, p.191). This epithet, meaning horn-bearing, is correctly rendered as "*corniger*" when masculine. Age: Late Cretaceous.

"*cornutus*" (Gerlach, 1961, p.180, pl.27, figs.10–12) Sarjeant, 1970, p.76. Emendation: Stover and Hardenbol, 1994, p.38–39, as *Spiniferella cornuta*. Holotype: Gerlach, 1961, pl.27, figs.10–12. **NOW** *Spiniferella*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferella*. Age: middle Oligocene–middle Miocene.

"subsp. *aspinatus*" (Cookson and Eisenack, 1974, p.63, pl.23, fig.6) Lentin and Williams, 1977b, p.149. Holotype: Cookson and Eisenack, 1974, pl.23, fig.6. **NOW** *Impagidinium aspinatum*. Originally *Spiniferites cornutus* var. *aspinatus*, subsequently *Spiniferites cornutus* subsp. *aspinatus*, thirdly (and now) *Impagidinium aspinatum*. Age: Paleocene.

"var. *aspinatus*" Cookson and Eisenack, 1974, p.63, pl.23, fig.6. Holotype: Cookson and Eisenack, 1974, pl.23, fig.6. **NOW** *Impagidinium aspinatum*. Originally *Spiniferites cornutus* var. *aspinatus*, subsequently *Spiniferites cornutus* subsp. *aspinatus*, thirdly (and now) *Impagidinium aspinatum*. Age: Paleocene.

"subsp. *cornutus*". Autonym. Holotype: Gerlach, 1961, pl.27, figs.10–12. **Now redundant**. Taxonomic junior synonyms (at subspecific rank): *Spiniferites cornutus* var. *opisthophorus* (as *Spiniferites cornutus* subsp. *opisthophorus*), according to Below (1982c, p.33); *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*), according to Cookson and Eisenack (1974, p.62) — however, Below (1982c, p.33) retained *Spiniferites cornutus* subsp. *laevimurus* (now *Spiniferella cornuta* subsp. *laevimura*).

"var. *cornutus*". Autonym. Holotype: Gerlach, 1961, pl.27, figs.10–12. **Now redundant**. Originally *Hystrichosphaera cornuta* var. *cornuta*, subsequently *Spiniferites cornutus* var. *cornutus*. Taxonomic junior synonyms (at subspecific rank): *Spiniferites cornutus* var. *opisthophorus* (as *Spiniferites cornutus* subsp. *opisthophorus*), according to Below (1982c, p.33); *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*), according to Cookson and Eisenack (1974, p.62) — however, Below (1982c, p.33) retained *Spiniferites cornutus* subsp. *laevimurus* (now *Spiniferella cornuta* subsp. *laevimura*).

"subsp. *crassifurcatus*" (Cookson and Eisenack, 1974, p.63, pl.22, fig.9) Lentin and Williams, 1977b, p.150. Holotype: Cookson and Eisenack, 1974, pl.22, fig.9. Originally *Spiniferites cornutus* var. *crassifurcatus*, subsequently *Spiniferites cornutus* subsp. *crassifurcatus*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*), according to Below (1982c, p.33). Age: Albian–Cenomanian.

"var. *crassifurcatus*" Cookson and Eisenack, 1974, p.63, pl.22, fig.9. Holotype: Cookson and Eisenack, 1974, pl.22, fig.9. Originally *Spiniferites cornutus* var. *crassifurcatus*, subsequently *Spiniferites cornutus* subsp. *crassifurcatus*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*), according to Below (1982c, p.33). Age: Albian–Cenomanian.

"subsp. *flexus*" He Chengquan, 1991, p.151, pl.22, fig.4. Holotype: He Chengquan, 1991, pl.22, fig.4. **NOW** *Spiniferella cornuta* subsp. *flexa*. Originally *Spiniferites cornutus* subsp. *flexus*, subsequently (and now) *Spiniferella cornuta* subsp. *flexa*. Age: Paleocene.

"subsp. *laevimurus*" (Davey and Williams, 1966a, p.44–45, pl.4, fig.5) Lentin and Williams, 1973, p.127. Holotype: Davey and Williams, 1966a, pl.4, fig.5; Bujak et al., 1980, pl.4, figs.9,12. **NOW** *Spiniferella cornuta* subsp. *laevimura*. Originally *Hystrichosphaera cornuta* var. *laevimura*, subsequently *Spiniferites cornutus* subsp. *laevimurus*, thirdly (and now) *Spiniferella cornuta* subsp. *laevimura*. Taxonomic senior synonym (at subspecific rank): *Hystrichosphaera cornuta* var. *cornuta* (as *Spiniferites cornutus* subsp. *cornutus*, now *Spiniferella cornuta* subsp. *cornuta*), according to Cookson and Eisenack (1974, p.62) — however, Below (1982c, p.33) retained *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*). Taxonomic junior synonyms (at

subspecific rank): *Spiniferites cornutus* var. *crassifurcatus* (as *Spiniferites cornutus* subsp. *crassifurcatus*), and *Spiniferites cornutus* var. *normalis* (as *Spiniferites cornutus* subsp. *normalis*), both according to Below (1982c, p.33). Age: early Eocene.

"subsp. *normalis*" (Cookson and Eisenack, 1974, p.62, pl.23, fig.5) Lentin and Williams, 1977b, p.150. Holotype: Cookson and Eisenack, 1974, pl.23, fig.5. Originally *Spiniferites cornutus* var. *normalis*, subsequently *Spiniferites cornutus* subsp. *normalis*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*), according to Below (1982c, p.33). Age: Paleocene.

"var. *normalis*" Cookson and Eisenack, 1974, p.62, pl.23, fig.5. Holotype: Cookson and Eisenack, 1974, pl.23, fig.5. Originally *Spiniferites cornutus* var. *normalis*, subsequently *Spiniferites cornutus* subsp. *normalis*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera cornuta* var. *laevimura* (as *Spiniferites cornutus* subsp. *laevimurus*, now *Spiniferella cornuta* subsp. *laevimura*), according to Below (1982c, p.33). Age: Paleocene.

"subsp. *opisthophorus*" (Cookson and Eisenack, 1974, p.62, pl.23, figs.1–4) Lentin and Williams, 1977b, p.150. Holotype: Cookson and Eisenack, 1974, pl.23, fig.1. Originally *Spiniferites cornutus* var. *opisthophorus*, subsequently *Spiniferites cornutus* subsp. *opisthophorus*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera cornuta* var. *cornuta*, the autonym (as *Spiniferites cornutus* subsp. *cornutus*), according to Below (1982c, p.33). Age: Paleocene.

"var. *opisthophorus*" Cookson and Eisenack, 1974, p.62, pl.23, figs.1–4. Holotype: Cookson and Eisenack, 1974, pl.23, fig.1. Originally *Spiniferites cornutus* var. *opisthophorus*, subsequently *Spiniferites cornutus* subsp. *opisthophorus*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera cornuta* var. *cornuta*, the autonym (as *Spiniferites cornutus* subsp. *cornutus*), according to Below (1982c, p.33). Age: Paleocene.

"subsp. *ovalis*" He Chengquan, 1991, p.151–152, pl.22, figs.1–2. Holotype: He Chengquan, 1991, pl.22, figs.1–2. **NOW** *Spiniferella cornuta* subsp. *ovalis*. Originally *Spiniferites cornutus* subsp. *ovalis*, subsequently (and now) *Spiniferella cornuta* subsp. *ovalis*. Age: Paleocene.

"subsp. *sinefurcatus*" (Cookson and Eisenack, 1974, p.63, pl.22, fig.8) Lentin and Williams, 1977b, p.150. Holotype: Cookson and Eisenack, 1974, pl.22, fig.8. Originally *Spiniferites cornutus* var. *sinefurcatus*, subsequently *Spiniferites cornutus* subsp. *sinefurcatus*. **Taxonomic senior synonym** (at subspecific rank): *Spiniferites ramosus* var. *brevifurcatus* (as *Spiniferites ramosus* subsp. *brevifurcatus*), according to Below (1982c, p.33). Age: Albian–Cenomanian.

"var. *sinefurcatus*" Cookson and Eisenack, 1974, p.63, pl.22, fig.8. Holotype: Cookson and Eisenack, 1974, pl.22, fig.8. Originally *Spiniferites cornutus* var. *sinefurcatus*, subsequently *Spiniferites cornutus* subsp. *sinefurcatus*. **Taxonomic senior synonym** (at subspecific rank): *Spiniferites ramosus* var. *brevifurcatus* (as *Spiniferites ramosus* subsp. *brevifurcatus*), according to Below (1982c, p.33). Age: Albian–Cenomanian.

"*crassimuratus*" (Davey and Williams, 1966a, p.39, pl.1, fig.11) Sarjeant, 1970, p.76. Holotype: Davey and Williams, 1966a, pl.1, fig.11. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly *Pterodinium*. **Taxonomic senior synonym:** *Cymatiosphaera* (as *Spiniferites*?, now *Pterodinium*) *pterota*, according to Kjellström (1973, p.44) and Pavlishina (1990, p.95). Taxonomic junior synonym (at specific rank): *Hystrichosphaera cingulata* var. *polygonalis*, according to Clarke et al. (1968, p.181) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* var. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Cenomanian.

"*crassipellis*" (Deflandre and Cookson, 1955, p.265, pl.6, figs.2–3; text-fig.20) Sarjeant, 1970, p.76. Holotype: Deflandre and Cookson, 1955, pl.6, figs.2–3. **NOW** *Achomosphaera*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Achomosphaera*. Taxonomic junior synonyms: *Achomosphaera recurvata* and *Hystrichosphaera* (subsequently *Spiniferites*) *membranosa*, according to Quattrocchio and Sarjeant (1996, p.116). Age: early Eocene.

crassivariabilis Strauss in Strauss et al., 2001, p.411, pl.4, figs.3–5; text-fig.4 (part). Holotype: Strauss et al., pl.4, fig.3. This name was not validly published in Pross (1997, p.97) since no holotype was designated; Pross attributed this name to an unpublished species by Strauss. Age: middle-late Miocene.

?***cristatus*** (Conrad, 1941, p.4–5, pl.1, fig.D; text-fig.2D) Lentin and Williams, 1973, p.128. Holotype: Conrad, 1941, pl.1, fig.D; text-fig.2D. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. Questionable assignment: Stover and Evitt (1978, p.191) as a problematic species. Age: Maastrichtian.

cruciformis Wall and Dale in Wall et al., 1973, p.21–22, pl.1, figs.1–6; pl.2, figs.1–4. Holotype: Wall et al., 1973, pl.1, figs.2–3. Age: early Holocene.

"***cryptovesiculatus***" (Hansen, 1977, p.14–15, figs.9–10,18C,E–F,19A–B) Stover and Williams, 1987, p.117. Holotype: Hansen, 1977, figs.18C,E–F. **NOW** *Hafniasphaera*. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Age: Danian.

delicatus Reid, 1974, p.601–602, pl.2, figs.20–22. Holotype: Reid, 1974, pl.2, figs.20–22. Age: Holocene.

dentatus (Gocht, 1959, p.75–76, pl.4, fig.11; pl.7, fig.19) Lentin and Williams, 1973, p.128. Emendation: Duxbury, 1977, p.49–50, as *Spiniferites? dentatus*. Holotype: Gocht, 1959, pl.4, fig.11. Originally *Hystrichosphaera?*, subsequently *Spiniferites?*, thirdly (and now) *Spiniferites*. Duxbury (1977, p.49) retained the species in *Spiniferites* without question. Questionable assignment: Lentin and Williams (1973, p.128). Age: late Hauterivian.

ellipsoideus Matsuoka, 1983b, p.132–133, pl.13, figs.6a–b,7a–b. Holotype: Matsuoka, 1983b, pl.13, figs.6a–b. Age: middle-late Miocene.

elongatus Reid, 1974, p.602–603, pl.3, figs.23–24. Holotype: Reid, 1974, pl.3, figs.23–24. Originally (and now) *Spiniferites*, subsequently *Gonyaulax* (Appendix B). Because we follow the dual approach to the nomenclature of dinoflagellates (see Head et al. 2016), we retain this species in *Spiniferites*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45). Age: Holocene.

falcipediis Warny and Wrenn, 1997, p.291,293,297, pl.5, figs.1–4; pl.6, figs.1–4; pl.7, figs.1–2. Holotype: Warny and Wrenn, 1997, pl.5, figs.1–4. Age: late Miocene–early Pliocene.

fenestratus Duxbury, 2001, p.114–115, fig.14, nos.1–6. Holotype: Duxbury, 2001, fig.14, no.1. Age: late Hauterivian–mid Barremian.

firmus Matsuoka, 1983b, p.134, pl.14, figs.4a–b,5a–c. Holotype: Matsuoka, 1983b, pl.14, figs.5a–c; He Chengquan et al., 2009, pl.131, fig.14. Age: early Pleistocene.

"***fluens***" (Hansen, 1977, p.16, figs.13–14,19C–D) Stover and Williams, 1987, p.117. Holotype: Hansen, 1977, figs.19C–D. **NOW** *Hafniasphaera*. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Age: late Maastrichtian–Danian.

formosus Shaw Chenglong, 1999b, p.177–178, figs.54–56. Holotype: Shaw Chenglong, 1999b, figs.54–56. Age: Eocene.

foveolatus Schiøler, 1993, p.111, pl.5, figs.1–6. Holotype: Schiøler, 1993, pl.5, fig.2. Age: Maastrichtian.

fragilis He Chengquan, 1991, p.152, pl.23, fig.12. Holotype: He Chengquan, 1991, pl.23, fig.12. Age: Paleocene.

frigidus Harland and Reid in Harland et al., 1980, p.213–216, figs.2A–J; text-fig.3. Holotype: Harland et al., 1980, figs.2G–J; de Vernal et al., 1992, pl.5, fig.8. Taxonomic junior synonym: *Rottnestia amphicavata*, according to Bujak (1984, p.191) — however, de Vernal et al. (1992, p.324) retained *Rottnestia amphicavata*. Age: Holocene.

"*furcatus*" (Ehrenberg, 1837b, pl.1, figs.12,14) Lentin and Williams, 1973, p.128. Holotype: not designated. **Combination not validly published:** not intended and basionym not fully referenced. Originally *Xanthidium furcatum* (Appendix A), subsequently *Hystrichosphaera furcata*, thirdly *Ovum hispidum* subsp. *furcatum* (combination not validly published), fourthly *Spiniferites furcatus* (combination not validly published). **Taxonomic senior synonym:** *Xanthidium* (as *Hystrichosphaera*, now *Spiniferites*) *ramosum*, according to Davey and Williams (1966a, p.29–33). Taxonomic junior synonym: *Geodia? tripunctata* (Appendix A), according to Sarjeant (1964a, p.195). Age: Late Cretaceous.

galeaformis Sütő, 1994, p.456, pl.8, figs.1–2. Holotype: Sütő, 1994, pl.8, fig.1. Age: late Miocene.

"*goodmanii*" (Edwards, 1982, p.110,112–113, pl.1, figs.1–3,5–6,8–9) Stover and Williams, 1987, p.117. Holotype: Edwards, 1982, pl.1, figs.1–3. **NOW** *Hafniasphaera*. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Age: early Eocene.

gracilimembranaceus Strauss and Lund, 1992, p.169–170, pl.4, figs.7–9. Holotype: Strauss and Lund, 1992, pl.4, fig.9. Age: middle Miocene.

"*graciosus*" (Hansen, 1977, p.15, figs.11–12,18B,D) Stover and Williams, 1987, p.117. Holotype: Hansen, 1977, fig.18B. **NOW** *Hafniasphaera*. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Age: Danian.

"*grallaeformis*" (Brosius, 1963, p.42, pl.5, fig.3; text-fig.2) Strauss et al. 2001, p.412. Holotype: Brosius, 1963, pl.5, fig.3. **Combination not validly published:** basionym not fully referenced. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently (and now) *Achomosphaera*, thirdly *Spiniferites* (combination not validly published). Taxonomic junior synonym: *Spiniferites solidago*, according to Strauss et al. (2001, p.412). Age: Oligocene.

"*granulatus*" Cookson and Eisenack, 1974, p.59, pl.27, fig.7. Holotype: Cookson and Eisenack, 1974, pl.27, fig.7. **Name illegitimate — senior homonym:** *Spiniferites granulatus* (Davey, 1969b) Lentin and Williams, 1973. **Substitute name:** *Spiniferites cooksoniae*. Originally *Spiniferites granulatus* (name illegitimate), subsequently (and now) *Spiniferites cooksoniae*. Age: ?Aptian–Albian.

granulatus (Davey, 1969b, p.4–5, pl.1, figs.4–7) Lentin and Williams, 1973, p.128. Holotype: Davey, 1969b, pl.1, figs.4–7. Junior homonym: *Spiniferites granulatus* Cookson and Eisenack, 1974. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: Maastrichtian–?Danian.

hainanensis Sun Xuekun and Song Zhichen, 1992, p.49, pl.1, fig.12; pl.2, figs.1–2. Holotype: Sun Xuekun and Song Zhichen, 1992, pl.1, fig.12; He Chengquan et al., 2009, pl.133, fig.1. Age: Quaternary.

"*heterostylus*" (Heisecke, 1970, p.238,240, pl.5, figs.1–4; pl.6, figs.4–5) Lentin and Williams, 1973, p.128. Holotype: Heisecke, 1970, pl.5, figs.3–4; pl.6, fig.4. **NOW** *Achomosphaera*. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Achomosphaera*. Age: Danian.

hexatypicus Matsuoka, 1983b, p.133–134, pl.13, figs.1a–b,2a–b,3; text-figs.18A–B. Holotype: Matsuoka, 1983b, pl.13, figs.1a–b. Taxonomic junior synonym: *Spiniferites ovatus* Bujak, according to Bujak and Matsuoka (1986, p.239). Age: middle-late Miocene.

"*hirundo*" (Eisenack, 1958a, p.404–405, pl.24, fig.12) Sarjeant, 1981, p.123. Emendation: Sarjeant, 1985a, p.76–77, as *Achomosphaera hirundo*. Holotype: Eisenack, 1958a, pl.24, fig.12. **NOW** *Cordosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently *Achomosphaera*, thirdly *Lanternosphaeridium*, fourthly (and now) *Cordosphaeridium?*, fifthly *Spiniferites?*. Questionable assignment: Sarjeant (1981, p.123). N.I.A. Age: Early Cretaceous.

"*hyalospinosus*" (Hansen, 1977, p.14, figs.7–8,18A) Stover and Williams, 1987, p.117. Holotype: Hansen, 1977, fig.18A. **NOW** *Hafniasphaera*. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites*. Age: Danian.

hyperacanthus (Deflandre and Cookson, 1955, p.264–265, pl.6, fig.7) Cookson and Eisenack, 1974, p.59. Holotype: Deflandre and Cookson, 1955, pl.6, fig.7. Originally *Hystrichosphaera*, subsequently *Achomosphaera*, thirdly (and now) *Spiniferites*. Taxonomic junior synonym (at specific rank): *Hystrichosphaera furcata* var. *multiplicata* (as *Spiniferites ramosus* subsp. *multiplicatus*), according to Matsuoka (1985a, p.35) — however, Londeix et al. (2009, p.66) retained the latter taxon. Motile equivalent: *Gonyaulax spinifera* complex, according to Matsuoka et al. (1989, p.94). Reid (1974, p.603) also proposed this combination. Age: Miocene.

"inaequalis" Wall and Dale in Wall et al., 1973, p.22, pl.1, figs.7–8. Holotype: Wall et al., 1973, pl.1, figs.7–8. **NOW** *Impagidinium*. Originally *Spiniferites*, subsequently (and now) *Impagidinium*. Age: Holocene.

incertus (Klumpp, 1953, p.389–390, pl.17, figs.1–2) Sarjeant, 1981, p.109–110. Emendations: Morgenroth, 1966a, p.15, as *Hystrichosphaera incerta*; Sarjeant, 1981, p.109–110, as *Spiniferites incertus*. Holotype: Klumpp, 1953, pl.17, figs.1–2. Originally *Areoligera*, subsequently *Hystrichosphaera*, thirdly (and now) *Spiniferites*. Taxonomic junior synonym: *Hystrichokibotium* (now *Spiniferites*) *pseudofurcatum*, according to Morgenroth (1966a, p.15) — however, Sarjeant (1981, p.108–109) retained *Hystrichokibotium* (as and now *Spiniferites*) *pseudofurcatum*. Age: late Eocene.

jarvisii Pearce, 2010, p.53,55, pl.6, figs.2–5. Holotype: Pearce, 2010, pl.6, figs.2–5. Age: early Campanian.

katatonos Corradini, 1973, p.169, pl.25, figs.3a–c,6a–b; pl.37, figs.1–2. Holotype: Corradini, 1973, pl.25, figs.3a–c. Age: Late Cretaceous–Paleocene.

lasmus Reid, 1974, p.604–605, pl.3, figs.25–27. Holotype: Reid, 1974, pl.3, figs.25–27. Age: Holocene.

lenzii Below, 1982c, p.34, pl.7, figs.7a–b; pl.8, figs.3a–b,6a–b; text-fig.7. Holotype: Below, 1982c, pl.7, figs.7a–b. Age: Albian.

"leptodermus" (Maier, 1959, p.321–322, pl.33, figs.5–6) Sarjeant, 1970, p.76. Holotype: Maier, 1959, pl.33, fig.5; Sarjeant, 1983, pl.1, fig.2; pl.6, figs.1–2; pl.7, fig.4. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaera*, thirdly *Spiniferites*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Achomosphaera*) *alcicornu*, according to Sarjeant (1983, p.100). Age: middle Oligocene–late Miocene.

ludhamensis Head, 1996a, p.557, fig.12, nos.3–14; fig.13; fig.14, nos.1–3. Holotype: Head, 1996a, fig.12, nos.5–9. Age: early Pleistocene (Antian).

?magnoserratus (Cookson and Eisenack, 1962b, p.490, pl.3, figs.7–8) Stover and Evitt, 1978, p.191. Holotype: Cookson and Eisenack, 1962b, pl.3, figs.7–8. Originally *Pterodinium*, subsequently (and now) *Spiniferites?*, thirdly *Gonyaulacysta*. Lentin and Williams (1985, p.154) questionably retained this species in *Spiniferites*. Questionable assignment: Stover and Evitt (1978, p.191). Age: Aptian–?Albian.

maisensis Sütő, 1994, p.456–457, pl.1, figs.1–2, text-fig.7 (al. pl.A), nos.1a–b. Holotype: Sütő, 1994, pl.1, fig.1. Age: late Miocene.

"makropterus" Cookson and Eisenack, 1982, p.47–48, pl.7, figs.1–3. Holotype: Cookson and Eisenack, 1982, pl.7, fig.2. **NOW** *Pterodinium?*. Originally *Spiniferites*, subsequently (and now) *Pterodinium?*. Age: Middle Cretaceous.

manumii (Lund, 2002, p.87–88, pl.1, figs.1–7) Schiøler, 2005, p.30. Emendation: Schiøler, 2005, p.30. Holotype: Lund, 2002, pl.1, figs.1–2. Originally *Pseudospiniferites*, subsequently (and now) *Spiniferites*. Age: early Oligocene.

?maranhensis (Regali et al., 1974, p.291, pl.23, fig.3) Lentin and Williams, 1981, p.263. Holotype: Regali et al., 1974, pl.23, fig.3. Originally *Hystrichosphaeridium*, subsequently (and now) *Spiniferites?*. Questionable assignment: Lentin and Williams (1981, p.263). Age: Albian–Cenomanian.

membranaceus (Rossignol, 1964, p.86, pl.1, figs.4,9–10; pl.3, figs.7,12) Sarjeant, 1970, p.76. Holotype: Rossignol, 1964, pl.1, figs.4,9–10. Originally *Hystrichosphaera furcata* var. *membranacea*, subsequently *Hystrichosphaera ramosa* var. *membranacea*, thirdly *Hystrichosphaera membranacea*, fourthly (and now) *Spiniferites membranaceus*, fifthly *Gonyaulax membranacea*. Because we follow the dual approach to the nomenclature of dinoflagellates (see Head et al. 2016), we retain this species in *Spiniferites*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45) and Dodge (1989, p.289). Age: Pleistocene–Holocene.

"*membranispinus*" O'Connor and Walker, 1993, p.151. **Name not validly published:** no description or illustration.

"*membranosus*" (Archangelsky, 1969b, p.197,199, pl.3, figs.1–4) Lentin and Williams, 1973, p.128. Holotype: Archangelsky, 1969b, pl.3, figs.1–3. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. **Taxonomic senior synonym:** *Hystrichosphaera* (as and now *Achomosphaera*) *crassipellis*, according to Quattrocchio and Sarjeant (1996, p.116). Age: late Eocene.

microceras Cookson and Eisenack, 1974, p.60–61, pl.22, figs.10–12; pl.24, figs.1–2. Holotype: Cookson and Eisenack, 1974, pl.24, fig.2. Age: Paleocene.

subsp. *laticornutus* (Cookson and Eisenack, 1974, p.61, pl.22, fig.11) Lentin and Williams, 1977b, p.151. Holotype: Cookson and Eisenack, 1974, pl.22, fig.11. Originally *Spiniferites microceras* var. *laticornutus*, subsequently (and now) *Spiniferites microceras* subsp. *laticornutus*. Age: Paleocene.

"var. *laticornutus*" Cookson and Eisenack, 1974, p.61, pl.22, fig.11. Holotype: Cookson and Eisenack, 1974, pl.22, fig.11. **NOW** *Spiniferites microceras* subsp. *laticornutus*. Originally *Spiniferites microceras* var. *laticornutus*, subsequently (and now) *Spiniferites microceras* subsp. *laticornutus*. Age: Paleocene.

subsp. *microceras*. Autonym. Holotype: Cookson and Eisenack, 1974, pl.24, fig.2.

"var. *microceras*". Autonym. Holotype: Cookson and Eisenack, 1974, pl.24, fig.2. **Now redundant.**

subsp. *opisthophorus* (Cookson and Eisenack, 1974, p.61, pl.22, fig.12) Lentin and Williams, 1977b, p.152. Holotype: Cookson and Eisenack, 1974, pl.22, fig.12. Originally *Spiniferites microceras* var. *opisthophorus*, subsequently (and now) *Spiniferites microceras* subsp. *opisthophorus*. Age: Paleocene.

"var. *opisthophorus*" Cookson and Eisenack, 1974, p.61, pl.22, fig.12. Holotype: Cookson and Eisenack, 1974, pl.22, fig.12. **NOW** *Spiniferites microceras* subsp. *opisthophorus*. Originally *Spiniferites microceras* var. *opisthophorus*, subsequently (and now) *Spiniferites microceras* subsp. *opisthophorus*. Age: Paleocene.

mirabilis (Rossignol, 1964, p.86–87, pl.2, figs.1–3; pl.3, figs.4–5) Sarjeant, 1970, p.76. Holotype: Rossignol, 1964, pl.2, figs.1–2. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Wall and Dale (1967, p.352; 1968c, p.270) and Dodge (1989, p.289). Age: Pleistocene.

monilis (Davey and Williams, 1966a, p.45, pl.5, fig.2) Sarjeant, 1970, p.76. Emendation: Eaton, 1976, p.282, as *Spiniferites monilis*. Holotype: Davey and Williams, 1966a, pl.5, fig.2; Bujak et al., 1980, pl.4, figs.7–8. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: early Eocene.

"*multibrevis*" (Davey and Williams, 1966a, p.35–36, pl.1, fig.4; pl.4, fig.6; text-fig.9) Below, 1982c, p.35. Holotype: Davey and Williams, 1966a, pl.4, fig.6. Originally *Hystrichosphaera ramosa* var. *multibrevis*, subsequently *Spiniferites ramosus* var. *multibrevis*, thirdly *Spiniferites ramosus* subsp. *multibrevis*, fourthly *Spiniferites multibrevis*. **Taxonomic senior synonym** (at specific rank): *Galea* (now *Spiniferites*) *twistingiensis*, according to Sarjeant (1983, p.94–95). **Taxonomic junior synonym** (at subspecific rank): *Achomosphaera* (as *Spiniferites*) *cambrata*, according to Jain (1982, p.51). Age: Hauterivian.

"subsp. *chebca*" Below, 1982c, p.35, pl.8, figs.7,8a–c,9. Holotype: Below, 1982c, pl.8, figs.8a–c. **NOW** *Spiniferites chebca*. Originally *Spiniferites multibrevis* subsp. *chebca*, subsequently (and now) *Spiniferites chebca*. N.I.A. Age: Hauterivian–Aptian.

"subsp. *multibrevis*". Autonym. Holotype: Davey and Williams, 1966a, pl.4, fig.6. **Now redundant**.

"subsp. *seghiris*" Below, 1982c, p.35–36, pl.8, figs.4a–b,5a–b. Holotype: Below, 1982c, pl.8, figs.4a–b. **NOW** *Spiniferites seghiris*. Originally *Spiniferites multibrevis* subsp. *seghiris*, subsequently (and now) *Spiniferites seghiris*. Age: late Hauterivian.

multisphaerus Price and Pospelova, 2014, p.107,113–115, pl.1, figs.1–13; pl.2, figs.1–12; pl.3, figs.7–9; pl.4, figs.4–9; pl.5, figs.4–11; text-fig.3. Holotype: Price and Pospelova, 2014, pl.1, figs.1–13. Age: late Quaternary.

multispinulus Pearce, 2010, p.55–56, pl.7, figs.1–6. Holotype: Pearce, 2010, pl.7, figs.1–6. Age: middle early Campanian.

"*nanus*" Matsuoka, 1976, p.111, pl.28, figs.1–3. Holotype: Matsuoka, 1976, p.111, pl.28, figs.1–2. **Taxonomic senior synonym:** *Hystrichosphaera* (as *Spiniferites*) *bulloidea*, according to Matsuoka (1983a, p.23). Taxonomic senior synonym: *Spiniferites nanus*, according to Matsuoka (1983a, p.23) — however, Matsuoka (1991, table 2 — p.8) retained *Spiniferites nanus*. N.I.A. Age: Pleistocene.

"*neptuni*" (Eisenack, 1958a, p.399, pl.26, figs.7–8; text-fig.8) Duxbury, 1983, p.55. Emendations: Duxbury, 1983, p.55, as *Spiniferites neptuni*; Sarjeant, 1985a, p.89–90,92, as *Florentinia? neptuni*. Holotype: Eisenack, 1958a, pl.26, fig.7. **NOW** *Achomosphaera*. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Achomosphaera*, thirdly *Achomosphaera?*, fourthly *Spiniferites*, fifthly *Florentinia?*. For etymology see under *Achomosphaera*. Age: Early Cretaceous.

nodosus (Wall, 1967, p.101, pl.14, figs.7–9; text-fig.2) Sarjeant, 1970, p.76. Holotype: Wall, 1967, pl.14, figs.7–9. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Taxonomic senior synonym: *Hystrichosphaera* (as and now *Spiniferites*) *bentorii*, according to Reid (1974, p.598) and Harland (1977b, p.98–99) — however, Lentin and Williams (1981, p.264) retained *Spiniferites nodosus*. Taxonomic junior synonym: *Leptodinium churchillii*, according to Reid (1974, p.599). Motile equivalent: *Gonyaulax digitalis* (Pouchet, 1883) Kofoid, 1911, according to Wall and Dale (1967, p.352). Age: Quaternary.

nortonensis Matsuoka and Bujak, 1988, p.79–80, pl.13, figs.1a–b,2; text-fig.19. Holotype: Matsuoka and Bujak, 1988, pl.13, figs.1a–b; text-fig.19. Age: late Miocene.

"*ovatus*" Bujak, 1984, p.192, pl.3, figs.15–18. Holotype: Bujak, 1984, pl.3, fig.18. **Name illegitimate — senior homonym:** *Spiniferites ovatus* Matsuoka, 1983b. **Taxonomic senior synonym:** *Spiniferites hexatypicus*, according to Bujak and Matsuoka (1986, p.239). Age: late Miocene–early Pliocene.

ovatus Matsuoka, 1983b, p.134–135, pl.3, figs.1a–c,2,3a–b,4a–b; text-figs.19A–B. Holotype: Matsuoka, 1983b, pl.3, figs.1a–c. Junior homonym: *Spiniferites ovatus* Bujak, 1984. Age: late Miocene.

pachydermus (Rossignol, 1964, p.86, pl.1, figs.1–2; pl.3, fig.6) Reid, 1974, p.607. Holotype: Rossignol, 1964, pl.1, figs.1–2. Originally *Hystrichosphaera furcata* var. *pachyderma*, subsequently *Hystrichosphaera ramosa* var. *pachyderma* (combination not validly published), thirdly *Spiniferites ramosus* subsp. *pachydermus*, fourthly (and now) *Spiniferites pachydermus*. Motile equivalent: *Gonyaulax ellegaardiae* Mertens et al. 2015, according to Mertens et al. (2015, p.560). Age: Pleistocene–Holocene.

pacificus Zhao Yunyun and Morzadec-Kerfourn, 1994, p.268–269, pl.1, figs.1a–c,2a–b,3; pl.2, figs.1–2,3a–b. Holotype: Zhao Yunyun and Morzadec-Kerfourn, 1994, pl.1, figs.1a–c. Age: Pleistocene.

"*palliatius*" Wilson in Slimani, 2001a, p.193. **Name not validly published:** no description. **Taxonomic senior synonym:** *Hystrichostroglylon coninckii*, according to Slimani (2001a, p.193).

"palmatus" (White, 1842, p.39–40, pl.4, fig.12) Mantell, 1854, p.251. Holotype: White, 1842, pl.4, fig.12.

Nomenclatural senior synonym: *Xanthidium tubiferum* var. *recurvatum* (as *Hystrichosphaeridium recurvatum*), which has the same type. Originally *Xanthidium tubiferum* var. *palmatum* (Appendix A), subsequently *Xanthidium palmatum* (Appendix A), thirdly *Spiniferites palmatus*, fourthly *Cordosphaeridium palmatum*, fifthly *Hystrichosphaeridium palmatum* (combination illegitimate), sixthly *Hystrichosphaeridium duplum* (name illegitimate). Nomenclatural junior synonyms: *Xanthidium tubiferum* var. *palmaforme* and *Hystrichosphaeridium duplum*, both of which have the same holotype as *Hystrichosphaeridium palmatum*. This is not an illegitimate combination. For a full discussion, see *Hystrichosphaeridium recurvatum*. Age: Senonian.

paradoxus (Cookson and Eisenack, 1968, p.114; text-figs.2G,3) Sarjeant, 1970, p.76. Holotype: Cookson and Eisenack, 1968, text-figs.2G,3. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: Senonian.

?**paucifurcatus** (Cookson and Eisenack, 1982, p.39, pl.8, figs.5–6) Masure in Fauconnier and Masure, 2004, p.346. Holotype: Cookson and Eisenack, 1982, pl.8, fig.5. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium?*, thirdly (and now) *Spiniferites?*. Questionable assignment: Masure in Fauconnier and Masure (2004, p.346). Age: Paleocene.

"?**pedatus**" (Wetzel, 1933b, p.55–56, pl.4, fig.35 ex Downie and Sarjeant, 1965, p.119) Lentin and Williams, 1973, p.129. Emendation: Sarjeant, 1985b, p.145–146, as *Coronifera pedata*. Holotype: Wetzel, 1933b, pl.4, fig.35. **NOW** *Coronifera*. Originally *Hystrichosphaera?*, subsequently *Spiniferites?*, thirdly (and now) *Coronifera*. Questionable assignment: Lentin and Williams (1973, p.129). Taxonomic senior synonym: *Coronifera oceanica*, by implication in Sarjeant (1985b, p.145–147), who believed *Hystrichosphaera?* (as *Coronifera*) *pedata* to be the senior name — however, Kirsch (1991, p.71) retained the two species. Age: Late Cretaceous.

perforatus (Davey and Williams, 1966a, p.41, pl.5, fig.7) Sarjeant, 1970, p.76. Holotype: Davey and Williams, 1966a, pl.5, fig.7; Bujak et al., 1980, pl.5, figs.2–3. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: early Eocene.

"perpusillus" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.86, pl.14, figs.19–20. Holotype: Liu Zhili et al., 1992, pl.14, fig.20. **NOW** *Valensiella*. Originally *Spiniferites*, subsequently (and now) *Valensiella*. Age: Early Tertiary.

polyplasius (Maier, 1959, p.322–323, pl.33, figs.7–8) Sarjeant, 1983, p.96. Emendation: Sarjeant, 1983, p.96–97, as *Spiniferites polyplasius*. Holotype: Maier, 1959, pl.33, fig.7; Sarjeant, 1983, pl.1, fig.3; pl.2, fig.2. Originally *Hystrichosphaeridium*, subsequently *Hystrichosphaeridium?*, thirdly (and now) *Spiniferites*. Age: Miocene.

porosus (Manum and Cookson, 1964, p.11–12, pl.2, figs.1–5; text-fig.2) Harland, 1973, p.690. Holotype: Manum and Cookson, 1964, pl.2, figs.2–3; text-fig.2. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Age: Late Cretaceous.

primaevus (Duxbury, 1977, p.50, pl.4, figs.2–3) Monteil, 1991b, p.304. Holotype: Duxbury, 1977, pl.4, figs.2–3. Originally *Spiniferites ramosus* subsp. *primaevus*, subsequently (and now) *Spiniferites primaevus*. Age: early Valanginian.

procerus Marheinecke, 1992, p.29–30, pl.3, fig.8. Holotype: Marheinecke, 1992, pl.3, fig.8. Contrary to the opinion of Lentin and Williams (1993, p.612), Williams et al. (1998, p.576) considered this name to be validly published. Age: early Maastrichtian.

pseudofurcatus (Klumpp, 1953, p.388, pl.16, figs.12–14) Sarjeant, 1970, p.76. Emendation: Sarjeant, 1981, p.108–109, as *Spiniferites pseudofurcatus*. Holotype: Klumpp, 1953, pl.16, figs.12,14; Sarjeant, 1981, pl.3, figs.1–2; text-fig.2; Fensome et al., 1995, figs.1–2 — p.1709. Originally *Hystrichokibotium*, subsequently *Hystrichosphaera* (combination illegitimate), thirdly (and now) *Spiniferites*. Taxonomic senior synonym: *Areoligera* (as *Hystrichosphaera*, now *Spiniferites*) *incerta*, according to Morgenroth (1966a, p.15) — however, Sarjeant (1981, p.108–109) retained *Hystrichokibotium* (as and now *Spiniferites*) *pseudofurcatum*. Taxonomic junior synonyms: *Hystrichosphaera* (as *Spiniferites*) *buccina*, according to Lentin and Williams (1973, p.126); *Hystrichosphaera*

tertiaria, according to Gocht (1969, p.32) and Sarjeant (1970, p.76). May (1980, p.64) considered *Achomosphaera alvicornu* to be a possible taxonomic junior synonym of this species. Age: late Eocene.

subsp. *granulosus* Schiøler, 1993, p.111, pl.4, figs.1–3. Holotype: Schiøler, 1993, pl.4, fig.2. Age: Maastrichtian.

subsp. *laevigatus* He Chengquan, 1991, p.153, pl.22, fig.15. Holotype: He Chengquan, 1991, pl.22, fig.15. Age: Paleocene.

subsp. *obliquus* (Wall, 1967, p.103, pl.14, fig.16; text-fig.2) Lentin and Williams, 1973, p.129. Holotype: Wall, 1967, pl.14, fig.16. Originally *Hystrichosphaera tertiariorum* var. *obliqua*, subsequently (and now) *Spiniferites pseudofurcatus* subsp. *obliquus*. Age: late Pleistocene–Holocene.

subsp. *pseudofurcatus*. Autonym. Holotype: Klumpp, 1953, pl.16, figs.12,14; Sarjeant, 1981, pl.3, figs.1–2; text-fig.2; Fensome et al., 1995, figs.1–2 — p.1709.

subsp. *verrucosus* Schiøler, 2005, p.31, pl.19, figs. 1–4. Holotype: Schiøler, 2005, pl. 19, fig.2. Age: latest Lutetian–Bartonian.

"?*pterotus*" (Cookson and Eisenack, 1958, p.50, pl.11, fig.7) Sarjeant, 1970, p.76. Emendation: Pavlishina, 1990, p.95, as *Pterodinium? pterotum*. Holotype: Cookson and Eisenack, 1958, pl.11, fig.7. **NOW** *Pterodinium?* Originally *Cymatiosphaera* (Appendix A), subsequently *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Spiniferites?*, fifthly (and now) *Pterodinium?*. Questionable assignment: Stover and Evitt (1978, p.191). Taxonomic senior synonym: *Cymatiosphaera* (as and now *Pterodinium*) *cingulata*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *pterota*. Taxonomic junior synonyms: *Hystrichosphaera* (as *Spiniferites*) *crassimurata*, according to Kjellström (1973, p.44) and Pavlishina (1990, p.95); (at specific rank) *Hystrichosphaera cingulata* var. *polygonalis*, according to Pavlishina (1990, p.95) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* subsp. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Albian–Maastrichtian.

puyangensis He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.70, pl.21, figs.1–11. Holotype: He Chengquan et al., 1989, pl.21, fig.4. Originally (and now) *Spiniferites puyangensis*, subsequently *Spiniferites adnatus* subsp. *puyangensis*. He Chengquan et al. (2009, p.208) retained this taxon at specific rank. Age: Early Tertiary.

**ramosus* (Ehrenberg, 1837b, pl.1, fig.15) Mantell, 1854, p.239. Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). Originally *Xanthidium ramosum* (Appendix A), subsequently (and now) *Spiniferites ramosus*, thirdly *Hystrichosphaera ramosa*, fourthly *Ovum hispidum* subsp. *ramosum* (combination not validly published, Appendix A), fifthly *Bion ramosum* (Appendix A). Sarjeant (1970, p.75) retained this species in *Spiniferites*. Taxonomic junior synonyms: *Xanthidium* (as *Hystrichosphaera*) *furcatum*, according to Davey and Williams (1966a, p.29–33); *Galea korykos* and *Hystrichosphaeridium echinoides*, both according to Sarjeant (1983, p.91–92); *Areoligera birama*, according to Morgenroth (1968, p.550); *Geodia? tripunctata*, by implication in Sarjeant (1964a, p.175), who considered *Geodia? tripunctata* to be a taxonomic junior synonym of *Xanthidium* (as *Hystrichosphaera*) *furcatum*; *Hystrichosphaera* (subsequently *Spiniferites*) *bulloidea*, according to Harland (1977b, p.101–102) — however, Lentin and Williams (1981, p.259) retained *Hystrichosphaera* (as *Spiniferites*) *bulloidea*; *Homotryblium distinctum*, according to Jain and Garg (1982, p.69), who considered *Homotryblium distinctum* to be a taxonomic junior synonym of *Spiniferites ramosus* subsp. *ramosus*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous.

?subsp. *angustus* (Wetzel, 1952, p.394, pl.A, fig.2; text-fig.2) Lentin and Williams, 1973, p.129. Emendation: Sarjeant, 1984c, p.125–126, as *Spiniferites ramosus* var. *angustus*. Holotype: Wetzel, 1952, pl.A, fig.2; text-fig.2; Sarjeant, 1984c, pl.8, figs.3–4. Originally *Hystrichosphaera furcata* subsp. *angusta*, subsequently (and now) *Spiniferites ramosus?* subsp. *angustus*, thirdly *Spiniferites ramosus* var. *angustus*.

Lentin and Williams (1985, p.335) questionably retained this taxon as a subspecies of *Spiniferites ramosus*. Questionable assignment: Lentin and Williams (1973, p.129). Age: Danian.

"var. *angustus*" (Wetzel, 1952, p.394, pl.A, fig.2; text-fig.2) Sarjeant, 1984c, p.125–126. Emendation: Sarjeant, 1984c, p.125–126, as *Spiniferites ramosus* var. *angustus*. Holotype: Wetzel, 1952, pl.A, fig.2; text-fig.2; Sarjeant, 1984c, pl.8, figs.3–4. **NOW** *Spiniferites ramosus*? subsp. *angustus*. Originally *Hystrichosphaera furcata* subsp. *angusta*, subsequently (and now) *Spiniferites ramosus*? subsp. *angustus*, thirdly *Spiniferites ramosus* var. *angustus*. Age: Danian.

subsp. *aquilus* Pearce, 2010, p.56, pl.7, figs.7–12. Holotype: Pearce, 2010, pl.7, figs.7–12. Pearce (2010, p.56) gave the heading for this taxon as "*Spiniferites ramosus aquilus* sp. nov." and began the diagnosis with "A species of *Spiniferites* ...". It is clear from the name, however, that he intended the taxon to be a subspecies, and so we consider the incorrect citation of rank as a typographic error and consider *Spiniferites ramosus* subsp. *aquilus* to be validly published in Pearce (2011). Age: early Cenomanian–late Campanian.

"?subsp. *aulosphaeropsis*" (Wetzel, 1933b, p.35, pl.5, fig.5 ex Downie and Sarjeant, 1965, p.118) Lentin and Williams, 1973, p.129. Holotype: Wetzel, 1933b, pl.5, fig.5. Originally *Hystrichosphaera furcata* forma *aulosphaeropsis*, subsequently *Spiniferites ramosus*? subsp. *aulosphaeropsis*. Questionable assignment: Lentin and Williams (1973, p.129). **Taxonomic senior synonym** (at specific rank): *Avellodinium falsificum*, according to Sarjeant (1985b, p.156–157). The name *Hystrichosphaera furcata* forma *aulosphaeropsis* was not validly published in Wetzel (1933b) since the species combination *Hystrichosphaera furcata* was not validly published. Age: Cretaceous.

subsp. *brevifurcatus* (Cookson and Eisenack, 1974, p.57, pl.21, figs.6,9) Lentin and Williams, 1977b, p.153. Holotype: Cookson and Eisenack, 1974, pl.21, fig.6. Originally *Spiniferites ramosus* var. *brevifurcatus*, subsequently (and now) *Spiniferites ramosus* subsp. *brevifurcatus*. Taxonomic junior synonym: *Spiniferites cornutus* var. *sinefurcatus* (as *Spiniferites cornutus* subsp. *sinefurcatus*), according to Below (1982c, p.33). Age: Turonian–Senonian.

"var. *brevifurcatus*" Cookson and Eisenack, 1974, p.57, pl.21, figs.6,9. Holotype: Cookson and Eisenack, 1974, pl.21, fig.6. **NOW** *Spiniferites ramosus* subsp. *brevifurcatus*. Originally *Spiniferites ramosus* var. *brevifurcatus*, subsequently (and now) *Spiniferites ramosus* subsp. *brevifurcatus*. Taxonomic junior synonym (at subspecific rank): *Spiniferites cornutus* var. *sinefurcatus* (as *Spiniferites cornutus* subsp. *sinefurcatus*), according to Below (1982c, p.33). Age: Turonian–Senonian.

subsp. *brevirugosus* He Chengquan, 1991, p.153, pl.22, fig.5. Holotype: He Chengquan, 1991, pl.22, fig.5. Age: Paleocene.

subsp. *cavispinosus* Hansen, 1977, p.13, figs.21D–E. Holotype: Hansen, 1977, fig.21D. Age: Maastrichtian.

subsp. *cingulatus* He Chengquan, 1991, p.153–154, pl.22, figs.6–7. Holotype: He Chengquan, 1991, pl.22, fig.7. Age: Paleocene.

subsp. *endoperforatus* (Corradini, 1973, p.168, pl.26, figs.9–10) Lentin and Williams, 1975, p.2155. Holotype: Corradini, 1973, pl.26, fig.9. Originally *Spiniferites ramosus* var. *endoperforatus*, subsequently (and now) *Spiniferites ramosus* subsp. *endoperforatus*. Age: Senonian.

"var. *endoperforatus*" Corradini, 1973, p.168, pl.26, figs.9–10. Holotype: Corradini, 1973, pl.26, fig.9. **NOW** *Spiniferites ramosus* subsp. *endoperforatus*. Originally *Spiniferites ramosus* var. *endoperforatus*, subsequently (and now) *Spiniferites ramosus* subsp. *endoperforatus*. Age: Senonian.

subsp. *gracilis* (Davey and Williams, 1966a, p.34–35, pl.1, fig.5; pl.5, fig.6) Lentin and Williams, 1973, p.130. Holotype: Davey and Williams, 1966a, pl.5, fig.6; Bujak et al., 1980, pl.4, figs.1–2. Originally *Hystrichosphaera ramosa* var. *gracilis*, subsequently *Spiniferites ramosus* var. *gracilis*, thirdly (and now) *Spiniferites ramosus* subsp. *gracilis*. Lentin and Williams (1993, p.614) retained this taxon as *Spiniferites*

ramosus subsp. *gracilis*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium plicatum*, according to Sarjeant (1983, p.93). Age: Cenomanian–Eocene.

"var. *gracilis*" (Davey and Williams, 1966a, p.34–35, pl.1, fig.5; pl.5, fig.6) Corradini, 1973, p.165. Holotype: Davey and Williams, 1966a, pl.5, fig.6; Bujak et al., 1980, pl.4, figs.1–2. **NOW** *Spiniferites ramosus* subsp. *gracilis*. Originally *Hystrichosphaera ramosa* var. *gracilis*, subsequently *Spiniferites ramosus* var. *gracilis*, thirdly (and now) *Spiniferites ramosus* subsp. *gracilis*. Taxonomic junior synonym (at subspecific rank): *Hystrichosphaeridium plicatum*, according to Sarjeant (1983, p.93). Age: Cenomanian–Eocene.

subsp. *granomembranceus* (Davey and Williams, 1966a, p.37–38, pl.4, fig.4) Lentin and Williams, 1973, p.130. Holotype: Davey and Williams, 1966a, pl.4, fig.4; Bujak et al., 1980, pl.4, figs.10–11. Originally *Hystrichosphaera ramosa* var. *granomembrancea*, subsequently *Spiniferites ramosus* var. *granomembranceus*, thirdly (and now) *Spiniferites ramosus* subsp. *granomembranceus*. Lentin and Williams (1993, p.614) retained this taxon as *Spiniferites ramosus* subsp. *granomembranceus*. Age: early Eocene.

"var. *granomembranceus*" (Davey and Williams, 1966a, p.37–38, pl.4, fig.4) Corradini, 1973, p.166. Holotype: Davey and Williams, 1966a, pl.4, fig.4; Bujak et al., 1980, pl.4, figs.10–11. **NOW** *Spiniferites ramosus* subsp. *granomembranceus*. Originally *Hystrichosphaera ramosa* var. *granomembrancea*, subsequently *Spiniferites ramosus* var. *granomembranceus*, thirdly (and now) *Spiniferites ramosus* subsp. *granomembranceus*. Lentin and Williams (1993, p.614) retained this taxon as *Spiniferites ramosus* subsp. *granomembranceus*. Age: early Eocene.

subsp. *granosus* (Davey and Williams, 1966a, p.35, pl.4, fig.9) Lentin and Williams, 1973, p.130. Holotype: Davey and Williams, 1966a, pl.4, fig.9. Originally *Hystrichosphaera ramosa* var. *granosa*, subsequently *Spiniferites ramosus* var. *granosus*, thirdly (and now) *Spiniferites ramosus* subsp. *granosus*. Age: early Eocene.

"var. *granosus*" (Davey and Williams, 1966a, p.35, pl.4, fig.9) Corradini, 1973, p.167. Holotype: Davey and Williams, 1966a, pl.4, fig.9. **NOW** *Spiniferites ramosus* subsp. *granosus*. Originally *Hystrichosphaera ramosa* var. *granosa*, subsequently *Spiniferites ramosus* var. *granosus*, thirdly (and now) *Spiniferites ramosus* subsp. *granosus*. Age: early Eocene.

subsp. *maeandriformis* (Corradini, 1973, p.168–169, pl.26, figs.11–12) Lentin and Williams, 1975, p.2155. Holotype: Corradini, 1973, pl.26, fig.11. Originally *Spiniferites ramosus* var. *maeandriformis*, subsequently (and now) *Spiniferites ramosus* subsp. *maeandriformis*. Age: Senonian.

"var. *maeandriformis*" Corradini, 1973, p.168–169, pl.26, figs.11–12. Holotype: Corradini, 1973, pl.26, fig.11. **NOW** *Spiniferites ramosus* subsp. *maeandriformis*. Originally *Spiniferites ramosus* var. *maeandriformis*, subsequently (and now) *Spiniferites ramosus* subsp. *maeandriformis*. Age: Senonian.

subsp. *multibrachiatus* (de Wit, 1943, p.376; text-fig.3f) Lentin and Williams, 1973, p.130. Holotype: de Wit, 1943, text-fig.3f. Originally *Hystrichosphaera furcata* forma *multibrachiata*, subsequently (and now) *Spiniferites ramosus* subsp. *multibrachiatus*. Age: Late Cretaceous.

"subsp. *multibrevis*" (Davey and Williams, 1966a, p.35–36, pl.1, fig.4; pl.4, fig.6; text-fig.9) Lentin and Williams, 1973, p.130. Holotype: Davey and Williams, 1966a, pl.4, fig.6; Bujak et al., 1980, pl.4, figs.3,6. Originally *Hystrichosphaera ramosa* var. *multibrevis*, subsequently *Spiniferites ramosus* var. *multibrevis*, thirdly *Spiniferites ramosus* subsp. *multibrevis*, fourthly *Spiniferites multibrevis*. **Taxonomic senior synonym** (at specific rank): *Galea* (now *Spiniferites*) *twistringiensis*, according to Sarjeant (1983, p.94–95). Taxonomic junior synonym (at subspecific rank): *Achomospaera* (as *Spiniferites*) *cambra*, according to Jain (1982, p.51). Age: Late Cretaceous.

"var. *multibrevis*" (Davey and Williams, 1966a, p.35–36, pl.1, fig.4; pl.4, fig.6; text-fig.9) Davey and Verdier, 1971, p.33. Holotype: Davey and Williams, 1966a, pl.4, fig.6; Bujak et al., 1980, pl.4, figs.3,6.

Originally *Hystrichosphaera ramosa* var. *multibrevis*, subsequently *Spiniferites ramosus* var. *multibrevis*, thirdly *Spiniferites ramosus* subsp. *multibrevis*, fourthly *Spiniferites multibrevis*. **Taxonomic senior synonym** (at specific rank): *Galea* (now *Spiniferites*) *twistringiensis*, according to Sarjeant (1983, p.95–96). Taxonomic junior synonym (at subspecific rank): *Achomosphaera* (as *Spiniferites*) *cambra*, according to Jain (1982, p.51). Age: Hauterivian.

subsp. ***multiplicatus*** (Rossignol, 1964, p.86, pl.1, fig.14; pl.3, fig.16) Lentin and Williams, 1973, p.130. Holotype: Rossignol, 1964, pl.1, fig.14. Originally *Hystrichosphaera furcata* var. *multiplicata*, subsequently *Hystrichosphaera ramosa* var. *multiplicata* (combination not validly published), thirdly *Spiniferites ramosus* subsp. *multiplicatus*. Taxonomic senior synonym (at specific rank): *Hystrichosphaera* (as *Spiniferites*) *hyperacantha*, according to Matsuoka (1985a, p.35) — however, Londeix et al. (2009, p.66) retained the latter taxon. Age: Pleistocene–Holocene.

"subsp. ***pachydermus***" (Rossignol, 1964, p.86, pl.1, figs.1–2; pl.3, fig.6) Lentin and Williams, 1973, p.130. Holotype: Rossignol, 1964, pl.1, figs.1–2. **NOW** *Spiniferites pachydermus*. Originally *Hystrichosphaera furcata* var. *pachyderma*, subsequently *Hystrichosphaera ramosa* var. *pachyderma* (combination not validly published), thirdly *Spiniferites ramosus* subsp. *pachydermus*, fourthly (and now) *Spiniferites pachydermus*. Age: Pleistocene–Holocene.

"subsp. ***primaevus***" Duxbury, 1977, p.50, pl.4, figs.2–3. Holotype: Duxbury, 1977, pl.4, figs.2–3. **NOW** *Spiniferites primaevus*. Originally *Spiniferites ramosus* subsp. *primaevus*, subsequently (and now) *Spiniferites primaevus*. Age: early Valanginian.

subsp. ***pteroceus*** Slimani, 1996, p.379, pl.3, figs.H–J; pl.4, figs.E–G ex Slimani, 2001b, p.8, pl.3, figs.1–4. Holotype: Slimani, 1996, pl.3, figs.H–J; Slimani, 2001b, pl.3, figs.1–2. This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Age: early Campanian–Danian.

subsp. ***ramosus***. Autonym. Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). Taxonomic junior synonym: *Homotryblium distinctum*, according to Jain and Garg (1982, p.69) (see *Spiniferites ramosus*).

"var. ***ramosus***". Autonym. Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). **Now redundant**. Originally *Hystrichosphaera ramosa* var. *ramosa*, subsequently *Spiniferites ramosus* var. *ramosus*.

subsp. ***reticulatus*** (Davey and Williams, 1966a, p.38, pl.1, figs.2–3) Lentin and Williams, 1973, p.130. Holotype: Davey and Williams, 1966a, pl.1, figs.2–3. Originally *Hystrichosphaera ramosa* var. *reticulata*, subsequently *Spiniferites ramosus* var. *reticulatus*, thirdly (and now) *Spiniferites ramosus* subsp. *reticulatus*. Age: Cenomanian.

"var. ***reticulatus***" (Davey and Williams, 1966a, p.38, pl.1, figs.2–3) Davey and Verdier, 1971, p.34. Holotype: Davey and Williams, 1966a, pl.1, figs.2–3. **NOW** *Spiniferites ramosus* subsp. *reticulatus*. Originally *Hystrichosphaera ramosa* var. *reticulata*, subsequently *Spiniferites ramosus* var. *reticulatus*, thirdly (and now) *Spiniferites ramosus* subsp. *reticulatus*. Age: Cenomanian.

subsp. ***septoperforatus*** Marheinecke, 1992, p.26, pl.3, figs.6–7. Holotype: Marheinecke, 1992, pl.3, figs.6–7. Contrary to the opinion of Lentin and Williams (1993, p.616), Williams et al. (1998, p.579) considered this name to be validly published. Age: early Maastrichtian.

subsp. ***spinosus*** Jain, 1978, p.149, pl.1, fig.3. Holotype: Jain, 1978, pl.1, fig.3. Age: Maastrichtian.

subsp. ***ulcus*** Marheinecke, 1992, p.20, pl.2, fig.3. Holotype: Marheinecke, 1992, pl.2, fig.3. Contrary to the opinion of Lentin and Williams (1993, p.616), Williams et al. (1998, p.580) considered this name to be validly published. N.I.A. Age: early–late Maastrichtian.

"*ramuliferus*" (Deflandre, 1937b, p.74, pl.14 [al. pl.11], figs.5–6; pl.17 [al. pl.14], fig.10) Reid, 1974, p.608. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), fig.5; Fensome et al., 1991, fig.1 — p.721; fig.1 — p.725. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published, Appendix A), thirdly (and now) *Achomosphaera*, fourthly *Spiniferites*. Taxonomic junior synonym: *Hystrichosphaeridium rehdense*, according to Sarjeant (1983, p.97–99). Age: Late Cretaceous.

reductus Matsuoka and Bujak, 1988, p.82–83, pl.14, figs.4a–b,5. Holotype: Matsuoka and Bujak, 1988, pl.14, figs.4a–b. Age: late Oligocene–early Miocene.

?*reginaldii* (Mantell, 1844, p.240; text-fig.53, no.5) Mantell, 1854, p.91. Emendation: Sarjeant, 1967c, p.244–245, as *Hystrichosphaera reginaldii*. Holotype: Mantell, 1844, text-fig.53, no.5; Sarjeant, 1967c, figs.3A–B,4–5; Sarjeant, 1992a, figs.2,4a–b. Originally *Xanthidium* (Appendix A), subsequently (and now) *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Baltisphaeridium* (Appendix A), fifthly (and now) *Spiniferites*?. Questionable assignment: Stover and Evitt (1978, p.191) as a problematic species. Age: Late Cretaceous.

rhizophorus Head in Head and Westphal, 1999, p.15,17, fig.4, no.8; fig.6, nos.1–6. Holotype: Head and Westphal, 1999, fig.6, nos.1–4. Age: late early–late Pliocene.

ristingensis Head, 2007, p.1011–1012, figs.8.c–l. Holotype: Head, 2007, figs.8.c–g. Age: late Pleistocene (Eemian).

rubinus (Rossignol, 1962, p.134 ex Rossignol, 1964, p.87–88, pl.1, figs.12–13; pl.3, figs.22–23) Sarjeant, 1970, p.76. Holotype: Rossignol, 1964, pl.1, figs.12–13. Originally *Hystrichosphaeridium* (name not validly published), subsequently *Hystrichosphaera*, thirdly (and now) *Spiniferites*. The name *Hystrichosphaeridium rubinum* was not validly published in Rossignol (1962) since no illustration was provided. Age: Quaternary.

"*sagittarius*" Sütő-Szentai, 1990, p.848,851, pl.2, figs.3–4; text-figs.76a–c. **Name not validly published:** lodgement of holotype not specified (I.C.N. Article 40.7). Age: late Miocene.

"*sarmaticus*" Sütő-Szentai, 1984, p.70, pl.1, fig.1. **Name not validly published:** no description.

scabratus (Wall, 1967, p.102, pl.14, figs.10–13; text-fig.2) Sarjeant, 1970, p.76. Holotype: Wall, 1967, pl.14, figs.10–13; Harland, 1983, pl.45, fig.7. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. This is a cyst equivalent of *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). Age: Pleistocene–Holocene.

scabrosus (Clarke and Verdier, 1967, p.49–50, pl.9, figs.7–10; text-fig.21) Lentin and Williams, 1975, p.2155. Holotype: Clarke and Verdier, 1967, pl.9, fig.10. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. Harker and Sarjeant (1975, p.225) also proposed this combination. Age: Cenomanian–Santonian.

scalenus Guerstein et al., 2008, p.79, pl.2, figs.3–8; pl.3, figs.6–12. Holotype: Guerstein et al., 2008, pl.2, figs.3–4. Age: middle Eocene to earliest Oligocene.

seghiris (Below, 1982c, p.35–36, pl.8, figs.4a–b,5a–b) Lentin and Williams, 1993, p.616. Holotype: Below, 1982c, pl.8, figs.4a–b. Originally *Spiniferites multibrevis* subsp. *seghiris*, subsequently (and now) *Spiniferites seghiris*. Age: late Hauterivian.

"*septatus*" (Cookson and Eisenack, 1967b, p.253–254, pl.42, figs.6–10; text-fig.1) McLean, 1971, p.730. Emendation: McLean, 1971, p.730, as *Spiniferites septatus*. Holotype: Cookson and Eisenack, 1967b, pl.42, fig.6; Eisenack and Kjellström, 1975b, uppermost figure — p.984w; Fensome et al., 1996, fig.1 — p.2355. **NOW** *Hafniasphaera*. Originally *Baltisphaeridium* (Appendix A), subsequently *Spiniferites*, thirdly (and now) *Hafniasphaera*, fourthly *Achomosphaera*, fifthly *Rivernookia*. Age: late Paleocene.

septentrionalis Harland, 1977b, p.103–104, pl.1, figs.12–18; text-fig.4. Holotype: Harland, 1977b, pl.1, figs.17–18; Jan du Chêne and Londeix, 1988, pl.1, figs.10–12. Taxonomic senior synonym: *Achomosphaera andalousiensis*, according to Harland (1983, p.326) — however, Londeix et al. (2009, p.67–68) retained *Spiniferites septentrionalis*.

Head and Wrenn (1992, p.2) had earlier questioned the synonymy and Matsuoka in Head and Wrenn (1992, p.26) considered *Spiniferites aquilonius* to be a possible synonym of *Spiniferites septentrionalis*. Age: late Quaternary.

serratus Matsuoka, 1983b, p.135–136, pl.14, figs.1a–c,2a–c,3; text-figs.20A–B. Holotype: Matsuoka, 1983b, pl.14, figs.1a–c. Age: Pliocene or younger.

?*setosus* (Philippot, 1949, p.56; text-fig.1) Sarjeant, 1970, p.76–77. Holotype: Philippot, 1949, text-fig.1. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. Questionable assignment: Stover and Evitt (1978, p.191) as a problematic species. Age: Senonian.

"*solidago*" de Verteuil and Norris, 1996a, p.144,146,148, pl.10, figs.6–15; pl.11, figs.1–8. Holotype: de Verteuil and Norris, 1996a, pl.10, figs.6–7. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as *Spiniferites*, now *Achomosphaera*) *grallaeformis*, according to Strauss et al. (2001, p.412). N.I.A. Age: late Oligocene–late Miocene.

?*speciosus* (Deflandre, 1937b, p.65, pl.11 [al. pl.8], fig.2) Sarjeant, 1970, p.77. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), fig.2. Originally *Hystrichosphaera*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites?*. Questionable assignment: Stover and Evitt (1978, p.191). Age: Late Cretaceous.

speetonensis Duxbury, 1980, p.131–132, pl.11, figs.1–2,4. Holotype: Duxbury, 1980, pl.11, figs.1–2,4. Age: Barremian.

spinatus (Song Zhichen in Song Zhichen et al., 1985, p.43, pl.2, fig.5) Lentin and Williams, 1989, p.351. Holotype: Song Zhichen et al., 1985, pl.2, fig.5; He Chengquan et al., 2009, pl.133, fig.7. Originally *Spiniferites cingulatus* var. *spinatus*, subsequently (and now) *Spiniferites spinatus*. Age: early-middle Pleistocene.

splendidus Harland, 1979b, p.537, pl.3, figs.1–2. Holotype: Harland, 1979b, pl.3, figs.1–2. Age: late Miocene–early Pliocene.

spongiophragmatus Strauss et al., 2001, p.412–413, pl.4, fig.1: text-fig.4 (part). Holotype: Strauss et al., pl.4, fig.1. This name was not validly published in Strauss (1991b, p.67–68) and Rusbült and Strauss (1992, p.156, caption to fig.2) since these authors did not provide a description. Age: middle Miocene.

?*spongiosus* Duxbury, 2001, p.116–117, fig.15, nos.1–5. Holotype: Duxbury, 2001, fig.15, nos.1–2. Questionable assignment: Duxbury (2001, p.116). Age: early Valanginian.

spumeus Harding, 1990b, p.24, pl.6, figs.1–8 ex Harding in Williams et al. 1998, p.581. Holotype: Harding, 1990b, pl.6, fig.1. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Barremian.

strictus Matsuoka, 1983b, p.136–137, pl.12, figs.5a–b,6. Holotype: Matsuoka, 1983b, pl.12, figs.5a–b. Age: Pliocene or younger.

supparus (Drugg, 1967, p.24, pl.4, figs.5–6) Sarjeant, 1970, p.77. Holotype: Drugg, 1967, pl.4, fig.5. Originally *Hystrichosphaera*, subsequently (and now) *Spiniferites*. N.I.A. Age: Maastrichtian–Danian.

"*szarmaticus*" Sütő-Szentai, 1983, p.18, pl.2, fig.1. **Name not validly published:** no description.

tengelicensis Sütő-Szentai, 1982a, p.208–209,217–218, pl.1, fig.7; text-fig.1. Holotype: Sütő-Szentai, 1982a, pl.1, fig.7; text-fig.1. Age: late Miocene.

terminus Marheinecke, 1992, p.30–31, pl.4, figs.3,6. Holotype: Marheinecke, 1992, pl.4, figs.3,6. Contrary to the opinion of Lentin and Williams (1993, p.617), Williams et al. (1998, p.581) considered this name to be validly published. Age: early Maastrichtian.

"*tertiarius*" (Eisenack and Gocht, 1960, p.515; text-fig.4) Lentin and Williams, 1973, p.131. Holotype: Eisenack and Gocht, 1960, text-fig.4. Originally *Hystrichosphaera*, subsequently *Spiniferites*. **Taxonomic senior synonym:**

Hystrichokibotium (now *Spiniferites*) *pseudofurcatum*, according to Gocht (1969, p.32) and Sarjeant (1970, p.76). Age: Oligocene.

tianshanensis He Chengquan, 1991, p.154–155, pl.23, fig.5. Holotype: He Chengquan, 1991, pl.23, fig.5. Age: Paleocene.

tihanyensis Sütő-Szentai, 2000, p.162, pl.2, fig.1; pl.3, figs.1–2; text-figs.5a–b. Holotype: Sütő-Szentai, 2000, pl.3, fig.1; text-fig.5a. This name was not validly published in Sütő-Szentai (1988, p.350; 1991, p. 180, pl.A, figs.a–b) since no description was provided. Age: late Miocene.

?*trabeculiferus* (Deflandre and Cookson, 1955, p.269, pl.8, fig.6) Lentin and Williams, 1973, p.131. Holotype: Deflandre and Cookson, 1955, pl.8, fig.6. Originally *Hystrichokibotium*, subsequently *Spiniferites*, thirdly (and now) *Spiniferites*?. Questionable assignment: Stover and Evitt (1978, p.191). Age: middle Miocene.

?*tripodes* (Morzadec-Kerfourn, 1966, p.140–141, pl.3, figs.3–4) Lentin and Williams, 1973, p.131. Holotype: Morzadec-Kerfourn, 1966, pl.3, figs.3–4. Originally *Baltisphaeridium* (Appendix A), subsequently (and now) *Spiniferites*?. Questionable assignment: Lentin and Williams (1973, p.131). Age: Holocene.

tripus Singh, 1983, p.144–145, pl.51, figs.2–3. Holotype: Singh, 1983, pl.51, fig.2. Age: early Cenomanian.

twistringiensis (Maier, 1959, p.308–309, pl.30, figs.3–4) Fensome et al., 1990, p.639. Holotype: Maier, 1959, pl.30, fig.3; Sarjeant, 1983, pl.5, fig.3. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Areoligera*, fourthly (and now) *Spiniferites*. Taxonomic junior synonyms: (at specific rank) *Hystrichosphaera ramosa* var. *multibrevis* (subsequently *Spiniferites multibrevis*), according to Sarjeant (1983, p.94–95); *Achomosphaera* (al. *Spiniferites*) *cambra*, by implication in Jain (1982, p.51), who considered this species to be a taxonomic junior synonym of *Hystrichosphaera ramosa* var. *multibrevis* (as *Spiniferites ramosus* subsp. *multibrevis*). Following I.C.N. Article 55.1, the species name *Galea twistringiensis* is validly published even though the generic name *Galea* is illegitimate. According to Fensome et al. (1990, p.639): "Lentin and Williams (1985, p.140,333) and Lentin and Williams (1989, p.347) brought together the synonymies proposed by Jain (1982) and Sarjeant (1983), but also accepted the elevation of the variety (and later subspecies) '*multibrevis*' to specific rank as *Spiniferites multibrevis*. Lentin and Williams (1985,1989) considered the epithet '*multibrevis*' to be senior. Since the latter epithet was not raised to specific rank until Below (1982c, p.35) did so, the epithets '*twistringiensis*' (validly published in 1964) and '*cambrus*' (erected in 1970) are both senior to '*multibrevis*' at specific rank. Thus, following the synonymies cited above and considering this taxon at specific rank, the correct name is *Spiniferites twistringiensis* The specific epithet has commonly been misspelled '*twistringense*'." Age: middle Miocene.

validus Sütő-Szentai, 1982b, p.316–318, pl.6, figs.1–2. Holotype: Sütő-Szentai, 1982b, pl.6, figs.1–2. Age: late Miocene.

"subsp. *robustus*" Sütő-Szentai, 1983, p.18, pl.2, fig.8. **Name not validly published:** no description.

variabilis Beilstein, 1994, p.172–173, pl.26, figs.9–11; pl.36, fig.6. Holotype: Beilstein, 1994, pl.26, figs.9–10. Age: Campanian–Maastrichtian.

?*varmae* Lentin and Williams, 1973, p.131. Emendation: Matsuoka and Bujak, 1988, p.84–84, as *Spiniferites? varmae*. Holotype: Varma and Dangwal, 1964, pl.2, figs.7–8. Originally *Hystrichosphaera pseudofurcata*, subsequently *Spiniferites varmae*, thirdly (and now) *Spiniferites varmae*?. Questionable assignment: Stover and Evitt (1978, p.191) as a problematic species. Substitute name for *Hystrichosphaera pseudofurcata* Varma and Dangwal, 1964, p.66, pl.2, figs.7–8; the name *Spiniferites pseudofurcatus* is preoccupied. Age: Eocene–Oligocene.

"?*velatus*" (Clarke and Verdier, 1967, p.51–52, pl.10, figs.1–2; text-fig.22) Stover and Evitt, 1978, p.191. Holotype: Clarke and Verdier, 1967, pl.10, fig.2. **NOW** *Culversphaera*. Originally *Nematosphaeropsis*, subsequently *Spiniferites*?, thirdly (and now) *Culversphaera*. Questionable assignment: Stover and Evitt (1978, p.191). Age: Santonian.

virgulaeformis Sütő, 1994, p.457, pl.2, figs.a–c, text-fig.7 (al. pl.A), nos.2a–b. Holotype: Sütő, 1994, pl.2, figs.a–c. Age: late Miocene.

"*wetzelii*" (Deflandre, 1937b, p.65, pl.11 [al. pl.8], figs.6,8) Sarjeant, 1970, p.77. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), figs.6,8. **NOW** *Rottnestia*. Originally *Hystrichosphaera*, subsequently *Hystrichosphaeropsis* (combination not validly published), thirdly *Spiniferites*, fourthly (and now) *Rottnestia*. Taxonomic junior synonym: *Hystrichosphaeropsis forficata* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

"**SPINIFERITES** subgenus **HAFNIASPHAERA**" (Hansen, 1977, p.13–14) Quattrocchio and Sarjeant, 2003, p.;140. Emendation: Fensome et al., 2009, p.34, as *Hafniasphaera*. **NOW** *Hafniasphaera*. Originally (and now) *Hafniasphaera*, subsequently *Spiniferites* subgenus *Hafniasphaera*. Taxonomic senior synonym: *Spiniferites*, according to Stover and Williams (1987, p.117) — however, Edwards (1996, p.989) retained *Hafniasphaera*. Taxonomic junior synonym: *Rivernookia*, according to Lentin and Williams (1985, p.311). Fensome et al. (2009, p.34) retained *Hafniasphaera* at generic rank. Type: Hansen, 1977, fig.18A, as *Hafniasphaera hyalospinosa*.

"**SPINIFERITES** subgenus **SPINIFERITES**". Autonym. **Now redundant**. Type: Ehrenberg, 1837b, pl.1, fig.15, as *Xanthidium ramosum*, designated by Davey and Williams (1966a, p.32) as a lectotype of *Hystrichosphaera ramosa*.

SPINIFEROPSIS He Chengquan, 1984a, p.770,773–774. Type: He Chengquan, 1984a, pl.1, fig.1, as *Spiniferopsis granulata*.

**granulata* He Chengquan, 1984a, p.770, pl.1, fig.1. Holotype: He Chengquan, 1984a, pl.1, fig.1. Age: late Paleocene–middle Eocene.

"**SPONGIOSPHAERIDIUM**" Sütő-Szentai, 1995, p.53. **Name not validly published**: no description. This name was spelled "*Spongiosphaerodinium*" by Sütő-Szentai (1995, p.49).

"*pannonicum*" Sütő-Szentai, 1995, p.49. **Name not validly published**: no description or illustration.

SPONGODINIUM Deflandre, 1936b, p.169–170. Emendations: Stover and Evitt, 1978, p.191–192; Lucas-Clark, 1987, p.166. Type: Ehrenberg, 1837b, pl.1, fig.6, as *Peridinium delitiense*.

"*canadense*" Singh, 1983, p.141, pl.49, figs.1–3. Emendation: Lucas-Clark, 1987, p.164, as *Wigginsiella canadensis*. Holotype: Singh, 1983, pl.49, fig.1; Jan du Chêne et al., 1986a, pl.114, fig.3. **NOW** *Wigginsiella*. Originally *Spongodinium*, subsequently (and now) *Wigginsiella*. Age: early Cenomanian.

**delitiense* (Ehrenberg, 1837b, pl.1, figs.1,6) Deflandre, 1936b, p.170–171. Emendation: Lucas-Clark, 1987, p.167, as *Spongodinium delitiense*. Holotype: Ehrenberg, 1837b, pl.1, fig.6. Originally *Peridinium* (Appendix B), subsequently (and now) *Spongodinium*. Of the two illustrations provided by Ehrenberg (1837b), only his pl.1, fig.6 shows a single specimen, which can thus be accepted as the type. However, the validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous.

?*extremum* (Cookson and Eisenack, 1974, p.48, pl.20, fig.4) Lentin and Williams, 1976, p.40. Holotype: Cookson and Eisenack, 1974, pl.20, fig.4. Originally *Deflandrea*, subsequently (and now) *Spongodinium*?, thirdly *Isabelidinium*?. Questionable assignment: Lentin and Williams (1976, p.40). We here retain this species questionably in *Spongodinium* rather than *Isabelidinium* as it clearly has a precingular archeopyle. Age: Albian–Cenomanian.

reticulatum Hultberg, 1985b, p.62–63, pl.2, figs.3–4. Holotype: Hultberg, 1985b, pl.2, fig.3. Hultberg (1985c, p.150) also proposed this name. Age: early Danian.

?*solidum* Alberti, 1961, p.31–32, pl.3, figs.17–18. Holotype: Alberti, 1961, pl.3, fig.18. Questionable assignment: Alberti (1961, p.31). Age: late Barremian–late Aptian.

SPUMADINIUM Brinkhuis et al., 2000, p.103, 105. Type: Brinkhuis et al., 2000, pl.4, figs.10–12, as *Spumadinium felderorum*.

**felderorum* Brinkhuis et al., 2000, p.105,107, pl.4, figs.1–3,7–12; pl.5, figs.1–12; pl.6, figs.2–4; pl.7, fig.2; text-fig.3L. Holotype: Brinkhuis et al., 2000, pl.4, figs.10–12. Age: latest Maastrichtian–Danian.

irregulare Slimani and Louwye, 2013, p.15,18, pl.3, figs.1–12. Holotype: Slimani and Louwye, 2013, pl.3, figs.1–5. Age: early late Maastrichtian.

STANFORDELLA Helenes and Lucas-Clark, 1997, p.180,182. Taxonomic junior synonyms: *Dampierodinium* (name not validly published), by implication in Riding and Helby (2001g, p.212); *Farragodinium* (name not validly published) by implication in Riding and Helby (2001g, p.212). Type: Helenes and Lucas-Clark, 1997, pl.2, figs.1–2, as *Stanfordella granulosa*.

?*cretacea* (Neale and Sarjeant, 1962, p.441–443, pl.19, figs.1–2; text-figs.2a–b) Helenes and Lucas-Clark, 1997, p.186. Holotype: Neale and Sarjeant, 1962, pl.19, figs.1–2; text-figs.2a–b. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Stanfordella*?. Questionable assignment: Helenes and Lucas-Clark (1997, p.186). Age: Hauterivian.

exsanguia (Duxbury, 1977, p.35–36, pl.1, figs.6–7; text-fig.10) Helenes and Lucas-Clark, 1997, p.182. Emendation: Harding, 1990b, p.31–32, as *Gonyaulacysta exsanguia*. Holotype: Duxbury, 1977, pl.1, fig.6; text-fig.10b; Jan du Chêne et al., 1986a, pl.40, figs.1–3. Originally *Gonyaulacysta*, subsequently *Millioudodinium*?, thirdly (and now) *Stanfordella*. Age: Hauterivian–Barremian.

fastigiata (Duxbury, 1977, p.36–37, pl.1, figs.8–9,12; text-fig.11) Helenes and Lucas-Clark, 1997, p.183. Emendation: Helenes and Lucas-Clark, 1997, p.184, as *Stanfordella fastigiata*. Holotype: Duxbury, 1977, pl.1, figs.8,12; text-fig.11; Jan du Chêne et al., 1986a, pl.43, figs.1–6. Originally *Gonyaulacysta*, subsequently (and now) *Stanfordella*. Age: early Hauterivian–early Barremian.

**granulosa* Helenes and Lucas-Clark, 1997, p.182, pl.2, figs.1–8; text-figs.4A–D. Holotype: Helenes and Lucas-Clark, 1997, pl.2, figs.1–2. Taxonomic junior synonyms: *Dampierodinium ovum* and *Farragodinium curiosum* (both names not validly published), both according to Riding and Helby (2001g, p.212). Age: late Tithonian–Valanginian.

ordocava (Duxbury, 1977, p.37–38, pl.1, figs.10–11; text-fig.12) Helenes and Lucas-Clark, 1997, p.184. Holotype: Duxbury, 1977, pl.1, figs.10–11; text-fig.12; Jan du Chêne et al., 1986a, pl.41, figs.1–2. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Stanfordella*. Age: early–late Hauterivian.

STELLADINIUM Bradford, 1975, p.3065–3066. Originally (and now) *Stelladinium*, subsequently *Protoperidinium* subgenus *Archaeoperidinium* section *Stelladinium* (combination not validly published). Harland and Reid in Harland et al. (1980, p.222,224) considered *Stelladinium* Bradford, 1975 to be not validly published, since it lacked a Latin diagnosis. As noted by Fensome et al. (1991, p.477), this was not necessary since a Latin diagnosis is not required for fossil cysts. Type: Bradford, 1975, fig.2, as *Stelladinium reidii*.

abei Matsuoka, 1985a, p.59–60, pl.14, figs.7–10. Holotype: Matsuoka, 1985a, pl.14, figs.7–10. Age: Holocene.

subsp. *abei*. Autonym. Holotype: Matsuoka, 1985a, pl.14, figs.7–10.

subsp. *elegans* He Chengquan and Sun Xuekun, 1991, p.294–295, pl.3, fig.17. Holotype: He Chengquan and Sun Xuekun, 1991, pl.3, fig.17. Age: Quaternary.

reductum Bint, 1988, p.333,335, figs.2G–I,3. Holotype: Bint, 1988, fig.2G; Fensome et al., 1996, fig.1 — p.2323. Age: Holocene.

**reidii* Bradford, 1975, p.3065–3066, figs.2–4. Holotype: Bradford, 1975, fig.2; Fensome et al., 1995, fig.1 — p.1735. Motile equivalent: *Protoperidinium compressum* (Abé, 1927) Balech, 1974, according to Bradford and Wall (1984, p.47). Age: Holocene.

robustum Zonneveld, 1997, p.334–335, pl.4, figs.8–10. Holotype: Zonneveld, 1997, pl.4, fig.8. Age: Holocene.

"*stellatum*" (Wall in Wall and Dale, 1968c, p.275, pl.2, figs.13–15; pl.3, figs.16–21) Reid, 1977, p.443. Holotype: Wall and Dale, 1968c, pl.3, figs.16–21. **NOW** *Protoperidinium* (Appendix B). Originally *Peridinium*, subsequently *Stelladinium*, thirdly (and now) *Protoperidinium* (Appendix B). Taxonomic senior synonym: *Peridinium* (now *Protoperidinium compressum* Abé, 1927, according to Loeblich III (1970, p.895–896) and Head (1996b, p.1228) — however, Head in Rochon et al. (1999, p.48) retained *Peridinium* (as *Protoperidinium stellatum*). The holotype of this taxon is a motile dinoflagellate. Age: extant

STENODINIUM Williams et al., 2015, p.313–314. Type: Gocht, 1969, pl.10, fig.13, as *Wetzeliella meckelfeldensis*.

**meckelfeldense* (Gocht, 1969, p.15–16, pl.10, figs.12–15) Williams et al., 2015, p.314. Holotype: Gocht, 1969, pl.10, fig.13. Originally *Wetzeliella*, subsequently (and now) *Stenodinium*. Age: early Eocene.

STENOPYXINIUM Deflandre, 1968, p.424. Type: Deflandre, 1968, figs.1–3, as *Stenopyxinium grassei*.

**grassei* Deflandre, 1968, p.425–426, figs.1–6. Holotype: Deflandre, 1968, figs.1–3; Fensome et al., 1995, figs.1–3 — p.1533. Age: Senonian.

STEPHANELYTRON Sarjeant, 1961a, p.109. Emendations: Stover et al., 1977, p.331; Courtinat, 1999, p.177. Taxonomic junior synonym: *Lagenadinium*, according to Courtinat (1999, p.177). Type: Sarjeant, 1961a, pl.15, fig.11; text-fig.10, as *Stephanelytron redcliffense*.

brontes Courtinat, 1999, p.178, pl.1, figs.1–4; text-fig.2. Holotype: Courtinat, 1999, pl.1, fig.2. N.I.A. Age: late Callovian–early Oxfordian.

callovianum (Piel, 1985, p.108,110,112, pl.1, figs.1–9; pl.2, figs.1–8; pl.3, figs.1–5; text-figs.1a–d,2a–c,3 [part]) Courtinat, 1999, p.177. Holotype: Piel, 1985, pl.1, figs.1–6; Fensome et al., 1993a, figs.1–3 — p.1011. Originally *Lagenadinium*, subsequently (and now) *Stephanelytron*. Age: middle to late Callovian.

caytonense Sarjeant, 1961a, p.110, pl.15, fig.16; text-fig.11. Emendation: Stover et al., 1977, p.332. Holotype: Sarjeant, 1961a, pl.15, fig.16; text-fig.11. Age: early Oxfordian.

ceto Courtinat, 1999, p.179, pl.1, figs.10–12; text-fig.3. Holotype: Courtinat, 1999, pl.1, fig.11. N.I.A. Age: latest Callovian–early Oxfordian.

cretaceum Duxbury, 1983, p.56, pl.7, figs.5–6. Holotype: Duxbury, 1983, pl.7, figs.5–6; Fauconnier and Masure, 2004, pl.73, figs.1–2. Taxonomic senior synonym: *Chlamydophorella* (as *Lagenadinium*?, now *Stephanelytron membranoidea*, according to Heilmann-Clausen in Heilmann-Clausen and Thomsen (1995, p.301) — however, Courtinat (1999, p.178) retained *Stephanelytron cretaceum*. Age: Aptian.

membranoideum (Vozzhennikova, 1967, p.114–115, pl.48, figs.1–2,3a–b,4a–b,5–8,9a–c,10) Courtinat, 1999, p.178. Emendation: Lentin and Vozzhennikova, 1990, p.103, as *Lagenadinium? membranoideum*. Holotype: Vozzhennikova, 1967, pl.48, figs.9a–b; Lentin and Vozzhennikova, 1990, text-fig.58; lost according to Lentin and Vozzhennikova (1990, p.103). Lectotype: ?Vozzhennikova, 1967, pl.48, fig.6; Lentin and Vozzhennikova, 1990, pl.10, figs.6–7; designated by Lentin and Vozzhennikova (1990, p.103). Originally *Chlamydophorella*, subsequently *Chlamydophorella?*, thirdly *Lagenadinium?*, fourthly (and now) *Stephanelyton*. Taxonomic junior synonym: *Stephanelyton cretaceum*, according to Heilmann-Clausen in Heilmann-Clausen and Thomsen (1995, p.301) — however, Courtinat (1999, p.178) retained *Stephanelyton cretaceum*. Age: Late Jurassic.

***redcliffense** Sarjeant, 1961a, p.109–110, pl.15, fig.11; text-fig.10. Emendation: Stover et al., 1977, p.331–332; Fauconnier and Masure, 2004, pl.73, fig.3. Holotype: Sarjeant, 1961a, pl.15, fig.11; text-fig.10; Fensome et al., 1995, figs.1–4 — p.1731. Age: early Oxfordian.

scarburghense Sarjeant, 1961a, p.111, pl.15, figs.12–13. Emendation: Stover et al., 1977, p.333, as *Stephanelyton scarburghense*. Holotype: Sarjeant, 1961a, pl.15, figs.12–13; Fauconnier and Masure, 2004, pl.73, fig.4. Originally (and now) *Stephanelyton*, subsequently *Lagenadinium*. Riding (1987a, p.263) retained this species in *Stephanelyton*. Age: early Oxfordian.

tabulophorum Stover et al., 1977, p.333, pl.1, figs.12a–b,13a–c. Holotype: Stover et al., 1977, pl.1, figs.13a–c. Age: late Callovian.

STEPHODINIUM Deflandre, 1936a, p.58. Emendation: Davey, 1970, p.347. Type: Deflandre, 1936a, text-fig.104, as *Stephodium coronatum*.

australicum Cookson and Eisenack, 1962b, p.491, pl.2, figs.5–10. Holotype: Cookson and Eisenack, 1962b, pl.2, fig.8. Taxonomic senior synonym: *Stephodium coronatum*, according to Clarke and Verdier (1967, p.67) — however, Singh (1983, p.154–155) retained *Stephodium australicum*. Age: late Albian–Cenomanian.

***coronatum** Deflandre, 1936a, p.58; text-fig.104. Holotype: Deflandre, 1936a, text-fig.104. Taxonomic junior synonyms: *Stephodium australicum* and *Stephodium europaicum*, both according to Clarke and Verdier (1967, p.67) — however, Singh (1983, p.154–155) retained *Stephodium australicum*. Age: Senonian.

"**daveyi**" Below, 1982d, p.353–354,356, figs.28–37. Holotype: Below, 1982d, figs.32–34. **Taxonomic senior synonym:** *Stephodium dianneae*, according to Lister and Batten (1988b, p.40). Age: late Aptian.

dianneae Morgan, 1980, p.32, pl.27, figs.9–11; pl.28, figs.1–4. Holotype: Morgan, 1980, pl.28, figs.1–4. Taxonomic junior synonym: *Stephodium daveyi*, according to Lister and Batten (1988b, p.40). Age: Aptian–early Albian.

"**europaicum**" Cookson and Hughes, 1964, p.50, pl.8, figs.9–17. Holotype: Cookson and Hughes, 1964, pl.8, figs.9–12. **Taxonomic senior synonym:** *Stephodium coronatum*, according to Clarke and Verdier (1967, p.67). Age: late Albian.

?**parvum** de Coninck, 1986b, p.19, pl.9, figs.16–18,21–23. Holotype: de Coninck, 1986b, pl.9, figs.21–23. Questionable assignment: de Coninck (1986b, p.19). Age: middle Eocene–early Oligocene (Bartonian–Rupelian).

?**pellucidum** Deflandre, 1943, p.505,507; text-figs.12–16. Holotype: Deflandre, 1943, text-figs.12–13. Originally *Stephodium*, subsequently (and now) *Stephodium?*. Questionable assignment: Stover and Evitt (1978, p.193). Age: ?Senonian.

"**spiniferum**" Cookson and Eisenack, 1965a, p.124–125, pl.14, fig.10. Holotype: Cookson and Eisenack, 1965a, pl.14, fig.10. **NOW** *Thalassiphora?*. Originally *Stephodium*, subsequently (and now) *Thalassiphora?*. Age: late Eocene.

?*spinosum* Slimani, 1996, p.379–380, pl.1, figs.M–R ex Slimani, 2001b, p.8–9, pl.3, figs.12–17. Holotype: Slimani, 1996, pl.1, figs.M–N; Slimani, 2001b, pl.3, figs.12–13. Questionable assignment: Slimani (1996, p.379; 2001b, p.8). This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Age: early–late Campanian.

spinulosum Duxbury, 1983, p.57–58, pl.5, figs.6,10,14; text-figs.25–26. Holotype: Duxbury, 1983, pl.5, fig.6. Age: late Aptian–early Albian.

STICHODINIUM Williams et al., 2015, p.314. Emendation: Iakovleva, 2016, p.11 (on PDF initially published online). Type: He Chengquan and Wang Kede, 1990, pl.2, fig.3; text-fig.2, as *Wilsonidium subtile*.

elegantulum Iakovleva, 2016, p.11,18 (on PDF initially published online), pl.7, figs.3,6,9; text-fig.4b (part). Holotype: Iakovleva, 2016, pl.1, figs.4–5. Age: earliest Eocene.

galliciense Iakovleva, 2016, p.18 (on PDF initially published online), pl.1, figs.1–2,4–5,7–8; text-fig.4a (part). Holotype: Iakovleva, 2016, pl.7, figs.3,6. Age: earliest Eocene.

?*lineidentatum* (Deflandre and Cookson, 1955, p.253–254, pl.5, fig.5; text-figs.17–18) Williams et al., 2015, p.314. Holotype: Deflandre and Cookson, 1955, pl.5, fig.5. Originally *Wetzeliella*, subsequently *Wilsonidium*, thirdly (and now) *Stichodinium*? Questionable assignment: Williams et al. (2015, p.314). Age: Eocene.

parisiense Iakovleva, 2016, p.18 (on PDF initially published online), pl.3, figs.1–2,4–5,7–8,10–11; text-fig.4b (part). Holotype: Iakovleva, 2016, pl.3, figs.1–2. Age: earliest Eocene.

prostimum Iakovleva, 2016, p.18–19 (on PDF initially published online), pl.7, figs.7–8; text-fig.4b (part). Holotype: Iakovleva, 2016, pl.7, figs.7–8. Age: earliest Eocene.

**subtile* (He Chengquan and Wang Kede, 1990, p.418,424, pl.2, fig.3; text-fig.2) Williams et al., 2015, p.314. Holotype: He Chengquan and Wang Kede, 1990, pl.2, fig.3; text-fig.2. Originally *Wilsonidium*, subsequently (and now) *Stichodinium*. Age: late early Eocene.

sympagicum Iakovleva, 2016, p.19 (on PDF initially published online), pl.8, figs.1–12; text-fig.4c (part). Holotype: Iakovleva, 2016, pl.8, figs.10–11. Age: earliest Eocene.

STIPHROSPHAERIDIUM Davey, 1982b, p.16. Although the "type species" was not validly transferred by Davey (1982b, p.16,35), the generic name *Stiphrosphaeridium* was validly published by that author since it is based on a previously validly published species name (I.C.N. Article 40.3). Type: Cookson and Eisenack, 1958, pl.11, fig.14, as *Hystrichosphaeridium dictyophorum*.

anthophorum (Cookson and Eisenack, 1958, p.43, pl.11, figs.12–13; text-figs.16–18) Lentin and Williams, 1985, p.340. Holotype: Cookson and Eisenack, 1958, pl.11, fig.12; Fauconnier and Masure, 2004, pl.73, figs.5–6. Originally *Hystrichosphaeridium*, subsequently *Oligosphaeridium*, thirdly *Polystephanephorus*, fourthly (and now) *Stiphrosphaeridium*. Taxonomic junior synonym: *Hystrichosphaerina schindewolfii*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Hystrichosphaerina schindewolfii*. This combination was not validly published in Davey (1982b, p.18,35) since that author did not give a reference for Cookson and Eisenack (1958). Age: Aptian–Albian.

arbustum Davey, 1982b, p.17–18, pl.3, figs.1–4. Holotype: Davey, 1982b, pl.3, figs.1–2; Fauconnier and Masure, 2004, pl.73, figs.7–8. Age: late Ryazanian.

**dictyophorum* (Cookson and Eisenack, 1958, p.44, pl.11, fig.14) Lentin and Williams, 1985, p.340. Holotype: Cookson and Eisenack, 1958, pl.11, fig.14; Fensome et al., 1993a, fig.1 — p.1125. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Oligosphaeridium*, fourthly (and now)

Stiphrosphaeridium. This combination was not validly published in Davey (1982b, p.16,35) since that author did not give a reference for Cookson and Eisenack (1958). Age: Late Jurassic.

"*sarjeantii*" (Gitmez, 1970, p.291–292, pl.11, fig.4; text-fig.25) Courtinat, 1989, p.172. Holotype: Gitmez, 1970, pl.11, fig.4; text-fig.25; Fauconnier and Masure, 2004, pl.26, fig.7. **NOW** *Emmetrocyta*. Originally *Polystephanephorus*, subsequently (and now) *Emmetrocyta*, thirdly *Hystriosphera*, fourthly *Stiphrosphaeridium*. Age: early Kimmeridgian.

STOMIOSPHAERA Wanner, 1940, p.76. Emendation: Dufour, 1968, p.1947. Calcareous dinoflagellate genus, originally described as a foraminifer (see Elbrächter et al., 2008, p.1302). Taxonomic junior synonyms: *Orthopithonella*, by implication in Reháková and Michalík (1996, p.93), who believed *Stomiosphaera* to be the senior name — however, Streng et al. (2004, p.482) retained *Orthopithonella*; *Cadosina*, according to Bonet (1956, p.447–448) — however, I. Nagy (1966, p.87) proposed the retention of *Cadosina*. Fensome and Williams (2004) considered this genus to be not validly published because a type was not designated. However, Elbrächter et al. (2008, p.1298) implied that this generic name can be considered validly published as it was proposed under the I.C.Z.N. Thus, we have revised the status of the contained species as appropriate, as well as reconsidered the generic synonymies. Type: not designated; "type species" — *Stomiosphaera moluccana*.

?*acculeata* Vogler, 1941, p.284, pl.21, figs.66,69. Questionable assignment: Dufour (1968, p.1948). Age: Late Jurassic?–Neocomian?

alpina Leischner, 1959, p.870, text-fig.10b. Holotype: Leischner, 1959, text-fig.10b. Further information not available.

?*asadensis* Colom and Allard, 1958, p.31–32, fig.1 (21 unlabelled illustrations). Holotype: not designated. Questionable assignment: Dufour (1968, p.1948). Even though no holotype was designated, since this species was proposed under zoological nomenclature it can be accepted as validly published. Age: Pliensbachian.

"*betica*" Azéma, 1966, p.838–840, pl.1, figs.7–8; pl.2, fig.9. Holotype: information not available. **NOW** *Bonetocardiella*. Originally *Stomiosphaera*, subsequently (and now) *Bonetocardiella*. Age: information not available.

"*borzae*" (I. Nagy, 1966, p.92, pl.5, figs.15–16) Dufour, 1968, p.1947. Holotype: I. Nagy, 1966, pl.5, fig.15. **NOW** *Carpistomiosphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Carpistomiosphaera*. Dufour did not reference the basonym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Kimmeridgian.

"*cardiiformis*" Ayala Castañares and Seigle, 1962, p.16–17, pl.1, figs.1–5,7–9. Holotype: information not available. Originally *Stomiosphaera*, subsequently *Bonetocardiella*, thirdly *Conejoconus* (generic name illegitimate).

Taxonomic senior synonym: *Leptodermella* (now *Inocardion*) *maastrichtiensis* (Appendix A), according to Villain (1975, p.198). Taxonomic junior synonym: *Bonetocardiella conoidea*, according to Andri (1972, p.15) — however, the latter species has generally been retained as type of *Bonetocardiella*. Age: information not available.

"*carpathica*" Borza, 1964, p.191–192, pl.1, figs.3–4. Holotype: Borza, 1964, pl.1, fig.3. **NOW** *Colomisphaera*. Originally *Stomiosphaera*, subsequently (and now) *Colomisphaera*. Age: Kimmeridgian.

colomii Durand Delga, 1957, p.162–163, pl.1, fig.4. Holotype: Durand Delga, 1957, pl.1, fig.4. Age: Berriasian.

"*conoidea*" Bonet, 1956, p.454–456, pl.22, figs.1(part)–2; pl.27, fig.1(part). **NOW** *Bonetocardiella*. Originally *Stomiosphaera*, subsequently (and now) *Bonetocardiella*, thirdly *Conejoconus* (generic name illegitimate). Taxonomic senior synonym: *Stomiosphaera cardiiformis* according to Andri (1972, p.15) — however, the latter species is now considered a taxonomic junior synonym of *Leptodermella* (now *Inocardion*) *maastrichtiensis* and separate from *Stomiosphaera* (now *Bonetocardiella*) *conoidea*. Age: Middle Cretaceous.

"?*diffringens*" (de Lapparent, 1918, p.21–22 [name first used on p.22], pl.2, fig.1–part; pl.3, figs.1–part,2–part) Vogler, 1941, p.283. Holotype: not designated. **NOW** *Microconus*. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly (and now) *Microconus*. Questionable assignment: Dufour (1968, p.1948). In proposing this combination Vogler (1941, p.283) gave the citation "*Stomiosphaera* cf. *diffringens*". Age: Late Cretaceous? (according to Vogler, 1941, "Inhalt" and p.283).

echinata Nowak, 1968, p.294,296–298, pl.27, figs.1–2; text-fig.4, nos.1–21. Holotype: Nowak, 1968, pl.27, figs.1–2. Age: Hauterivian.

"*fibrata*" (I. Nagy, 1966, p.92–93,100, pl.5, figs.14,22) Dufour, 1968, p.1948. Holotype: I. Nagy, 1966, pl.5, fig.14. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Oxfordian.

"*fusca*" (Wanner, 1940, p.79–81, pl.1, figs.1–2 [parts]; pl.2, figs.3–5; text-figs.19–30) Dufour, 1968, p.1948. Holotype: not designated. **Combination not validly published**: not intended. **NOW** *Cadosina*. Originally (and now) *Cadosina*, subsequently *Stomiosphaera* (combination not validly published). This species is now retained as the type of *Cadosina*. See also *Stomiosphaera fusca* subsp. *misolensis*. Age: Late Jurassic?

"subsp. *misolensis*" (Vogler, 1941, p.281, pl.20, fig.7) Dufour, 1968, p.1948. Holotype: Vogler, 1941, pl.20, fig.7. **Combination not validly published**: specific combination not validly published. **NOW** *Cadosina fusca* subsp. *misolensis*. Originally (and now) *Cadosina fusca* subsp. *misolensis*, subsequently *Stomiosphaera fusca* subsp. *misolensis* (name not validly published). Age: Late Jurassic?–Neocomian?

"*heliosphaera*" (Vogler, 1941, p.281, pl.20, fig.6) Dufour, 1968, p.1948. Holotype: Vogler, 1941, pl.20, fig.6. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Neocomian? (Oxfordian–Berriasian according to I. Nagy, 1966, p.88).

"*lapidosa*" (Vogler, 1941, p.281, pl.21, fig.58) Dufour, 1968, p.1948. Holotype: Vogler, 1941, pl.21, fig.58. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Neocomian?

leporis Řehánek, 1984, p.182–184, pl.84, figs.1–8. Holotype: Řehánek, 1984, pl.84, figs.1–3. Age: Late Cretaceous.

"*malmica*" Borza, 1964, p.192, pl.1, figs.5–6. Holotype: Borza, 1964, pl.1, fig.5. **NOW** *Parastomiosphaera*. Originally *Stomiosphaera*, subsequently *Cadosina* (name not validly published), thirdly (and now) *Parastomiosphaera*. Age: Kimmeridgian.

"*minutissima*" (Colom, 1935, p.12, pl.2, fig.8; text-fig.4a [four specimens]) Durand Delga, 1957, p.161. Holotype: not designated. **NOW** *Colomisphaera*. Originally *Fibroaesphaerae* (generic name not validly published; Appendix A), subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*, fourthly *Schizosphaerella*. Age: Late Early Jurassic.

misolensis (Vogler, 1941, p.281, pl.20, figs.1b [indicated as 1a in plate caption],8) Dufour, 1968, p.1948. Holotype: not designated. Originally *Cadosina*, subsequently (and now) *Stomiosphaera*. Age: Late Jurassic?–Neocomian?

**moluccana* Wanner, 1940, p.76–78, pl.1, figs.1–2(parts); pl.2, figs.3–6 (parts); text-figs.1–18. Holotype: not designated. Age: Late Jurassic?

moretii Durand Delga, 1957, p.163, pl.1, fig.5. Holotype: Durand Delga, 1957, pl.1, fig.5. Age: Late Jurassic.

"?*orbularia*" (de Lapparent, 1918, p.20, pl.2, figs.1–part,2–part; pl.3, fig.2–part) Vogler, 1941, p.283. Holotype: not designated. **NOW** *Inocardion*. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly

Sphaerella (generic name illegitimate), fourthly *Stomiodinium?*, fifthly (and now) *Inocardion*. Questionable assignment: Dufour (1968, p.1948). Taxonomic senior synonym: *Lagena* (now *Pithonella*) *sphaerica*, according to Bonet (1956, p.450) — however, Masters and Scott (1978, p.215) retained this species as the type of *Inocardion*. In proposing this combination, Vogler (1941, p.283) gave the citation "*Stomiosphaera* cf. *orbularia*". Age: Late Cretaceous.

?*polygona* Vogler, 1941, p.283, pl.21, fig.61. Holotype: Vogler, 1941, pl.21, fig.61. Questionable assignment: Dufour (1968, p.1948). Age: Neocomian?

"*pulla*" Borza, 1964, p.192–193, pl.2, figs.1–2. Holotype: Borza, 1964, pl.2, fig.1. **NOW** *Colomisphaera*. Originally *Stomiosphaera*, subsequently *Cadosina*, thirdly (and now) *Colomisphaera*. Age: Kimmeridgian.

radiata (Vogler, 1941, p.281, pl.20, fig.1) Dufour, 1968, p.1948. Holotype: Vogler, 1941, pl.20, fig.1. Originally *Cadosina*, subsequently (and now) *Stomiosphaera*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Neocomian? (Kimmeridgian according to I. Nagy, 1966, p.88).

"*semiradiata*" (Wanner, 1940, p.81, text-figs.36–37) Dufour, 1968, p.1948. Holotype: not designated. **NOW** *Crustocadosina*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Crustocadosina*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Late Jurassic?

similis Bonet, 1956, p.453–454, text-figs.4A–C. Holotype: Bonet, 1956, text-figs.4A–C. Age: late Aptian?–early Albian.

"?*sphaerica*" (Kaufmann in Heer, 1865, p.196, figs.104, 106a–b) Bonet, 1956, p.450. Holotype: not designated. **NOW** *Pithonella*. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly *Palinosphaera* (generic name not validly published), fourthly (and now) *Pithonella*. Questionable assignment: Dufour (1968, p.1948). Taxonomic senior synonym: *Lagena* (now *Pithonella*) *ovalis*, according to Lorenz (1902, p.46) — however, Bonet (1956, p.450) retained *Lagena* (as *Stomiosphaera*) *sphaerica*. Taxonomic junior synonym: *Lagena orbularia* (Appendix A), according to Bonet (1956, p.450) — however, Masters and Scott (1978, p.215) retained the latter species as type of *Inocardion*. Age: late Cenomanian–Turonian (based on later studies by Bolli — P. Hochuli, personal communication).

?*spinosa* Vogler, 1941, p.284, pl.21, figs.60,65. Holotype : not designated. Questionable assignment: Dufour (1968, p.1948). Age: Early Cretaceous?

stephanoidea (Colom, 1935, p.12, text-fig.4b) Dufour, 1968, p.1948. Holotype: Colom, 1935, text-fig.4b. Originally *Fibrosphaera* (Appendix A), subsequently (and now) *Stomiosphaera*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Late Early Jurassic.

"*sublapidosa*" (Vogler, 1941, p.280–281, pl.20, fig.5) Dufour, 1968, p.1948. Holotype: Vogler, 1941, pl.20, fig.5. **NOW** *Committosphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Committosphaera*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Neocomian?

"*tenuis*" (I. Nagy, 1966, p.93, 100–101, pl.5, fig.18) Dufour, 1968, p.1948. Holotype: I. Nagy, 1966, pl.5, fig.18. **NOW** *Colomisphaera*. Originally *Cadosina*, subsequently *Stomiosphaera*, thirdly (and now) *Colomisphaera*. Dufour did not reference the basionym when proposing this combination, but this was not a requirement since he was using zoological nomenclature. Age: Oxfordian.

wanneri Borza, 1969, p.62, pl.61, figs.4–13. Taxonomic junior synonym: *Orthopithonella congruens*, according to Reháková and Michalík (1996, p.93) — however, Streng et al. (2004, p.482) retained the latter species separately. Further information not available.

STOMIOSPHAERINA Nowak, 1974, p.53. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1302). Type: Nowak, 1974, pl.1, figs.1–2, as *Stomiosphaerina biedae*.

**biedae* Nowak, 1974, p.53–56, pl.1, figs.1–4; pl.2, figs.3–4; pl.3, figs.1–4; pl.5, figs.1–4; text-fig.2. Holotype: Nowak, 1974, pl.1, figs.1–2. Age: Turonian–?Santonian.

proxima Řehánek, 1987b, p.696–700, pl.1, figs.1–8. Holotype: Řehánek, 1987b, pl.1, figs.1,3,5. Age: early Berriasian.

"**STOMODINIUM**" He Chengquan, 1984a, p.770,774. **Taxonomic senior synonym:** *Xenicodinium*, according to Chen et al. (1988, p.31). Type: He Chengquan, 1984a, pl.1, fig.12, as *Stomodinium crassum*.

crassum* He Chengquan, 1984a, p.770–771, pl.1, figs.12–14; text-fig.2. Holotype: He Chengquan, 1984a, pl.1, fig.12. **NOW *Xenicodinium*. Originally *Stomodinium*, subsequently (and now) *Xenicodinium*. Age: early-middle Eocene.

suturispinosum He Chengquan, 1991, p.120, pl.13, fig.8. Holotype: He Chengquan, 1991, pl.13, fig.8. **NOW** *Xenicodinium*. Originally *Stomodinium*, subsequently (and now) *Xenicodinium*. Age: early Eocene.

verrucosum He Chengquan, 1991, p.119–120, pl.13, figs.1,7; text-fig.18. Holotype: He Chengquan, 1991, pl.13, fig.7, text-fig.18. **NOW** *Xenicodinium*. Originally *Stomodinium*, subsequently (and now) *Xenicodinium*. Age: middle Eocene.

STOVERACYSTA Clowes, 1985, p.29–30. Type: Clowes, 1985, pl.1, figs.1–3, as *Stoveracysta kakanuiensis*.

conerae Biffi and Manum, 1988, p.192,194, pl.6, figs.10–18. Holotype: Biffi and Manum, 1988, pl.6, figs.10–11. Age: early Miocene.

**kakanuiensis* Clowes, 1985, p.32,34, pl.1, figs.1–12; pl.2, figs.1–12; text-figs.4a–b. Holotype: Clowes, 1985, pl.1, figs.1–3; Fensome et al., 1996, figs.1–3 — p.2175. Age: early Oligocene.

ornata (Cookson and Eisenack, 1965a, p.124, pl.13, figs.1–8) Clowes, 1985, p.34. Holotype: Cookson and Eisenack, 1965a, pl.13, figs.1–2. Originally *Eisenackia*, subsequently *Alisocysta*, thirdly (and now) *Stoveracysta*. Age: late Eocene.

STRIATODINIUM Riding and Helby, 2001f, p.166,168. Type: Riding and Helby, 2001f, figs.15O–P, as *Striatodinium ottii*.

lineatum Riding and Helby, 2001f, p.168,170, figs.14A–P. Holotype: Riding and Helby, 2001f, figs.14A–B. Age: Oxfordian–earliest Kimmeridgian.

**ottii* Riding and Helby, 2001f, p.170–171, figs.15A–P. Holotype: Riding and Helby, 2001f, figs.15O–P. Taxonomic junior synonym: *Dictyopyxis elliptica* (name not validly published), according to Riding and Helby (2001f, p.170). Age: Oxfordian–earliest Kimmeridgian.

STROMAPHORA Xu Jinli et al., 1997, p.123,155. Type: Xu Jinli et al., 1997, pl.8, fig.10; text-fig.15, as *Stromaphora caudata*.

**caudata* Xu Jinli et al., 1997, p.123–124,155–156, pl.8, figs.9–11; text-fig.15. Holotype: Xu Jinli et al., 1997, pl.8, fig.10; text-fig.15. Age: middle-late Eocene.

ovata Xu Jinli et al., 1997, p.124, pl.8, figs.1–2,5–8; pl.23, fig.15 ex He Chengquan et al., 2009, p.372,672. Holotype: Xu Jinli et al., 1997, pl.8, fig.1. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.672) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

rotunda Xu Jinli et al., 1997, p.125, pl.8, figs.3–4 ex He Chengquan et al., 2009, p.372,673. Holotype: Xu Jinli et al., 1997, pl.8, fig.3. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.673) validated the name by publishing an English diagnosis. Age: middle-late Eocene.

"**SUBATHUA**" Khanna and Singh, 1980, p.307–308. **Taxonomic senior synonym:** *Thalassiphora*, according to Lentin and Williams (1985, p.340; 1989, p.354). Taxonomic senior synonym: *Disphaeria*, by implication in Sarkar and Singh (1988, p.41), who transferred the "type species" of *Subathua*, *Subathua sahnii*, to *Disphaeria*. Type: Khanna and Singh, 1980, pl.1, fig.2, as *Subathua sahnii*.

"**balcanica**" (Balteş, 1971, p.6, pl.3, figs.3–7) Khanna and Singh, 1980, p.308 and 1981b, p.394. Holotype: Balteş, 1971, pl.3, figs.3–7. **Combination not validly published:** basionym not fully referenced. **NOW** *Thalassiphora*. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*, thirdly *Subathua* (combination not validly published), fourthly *Spiniferites*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Stover and Evitt (1978, p.194) — however, Sütő-Szentai (2000, p.162) retained *Thalassiphora* (as *Spiniferites*) *balcanica*. Age: early Pliocene.

"**sahnii**" Khanna and Singh, 1980, p.308–309, pl.1, figs.1–3,5–9; text-figs.1–2. Emendation: Sarkar and Singh, 1988, p.41, as *Disphaeria sahnii*. Holotype: Khanna and Singh, 1980, pl.1, fig.2; Fensome et al., 1995, fig.2 — p.1759. Originally *Subathua*, subsequently *Disphaeria*. **Taxonomic senior synonym:** *Adnatosphaeridium* (as and now *Thalassiphora*) *patulum*, according to Stover and Williams (1987, p.207) and Lentin and Williams (1989, p.354). Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Lentin and Williams (1985, p.340). This name was not validly published in Singh et al. (1979, p.35–36,46: caption to pl.2, fig.4) and Khanna (1979, p.217) since no description was provided. Age: Eocene.

"**spinosa**" Khanna and Singh, 1980, p.309, pl.1, figs.10–12; text-fig.3. Holotype: Khanna and Singh, 1980, pl.1, fig.10. **NOW** *Thalassiphora simlaensis*. Originally *Subathua spinosa*, subsequently *Thalassiphora spinosa* (combination illegitimate), thirdly (and now) *Thalassiphora simlaensis*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Lentin and Williams (1985, p.340) — however, Stover and Williams (1987, p.207) retained *Subathua* (as *Thalassiphora*) *spinosa* (now *Thalassiphora simlaensis*). Nomenclatural junior synonym: *Muratodinium subathuensis*, since in proposing this species Sarkar (2012, p.174) included the holotype of *Thalassiphora simlaensis* (= *Subathua spinosa*) in synonymy with *Muratodinium subathuensis*. Age: Eocene.

SUBTILIDINIUM Morgenroth, 1968, p.539. Taxonomic senior synonym: *Phanerodinium*, according to Below (1987b, p.36) — however, Lentin and Williams (1989, p.354,622) retained *Subtilidinium*. Type: Morgenroth, 1968, pl.42, figs.8–9, as *Subtilidinium minutum*.

***minutum** Morgenroth, 1968, p.539–540, pl.42, figs.8–9; pl.43, figs.1–2; text-figs.3–4. Holotype: Morgenroth, 1968, pl.42, figs.8–9. Originally (and now) *Subtilidinium*, subsequently *Phanerodinium*. Lentin and Williams (1989, p.355) retained this species in *Subtilidinium*. Age: Danian.

SUBTILISPHAERA Jain and Millepied, 1973, p.26–27. Emendation: Lentin and Williams, 1976, p.117–119. Type: Jain and Millepied, 1973, pl.3, fig.31, as *Subtilisphaera senegalensis*.

"**asymmetrica**" (Davey and Verdier, 1971, p.39–40, pl.2, figs.4,6) Lentin and Williams, 1976, p.119. Holotype: Davey and Verdier, 1971, pl.2, fig.6. **Name illegitimate: nomenclatural senior synonym:** *Deflandrea* (now *Subtilisphaera*) *deformans*, which has the same type. **NOW** *Subtilisphaera deformans*. Originally *Deflandrea*

asymmetrica (name illegitimate), subsequently *Deflandrea deformans*, thirdly *Deflandrea daveyi* (name illegitimate), fourthly *Subtilisphaera asymmetrica* (name illegitimate), fifthly (and now) *Subtilisphaera deformans*. Age: middle Albian.

balcattensis (Cookson and Eisenack, 1969, p.3,5, figs.1B–F) Lentin and Williams, 1976, p.119. Holotype: Cookson and Eisenack, 1969, fig.1B. Originally *Deflandrea*, subsequently (and now) *Subtilisphaera*. Age: Albian–Cenomanian.

"***cheit***" Below, 1981a, p.126–127, pl.9, figs.23–24; text-fig.85. Holotype: Below, 1981a, pl.9, fig.23; Fensome et al., 1991, fig.1 — p.611. **NOW** *Palaeohystrichophora*. Originally *Subtilisphaera*, subsequently (and now) *Palaeohystrichophora* Age: Aptian–Vraconian.

"***chichalii***" Beju, 1978, p.4. **Name not validly published**: no description or illustration.

cinctuta Roncaglia and Corradini, 1997, p.189,192, pl.5, figs.7–8. Holotype: Roncaglia and Corradini, 1997, pl.5, fig.7. Age: middle Maastrichtian.

circularis He Chengquan in Zheng Yahui and He Chengquan, 1984, p.101, pl.6, figs.10–17. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.12. Age: Late Cretaceous.

crassigranulosa Jain and Millepied, 1973, p.28, pl.2, fig.25. Holotype: Jain and Millepied, 1973, pl.2, fig.25 (centre of plate). This name was listed incorrectly as invalid in Fensome and Williams (2004, p.637). Age: Aptian.

"***cretacea***" (Pocock, 1962, p.80, pl.14, figs.219–221 ex Davey, 1970, p.359) Jain and Millepied, 1973, p.27. Emendation: Harding, 1990a, p.44, as *Palaeoperidinium cretaceum*. Holotype: Pocock, 1962, pl.14, fig.219. **NOW** *Palaeoperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Astrocysta*, thirdly *Lejeunia?* (combination illegitimate), fourthly *Subtilisphaera*, fifthly (and now) *Palaeoperidinium*. Taxonomic junior synonyms: *Lejeunia* (as *Palaeoperidinium*) *ampla*, according to Harker and Sarjeant in Harker et al. (1990, p.128); *Astrocysta* (as *Palaeoperidinium*) *manumcooksonii*, according to Lentin and Williams (1976, p.110). Age: Aptian–Albian.

deformans (Davey and Verdier, 1973, p.197) Stover and Evitt, 1978, p.238. Holotype: Davey and Verdier, 1971, pl.2, fig.6. Originally *Deflandrea asymmetrica* (name illegitimate), subsequently *Deflandrea deformans*, thirdly *Deflandrea daveyi* (name illegitimate), fourthly *Subtilisphaera asymmetrica* (name illegitimate), fifthly (and now) *Subtilisphaera deformans*. *Deflandrea deformans* is the substitute name for *Deflandrea asymmetrica* Davey and Verdier, 1971, p.39–40, pl.2, figs.4,6 (an illegitimate name). Age: middle Albian.

dongyingensis (Jiabo, 1978, p.82, pl.4, figs.6–9; pl.5, figs.1–6) Song Zhichen and He Chengquan, 1982, p.735. Holotype: Jiabo, 1978, pl.4, fig.6. Originally *Deflandrea*, subsequently (and now) *Subtilisphaera*. Age: Early Tertiary.

elongata He Chengquan in Zheng Yahui and He Chengquan, 1984, p.101–102, pl.6, fig.26; text-fig.1. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.26; text-fig.1. Age: Late Cretaceous.

"***euthema***" (Davey and Verdier, 1971, p.40, pl.3, figs.1–3) Lentin and Williams, 1976, p.119. Holotype: Davey and Verdier, 1971, pl.3, fig.2. **NOW** *Eurydinium*. Originally *Deflandrea*, subsequently *Subtilisphaera?*, thirdly (and now) *Eurydinium*. Questionable assignment: Lentin and Williams (1976, p.119). Age: middle-late Albian.

foliacea (Eisenack and Cookson, 1960, p.2, pl.1, fig.3) Stover and Evitt, 1978, p.239. Holotype: Eisenack and Cookson, 1960, pl.1, fig.3. Originally *Deflandrea*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Subtilisphaera*. Age: Turonian–mid Senonian.

"***guarujaensis***" Masare and Arai, 2003, p.62, pl.1, figs.4–8. Holotype: Masare and Arai, 2003, pl.1, figs.4–7. **Name not validly published**: no English or Latin description. Age: Albian.

?habibii Masure, 1988b, p.129, pl.5, figs.2A–B,3A–B,12; text-fig.6, nos.1–2. Holotype: Masure, 1988b, pl.5, figs.2A–B. Questionable assignment: Masure (1988b, p.129). Age: late Albian–middle Cenomanian.

hagnii Kirsch, 1993, p.50,52, pl.3, figs.1–6; text-figs.5a–d. Holotype: Kirsch, 1993, pl.3, figs.1–2. Age: Barremian.

hyalina Singh, 1983, p.161–162, pl.60, figs.3–9. Holotype: Singh, 1983, pl.60, fig.3. Age: middle Cenomanian.

"inaffecta" (Drugg, 1978, p.68, pl.3, figs.10–12) Bujak and Davies, 1983, p.163. Holotype: Drugg, 1978, pl.3, fig.10. **NOW** *Corculodinium*. Originally *Geiselodinium*, subsequently *Subtilisphaera*, thirdly *Subtilisphaera?*, fourthly (and now) *Corculodinium*. Questionable assignment: Lentin and Williams (1985, p.341). Taxonomic junior synonym: *Geiselodinium paeminosum*, according to Courtinat (2000, p.173). Age: early Kimmeridgian.

kalaallitii Nøhr-Hansen, 1993, p.114, pl.26, figs.1–5. Holotype: Nøhr-Hansen, 1993, pl.26, figs.1–2. Age: late Albian.

"ovata" (Jiabo, 1978, p.84, pl.4, figs.1–3) Song Zhichen and He Chengquan, 1982, p.735. Emendation: Mao Shaozhi et al., 1995, p.51, as *Sanshuia ovata*. Holotype: Jiabo, 1978, pl.4, fig.2. **NOW** *Sanshuia*. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Sanshuia*, fourthly *Geiselodinium*, fifthly *Saepodinium*. Age: Early Tertiary.

"paeminosa" (Drugg, 1978, p.68–69, pl.3, figs.5–9) Bujak and Davies, 1983, p.163. Holotype: Drugg, 1978, pl.3, fig.8. Originally *Geiselodinium*, subsequently *Subtilisphaera*, thirdly *Subtilisphaera?*. Questionable assignment: Lentin and Williams (1985, p.342). **Taxonomic senior synonym:** *Geiselodinium* (now *Corculodinium*) *inaffectum*, according to Courtinat (2000, p.173). Age: middle Kimmeridgian.

perlucida (Alberti, 1959b, p.102, pl.9, figs.16–17) Jain and Millepied, 1973, p.27. Holotype: Alberti, 1959b, pl.9, fig.16. Originally *Deflandrea*, subsequently (and now) *Subtilisphaera*. Taxonomic junior synonyms: *Deflandrea* (as *Subtilisphaera*) *pirnaensis*, according to Fensome et al. (2009, p.60); and by implication *Scriniodinium cooksoniae*, which Sarjeant and Anderson (1969, p.32–33) considered to be a taxonomic junior synonym of *Deflandrea* (subsequently *Subtilisphaera*) *pirnaensis*; *Deflandrea* (now *Subtilisphaera*) *rotundata*, according to Davey (1974, p.65) — however, Lentin and Williams (1976, p.119) retained *Deflandrea* (as and now *Subtilisphaera*) *rotundata*. Age: late Barremian.

"pirnaensis" (Alberti, 1959b, p.100, pl.8, figs.1,5) Jain and Millepied, 1973, p.27. Holotype: Alberti, 1959b, pl.8, fig.1. **Taxonomic senior synonym:** *Subtilisphaera perlucida*, according to Fensome et al., 2009, p.60. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly *Subtilisphaera?* Questionable assignment: Harker and Sarjeant in Harker et al. (1990, p.133). Taxonomic junior synonym: *Scriniodinium cooksoniae*, according to Sarjeant and Anderson (1969, p.232–233). Lentin and Williams (1976, p.118) stated " *S. pirnaensis* ' is transferred to *Alterbia* ..."; however, they did not effect this change. Age: ?middle Turonian.

pontis-mariae (Deflandre, 1936b, p.167, pl.2, figs.7–9) Lentin and Williams, 1976, p.119. Holotype: Deflandre, 1936b, pl.2, fig.7. Originally *Gymnodinium* (Appendix B), subsequently *Deflandrea*, thirdly *Ascodinium*, fourthly (and now) *Subtilisphaera*. Age: ?Senonian.

puyangensis (Jin Guangxing, He Chengquan and Zhu Shenzhao in He Chengquan et al., 1989, p.37–38, pl.3, fig.7; text-fig.1) Williams et al., 1998, p.590. Holotype: He Chengquan et al., 1989, pl.3, fig.7; text-fig.1. Originally *Alterbia* (generic name illegitimate), subsequently *Alterbidinium*, thirdly (and now) *Subtilisphaera*. Mao Shaozhi et al. (1995, p.99) implied that this name should be restricted to the holotype. Age: Early Tertiary.

rotundata (Eisenack and Cookson, 1960, p.2, pl.1, figs.1–2) Jain and Millepied, 1973, p.27. Holotype: Eisenack and Cookson, 1960, pl.1, fig.1. Originally *Deflandrea*, subsequently *Subtilisphaera*. Taxonomic senior synonym: *Deflandrea* (as and now *Subtilisphaera*) *perlucida*, according to Davey (1974, p.65) — however, Lentin and Williams (1976, p.119) retained *Subtilisphaera rotundata*. Age: Albian.

scabrata Jain and Millepied, 1973, p.28, pl.3, figs.36–39. Holotype: Jain and Millepied, 1973, pl.3, fig.39. Age: Aptian.

scabrella He Chengquan in Zheng Yahui and He Chengquan, 1984, p.102, pl.6, figs.23–25. Holotype: Zheng Yahui and He Chengquan, 1984, pl.6, fig.25. Age: Late Cretaceous.

**senegalensis* Jain and Millepied, 1973, p.27–28, pl.3, figs.31–33. Holotype: Jain and Millepied, 1973, pl.3, fig.31; Fensome et al., 1995, fig.1 — p.1777. Age: Aptian.

"*sverdrupiana*" (Manum, 1963, p.59–60, pl.2, figs.6–15; text-fig.3) Jain and Millepied, 1973, p.27. Emendation: Lebedeva in Ilyina et al., 1994, p.64, as *Spinidinium sverdrupianum*. Holotype: Manum, 1963, pl.2, figs.12–13. **NOW** *Spinidinium*. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Subtilisphaera*, fourthly *Cooksoniella* (combination not validly published). Lentin and Williams (1976, p.118) stated " '*S. sverdrupiana*' [is transferred] to *Palaeoperidinium* ..."; however, they did effect this change. Age: Cenomanian.

terrula (Davey, 1974, p.65, pl.8, figs.4–5) Lentin and Williams, 1976, p.119. Emendation: Harding, 1986a, p.101–102,104, as *Subtilisphaera terrula*. Holotype: Davey, 1974, pl.8, fig.4. Originally *Deflandrea*, subsequently *Subtilisphaera*?, thirdly (and now) *Subtilisphaera*. Questionable assignment: Lentin and Williams (1976, p.119) — however, Harding (1986a, p.101) included the species in *Subtilisphaera* without question. N.I.A. Age: middle Barremian.

"?*trendallii*" (Cookson and Eisenack, 1970a, p.145–146, pl.12, figs.5–6) Lentin and Williams, 1976, p.120. Emendation: Pavlishina, 1995, p.138–139, as *Trithyrodinium trendallii*. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.5. **NOW** *Trithyrodinium*. Originally *Ascodinium*?, subsequently *Subtilisphaera*?, thirdly (and now) *Trithyrodinium*. Questionable assignment: Lentin and Williams (1976, p.120). Age: Albian–Cenomanian.

"*ventriosa*" (Alberti, 1959b, p.101, pl.9, figs.14–15) Jain and Millepied, 1973, p.27. Holotype: Alberti, 1959b, pl.9, fig.14; Eisenack and Klement, 1964, p.239; Fensome et al., 1995, fig.1 — p.1895. **NOW** *Cepadinium*. Originally *Deflandrea*, subsequently *Subtilisphaera*, thirdly (and now) *Cepadinium*. Taxonomic junior synonym: *Cepadinium variabile*, by implication in Lister and Batten (1988b, p.43), who considered *Cepadinium variabile* to be the senior name. Age: early Aptian.

zawia Below, 1981a, p.128–129, pl.9, figs.21–22; text-fig.82. Holotype: Below, 1981a, pl.9, fig.21; Fensome et al., 1991, fig.1 — p.777. N.I.A. Age: Albian.

SUCCINIPERIDINIUM Measure et al., 2013, p.141. Fossil motile dinoflagellate preserved in amber. Type: Measure et al., 2013, pl.3, fig.A, as *Succiniperidinium inopinatum*.

**inopinatum* Measure et al., 2013, p.141–142, pl.1, figs.A–F, pl.2, figs.A–D; pl.3, figs.A–C; pl.4, figs.A–D; pl.5, figs.A–C; pl.6, figs.A–C; pl.7, figs.A–B; text-fig.2. Holotype: Measure et al., pl.3, fig.A. Age: late Albian–earliest Cenomanian.

SUESSIA Morbey, 1975, p.38. Emendation: Below, 1987a, p.87. Nomenclatural junior synonym: *Baserus*, which has the same type. In proposing the name *Baserus*, Özdikmen (2009, p.237) considered *Suessia* Morbey to be illegitimate because it is a junior homonym of *Suessia* Deslongchamps 1855; however, *Suessia* Deslongchamps is an animal and under the I.C.N. it does not pre-empt *Suessia* Morbey. Type: Morbey, 1975, pl.14, fig.5; pl.17, fig.4; text-figs.12a–c, as *Suessia swabiana*.

"*listeri*" Stover and Helby, 1987a, p.121–122,124, figs.21A–C,22A–D,23A–L. Emendation: Below, 1987a, p.77,80, as *Wanneria listeri*. Holotype: Stover and Helby, 1987a, figs.22A–D; Fensome et al., 1996, figs.1–4 — p.2195. **NOW** *Wanneria*. Originally *Suessia*, subsequently (and now) *Wanneria*. Age: Norian.

**swabiana* Morbey, 1975, p.39–40, pl.14, figs.5–11; pl.17, figs.4–9; text-figs.12a–c,13a–c,14a–b,15. Emendation: Below, 1987a, p.94–96. Originally (and now) *Suessia*, subsequently *Baserus* (generic name illegitimate). Holotype: Morbey, 1975, pl.14, fig.5; pl.17, fig.4; text-figs.12a–c; Fensome et al., 1995, figs.1,7–9 — p.1819. Below (1987a,

p.94) considered *Rhombodella* (now *Heibergella*) *kendelbachia* to be a questionable junior synonym of this species. Age: Rhaetian.

SUIBINDIA Yu Jingxian, 1982, p.258–259,262. Type: Yu Jingxian, 1982, pl.8, fig.12, as *Suibindia punctata*.

ovata Yu Jingxian, 1982, p.259, pl.8, figs.25–26. Holotype: Yu Jingxian, 1982, pl.8, fig.26. Age: Late Jurassic–Early Cretaceous.

**punctata* Yu Jingxian, 1982, p.259, pl.8, figs.12,23. Holotype: Yu Jingxian, 1982, pl.8, fig.12. Age: Late Jurassic–Early Cretaceous.

SUMATRADINIUM Lentin and Williams, 1976, p.77–78. Emendation: Lentin et al., 1994, p.570. Matsuoka (1992, p.451) considered *Xandarodinium* to be a possible taxonomic junior synonym of this genus. Type: Drugg, 1970a, fig.12, as *Xenicodinium hispidum*.

"*cephalum*" (Kar, 1979, p.34, pl.4, figs.66a–b,67) Jain, 1980, p.141. Holotype: Kar, 1979, pl.4, figs.66a–b. Originally *Polysphaeridium*, subsequently *Sumatradinium*, thirdly *Batiacasphaera*?. **Taxonomic senior synonym:** *Operculodinium placitum*, according to Jain and Garg (1991, p.81). N.I.A. Age: Oligocene.

"*delectabile*" de Verteuil and Norris, 1992, p.401–402, pl.9, figs.2–6; text-fig.7. Holotype: de Verteuil and Norris, 1992, pl.9, figs.3–4. **NOW** *Erymnodinium*. Originally *Sumatradinium*, subsequently (and now) *Erymnodinium*. Questionable assignment: de Verteuil and Norris (1992, p.401). Age: late Miocene.

druggii Lentin et al., 1994, p.574–575, pl.1, figs.4–7; Fig.3A. Holotype: Lentin et al., 1994, pl.1, fig.4. Age: Burdigalian–?Pliocene.

hamulatum de Verteuil and Norris, 1996a, p.152–153, pl.16, figs.1–8. Holotype: de Verteuil and Norris, 1996a, pl.16, figs.2–5. Age: early Miocene.

**hispidum* (Drugg, 1970a, p.120–121, figs.12–14 [not fig.15]) Lentin and Williams, 1976, p.77. Emendation: Lentin et al., 1994, p.571, as *Sumatradinium hispidum*. Holotype: Drugg, 1970a, fig.12; Lentin et al., 1994, pl.1, fig.1; Fensome et al., 1995, fig.1 — p.1545. Originally *Xenicodinium*, subsequently (and now) *Sumatradinium*. Age: middle Miocene–Pliocene.

"*pliocenicum*" Head, 1993, p.40–41, fig.22, nos.5–14; fig.23. Emendation: De Schepper et al., 2004, p.634, as *Barssidinium pliocenicum*. Holotype: Head, 1993, fig.22, no.11; De Schepper et al., 2004, fig.10.7–9. **NOW** *Barssidinium*. Originally *Sumatradinium*, subsequently (and now) *Barssidinium*. Taxonomic junior synonym: *Barssidinium wrennii*, according to De Schepper et al. (2004, p.634). Age: latest Pliocene.

pustulosum Lentin et al., 1994, p.575, pl.1, fig.12; Fig.3F. Holotype: Lentin et al., 1994, pl.1, fig.12. Age: Serravallian–Tortonian.

soucouyantiae de Verteuil and Norris, 1992, p.402,404,406, pl.8, figs.1–6; pl.9, fig.1; pl.12, figs.2–8. Holotype: de Verteuil and Norris, 1992, pl.8, figs.1–2. Age: early–late Miocene.

SURCULOSPHAERIDIUM Davey et al., 1966, p.160–161. Emendation: Davey, 1982b, p.15 — however, see Stancliffe and Sarjeant (1990, p.207). Taxonomic senior synonym: *Polystephanosphaera*, by implication in Courtinat (1989, p.173), who considered the "type species", *Polystephanosphaera valensii*, to be a taxonomic junior synonym of *Hystrichosphaeridium* (as and now *Surculosphaeridium*) *vestitum* — however, Stancliffe and Sarjeant (1990, p.207–208) retained the two species, as well as the genus *Surculosphaeridium*. Type: Sarjeant, 1960a, pl.6, fig.2, as *Hystrichosphaeridium cribrotubiferum*.

?*alagoense* (Regali et al., 1974, p.290, pl.24, fig.2) Lentin and Williams, 1981, p.270. Holotype: Regali et al., 1974, pl.24, fig.2. Originally *Hystrichosphaeridium*, subsequently (and now) *Surculosphaeridium*?. Questionable assignment: Lentin and Williams (1981, p.270) and Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.519) as a problematic species. Age: middle Eocene–Miocene.

?*argentinense* (Pöthe de Baldis, 1986, p.172, pl.1, figs.1–2) Stover and Williams, 1995, p.102. Holotype: Pöthe de Baldis, 1986, pl.1, fig.1. Originally *Areosphaeridium*, subsequently (and now) *Surculosphaeridium*?. Questionable assignment: Stover and Williams (1995, p.102). Age: Santonian–Campanian.

?*basifurcatum* Yun Hyesu, 1981, p.39–40, pl.16, figs.13–14; text-figs.10a–c. Holotype: Yun Hyesu, 1981, pl.16, fig.13; text-figs.10a–b; Fensome et al., 1991, figs.1,3–4 — p.585; Fauconnier and Masure, 2004, pl.74, figs.14–15. Questionable assignment: Yun Hyesu (1981, p.39) and Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.519) as a problematic species. Age: early Santonian.

belowii Yun Hyesu, 1981, p.40–41, pl.16, figs.5,12; text-figs.11a–b. Holotype: Yun Hyesu, 1981, pl.16, fig.5; text-figs.11a–b; Fensome et al., 1991, figs.2–4 — p.587. Age: early Santonian.

"?*calicigerum*" (de Coninck, 1986b, p.10, pl.1, figs.8–13) Stover and Williams, 1995, p.102. Emendation: Michoux and Masure in Fauconnier and Masure, 2004, p.63. Holotype: de Coninck, 1986b, pl.1, figs.11–13; Fauconnier and Masure, 2004, pl.7, figs.1–3. **NOW** *Areosphaeridium*. Originally *Areosphaeridium*?, subsequently *Surculosphaeridium*?, thirdly (and now) *Areosphaeridium*. Questionable assignment: Stover and Williams (1995, p.102). Age: late Eocene (Tongrian).

?*cassospinum* Yun Hyesu, 1981, p.39, pl.16, figs.4,9,11. Holotype: Yun Hyesu, 1981, pl.16, fig.11; Fensome et al., 1991, fig.3 — p.599. Questionable assignment: Yun Hyesu (1981, p.39) and Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.519) as a problematic species. Age: early Santonian.

**cribrotubiferum* (Sarjeant, 1960a, p.137, pl.6, figs.2–3; text-fig.1) Davey et al., 1966, p.161. Emendations: Davey et al., 1966, p.161; Stancliffe and Sarjeant, 1990, p.207, both as *Surculosphaeridium cribrotubiferum*. Holotype: Sarjeant, 1960a, pl.6, fig.2; text-fig.1; Stancliffe and Sarjeant, 1990, text-fig.3, nos.4,6; Fauconnier and Masure, 2004, pl.73, figs.9–10. Originally *Hystrichosphaeridium*, subsequently (and now) *Surculosphaeridium*. Age: early Oxfordian.

subsp. *cribrotubiferum*. Autonym. Holotype: Sarjeant, 1960a, pl.6, fig.2; text-fig.1; Stancliffe and Sarjeant, 1990, text-fig.3, nos.4,6; Fauconnier and Masure, 2004, pl.73, figs.9–10.

?subsp. *granulosum* Jain, 1977b, p.183, pl.6, fig.76. Holotype: Jain, 1977b, pl.6, fig.76. Originally *Surculosphaeridium cribrotubiferum* subsp. *granulosum*, subsequently (and now) *Surculosphaeridium cribrotubiferum*? subsp. *granulosum*. Questionable assignment: Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.518). Age: early Albian.

divarispinosum Jain, 1977b, p.183, pl.6, fig.77. Holotype: Jain, 1977b, pl.6, fig.77. Age: early Albian.

?*granulatum* (Wetzel, 1952, p.404; text-fig.25) Sarjeant, 1984c, p.136. Emendation: Sarjeant, 1984c, p.136, as *Surculosphaeridium? granulatum*. Holotype: Wetzel, 1952, text-fig.25; Sarjeant, 1984c, pl.5, figs.1–3; text-fig.8. Originally *Hystrichosphaeridium oligacanthum* subsp. *granulatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *granulatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *granulatum*, fourthly (and now) *Surculosphaeridium? granulatum*. Questionable assignment: Sarjeant (1984c, p.136) and Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.519) as a problematic species. Age: Paleocene.

"*granulosum*" Jain, 1977b, p.182–183, pl.2, fig.17. Holotype: Jain, 1977b, pl.2, fig.17; Fauconnier and Masure, 2004, pl.76, figs.8–10. **NOW** *Systematophora*. Originally *Surculosphaeridium*, subsequently (and now) *Systematophora*. Age: early Albian.

longifurcatum (Firtion, 1952, p.157–158, pl.9, fig.1; text-figs.1H–M) Davey et al., 1966, p.163. Holotype: Firtion, 1952, pl.9, fig.1; lost according to Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.517). Neotype:

Foucher, 1976, pl.5, figs.7–8, designated by Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.518); Fauconnier and Masure, 2004, pl.74, figs.2–3. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Surculosphaeridium*, fourthly *Surculosphaeridium?*. Questionable assignment: Stover and Evitt (1978, p.83) — however, Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.517) considered that this species should be assigned to *Surculosphaeridium* without question.. Age: Cenomanian.

?*oecaniae* (de Coninck, 1969, p.60, pl.17, figs.12–21) de Coninck, 1986b, p.14. Holotype: de Coninck, 1969, pl.17, figs.20–21. Originally *Micrhystridium* (Appendix A), subsequently *Surculosphaeridium*, thirdly (and now) *Surculosphaeridium?*. Questionable assignment: Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.519) as a problematic species. The epithet was originally cited as "*oecaniae*". In earlier versions of this index it was cited as "*oecania*", and as a noun in apposition (N.I.A.). Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.519) cite the name as "*oecaniense*". However, according to J. Jansonius (pers. comm.), the epithet can be considered a noun in apposition (in the possessive case), since de Coninck (1969, p.60) clearly wanted to emphasize its occurrence in the Eocene of Australia. Hence, the epithet is based on the geographic name "*oecania*". N.I.A. Age: Ypresian.

"?*phoenix*" (Duxbury, 1980, p.124–125, pl.13, figs.5–6; text-fig.9) Lentin and Williams, 1981, p.271. Holotype: Duxbury, 1980, pl.13, figs.5–6; text-fig.9; Fauconnier and Masure, 2004, pl.19, figs.4–11. **NOW** *Cymosphaeridium?*. Originally *Hystrichosphaeridium?*, subsequently *Surculosphaeridium?*, thirdly (and now) *Cymosphaeridium?*. Questionable assignment: Lentin and Williams (1981, p.271). N.I.A. Age: Barremian.

"subsp. *phoenix*". Autonym. Holotype: Duxbury, 1980, pl.13, figs.5–6; text-fig.9. **Now redundant.** N.I.A.

"subsp. *stella*" (Wetzel, 1952, p.403, pl.A, fig.4; text-fig.23) Sarjeant, 1984c, p.135. Emendation: Sarjeant, 1984c, p.135, as *Surculosphaeridium phoenix* subsp. *stella*. Holotype: Wetzel, 1952, pl.A, fig.4; Dietz et al. 1999, text-fig.6f. **NOW** *Surculosphaeridium? stella*. Originally *Hystrichosphaeridium oligacanthum* subsp. *stella*, subsequently *Baltisphaeridium oligacanthum* subsp. *stella* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *stella*, fourthly *Surculosphaeridium? phoenix* subsp. *stella*, fifthly (and now) *Surculosphaeridium? stella*. N.I.A. Age: Paleocene.

"*polyozum*" (Brosius, 1963, p.45, pl.1, fig.6; pl.6, fig.5; text-figs.2a–d) Strauss and Lund, 1992, p.172. Holotype: Brosius, 1963, pl.1, fig.6. **NOW** *Impletosphaeridium?*. Originally *Baltisphaeridium* (Appendix A), subsequently *Cleistosphaeridium?*, thirdly *Surculosphaeridium*, fourthly (and now) *Impletosphaeridium?*. For etymology see under *Impletosphaeridium? polyozum*. Age: late Oligocene.

scissospinum (Yun Hyesu, 1981, p.32–33, pl.16, figs.3,7–8,10; text-figs.8a–b) Fauconnier and Pourtoy in Fauconnier and Masure, 2004, p.518. Holotype: Yun Hyesu, 1981, pl.16, fig.10; text-figs.8a–b; Fensome et al., 1991, figs.3–5 — p.731; Fauconnier and Masure, 2004, pl.74, figs.4–6. Originally *Hystrichosphaeridium*, subsequently (and now) *Surculosphaeridium*. Age: early Santonian.

spinicongregatum Yun Hyesu, 1981, p.40, pl.16, figs.2,6. Holotype: Yun Hyesu, 1981, pl.16, fig.6; Fensome et al., 1991, fig.2 — p.753; Fauconnier and Masure, 2004, pl.74, fig.7. Age: early Santonian.

?*stella* (Wetzel, 1952, p.403, pl.A, fig.4; text-fig.23) Fauconnier in Fauconnier and Masure (2004, p.519). Emendation: Sarjeant, 1984c, p.135, as *Surculosphaeridium phoenix* subsp. *stella*. Holotype: Wetzel, 1952, pl.A, fig.4; Dietz et al. 1999, text-fig.6f. Originally *Hystrichosphaeridium oligacanthum* subsp. *stella*, subsequently *Baltisphaeridium oligacanthum* subsp. *stella* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *stella*, fourthly *Surculosphaeridium? phoenix* subsp. *stella*, fifthly (and now) *Surculosphaeridium? stella*. Questionable assignment: Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.519) as a problematic species. N.I.A. Age: Paleocene.

?*suggestium* (McMinn, 1988, p.146–148, figs.3A–F,4) Stover and Williams, 1995, p.102. Holotype: McMinn, 1988, figs.3A,C; Fensome et al., 1996, figs.1–2 — p.2389. Originally *Areosphaeridium*, subsequently (and now) *Surculosphaeridium*. Questionable assignment: Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.520) as a problematic species. Age: Santonian–mid Campanian.

trunculum Davey, 1979b, p.559–560, pl.8, figs.6–9. Holotype: Davey, 1979b, pl.8, fig.7; Fauconnier and Masure, 2004, pl.74, figs.8–10. Age: Aptian–Albian.

?**vestitum** (Deflandre, 1939a, p.189–190, pl.11, figs.4–6) Davey et al., 1966, p.162. Emendation: Sarjeant, 1960b, p.397, as *Baltisphaeridium vestitum*. Holotype: Deflandre, 1939a, pl.11, fig.5; Fauconnier and Masure, 2004, pl.74, figs.11–12. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Surculosphaeridium*, fourthly (and now) *Surculosphaeridium*?, fifthly *Multiplisphaeridium*? (Appendix A), sixthly *Systematophora*. Stancliffe and Sarjeant (1990, p.207) questionably retained this taxon in *Surculosphaeridium*. Questionable assignment: Stover and Evitt (1978, p.83) and Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.518). Taxonomic junior synonym: *Polystephanosphaera valensii*, according to Courtinat (1989, p.173) — however, Stancliffe and Sarjeant (1990, p.209) retained *Polystephanosphaera* (as and now *Systematophora*) *valensii*. Prior to re-examination of the holotype by Fauconnier and Pourtoy, Davey in Kennedy et al. (2000, p.638) indicated that this species should be assigned to *Surculosphaeridium* without question. Age: Oxfordian.

SUSADINIUM Dörhöfer and Davies, 1980, p.28. Taxonomic senior synonym: *Dodekovia*, according to Below (1987a, p.113) — however, Stover and Williams (1987, p.209) and Lentin and Williams (1989, p.358) retained *Susadinium*. Taxonomic junior synonym: *Facetodinium*, according to Lentin and Williams (1985, p.133). Type: Dörhöfer and Davies, 1980, fig.24I, as *Susadinium scrofoides*.

?**australe** Riding and Helby, 2001a, p.19,22, figs.11A–P. Holotype: Riding and Helby, 2001a, figs.11M–O. Questionable assignment: Riding and Helby (2001a, p.19). Age: early Toarcian.

delmense (Below, 1987a, p.135–136, pl.18, figs.1–3,6,8–9) Lentin and Williams, 1989, p.358. Holotype: Below, 1987a, pl.18, figs.1,8; Fensome et al., 1993a, figs.1,4 — p.1111. Originally *Reutlingia*, subsequently (and now) *Susadinium*. Age: Toarcian.

faustum (Bjaerke, 1980, p.69, pl.2, figs.1–6; text-figs.4A–D) Lentin and Williams, 1985, p.344. Emendation: Below, 1987a, p.136–137, as *Reutlingia fausta*. Holotype: Bjaerke, 1980, pl.2, figs.1–3; Fensome et al., 1993a, figs.1–3 — p.1175. Originally *Facetodinium*, subsequently (and now) *Susadinium*, thirdly *Reutlingia*. Lentin and Williams (1989, p.358) retained this species in *Susadinium*. Age: Toarcian.

"**inflatum**" (Bjaerke, 1980, p.69–71, pl.3, figs.1–13; text-fig.5) Lentin and Williams, 1985, p.344. Holotype: Bjaerke, 1980, pl.3, figs.1–6. Originally *Facetodinium*, subsequently *Susadinium*. **Taxonomic senior synonym:** *Susadinium scrofoides*, according to Below (1987a, p.120) and Stover and Williams (1987, p.97). Age: Toarcian.

knertense (Below, 1987a, p.115–116, pl.16, figs.1–18) Lentin and Williams, 1989, p.358. Holotype: Below, 1987a, pl.16, figs.3–6,14,18; Fensome et al., 1993a, figs.2–4,6 — p.1243. Originally *Dodekovia*, subsequently (and now) *Susadinium*. Age: Toarcian.

?**pinna** (Below, 1987a, p.116–118, pl.14, figs.1–5,11; text-figs.65a–b) Lentin and Williams, 1989, p.358. Holotype: Below, 1987a, pl.14, figs.1,3,5; Fensome et al., 1993a, figs.1,3–4 — p.1281. Originally *Dodekovia*, subsequently (and now) *Susadinium*?. Questionable assignment: Lentin and Williams (1989, p.358). N.I.A. Age: Toarcian.

***scrofoides** Dörhöfer and Davies, 1980, p.28–29, figs.13,24F,H–I,K,25A–D. Holotype: Dörhöfer and Davies, 1980, fig.24I; Fensome et al., 1993a, fig.1 — p.1311; fig.2 — p.1315. Originally (and now) *Susadinium*, subsequently *Dodekovia*. Lentin and Williams (1989, p.359) retained this species in *Susadinium*. Taxonomic junior synonyms: *Parvocysta contracta* and *Facetodinium* (as *Susadinium*) *inflatum*, both according to Below (1987a, p.120). Below (1987a, p.120) provided an emendation, but apparently for *Dodekovia scrofoides* var. *scrofoides*. Age: Toarcian–Bathonian.

subsp. **penicillus** (Below, 1987a, p.121, pl.17, figs.1–2,7–15,17–18) Lentin and Williams, 1989, p.359. Holotype: Below, 1987a, pl.17, figs.9–12; Fensome et al., 1993a, figs.5–7 — p.1279; fig.2 — p.1311. Originally *Dodekovia scrofoides* var. *penicillus*, subsequently (and now) *Susadinium scrofoides* subsp. *penicillus*. N.I.A. Age: Toarcian.

subsp. *scrofoides*. Autonym. Emendation: Below, 1987a, p.120, as *Dodekovia scrofoides* var. *scrofoides*. Holotype: Dörhöfer and Davies, 1980, fig.24I; Fensome et al., 1993a, fig.1 — p.1311; fig.2 — p.1315.

?*tabulatum* (Below, 1987a, p.123,125, pl.13, figs.1–15; text-figs.66a–i) Lentin and Williams, 1989, p.359. Holotype: Below, 1987a, pl.13, figs.1,4,8,12,13; Fensome et al., 1993a, figs.1,3,5–6 — p.1365. Originally *Dodekovia*, subsequently (and now) *Susadinium*?. Questionable assignment: Lentin and Williams (1989, p.359). Age: Toarcian.

SVALARDELLA Manum, 1960, p.21. Taxonomic junior synonym: *Palaeocystodinium*, according to Lindgren (1984, p.186) — however, Wrenn and Hart (1988, p.361–362) retained *Palaeocystodinium*. Type: Manum, 1960, pl.1, figs.1–3; text-fig.2, as *Svalbardella cooksoniae*.

"*australina*" Cookson, 1965b, p.140, pl.25, figs.1–4. Emendation: Malloy, 1972, p.63, as *Svalbardella australina*. Holotype: Cookson, 1965b, pl.25, fig.4. **NOW** *Palaeocystodinium*. Originally *Svalbardella*, subsequently (and now) *Palaeocystodinium*. Age: Paleocene.

**cooksoniae* Manum, 1960, p.21–22, pl.1, figs.1–3; text-fig.2. Holotype: Manum, 1960, pl.1, figs.1–3; text-fig.2. Age: late Paleocene–Eocene.

"*granulata*" Wilson, 1967b, p.226–227, figs.7–9. Holotype: Wilson, 1967b, fig.9. **NOW** *Palaeocystodinium*. Originally *Svalbardella*, subsequently (and now) *Palaeocystodinium*. Age: Maastrichtian (see Wilson, 1972).

"*hampdenensis*" Wilson, 1977, p.564–566, figs.1–8. Holotype: Wilson, 1977, figs.1–3. **NOW** *Palaeocystodinium*. Originally *Svalbardella*, subsequently (and now) *Palaeocystodinium*. Age: middle Eocene.

"*inflata*" Rauscher and Doubinger, 1982, p.104–105, pl.1, figs.13–17. Holotype: Rauscher and Doubinger, 1982, pl.1, figs.13–15. **NOW** *Andalusiella*. Originally *Svalbardella*, subsequently (and now) *Andalusiella*. Age: Maastrichtian.

partimtabulata Heilmann-Clausen and Van Simaëys, 2005, p.180,182, pl.11, figs.2–5; text-fig.8. Holotype: Heilmann-Clausen and Van Simaëys, 2005, pl.11, fig.3; text-fig.8. Age: middle Eocene.

"*parva*" Wilson in Slimani, 2001a, p.192. **Name not validly published**: no description. **Taxonomic senior synonym**: *Palaeocystodinium* (as and now *Biconidinium*) *reductum*, according to Slimani (2001a, p.192).

"*polymorpha*" Malloy, 1972, p.63–64, pl.1, figs.8–16,21. Holotype: Malloy, 1972, pl.1, fig.15. **NOW** *Andalusiella*. Originally *Svalbardella*, subsequently *Alterbia* (combination illegitimate), thirdly (and now) *Andalusiella*. Taxonomic junior synonyms: *Palaeocystodinium microgranulatum*, according to Lentin and Williams (1976, p.89); *Senegalinium trisinium*, according to Lentin and Williams (1976, p.164); *Andalusiella mauthei*, according to Lentin and Williams (1976, p.149) — however, Lentin and Williams (1977b, p.8) retained *Andalusiella mauthei*; *Palaeocystodinium punctatum*, according to Lentin and Williams (1976, p.89) — however, Schrank (1987, p.265) retained that taxon as the subspecies *Andalusiella polymorpha* subsp. *punctata*. Age: Maastrichtian.

"*rhomboides*" Boltenhagen, 1977, p.106–107, pl.20, figs.1a–b,2a–b,3. Emendation: Masare et al., 1996, p.182, as *Andalusiella rhomboides*. Holotype: Boltenhagen, 1977, pl.20, figs.1a–b. **NOW** *Andalusiella*. Originally *Svalbardella*, subsequently (and now) *Andalusiella*. Age: Campanian.

"*vozhennikovae*" Boltenhagen, 1977, p.108, pl.19, figs.5a–c,6–7. Emendation: Masare et al., 1996, p.182, as *Trithyrodinium vozhennikovae*. Holotype: Boltenhagen, 1977, pl.19, figs.5a–c. **NOW** *Trithyrodinium*. Originally *Svalbardella*, subsequently *Andalusiella*, thirdly (and now) *Trithyrodinium*. Age: Campanian.

SVERDRUPIELLA Bujak and Fisher, 1976, p.45–48. Type: Bujak and Fisher, 1976, pl.1, figs.1–2; text-fig.2A, as *Sverdrupiella septentrionalis*.

baccata Bujak and Fisher, 1976, p.48–49, pl.1, figs.5–7; text-fig.2B. Holotype: Bujak and Fisher, 1976, pl.1, figs.5–6; text-fig.2B. Age: Norian.

"**cristata**" Bujak and Fisher, 1976, p.51, pl.6, figs.4–7; text-fig.2F. Holotype: Bujak and Fisher, 1976, pl.6, fig.4; text-fig.2F. **Taxonomic senior synonym:** *Sverdrupiella septentrionalis*, according to Below (1987a, p.101). Age: ?Carnian–Norian.

"**downiei**" Bujak and Fisher, 1976, p.51, pl.7, figs.1–6; text-fig.2I. Holotype: Bujak and Fisher, 1976, pl.7, figs.1–2; text-fig.2I. **Taxonomic senior synonym:** *Sverdrupiella septentrionalis*, according to Below (1987a, p.101). Age: ?Carnian–Norian.

manicata Bujak and Fisher, 1976, p.50, pl.3, figs.8–11; text-fig.2G. Holotype: Bujak and Fisher, 1976, pl.3, figs.8–9; text-fig.2G. Age: Norian.

mutabilis Bujak and Fisher, 1976, p.50, pl.4, figs.1–12; pl.5, figs.1–10; pl.6, figs.1–3; text-fig.2J. Holotype: Bujak and Fisher, 1976, pl.4, fig.1; pl.5, fig.8; text-fig.2J. Age: ?Carnian–Norian.

ornaticingulata Bujak and Fisher, 1976, p.49, pl.1, figs.8–10; text-fig.2K. Holotype: Bujak and Fisher, 1976, pl.1, figs.8–9; text-fig.2K. Age: ?Carnian–Norian.

raiaformis Bujak and Fisher, 1976, p.50, pl.3, figs.4–7; text-fig.2D. Holotype: Bujak and Fisher, 1976, pl.3, figs.4–5; text-fig.2D. Age: ?Carnian–Norian.

sabinensis Bujak and Fisher, 1976, p.49–50, pl.3, figs.1–3; text-fig.2E. Holotype: Bujak and Fisher, 1976, pl.3, figs.1–2; text-fig.2E. Age: ?Carnian–Norian.

***septentrionalis** Bujak and Fisher, 1976, p.48, pl.1, figs.1–4; text-fig.2A. Holotype: Bujak and Fisher, 1976, pl.1, figs.1–2; text-fig.2A. Taxonomic junior synonyms: *Sverdrupiella cristata* and *Sverdrupiella downiei*, both according to Below (1987a, p.101). Age: ?Carnian–Norian.

spinosa Bujak and Fisher, 1976, p.51, pl.6, figs.8–10; text-fig.2C. Holotype: Bujak and Fisher, 1976, pl.6, figs.9–10; text-fig.2C. Age: ?Carnian–Norian.

usitata Bujak and Fisher, 1976, p.49, pl.2, figs.1–12; text-fig.2H. Holotype: Bujak and Fisher, 1976, pl.2, figs.1–2; text-fig.2H. Age: ?Carnian–Norian.

warepaensis Helby and Wilson, 1988, p.118–119,122; text-figs.2A–C,3–14. Holotype: Helby and Wilson, 1988, text-figs.3–4. Age: Norian.

SYSTEMATOPHORA Klement, 1960, p.61–62. Emendations: Brenner, 1988, p.83; Stancliffe and Sarjeant, 1990, p.207–208; Riding and Helby, 2001e, p.123. Taxonomic junior synonyms: *Cleistosphaeridium*, according to Islam (1993, p.88) — however, Eaton et al. (2001, p.176) retained *Cleistosphaeridium*; *Hystrichosphaerina*, by implication in Downie and Sarjeant (1965, p.146), who transferred the "type species" of *Hystrichosphaerina*, *Hystrichosphaerina schindewolfi*, to *Systematophora* and Brenner (1988, p.83) — however, Stover and Evitt (1978, p.57–58) and Stancliffe and Sarjeant (1990, p.204) retained *Hystrichosphaerina*; *Polystephanephorus*, according to Brenner (1988, p.83) — however, Stancliffe and Sarjeant (1990, p.205) retained *Polystephanephorus*; *Polystephanosphaera*, according to Sarjeant (1961b, p.1095–1096); *Taeniophora*, according to Stover and Evitt (1978, p.84) — however, Sarjeant (1984a, p.166) retained *Taeniophora*. Courtinat, Londeix and Pourtoy in Fauconnier and Masure (2004, p.525) listed *Taeniophora* as a taxonomic junior synonym of *Systematophora* but did not list the type, *Taeniophora iunctispina*, within the latter genus. Moreover, Courtinat and Begouën in Fauconnier and Masure (2004, p.545) listed *Taeniophora* as a separate genus, a treatment followed here. Type: Klement, 1960, pl.9, figs.1–3, as *Systematophora areolata*.

"*ancyrea*" Cookson and Eisenack, 1965a, p.126, pl.14, figs.1–3. Holotype: Cookson and Eisenack, 1965a, pl.14, fig.1; Fauconnier and Masure, 2004, pl.76, figs.1–2. **NOW** *Cleistosphaeridium ancyreum*. Originally *Systematophora ancyrea*, subsequently *Systematophora placacantha* var. *ancyrea* (combination not validly published), thirdly (and now) *Cleistosphaeridium ancyreum*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Cleistosphaeridium*) *placacanthum*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: late Eocene.

**areolata* Klement, 1960, p.62–65, pl.9, figs.1–8; text-figs.32–35. Holotype: Klement, 1960 pl.9, figs.1–3; Stancliffe and Sarjeant, 1990, pl.5, fig.7. Age: early Kimmeridgian.

"?*austini*" (Merrill, 1895, p.6, text-fig.11) Sarjeant, 1964a, p.175. Holotype: Merrill, 1895, text-fig.11. Originally *Geodia?* (Appendix A), subsequently *Systematophora?*. Questionable assignment: Sarjeant (1964a, p.175). **Taxonomic senior synonym:** *Xanthidium* (as *Hystrichosphaera*, now *Spiniferites*) *ramosum*, according to Sarjeant (1966a, p.5). Age: Early Cretaceous.

"?*capricorna*" (Cookson and Eisenack, 1965a, p.128–129, pl.15, figs.1–9) Eisenack, 1969a, p.113. Emendation: Stover and Williams, 1995, p.107, as *Cooksonidium capricornum*. Holotype: Cookson and Eisenack, 1965a, pl.15, fig.7; Fauconnier and Masure, 2004, pl.7, figs.7–10. **NOW** *Cooksonidium*. Originally *Cordosphaeridium*, subsequently *Systematophora?*, thirdly *Areosphaeridium*, fourthly (and now) *Cooksonidium*. Questionable assignment: Eisenack (1969a, p.113). Taxonomic senior synonym: *Hystrichosphaeridium* (as and now *Areosphaeridium*) *dictyostilum*, according to Sarjeant (1981, p.115–116) — however, Lentin and Williams (1985, p.26) retained *Areosphaeridium* (now *Cooksonidium*) *capricornum*. Age: late Eocene.

"*complicata*" Neale and Sarjeant, 1962, p.455–456, pl.19, figs.6–7. Holotype: Neale and Sarjeant, 1962, pl.19, figs.6–7; Fauconnier and Masure, 2004, pl.75, figs.7–8. **NOW** *Palaecysta*. Originally *Systematophora*, subsequently (and now) *Palaecysta*. Age: late Hauterivian–mid Barremian.

conspicua He Chengquan and Li Peng, 1981, p.68–69, pl.33, figs.10–12. Holotype: He Chengquan and Li Peng, 1981, pl.33, fig.12. Age: late Oligocene.

cretacea Davey, 1979b, p.560, pl.8, figs.10,13–15. Holotype: Davey, 1979b, pl.8, figs.10,13; Fauconnier and Masure, 2004, pl.76, figs.4–5. Age: Albian.

?*curta* Matsuoka and Bujak, 1988, p.84–86, pl.15, figs.8–11; text-fig.21. Holotype: Matsuoka and Bujak, 1988, pl.15, fig.9. Originally *Systematophora curta*, subsequently (and now) *Systematophora? curta*, thirdly *Systematophora placacantha* var. *curta*. Eaton et al. (2001, p.190) retained this taxon, without question, as *Systematophora curta*. Questionable assignment: Stancliffe and Sarjeant (1990, p.208) and Courtinat, Londeix and Pourtoy in Fauconnier and Masure (2004, p.526–527). Age: late Oligocene–early Miocene.

?*daveyi* Riding and Thomas, 1988, p.82,84,86, pl.3, figs.8–10; text-figs.10a–b. Holotype: Riding and Thomas, 1988, pl.3, figs.8–9; Fauconnier and Masure, 2004, pl.77, fig.5. Originally *Systematophora*, subsequently (and now) *Systematophora?*. Questionable assignment: Stancliffe and Sarjeant (1990, p.208). Age: early Kimmeridgian–early Portlandian.

"*diversispinosa*" (Davey et al., 1966, p.167, pl.10, fig.7) Islam, 1993, p.88. Emendation: Eaton et al., 2001, p.177. Holotype: Davey et al., 1966, pl.10, fig.7; Bujak et al., 1980, pl.7, figs.7–8; Islam, 1993, pl.1, figs.1–10; text-figs.1A–B; Eaton et al., 2001, figs.1A–B,2A–B; Fauconnier and Masure, 2004, pl.77, fig.9. **NOW** *Cleistosphaeridium*. Originally (and now) *Cleistosphaeridium*, subsequently *Systematophora*. Eaton et al. (2001, p.177) retained this species in *Cleistosphaeridium*. Taxonomic junior synonym: *Areosphaeridium polypetellum*, according to Islam (1993, p.88) — however, Eaton et al. (2001, p.194) retained *Areosphaeridium* (as and now *Cleistosphaeridium*) *polypetellum*. Age: early Eocene.

"*fasciculigera*" Klement, 1960, p.65, pl.9, figs.11–12. Holotype: Klement, 1960, pl.9, figs.11–12; Fauconnier and Masure, 2004, pl.76, fig.6. **Taxonomic senior synonym:** *Xanthidium* (as and now *Systematophora*) *penicillatum*, according to Sarjeant (1980a, p.282). As well as accepting the synonymy cited above, Courtinat, Londeix and

Pourtoy in Fauconnier and Masure (2004, p.527) listed this as a problematic species. Age: middle Oxfordian–early Kimmeridgian.

geminus Riding and Helby, 2001e, p.123–126, figs.7A,8A–I,9A–I. Holotype: Riding and Helby, 2001e, figs.8D–F. N.I.A. Age: Callovian–Oxfordian.

granulosa (Jain, 1977b, p.182–183, pl.2, fig.17) Fauconnier in Fauconnier and Masure, 2004, p.525. Holotype: Jain, 1977b, pl.2, fig.17; Fauconnier and Masure, 2004, pl.76, figs.8–10. Originally *Surculosphaeridium*, subsequently (and now) *Systematophora*. Age: early Albian.

"*iunctispina*" (Klement, 1960, p.68–69, pl.10, figs.1–4) Stover and Evitt, 1978, p.84. Emendation: Sarjeant and Gocht in Sarjeant, 1984a, p.168–169, as *Taeniophora iunctispina*. Holotype: Klement, 1960, pl.10, figs.1–2; Sarjeant, 1984a, pl.3, figs.1–2; text-fig.6; Stancliffe and Sarjeant, 1990, pl.3, figs.3,8; Fauconnier and Masure, 2004, pl.78, figs.3–4. Originally (and now) *Taeniophora*, subsequently *Systematophora*. Age: middle Oxfordian.

"subsp. ***filamentosa***" (Klement, 1960, p.70, pl.10, figs.5–6) Stover and Evitt, 1978, p.84. Emendation: Sarjeant and Gocht in Sarjeant, 1984a, p.169–170, as *Taeniophora filamentosa*. Holotype: Klement, 1960, pl.10, fig.5; Sarjeant, 1984a, pl.2, figs.3–4; Stancliffe and Sarjeant, 1990, pl.3, figs.4,6; Fauconnier and Masure, 2004, pl.78, figs.1–2. **NOW** *Taeniophora filamentosa*. Originally *Taeniophora iunctispina* subsp. *filamentosa*, subsequently *Systematophora iunctispina* subsp. *filamentosa*, thirdly (and now) *Taeniophora filamentosa*. Age: middle Oxfordian.

"subsp. ***iunctispina***". Autonym. Holotype: Klement, 1960, pl.10, figs.1–2; Sarjeant, 1984a, pl.3, figs.1–2; text-fig.6; Stancliffe and Sarjeant, 1990, pl.3, figs.3,8; Fauconnier and Masure, 2004, pl.78, figs.3–4. **Now redundant**. Originally *Taeniophora iunctispina* subsp. *iunctispina*, subsequently *Systematophora iunctispina* subsp. *iunctispina*.

jubifera Dodekova, 1994, p.34–35, pl.7, figs.2–5,8–9. Holotype: Dodekova, 1994, pl.7, figs.5,8. Age: middle-late Tithonian.

"*orbifera*" Klement, 1960, p.66–67, pl.9, figs.9–10; pl.10, fig.7. Holotype: Klement, 1960, pl.9, fig.9; Stancliffe and Sarjeant, 1990, pl.5, fig.2; Fauconnier and Masure, 2004, pl.48, figs.1–2. **NOW** *Hystrichosphaerina?*. Originally *Systematophora*, subsequently *Hystrichosphaerina*, thirdly (and now) *Hystrichosphaerina?*. Age: middle Oxfordian.

?*ovata* Gitmez and Sarjeant, 1972, p.237, pl.14, figs.1–3. Holotype: Gitmez and Sarjeant, 1972, pl.14, figs.2–3; Fauconnier and Masure, 2004, pl.77, fig.10. Originally *Systematophora*, subsequently (and now) *Systematophora?*, thirdly *Egmontodinium*. Courtinat (1989, p.173) retained this species in *Systematophora* without question. Questionable assignment: Stover and Evitt (1978, p.84); and Courtinat, Londeix and Pourtoy in Fauconnier and Masure (2004, p.527) as a problematic species. Age: early–late Kimmeridgian.

"*palmula*" Davey, 1982b, p.11–12, pl.1, figs.1–4. Holotype: Davey, 1982b, pl.1, figs.1–3; Fauconnier and Masure, 2004, pl.76, figs.11–13. **NOW** *Palaecysta*. Originally *Systematophora*, subsequently (and now) *Palaecysta*. Age: Ryazanian–Valanginian.

penicillata (Ehrenberg, 1843b, p.62 ex Ehrenberg, 1854, pl.37, section 8, fig.3) Sarjeant, 1980a, p.282. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.3. Originally *Xanthidium penicillatum* (Appendix A), subsequently *Hystrichosphaera penicillata* (combination not validly published), thirdly *Hystrichosphaeridium penicillatum*, fourthly *Ovum hispidum* subsp. *penicillatum* (combination not validly published; Appendix A), fifthly *Hystrichosphaeridium? penicillatum*, sixthly (and now) *Systematophora penicillata*. Taxonomic junior synonym: *Systematophora fasciculigera*, according to Sarjeant (1980a, p.282). The name *Systematophora penicillata* was not validly published in Ehrenberg (1843b) since neither description nor illustration was provided. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1854) did not provide a description. Age: late Oxfordian.

"*placacantha*" (Deflandre and Cookson, 1955, p.276–277, pl.9, figs.1–3) Davey et al., 1969, p.17. Emendation: May, 1980, p.68, as *Systematophora placacantha*. Holotype: Deflandre and Cookson, 1955, pl.9, figs.1–2; Fauconnier and Masure, 2004, pl.76, figs.14–16. **NOW** *Cleistosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Systematophora*, fifthly (and now) *Cleistosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (now *Impletosphaeridium*) *panniforme*, according to Sarjeant (1984b, p.86–87) — however, Eaton et al. (2001, p.191) retained *Baltisphaeridium panniforme*; *Systematophora ancyrea*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: Miocene.

"var. *ancyrea*" (Cookson and Eisenack, 1965a, p.126, pl.14, figs.1–3) Strauss and Lund, 1992, p.173. Holotype: Cookson and Eisenack, 1965a, pl.14, fig.1; Fauconnier and Masure, 2004, pl.76, figs.1–3. **Combination not validly published**: basionym not fully referenced. **NOW** *Cleistosphaeridium ancyreum*. Originally *Systematophora ancyrea*, subsequently *Systematophora placacantha* var. *ancyrea* (combination not validly published), thirdly (and now) *Cleistosphaeridium ancyreum*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Cleistosphaeridium*) *placacanthum*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: late Eocene.

"var. *curta*" (Matsuoka and Bujak, 1988, p.84–86, pl.15, figs.8–11; text-fig.21) Strauss and Lund, 1992, p.173. Holotype: Matsuoka and Bujak, 1988, pl.15, fig.9. **NOW** *Systematophora? curta*. Originally *Systematophora curta*, subsequently (and now) *Systematophora? curta*, thirdly *Systematophora placacantha* var. *curta*. Age: late Oligocene–early Miocene.

"var. *placacantha*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.9, figs.1–2; Fauconnier and Masure, 2004, pl.76, figs.14–16. **Now redundant**

?*prodigiosa* Dodekova, 1994, p.35–36, pl.8, figs.3–6. Holotype: Dodekova, 1994, pl.8, figs.3–4. Questionable assignment: Dodekova (1994, p.35). Age: middle Tithonian.

rosenfeldii Volkheimer and Sarjeant, 1993, p.251.253–254, fig.2, nos.1–4; fig.3, nos.1–2; figs.4–5; fig.6, nos.1–5; fig.7, nos.1–2; fig.8, nos.1–2; fig.9, nos.1–3. Holotype: Volkheimer and Sarjeant, 1993, fig.2, nos.1–2; fig.3, nos.1–2; fig.6, no.3. Age: Valanginian–Hauterivian.

"*schindewolfii*" (Alberti, 1961, p.38–39, pl.10, figs.1–3,6–7) Downie and Sarjeant, 1965, p.146. Holotype: Alberti, 1961, pl.10, figs.2–3; Eisenack and Kjellström, 1972, p.1009; Fensome et al., 1995, figs.2–3 — p.1765. **NOW** *Hystrichosphaerina*. Originally (and now) *Hystrichosphaerina*, subsequently *Systematophora*, thirdly *Polystephanephorus*. Taxonomic senior synonym: *Hystrichosphaeridium* (as and now *Oligosphaeridium*) *anthophorum*, according to Davey (1979c, p.65) — however, Lentin and Williams (1981, p.150) retained *Systematophora* (as *Hystrichosphaerina*) *schindewolfii*. Taxonomic junior synonym: *Perisseiasphaeridium eisenackii*, according to Davey and Verdier (1974, p.640). Age: late Barremian–Turonian.

scoriacea (Raynaud, 1978, p.393, pl.1, figs.4–5) Monteil, 1992b, p.304. Holotype: Raynaud, 1978, pl.1, fig.4; Fauconnier and Masure, 2004, pl.77, figs.1–2. Originally *Hystrichosphaeridium*, subsequently (and now) *Systematophora*. Age: Berriasian–mid Valanginian.

?*septata* Wilson, 1988, p.31, pl.23, figs.1a–b,2a–c. Holotype: Wilson, 1988, pl.23, figs.2a–c; Fensome et al., 1996, figs.1–3 — p.2353; Fauconnier and Masure, 2004, pl.77, figs.11–12. Originally *Systematophora*, subsequently (and now) *Systematophora?*. Questionable assignment: Courtinat, Londeix and Pourtoy in Fauconnier and Masure (2004, p.527) as a problematic species. Age: early Eocene.

silvosa Davey in Kennedy et al., 2000, p.636.638–639, figs.30a–d. Holotype: Kennedy et al., 2000, fig.30a. In the protologue the epithet is given as "*silvosus*"; since the epithet is an adjective, the spelling is here made to agree with the gender of the generic name. Age: latest Aptian.

silybum Davey, 1979a, p.433–434,436, pl.48, figs.7–8; pl.50, figs.2–3,5–6,7–9. Holotype: Davey, 1979a, pl.50, fig.2; Fauconnier and Masure, 2004, pl.77, fig.3. N.I.A. Age: Barremian.

"*sylibum*" Davey, 1979a, p.433–434,436, pl.48, figs.7–8; pl.50, figs.2–3,5–6,7–9. Holotype: Davey, 1979a, pl.50, fig.2; Fauconnier and Masure, 2004, pl.77, fig.3. **NOW** *Palaecysta*. Originally *Systematophora*, subsequently (and now) *Palaecysta*. N.I.A. Age: late Tithonian–Barremian.

taiwaniana Shaw Chenglong, 1999b, p.192, figs.120–125. Holotype: Shaw Chenglong, 1999b, figs.123–125. Age: Eocene.

tianshanensis He Chengquan, 1991, p.140, pl.25, figs.1–3; text-fig.25. Holotype: He Chengquan, 1991, pl.25, fig.2. Age: early Eocene.

"*turonica*" (Alberti, 1961, p.39, pl.10, figs.4a–b) Downie and Sarjeant, 1965, p.146. Holotype: Alberti, 1961, pl.10, figs.4a–b. **NOW** *Hystrichosphaerina*. Originally (and now) *Hystrichosphaerina*, subsequently *Systematophora*, thirdly *Polystephanophorus*. Age: Turonian.

urbini Biffi and Manum, 1988, p.196, pl.8, figs.1–2,4,8–9. Holotype: Biffi and Manum, 1988, pl.8, fig.2; Fauconnier and Masure, 2004, pl.77, fig.4. Age: early Miocene.

valensii (Sarjeant, 1960a, p.142–143, pl.6, figs.5–7; text-fig.3c) Sarjeant, 1961b, p.1096. Holotype: Sarjeant, 1960a, pl.6, fig.6; text-fig.3c; Eisenack and Kjellström, 1972, p.143; Stancliffe and Sarjeant, 1990, pl.3, figs.5,7,10; Fensome et al., 1995, figs.2,4 — p.1871. Originally *Polystephanosphaera*, subsequently (and now) *Systematophora*. Taxonomic senior synonym: *Hystrichosphaeridium* (as and now *Surculosphaeridium?*) *vestitum*, according to Courtinat (1989, p.173) — however, Stancliffe and Sarjeant (1990, p.209) retained *Polystephanosphaera* (as and now *Systematophora*) *valensii*. Age: late Oxfordian.

?*variabilis* (Cookson and Eisenack, 1967a, p.134–135, pl.19, figs.9–11) Stover and Evitt, 1978, p.84. Holotype: Cookson and Eisenack, 1967a, pl.19, fig.9; Fauconnier and Masure, 2004, pl.77, figs.6–8. Originally *Cyclonephelium*, subsequently (and now) *Systematophora?*. Questionable assignment: Stover and Evitt (1978, p.84). Age: Paleocene.

"*varians*" May, 1980, p.68–69, pl.7, figs.12–16. Holotype: May, 1980, pl.7, figs.12–14. **NOW** *Hystrichosphaerina*. Originally *Systematophora*, subsequently (and now) *Hystrichosphaerina*. Age: Campanian.

"*varispinosa*" Brenner, 1988, p.87–88, pl.16, figs.2a–c,5a–b. Holotype: Brenner, 1988, pl.16, figs.2a–c. **NOW** *Hystrichosphaerina?* Originally *Systematophora*, subsequently (and now) *Hystrichosphaerina?*. Age: early Kimmeridgian.

"*vestita*" (Deflandre, 1939a, p.189–190, pl.11, figs.4–6) Davey, 1982b, p.13. Emendation: Sarjeant, 1960b, p.397, as *Baltisphaeridium vestitum*. Holotype: Deflandre, 1939a, pl.11, fig.5; Fauconnier and Masure, 2004, pl.74, figs.11–12. **NOW** *Surculosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Surculosphaeridium*, fourthly (and now) *Surculosphaeridium?*, fifthly *Multiplicisphaeridium?* (Appendix A), sixthly *Systematophora*. Taxonomic junior synonym: *Polystephanosphaera valensii*, according to Courtinat (1989, p.173) — however, Stancliffe and Sarjeant (1990, p.209) retained *Polystephanosphaera* (as and now *Systematophora*) *valensii*. Age: Oxfordian.

"*vetuscula*" (Davey, 1974, p.45, pl.1, figs.1–2) Duxbury, 1977, p.51. Holotype: Davey, 1974, pl.1, fig.2. **NOW** *Nexosispinum*. Originally *Adnatosphaeridium*, subsequently *Systematophora*, thirdly (and now) *Nexosispinum*, fourthly *Kiokansium*. Age: early Barremian.

TABULODINIUM Dodekova, 1990, p.23–24. Emendation: Riding and Helby, 2001d, p.89. Type: Dodekova, 1990, pl.4, figs.4–5, as *Tabulodinium senarium*.

**senarium* Dodekova, 1990, p.24–25, pl.4, figs.4–10; pl.9, figs.3–5,9–10; text-figs.3a–b. Emendation: Riding and Helby, 2001d, p.89. Holotype: Dodekova, 1990, pl.4, figs.4–5. Taxonomic junior synonym: *Pareodinia tamarensis* (name not validly published), according to Riding and Helby (2001d, p.89). Age: late Bathonian–?early Callovian.

TAENIOPHORA Klement, 1960, p.67–68. Emendation: Sarjeant, 1984a, p.166–168. Taxonomic senior synonym: *Systematophora*, according to Stover and Evitt (1978, p.84) — however, Sarjeant (1984a, p.166) retained *Taeniophora*. Courtinat, Londeix and Pourtoy in Fauconnier and Masure (2004, p.525) listed *Taeniophora* as a taxonomic junior synonym of *Systematophora* but did not list the type, *Taeniophora iunctispina*, within the latter genus. Moreover, Courtinat and Begouën in Fauconnier and Masure (2004, p.545) listed *Taeniophora* as a separate genus, a treatment followed here. Type: Klement, 1960, pl.10, figs.1–2, as *Taeniophora iunctispina*.

filamentosa (Klement, 1960, p.70, pl.10, figs.5–6) Sarjeant and Gocht in Sarjeant, 1984a, p.169. Emendation: Sarjeant and Gocht in Sarjeant, 1984a, p.169–170, as *Taeniophora filamentosa*. Holotype: Klement, 1960, pl.10, fig.5; Sarjeant, 1984a, pl.2, figs.3–4; Stancliffe and Sarjeant, 1990, pl.3, figs.4,6; Fauconnier and Masure, 2004, pl.78, figs.1–2. Originally *Taeniophora iunctispina* subsp. *filamentosa*, subsequently *Systematophora iunctispina* subsp. *filamentosa*, thirdly (and now) *Taeniophora filamentosa*. Age: middle Oxfordian.

***iunctispina** Klement, 1960, p.68–69, pl.10, figs.1–4. Emendation: Sarjeant and Gocht in Sarjeant, 1984a, p.168–169, as *Taeniophora iunctispina*. Holotype: Klement, 1960, pl.10, figs.1–2; Sarjeant, 1984a, pl.3, figs.1–2; text-fig.6; Stancliffe and Sarjeant, 1990, pl.3, figs.3,8; Fauconnier and Masure, 2004, pl.78, figs.3–4. Originally (and now) *Taeniophora*, subsequently *Systematophora*. Sarjeant and Gocht in Sarjeant (1984a, p.168) retained this species in *Taeniophora*. Age: middle Oxfordian.

"subsp. **filamentosa**" Klement, 1960, p.70, pl.10, figs.5–6. Emendation: Sarjeant and Gocht in Sarjeant, 1984a, p.169–170, as *Taeniophora filamentosa*. Holotype: Klement, 1960, pl.10, fig.5; Sarjeant, 1984a, pl.2, figs.3–4; Stancliffe and Sarjeant, 1990, pl.3, figs.4,6; Fauconnier and Masure, 2004, pl.78, figs.1–2. **NOW** *Taeniophora filamentosa*. Originally *Taeniophora iunctispina* subsp. *filamentosa*, subsequently *Systematophora iunctispina* subsp. *filamentosa*, thirdly (and now) *Taeniophora filamentosa*. Age: middle Oxfordian.

"subsp. **iunctispina**". Autonym. Holotype: Klement, 1960, pl.10, figs.1–2; Sarjeant, 1984a, pl.3, figs.1–2; text-fig.6; Stancliffe and Sarjeant, 1990, pl.3, figs.3,8; Fauconnier and Masure, 2004, pl.78, figs.3–4. **Now redundant**. Originally *Taeniophora iunctispina* subsp. *iunctispina*, subsequently *Systematophora iunctispina* subsp. *iunctispina*.

"**linifera**" (Cookson and Eisenack, 1967b, p.253, pl.40, fig.9; pl.41, figs.7–8) Eisenack and Kjellström, 1972, p.1019. Holotype: Cookson and Eisenack, 1967b, pl.41, fig.8. **NOW** *Achomosphaera*. Originally *Baltisphaeridium* (Appendix A), subsequently *Taeniophora*, thirdly (and now) *Achomosphaera*. Age: late Paleocene.

TALEISPHAERA Duxbury, 1979a, p.201. Emendation: Masure, 1986, p.114. Taxonomic senior synonym: *Kiokansium*, according to Below (1982c, p.13–15) — however, Lentin and Williams (1985, p.348) retained *Taleisphaera*. Type: Duxbury, 1979a, pl.2, figs.1,4, as *Taleisphaera hydra*.

?**capillata** Lister and Batten, 1988b, p.41, pl.9, figs.15–19. Holotype: Lister and Batten, 1988b, pl.9, fig.15. Questionable assignment: Lister and Batten (1988b, p.41). Age: late Barremian–earliest Aptian.

***hydra** Duxbury, 1979a, p.201, pl.2, figs.1,4,6–7. Emendation: Harding, 1986a, p.97–98,100, as *Taleisphaera hydra*. Holotype: Duxbury, 1979a, pl.2, figs.1,4; Fensome et al., 1993a, figs.1–2 — p.1233. Originally (and now) *Taleisphaera*, subsequently *Kiokansium*. Lentin and Williams (1985, p.348) retained this species in *Taleisphaera*. N.I.A. Age: middle Barremian.

subsp. **elongata** Heilmann-Clausen in Heilmann-Clausen and Thomsen, 1995, p.308–309, pl.12, figs.1–5; text-fig.18. Holotype: Heilmann-Clausen and Thomsen, 1995, pl.12, fig.1; text-fig.18. Age: late Barremian.

subsp. **hydra**. Autonym. Holotype: Duxbury, 1979a, pl.2, figs.1,4.

TALIMUDINIUM Mao Shaozhi and Norris, 1988, p.47–48. Type: Mao Shaozhi and Norris, 1988, pl.15, fig.12; text-fig.18, no.1, as *Talimudinium scissura*.

**scissura* Mao Shaozhi and Norris, 1988, p.48–49, pl.15, figs.8–13; text-fig.18., nos.1–6. Holotype: Mao Shaozhi and Norris, 1988, pl.15, fig.12; text-fig.18, no.1; Fensome et al., 1995, fig.5 — p.1771. N.I.A. Age: Late Cretaceous.

TALLADINIUM Williams, Damassa, Fensome and Guerstein in Fensome et al., 2009, p.61–62. Type: Mao Shaozhi and Norris, 1988, pl.13, fig.6, as *Charlesdowniea wulagenensis*.

?*angulosum* (Châteauneuf and Gruas-Cavagnetto, 1978, p.69–70. Pl.5, figs.8–9) Williams et al., 2015, p.315. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.5, figs.8–9. Originally *Kisselevia clathrata* subsp. *angulosa*, subsequently *Charlesdowniea clathrata* subsp. *angulosa*, thirdly (and now) *Talladinium? angulosum*. Questionable assignment: Williams et al. (2015, p.315). Age: early Oligocene.

?*clathratum* (Eisenack, 1938b, p.187; text-fig.5) Williams, Damassa, Fensome and Guerstein in Fensome et al., 2009, p.62. Holotype: Eisenack, 1938b, text-fig.5; Eisenack, 1954b, pl.7, fig.12. Originally *Wetziella*, subsequently *Kisselevia?*, thirdly *Charlesdowniea*, fourthly (and now) *Talladinium?* Questionable assignment: Williams, Damassa, Fensome and Guerstein in Fensome et al. (2009, p.62). Taxonomic senior synonym: *Wetziella* (as *Hystrichosphaeridium*) *articulata*, according to Pastiels (1948, p.42) — however, this synonymy has not been generally accepted. Age: late Eocene–early Oligocene.

fusiforme (Mao Shaozhi and Norris, 1988, p.49–50, pl.13, figs.2–4) Williams et al., 2015, p.315. Holotype: Mao Shaozhi and Norris, 1988, pl.13, fig.3. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Talladinium*. Age: early Oligocene.

?*marginatum* (Andreeva-Grigorovich and Savitskaya, 1993, p.43–44, pl.2, figs.1–3) Williams et al., 2015, p.315. Holotype: Andreeva-Grigorovich and Savitskaya, 1993, pl.2, fig.2; Andreeva-Grigorovich et al., 2011, pl.18, fig.4. Originally *Charlesdowniea*, subsequently (and now) *Talladinium*. Questionable assignment: Williams et al. (2015, p.315). Age: Rupelian– Chattian.

**wulagenense* (Mao Shaozhi and Norris, 1988, p.50, pl.13, figs.5–10) Fensome et al., 2009, p.62. Holotype: Mao Shaozhi and Norris, 1988, pl.13, fig.6. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Talladinium*. Age: late Eocene.

"**TALTARNIA**" Morgan in Riding and Helby, 2001e, p.133. **Name not validly published:** no description. **Taxonomic senior synonym:** *Woodinia*, by implication in Riding and Helby (2001e, p.133), who included the only citation of this generic name, as "*Taltarnia* spp", in synonymy with *Woodinia bensonii*.

TANYOSPHAERIDIUM Davey and Williams, 1966b, p.98. Type: Davey and Williams, 1966b, pl.6, fig.7; text-fig.20, as *Tanyosphaeridium variecalamum*.

boletus Davey, 1974, p.61–62, pl.6, fig.7. Holotype: Davey, 1974, p.61–62, pl.6, fig.7; Fauconnier and Masure, 2004, pl.79, fig.1. N.I.A. Age: Barremian.

"*ellipticum*" (Cookson, 1965a, p.87–88, pl.11, figs.1–3,3a) Davey and Williams, 1969, p.7. Holotype: Cookson, 1965a, pl.11, fig.1. **NOW** *Distatodinium*. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly (and now) *Distatodinium*. Age: late Eocene.

"*fusiforme*" Matsuoka, 1974, p.332–333, pl.46, figs.4,9–10. Holotype: Matsuoka, 1974, pl.46, fig.4; Fauconnier and Masure, 2004, pl.22, fig.7. **NOW** *Distatodinium*. Originally *Tanyosphaeridium*, subsequently (and now) *Distatodinium*. Age: early-middle Miocene.

isocalamum (Deflandre and Cookson, 1955, p.272, pl.2, figs.7–8; text-figs.30–35) Davey and Williams, 1969, p.7. Holotype: Deflandre and Cookson, 1955, pl.2, figs.7–8; Fauconnier and Masure, 2004, pl.78, figs.5–8. Originally *Hystrichosphaeridium*, subsequently (and now) *Tanyosphaeridium*. Age: Early Cretaceous.

jurassicum Jain and Garg in Jain et al., 1984, p.73, pl.1, fig.10. Holotype: Jain et al., 1984, pl.1, fig.10. Age: Kimmeridgian–early Tithonian.

"magdaliuM" (Drugg, 1967, p.26–27, pl.4, figs.8–10; pl.9, fig.7) Heisecke, 1970, p.244. Holotype: Drugg, 1967, pl.4, fig.9. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaera* (as and now *Tanyosphaeridium*) *xanthiopyxides*, according to Stover and Evitt (1978, p.85). Age: Danian.

magneticum Davies, 1983, p.25, pl.8, figs.1–8,11–12; text-fig.20. Emendation: Torricelli, 2000, p.263. Holotype: Davies, 1983, pl.8, fig.7; Fauconnier and Masure, 2004, pl.79, figs.2–3. Age: Valanginian.

"paradoxum" (Brosius, 1963, p.41–42, pl.4, figs.1,6; text-fig.2, nos.1a–c) Gocht, 1969, p.54. Holotype: Brosius, 1963, pl.4, fig.6; Fensome et al., 1995, fig.2 — p.1639. **NOW** *Distatodinium*. Originally *Hystrichosphaeridium*, subsequently *Tanyosphaeridium*, thirdly *Oligosphaeridium?*, fourthly (and now) *Distatodinium*, fifthly *Bipolaribucina*. Taxonomic junior synonym: *Distatodinium craterum*, according to Fensome et al. (2009, p.31). Age: late Oligocene.

"prolixispinosum" (Davey and Williams, 1966b, p.76–77, pl.8, figs.2–3) Duxbury, 1980, p.132. Holotype: Davey and Williams, 1966b, pl.8, fig.3; Fauconnier and Masure, 2004, pl.60, figs.2–4. **NOW** *Oligosphaeridium*. Originally (and now) *Oligosphaeridium*, subsequently *Tanyosphaeridium*. Age: Cenomanian.

regulare Davey and Williams, 1966b, p.99–100, pl.3, fig.4 (not fig.3 as indicated in text and plate caption). Holotype: Davey and Williams, 1966b, pl.3, fig.4; Bujak et al., 1980, pl.8, figs.3,6; Fauconnier and Masure, 2004, pl.79, figs.4–5. Age: early Eocene.

salpinx Norvick, 1976, p.63–64, pl.9, fig.10. Holotype: Norvick, 1976, pl.9, fig.10; Fauconnier and Masure, 2004, pl.79, figs.6–8. N.I.A. Age: Cenomanian.

singulare Fedorova-Shakhmundes, 1980, p.7, pl.1, fig.4. Holotype: Fedorova-Shakhmundes, 1980, pl.1, fig.4. Age: early Valanginian.

"tenerum" Benedek, 1972, p.35, pl.10, figs.13–14; text-fig.14. Emendation: Benedek and Sarjeant, 1981, p.347–348, as *Distatodinium tenerum*. Holotype: Benedek, 1972, pl.10, fig.13; Benedek and Sarjeant, 1981, fig.1, no.5. **NOW** *Distatodinium*. Originally *Tanyosphaeridium*, subsequently (and now) *Distatodinium*. Age: middle Oligocene.

"toryna" (Cookson and Eisenack, 1960b, p.252, pl.38, figs.6,15) Stover and Evitt, 1978, p.85. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.15. **NOW** *Egmontodinium*. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium?*, thirdly *Tanyosphaeridium*, fourthly (and now) *Egmontodinium*. N.I.A. Age: Tithonian–Neocomian.

***variecalamum** Davey and Williams, 1966b, p.98–99, pl.6, fig.7; text-fig.20. Holotype: Davey and Williams, 1966b, pl.6, fig.7; text-fig.20; Fauconnier and Masure, 2004, pl.80, figs.1–2. Age: Cenomanian.

xanthiopyxides (Wetzel, 1933b, p.44–45, pl.4, fig.25 ex Deflandre, 1937b, p.77) Stover and Evitt, 1978, p.85. Emendations: Morgenroth, 1968, p.556, as *Hystrichosphaeridium? xanthiopyxides*; Sarjeant, 1985b, p.142–144, as *Tanyosphaeridium xanthiopyxides*. Holotype: Wetzel, 1933b, pl.4, fig.25, Morgenroth, 1968, pl.48, fig.5; Sarjeant, 1985b, pl.3, figs.2–3; Dietz et al., 1999, fig.10, no.8. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Baltisphaeridium* (Appendix A), fifthly *Prolixosphaeridium?*, sixthly (and now) *Tanyosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Tanyosphaeridium*) *magdaliuM*, according to Stover and Evitt (1978, p.85). The name

Hystrichosphaera xanthiopyxides was not validly published in Wetzel (1933b), since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous (?Maastrichtian, according to Sarjeant, 1985b, p.143).

"**TAPEINOSPHAERIDIUM**" Ioannides et al., 1977, p.461–462. **Taxonomic senior synonym:** *Chytroeisphaeridia*, according to Davey (1979d, p.211). Type: Ioannides et al., 1977, pl.5, fig.1, as *Tapeinosphaeridium pericompsum*.

"**granulatum**" Ioannides et al., 1977, p.462, pl.4, figs.18–19. Holotype: Ioannides et al., 1977, pl.4, fig.18. **NOW** *Pyxidinospis*. Originally *Tapeinosphaeridium*, subsequently *Tectatodinium?*, thirdly (and now) *Pyxidinospis*. Age: middle Kimmeridgian.

"**hyalinum**" Raynaud, 1978, p.394–395, pl.2, fig.18. Holotype: Raynaud, 1978, pl.2, fig.18. **NOW** *Chytroeisphaeridia*. Originally *Tapeinosphaeridium*, subsequently (and now) *Chytroeisphaeridia*. Taxonomic junior synonym: *Chytroeisphaeridia grossa*, according to Riding (1990, p.311). Age: early-middle Callovian.

"***pericompsum**" Ioannides et al., 1977, p.463, pl.5, figs.1–4; text-fig.13. Holotype: Ioannides et al., 1977, pl.5, fig.1. **NOW** *Chytroeisphaeridia*. Originally *Tapeinosphaeridium*, subsequently (and now) *Chytroeisphaeridia*. Age: middle Kimmeridgian.

TECTATODINIUM Wall, 1967, p.112–113. Emendation: Head, 1994a, p.306. Type: Wall, 1967, pl.16, fig.12, as *Tectatodinium pellitum*.

"**gochtii**" Dodekova, 1975, p.31, pl.3, figs.8,10–13. Holotype: Dodekova, 1975, pl.3, fig.10. **NOW** *Chytroeisphaeridia*. Originally *Tectatodinium*, subsequently *Dodekovia*, thirdly (and now) *Chytroeisphaeridia*. Age: late Bathonian.

"**grande**" Williams et al., 1993, p.57. Holotype: Manum et al., 1989, pl.20, figs.3–4, as *Tectatodinium* sp. 2. **Taxonomic senior synonym:** *Tectatodinium pellitum*, according to Head (1994a, p.308). Age: late Miocene, ?Tortonian.

"**granulatum**" (Ioannides et al., 1977, p.462, pl.4, figs.18–19) Davey, 1979d, p.217. Holotype: Ioannides et al., 1977, pl.4, fig.18. **NOW** *Pyxidinospis*. Originally *Tapeinosphaeridium*, subsequently *Tectatodinium?*, thirdly (and now) *Pyxidinospis*. Questionable assignment: Davey (1979d, p.217). Age: middle Kimmeridgian.

"**laminatum**" Davies, 1983, p.21, pl.6, figs.1–5,21; text-fig.16. Holotype: Davies, 1983, pl.6, fig.21; text-fig.16. **NOW** *Pyxidinospis*. Originally *Tectatodinium*, subsequently (and now) *Pyxidinospis*. Age: late Oxfordian–late Tithonian.

"**minutum**" Matsuoka, 1983b, p.127, pl.5, fig.6; pl.6, figs.7a–b. Emendation: Matsuoka and Head, 1992, p.167, as *Batiacasphaera minuta*. Holotype: Matsuoka, 1983b, pl.6, figs.7a–b; Matsuoka and Head, 1992, pl.1, figs.1–11; text-figs.1A–C. **NOW** *Batiacasphaera*. Originally *Tectatodinium*, subsequently (and now) *Batiacasphaera*. Age: late early–early middle Miocene.

"**nudum**" (Nagy, 1969, p.291, pl.1, fig.1) Lentin and Williams, 1977b, p.161. Holotype: Nagy, 1969, pl.1, fig.1. **NOW** *Pyxidinospis? nuda*. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta? nuda*, fifthly *Tectatodinium? nudum*, sixthly *Tectatodinium? pannonium* (name illegitimate), seventhly *Pyxidinospis? pannonia* (name illegitimate), eighthly (and now) *Pyxidinospis? nuda*. Questionable assignment: Lentin and Williams (1977b, p.161). Nomenclatural junior synonym: *Palaeoperidinium* (subsequently *Phthanoperidinium*, *Tectatodinium* and *Pyxidinospis?*) *pannonium*, which has the same holotype. See also the discussion under *Pyxidinospis? nuda*. Age: late Miocene.

"?*pannonium*" (Lentin and Williams, 1973, p.106) Lentin and Williams, 1981, p.275. Holotype: Nagy, 1969, pl.1, fig.1. **Name illegitimate — nomenclatural senior synonym:** *Palaeoperidinium* (now *Pyxidinospis?*) *nudum*, which has the same type. **NOW** *Pyxidinospis? nuda*. Originally *Palaeoperidinium nudum* Nagy, subsequently *Palaeoperidinium pannonium* (name illegitimate), thirdly *Phthanoperidinium pannonium* (name illegitimate), fourthly *Gonyaulacysta? nuda*, fifthly *Tectatodinium? nudum*, sixthly *Tectatodinium? pannonium* (name illegitimate), seventhly *Pyxidinospis? pannonia* (name illegitimate), eighthly (and now) *Pyxidinospis? nuda*. Questionable assignment: Lentin and Williams (1985, p.350). See also the discussion under *Pyxidinospis? nuda*. Age: late Miocene.

**pellitum* Wall, 1967, p.113, pl.16, figs.11–12. Emendation: Head, 1994a, p.308,310. Holotype: Wall, 1967, pl.16, fig.12; Head, 1994a, pl.1, figs.1–9. Taxonomic junior synonym: *Tectatodinium grande*, according to Head (1994a, p.308); *Tectatodinium rugulatum*, questionably according to Head (1994a, p.308), and according to Head and Nøhr-Hansen (1999, p.577). Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Wall and Dale (1967, p.352; 1968c, p.270) and Dodge (1989, p.289). Age: ?Holocene.

"*psilatium*" Wall and Dale in Wall et al., 1973, p.22–23, pl.1, figs.9–15; pl.3, figs.1–6. Holotype: Wall et al., 1973, pl.1, fig.9; Head, 1994b, pl.5, figs.8–10. **NOW** *Pyxidinospis*. Originally *Tectatodinium*, subsequently (and now) *Pyxidinospis*. Age: Holocene.

"*rugulatum*" (Hansen, 1977, p.12–13, figs.20H–J) McMinn, 1988, p.152. Holotype: Hansen, 1977, figs.20H–J. Originally *Xenicodinium*, subsequently *Tectatodinium*. **Taxonomic senior synonym:** *Tectatodinium pellitum*, questionably according to Head (1994a, p.308), and according to Head and Nøhr-Hansen (1999, p.577). Age: Danian.

"*simplex*" (Harland, 1979b, p.537–538, pl.3, figs.12–15) Edwards, 1984, p.587. Holotype: Harland, 1979b, pl.3, fig.12. **NOW** *Pyxidiella?*. Originally (and now) *Pyxidiella?*, subsequently *Tectatodinium*. Age: late Miocene.

TEHAMADINIUM Jan du Chêne et al., 1986b, p.20–21. This name was not validly published in Jan du Chêne et al. (1986a, p.352) since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1b). Type: Below, 1982a, pl.2, figs.13a–b, as *Occisucysta brixii*.

aculeatum (Klement, 1960, p.42, pl.5, figs.6–9; text-fig.21) Thomas and Cox, 1988, p.319 (August). Holotype: Klement, 1960, pl.5, figs.6–7. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly *Acanthaulax*, fourthly *Occisucysta*, fifthly (and now) *Tehamadinium*. Brenner (1988, p.89; October) also proposed this combination. Age: early Kimmeridgian.

**brixii* (Below, 1982a, p.29–30,32, pl.2, figs.3a–b,4a–b,5–11,12a–b,13a–b; pl.3, figs.10–17,21; textfigs.5a–d) Jan du Chêne et al., 1986b, p.20. Emendation: Jan du Chêne et al., 1986b, p.21–22, as *Tehamadinium brixii*. Holotype: Below, 1982a, pl.2, figs.13a–b; Jan du Chêne et al., 1986a, pl.116, figs.1–2; Jan du Chêne et al., 1986b, pl.13, figs.1–4; Fensome et al., 1993a, figs.1–2 — p.987. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. Jan du Chêne et al. (1986b, p.21) gave the citation "*Tehamadinium bixi* subsp. *bixi* (Below, 1982[a]) emend." but did not name any subspecies of *Tehamadinium brixii*. This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: early Valanginian.

coummia (Below, 1981a, p.61, pl.8, figs.6–7; pl.13, figs.10–11) Jan du Chêne et al., 1986b, p.21. Emendation: Jan du Chêne et al., 1986b, p.22–23, as *Tehamadinium coummia*. Holotype: Below, 1981a, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.118, figs.7–9; Jan du Chêne et al., 1986b, pl.14, figs.1–4; Fensome et al., 1991, figs.1–2 — p.631. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. N.I.A. Age: Albian.

crestatum (Jain, 1977b, p.175, pl.5, figs.63–65) Jan du Chêne et al., 1986b, p.21. Emendation: Jan du Chêne et al., 1986b, p.23–24, as *Tehamadinium crestatum*. Holotype: Jain, 1977b, pl.5, figs.63–65; Jan du Chêne et al., 1986a, pl.118, fig.11; Jan du Chêne et al., 1986b, pl.26, fig.4. Originally *Occisucysta*, subsequently (and now)

Tehamadinium. This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: early Albian.

daveyi Jan du Chêne et al., 1986b, p.24, pl.16, figs.1–15; pl.17, figs.1–5. Holotype: Jan du Chêne et al., 1986b, pl.16, figs.1–8. This name was not validly published in Jan du Chêne et al. (1986a, p.352) since the generic name *Tehamadinium* was not validly published and no holotype was designated. Age: Berriasian.

dodekovae Jan du Chêne et al., 1986b, p.25–26, pl.18, figs.1–9; pl.19, figs.1–6; text-fig.5, nos.1–2. Holotype: Jan du Chêne et al., 1986a, pl.116, figs.7–8; Jan du Chêne et al., 1986b, pl.18, figs.1,3,6–9. This name was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: Berriasian–early? Hauterivian.

evittii (Dodekova, 1969, p.14–15, pl.1, figs.1–6; pl.2, figs.1–12; text-figs.Aa–b) Jan du Chêne et al., 1986b, p.21. Emendation: Jan du Chêne et al., 1986b, p.26–27, as *Tehamadinium evittii*. Holotype: Dodekova, 1969, pl.1, figs.1–2; Jan du Chêne et al., 1986a, pl.117, figs.1–2; Jan du Chêne et al., 1986b, pl.20, figs.1–4. Originally *Gonyaulacysta*, subsequently *Occisucysta*, thirdly (and now) *Tehamadinium*. Taxonomic junior synonym: *Diacanthum hollisteri*, according to Below (1982a, p.32–33) — however, Jan du Chêne et al. (1986b, p.122) and Habib and Drugg (1987, p.762–763) retained *Diacanthum hollisteri*. This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: Tithonian.

konarae Dodekova, 1992, p.60–61, pl.10, figs.4–8. Holotype: Dodekova, 1992, pl.10, figs.4–7. Age: early Oxfordian–early Kimmeridgian.

mazaganense (Below, 1984, p.636–637, pl.6, figs.9A–C; pl.7, figs.1A–B; text-fig.7) Jan du Chêne et al., 1986b, p.21. Emendation: Jan du Chêne et al., 1986b, p.27, as *Tehamadinium mazaganense*. Holotype: Below, 1984, pl.7, figs.1A–B; Jan du Chêne et al., 1986a, pl.117, figs.4–6; Jan du Chêne et al., 1986b, pl.21, figs.1–9. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: late Albian.

sousense (Below, 1981a, p.61–62, pl.8, figs.1a–b,2) Jan du Chêne et al., 1986b, p.21. Emendation: Jan du Chêne et al., 1986b, p.27–28, as *Tehamadinium sousense*. Holotype: Below, 1981a, pl.8, figs.1a–b; Jan du Chêne et al., 1986a, pl.117, figs.7–10; Jan du Chêne et al., 1986b, pl.22, figs.1–5; Fensome et al., 1991, figs.1–5 — p.743. Originally *Occisucysta*, subsequently (and now) *Tehamadinium*. This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: late Aptian.

"*tenuiceras*" (Eisenack, 1958a, p.389–391, pl.21, figs.14–15; pl.22, figs.1–3; pl.24, fig.2; text-figs.4a–c,5) Jan du Chêne et al., 1986b, p.32. Emendations: Sarjeant, 1985a, p.63,65–66, as *Acanthaulax? tenuiceras*; Jan du Chêne et al., 1986b, p.29–30, as *Tehamadinium tenuiceras*. Holotype: Eisenack, 1958a, pl.21, fig.15; Sarjeant, 1985a, pl.6, figs.1–2; text-fig.3; Jan du Chêne et al., 1986a, pl.118, fig.1; Jan du Chêne et al., 1986b, pl.24, fig.5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta?*, thirdly *Diacanthum*, fourthly *Occisucysta*, fifthly *Acanthaulax?*, sixthly *Tehamadinium*, seventhly (and now) *Cribroperidinium?*. Taxonomic junior synonym: *Occisucysta* (subsequently *Tehamadinium*) *victorii*, according to Pöthe de Baldis and Ramos (1988, p.33). This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: late Barremian–Aptian.

"*victorii*" (Pöthe de Baldis and Ramos, 1983, p.444, pl.3, figs.6,8) Jan du Chêne et al., 1986b, p.21. Holotype: Pöthe de Baldis and Ramos, 1983, pl.3, figs.6,8; Jan du Chêne et al., 1986b, pl.26, figs.1–2. Originally *Occisucysta*, subsequently *Tehamadinium*. **Taxonomic senior synonym:** *Gonyaulax* (as *Occisucysta*, now *Cribroperidinium?*) *tenuiceras*, according to Pöthe de Baldis and Ramos (1988, p.33). This combination was not validly published in Jan du Chêne et al. (1986a, p.352), since the generic name *Tehamadinium* was not validly published. Age: early Aptian.

TENERIDINIUM Krutzsch, 1962, p.41. Type: Krutzsch, 1962, pl.10, figs.3–5, as *Teneridinium magnoides*.

lingulatum He Chengquan, 1991, p.67, pl.2, fig.32. Holotype: He Chengquan, 1991, pl.2, fig.32. Age: Paleocene.

**magnoides* Krutzsch, 1962, p.42, pl.10, figs.1–7; text-fig.1a. Holotype: Krutzsch, 1962, pl.10, figs.3–5. Age: Eocene.

"**TENUA**" Davey, 1978, p.894. **Name illegitimate** — **senior homonym**: *Tenua* Eisenack, 1958a. **Nomenclatural senior synonym**: *Sentusidinium* Sarjeant and Stover, 1978, which has the same type. Type: Sarjeant, 1968, pl.1, fig.22; pl.2, fig.1, as *Tenua rioultii*.

"**rioultii*" (Sarjeant, 1968, p.231, pl.1, figs.12,22; pl.2, figs.1–2,4) Davey, 1978, p.894. Emendation: Courtinat, 1989, p.192, as *Sentusidinium rioultii*. Holotype: Sarjeant, 1968, pl.1, fig.22; pl.2, fig.1; Fauconnier and Masure, 2004, pl.70, fig.4. **Combination illegitimate**: the generic name *Tenua* Davey is illegitimate. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly (and now) *Sentusidinium*, fourthly *Tenua* Davey (combination illegitimate). Age: late Callovian.

TENUA Eisenack, 1958a, p.410. Emendations: Sarjeant, 1968, p.230–231; Pocock, 1972, p.94; Sarjeant, 1985a, p.94. Junior homonym: *Tenua* Davey, 1978. Taxonomic senior synonym: *Cyclonephelium*, according to Sarjeant and Stover (1978, p.49) — however, Sarjeant (1985a, p.93) and Lentin and Williams (1989, p.365) retained *Tenua* Eisenack. Taxonomic junior synonym: *Cerbia*, according to Sarjeant (1985a, p.93–94) and Sarjeant (1992b, p.678) — however, Duxbury (2002, p.76,78) retained *Cerbia*. Duxbury (2002, p.78) considered that *Tenua* Eisenack may be the taxonomic senior synonym of *Circulodinium*. Type: Eisenack, 1958a, pl.23, fig.1, as *Tenua hystrix*.

?*americana* (Pöthe de Baldis and Ramos, 1983, p.432–433, pl.1, figs.6,9) Prössl, 1992b, p.116. Holotype: Pöthe de Baldis and Ramos, 1983, pl.1, fig.9. This combination was not validly published in Prössl (1990, p.99), since that author did not fully reference the basionym. Originally *Canningia*, subsequently (and now) *Tenua?* Eisenack. Questionable assignment: Prössl (1992b, p.116); and Courtinat in Fauconnier and Masure (2004, p.557) as a problematic species. Age: early Aptian.

"*anaphrissa*" (Sarjeant, 1966c, p.206, pl.22, fig.8; pl.23, fig.6; text-fig.55) Benedek, 1972, p.9–10. Emendation: Harding, 1990b, p.17–18, as *Pseudoceratium anaphrissum*. Holotype: Sarjeant, 1966c, pl.22, fig.8; text-fig.55. **NOW** *Pseudoceratium*. Originally *Doidyx*, subsequently *Tenua* Eisenack, thirdly *Aptea*, fourthly (and now) *Pseudoceratium*. Age: early Barremian.

"*aptiensis*" Burger, 1980a, p.76, pl.23, figs.1,5; pl.24, fig.1. Holotype: Burger, 1980a, pl.23, fig.1; Fauconnier and Masure, 2004, pl.63, figs.11–13. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Taxonomic junior synonym: *Tenua* (as *Sentusidinium*) *microrobusta*, according to Backhouse (1988, p.107). Age: Aptian.

"*asymmetra*" Fenton et al., 1980, p.160,162, pl.16, figs.1,3,5. Holotype: Fenton et al., 1980, pl.16, fig.3. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Age: late Bajocian–early Bathonian.

"*atlantica*" Habib, 1972, p.375, pl.4, figs.2,5. Holotype: Habib, 1972, pl.4, fig.2. **NOW** *Valvaeodinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium?*, thirdly *Fromea* (Appendix A), fourthly *Kylindrocysta*, fifthly (and now) *Valvaeodinium*. Taxonomic junior synonym: *Fromea complicata* (Appendix A), according to Davies (1983, p.31) — however, Jansonius (1989, p.65) retained *Fromea complicata*. Age: Callovian–Oxfordian.

aucda (Below, 1981a, p.8–9, pl.4, figs.3,5a–b; pl.12, fig.20; text-figs.6a–c,g) Lentin and Williams, 1993, p.638. Holotype: Below, 1981a, pl.4, fig.3; Fensome et al., 1991, fig.1 — p.577. Originally *Cerbia*, subsequently (and now) *Tenua* Eisenack. N.I.A. Age: Barremian.

"*baculata*" Dodekova, 1975, p.28–29, pl.6, figs.1–3; text-fig.7. Holotype: Dodekova, 1975, pl.6, figs.1–3. **NOW** *Barbatocysta*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Barbatocysta*. Age: late Bathonian.

- "bellula"** Jiabo, 1978, p.51, pl.23, figs.14–16. Holotype: Jiabo, 1978, pl.23, fig.15. **NOW** *Batiacasphaera*?. Originally *Tenua* Eisenack, subsequently *Kallosphaeridium*?, thirdly *Batiacasphaera*, fourthly (and now) *Batiacasphaera*?, fifthly *Sentusidinium*. Age: Early Tertiary.
- "bifidis"** Jiabo, 1978, p.51–52, pl.22, figs.7–16. Holotype: Jiabo, 1978, pl.22, fig.8. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently *Cleistosphaeridium*?, thirdly (and now) *Sentusidinium*. Age: Early Tertiary.
- "biornata"** Jiabo, 1978, p.52, pl.22, figs.21–29; pl.23, figs.1–4. Holotype: Jiabo, 1978, pl.22, fig.24. **NOW** *Sentusidinium biornatum*. Originally *Tenua biornata*, subsequently *Kallosphaeridium biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum*, fourthly *Batiacasphaera biornata*, fifthly (and now) *Sentusidinium biornatum*. Age: Early Tertiary.
- "brevispinosa"** (Pocock, 1962, p.81, pl.14, figs.222–223) Brideaux, 1977, p.15. Emendation: Brideaux, 1977, p.15–16, as *Tenua brevispinosa*. Holotype: Pocock, 1962, pl.14, fig.222; Jansonius, 1986, pl.4, fig.6; Fauconnier and Masure, 2004, pl.14, figs.7–8. **NOW** *Circulodinium*. Originally *Palaeohystrichophora*, subsequently *Tenua* Eisenack, thirdly *Canningia*?, fourthly *Cyclonephelium*, fifthly (and now) *Circulodinium*. Age: Barremian.
- "capillata"** Davey, 1975, p.155–156, pl.2, figs.4,7. Holotype: Davey, 1975, pl.2, fig.7. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Age: Senonian, ?Campanian.
- "capitata"** (Cookson and Eisenack, 1960b, p.252, pl.39, fig.9) Gitmez and Sarjeant, 1972, p.189. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.9; Fauconnier and Masure, 2004, pl.66, fig.1. **NOW** *Barbatacysta*. Originally *Hystrichosphaeridium*, subsequently *Prolixosphaeridium*, thirdly *Tenua* Eisenack, fourthly *Batiacasphaera*, fifthly (and now) *Barbatacysta*. Age: Oxfordian–Kimmeridgian.
- "colligata"** Morgan, 1980, p.32, pl.29, figs.6–11. Holotype: Morgan, 1980, pl.29, figs.6–8. **NOW** *Epelidosphaeridia*. Originally *Tenua* Eisenack, subsequently (and now) *Epelidosphaeridia*. Age: Aptian–early Albian.
- "dubia"** Jain and Millepied, 1975, p.152, pl.5, figs.75–76. Holotype: Jain and Millepied, 1975, pl.5, fig.76. **NOW** *Cyclonephelium*?. Originally *Tenua* Eisenack, subsequently *Cyclonephelium*, thirdly (and now) *Cyclonephelium*?. Age: Campanian–Maastrichtian.
- "echinata"** Gitmez and Sarjeant, 1972, p.190, pl.1, figs.1,9. Holotype: Gitmez and Sarjeant, 1972, pl.1, fig.1; Fauconnier and Masure, 2004, pl.63, fig.14. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*, thirdly *Batiacasphaera*, fourthly (and now) *Pilosidinium*. Age: early–late Kimmeridgian.
- "eisenackii"** Boltenhagen, 1977, p.56–58, pl.5, figs.5a–b,6a–b,7a–b,8a–b. Holotype: Boltenhagen, 1977, pl.5, figs.5a–b; Fauconnier and Masure, 2004, pl.69, fig.4. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently (and now) *Sentusidinium*. Taxonomic junior synonym: *Sentusidinium spiculatum*, according to Courtinat in Fauconnier and Masure (2004, p.485). Age: Cenomanian–Turonian.
- "evittii"** Pocock, 1972, p.94–95, pl.24, figs.6,8; text-fig.11. Holotype: Pocock, 1972, pl.24, fig.8, lost according to Jansonius (1986, p.208). Lectotype: Jansonius, 1986, pl.6, figs.8–9, designated by Jansonius (1986, p.208). **NOW** *Evansia*. Originally *Tenua* Eisenack, subsequently *Pareodinia*, thirdly *Glomodinium*, fourthly (and now) *Evansia*. Taxonomic junior synonyms: *Pareodinia tripartita* and (at specific rank) *Pareodinia tripartita* subsp. *rotunda*, both according to Wiggins (1975, p.105). Age: late Bajocian–Callovian.
- "formosa"** (Mao Shaozhi and Norris, 1988, p.31–32, pl.1, figs.9–10; text-fig.8, nos.1–2) Lentin and Williams, 1993, p.639. Holotype: Mao Shaozhi and Norris, 1988, pl.1, fig.9; text-fig.8, no.2. Originally *Cerbia*, subsequently (and now) *Tenua* Eisenack. Age: late Eocene–early Oligocene.

"*hystricella*" Eisenack, 1958a, p.411, pl.23, figs.5–7. Holotype: Eisenack, 1958a, pl.23, fig.5; Sarjeant, 1985a, pl.10, fig.6. **Taxonomic senior synonym:** *Tenua hystrix*, according to Eisenack and Kjellström (1972, p.1039). N.I.A. Age: Aptian.

**hystrix* Eisenack, 1958a, p.410, pl.23, figs.1–4; text-fig.10. Emendation: Sarjeant, 1985a, p.94–95, as *Tenua hystrix*. Holotype: Eisenack, 1958a, pl.23, fig.1; Sarjeant, 1985a, pl.10, fig.5; Sarjeant, 1992b, fig.1; Fauconnier and Masure, 2004, pl.80, fig.3. Originally (and now) *Tenua* Eisenack, subsequently *Cyclonephelium*. Taxonomic junior synonyms: *Tenua hystricella*, according to Eisenack and Kjellström (1972, p.1039); *Cyclonephelium* (as *Cerbia*) *tabulatum*, according to Sarjeant (1985a, p.95–96) and Sarjeant (1992b, p.681). Backhouse (1988, p.83) considered *Circulodinium hirtellum* to be a possible taxonomic junior synonym of this species. N.I.A. Age: Aptian.

"*kutharensis*" Khanna and Singh, 1981b, p.389–390, fig.1, nos.3,5; text-fig.1. Holotype: Khanna and Singh, 1981b, fig.1, no.3. **NOW** *Batiacasphaera*. Originally *Tenua* Eisenack, subsequently (and now) *Batiacasphaera*?. This name was not validly published in Khanna (1979, p.216) and Singh et al. (1979, p.35–36) since no description was provided. Age: late Paleocene.

"*microcysta*" Bujak in Bujak et al., 1980, p.88,90, pl.22, figs.2–5. Holotype: Bujak et al., 1980, pl.22, figs.2–3; Fauconnier and Masure, 2004, pl.64, figs.4–5. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Cleistosphaeridium*, thirdly *Sentusidinium*, fourthly (and now) *Pilosidinium*. Age: middle Eocene (see Aubry, 1986).

"*microrobusta*" Morgan, 1980, p.33, pl.29, figs.15–16. Holotype: Morgan, 1980, pl.29, figs.15–16. Originally *Tenua* Eisenack, subsequently *Sentusidinium*. **Taxonomic senior synonym:** *Tenua* (as *Batiacasphaera*, now *Pilosidinium*) *aptiensis*, according to Backhouse (1988, p.107). Age: late Neocomian–late Albian.

"*neophytensa*" Ioannides et al., 1977, p.463, pl.6, figs.5,8–9. Holotype: Ioannides et al., 1977, pl.5, fig.5. **NOW** *Pilosidinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*?, thirdly (and now) *Pilosidinium*. Age: middle Kimmeridgian.

"*pilosa*" (Ehrenberg, 1854, pl.37, section 8, fig.4) Sarjeant, 1968, p.231. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. Age: Oxfordian.

reductum (Châteauneuf, 1980, p.136, pl.21, fig.10) Courtinat in Fauconnier and Masure, 2004, p.557. Holotype: Châteauneuf, 1980, pl.21, fig.10; Fauconnier and Masure, 2004, pl.18, figs.11–15. Originally *Cyclonephelium*, subsequently (and now) *Tenua* Eisenack. Age: late Eocene (Marinesian–Ludian).

"*rioultii*" Sarjeant, 1968, p.231, pl.1, figs.12,22; pl.2, figs.1–2,4. Emendation: Courtinat, 1989, p.192, as *Sentusidinium rioultii*. Holotype: Sarjeant, 1968, pl.1, fig.22; pl.2, fig.1; Eisenack and Kjellström, 1972, figure to left — p.1043; Fensome et al., 1995, fig.1 — p.1743; Fauconnier and Masure, 2004, pl.70, fig.4. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly (and now) *Sentusidinium*, fourthly *Tenua* Davey (combination illegitimate). Age: late Callovian.

"*simlaensis*" Khanna and Singh, 1981b, p.390, fig.1, nos.8–9; text-fig.2. Holotype: Khanna and Singh, 1981b, fig.1, no.8. **NOW** *Batiacasphaera*?. Originally *Tenua* Eisenack, subsequently (and now) *Batiacasphaera*?. This name was not validly published in Khanna (1979, p.216) and Singh et al. (1979, p.35–36) since no description was provided. Age: early Eocene.

suturispinosa (He Chengquan, 1991, p.173, pl.10, figs.1–3) Lentin and Williams, 1993, p.640. Holotype: He Chengquan, 1991, pl.10, fig.1. Originally *Cerbia*, subsequently (and now) *Tenua* Eisenack. Age: middle Eocene.

"*taugourdeau*" Varma and Dangwal, 1964, p.68, pl.2, fig.9. Holotype: Varma and Dangwal, 1964, pl.2, fig.9. Originally *Tenua* Eisenack, subsequently *Hemicystodinium?*, thirdly *Batiacasphaera*. **Taxonomic senior synonym:** *Polysphaeridium subtile*, according to Lentin and Williams (1993, p.275). Taxonomic senior synonym: *Hystriospheraeridium* (now *Polysphaeridium*) *zoharyi*, according to Lentin and Williams (1981, p.26,127) — however, *Tenua taugoudeau* is now considered a taxonomic junior synonym of *Polysphaeridium subtile*. Age: Eocene–Oligocene.

"*varispinosa*" (Sarjeant, 1959, p.338–340, pl.13, fig.7; text-fig.6) Sarjeant, 1972, p.43. Holotype: Sarjeant, 1959, pl.13, fig.7; text-fig.6; Fauconnier and Masure, 2004, pl.49, fig.8. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium* (Appendix A), subsequently *Tenua* Eisenack, thirdly *Sentusidinium*, fourthly *Sentusidinium?*, fifthly *Cleistosphaeridium*, sixthly (and now) *Impletosphaeridium*. Age: early Callovian.

"*verrucosa*" Sarjeant, 1968, p.232, pl.1, fig.17; pl.2, figs.3,6. Holotype: Sarjeant, 1968, pl.1, fig.17; pl.2, figs.3,6; Fauconnier and Masure, 2004, pl.11, figs.2–3. **NOW** *Barbatacysta*. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly *Sentusidinium*, fourthly (and now) *Barbatacysta*. Age: late Callovian.

"*villersensis*" Sarjeant, 1968, p.231–232, pl.1, fig.16; pl.2, figs.5–10. Holotype: Sarjeant, 1968, pl.1, fig.16; Fauconnier and Masure, 2004, pl.70, fig.5. **NOW** *Sentusidinium*. Originally *Tenua* Eisenack, subsequently *Batiacasphaera*, thirdly (and now) *Sentusidinium*. Age: early Callovian–early Oxfordian.

wenquanensis Cheng Jinhui and He Chengquan 2006, p.280–281, fig.3s1–3s2; fig.5a–b. Holotype: Cheng Jinhui and He Chengquan 2006, fig.3s1–3s2; fig.5a–b. Age: late Kimmeridgian.

"subsp. *biornata*". Autonym. Holotype: Jiabo, 1978, pl.22, fig.24. **NOW** *Sentusidinium biornatum* subsp. *biornatum*. Originally *Tenua biornata* subsp. *biornata*, subsequently *Kallosphaeridium biornatum* subsp. *biornatum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *biparatum*, fourthly *Batiacasphaera biornata* subsp. *biornata*, fifthly (and now) *Sentusidinium biornatum* subsp. *biornatum*.

"subsp. *crassa*" Jiabo, 1978, p.52, pl.23, figs.1–4. Holotype: Jiabo, 1978, pl.23, fig.3. **NOW** *Sentusidinium biornatum* subsp. *crassum*. Originally *Tenua biornata* subsp. *crassa*, subsequently *Kallosphaeridium biornatum* subsp. *crassum* (combination not validly published), thirdly *Kallosphaeridium biparatum* subsp. *crassum*, fourthly *Batiacasphaera biornata* subsp. *crassa*, fifthly (and now) *Sentusidinium biornatum* subsp. *crassum*. Age: Early Tertiary.

"var. *eisenackii*". Autonym. Holotype: Boltenhagen, 1977, pl.5, figs.5a–b; Fauconnier and Masure, 2004, pl.69, fig.4. **Now redundant.**

"var. *vermiculata*" Boltenhagen, 1977, p.57–58, pl.5, figs.7a–b,8a–b. Holotype: Boltenhagen, 1977, pl.5, figs.7a–b; Fauconnier and Masure, 2004, pl.70, fig.6. **NOW** *Sentusidinium eisenackii?* subsp. *vermiculatum*. Originally *Tenua eisenackii* var. *vermiculata*, subsequently *Sentusidinium eisenackii?* subsp. *vermiculatum*, thirdly (and now) *Sentusidinium eisenackii?* subsp. *vermiculatum*. Age: Cenomanian–Turonian.

"subsp. *hystrix*". Autonym. Holotype: Eisenack, 1958a, pl.23, fig.1; Sarjeant, 1985a, pl.10, fig.5; Sarjeant, 1992b, fig.1; Fauconnier and Masure, 2004, pl.80, fig.3. **Now redundant.**

"subsp. *minor*" Jiabo, 1978, p.52–53, pl.23, figs.5–7. Holotype: Jiabo, 1978, pl.23, fig.5. **NOW** *Sentusidinium minus*. Originally *Tenua hystrix* subsp. *minor*, subsequently *Kallosphaeridium?* *minus*, thirdly *Batiacasphaera minor* (combination illegitimate), fourthly *Batiacasphaera sinensis*, fifthly *Batiacasphaera jiaboi* (name not validly published), sixthly (and now) *Sentusidinium minus*. Age: Early Tertiary.

"subsp. *longispinosa*" (Sarjeant, 1961a, p.102, pl.14, fig.8) Lentin and Williams, 1973, p.136. Holotype: Sarjeant, 1961a, pl.14, fig.8. Originally *Baltisphaeridium pilosum* var. *longispinosum* (Appendix A), subsequently *Tenua pilosa* subsp. *longispinosa*. **Taxonomic senior synonym** (at specific rank):

Prolixosphaeridium anasillum, according to Erkmen and Sarjeant (1980, p.64). Taxonomic senior synonym (at specific rank): *Hystrichosphaeridium xanthiopyxides* var. *granulosum* (as *Prolixosphaeridium granulosum*), according to Sarjeant (1976c, p.19) — however, the taxon is now considered a taxonomic junior synonym (at specific rank) of *Prolixosphaeridium anasillum*. Age: early Oxfordian.

"subsp. *pilosa*". Autonym. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **Now redundant.**

TERNIA Helby and Stover, 1987a, p.135. Type: Helby and Stover, 1987a, figs.4A–C, as *Ternia balmei*.

**balmei* Helby and Stover, 1987a, p.135–136, 138–139, figs.2A–C, 3A–I, 4A–C, 5B, 6A–F, 7A–B. Holotype: Helby and Stover, 1987a, figs.4A–C; Fensome et al., 1993a, figs.1–2 — p.955. Age: late Bathonian–middle Callovian.

TETRACHACYSTA Backhouse, 1988, p.109–110. Type: Backhouse, 1988, pl.42, figs.1a–b; text-figs.32B–C, as *Tetrachacysta allenii*.

**allenii* Backhouse, 1988, p.110, pl.42, figs.1a–b, 2a–b, 3; text-figs.32A–C. Holotype: Backhouse, 1988, pl.42, figs.1a–b; text-figs.32B–C; Fensome et al., 1993a, figs.1–2 — p.905. Taxonomic junior synonym: *Horologinella biconvexa* subsp. *granulata*, according to Xu Jinli et al. (1997, p.42) — however, He Chengquan et al., 2009, p.374 retained that taxon. Age: ?Valanginian–early Barremian.

amphidoxosum (Jiabo, 1978, p.93, pl.6, fig.2) He Chengquan et al., 2009, p.373. Holotype: Jiabo, 1978, pl.6, fig.2. **NOW** *Tetrachacysta*. Originally *Dinogymnium*?, subsequently *Microdinium*, thirdly (and now) *Tetrachacysta*. Age: Early Tertiary.

?*baculata* Backhouse, 1988, p.110–111, pl.42, figs.4–5; pl.51, figs.2–3. Holotype: Backhouse, 1988, pl.42, fig.5; Fensome et al., 1996, fig.2 — p.2059. Questionable assignment: Backhouse (1988, p.110). Age: late Tithonian–Valanginian.

biconvexa (Jiabo, 1978, p.95, pl.29, figs.20–21) He Chengquan et al., 2009, p.374. Holotype: Jiabo, 1978, pl.29, fig.21. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

subsp. *biconvexa*. Autonym. Holotype: Jiabo, 1978, pl.29, fig.21. Originally *Horologinella biconvexa* subsp. *biconvexa*, subsequently (and now) *Tetrachacysta biconvexa* subsp. *biconvexa*.

subsp. *granulata* (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.70, pl.10, figs.3–8) He Chengquan et al., 2009, p.374. Holotype: Liu Zhili et al., 1992, pl.10, fig.7. Originally *Horologinella biconvexa* subsp. *granulata*, subsequently (and now) *Tetrachacysta biconvexa* subsp. *granulata*. Taxonomic senior synonym: *Tetrachacysta allenii*, according to Xu Jinli et al. (1997, p.42) — however, He Chengquan et al., 2009, p.374 retained this taxon. Age: Early Tertiary.

subsp. *laevigata* (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.69–70, pl.10, figs.1–2) He Chengquan et al., 2009, p.374. Holotype: Liu Zhili et al., 1992, pl.10, fig.2. Originally *Horologinella biconvexa* subsp. *laevigata*, subsequently (and now) *Tetrachacysta biconvexa* subsp. *laevigata*. Age: Early Tertiary.

dawanensis (Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.70, pl.10, figs.13–14) He Chengquan et al., 2009, p.375. Holotype: Liu Zhili et al., 1992, pl.10, fig.13. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

granulata (Jiabo, 1978, p.94, pl.6, figs.7–8) Mao Shaozhi et al., 1999, p.158. Holotype: Jiabo, 1978, pl.6, fig.7. Originally *Dinogymnium*, subsequently *Microdinium*, thirdly *Dinogymniopsis*, fourthly (and now) *Tetrachacysta*. Mao Shaozhi et al. (1999, p.158) attributed this species to Gao Ruiqi et al. (1992a), but clearly intended *Dinogymnium granulatum* Jiabo 1978 and gave a full citation for the correct basionym. Age: Early Tertiary.

?*keenei* Marshall, 1989, p.51–52, pl.7, figs.1–12; text-figs.15A–C. Holotype: Marshall, 1989, pl.7, figs.5–7; text-fig.15B; Fensome et al., 1996, figs.4–6,11 — p.2179. Questionable assignment: Marshall (1989, p.51). Age: Turonian–early Santonian.

magnusa (Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.70–71, pl.10, fig.11; text-fig.4) He Chengquan et al., 2009, p.375. Holotype: Liu Zhili et al., 1992, pl.10, fig.11; text-fig.4. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

minuta (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.70, pl.10, figs.9–10,12 — not text-fig.4) He Chengquan et al., 2009, p.376. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Holotype: Liu Zhili et al., 1992, pl.10, fig.9. Age: Early Tertiary.

multispinosa (Xu Jinli et al., 1997, p.118, pl.22, figs.7–8) He Chengquan et al., 2009, p.376,671. Holotype: Xu Jinli et al., 1997, pl.22, fig.8. Originally *Delozonocysta* (name not validly published), subsequently (and now) *Tetrachacysta*. The name *Delozonocysta multispinosa* was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.671) validated the name by publishing an English diagnosis on proposing the transfer to *Tetrachacysta*. Age: middle-late Eocene.

parvita (Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.67, pl.7, figs.26–28) He Chengquan et al., 2009, p.377. Holotype: Liu Zhili et al., 1992, pl.7, fig.26. Originally *Dinogymnium*, subsequently (and now) *Tetrachacysta*. Age: Early Tertiary.

spinosigibberosa (Brideaux and Fisher, 1976, p.22–24, pl.4, fig.9; pl.5, figs.1–16) Backhouse, 1988, p.110. Holotype: Brideaux and Fisher, 1976, pl.5, figs.1,5–8. Originally *Horologinella*, subsequently (and now) *Tetrachacysta*. Age: late Oxfordian–?Portlandian.

spinulosa (Gao Ruiqi et al., 1992a, p.19–20,26, pl.1, figs.7–8) Mao Shaozhi et al., 1999, p.158. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.7. Originally *Dinogymniopsis*, subsequently (and now) *Tetrachacysta*. Taxonomic junior synonym: *Dinogymnium velutinum*, according to He Chengquan et al. (2009, p.377). Age: Cenomanian.

tuberculata (Gao Ruiqi et al., 1992a, p.20,27, pl.1, figs.5–6) Mao Shaozhi et al., 1999, p.158–159. Holotype: Gao Ruiqi et al., 1992a, pl.1, fig.5. Originally *Dinogymniopsis*, subsequently (and now) *Tetrachacysta*. Taxonomic junior synonym: *Dinogymnium cavituberculatum*, according to He Chengquan et al. (2009, p.377). Age: Cenomanian.

TETRAMEROSPHAERA Willems, 1985, p.183. Emendation: Willems, 1988, p.452. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1302). Type: Willems, 1985, pl.1, figs.1a–d, as *Tetramerosphaera lacrimula*.

**lacrimula* Willems, 1985, p.183–190, pl.1, figs.1a–d,2,3a–c; pl.2, figs.4–6,7a–c,8,9a–b; pl.3, figs.10–11,12a–b,13–14; pl.4, figs.15a–b,16a–b,17a–b,18a–c,19a–b,20a–c; text-fig.2. Holotype: Willems, 1985, pl.1, figs.1a–d. N.I.A. Age: late Maastrichtian.

"**rara*" Górká, 1965, p.307, pl.2, figs.6a–b. Holotype: Górká, 1965, pl.2, figs.6a–b. **NOW** *Gorkadinium*. Originally *Tetrasphaera* Górká (generic name illegitimate), subsequently (and now) *Gorkadinium*. Following I.C.N. Article 55.1, the species name *Tetrasphaera rara* is validly published even though the generic name *Tetrasphaera* Górká, 1965 is illegitimate. Age: early Kimmeridgian.

"**TETRASPHERA**" Górká, 1965, p.307. **Name illegitimate** — **senior homonym**: *Tetrasphaera* Popovsky, 1912. **Substitute name**: *Gorkadinium*. Type: Górká, 1965, pl.2, figs.6a–b, as *Tetrasphaera rara*.

TETRATROPIS Willems, 1990, p.242–244. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1302, the latter noting that the cyst wall is pithonelloid and so a dinoflagellate affinity is

questionable). Emendations: Bison et al., 2004, p.127; Odin, 2009, p.185. Type: Willems, 1990, pl.1, figs.1a–d, as *Tetratropis corbula*.

**corbula* Willems, 1990, p.244–248, pl.1, figs.1a–d,2a–d; text-figs.1a–c. Holotype: Willems, 1990, pl.1, figs.1a–d. Hildebrand-Habel and Willems (1997, p.183) referred to this name as a new combination. N.I.A. Age: middle Coniacian.

medicamen Odin, 2009, p.185, pl.4, figs.57–64. Holotype: Odin, 2009, pl.4, fig.57–59. Odin (2009) did not provide an English or Latin description; however, the name *Tetratropis medicamen* can be considered validly published as Odin was using the I.C.Z.N. Age: late Campanian.

patina Willems, 1990, p.248–250, pl.2, figs.3a–b,4,5a–b,6a–b,7; text-figs.2a–c. Holotype: Willems, 1990, pl.2, figs.3a–b. Hildebrand-Habel and Willems (1997, p.183) referred to this name as a new combination. N.I.A. Age: middle Coniacian.

terrina Bison et al., 2004, p.128–132, pl.1, figs.1–6: pl.2, figs.1–6. Holotype: Bison et al., 2004, pl.1, figs.1,3. Age: late Campanian.

THALASSIPHORA Eisenack and Gocht, 1960, p.513. Emendations: Williams and Downie, 1966c, p.234; Gocht, 1968, p.153; Benedek and Gocht, 1981, p.59. Taxonomic senior synonym: *Disphaeria*, according to Norvick (1973, p.45) — however, Lentin and Williams (1985, p.353) retained *Thalassiphora*. Taxonomic junior synonyms: *Erikania*, according to Stover and Evitt (1978, p.194); *Subathua*, according to Lentin and Williams (1985, p.340) and Stover and Williams (1987, p.207). Type: Eisenack, 1954b, pl.12, fig.17, as *Pterospermopsis pelagica*.

angusta He Chengquan, 1991, p.124, pl.10, figs.4–6. Holotype: He Chengquan, 1991, pl.10, fig.6. Age: middle Eocene.

balcanica Balteş, 1971, p.6, pl.3, figs.3–7. Holotype: Balteş, 1971, pl.3, figs.3–7. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*, thirdly *Subathua* (combination not validly published), fourthly *Spiniferites*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Stover and Evitt (1978, p.194) — however, Sütő-Szentai (2000, p.162) retained *Thalassiphora* (as *Spiniferites*) *balcanica*. This species is herein retained in *Thalassiphora* as its morphology clearly accords with that genus rather than with *Spiniferites*. Age: early Pliocene.

bononiensis Corradini, 1973, p.185–186, pl.30, figs.5,6a–b,8a–b; pl.37, figs.5a–b; pl.38, fig.1; pl.39, fig.1. Holotype: Corradini, 1973, pl.30, figs.6a–b. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Lentin and Williams (1985, p.353) retained this species in *Thalassiphora*. Age: Late Cretaceous–Paleocene.

chinensis He Chengquan, 1991, p.124–125, pl.11, figs.8–9. Holotype: He Chengquan, 1991, pl.11, figs.8–9. Age: early Eocene.

decrementa Islam, 1983b, p.343–344, pl.4, figs.4–5; text-fig.7. Holotype: Islam, 1983b, pl.4, figs.4–5; text-fig.7. Age: middle Eocene.

"*defloccata*" (Davey and Verdier, 1973, p.198, pl.3, figs.6,8) Lentin and Williams, 1976, p.85. Holotype: Davey and Verdier, 1973, pl.3, fig.8. **NOW** *Leberidocysta*. Originally *Hexagonifera*, subsequently *Thalassiphora*, thirdly (and now) *Leberidocysta*, fourthly *Disphaeria*, fifthly *Craspedodinium*. Age: late Albian–early Cenomanian.

delicata Williams and Downie, 1966c, p.235, pl.26, fig.8. Emendation: Eaton, 1976, p.287, as *Thalassiphora delicata*. Holotype: Williams and Downie, 1966c, pl.26, fig.8; Bujak et al., 1980, pl.10, fig.8. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Lentin and Williams (1977b, p.54) retained this species in *Thalassiphora*. Age: early Eocene.

dominiqui Iakovleva and Heilmann-Clausen, 2010, p.211, pl.11, figs.1–4. Holotype: Iakovleva and Heilmann-Clausen, 2010, pl.11, figs.1–2. Age: late Ypresian.

dynamica (Morgenroth, 1966a, p.27–28, pl.6, figs.7–8) Stover and Evitt, 1978, p.195. Holotype: Morgenroth, 1966a, pl.6, fig.8. Originally *Erikania*, subsequently (and now) *Thalassiphora*. Taxonomic junior synonym: *Thalassiphora* (as and now *Disphaeria*) *munda*, according to Yun Hyesu (1981, p.70) — however, Lentin and Williams (1985, p.353) retained *Disphaeria munda*. Age: early Eocene.

elongata Vasilyeva in Vasilyeva et al., 2001, p.67–68, pl.1, figs.1–2,6 ex Vasilyeva in Andreeva-Grigorovich et al., 2011, p.31–32, pl.4, figs.1–8. Holotype: Andreeva-Grigorovich et al., 2011, pl.4, figs.1–5. This species was not validly published in Vasilyeva et al. (2001), since no English or Latin diagnosis was provided. We provisionally interpret the five images listed as the holotype to represent a single specimen that has been manipulated; if it is found that they represent more than one specimen, the name *Thalassiphora elongata* would remain to be validated. Age: late Eocene–early Oligocene.

"*eocenica*" Yu Jingxian, 1989, p.159, pl.43, figs.1,3,6; text-fig.3. Emendation: He Chengquan et al., 2009, p.645, as *Muratodinium eocenicum*. Holotype: Yu Jingxian, 1989, pl.43, fig.3. **NOW** *Muratodinium*. Originally *Thalassiphora*, subsequently (and now) *Muratodinium*. Age: Eocene.

fenestrata Liengjarern et al., 1980, p.489, pl.54, fig.1. Holotype: Liengjarern et al., 1980, pl.54, fig.1. Age: late Eocene–early Oligocene.

flammea Cookson and Eisenack, 1967b, p.252–253, pl.42, figs.1–5. Holotype: Cookson and Eisenack, 1967b, pl.42, fig.1. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Lentin and Williams (1985, p.353) retained this species in *Thalassiphora*. Age: late Paleocene.

"*gonoperforata*" Strauss, 1991b, p.68. **Name not validly published**: no description or illustration. **NOW** *Cousteaudinium aubryae* subsp. *gonoperforatum*. Originally *Thalassiphora gonoperforata* (name not validly published), subsequently (and now) *Cousteaudinium aubryae* subsp. *gonoperforatum*. The name *Thalassiphora gonoperforata* was also not validly published in Rusbült and Strauss (1992, p.156) and Lund et al. (1993, caption to pl.1, fig.13). Age: middle Miocene.

graciliis Heilmann-Clausen and Van Simaëys, 2005, p.182,184, pl.12, figs.1–3; pl.14, fig.3. Holotype: Heilmann-Clausen and Van Simaëys, 2005, pl.12, fig.1. Age: middle-late Eocene.

indica Saxena and Sarkar, 2000, p.259, pl.1, figs.11–12. Holotype: Saxena and Sarkar, 2000, pl.1, fig.12. Age: middle Eocene.

inflata Heilmann-Clausen in Thomsen and Heilmann-Clausen, 1985, p.355,361, pl.7, figs.3–8; text-figs.11A–F. Holotype: Thomsen and Heilmann-Clausen, 1985, pl.7, figs.5–6; text-figs.11C–D. Originally (and now) *Thalassiphora*, subsequently *Flandrecysta* (name not validly published). Age: Danian–early Selandian.

jabliensis Khanna and Singh, 1981b, p.393, fig.3, nos.5–6; text-fig.7. Holotype: Khanna and Singh, 1981b, fig.3, no.5. Age: middle Eocene.

kacharica Vasilyeva in Vasilyeva et al., 2001, p.68, pl.2, figs.1–2 ex Vasilyeva in Andreeva-Grigorovich et al., 2011, p.32–33, pl.4, figs.9–12. Holotype: Vasilyeva et al., 2001, pl.2, fig.1; Andreeva-Grigorovich et al., 2011, pl.4, fig.9. This species was not validly published in Vasilyeva et al. (2001), since no English or Latin diagnosis was provided. Age: late Eocene–early Oligocene.

?*maxima* Jain and Millepied, 1975, p.146, pl.4, figs.53–54. Holotype: Jain and Millepied, 1975, pl.4, fig.54. Originally *Thalassiphora*, subsequently (and now) *Thalassiphora?*, thirdly *Disphaeria*. Lentin and Williams (1985, p.354) questionably retained the species in *Thalassiphora*. Questionable assignment: Stover and Evitt (1978, p.195). Age: Campanian–Maastrichtian.

microcysta Singh, 1983, p.153–154, pl.56, figs.7–8; pl.57, fig.1. Holotype: Singh, 1983, pl.56, fig.7. Age: early Cenomanian.

microperforata Heilmann-Clausen and Van Simaey, 2005, p.184,186, pl.13, figs.1–3; pl.14, fig.2. Holotype: Heilmann-Clausen and Van Simaey, 2005, pl.13, figs.1–2. Age: middle-late Eocene.

"*munda*" Davey and Verdier, 1973, p.196, pl.3, figs.5,7,10. Holotype: Davey and Verdier, 1973, pl.3, fig.10. **NOW** *Disphaeria*. Originally *Thalassiphora*, subsequently (and now) *Disphaeria*. Taxonomic senior synonym: *Erikania* (as and now *Thalassiphora*) *dynamica*, according to Yun Hyesu (1981, p.70) — however, Lentin and Williams (1985, p.353) retained *Thalassiphora* (as *Disphaeria*) *munda*. Age: late Albian–Cenomanian.

ovata He Chengquan, 1991, p.125, pl.11, figs.10–12. Holotype: He Chengquan, 1991, pl.11, fig.11. Age: Paleocene–early Eocene.

"*pansa*" Stover, 1977, p.78–79, pl.2, figs.32–38. Holotype: Stover, 1977, pl.2, figs.34–36. **NOW** *Saturnodinium*. Originally *Thalassiphora*?, subsequently (and now) *Saturnodinium*. Questionable assignment: Stover (1977, p.78). Age: middle-late Oligocene.

papulovii Vasilyeva in Vasilyeva et al., 2001, p.68, pl., figs.3–5,7 ex Vasilyeva in Andreeva-Grigorovich et al., 2011, p.33–34, pl.4, figs.13–16. Holotype: Vasilyeva et al., 2001, pl.2, fig.3; Andreeva-Grigorovich et al., 2011, pl.4, fig.13. This species was not validly published in Vasilyeva et al. (2001), since no English or Latin diagnosis was provided. Age: late Eocene–early Oligocene.

patula (Williams and Downie, 1966c, p.217, pl.24, figs.1–2; text-fig.58) Stover and Evitt, 1978, p.195. Holotype: Williams and Downie, 1966c, pl.24, fig.2; text-fig.58. Originally *Adnatosphaeridium*?, subsequently (and now) *Thalassiphora*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Benedek and Gocht (1981, p.59) — however, Lentin and Williams (1985, p.354) retained *Thalassiphora patula*. Taxonomic junior synonym: *Subathua sahnii*, according to Stover and Williams (1987, p.207) and Lentin and Williams (1989, p.354). Bujak et al. (1980, p.36) also proposed this combination. Age: early Eocene.

**pelagica* (Eisenack, 1954b, p.71, pl.12, figs.17–18) Eisenack and Gocht, 1960, p.513–514. Emendation: Benedek and Gocht, 1981, p.59–61, as *Thalassiphora pelagica*. Holotype: Eisenack, 1954b, pl.12, fig.17. Originally *Pterospermopsis* (Appendix A), subsequently (and now) *Thalassiphora*, thirdly *Disphaeria*. Lentin and Williams (1977b, p.54) retained this species in *Thalassiphora*. Taxonomic junior synonyms: *Thalassiphora sueroi* and *Thalassiphora* (as *Disphaeria*) *balcanica*, both according to Stover and Evitt (1978, p.194) — however, Sütő-Szentai (2000, p.162) retained *Thalassiphora* (as *Spiniferites*) *balcanica*; *Pterocystidiopsis* (as *Thalassiphora*) *velata* and *Adnatosphaeridium* (as *Thalassiphora*) *patulum*, both according to Benedek and Gocht (1981, p.59) — however, Lentin and Williams (1985, p.354) retained *Thalassiphora patula* and Brinkhuis and Biffi (1993, p.179) retained *Pterocystidiopsis* (as and now *Thalassiphora*) *velata*; *Subathua sahnii*, according to Lentin and Williams (1985, p.340) — however, *Subathua sahnii* is now considered to be a taxonomic junior synonym of *Adnatosphaeridium* (as and now *Thalassiphora*) *patulum*; *Subathua spinosa*, according to Lentin and Williams (1985, p.340) — however, Stover and Williams (1987, p.207) retained *Subathua* (as *Thalassiphora*) *spinosa* (now *Thalassiphora simlaensis*). Age: late Eocene–early Oligocene.

"*petila*" Corradini, 1973, p.186, pl.31, figs.1–2. Emendation: Slimani, 1994, p.65, as *Wilsonisphaera petila*. Holotype: Corradini, 1973, pl.31, fig.2. **NOW** *Wilsonisphaera*. Originally *Thalassiphora*?, subsequently *Disphaeria*, thirdly (and now) *Wilsonisphaera*. Taxonomic junior synonym: *Glaphyrosphaera glabra*, according to Schiøler and Wilson (1995, p.511). Lentin and Williams (1985, p.354) questionably retained this species in *Thalassiphora*. Questionable assignment: Corradini (1973, p.186). Age: Senonian.

reticulata Morgenroth, 1966b, p.6–7, pl.2, figs.1–2. Holotype: Morgenroth, 1966b, pl.2, figs.1–2; Sarjeant et al., 1987, pl.1, fig.4. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Lentin and Williams (1977b, p.54) retained this species in *Thalassiphora*. Age: early Oligocene.

robusta Smith and Harding, 2004, p.376–377, pl.5, figs.1–3,12. Holotype: Smith and Harding, 2004, pl.5, figs.1–2. Age: middle Volgian.

rota Schiøler, 2005, p.31–32, pl.5, figs.1–4; text-figs.7a–b. Holotype: Schiøler, 2005, pl.5, fig.1; text-fig.7a. Age: latest Aquitanian–earliest Burdigalian.

salvadorensis (Regali et al., 1974, p.290, pl.23, fig.1) Lentin and Williams, 1981, p.279. Holotype: Regali et al., 1974, pl.23, fig.1. Originally *Hystriochosphaeridium*, subsequently (and now) *Thalassiphora*. Age: Eocene.

simlaensis Lentin and Williams, 1993, p.644. Holotype: Khanna and Singh, 1980, pl.1, fig.10. Originally *Subathua spinosa*, subsequently *Thalassiphora spinosa* (combination illegitimate), thirdly (and now) *Thalassiphora simlaensis*. Substitute name for *Thalassiphora spinosa* (Khanna and Singh, 1980, p.309, pl.1, figs.10–12; text-fig.3) Stover and Williams, 1987, p.207 (an illegitimate name). Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Lentin and Williams (1985, p.340) — however, Stover and Williams (1987, p.207) retained *Thalassiphora simlaensis* (as *Thalassiphora spinosa*). Nomenclatural junior synonym: *Muratodinium subathuensis*, since in proposing this species Sarkar (2012, p.174) included the holotype of *Thalassiphora simlaensis* (= *Subathua spinosa*) in synonymy with *Muratodinium subathuensis*. Age: Eocene.

?*spinifera* (Cookson and Eisenack, 1965a, p.124–125, pl.14, fig.10) Stover and Evitt, 1978, p.195. Holotype: Cookson and Eisenack, 1965a, pl.14, fig.10. Originally *Stephodinium*, subsequently (and now) *Thalassiphora*?. Questionable assignment: Stover and Evitt (1978, p.195). Age: late Eocene.

"?*spinosa*" (Clarke and Verdier, 1967, p.77–78, pl.17, figs.1–2; text-fig.31) Foucher, 1975, caption to pl.1, figs.7–8. Holotype: Clarke and Verdier, 1967, pl.17, fig.1. **NOW** *Whitecliffia*. Originally *Pterospermopsis* (Appendix A), subsequently *Pterospermella* (Appendix A), thirdly *Thalassiphora*?, fourthly (and now) *Whitecliffia*. Questionable assignment: Foucher (1975, caption to pl.1). Taxonomic junior synonym: *Hexagonifera perforata* (name not validly published), according to Slimani (2001a, p.194). Junior homonym: *Thalassiphora spinosa* (Khanna and Singh, 1980) Stover and Williams, 1987. Foucher (1976, caption to pl.2, fig.3 — p.218) also proposed this combination. Age: Santonian.

"*spinosa*" (Khanna and Singh, 1980, p.309, pl.1, figs.10–12; text-fig.3) Stover and Williams, 1987, p.207. Holotype: Khanna and Singh, 1980, pl.1, fig.10. **Combination illegitimate — senior homonym:** *Thalassiphora spinosa* (Clarke and Verdier, 1967) Foucher, 1975. **Substitute name:** *Thalassiphora simlaensis*. Originally *Subathua spinosa*, subsequently *Thalassiphora spinosa* (combination illegitimate), thirdly (and now) *Thalassiphora simlaensis*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Lentin and Williams (1985, p.340) — however, Stover and Williams (1987, p.207) retained *Subathua* (as *Thalassiphora*) *spinosa* (now *Thalassiphora simlaensis*). Nomenclatural junior synonym: *Muratodinium subathuensis*, since in proposing this species Sarkar (2012, p.174) included the holotype of *Thalassiphora simlaensis* (= *Subathua spinosa*) in synonymy with *Muratodinium subathuensis*. Age: Eocene.

succincta Morgenroth, 1966b, p.7–8, pl.2, figs.7–9. Holotype: Morgenroth, 1966b, pl.2, fig.7. Originally (and now) *Thalassiphora*, subsequently *Disphaeria*. Lentin and Williams (1977b, p.54) retained this species in *Thalassiphora*. Age: early Oligocene.

"*sueroi*" Pöthe de Baldis, 1966, p.224–225, pl.2, fig.d. Holotype: Pöthe de Baldis, 1966, pl.2, fig.d. Originally *Thalassiphora*, subsequently *Disphaeria*. Lentin and Williams (1985, p.355) retained this species in *Thalassiphora*. **Taxonomic senior synonym:** *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Stover and Evitt (1978, p.194). Age: Early Tertiary.

velata (Deflandre and Cookson, 1955, p.291, pl.8, fig.8) Eisenack and Gocht, 1960, p.514–515. Holotype: Deflandre and Cookson, 1955, pl.8, fig.8. Originally *Pterocystidiopsis* (Appendix A), subsequently (and now) *Thalassiphora*, thirdly *Disphaeria*. Brinkhuis and Biffi (1993, p.179) retained this species in *Thalassiphora*. Taxonomic senior synonym: *Pterospermopsis* (as and now *Thalassiphora*) *pelagica*, according to Benedek and Gocht (1981, p.59) and Sarjeant (1981, p.117) — however, Brinkhuis and Biffi (1993, p.179) retained *Thalassiphora velata*. Age: Early Tertiary.

"**THULEDINIUM**" Pocock and Sarjeant, 1972, p.352. **Taxonomic senior synonym:** *Mendicodinium*, according to Davey (1979c, p.64). Pocock and Sarjeant (1972, p.352) considered *Thuledinium* to be an acritarch. Type: Pocock and Sarjeant, 1972, pl.2, fig.1; text-fig.2, as *Thuledinium groenlandicum*.

"**groenlandicum*" Pocock and Sarjeant, 1972, p.352–354, pl.2, figs.1–9; text-fig.2. Holotype: Pocock and Sarjeant, 1972, pl.2, fig.1; text-fig.2. **NOW** *Mendicodinium*. Originally *Thuledinium*, subsequently (and now) *Mendicodinium*. Taxonomic junior synonym: *Mendicodinium woodhamense*, according to Kunz (1990, p.38). Age: middle Callovian.

TIANJINELLA He Chengquan and Sun Xuekun, 1996, p.384–385. Taxonomic junior synonym: *Delozonocysta*, according to He Chengquan et al. (2009, p.126). Type: He Chengquan and Sun Xuekun, 1996, pl.1, fig.1, as *Tianjinella elliptica*.

brevispinosa (Xu Jinli et al., 1997, p.116–117, 153, pl.8, figs.12, 13a–b, 14a–b, 15a–b, 16–17; pl.9, figs.2, 8; text-fig.12) He Chengquan et al. 2009, p.127. Originally *Delozonocysta*, subsequently (and now) *Tianjinella*. Holotype: Xu Jinli et al., 1997, pl.8, figs.13a–b. Age: middle-late Eocene.

displicata Xu Jinli et al., 1997, p.117, pl.9, fig.7 ex He Chengquan et al., 2009, p.127, 671. Holotype: Xu Jinli et al., 1997, pl.9, fig.7. Originally *Delozonocysta* (name not validly published), subsequently (and now) *Tianjinella*. The name *Delozonocysta displicata* was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.671) validated the name by publishing an English diagnosis on proposing the transfer to *Tianjinella*. Age: middle-late Eocene.

**elliptica* He Chengquan and Sun Xuekun, 1996, p.385, pl.1, figs.1–9; pl.2, figs.1–6; text-fig.3. Holotype: He Chengquan and Sun Xuekun, 1996, pl.1, fig.1. Age: Eocene.

longispinosa Xu Jinli et al., 1997, p.117–118, pl.9, figs.1a–c, 3a–b, 4–6 ex He Chengquan et al., 2009, p.128, 672. Holotype: Xu Jinli et al., 1997, pl.9, figs.1a–c. Originally *Delozonocysta* (name not validly published), subsequently (and now) *Tianjinella*. The name *Delozonocysta longispinosa* was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.672) validated the name by publishing an English diagnosis on proposing the transfer to *Tianjinella*. Age: middle-late Eocene.

ovata (Jiabo, 1978, p.94, pl.6, fig.1) He Chengquan and Sun Xuekun, 1996, p.385. Holotype: Jiabo, 1978, pl.6, fig.1. Originally *Dinogymnium ovatum*, subsequently *Microdinium jiaboense*, thirdly (and now) *Tianjinella ovata*. Age: Early Tertiary.

"**TITYROSPHAERIDIUM**" Sarjeant, 1981, p.120. **Taxonomic senior synonym:** *Cordosphaeridium*, according to Lentin and Williams (1985, p.355) and Edwards (2001, p.G19). Type: Brosius, 1963, pl.6, fig.1, as *Hystrichosphaeridium cantharellus*.

"**biarmatum*" (Morgenroth, 1966a, p.21, pl.4, figs.6–7) Sarjeant, 1981, p.121. Holotype: Morgenroth, 1966a, pl.4, figs.6–7. **NOW** *Cordosphaeridium*. Originally (and now) *Cordosphaeridium*, subsequently *Tityrosphaeridium*?. Questionable assignment: Sarjeant (1981, p.121). Age: early Eocene.

"**callosum*" (Morgenroth, 1966a, p.21, pl.4, figs.8–10) Sarjeant, 1981, p.121. Holotype: Morgenroth, 1966a, pl.4, figs.9–10. **NOW** *Cordosphaeridium*?. Originally *Cordosphaeridium*, subsequently (and now) *Cordosphaeridium*?, thirdly *Tityrosphaeridium*?. Questionable assignment: Sarjeant (1981, p.121). Age: early Eocene.

"**cantharellus*" (Brosius, 1963, p.40–41, pl.6, fig.1; text-fig.2, nos.11a–c) Sarjeant, 1981, p.120. Holotype: Brosius, 1963, pl.6, fig.1; Fensome et al., 1993a, fig.1 — p.1021. **NOW** *Cordosphaeridium*. Originally *Hystrichosphaeridium*, subsequently (and now) *Cordosphaeridium*, thirdly *Tityrosphaeridium*. N.I.A. Age: late Oligocene.

"**exilimum*" (Davey and Williams, 1966b, p.87, pl.11, fig.2) Jain and Garg, 1986a, p.120. Holotype: Davey and Williams, 1966b, pl.11, fig.2; Bujak et al., 1980, pl.7, figs.4–5. Originally *Cordosphaeridium*, subsequently *Hystrichosphaerina*?, thirdly *Tityrosphaeridium*?. Questionable assignment: Jain and Garg (1986a, p.120). **Taxonomic senior synonym:** *Cordosphaeridium fibrospinum*, according to Fensome et al. (2009, p.23).

Taxonomic junior synonym: *Achomosphaera* (subsequently *Cordosphaeridium*) *valianta*, according to Jain (1982, p.52). Age: early Eocene.

"*fibrospinosum*" (Davey and Williams, 1966b, p.86, pl.5, fig.5) Jain and Garg, 1986a, p.121. Emendation: Davey, 1969c, p.36, as a revised diagnosis for *Cordosphaeridium fibrospinosum*. Holotype: Davey and Williams, 1966b, pl.5, fig.5; Bujak et al., 1980, pl.7, figs.3,6. **NOW** *Cordosphaeridium*. Originally (and now) *Cordosphaeridium*, subsequently *Emmetrocyta*?, thirdly *Tityrosphaeridium*?. Questionable assignment: Jain and Garg (1986a, p.121). Taxonomic junior synonyms: *Cordosphaeridium exilimurum* and *Achomosphaera* (subsequently *Cordosphaeridium*) *valianta*, both according to Fensome et al. (2009, p.23). Age: early Eocene.

"*funiculatum*" (Morgenroth, 1966a, p.22–23, pl.6, figs.2–3) Sarjeant, 1981, p.121. Emendation: Brinkhuis, 1992, p.97, as *Cordosphaeridium funiculatum*. Holotype: Morgenroth, 1966a, pl.6, fig.2. **NOW** *Cordosphaeridium*. Originally (and now) *Cordosphaeridium*, subsequently *Tityrosphaeridium*?. Questionable assignment: Sarjeant (1981, p.121). Age: early Eocene.

"*gracile*" (Eisenack, 1954b, p.66, pl.8, fig.17; pl.10, figs.3–8; pl.12, figs.7,21) Sarjeant, 1981, p.121. Emendation: Davey and Williams, 1966b, p.84–85, as *Cordosphaeridium gracile*. Holotype: Eisenack, 1954b, pl.10, fig.5. **NOW** *Cordosphaeridium gracile*. Originally *Hystrichosphaeridium inodes* subsp. *gracile*, subsequently *Cordosphaeridium inodes* subsp. *gracile*, thirdly (and now) *Cordosphaeridium gracile*, fourthly *Tityrosphaeridium gracile*. Age: Oligocene.

"*latispinosum*" (Davey and Williams, 1966b, p.88, pl.5, fig.8) Sarjeant, 1981, p.121. Holotype: Davey and Williams, 1966b, pl.5, fig.8; Bujak et al., 1980, pl.8, figs.7–9. **NOW** *Achilleodinium*. Originally *Cordosphaeridium*, subsequently (and now) *Achilleodinium*, thirdly *Tityrosphaeridium*?. Questionable assignment: Sarjeant (1981, p.121). Age: early Eocene.

"*porosispinum*" (Davey, 1982b, p.29–30, pl.10, figs.8–12) Norris and Jux, 1984, p.160. Holotype: Davey, 1982b, pl.10, figs.10–12. **NOW** *Kleithriasphaeridium*. Originally (and now) *Kleithriasphaeridium*, subsequently *Tityrosphaeridium*. Age: late Kimmeridgian–late Ryazanian.

"*senegalense*" (Jain and Millepied, 1975, p.149, pl.5, fig.68) Sarjeant, 1981, p.121. Holotype: Jain and Millepied, 1975, pl.5, fig.68. **NOW** *Cordosphaeridium*. Originally (and now) *Cordosphaeridium*, subsequently *Tityrosphaeridium*?. Questionable assignment: Sarjeant (1981, p.121). Age: Campanian–Maastrichtian.

"*tenuistriatum*" (Heisecke, 1970, p.245, pl.7, fig.1; pl.12, figs.3–4) Sarjeant, 1981, p.121. Emendation: Quattrocchio and Sarjeant (1996, p.118), as *Tityrosphaeridium tenuistriatum*. Holotype: Heisecke, 1970, pl.7, fig.1; pl.12, figs.3–4. **NOW** *Cordosphaeridium*?. Originally *Cordosphaeridium*, subsequently (and now) *Cordosphaeridium*?, thirdly *Tityrosphaeridium*?, fourthly *Tityrosphaeridium*. Questionable assignment: Sarjeant (1981, p.121) — however, Quattrocchio and Sarjeant (1996, p.118) retained this species in *Tityrosphaeridium* without question. Quattrocchio and Sarjeant (1996, p.118) also proposed this combination. Age: early Paleocene.

"*truncigerum*" (Deflandre, 1937b, p.71–72, pl.13 [al. pl.10], figs.6–7) Sarjeant, 1981, p.121. Holotype: Deflandre, 1937b, pl.13 (al. pl.10), fig.6. **NOW** *Raetiaedinium*. Originally *Hystrichosphaeridium*, subsequently *Litosphaeridium*?, thirdly *Cordosphaeridium*, fourthly *Exochosphaeridium*, fifthly *Pervosphaeridium*, sixthly *Tityrosphaeridium*?, seventhly *Florentinia*, eighthly *Pervosphaeridium*?, ninthly (and now) *Raetiaedinium*. Questionable assignment: Sarjeant (1981, p.121). Taxonomic senior synonym: *Xanthidium* (now *Hystrichokolpoma*) *crassipes*, by implication in Yun Hyesu (1981, p.27) who considered *Tityrosphaeridium* (as *Pervosphaeridium*) *truncigerum* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Tityrosphaeridium* (as *Pervosphaeridium*) *truncigerum*. Taxonomic junior synonym: *Laticavodinium latispinosum* (name not validly published), according to Slimani (2001a, p.194). Age: Senonian.

"**TOENISBERGIA**" Benedek et al., 1982, p.279. **Taxonomic senior synonym:** *Pentadinium*, according to Lentin and Williams (1985, p.356; 1993, p.498). Type: Benedek, 1972, pl.6, figs.12a–b, as *Pentadinium taeniagerum* subsp. *imaginatum*.

"**imaginata*" (Benedek, 1972, p.45–46, pl.6, figs.12a–b; pl.6, fig.9) Benedek et al., 1982, p.279,281–283. Emendation: Benedek et al., 1982, p.279,281, as *Toenisbergia imaginata*. Holotype: Benedek, 1972, pl.6, figs.12a–b; Eisenack and Kjellström, 1975a, page labelled "nach S.646"; Benedek et al., 1982, figs.7A,C,E,8C–D (not 8A–B); Fensome et al., 1995, figs.1–4 — p.1557. **NOW** *Pentadinium taeniagerum* subsp. *imaginatum*. Originally (and now) *Pentadinium taeniagerum* subsp. *imaginatum*, subsequently *Toenisbergia imaginata*. Taxonomic junior synonym (at specific rank): *Pentadinium laticinctum* subsp. *imaginatum*, according to Benedek et al. (1982, p.279–283) — however, Lentin and Williams (1985, p.279) retained *Pentadinium laticinctum* subsp. *imaginatum*. Age: late Oligocene.

"**TOOLONGIA**" Cookson and Eisenack, 1960a, p.14. **Taxonomic senior synonym:** *Dinopterygium*, according to Stover and Evitt (1978, p.205). Type: Cookson and Eisenack, 1960a, pl.3, fig.11, as *Toolongia medusoides*.

"**medusoides*" Cookson and Eisenack, 1960a, p.14, pl.3, figs.11–12. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.11. Originally *Toolongia*, subsequently *Dinopterygium*. **Taxonomic senior synonym:** *Dinopterygium cladoides*, according to Yun Hyesu (1981, p.71). Age: Senonian.

TRABECULIDIUM Duxbury, 1980, p.132–133. Taxonomic senior synonym: *Nematosphaeropsis*, according to Stover and Williams (1987, p.217) and Jan du Chêne (1988, p.162) — however, Sarjeant (1989, p.93) retained *Trabeculidium*. Type: Duxbury, 1980, pl.9, fig.2, as *Trabeculidium quinquetrum*.

elegantulum (Drugg, 1967, p.25, pl.4, fig.17) Duxbury, 1980, p.134. Holotype: Drugg, 1967, pl.4, fig.17. Originally *Cannosphaeropsis*, subsequently *Cannosphaeropsis?*, thirdly (and now) *Trabeculidium*, fourthly *Nematosphaeropsis*. Lentin and Williams (1993, p.649) retained this species in *Trabeculidium*. Age: Danian.

pusulosum (Morgenroth, 1966b, p.8, pl.2, fig.6) Duxbury, 1980, p.134. Holotype: Morgenroth, 1966b, pl.2, fig.6; Sarjeant et al., 1987, pl.1, fig.8. Originally *Cannosphaeropsis*, subsequently *Nematosphaeropsis*, thirdly (and now) *Trabeculidium*. Lentin and Williams (1993, p.649) retained this species in *Trabeculidium*. Age: early Oligocene.

**quinquetrum* Duxbury, 1980, p.133–134, pl.9, figs.1–2,5. Holotype: Duxbury, 1980, pl.9, fig.2; Fensome et al., 1995, fig.2 — p.1729. Originally (and now) *Trabeculidium*, subsequently *Nematosphaeropsis*. Lentin and Williams (1993, p.649) retained this species in *Trabeculidium*. Age: middle Barremian.

TRIBLASTULA Wetzel, 1933b, p.54. Emendations: Morgenroth, 1966a, p.15; Eisenack, 1969a, p.107. Taxonomic junior synonyms: *Rottnestia*, according to Yun Hyesu (1981, p.22) — however, Jan du Chêne et al. (1986a, p.309) retained *Rottnestia*; *Hystrichosphaeropsis*, according to Yun Hyesu (1981, p.22) — however, Jan du Chêne et al. (1986a, p.158) retained *Hystrichosphaeropsis*. Sarjeant (1985b, p.138) considered the "Modified Description" of Stover and Evitt (1978, p.195–196) to represent an emendation of *Triblastula*. This name was not validly published in Wetzel (1932, p.136), since that author did not designate a type, a requirement at that time under the I.C.Z.N. Type: Wetzel, 1933b, pl.6, fig.5, as *Triblastula utinensis*.

"*borussica*" (Eisenack, 1954b, p.62, pl.9, figs.5a–b,6–7) Morgenroth, 1966a, p.15–16. Holotype: Eisenack, 1954b, pl.9, fig.5a–b. **NOW** *Rottnestia*. Originally *Hystrichosphaera*, subsequently (and now) *Rottnestia*, thirdly *Triblastula*, fourthly *Hystrichosphaeropsis* (combination not validly published). Taxonomic junior synonym: *Hystrichosphaeropsis jubata* (name not validly published), according to May (1980, p.24). Age: early Oligocene.

"*fibrata*" Wilson in Slimani, 1994, p.61. **Name not validly published:** no description or illustration. **Taxonomic senior synonym:** *Triblastula wilsonii*, according to Slimani (2001a, p.194).

"*nuda*" Wetzel, 1961, p.340, pl.2, fig.2. Holotype: Wetzel, 1961, pl.2, fig.2. Originally *Triblastula*, subsequently *Hystrichosphaeropsis*. **Taxonomic senior synonym:** *Triblastula* (as and now *Hystrichosphaeropsis*) *quasicribrata*, according to Marheinecke (1992, p.44). Age: ?Late Cretaceous (erratic).

"quasicribrata" Wetzel, 1961, p.340, pl.2, fig.3. Holotype: Wetzel, 1961, pl.2, fig.3; Sarjeant, 1985b, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.46, figs.9–10; Dietz et al., 1999, fig.10, no.9. **NOW** *Hystrichosphaeropsis*. Originally *Triblastula*, subsequently (and now) *Hystrichosphaeropsis*. Taxonomic junior synonyms: *Triblastula nuda* and *Triblastula tubulata*, both according to Marheinecke (1992, p.44); (at specific rank) *Deflandrea* (as *Amphidiadema*) *rectangularis* subsp. *samuelsonii*, according to Gocht (1976, p.322). Contrary to the opinion of Stover and Evitt (1978, p.94), Gocht (1976, p.322) did not consider this species to be the taxonomic senior synonym of *Amphidiadema rectangularis*, but only the specimen identified by Kjellström (1973, p.17). Age: ?Late Cretaceous (erratic).

"tubulata" Wetzel, 1961, p.340, pl.2, fig.4. Holotype: Wetzel, 1961, pl.2, fig.4. Originally *Triblastula*, subsequently *Hystrichosphaeropsis*. **Taxonomic senior synonym:** *Triblastula* (as and now *Hystrichosphaeropsis*) *quasicribrata*, according to Marheinecke (1992, p.44). Age: ?Late Cretaceous (erratic).

***utinensis** Wetzel, 1933b, p.54, pl.6, figs.5–6. Emendation: Sarjeant, 1985b, p.138–139. Holotype: Wetzel, 1933b, pl.6, fig.5; lost according to Sarjeant (1985b, p.139). Neotype: Wetzel, 1961, pl.2, fig.1, designated by Sarjeant (1985b, p.139). This name was not validly published in Wetzel (1932, p.136), since that author did not designate a holotype, a requirement at that time under the I.C.Z.N. Age: Cretaceous (erratic).

wilsonii Slimani, 1994, p.60–62, pl.9, fig.3; pl.10, figs.10–12. Holotype: Slimani, 1994, pl.10, figs.10–11. Taxonomic junior synonym: *Triblastula fibrata* (name not validly published), according to Slimani (2001a, p.194). Age: latest early to earliest late Maastrichtian.

TRICHODINIUM Eisenack and Cookson, 1960, p.5. Emendation: Clarke and Verdier, 1967, p.18–19. Type: Eisenack and Cookson, 1960, pl.2, fig.4, as *Trichodinium pellitum*.

australe (Burger, 1980b, p.268–269, figs.5C–D,6A) Fauconnier in Fauconnier and Masure, 2004, p.116. Emendation: Fauconnier in Fauconnier and Masure, 2004, p.116, as *Trichodinium australe*. Holotype: Burger, 1980b, fig.5D; Fauconnier and Masure, 2004, pl.15, figs.3–5. Originally *Cleistosphaeridium*, subsequently *Circulodinium*, thirdly (and now) *Trichodinium*. Age: Neocomian.

"bifurcatum" Jain and Millepied, 1975, p.140–141, pl.1, figs.14–16. Holotype: Jain and Millepied, 1975, pl.1, fig.14; Jan du Chêne et al., 1986a, pl.121, figs.6–8. **NOW** *Trichodinium castanea* subsp. *bifurcatum*. Originally *Trichodinium bifurcatum*, subsequently (and now) *Trichodinium castanea* subsp. *bifurcatum*. Age: Maastrichtian.

bisculpturum Beilstein, 1994, p.155, pl.23, figs.9–10. Holotype: Beilstein, 1994, pl.23, fig.9. Age: Campanian–Maastrichtian.

boltenhagenii Masure in Fauconnier and Masure, 2004, p.116. Emendation: Masure in Fauconnier and Masure, 2004, p.116–117, as *Trichodinium boltenhagenii*. Holotype: Boltenhagen, 1977, pl.7, figs.1a–b; Fauconnier and Masure, 2004, pl.15, fig.6. Originally *Chytroeisphaeridia spinosa*, subsequently *Cleistosphaeridium? spinosum*, thirdly *Circulodinium spinosum*, fourthly (and now) *Trichodinium boltenhagenii*. Substitute name for *Chytroeisphaeridia spinosa* Boltenhagen, 1977, p.54–55, pl.7, figs.1a–b,2,3a–b,4a–b,5a–b, since the name *Trichodinium spinosum* is preoccupied. Age: Cenomanian–Turonian.

brevispinosum Khowaja-Ateequzaman, 1993, p.131–132, pl.1, figs.1–3. Holotype: Khowaja-Ateequzaman, 1993, pl.1, figs.1–3. Age: early Albian.

calvum Harding, 1990b, p.37, pl.19, figs.7–12 ex Harding in Williams et al. 1998, p.614. Holotype: Harding, 1990b, pl.19, fig.7. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Barremian.

"capillatum" (Courtinat in Courtinat and Gaillard, 1980, p.75, pl.2, fig.15) Courtinat, 1989, p.208. Holotype: Courtinat and Gaillard, 1980, pl.2, fig. 15. **NOW** *Filisphaeridium? courtinatii* (Appendix A). Originally *Comasphaeridium capillatum* (Appendix A), subsequently *Trichodinium capillatum*, thirdly (and now) *Filisphaeridium? courtinatii* (Appendix A). Age: late Oxfordian.

castanea Deflandre, 1935, p.229, pl.6, fig.8 ex Clarke and Verdier, 1967, p.19–20. Holotype: Deflandre, 1935, pl.6, fig.8; Deflandre, 1936b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.122, figs.9–10. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Trichodinium*. Taxonomic senior synonyms: *Apteodinium* (as and now *Trichodinium*) *ciliatum* and *Trichodinium intermedium*, both by implication in Clarke and Verdier (1967, p.19), who believed *Trichodinium castanea* to be the senior name — however, subsequent workers have retained the three species (e.g. see Morgan, 1980, p.33; Harding, 1990b, p.38). A full description of this species was given in Deflandre (1936b, p.177–178). The name *Palaeoperidinium castanea* was not validly published in Deflandre (1935) since the generic name *Palaeoperidinium* was not validly published until 1967. N.I.A. Age: ?Senonian (erratic).

subsp. **bifurcatum** (Jain and Millepied, 1975, p.140, pl.1, figs.14–16) Schrank, 1987, p.263. Holotype: Jain and Millepied, 1975, pl.1, fig.14; Jan du Chêne et al., 1986a, pl.121, figs.6–8. Originally *Trichodinium bifurcatum*, subsequently (and now) *Trichodinium castanea* subsp. *bifurcatum*. Age: Maastrichtian.

subsp. **castanea**. Autonym. Holotype: Deflandre, 1935, pl.6, fig.8; Deflandre 1936b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.122, figs.9–10. N.I.A.

cerciatum He Chengquan, 1991, p.120–121, pl.21, fig.17. Holotype: He Chengquan, 1991, pl.21, fig.17. Age: Paleocene.

?**chilense** Troncoso and Doubinger, 1980, p.96–97, pl.1, fig.14. Holotype: Troncoso and Doubinger, 1980, pl.1, fig.14. Originally *Trichodinium*, subsequently (and now) *Trichodinium?*. Questionable assignment: Jan du Chêne et al. (1986a, p.369). Age: Maastrichtian–Danian.

ciliatum (Gocht, 1959, p.65, pl.8, figs.5–6) Eisenack and Klement, 1964, p.811. Holotype: Gocht, 1959, pl.8, fig.5; Jan du Chêne et al., 1986a, pl.121, figs.9–13. Originally *Apteodinium*, subsequently (and now) *Trichodinium*. Taxonomic junior synonym: *Trichodinium castanea*, by implication in Clarke and Verdier (1967, p.19), who believed *Trichodinium castanea* to be the senior name — however, Harding (1990b, p.38) retained the two species. Age: late Hauterivian.

"**delicatum**" Davey, 1975, p.156–157, pl.2, figs.8–9,11–12. Holotype: Davey, 1975, pl.2, fig.8. **NOW** *Apteodinium*. Originally *Trichodinium*, subsequently (and now) *Apteodinium*. Age: Senonian, ?Campanian.

discus Harding, 1990b, p.38, pl.18, figs.7–13 ex Harding in Williams et al. 1998, p.615. Holotype: Harding, 1990b, pl.18, fig.7. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). N.I.A. Age: early Barremian.

eisenackii Burger, 1980a, p.81, pl.37, figs.1,4. Holotype: Burger, 1980a, pl.37, fig.1. Age: Aptian.

erinaceoides Davies, 1983, p.21–22, pl.6, figs.6–15; text-fig.17. Holotype: Davies, 1983, pl.6, figs.6–7. Age: late Tithonian–early Valanginian.

fusifforme He Chengquan, 1991, p.121, pl.21, fig.3. Holotype: He Chengquan, 1991, pl.21, fig.3. Age: early Eocene.

hirsutum Cookson, 1965b, p.139, pl.25, figs.5–13. Holotype: Cookson, 1965b, pl.25, figs.5–7. Age: Paleocene.

intermedium Eisenack and Cookson, 1960, p.6, pl.2, figs.5–6. Holotype: Eisenack and Cookson, 1960, pl.2, fig.5; Jan du Chêne et al., 1986a, pl.120, fig.1. Taxonomic junior synonym: *Trichodinium castanea*, by implication in Clarke and Verdier (1967, p.19), who believed *Trichodinium castanea* to be the senior name — however, Morgan (1980, p.33) retained the two species. Age: Aptian–early Albian.

jainii Khowaja-Ateequzzaman, 1993, p.132,134, pl.1, figs.8–10. Holotype: Khowaja-Ateequzzaman, 1993, pl.1, figs.8–10. Age: early Albian.

"**magnum**" Jain, 1977b, p.175–176, pl.4, figs.40–42. Holotype: Jain, 1977b, pl.4, figs.41–42; Jan du Chêne et al., 1986a, pl.122, fig.8. **NOW** *Cribroperidinium*. Originally *Trichodinium*, subsequently *Acanthaulax*, thirdly (and now) *Cribroperidinium*. Age: early Albian.

minutum Khowaja-Ateequzzaman, 1993, p.134–135, pl.1, figs.4–7. Holotype: Khowaja-Ateequzzaman, 1993, pl.1, figs.4–7. Age: early Albian.

"**paucispinum**" Eisenack and Cookson, 1960, p.5–6, pl.2, fig.7. Emendation: Jan du Chêne et al., 1986a, p.369, as *Pervosphaeridium paucispinum*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.7; Jan du Chêne et al., 1986a, pl.122, fig.13. **NOW** *Pervosphaeridium*. Originally *Trichodinium*, subsequently *Occisucysta*, thirdly (and now) *Pervosphaeridium*. Age: Albian.

***pellitum** Eisenack and Cookson, 1960, p.5, pl.2, fig.4. Holotype: Eisenack and Cookson, 1960, pl.2, fig.4; Jan du Chêne et al., 1986a, pl.120, fig.4. Age: Aptian.

piaseckii Bailey et al., 1997, p.239,241, figs.3g–k. Holotype: Bailey et al., 1997, fig.3h. Age: late Kimmeridgian.

?**rhomboidale** Górká, 1965, p.301–302, pl.1, figs.6a–b ex Sarjeant, 1967b, p.255–256. Holotype: Górká, 1965, pl.1, figs.6a–b; Jan du Chêne et al., 1986a, pl.121, figs.14–15. Originally *Palaeoperidinium* (name not validly published), subsequently (and now) *Trichodinium*?. Questionable assignment: Sarjeant (1967b, p.256). The name *Palaeoperidinium rhomboidale* was not validly published in Górká (1965) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.616) accepted Sarjeant's (1967b) indirect reference to Górká (1965) as indication of a type (I.C.N. Article 40.3). Lentin and Williams (1976, p.111) also proposed this name, as a new combination. Age: early Kimmeridgian.

scarburghense (Sarjeant, 1964b, p.472–473) Williams et al., 1993, p.57. Holotype: Sarjeant, 1961a, pl.13, fig.13; text-fig.5; Jan du Chêne et al., 1986a, pl.3, figs.1–2. Originally *Gonyaulax areolata* (name illegitimate; Appendix B), subsequently *Gonyaulacysta scarburghensis*, thirdly *Gonyaulacysta areolata* (combination illegitimate), fourthly *Acanthaulax areolata* (combination illegitimate), fifthly *Acanthaulax scarburghensis*, sixthly *Liesbergia scarburghensis*, seventhly (and now) *Trichodinium scarburghense*. *Gonyaulacysta scarburghensis* is the substitute name for *Gonyaulax areolata* Sarjeant, 1961a, p.95–96, pl.13, fig.13; text-fig.5 (an illegitimate name). Taxonomic junior synonym: *Acanthaulax senta*, according to Berger (1986, p.343). Age: late Callovian–early Oxfordian.

speetonense Davey, 1974, p.63, pl.7, figs.2–3. Holotype: Davey, 1974, pl.7, figs.2–3; Jan du Chêne et al., 1986a, pl.121, figs.1–2. Originally (and now) *Trichodinium*, subsequently *Occisucysta*?. Lentin and Williams (1981, p.281) retained this species in *Trichodinium*. Age: Barremian.

spinosum Singh, 1971, p.316–317, pl.48, figs.8–9. Holotype: Singh, 1971, pl.48, fig.8; Jan du Chêne et al., 1986a, pl.122, fig.12. Age: late Albian.

tenuispinum He Chengquan, 1991, p.121, pl.21, fig.16; text-fig.19. Holotype: He Chengquan, 1991, pl.21, fig.16; text-fig.19. Age: middle Eocene.

TRIGONOPYXIDIA Cookson and Eisenack, 1961a, p.75. Substitute name for *Trigonopyxis* Cookson and Eisenack, 1960a, p.11 (an illegitimate name). Although the "type species" was not validly transferred by Cookson and Eisenack (1961a, p.75), the generic name *Trigonopyxidida* was validly published by these authors since it is based on a previously validly published species name (I.C.N. Article 40.3). Type: Cookson and Eisenack, 1960a, pl.3, fig.19, as *Trigonopyxis ginella*.

ficellata de Coninck, 1986b, p.20, pl.10, figs.13–18,22–25. Holotype: de Coninck, 1986b, pl.10, figs.13–15. Age: Tongrian.

***ginella** (Cookson and Eisenack, 1960a, p.11, pl.3, figs.18–20) Downie and Sarjeant, 1965, p.149. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.19; Fensome et al., 1996, fig.2 — p.2137. Originally *Trigonopyxis* (generic name illegitimate), subsequently (and now) *Trigonopyxidida*. Age: ?late Albian–Cenomanian.

microreticulata Jiabo, 1978, p.124–125, pl.43, fig.1. Holotype: Jiabo, 1978, pl.43, fig.1. Age: Early Tertiary.

"**TRIGONOPYXIS**" Cookson and Eisenack, 1960a, p.11. **Name illegitimate** — **senior homonym**: *Trigonopyxis* Penard, 1912. **Substitute name**: *Trigonopyxidida*. Type: Cookson and Eisenack, 1960a, pl.3, fig.19, as *Trigonopyxis ginella*.

"**ginella*" Cookson and Eisenack, 1960a, p.11, pl.3, figs.18–20. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.19; Fensome et al., 1996, fig.2 — p.2137. **NOW** *Trigonopyxidida*. Originally *Trigonopyxis* (generic name illegitimate), subsequently (and now) *Trigonopyxidida*. Age: ?late Albian–Cenomanian.

"**TRIGONUS**" Banasová et al., 2007, p.111. Calcareous dinoflagellate genus (see Gottschling and Soehner, 2013, p.127). **Name not validly published**, since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1). **Taxonomic synonym**: *Calciconus*, according to Streng et al. (2009, p.229).

"*conicus*" Banasová et al., 2007, p.111–113, pl.1, figs.9–12. **Name not validly published**, since it was merely used in anticipation of future acceptance of the name (I.C.N. Article 36.1). **Taxonomic synonym**: *Calciconus irregularis*, according to Streng et al. (2009, p.230). Age: middle Miocene.

TRINGADINIUM Riding and Helby, 2001e, p.126,128. Type: Riding and Helby, 2001e, fig.10Q–S, as *Tringadinium bjaerkei*.

**bjaerkei* Riding and Helby, 2001e, p.128,130–131, figs.10A–T,11A–T. Holotype: Riding and Helby, 2001e, figs.10Q–S. Taxonomic junior synonym: *Bulbosia tithonica* (name not validly published), according to Riding and Helby (2001e, p.128). Age: Callovian–Berriasian.

comptum Riding and Helby, 2001e, p.131,133, figs.12A–T. Holotype: Riding and Helby, 2001e, figs.12P–R. Age: Callovian–Oxfordian.

TRINOVANTEDINIUM Reid, 1977, p.436–437. Emendations: Harland, 1977b, p.108; Bujak, 1984, p.193; de Verteuil and Norris, 1992, p.406. Originally (and now) *Trinovantedinium*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Trinovantedinium* (combination not validly published). Bradford and Wall (1984, p.48) considered *Vozzhennikovia* to be the questionable taxonomic senior synonym of this genus. Type: Reid, 1977, pl.1, figs.6–8, as *Trinovantedinium capitatum*.

+*applanatum* (Bradford, 1977 [April], p.47–49, fig.2, nos.1–8) Bujak and Davies, 1983, p.163. Holotype: Bradford, 1977, fig.2, nos.1–4. Originally *Lejeunia* (generic name illegitimate), subsequently *Lejeunecysta*, thirdly (and now) *Trinovantedinium*, fourthly *Capillicysta*. Taxonomic junior synonym: *Trinovantedinium capitatum* Reid, 1977 (November), by implication in Matsuoka (1984b, p.6), who did not specify priority, and de Verteuil and Norris (1992, p.397–398,408). The nomenclatural type of the genus *Trinovantedinium* remains the holotype of *Trinovantedinium capitatum*. Motile equivalent: *Protoperidinium pentagonum* (Gran, 1902) Balech, 1974, according to Bradford and Wall (1984, p.48–49) and Gu Haifeng et al. (2015, p.49). Age: Holocene.

boreale Bujak, 1984, p.193–194, pl.4, figs.1–4. Holotype: Bujak, 1984, pl.4, fig.2; Head, 1994b, pl.10, figs.1–5. Age: late Eocene.

"**capitatum*" Reid, 1977 (November), p.437–438, pl.1, figs.6–8. Holotype: Reid, 1977, pl.1, figs.6–8; Fensome et al., 1993a, figs.1–3 — p.1027. **Taxonomic senior synonym**: *Lejeunia* (now *Trinovantedinium*) *applanata* Bradford, 1977 (April), by implication in Matsuoka (1984b, p.6), who did not specify priority, and de Verteuil and Norris (1992, p.397–398,408). The nomenclatural type of the genus *Trinovantedinium* remains the holotype of *Trinovantedinium capitatum*. Motile equivalent: *Protoperidinium pentagonum* (Gran, 1902) Balech, 1974, according to Harland (1981, p.68). Age: Holocene.

"**concretum**" Reid, 1977, p.438–439, pl.1, figs.9–11. Holotype: Reid, 1977, pl.1, figs.9–11; Fensome et al., 1993a, figs.1–3 — p.1069. **NOW** *Quinquecuspis*. Originally *Trinovantedinium*, subsequently (and now) *Quinquecuspis*, thirdly *Lejeunecysta*. Motile equivalent: *Protopteridinium leonis* (Pavillard, 1916) Balech, 1974, according to Harland (1981, p.68) and Lewis et al. (1984, p.30). Age: Holocene.

ferugnomatum de Verteuil and Norris, 1992, p.412,414, pl.3, figs.1–10. Holotype: de Verteuil and Norris, 1992, pl.3, figs.1–3. Age: late Miocene.

glorianum (Head et al., 1989b, p.453, pl.5, figs.4,8,10–12) de Verteuil and Norris, 1992, p.414. Holotype: Head et al., 1989b, pl.5, figs.11–12. Originally *Capillicysta*, subsequently (and now) *Trinovantedinium*. Age: late Miocene–earliest Pliocene.

harpagonium de Verteuil and Norris, 1992, p.414–415, pl.4, figs.1–8; text-fig.8. Holotype: de Verteuil and Norris, 1992, pl.4, figs.1–3. Age: middle Miocene.

henrietii Louwye et al., 2008, p.138,140, pl.4, figs.1–9. Holotype: Louwye et al., pl.4, figs.1–5. Age: middle Miocene.

"**oliva**" Reid, 1977, p.439–440, pl.1, figs.12–14; pl.2, fig.18. Holotype: Reid, 1977, pl.1, figs.12–13. **NOW** *Lejeunecysta*. Originally *Trinovantedinium*, subsequently (and now) *Lejeunecysta*. Taxonomic senior synonym: *Lejeunia* (as *Lejeunecysta*) *paratenella*, according to Harland (1977b, p.105) — however, Turon and Londeix (1988, p.344) retained *Trinovantedinium* (as *Lejeunecysta*) *oliva*. N.I.A. Age: Holocene.

pallidifulvum Matsuoka, 1987, p.63–64, pl.13, figs.1–9. Holotype: Matsuoka, 1987, pl.13, figs.7–9. Age: Holocene.

papula de Verteuil and Norris, 1992, p.415–416, pl.5, figs.1–9. Holotype: de Verteuil and Norris, 1992, pl.5, figs.1–3. N.I.A. Age: late Miocene.

"**sabrina**" Reid, 1977, p.441–442, pl.2, figs.15–17. Holotype: Reid, 1977, pl.2, fig.15. **NOW** *Lejeunecysta*. Originally *Trinovantedinium*, subsequently (and now) *Lejeunecysta*. Motile equivalent: *Protopteridinium leonis* (Pavillard, 1916) Balech, 1974, according to Harland (1981, p.68). N.I.A. Age: Holocene.

sterthense Head, 1993, p.41,44, fig.25, nos.2–11. Holotype: Head, 1993, fig.25, nos.10–11. Age: latest Pliocene.

variabile (Bujak, 1984, p.194–195, pl.4, figs.7–10; text-fig.3) de Verteuil and Norris, 1992, p.416. Holotype: Bujak, 1984, pl.4, fig.8; Head, 1994b, pl.11, figs.4–5,7–8; text-fig.3. Originally *Xandarodinium*, subsequently (and now) *Trinovantedinium*. Age: late Miocene–early Pleistocene.

?**xyllochporum** de Verteuil and Norris, 1992, p.416,418,420, pl.6, figs.1–6; text-fig.10. Holotype: de Verteuil and Norris, 1992, pl.6, fig.1. Questionable assignment: de Verteuil and Norris (1992, p.416). Age: middle Miocene.

"**TRIOPERCULODINIUM**" Drugg, 1970b, p.820. **Taxonomic senior synonym:** *Lingulodinium*, according to Wall and Dale in Wall et al. (1973, p.24). Type: Drugg, 1970b, text-figs.16F–G, as *Trioperculodinium siculum*.

"***sicula**" Drugg, 1970b, p.820; text-figs.16F–G. Holotype: Drugg, 1970b, text-figs.16F–G. **NOW** *Lingulodinium*. Originally *Trioperculodinium*, subsequently (and now) *Lingulodinium*. N.I.A. Age: Oligocene.

TRIPHAGMADINIUM Van Simaey et al., 2005, p.125. Type: Van Simaey et al., 2005, pl.1, figs.1–5, as *Triphragmadinium demaniae*.

***demiae** Van Simaey et al., 2005, p.126, pl.1, figs.1–6; pl.2, figs.1–3,6–8. Holotype: Van Simaey et al., 2005, pl.1, figs.1–5. Age: late Oligocene.

TRITHYRODINIUM Drugg, 1967, p.20. Emendations: Davey, 1969b, p.10; Lentin and Williams, 1976, p.98–100; Marheinecke, 1992, p.94–95. Type: Drugg, 1967, pl.3, fig.2, as *Trithyrodinium evittii*.

druggii Stone, 1973, p.54–55, pl.5, figs.18–19,19a. Holotype: Stone, 1973, pl.5, fig.18. Age: late Campanian.

dubium Singh, 1983, p.137, pl.47, figs.8–10. Holotype: Singh, 1983, pl.47, fig.8. Age: middle Cenomanian.

***evittii** Drugg, 1967, p.20, pl.3, figs.2–3; pl.9, fig.2. Holotype: Drugg, 1967, pl.3, fig.2. Taxonomic junior synonym: *Trithyrodinium fragile*, according to Nøhr-Hansen and Dam (1999, p.129). Age: Danian.

"**fragile**" Davey, 1969b, p.11, pl.3, figs.6,9. Holotype: Davey, 1969b, pl.3, fig.6. **Taxonomic senior synonym:** *Trithyrodinium evittii*, according to Nøhr-Hansen and Dam (1999, p.129). Age: Maastrichtian–?Danian.

"**inequale**" Wilson in Slimani, 2001a, p.192. **Name not validly published:** no description. **Taxonomic senior synonym:** *Trithyrodinium* (now *Chatangiella?*) *robustum*, according to Slimani (2001a, p.192).

nigerianum Beilstein, 1994, p.193–194, pl.29, figs.5–6. Holotype: Beilstein, 1994, pl.29, fig.5. Age: Campanian.

"**ornatum**" Felix and Burbridge, 1973, p.23–24, pl.4, fig.12. Holotype: Felix and Burbridge, 1973, pl.4, fig.12. **NOW** *Ginginodinium*. Originally *Trithyrodinium*, subsequently (and now) *Ginginodinium*. Age: Maastrichtian.

partridgei Willumsen and Vajda 2010, p.529,531; figs.5A–F. Holotype: Willumsen and Vajda 2010, figs.5A–B. Age: early Paleocene.

"**pentagonum**" May, 1980, p.87–88, pl.10, figs.13–14. Holotype: May, 1980, pl.10, figs.13–14. **NOW** *Pierceites*. Originally *Trithyrodinium*, subsequently (and now) *Pierceites*. Age: early Maastrichtian.

quinqueangulare Marheinecke, 1992, p.95, pl.19, figs.9–11. Holotype: Marheinecke, 1992, pl.19, figs.9–10. Contrary to the opinion of Lentin and Williams (1993, p.653), Williams et al. (1998, p.618) considered this name to be validly published. Age: early Maastrichtian.

rhomboideum Singh, 1983, p.136–137, pl.46, figs.11–13; pl.47, figs.1–7. Holotype: Singh, 1983, pl.46, figs.11–13. Age: middle Cenomanian.

"**robustum**" Benson, 1976, p.199,200,202, pl.11, figs.9–12; pl.12, fig.1. Holotype: Benson, 1976, pl.11, figs.9–12; pl.12, fig.1. **NOW** *Chatangiella?*. Originally *Trithyrodinium*, subsequently (and now) *Chatangiella?*. Taxonomic junior synonym: *Trithyrodinium inequale* (name not validly published), according to Slimani (2001a, p.192). Age: late Maastrichtian.

sabulum Mao Shaozhi and Norris, 1988, p.45–46, pl.12, figs.1–4; text-figs.16–17. Holotype: Mao Shaozhi and Norris, 1988, pl.12, fig.4; text-fig.16. N.I.A. Age: Late Cretaceous.

striatum Benson, 1976, p.197–198, pl.11, figs.4–8. Holotype: Benson, 1976, pl.11, figs.4–6. Age: late Maastrichtian.

suspectum (Manum and Cookson, 1964, p.9–10, pl.1, figs.9–13) Davey, 1969b, p.12. Holotype: Manum and Cookson, 1964, pl.1, fig.9. Originally *Hexagonifera*, subsequently (and now) *Trithyrodinium*, thirdly *Deflandrea*. Lentin and Williams (1976, p.100) retained this species in *Trithyrodinium*. Age: Cenomanian.

subsp. **suspectum**. Autonym. Holotype: Manum and Cookson, 1964, pl.1, fig.9.

subsp. **ukrainense** Dodsworth, 2004, p.130–131,133–134, pl.1, figs.1–8. Holotype: Dodsworth, 2004, pl.1, figs.1,7. Age: Cenomanian–Turonian.

trendallii (Cookson and Eisenack, 1970a, p.145–146, pl.12, figs.5–6) Pavlishina, 1995, p.138–139. Emendation: Pavlishina, 1995, p.138–139, as *Trithyrodinium trendallii*. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.5. Originally *Ascodinium*?, subsequently *Subtilisphaera*?, thirdly (and now) *Trithyrodinium*. Age: Albian–Cenomanian.

unicorniculum Davey, 1975, p.158–159, pl.3, figs.6–7. Holotype: Davey, 1975, pl.3, fig.6. Age: Senonian, ?Campanian.

?*velatum* (Conrad, 1941, p.8–9, pl.1, fig.A ex Sarjeant, 1967b, p.256) Riding and Fensome, 2003, p.24. Holotype: Conrad, 1941, pl.1, fig.A. Originally *Palaeoperidinium* (name not validly published), subsequently *Scriniodinium*?, thirdly *Palaeoperidinium*? (combination not validly published), fourthly (and now) *Trithyrodinium*?. Questionable assignment: Riding and Fensome (2003, p.24). The name *Palaeoperidinium velatum* was not validly published in Conrad (1941) since the generic name *Palaeoperidinium* was not validly published until 1967. Williams et al. (1998, p.550) accepted Sarjeant's (1967b) indirect reference to Conrad (1941) as indication of a type (I.C.N. Article 40.3). Age: Maastrichtian.

vermiculatum (Cookson and Eisenack, 1961a, p.74, pl.12, figs.6–8) Lentin and Williams, 1976, p.100. Holotype: Cookson and Eisenack, 1961a, pl.12, fig.6. Originally *Hexagonifera*, subsequently (and now) *Trithyrodinium*. Age: Senonian.

"*verrucosum*" (Manum, 1963, p.60–61, pl.3, figs.1–4) Davey, 1969b, p.12. Holotype: Manum, 1963, pl.3, figs.1–2. **NOW** *Chatangiella*. Originally *Deflandrea*, subsequently *Trithyrodinium*, thirdly *Australiella*, fourthly (and now) *Chatangiella*. Taxonomic junior synonym: *Cooksoniella* (as *Chatangiella*) *vnigrii*, according to Yun Hyesu (1981, p.66) — however, Lebedeva in Ilyina et al. (1994, p.70) retained *Cooksoniella* (as and now *Chatangiella*) *vnigrii*. Age: Middle Cretaceous.

vozhennikovae (Boltenhagen, 1977, p.108, pl.19, figs.5a–c,6–7) Masare et al., 1996, p.182. Emendation: Masare et al., 1996, p.182, as *Trithyrodinium vozhennikovae*. Holotype: Boltenhagen, 1977, pl.19, figs.5a–c. Originally *Svalbardella*, subsequently *Andalusiella*, thirdly (and now) *Trithyrodinium*. Age: Campanian.

TRIVALVADINIUM Islam, 1983b, p.344,346. Emendation: Khowaja-Ateequzzaman and Garg, 1995, p.247–248. Type: Islam, 1983b, pl.4, fig.9, as *Trivalvadinium formosum*.

**formosum* Islam, 1983b, p.346, pl.4, fig.9. Holotype: Islam, 1983b, pl.4, fig.9; Fensome et al., 1995, fig.1 — p.1487. Age: early-middle Eocene.

"*plenum*" Islam, 1983c, p.90, pl.4, figs.4–6. Holotype: Islam, 1983c, pl.4, fig.5. **NOW** *Jainiella*. Originally *Trivalvadinium*, subsequently (and now) *Jainiella*. Age: early Eocene.

TUBERCULODINIUM Wall, 1967, p.114. Taxonomic senior synonym: *Pyrophacus*, by implication in Wall and Dale (1971, p.234), who included the "type species", *Tuberculodinium vancampoae*, in *Pyrophacus* — however, Head (1996b, p.1232) retained *Tuberculodinium*. Type: Rossignol, 1962, pl.2, fig.1, as *Pterospermopsis? vancampoae*.

paraense (Regali et al., 1974, p.289, pl.23, fig.6) Lentin and Williams, 1981, p.282. Holotype: Regali et al., 1974, pl.23, fig.6. Originally *Hystriospheraidium*, subsequently (and now) *Tuberculodinium*. Age: early Miocene.

rossignoliae Drugg, 1970a, p.116–118, figs.3,10–11. Emendation: Matsuoka and Bujak, 1988, p.87–88. Holotype: Drugg, 1970a, fig.10. Age: early Miocene.

**vancampoae* (Rossignol, 1962, p.134, pl.2, fig.1) Wall, 1967, p.114–115. Holotype: Rossignol, 1962, pl.2, fig.1. Originally *Pterospermopsis?* (Appendix A), subsequently (and now) *Tuberculodinium*, thirdly *Pyrophacus* (Appendix B). Head (1996b, p.1232) retained this species in *Tuberculodinium*. Taxonomic junior synonym:

Membranilarnacia donaensis, according to Jain and Garg (1990, p.108). Motile equivalent: *Pyrophacus steinii* (Schiller, 1935) Wall and Dale, 1971, according to Matsuoka et al. (1989, p.94). Age: Pleistocene.

wallii Drugg, 1970a, p.115–116, figs.1,4–6. Holotype: Drugg, 1970a, p.115–116, fig.4. Age: post–Miocene.

TUBIDERMODINIUM Morgenroth, 1966a, p.16. Type: Morgenroth, 1966a, pl.3, fig.4, as *Tubidermodinium sulcatum*.

**sulcatum* Morgenroth, 1966a, p.16–17, pl.3, figs.4–6. Holotype: Morgenroth, 1966a, pl.3, fig.4. Age: early Eocene.

TUBOTUBERELLA Vozzhennikova, 1967, p.179–180. Emendations: Brideaux, 1977, p.36; Sarjeant, 1982b, p.41; Dodekova, 1990, p.32. Taxonomic junior synonyms: *Dimidiadinium*, by implication in Sarjeant (1982b, p.42), who retained the "type species" of *Dimidiadinium*, *Dimidiadinium dangeardii*, in *Tubotuberella*; *Glabridinium*, according to Sarjeant (1982b, p.41). Type: Vozzhennikova, 1967, pl.101, figs.2a–b; pl.104, fig.2, as *Tubotuberella rhombiformis* (which see for lectotype).

apatela (Cookson and Eisenack, 1960b, p.249, pl.37, figs.12–13) Ioannides et al., 1977, p.464. Emendation: Sarjeant, 1982b, p.42, as *Tubotuberella apatela*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.12; Jan du Chêne et al., 1986a, pl.124, figs.1–2; Fensome et al., 1993a, fig.1 — p.921. Originally *Scriniodinium*, subsequently *Psaligonyaulax*, thirdly (and now) *Tubotuberella*, fourthly *Glabridinium*. Sarjeant (1982b, p.41) retained this species in *Tubotuberella*. This combination was not validly published in Fisher and Riley (1976, p.52), since these authors did not fully reference the basionym. Age: Late Jurassic.

dangeardii (Sarjeant, 1968, p.226–227, pl.1, fig.21; pl.3, figs.8,15; text-fig.3) Stover and Evitt, 1978, p.197. Emendation: Sarjeant, 1982b, p.42–43, as *Tubotuberella dangeardii*. Holotype: Sarjeant, 1968, pl.3, fig.8; text-fig.3; Sarjeant, 1982b, text-figs.5c–d; Jan du Chêne et al., 1986a, pl.127, figs.4–7; Fensome et al., 1993a, figs.1,3–4 — p.1089; figs.1,4–5 — p.1093. Originally *Gonyaulacysta*, subsequently *Dimidiadinium*, thirdly (and now) *Tubotuberella*. Lentin and Williams (1985, p.150) retained this species in *Tubotuberella*. Age: Oxfordian.

subsp. *dangeardii*. Autonym. Holotype: Sarjeant, 1968, pl.3, fig.8; text-fig.3; Sarjeant, 1982b, text-figs.5c–d; Jan du Chêne et al., 1986a, pl.127, figs.4–7; Fensome et al., 1993a, figs.1,3–4 — p.1089; figs.1,4–5 — p.1093.

subsp. *primitiva* Sarjeant, 1982b, p.44, pl.7, figs.3–4,9–10; text-figs.5a–b. Holotype: Sarjeant, 1982b, pl.7, fig.9; text-figs.5a–b; Fensome et al., 1993a, fig.3 — p.1089; figs.1,4–5 — p.1289. Age: Bathonian.

"*dentata*" Raynaud, 1978, p.395, pl.2, fig.13. Emendation: Riding, 2012, p.70,72, as *Gonyaulacysta dentata*. Holotype: Raynaud, 1978, pl.2, fig.13; Jan du Chêne et al., 1986a, pl.126, figs.1–3, lost according to Riding and Michoux (2013, p.51). Neotype: Fensome et al., 1996, pl.1, fig.20; Riding, 2012, pl.2, figs.1–2; Riding and Michoux, 2013, pl.1, figs.1–3; designated by Riding and Michoux (2013, p.51–52. **NOW** *Gonyaulacysta*. Originally *Tubotuberella*, subsequently (and now) *Gonyaulacysta*. Age: middle-late Callovian.

egemenii (Gitmez, 1970, p.272–274, pl.10, figs.5–6; text-fig.18) Stover and Evitt, 1978, p.197. Holotype: Gitmez, 1970, pl.10, figs.5–6; text-fig.18; Jan du Chêne et al., 1986a, pl.126, figs.4–7. Originally *Leptodinium*, subsequently (and now) *Tubotuberella*. Brenner (1988, p.93) considered *Tubotuberella sphaerocephalis* to be the questionable taxonomic senior synonym of this species. Age: early Kimmeridgian.

"*eisenackii*" (Deflandre, 1939a, p.171, pl.6, figs.7–10; text-figs.3–4) Stover and Evitt, 1978, p.197. Emendation: Sarjeant, 1982b, p.32–33, as *Gonyaulacysta eisenackii*. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. **NOW** *Gonyaulacysta*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Gonyaulacysta*, thirdly *Endoscrinium*, fourthly *Tubotuberella*. Taxonomic junior synonym: *Tubotuberella sphaerocephalis*, according to Sarjeant (1982b, p.32). Age: Oxfordian.

"subsp. *eisenackii*". Autonym. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. **Now redundant.** Originally *Gonyaulax eisenackii* subsp. *eisenackii* (Appendix B), subsequently *Endoscrinium eisenackii* subsp. *eisenackii*, thirdly *Gonyaulacysta eisenackii* subsp. *eisenackii*, fourthly *Tubotuberella eisenackii* subsp. *eisenackii*. Taxonomic junior synonym: *Gonyaulax* (as *Gonyaulacysta*, subsequently *Tubotuberella*) *eisenackii* subsp. *oligodentata*, according to Sarjeant (1982b, p.32).

"subsp. *oligodentata*" (Cookson and Eisenack, 1958, p.30, pl.2, fig.11) Stover and Evitt, 1978, p.198. Holotype: Cookson and Eisenack, 1958, pl.2, fig.11; Jan du Chêne et al., 1986a, pl.125, figs.10–11. Originally *Gonyaulax eisenackii* subsp. *oligodentata* (Appendix B), subsequently *Gonyaulacysta eisenackii* subsp. *oligodentata*, thirdly *Endoscrinium eisenackii* subsp. *oligodentatum*, fourthly *Tubotuberella eisenackii* subsp. *oligodentata*. **Taxonomic senior synonym:** *Gonyaulax* (as and now *Gonyaulacysta*) *eisenackii* subsp. *eisenackii*, according to Sarjeant (1982b, p.32). Age: Late Jurassic.

"*irregularis*" (Cookson and Eisenack, 1958, p.28–29, pl.10, figs.1–2) Davies, 1983, p.23. Holotype: Cookson and Eisenack, 1958, pl.10, fig.1; Jan du Chêne et al., 1986a, pl.109, figs.1–2. **NOW** *Endoscrinium*. Originally *Wetzeliella*, subsequently *Wetzeliopsis* (name not validly published), thirdly *Scriniodinium?*, fourthly *Tubotuberella*, fifthly (and now) *Endoscrinium*. Taxonomic junior synonym: *Wetzeliella meckelfeldensis*, according to Costa and Downie (1979, p.43) — however, Lentin and Williams (1981, p.290) retained *Wetzeliella meckelfeldensis*. Age: Late Jurassic.

"*lurida*" (Deflandre, 1939a, p.166, pl.5, figs.4–6) Davies, 1983, p.24. Holotype: Deflandre, 1939a, pl.5, figs.4–5; Jan du Chêne et al., 1986a, pl.109, figs.6–8. **NOW** *Endoscrinium*. Originally *Gymnodinium* (Appendix B), subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*, fourthly *Tubotuberella*. Age: early Oxfordian.

missilis Stover and Helby, 1987a, p.124,126–127, figs.24A–B,25A–K. Holotype: Stover and Helby, 1987a, figs.25A–G; Fensome et al., 1996, figs.1–6 — p.2229. N.I.A. Age: Kimmeridgian.

owensii Poulsen, 1996, p.78–79, pl.34, figs.1–9. Holotype: Poulsen, 1996, pl.34, figs.4–5. Age: Oxfordian.

**rhomboformis* Vozzhennikova, 1967, p.180, pl.101, figs.1a–b,2a–b; pl.102, figs.1,2a–b,3a–b; pl.104, figs.1–3. Emendation: Brideaux, 1977, p.36. Holotype: Vozzhennikova, 1967, pl.101, figs.2a–b; pl.104, fig.2, lost according to Lentin and Vozzhennikova (1990, p.117–118). Lectotype: Lentin and Vozzhennikova, 1990, pl.14, figs.1–2; text-fig.68, designated by Lentin and Vozzhennikova (1990, p.117). Contrary to the statements of Stover and Evitt (1978, p.197), Vozzhennikova (1967, p.180) cited only one specimen for the holotype. Lentin and Vozzhennikova (1990, p.117) provided an "expanded description" for this species. Age: Late Jurassic.

"*sphaerocephala*" Vozzhennikova, 1967, p.181, pl.103, figs.1a–b,2,3a–b; pl.104, figs.4,5a–b. Holotype: Vozzhennikova, 1967, pl.103, fig.2; Lentin and Vozzhennikova, 1990, text-fig.55; lost according to Lentin and Vozzhennikova (1990, p.98). Originally *Tubotuberella*, subsequently *Dimidiadinium*. **Taxonomic senior synonym:** *Gonyaulax* (as and now *Gonyaulacysta*) *eisenackii*, according to Sarjeant (1982b, p.32). Vozzhennikova originally spelled the epithet as "*sphaerocephalus*" but indicated it to be an adjective; hence it is here revised to "*sphaerocephala*". Age: Late Jurassic.

uncinata (Brideaux, 1977, p.38–39, pl.15, figs.2–5,7–8) Davies, 1983, p.24. Holotype: Brideaux, 1977, pl.15, figs.2–5; Jan du Chêne et al., 1986a, pl.127, figs.1–3. Originally *Dimidiadinium*, subsequently (and now) *Tubotuberella*. Backhouse (1987, p.221) also proposed this combination. Age: Hauterivian–Barremian.

vlamingii Backhouse, 1987, p.221,223, figs.8A–B,13A–D,14D. Holotype: Backhouse, 1987, figs.8A–B,13A–B; Fensome et al., 1996, figs.1–2,6–7 — p.2437. Age: Valanginian.

vozhennikovae (Sarjeant, 1982b, p.33–34, pl.7, fig.8; pl.8, fig.9) Jan du Chêne et al., 1986a, p.379. Holotype: Sarjeant, 1982b, pl.8, fig.9. Originally *Gonyaulacysta*, subsequently (and now) *Tubotuberella*. Brenner (1988, p.93) considered *Tubotuberella sphaerocephala* to be the questionable taxonomic senior synonym of this species. Age: early Oxfordian.

whatleyi (Sarjeant, 1972, p.19–21, pl.7, fig.1; text-fig.4) Stover and Evitt, 1978, p.198. Holotype: Sarjeant, 1972, pl.7, fig.1; text-fig.4; Jan du Chêne et al., 1986a, pl.124, figs.10–11. Originally *Gonyaulacysta*, subsequently (and now) *Tubotuberella*. Age: Bathonian–middle Callovian.

TURBIOSPHAERA Archangelsky, 1969a, p.408. Type: Wilson, 1967a, figs.2b,32, as *Cordosphaeridium filosum*.

**filosa* (Wilson, 1967a, p.66, figs.2b,31–32,34) Archangelsky, 1969a, p.408–411. Holotype: Wilson, 1967a, figs.2b,32. Originally *Cordosphaeridium*, subsequently (and now) *Turbiosphaera*. Age: Paleocene–Oligocene.

galatea Eaton, 1976, p.289, pl.15, figs.4–6. Holotype: Eaton, 1976, pl.15, fig.4; Bujak et al., 1980, pl.6, figs.1–2. N.I.A. Age: early Eocene.

guersteiniae Bijl and Brinkhuis, 2015, p.91–92, pl.1A–G. Holotype: Bijl and Brinkhuis, 2015, pl.1A–B. Age: Ypresian.

magnifica Eaton, 1976, p.290, pl.15, figs.7–9. Holotype: Eaton, 1976, pl.15, fig.8; Bujak et al., 1980, pl.6, fig.3. Age: middle Eocene.

proximata Tripathi, 1989, p.64–65, pl.1, figs.9,12; pl.2, figs.6,10; pl.3, fig.6. Holotype: Tripathi, 1989, pl.1, fig.9. Age: late Eocene.

sagena Levy and Harwood, 2000, p.230, pl.11, figs.a–e. Holotype: Levy and Harwood, 2000, pl.11, figs.a–c. Age: early late Eocene.

symmetrica Bujak in Bujak et al., 1980, p.90, pl.22, figs.6–8. Holotype: Bujak et al., 1980 pl.22, fig.6. Age: middle Eocene (see Aubry, 1986).

TURNHOSPHERA Slimani, 1994, p.62. Type: Yun Hyesu, 1981, pl.9, fig.1, as *Disphaeria hypoflata*.

granulata Slimani, 1994, p.63–64, pl.8, figs.5,7–9; pl.10, fig.6; text-fig.9C. Holotype: Slimani, 1994, pl.8, figs.7–9. Age: late Campanian–early Maastrichtian.

hyalina Slimani, 1994, p.64–65, pl.8, figs.6,10–14; text-fig.9B. Holotype: Slimani, 1994, pl.8, figs.10–14. Age: early Campanian–early Maastrichtian.

**hypoflata* (Yun Hyesu, 1981, p.70, pl.9, figs.1–3) Slimani, 1994, p.65. Emendation: Slimani, 1994, p.66, as *Turnhosphaera hypoflata*. Holotype: Yun Hyesu, 1981, pl.9, fig.1; Fensome et al., 1991, fig.1 — p.651. Originally *Disphaeria*, subsequently (and now) *Turnhosphaera*. Taxonomic junior synonyms: *Nelsoniella glomerata* (name not validly published), according to Slimani (2001a, p.194); *Invertocysta flandriensis*, according to Slimani and Louwye (2012, p.110,114). Age: early Santonian.

UMBODINIUM Bint, 1983, p.173–175. Type: Bint, 1983, pl.1, figs.1–3; text-fig.4A, as *Umbodinium crustov*.

**crustov* Bint, 1983, p.175–176,178, pl.1, figs.1–12; text-figs.2A–B,3F,4A–D. Holotype: Bint, 1983, pl.1, figs.1–3; text-fig.4A; Fensome et al., 1993a, figs.1–3,7 — p.1083. Age: late Albian.

UMBRIADINIUM Bucefalo Palliani and Riding, 1997a, p.199. This name was not validly published in Bucefalo Palliani and Mattioli (1995, p.60) since these authors did not provide a description. Type: Bucefalo Palliani and Riding, 1997a, pl.1, fig.1, as *Umbriadinium mediterraneense*.

***mediterraneense** Bucefalo Palliani and Riding, 1997a, p.199–201, pl.1, figs.1–9; text-figs.8A–E. Holotype: Bucefalo Palliani and Riding, 1997a, pl.1, fig.1. This name was not validly published in Bucefalo Palliani and Mattioli (1995, p.60) since these authors did not provide a description. Age: late Pliensbachian–early Toarcian.

UNIPONTIDINIUM Wrenn, 1988, p.148. Type: Piasecki, 1980, pl.1, figs.1–3, as *Nematosphaeropsis aquaeductus*.

***aquaeductus** (Piasecki, 1980, p.70, pl.1, figs.1–3; pl.5, figs.1–2) Wrenn, 1988, p.148. Holotype: Piasecki, 1980, pl.1, figs.1–3. Originally *Nematosphaeropsis*, subsequently *Nematosphaeropsis?*, thirdly *Impagidinium*, fourthly (and now) *Unipontidinium*. N.I.A. Age: middle Miocene.

grande (Davey, 1975, p.153–154, pl.1, fig.9) Wrenn, 1988, p.149. Holotype: Davey, 1975, pl.1, fig.9; Jan du Chêne et al., 1986a, pl.55, figs.1–8. Originally *Nematosphaeropsis*, subsequently *Impagidinium*, thirdly (and now) *Unipontidinium*. Age: Senonian, ?Campanian.

UVATODINIUM Vozzhennikova, 1963, p.182. Emendation: Lentin and Vozzhennikova, 1990, p.70. Type: Vozzhennikova, 1963, text-figs.13a–b, as *Uvatodinium nasutum* (which see for lectotype).

"marginatum" Vozzhennikova, 1967, p.51–52, pl.8, figs.1–2. Holotype: Vozzhennikova, 1967, pl.8, fig.1, lost according to Lentin and Vozzhennikova (1990, p.71). **Taxonomic senior synonym:** *Uvatodinium nasutum*, according to Lentin and Vozzhennikova (1990, p.71). Age: Paleocene.

"minutum" Mao Shaozhi, 1988, p.246–247, 251, pl.1, figs.5–6, 10. Holotype: Mao Shaozhi, 1988, pl.1, figs.5–6, 10. **NOW** *Vozzhennikovia*. Originally *Uvatodinium*, subsequently (and now) *Vozzhennikovia*. Age: Eocene.

***nasutum** Vozzhennikova, 1963, p.182; text-figs.13a–b. Emendation: Lentin and Vozzhennikova, 1990, p.71–72. Holotype: Vozzhennikova, 1963, text-figs.13a–b; Vozzhennikova, 1967, pl.8, fig.5; lost according to Lentin and Vozzhennikova (1990, p.71). Lectotype: Lentin and Vozzhennikova, 1990, pl.12, figs.1–2; text-fig.38, designated by Lentin and Vozzhennikova (1990, p.71). Taxonomic junior synonym: *Uvatodinium marginatum*, according to Lentin and Vozzhennikova (1990, p.71). Age: Paleocene.

VALENSIELLA Eisenack, 1963a, p.100–101. Emendation: Courtinat, 1989, p.182. Nomenclatural junior synonym: *Favilarnax*, which has the same type. Taxonomic junior synonym: *Cassiculosphaeridia*, according to Courtinat (1989, p.182) — however, Slimani (1994, p.98) retained *Cassiculosphaeridia*. Type: Deflandre, 1947d, text-fig.22, as *Membranilarnax ovulum*.

altomurata (Courtinat in Courtinat and Gaillard, 1980, p.11–12, pl.2, fig.16; pl.5, fig.7) Courtinat, 1989, p.182. Emendation: Courtinat, 1989, p.182–183, as *Valensiella altomurata*. Holotype: Courtinat and Gaillard, 1980, pl.2, fig.16; pl.5, fig.7. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: late Oxfordian.

?amandopolitana (Valensi, 1955b, p.590, pl.2, fig.7; pl.5, fig.2) Eisenack, 1963a, p.102. Holotype: Valensi, 1955b, pl.2, fig.7. Originally *Membranilarnax*, subsequently *Favilarnax*, thirdly *Valensiella*, fourthly (and now) *Valensiella?*. Questionable assignment: Stover and Evitt (1978, p.86). Age: Middle Jurassic.

ampulla Gocht, 1970b, p.149–150, pl.34, figs.7–9; text-fig.19a. Holotype: Gocht, 1970b, pl.34, fig.7. N.I.A. Age: early Bathonian.

?clathroderma (Deflandre and Cookson, 1955, p.290, pl.7, fig.6; text-fig.51) Eisenack, 1963a, p.101. Holotype: Deflandre and Cookson, 1955, pl.7, fig.6. Originally *Membranilarnax*, subsequently *Valensiella*, thirdly (and now) *Valensiella?*. Questionable assignment: Stover and Evitt (1978, p.86). Taxonomic junior synonym: *Membranilarnacia densa*, according to Stover and Evitt (1978, p.64). N.I.A. Age: ?early Eocene.

delicata (Stover and Helby, 1987a, p.103, figs.2A–H) Lentin and Williams, 1993, p.661. Holotype: Stover and Helby, 1987a, figs.2A–C; Stevens, 1987, figs.9K–M; Fensome et al., 1996, figs.1–3 — p.2107. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: Berriasian.

dictydia (Sarjeant, 1972, p.41, pl.3, fig.3; pl.6, fig.6) Lentin and Williams, 1993, p.661. Holotype: Sarjeant, 1972, pl.6, fig.6. Originally *Chytroeisphaeridia*, subsequently *Batiacasphaera*, thirdly *Escharisphaeridia*, fourthly *Cassiculosphaeridia*, fifthly (and now) *Valensiella*. Age: Bathonian–Callovian.

dictyophora Yuan Deyan and He Chengquan, 1999, p.91,93–94, pl.1, figs.1a–b,2–8. Holotype: Yuan Deyan and He Chengquan, 1999, pl.1, figs.1a–b. Age: Middle Late Cretaceous.

foucheri Slimani, 1994, p.118–119, pl.18, figs.1–6. Holotype: Slimani, 1994, pl.18, figs.1–2. Age: early Campanian–late Maastrichtian.

griphus Norvick, 1976, p.75–76, pl.8, figs.6–7; pl.10, figs.7–9. Holotype: Norvick, 1976, pl.10, figs.7–8. N.I.A. Age: Cenomanian.

"*groenlandica*" (Smelror, 1988a, p.288,292,294, pl.8, figs.3,5–6; text-fig.9) Poulsen, 1992a, p.70. Holotype: Smelror, 1988a, pl.8, figs.5–6. **Combination not validly published:** basionym not fully referenced. **NOW** *Valvaeodinium*. Originally *Ellipsoidictyum*, subsequently (and now) *Valvaeodinium*, thirdly *Valensiella* (combination not validly published). Age: early Oxfordian.

"*magna*" (Davey, 1974, p.46, pl.1, figs.3–7) Courtinat, 1989, p.183. Emendation: Harding, 1990b, p.49, as *Cassiculosphaeridia magna*. Holotype: Davey, 1974, pl.1, fig.6. **NOW** *Cassiculosphaeridia*. Originally (and now) *Cassiculosphaeridia*, subsequently *Valensiella*. Age: early–late Barremian.

ovalis (Harker and Sarjeant in Harker et al., 1990, p.87–88, pl.2, figs.7–8,11–12; text-fig.19 ex Harker and Sarjeant, 1991, p.708) Lentin and Williams, 1993, p.661. Holotype: Harker et al., 1990, pl.2, fig.7; text-fig.19. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. This name was not validly published by Harker and Sarjeant in Harker et al. (1990), since these authors did not specify place of lodgement of the holotype (I.C.N. Article 40.7). Age: late Campanian.

**ovulum* (Deflandre, 1947d, p.9–10; text-figs.22–23) Eisenack, 1963a, p.101. Emendation: Courtinat, 1989, p.183, as *Valensiella ovulum*. Holotype: Deflandre, 1947d, text-fig.22; Eisenack and Kjellström, 1972, figure to left — p.1095; Fensome et al., 1995, fig.1 — p.1633. Originally *Membranilarnax*, subsequently *Favilarnax*, thirdly (and now) *Valensiella*. N.I.A. Age: Bajocian.

parvula (Batten and Lister, 1988, p.341,343, figs.1h,2c–d) Lentin and Williams, 1993, p.662. Holotype: Batten and Lister, 1988, figs.2c–d. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: Barremian.

perpusilla (Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.86, pl.14, figs.19–20) He Chengquan et al., 2009, p.379. Holotype: Liu Zhili et al., 1992, pl.14, fig.20. Originally *Spiniferites*, subsequently (and now) *Valensiella*. Age: Early Tertiary.

pontiformis (He Chengquan, 1991, p.57–58, pl.8, figs.1–5; pl.54, fig.5) Lentin and Williams, 1993, p.662. Holotype: He Chengquan, 1991, pl.8, fig.4. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: middle-late Eocene.

punctata Jain, 1977b, p.180, pl.4, fig.44. Holotype: Jain, 1977b, pl.4, fig.44. Age: early Albian.

"*pygmaeus*" (Stevens, 1987, p.186,188, figs.4L–Q) Lentin and Williams, 1993, p.662. Holotype: Stevens, 1987, figs.4L–N; Fensome et al., 1996, figs.1–3 — p.2309. **NOW** *Cassiculosphaeridia*. Originally (and now) *Cassiculosphaeridia*, subsequently *Valensiella*. N.I.A. Age: early Berriasian.

"reticulata" (Davey, 1969a, p.142, pl.3, fig.7; pl.4, fig.3) Courtinat, 1989, p.184. Holotype: Davey, 1969a, pl.4, fig.3. **NOW** *Cassiculosphaeridia*. Originally (and now) *Cassiculosphaeridia*, subsequently *Valensiella*. Age: Cenomanian.

sarstedtensis (Below, 1982d, p.344–345, figs.1–2) Lentin and Williams, 1993, p.662. Holotype: Below, 1982d, fig.1. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: late Aptian.

tazadensis (Below, 1981a, p.33–34, pl.10, figs.8–10; pl.12, fig.16) Lentin and Williams, 1993, p.662. Holotype: Below, 1981a, pl.10, fig.10; Fensome et al., 1991, fig.3 — p.755. Originally *Cassiculosphaeridia*, subsequently (and now) *Valensiella*. Age: Hauterivian–early Barremian.

undulata Jiabo, 1978, p.92, pl.27, figs.11–12. Holotype: Jiabo, 1978, pl.27, fig.12. Age: Early Tertiary.

vermiculata Gocht, 1970b, p.150, pl.34, figs.10–11; text-fig.19d. Holotype: Gocht, 1970b, pl.34, fig.10. Age: early Bathonian.

VALLODINIUM Williams et al., 2015, p.315–316. Type: Jan du Chêne and Adediran, 1985, pl.9, figs.1–2, as *Wilsonidium nigeriaense*.

?echinosuturatum (Wilson, 1967c, p.477,479, figs.3,22–25) Williams et al., 2015, p.316 Holotype: Wilson, 1967c, figs.22–24. Originally *Wetzeliella*, subsequently *Wilsonidium*, thirdly (and now) *Vallodinium*? Questionable assignment: Williams et al. (2015, p.316). Age: middle Eocene.

heilmannii Iakovleva, 2016, p.19 (on PDF initially published online), pl.6, figs.3–8; text-fig.4b (part). Holotype: Iakovleva, 2016, pl.6, fig.3. Age: earliest Eocene.

***nigeriaense** (Jan du Chêne and Adediran, 1985, p.31,33, pl.7, figs.1–6; pl.8, figs.1–6; pl.9, figs.1–5) Williams et al., 2015, p.316. Holotype: Jan du Chêne and Adediran, 1985, pl.9, figs.1–2. Originally *Wilsonidium*, subsequently (and now) *Vallodinium*. Age: late Paleocene–early Eocene.

picardicum Iakovleva, 2016, p.19–20 (on PDF initially published online), pl.2, figs.1–2,5–6,9; text-fig.4c (part). Holotype: Iakovleva, 2016, pl.2, fig.9. Age: earliest Eocene.

stellatum (Damassa, 1979a, p.834,837, pl.7, figs.1–7) Williams et al., 2015, p.316. Holotype: Damassa, 1979a, pl.7, figs.1–2. Originally *Kisselevia*, subsequently *Charlesdowniea*, thirdly (and now) *Vallodinium*. Age: early-middle Eocene.

VALVAEODINIUM Morgenroth, 1970, p.350. Emendation: Below, 1987b, p.64–65. Taxonomic junior synonyms: *Kylindrocysta*, *Comparodinium* and *Opaeopsomus*, all according to Below (1987b, p.64) — however, Lentin and Williams (1993, p.465) retained *Opaeopsomus*. Type: Morgenroth, 1970, pl.11, figs.1–2, as *Valvaeodinium armatum*.

aquilonium (Dörhöfer and Davies, 1980, p.24,26, figs.26E,I,28A–H) Below, 1987b, p.69. Emendation: Below, 1987b, p.69, as *Valvaeodinium aquilonium*. Holotype: Dörhöfer and Davies, 1980, fig.26E. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Toarcian–Bajocian/Bathonian.

***armatum** Morgenroth, 1970, p.350–351, pl.11, figs.1–5. Holotype: Morgenroth, 1970, pl.11, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.935; figs.1–2 — p.939. Age: late Pliensbachian.

subsp. **armatum**. Autonym. Holotype: Morgenroth, 1970, pl.11, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.935; figs.1–2 — p.939.

"var. **armatum**". Autonym. Holotype: Morgenroth, 1970, pl.11, figs.1–2; Fensome et al., 1993a, figs.1–2 — p.935; figs.1–2 — p.939. **Now redundant.**

subsp. *exile* (Below, 1987b, p.67–69, pl.20, figs.1–5) Lentin and Williams, 1989, p.379. Holotype: Below, 1987b, pl.20, figs.1–4; Fensome et al., 1993a, fig.3 — p.935. Originally *Valvaeodinium armatum* var. *exile*, subsequently (and now) *Valvaeodinium armatum* subsp. *exile*. Age: Toarcian.

"var. *exile*" Below, 1987b, p.67–69, pl.20, figs.1–5. Holotype: Below, 1987b, pl.20, figs.1–4; Fensome et al., 1993a, fig.3 — p.935. **NOW** *Valvaeodinium armatum* subsp. *exile*. Originally *Valvaeodinium armatum* var. *exile*, subsequently (and now) *Valvaeodinium armatum* subsp. *exile*. Age: Toarcian.

atlanticum (Habib, 1972, p.375, pl.4, figs.2,5) Lentin and Williams, 1993, p.663. Holotype: Habib, 1972, pl.4, fig.2. Originally *Tenua* Eisenack, subsequently *Sentusidinium?*, thirdly *Fromea* (Appendix A), fourthly *Kylindrocysta*, fifthly (and now) *Valvaeodinium*. Taxonomic junior synonym: *Fromea complicata* (Appendix A), according to Davies (1983, p.31) — however, Jansonius (1989, p.65) retained *Fromea complicata*. Age: Callovian–Oxfordian.

brevepellitum Below, 1987b, p.69–70, pl.24, figs.10–14 (not 12–16). Holotype: Below, 1987b, pl.24, figs.10–13 (not 12–15); Fensome et al., 1993a, figs.1–4 — p.985. Age: late Bajocian.

cavum (Davies, 1983, p.16, pl.2, figs.10–15; text-fig.9) Below, 1987b, p.70. Emendation: Below, 1987b, p.70, as *Valvaeodinium cavum*. Holotype: Davies, 1983, pl.2, figs.10–11. Originally *Comparodinium?*, subsequently (and now) *Valvaeodinium*. Age: Toarcian–Bajocian.

cookii Mantle and Riding, 2012, p.65,67, pl.8, figs.16–25. Holotype: Mantle and Riding, 2012, pl.8, fig.25. Age: late Bajocian–early Bathonian.

"*diacrorhaetium*" (Morbey, 1975, p.44, pl.16, figs.3–6; text-figs.20a–b) Lentin and Williams, 1989, p.380. Holotype: Morbey, 1975, pl.16, figs.3–6; text-fig.20a. Originally *Comparodinium*, subsequently *Valvaeodinium*. **Taxonomic senior synonym:** *Comparodinium* (as and now *Valvaeodinium*) *koessenium*, according to Below (1987b, p.66). Age: Rhaetian.

euareatum Prauss, 1989, p.26–27, pl.3, figs.18–22,26–28,33; text-fig.7. Holotype: Prauss, 1989, pl.3, figs.18–20; text-fig.7. Age: early-middle Bajocian.

flos Below, 1987b, p.71–72, pl.22, figs.1–6,12 (not 13). Holotype: Below, 1987b, pl.22, figs.1,3–6; Fensome et al., 1993a, figs.1,3–6 — p.1195. N.I.A. Age: early Pliensbachian.

groenlandicum (Smelror, 1988a, p.288,292,294, pl.8, figs.3,5–6; text-fig.9) Smelror, 1988a, p.303. Holotype: Smelror, 1988a, pl.8, figs.5–6. Originally *Ellipsoidictyum*, subsequently (and now) *Valvaeodinium*, thirdly *Valensiella* (combination not validly published). Age: early Oxfordian.

hanneae Piasecki, 2001, p.28–29, figs.5A–L. Holotype: Piasecki, 2001, fig.5A–B. Age: latest Bathonian–earliest Callovian.

hirsutum Bucefalo Palliani and Riding, 1997a, p.202,204, pl.1, figs.10–12; text-figs.9A–B. Holotype: Bucefalo Palliani and Riding, 1997a, pl.1, fig.10. Age: early Toarcian.

koessenium (Morbey, 1975, p.44, pl.15, figs.14a–b; pl.16, figs.1–2; text-fig.19a, nos.a–b; textfig.19b, no.i) Below, 1987b, p.66. Holotype: Morbey, 1975, pl.15, figs.14a–b; text-fig.19a, no.a; Fensome et al., 1995, figs.1–3 — p.1589. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Taxonomic junior synonym: *Comparodinium* (subsequently *Valvaeodinium*) *diacrorhaetium*, according to Below (1987b, p.66). Age: Rhaetian–Hettangian.

leneae Piasecki, 2001, p.26–28, figs.4A–L. Holotype: Piasecki, 2001, fig.4D–E (not figs.5D–E, as indicated by Piasecki, 2001, p.27). Age: middle Bathonian–earliest Callovian.

limbafibrosus Below, 1987b, p.72–73, pl.20, figs.6–15. Holotype: Below, 1987b, pl.20, figs.6–9; Fensome et al., 1993a, fig.1 — p.1251; figs.1–4 — p.1255. Age: late Pliensbachian.

subsp. **gralla** (Below, 1987b, p.73, pl.20, figs.11–15) Lentin and Williams, 1989, p.380. Holotype: Below, 1987b, pl.20, figs.11–12,14–15; Fensome et al., 1993a, figs.1–2,4–5 — p.1215; fig.2 — p.1251. Originally *Valvaeodinium limbafibrosus* var. *gralla*, subsequently (and now) *Valvaeodinium limbafibrosus* subsp. *gralla*. N.I.A. Age: late Pliensbachian.

"var. **gralla**" Below, 1987b, p.73, pl.20, figs.11–15. Holotype: Below, 1987b, pl.20, figs.11–12,14–15; Fensome et al., 1993a, figs.1–2,4–5 — p.1215; fig.2 — p.1251. **NOW** *Valvaeodinium limbafibrosus* subsp. *gralla*. Originally *Valvaeodinium limbafibrosus* var. *gralla*, subsequently (and now) *Valvaeodinium limbafibrosus* subsp. *gralla*. N.I.A. Age: late Pliensbachian.

subsp. **limbafibrosus**. Autonym. Holotype: Below, 1987b, pl.20, figs.6–9; Fensome et al., 1993a, fig.1 — p.1251; figs.1–4 — p.1255.

"var. **limbafibrosus**". Autonym. Holotype: Below, 1987b, pl.20, figs.6–9; Fensome et al., 1993a, fig.1 — p.1251; figs.1–4 — p.1255. **Now redundant.**

lineatum (Wille and Gocht, 1979, p.235,237, figs.13a–b,14a–b,15a–b,16a–b; fig.24, nos.10–11; fig.27, nos.7a–b,8–9,10a–b,11; fig.28, nos.1a–b) Below, 1987b, p.66. Holotype: Wille and Gocht, 1979, figs.13a–b; fig.27, nos.9a–b. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian–Toarcian.

perpunctatum (Wille and Gocht, 1979, p.238, fig.24, no.4; fig.28, nos.7–8) Below, 1987b, p.66. Holotype: Wille and Gocht, 1979, fig.28, no.7. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian.

punctatum (Wille and Gocht, 1979, p.228–231, figs.3a–b,4a–b,5a–d,6–8,9a–b,10a–b; fig.24, nos.6–9; fig.26, nos.1a–b,2a–b,3a–b,4–5,6a–b,7a–b,8–9,10a–b,11,12a–b; fig.27, nos.1a–b,2a–b,3–6) Below, 1987b, p.73. Emendation: Below, 1987b, p.73, as *Valvaeodinium punctatum*. Holotype: Wille and Gocht, 1979, figs.3a–b; fig.26, nos.1a–b. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian–Toarcian.

subsp. **magnum** (Wille and Gocht, 1979, p.231, fig.24, no.9; fig.26, no.11) Lentin and Williams, 1989, p.380. Holotype: Wille and Gocht, 1979, fig.26, no.11. Originally *Comparodinium punctatum* var. *magnum*, subsequently *Comparodinium punctatum* subsp. *magnum*, thirdly *Valvaeodinium punctatum* var. *magnum*, fourthly (and now) *Valvaeodinium punctatum* subsp. *magnum*. Age: Toarcian.

"var. **magnum**" (Wille and Gocht, 1979, p.231, fig.24, no.9; fig.26, no.11) Below, 1987b, p.66. Holotype: Wille and Gocht, 1979, fig.26, no.11. **NOW** *Valvaeodinium punctatum* subsp. *magnum*. Originally *Comparodinium punctatum* var. *magnum*, subsequently *Comparodinium punctatum* subsp. *magnum*, thirdly *Valvaeodinium punctatum* var. *magnum*, fourthly (and now) *Valvaeodinium punctatum* subsp. *magnum*. Age: Toarcian.

subsp. **punctatum**. Autonym. Holotype: Wille and Gocht, 1979, figs.3a–b; fig.26, nos.1a–b. Originally *Comparodinium punctatum* subsp. *punctatum*, subsequently (and now) *Valvaeodinium punctatum* subsp. *punctatum*.

"var. **punctatum**". Autonym. Holotype: Wille and Gocht, 1979, figs.3a–b; fig.26, nos.1a–b. **Now redundant.** Originally *Comparodinium punctatum* var. *punctatum*, subsequently *Valvaeodinium punctatum* var. *punctatum*

scalatum (Wille and Gocht, 1979, p.231,233–234, figs.11a–b,12a–b; fig.28, nos.2a–b,3a–c,4a–b,5–6) Below, 1987b, p.74. Emendation: Below, 1987b, p.74, as *Valvaeodinium scalatum*. Holotype: Wille and Gocht, 1979, figs.11a–b; fig.28, nos.2a–b. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian–Toarcian.

sphaerechinatum Below, 1987b, p.75–76, pl.21, figs.1–6. Holotype: Below, 1987b, pl.21, figs.2–5; Fensome et al., 1993a, figs.2–5 — p.1341. Age: Toarcian.

spinosum (Fenton et al., 1980, p.162–163, pl.14, figs.10–13; pl.15, figs.2,4–6) Below, 1987b, p.66. Holotype: Fenton et al., 1980, pl.14, fig.13; Fensome et al., 1995, fig.4 — p.1797. Originally *Kylindrocysta*, subsequently (and now) *Valvaeodinium*. Age: late Bajocian–early Bathonian.

spongiosum Below, 1987b, p.76–78, pl.23, figs.1–15. Holotype: Below, 1987b, pl.23, figs.6–10; Fensome et al., 1993a, fig.1 — p.1345; figs.1–4 — p.1347. Age: Aalenian–early Bajocian.

subsp. *spongiosum*. Autonym. Holotype: Below, 1987b, pl.23, figs.6–10; Fensome et al., 1993a, fig.1 — p.1345; figs.1–4 — p.1347.

"var. *spongiosum*". Autonym. Holotype: Below, 1987b, pl.23, figs.6–10; Fensome et al., 1993a, fig.1 — p.1345; figs.1–4 — p.1347. **Now redundant.**

subsp. *spongoflabellum* (Below, 1987b, p.77–78, pl.23, figs.1–5,11) Lentin and Williams, 1989, p.380. Holotype: Below, 1987b, pl.23, figs.1–5; Fensome et al., 1993a, fig.2 — p.1345; figs.1–5 — p.1351. Originally *Valvaeodinium spongiosum* var. *spongoflabellum*, subsequently (and now) *Valvaeodinium spongiosum* subsp. *spongoflabellum*. Age: Aalenian–early Bajocian.

"var. *spongoflabellum*" Below, 1987b, p.77–78, pl.23, figs.1–5,11. Holotype: Below, 1987b, pl.23, figs.1–5; Fensome et al., 1993a, fig.2 — p.1345; figs.1–5 — p.1351. **NOW** *Valvaeodinium spongiosum* subsp. *spongoflabellum*. Originally *Valvaeodinium spongiosum* var. *spongoflabellum*, subsequently (and now) *Valvaeodinium spongiosum* subsp. *spongoflabellum*. Age: Aalenian–early Bajocian.

stella Below, 1987b, p.78, pl.22, figs.13–16. Holotype: Below, 1987b, pl.22, figs.13–16; Fensome et al., 1993a, figs.1–4 — p.1359. N.I.A. Age: Aalenian–early Bajocian.

stipulatum (Wille and Gocht, 1979, p.237–238, figs.17a–b; fig.24, no.5; fig.28, nos.9–12) Below, 1987b, p.79. Emendation: Below, 1987b, p.79, as *Valvaeodinium stipulatum*. Holotype: Wille and Gocht, 1979, figs.17a–b; fig.28, nos.9–12. Originally *Comparodinium*, subsequently (and now) *Valvaeodinium*. Age: Pliensbachian.

thereseae Smelror, 1991, p.175,179, pl.1, figs.1–10. Holotype: Smelror, 1991, pl.1, fig.5. Age: late Bathonian–middle Callovian.

vermicylindratum Below, 1987b, p.79–80, pl.25, figs.1–18. Holotype: Below, 1987b, pl.25, figs.9–12,17; Fensome et al., 1993a, figs.7–11 — p.1373. Age: Bajocian.

vermipellitum Below, 1987b, p.80–81, pl.24, figs.1–11. Holotype: Below, 1987b, pl.24, figs.1–5; Fensome et al., 1993a, figs.1–4 — p.1377. Age: Aalenian–early Bajocian.

"*wapellense*" (Pocock, 1972, p.97, pl.24, fig.14) Below, 1987b, p.66. Emendation: Dörhöfer and Davies, 1980, p.23, as *Dapcodinium wapellense*. Holotype: Pocock, 1972, pl.24, fig.14. **NOW** *Opaeopsomus*. Originally (and now) *Opaeopsomus*, subsequently *Dapcodinium*, thirdly *Valvaeodinium*. Age: Callovian.

weitschatii Below, 1987b, p.81, pl.22, figs.7–11. Holotype: Below, 1987b, pl.22, figs.7–11; Fensome et al., 1993a, figs.1–5 — p.1385. Age: Toarcian.

VECTENSIA Batten and Lister, 1988, p.348–349. Type: Batten and Lister, 1988, fig.3c, as *Vectensia varians*.

**variens* Batten and Lister, 1988, p.349–350, figs.3c,e–f. Holotype: Batten and Lister, 1988, fig.3c. Age: Barremian.

VECTIDINIUM Liengjarern et al., 1980, p.490. Taxonomic senior synonym: *Phthanoperidinium*, according to Islam (1982, p.313) — however, Lentin and Williams (1985, p.364) retained *Vectidinium*. Type: Liengjarern et al., 1980, pl.54, fig.7, as *Vectidinium stoveri*.

**stoveri* Liengjarern et al., 1980, p.490–491, pl.54, fig.7. Holotype: Liengjarern et al., 1980, pl.54, fig.7; Fensome et al., 1995, fig.1 — p.1807. Originally (and now) *Vectidinium*, subsequently *Phthanoperidinium*. Lentin and Williams (1985, p.365) retained this species in *Vectidinium*. Age: late Eocene–early Oligocene.

VERTEBRELLUM Zügel, 1994, p.54. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1303). Type: Zügel, 1994, pl.11, figs.10–15, as *Vertebrellum holotabulatum*.

**holotabulatum* Zügel, 1994, p.54–56, pl.11, figs.10–15; text-fig.16. Holotype: Zügel, 1994, pl.11, figs.10–15. Age: late Cenomanian.

"**VESPADINIA**" Parker in Riding and Helby, 2001g, p.179,181. **Name not validly published:** no description. **Taxonomic senior synonym:** *Aidelocysta*, by implication in Riding and Helby (2001g, p.179,181), who included the only species name, *Vespadinia clavata* (name not validly published), in synonymy with *Aidelocysta clavata*.

"*clavata*" Parker in Riding and Helby, 2001g, p.179,181. **Name not validly published:** no description. **Taxonomic senior synonym:** *Aidelocysta clavata*, according to Riding and Helby (2001g, p.179,181).

VESPEROPSIS Bint, 1986, p.156. Emendations: Qiao Xiuyun et al., 1992, p.32–33,36–37; Wan Chuanbiao and Qiao Xiuyun, 1994, p.503; Mao Shaozhi et al., 1999, p.149–150. Taxonomic junior synonym: *Contrangularia*, by implication in He Chengquan et al. (2009, p.307). Type: Bint, 1986, pl.5, figs.9,12–13; text-fig.5, as *Vesperopsis mayi*.

didaoensis Cheng Jinhui and He Chengquan, 2001, p.129–130,133, fig.1, nos.1–5. Holotype: Cheng Jinhui and He Chengquan, 2001, fig.1, no.2. Age: Berriasian–Hauterivian.

digitata (Duxbury, 1983, p.35–36, pl.3, fig.15; text-fig.15) Bint, 1986, p.156. Holotype: Duxbury, 1983, pl.3, fig.15; text-fig.15. Originally *Muderongia*?, subsequently *Australisphaera*, thirdly (and now) *Vesperopsis*, fourthly *Vesperopsis*?. Questionable assignment: Lentin and Williams (1989, p.381), who stated incorrectly that Bint (1986, p.156) questionably included this species in *Vesperopsis* — however, Lentin and Williams (1993, p.665) included the species in *Vesperopsis* without question. Bint (1986, p.156) suggested that *Australisphaera* (as and now *Vesperopsis*) *dolabella* is a possible taxonomic synonym of this species. Age: late Aptian.

dolabella (Duxbury, 1983, p.25–26, pl.3, fig.11; text-fig.7) Bint, 1986, p.156. Holotype: Duxbury, 1983, pl.3, fig.11; text-fig.7. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*, thirdly *Vesperopsis*?. Lentin and Williams (1993, p.665) included the species in *Vesperopsis* without question. Questionable assignment: Lentin and Williams (1989, p.381), who stated incorrectly that Bint (1986, p.156) questionably included this species in *Vesperopsis* — however, Lentin and Williams (1993, p.665) included the species in *Vesperopsis* without question. Bint (1986, p.156) suggested that *Muderongia*? (as and now *Vesperopsis*) *digitata* is a possible taxonomic synonym of this species. Age: early Albian.

fragilis (Harding, 1986a, p.100–101, pl.16, figs.6–9; pl.17, fig.9; text-fig.2) Harding, 1990b, p.22. Holotype: Harding, 1986a, pl.16, fig.6. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*. Age: late Hauterivian.

glabra Qiao Xiuyun et al., 1992, p.33,36–37, pl.1, figs.1–9; pl.3, figs.1–12. Emendation: Mao Shaozhi et al., 1999, p.150–151. Holotype: Qiao Xiuyun et al., 1992, pl.1, fig.9; Gao Ruiqi et al., 1992b, pl.5, fig.7. Taxonomic junior synonyms: *Vesperopsis granulata* and *Australisphaera cruciata*, both according to Mao Shaozhi et al. (1999, p.150). Age: Berriasian–Barremian.

granulata (Wan Chuanbiao and Zhang Ying, 1990, p.12, pl.3, figs.7–9) He Chengquan et al., 2009, p.307. Emendation: Mao Shaozhi et al., 1999, p.155. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.3, fig.8. Originally *Contrangularia*, subsequently (and now) *Vesperopsis*. He Chengquan et al., (2009, p.307) incorrectly considered the new combination to be a "stat. nov." as well as a "comb nov". Age: Early Cretaceous.

jixianensis Wan Chuanbiao et al., 1995, p.57–58,60–61, pl.3, figs.9–10. Emendation: Mao Shaozhi et al., 1999, p.151. Holotype: Wan Chuanbiao et al., 1995, pl.3, fig.9; Mao Shaozhi et al., 1999, pl.1, fig.4. Taxonomic junior synonym: *Vesperopsis suibinensis*, according to Mao Shaozhi et al.(1999, p.151). Age: Neocomian.

longicornis (Batten and Lister, 1988, p.340–341, figs.1b–e,g) Harding, 1990b, p.21. Emendation: Harding, 1990b, p.21–22, as *Vesperopsis longicornis*. Holotype: Batten and Lister, 1988, figs.1b–c. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*. Age: Barremian.

**mayi* Bint, 1986, p.156–157, pl.5, figs.8–9,12–14; pl.6, figs.6–8; text-fig.5. Holotype: Bint, 1986, pl.5, figs.9,12–13; text-fig.5; Fensome et al., 1995, figs.1–2 — p.1617. Age: late Albian.

nebulosa Bint, 1986, p.157, pl.6, figs.1–5. Holotype: Bint, 1986, pl.6, figs.1–2. Age: late Albian.

pseudovitrea (Lister and Batten, 1988b, p.25–27, pl.3, figs.2–3; text-fig.6B, nos.1–4) Harding, 1990b, p.22. Holotype: Lister and Batten, 1988b, pl.3, fig.3; text-fig.6B, no.1. Originally *Australisphaera*, subsequently (and now) *Vesperopsis*. Age: latest Barremian–early Aptian.

reticulata (Wan Chuanbiao and Zhang Ying, 1990, p.11–12, pl.3, figs.2,4,6) He Chengquan et al., 2009, p.308. Emendation: Mao Shaozhi et al., 1999, p.155. Holotype: Wan Chuanbiao and Zhang Ying, 1990, pl.3, fig.2; Mao Shaozhi et al., 1999, pl.4, fig.9. Originally *Contrangularia*, subsequently (and now) *Vesperopsis*. He Chengquan et al., 2009, p.307) incorrectly considered the new combination to be a "stat. nov." as well as a "comb nov". Age: Early Cretaceous.

sanjiangensis Wan Chuanbiao and Qiao Xiuyun, 1994, p.504,507, pl.1, figs.1,4; pl.2, fig.9. Emendation: Mao Shaozhi et al., 1999, p.151. Holotype: Wan Chuanbiao and Qiao Xiuyun, 1994, pl.2, fig.9. Age: Middle-late Early Cretaceous.

"*suibinensis*" Wan Chuanbiao et al., 1995, p.57,60, pl.3, figs.2–3,7. Holotype: Wan Chuanbiao et al., 1995, pl.3, fig.3. **Taxonomic senior synonym:** *Vesperopsis jixianensis*, according to Mao Shaozhi et al. (1999, p.151). Age: Neocomian.

yanjiensis Mao Shaozhi et al., 1999, p.151–152, pl.2,figs.1–5; pl.3, figs.1–7; text-fig.3A–F. Holotype: Mao Shaozhi et al., 1999, pl.2,fig.1; text-fig.3C. Age: Valanginian–Hauterivian.

zhaodongensis Qiao Xiuyun et al., 1992, p.34,37–38, pl.2, figs.1–7. Holotype: Qiao Xiuyun et al., 1992, pl.2, figs.1–2; Gao Ruiqi et al., 1992b, pl.7, fig.1. Age: Aptian.

"**VESPEROPSIS** subgenus **CONTRANGULARIA**" (Wan Chuanbiao and Zhang Ying, 1990, p.11,13–14) He Chengquan et al. 2009, p.307. Emendation: Mao Shaozhi et al., 1999, p.154–155, as *Contrangularia*. **Combination not validly published:** no clear indication of rank. We assume that the rank of subgenus was implied by He Chengquan et al. (2009) and so treat it as such here; but in doing so do not intend to validate the name. **Taxonomic senior synonym:** *Vesperopsis*, by implication in He Chengquan et al. (2009, p.307). Originally *Contrangularia*, subsequently *Vesperopsis* subgenus *Contrangularia* (name not validly published). Type: Wan Chuanbiao and Zhang Ying, 1990, pl.3, fig.2, as *Contrangularia reticulata*.

VEXILLOCYSTA Harding, 1990b, p.45 ex Harding in Williams et al., 1998, p.628. This name was not validly published in Harding (1990b) since the name of the "type species" was not validly published. Type: Harding, 1990b, pl.24, fig.8, as *Vexillocysta retis*.

**retis* Harding, 1990b, p.45, pl.24, figs.8–14 ex Harding in Williams et al., 1998, p.628. Holotype: Harding, 1990b, pl.24, fig.8. This name was not validly published in Harding (1990b) since the lodgement of the holotype was not specified (I.C.N. Article 40.7). Age: late Hauterivian–late Barremian.

"**VOLKHEIMERIDIUM**" Quattrocchio and Sarjeant, 2003, 136,138. **Taxonomic senior synonym:** *Spinidinium*, according to Sluijs et al. (2009, p.46). Type: Cookson and Eisenack, 1970a, pl.12, fig.2, as *Spinidinium lanterna*.

"*clavus*" (Harland, 1973, p.674–675, pl.84, figs.5–6,10; text-fig.9) Quattrocchio and Sarjeant, 2003, p.136. Holotype: Harland, 1973, pl.84, fig.6. **NOW** *Spinidinium*. Originally (and now) *Spinidinium* subsequently *Spinidinium?*, thirdly *Volkheimeridium*. N.I.A. Age: late Campanian.

"*irmoechinatum*" (Heisecke, 1970, p.230, pl.1, fig.3; pl.2, figs.2–3) Quattrocchio and Sarjeant, 2003, p.138. Holotype: Heisecke, 1970, pl.1, fig.3; pl.2, figs.2–3. **NOW** *Spinidinium?* Originally *Deflandrea*, subsequently *Gonyaulacysta*, thirdly (and now) *Spinidinium?*, fourthly *Volkheimeridium*. Questionable assignment: Quattrocchio and Sarjeant (2003, p.138). Age: early Paleocene.

"*lanterna*" (Cookson and Eisenack, 1970a, p.144–145, pl.12, figs.1–3) Quattrocchio and Sarjeant, 2003, p.136. Holotype: Cookson and Eisenack, 1970a, pl.12, fig.2. **NOW** *Spinidinium*. Originally (and now) *Spinidinium*, subsequently *Volkheimeridium*. N.I.A. Age: Late Cretaceous.

"*luciae*" (Wrenn and Hart, 1988, p.368, fig.35, nos.1–3, fig.38, nos.1–5; fig.39, no.4) Quattrocchio and Sarjeant, 2003, p.138. Holotype: Wrenn and Hart, 1988, fig.35, nos.1–3. **NOW** *Spinidinium*. Originally (and now) *Spinidinium*, subsequently *Volkheimeridium*. Age: early Eocene.

VOODOOIA Riding and Helby, 2001d, p.93–95. Taxonomic junior synonym: *Samsonia* (name not validly published), by implication in Riding and Helby (2001d, p. 95), who included the only species name, *Samsonia tabulata* (name not validly published), in synonymy with *Voodooia tabulata*. Type: Riding and Helby, 2001d, fig.18M, as *Voodooia tabulata*.

**tabulata* Riding and Helby, 2001d, p.95,97, figs.17A–B,18A–O. Holotype: Riding and Helby, 2001d, fig.18M. Taxonomic junior synonyms: *Samsonia tabulata* and *Broomea tabulata* (both names not validly published), both according to Riding and Helby (2001d, p.95). Age: early late Callovian.

VOTADINIUM Reid, 1977, p.444. Originally (and now) *Votadinium*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Votadinium* (combination not validly published). Contrary to the opinion of Lentin and Williams (1993, p.666), we consider this name not to be illegitimate. I.C.N. Article 52.1 states that a name is illegitimate if it was nomenclaturally superfluous when published — i.e. if the taxon to which the name was applied definitely included the type of another name. However, Article 52.2 indicates that this rule does not apply if "... the type is at the same time excluded either explicitly or by implication." We have invoked this last clause to retain the species name *Votadinium calvum* (and in consequence the generic name *Votadinium*). Lentin and Williams (1993) considered the name *Votadinium calvum* to be an illegitimate superfluous name (in the sense of Article 52.1), since in proposing the species as new, Reid (1977) considered it to represent the encysted stage of *Protoperidinium oblongum*; strict application of Article 52.1 thus prescribes that *Votadinium calvum* is a nomenclatural junior synonym of *Protoperidinium oblongum*. However, a duality of nomenclature ("cyst taxa" and "motile taxa") is acceptable practice for dinoflagellates, and is condoned by Article 11.1. Since Reid (1977) clearly viewed the two names *Votadinium calvum* and *Protoperidinium oblongum* as representing distinct entities, one based on cysts, the other on the motile stage, and since he clearly did not propose the name *Votadinium calvum* to replace *Protoperidinium oblongum*, we invoke Article 52.2 to retain the former name as an acceptable option from both the nomenclatural and taxonomic viewpoints. Type: Reid, 1977, pl.2, fig.21, as *Votadinium calvum*.

**calvum* Reid, 1977, p.444–445, pl.2, figs.21–23. Holotype: Reid, 1977, pl.2, fig.21; Fensome et al., 1993a, fig.1 — p.1017. Motile equivalent: *Peridinium* (now *Protoperidinium*) *oblongum* (Aurivillius, 1898) Cleve, 1900,

according to Reid (1977, p.444). For a discussion of the nomenclatural validity and legitimacy of this species name, see the discussion under *Votadinium*. Age: Holocene.

elongatum He Chengquan and Sun Xuekun, 1991, p.297, pl.2, figs.11–12. Holotype: He Chengquan and Sun Xuekun, 1991, pl.2, fig.11. Age: Quaternary.

nanhaiense He Chengquan and Sun Xuekun, 1991, p.297–298, pl.2, figs.13–17. Holotype: He Chengquan and Sun Xuekun, 1991, pl.2, fig.15. Age: Quaternary.

spinosum Reid, 1977, p.445–446, pl.2, figs.24–26. Holotype: Reid, 1977, pl.2, figs.24–26. Motile equivalent: *Protoperidinium claudicans* (Paulsen, 1907) Balech, 1974, according to Reid (1977, p.445). Contrary to the opinion of Lentin and Williams (1993, p.666), this name is not illegitimate following I.C.N. Article 52.2e, since Reid (1977, p.445) did not explicitly include the type of *Peridinium claudicans* in synonymy with his new species, *Votadinium spinosum*. Age: Holocene.

VOZZHENNIKOVIA Lentin and Williams, 1976, p.65–66. Emendation: Sluijs et al., 2009, p.48–49. Taxonomic senior synonym: *Dioxya*, according to Morgan (1977, p.131) — however, Lentin and Williams (1981, p.287) retained *Vozzhennikovia*. Bradford and Wall (1984, p.48) considered *Trinovantedium* to be a questionable taxonomic junior synonym of this genus. Type: Wilson, 1967a, figs.3–4, as *Spinidinium apertura*.

angulata Wilson, 1988, p.32, pl.24, figs.1–6, 7a–c. Holotype: Wilson, 1988, pl.24, fig.5; Fensome et al., 1996, fig.4 — p.2031. Age: Paleocene.

**apertura* (Wilson, 1967a, p.64–65, figs.3–5, 8) Lentin and Williams, 1976, p.65. Holotype: Wilson, 1967a, figs.3–4; Fensome et al., 1993a, figs.1–2 — p.925. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*, thirdly *Dioxya*. Lentin and Williams (1981, p.287) retained this species in *Vozzhennikovia*. N.I.A. Age: Paleocene–Oligocene.

cearaichia Stover and Hardenbol, 1994, p.39, pl.12, figs.78a–b, 79. Holotype: Stover and Hardenbol, 1994, pl.12, fig.79. Age: Rupelian.

"*echinoidea*" (Cookson and Eisenack, 1960a, p.2, pl.1, figs.5–6) Stover and Evitt, 1978, p.130. Emendation: Sverdløve and Habib, 1974, p.58–59, as *Deflandrea echinoidea*. Holotype: Cookson and Eisenack, 1960a, pl.1, figs.5. **NOW** *Spinidinium*. Originally *Deflandrea*, subsequently (and now) *Spinidinium*, thirdly *Vozzhennikovia*, fourthly *Spinidinium*? Age: Santonian–Campanian.

"*elegantula*" Williams, 1978, p.797–798, pl.7, figs.4, 7–9 (not only figs.7–9, as specified in the protologue). Holotype: Williams, 1978, pl.7, fig.8. **NOW** *Selenopemphix*. Originally *Vozzhennikovia*?, subsequently (and now) *Selenopemphix*. Questionable assignment: Williams (1978, p.797). Age: middle Eocene.

"*extensa*" (Stover, 1974, p.178–179, pl.5, figs.4a–c, 5a–d, 6) Lentin and Williams, 1976, p.67. Holotype: Stover, 1974, pl.5, figs.4a–c; Fensome et al., 1993a, figs.1–3 — p.1167. **NOW** *Gippslandia*. Originally *Deflandrea*, subsequently *Vozzhennikovia*?, thirdly *Dioxya*?, fourthly *Lentinia*, fifthly (and now) *Gippslandia*. Questionable assignment: Lentin and Williams (1976, p.67). Age: middle-late Eocene.

"*filigrana*" (Benedek, 1972, p.12–13, pl.4, figs.3a–b) Lentin and Williams, 1976, p.67. Holotype: Benedek, 1972, pl.4, figs.3a–b; Benedek and Sarjeant, 1981, figs.4, 8, nos.1–2. **NOW** *Phthanoperidinium*. Originally *Deflandrea*?, subsequently *Vozzhennikovia*?, thirdly *Dioxya*, fourthly (and now) *Phthanoperidinium*. Questionable assignment: Lentin and Williams (1976, p.67). Age: middle Oligocene.

mariae (Aurisano, 1984, p.5, 7, figs.4E–G) Sluijs et al., 2009, p.50. Holotype: Aurisano, 1984, figs.4E–F. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*. Age: early Santonian–late early Campanian.

?*microornata* Slimani, 1994, p.120–121, pl.14, figs.16–22, 38. Holotype: Slimani, 1994, pl.14, figs.16–18. Questionable assignment: Sluijs et al. (2009, p.50). Age: late Campanian–early Maastrichtian

minus (He Chengquan and Wang Kede, 1990, p.417,423,424, pl.4, figs.10–11) Sluijs et al., 2009, p.50. Holotype: designated but not identified in illustrations. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*. Age: Eocene.

minuta (Mao Shaozhi, 1988, p.246–247,251, pl.1, figs.5–6,10) Lentin and Vozzhennikova, 1990, p.71. Holotype: Mao Shaozhi, 1988, pl.1, figs.5–6,10. Originally *Uvatodinium*, subsequently (and now) *Vozzhennikovia*. Age: Eocene.

netrona Levy and Harwood, 2000, p.210,212, pl.11, figs.f–g. Emendation: Sluijs et al., 2009, p.49. Holotype: Levy and Harwood, 2000, pl.11, figs.f–g. Age: middle-late Eocene.

roehliae Sluijs et al., 2009, p.49, pl.3, figs.1–7; pl.5, figs.1–7; text-fig.2b. Holotype: Sluijs et al., 2009, pl.3, figs.1–3. Age: middle-late Eocene.

rotunda (Wilson, 1967a, p.65–66, figs.6–7) Lentin and Williams, 1976, p.67. Holotype: Wilson, 1967a, fig.6. Originally *Spinidinium*, subsequently (and now) *Vozzhennikovia*, thirdly *Dioxya*. Lentin and Williams (1981, p.287) retained this species in *Vozzhennikovia*. Age: Eocene.

spinalis He Chengquan, 1991, p.72, pl.2, fig.23. Holotype: He Chengquan, 1991, pl.2, fig.23. Age: middle Eocene.

spinula Stover and Hardenbol, 1994, p.39–40, pl.12, figs.80,81a–b,82a–b. Holotype: Stover and Hardenbol, 1994, pl.12, fig.80. N.I.A. Age: Rupelian.

spinulosa Wilson, 1984c, p.549,552, figs.2–5. Holotype: Wilson, 1984c, fig.4; Fensome et al., 1996, fig.4 — p.2377. Age: Maastrichtian.

stickleyae Sluijs et al., 2009, p.49, pl.3, figs.8–9; pl.4, figs.1–5; pl.6, fig.2a. Holotype: Sluijs et al., 2009, pl.4, figs.1–3. Age: middle-late Eocene.

tawanuiensis Crouch et al., 2014, p.65,71,73, pl.3, figs.1–12. Holotype: Crouch et al., 2014, pl.3, figs.1–2. Age: late Paleocene.

"*tenella*" (Morgenroth, 1966b, p.4–5, pl.1, figs.8–9) Lentin and Williams, 1976, p.67. Holotype: Morgenroth, 1966b, pl.1, fig.8. **NOW** *Lejeunecysta*. Originally *Lejeunia* (generic name illegitimate), subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Lejeunecysta*. Age: early Oligocene.

"*tenera*" (Krutzsch, 1962, p.44, pl.11, figs.20–22; text-fig.1e) Lentin and Williams, 1976, p.67. Holotype: Krutzsch, 1962, pl.11, figs.20–22. **NOW** *Geiselodinium*. Originally *Deflandrea?*, subsequently *Vozzhennikovia*, thirdly *Dioxya*, fourthly (and now) *Geiselodinium*. Age: middle Eocene.

"*villosa*" (Eisenack and Cookson, 1960, p.10, pl.2, figs.15–16) Stover and Evitt, 1978, p.130. Emendation: Morgan, 1977, p.134,136, as *Dioxya villosa*. Holotype: Eisenack and Cookson, 1960, pl.2, fig.15; Morgan, 1977, pl.2, figs.6a–b. **NOW** *Dioxya*. Originally (and now) *Dioxya*, subsequently *Vozzhennikovia*. Age: Albian.

"**WALLIA**" Keupp, 1990, p.49. Calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1303, the latter noting that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable). **Taxonomic senior synonym:** *Pithonella*, according to Wendler et al. (2013, p.1098). The name *Wallia* was not validly published in Keupp and Ilg (1989, p.175), since these authors clearly did not intend to propose a new name. Type: Keupp, 1990, pl.14, figs.1–3, as *Wallia melloi*.

"*jakei*" Keupp and Ilg, 1989, Caption to pl.12, figs.13–15. **Name not validly published:** generic name not validly published until 1990. **Taxonomic senior synonym:** *Wallia* (now *Pithonella*) *melloi*, according to Keupp (1990, p.49). Age: middle Campanian.

"**melloi*" Keupp, 1990, p.49–50, pl.14, figs.1–12; pl.15, figs.1–4. Holotype: Keupp, 1990, pl.14, figs.1–3. **NOW** *Pithonella*. Originally *Wallia*, subsequently (and now) *Pithonella*. Taxonomic junior synonym: *Wallia jakei* (name not validly published), according to Keupp (1990, p.49). Age: middle Campanian.

WALLIDINELLUM Keupp, 1991a, p.282–283. Calcareous dinoflagellate genus. Type: Wall and Dale, 1968b, pl.172, figs.5–6, as *Scrippsiella sweeneyae*.

**dalei* Keupp, 1991a, p.283. Holotype: Wall and Dale, 1968b, pl.172, figs.5–6, as *Scrippsiella sweeneyae*. Motile equivalent: *Scrippsiella sweeneyae* Balech, 1959, according to Keupp (1991a, p.282). Age: Quaternary.

WALLODINIUM Loeblich Jr. and Loeblich III, 1968, p.212. Emendation: Riding, 1994, p.17–18. Substitute name for *Diplotesta* Cookson and Eisenack, 1960b, p.256 (an illegitimate name). Duxbury (1983, p.68) and Fensome et al. (1990, p.535) considered this genus to represent acritarchs; however, Riding (1994, p.17–18) confirmed its dinoflagellate affinity. Type: Cookson and Eisenack, 1960b, pl.39, fig.4, as *Diplotesta glaessneri*.

anglicum (Cookson and Hughes, 1964, p.56–57, pl.11, figs.1–5) Lentin and Williams, 1973, p.140. Holotype: Cookson and Hughes, 1964, pl.11, fig.2. Originally *Diplotesta*, subsequently (and now) *Wallodinium*. Age: late Albian–early Cenomanian.

bidigitatum (Manum and Cookson, 1964, p.25–26, pl.5, figs.4–6) Lentin and Williams, 1973, p.140. Holotype: Manum and Cookson, 1964, pl.5, fig.6. Originally *Diplotesta*, subsequently (and now) *Wallodinium*. Age: Late Cretaceous.

cylindricum (Habib, 1970, p.374, pl.10, fig.2) Duxbury, 1983, p.68. Emendations: Prauss, 1989, p.47–48; Riding, 1994, p.18; Feist-Burkhardt and Monteil, 1994, p.7, all as *Wallodinium cylindricum*. Holotype: Habib, 1970, pl.10, fig.2. Originally *Prismatocystis* (Appendix A), subsequently *Hexagonifera*, thirdly (and now) *Wallodinium*. Taxonomic junior synonym: *Fromea* (as *Wallodinium*, now *Phallocysta*) *elongata*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Fromea* (as *Andreedinium*) *elongata*. Age: Albian–Cenomanian.

"*elongatum*" (Beju, 1971, p.289–290, pl.3, figs.7–10; text-figs.6A–E) Duxbury, 1980, p.136. Emendations: Feist-Burkhardt and Monteil, 1994, p.9, as *Andreedinium elongatum*; Riding, 1994, p.16, as *Phallocysta elongata*. Holotype: Beju, 1971, pl.3, fig.7; text-fig.6A. **NOW** *Phallocysta*. Originally *Fromea* (Appendix A), subsequently *Fromea?* (Appendix A), thirdly *Wallodinium*, fourthly *Palaeostomocystis* (Appendix A), fifthly *Andreedinium*, sixthly (and now) *Phallocysta*. Nomenclatural junior synonym: *Phallocysta minuta*; refer to that species for details. Taxonomic senior synonym: *Prismatocystis* (as and now *Wallodinium*) *cylindrica*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Wallodinium* (as *Andreedinium*) *elongatum*. Taxonomic junior synonym: *Phallocysta subconica*, according to Riding (1994, p.16). Age: Bajocian–Oxfordian.

**glaessneri* (Cookson and Eisenack, 1960b, p.256, pl.39, figs.4–6) Loeblich Jr. and Loeblich III, 1968, p.212. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.4. Originally *Diplotesta*, subsequently (and now) *Wallodinium*. Age: Oxfordian–?Aptian.

inflatum (Habib, 1969, p.98, pl.3, figs.14–15; pl.4, fig.2) Habib, 1970, p.274. Holotype: Habib, 1969, pl.3, fig.14. Originally *Diplotesta*, subsequently (and now) *Wallodinium*. Age: Albian–Cenomanian.

krutzschii (Alberti, 1961, p.21, pl.7, figs.19–21; pl.12, figs.6–7) Habib, 1972, p.378. Holotype: Alberti, 1961, pl.7, fig.19. Originally *Diplotesta*, subsequently (and now) *Wallodinium*. Age: Hauterivian–Barremian.

laganum Feist-Burkhardt and Monteil, 1994, p.7–8, pl.4, figs.1–4; text-fig.2b. Holotype: Feist-Burkhardt and Monteil, 1994, pl.4, fig.2. Age: late Toarcian–early Aalenian.

luna (Cookson and Eisenack, 1960a, p.10–11, pl.3, fig.21) Lentini and Williams, 1973, p.140. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.21. Originally *Diplotesta*, subsequently (and now) *Wallothinium*. N.I.A. Age: ?late Albian–Cenomanian.

WALVISIA Miles, 1990, p.82–84. Type: Miles, 1990, pl.2, figs.1–3, as *Walvisia woodii*.

**woodii* Miles, 1990, p.84, pl.2, figs.1–9; text-figs.4A–B. Holotype: Miles, 1990, pl.2, figs.1–3. Age: late Albian.

WANAEA Cookson and Eisenack, 1958, p.57. Emendations: Fensome, 1981, p.51; Riding and Helby, 2001b, p.35. Taxonomic junior synonym: *Energlynia*, according to Riley and Fenton (1982, p.199–200). Type: Deflandre and Cookson, 1955, pl.3, fig.14, as *Epicephalopyxis spectabilis*.

acollaris Dodekova, 1975, p.20–21, pl.2, figs.9–10; pl.3, figs.1–7,9; text-fig.2. Emendation: Riding and Helby, 2001b, p.37. Holotype: Dodekova, 1975, pl.3, figs.1–4. Originally (and now) *Wanaea*, subsequently *Energlynia*. Dodekova (1990, p.43) retained this species in *Wanaea*. Taxonomic junior synonyms: *Wanaea* (as *Energlynia*) *indotata*, according to Woollam (1980, p.250) — however, Feist-Burkhardt and Monteil (1997, p.45) retained *Wanaea indotata*; *Wanaea zoharensis*, according to Fensome (1981, p.50) — however, Riding and Helby (2001b, p.51) retained *Wanaea zoharensis*; *Energlynia kyrbasia*, according to Fenton and Fisher (1978, p.236). Age: late Bathonian.

clathrata Cookson and Eisenack, 1958, p.58, pl.9, figs.6–8. Holotype: Cookson and Eisenack, 1958, pl.9, fig.6; Helby et al., 1987, fig.18M. Age: Late Jurassic.

"*clathrabilis*" Helby in Riding and Helby, 2001b, p.43. **Name not validly published**: no description. **Taxonomic senior synonym**: *Wanaea spectabilis*, according to Riding and Helby (2001b, p.43).

cornucavata Feist-Burkhardt and Pross, 1998, p.109–110, pl.3, figs.1–6; pl.4, figs.1–7; pl.8, figs.1–6; pl.13, figs.1–5; pl.14, figs.1–5; pl.16, figs.3–4. Holotype: Feist-Burkhardt and Pross, 1998, pl.3, figs.1–6; pl.8, figs.1–3; pl.13, figs.1–5. Age: early Bathonian.

digitata Cookson and Eisenack, 1958, p.58, pl.9, figs.2–5. Emendation: Woollam, 1982, p.48. Holotype: Cookson and Eisenack 1958, pl.9, fig.2. Age: Late Jurassic.

enoda Riding and Helby, 2001b, p.39, figs.2A–I. Holotype: Riding and Helby, 2001b, fig.2H. Age: late Bathonian–mid Callovian.

fimbriata Sarjeant, 1961a, p.112–113, pl.15, fig.14; text-fig.13. Holotype: Sarjeant, 1961a, pl.15, fig.14; textfig.13. Age: early Oxfordian.

indotata Drugg, 1978, p.74–75, pl.8, figs.11–14. Holotype: Drugg, 1978, pl.8, fig.12. Originally (and now) *Wanaea*, subsequently *Energlynia*. Feist-Burkhardt and Monteil (1997, p.45) retained this species in *Wanaea*. Taxonomic senior synonym: *Wanaea acollaris*, according to Woollam (1980, p.250) — however, Feist-Burkhardt and Monteil (1997, p.45) retained *Wanaea indotata*. Age: Bajocian–middle Callovian.

lacuna Riding and Helby, 2001b, p.39,41, figs.3A–L. Holotype: Riding and Helby, 2001b, fig.3J. Age: late Bathonian.

**spectabilis* (Deflandre and Cookson, 1955, p.293, pl.3, figs.12–14) Cookson and Eisenack, 1958, p.57. Emendation: Riding and Helby, 2001b, p.43–44. Holotype: Deflandre and Cookson, 1955, pl.3, fig.14. Originally *Epicephalopyxis* (Appendix A), subsequently (and now) *Wanaea*. Taxonomic junior synonym: *Wanaea clathrabilis* (name not validly published), according to Riding and Helby (2001b, p.43). Age: Oxfordian.

talea Riding and Helby, 2001b, p.45,47,49, figs.7C,8A–I. Holotype: Riding and Helby, 2001b, figs.7C,8I. Age: middle Oxfordian.

thysanota Woollam, 1982, p.48, pl.2, fig.1; text-fig.1B(ii). Holotype: Woollam, 1982, pl.2, fig.1. Age: late Callovian–early Oxfordian.

verrucosa Riding and Helby, 2001b, p.49,51, figs.9A–L. Holotype: Riding and Helby, 2001b, fig.9A. Age: late Bathonian.

zoharensis Conway, 1978, p.347, pl.1, figs.6–7,9. Emendation: Riding and Helby, 2001b, p.51. Holotype: Conway, 1978, pl.1, fig.7; Riding and Helby, 2001b, figs.10G–H. Taxonomic senior synonym: *Wanaea* (as *Energlynia*) *acollaris*, according to Fensome (1981, p.50) — however, Riding and Helby (2001b, p.51) retained *Wanaea zoharensis*. Age: late Bathonian.

WANNERIA Below, 1987a, p.72–73,76–77. Nomenclatural junior synonym: *Belowius*, which has the same type. Özdikmen (2009) considered *Wanneria* Below to be illegitimate because it is a junior homonym of *Wanneria* Walcott 1908; however, *Wanneria* Walcott is an animal and under the I.C.N. it does not pre-empt *Wanneria* Below. Type: Below, 1987a, pl.2, figs.2–10, as *Wanneria misolensis*.

listeri (Stover and Helby, 1987a, p.121–122,124, figs.21A–C,22A–D,23A–L) Below, 1987a, p.77,80. Emendation: Below, 1987a, p.77,80, as *Wanneria listeri*. Holotype: Stover and Helby, 1987a, figs.22A–D; Fensome et al., 1996, figs.1–4 — p.2195. Originally *Suessia*, subsequently (and now) *Wanneria*. Age: Norian.

**misolensis* Below, 1987a, p.80,86, pl.1, figs.15–18; pl.2, figs.1–10,14–15; pl.3, figs.2–10,12–13,15; text-figs.36a–g,37a–h,39–47; table 2. Holotype: Below, 1987a, pl.2, figs.2–10; Fensome et al., 1993a, figs.2–3 — p.1257. Originally (and now) *Wanneria*, subsequently *Belowius* (generic name illegitimate). Age: Norian.

WARRENIA Monteil, 1992a, p.278–279. Type: Monteil, 1992a, pl.5, figs.1–2, as *Warrenia californica*.

?*brevispinosa* (Iosifova, 1992, p.61–62, pl.10, figs.2a–b,3a–b) Iosifova, 1996, p.231. Holotype: Iosifova, 1992, pl.10, figs.3a–b; Iosifova, 1996, pl.14, figs.1a–c. Originally *Kiokansium*, subsequently (and now) *Warrenia*?. Questionable assignment: Iosifova (1996, p.231). Age: Valanginian.

**californica* Monteil, 1992a, p.279,281, pl.5, figs.1–9; pl.8, figs.1–4. Holotype: Monteil, 1992a, pl.5, figs.1–2. Age: late Tithonian–early Valanginian.

WEIACHIA Feist-Burkhardt, 1995b, p.212–213. Type: Feist-Burkhardt, 1995b, pl.1, fig.9; text-fig.3, as *Weiachia fenestrata*.

**fenestrata* Feist-Burkhardt, 1995b, p.213–214, pl.1, figs.1–5,9; text-fig.3. Holotype: Feist-Burkhardt, 1995b, pl.1, fig.9; text-fig.3. Age: late Toarcian.

WERVEKODINIUM Below, 1990, p.80,82. Contrary to the opinion of Lentin and Williams (1993, p.670), this name is validly published since the name of the "type species" is validly published. Type: Below, 1990, pl.16, figs.9–10,13, as *Wervekodium granulatum*.

**granulatum* Below, 1990, p.82, pl.16, figs.7–17; text-figs.24a–f. Holotype: Below, 1990, pl.16, figs.9–10,13. Contrary to the opinion of Lentin and Williams (1993, p.670), this name is validly published. Below (1987a, p.6) stated that, unless otherwise indicated, all the material is in his personal collection. Since Below (1987a, 1987b, 1990) are parts I to III of a single study, we agree with J. Jansonius (personal communication) that Below's (1987a) repository statement refers to all three publications, fulfilling the requirement of I.C.N. Article 40.7 (see also the discussion on Article 40.7 in the Introduction). Age: late Pliensbachian–Toarcian.

WETZELIELLA Eisenack, 1938b, p.187. Emendations: Williams and Downie, 1966b, p.182; Lentin and Williams, 1976, p.129–130; Williams, Damassa, Fensome and Guerstein in Fensome et al., 2009, p.66. Taxonomic junior synonyms: *Gochtodinium*, according to Lentin and Vozzhennikova (1989, p.228); *Dracodinium*, by implication in Williams and Downie (1966b, p.195), who transferred the "type species" of *Dracodinium*, *Dracodinium solidum*, to *Wetzelietta* — however, Costa and Downie (1979, p.36) and Lentin and Williams (1989, p.121) retained *Dracodinium*. Type: Eisenack, 1938b, fig.4, as *Wetzelietta articulata*.

"*abortiva*" Yu Jingxian, 1989, p.154–155, pl.56, fig.4; pl.57, fig.4. Holotype: Yu Jingxian, 1989, pl.56, fig.4. **NOW** *Axiodinium*. Originally *Wetzelietta*, subsequently (and now) *Axiodinium*. Age: Eocene.

"*africaensis*" Jan du Chêne and Adediran, 1985, p.30–31, pl.6, figs.5–6. Holotype: Jan du Chêne and Adediran, 1985, pl.6, fig.5. **NOW** *Apectodinium*. Originally *Wetzelietta*, subsequently (and now) *Apectodinium*. Age: late Paleocene–early Eocene.

**articulata* Wetzel in Eisenack, 1938b, p.187; text-fig.4. Holotype: Eisenack, 1938b, fig.4; Eisenack, 1954b, pl.7, fig.3 (not pl.7, fig.1 as indicated in Eisenack, 1954b, p.90). Originally (and now) *Wetzelietta*, subsequently *Palaeoperidinium* (name not validly published), thirdly *Hystrichosphaeridium*, fourthly *Wetzelietta* subgenus *Wetzelietta*. Taxonomic junior synonyms: *Wetzelietta echinulata*, according to Costa and Downie (1979, p.40); *Wetzelietta horrida*, according to Stover and Evitt (1978, p.131); *Rhombodinium* (as *Wetzelietta coronatum*), according to Costa and Downie (1979, p.43) — however, Iakovleva and Heilmann-Clausen (2010, p. 211,226) retained *Rhombodinium* (as *Wetzelietta coronatum*); *Rhombodinium pentagonum*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.244) retained *Rhombodinium pentagonum*; *Wetzelietta hampdenensis*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.290) retained *Wetzelietta hampdenensis*; *Wetzelietta* (now *Charlesdowniea clathrata*, according to Pasteris (1948, p.42) — however, this synonymy has not been generally accepted. Age: late Eocene–early Oligocene.

subsp. *articulata*. Autonym. Holotype: Eisenack, 1938b, fig.4; Eisenack, 1954b, pl.7, fig.3 (not pl.7, fig.1 as indicated in Eisenack, 1954b, p.90).

"var. *articulata*". Autonym. Holotype: Eisenack, 1938b, fig.4; Eisenack, 1954b, pl.7, fig.3 (not pl.7, fig.1 as indicated in Eisenack, 1954b, p.90). **Now redundant**.

"subsp. *brevicornuta*" Heilmann-Clausen in Heilmann-Clausen and Costa, 1989, p.472, pl.6, figs.1,6. Holotype: Heilmann-Clausen and Costa, 1989, pl.6, fig.1. **NOW** *Dracodinium? brevicornutum*. Originally *Wetzelietta articulata* subsp. *brevicornuta*, subsequently (and now) *Dracodinium? brevicornutum*. Age: late Ypresian.

"subsp. *conopia*" (Williams and Downie, 1966b, p.184, pl.18, fig.5) Lentin and Williams, 1973, p.141. Holotype: Williams and Downie, 1966b, pl.18, fig.5. **NOW** *Sophismatia conopia*. Originally *Wetzelietta articulata* var. *conopia*, subsequently *Wetzelietta articulata* subsp. *conopia*, thirdly *Kisselevia tenuivirgula* subsp. *conopia*, fourthly *Charlesdowniea tenuivirgula* subsp. *conopia*, fifthly (and now) *Sophismatia conopia*. Age: early Eocene.

"var. *conopia*" Williams and Downie, 1966b, p.184, pl.18, fig.5. Holotype: Williams and Downie, 1966b, pl.18, fig.5. **NOW** *Sophismatia conopia*. Originally *Wetzelietta articulata* var. *conopia*, subsequently *Wetzelietta articulata* subsp. *conopia*, thirdly *Kisselevia tenuivirgula* subsp. *conopia*, fourthly *Charlesdowniea tenuivirgula* subsp. *conopia*, fifthly (and now) *Sophismatia conopia*. Age: early Eocene

"subsp. *magnifica*" (Iakovleva and Kulkova, 2001, p.18, pl.6, figs.3–4; text-fig.11) Fensome and Williams, 2004, p.686. Holotype Iakovleva and Kulkova, 2001, pl.6, figs.3–4; text-fig.11. **NOW** *Dracodinium magnificum*. Originally *Wetzelietta coronata* subsp. *magnifica*, subsequently *Wetzelietta articulata* subsp. *magnifica*, thirdly (and now) *Dracodinium magnificum*. The combination *Wetzelietta articulata* subsp. *magnifica* was proposed by Fensome and Williams (2004, p.686), since *Wetzelietta coronata* was then considered a taxonomic junior synonym of *Wetzelietta articulata*, however, Iakovleva and Heilmann-Clausen (2010, p. 211,226) retained *Rhombodinium* (as *Wetzelietta coronatum*). Age: Ypresian.

?subsp. *scabrata* (Shaw Chenglong, 1999a, p.45, figs.49–57) Williams et al., 2015, p.317. Holotype: Shaw Chenglong, 1999a, figs.49–51. Originally *Wetzeliella articulata* var. *scabrata*, subsequently (and now) *Wetzeliella articulata*? subsp. *scabrata*. Questionable assignment: Williams et al. (2015, p.317). Age: Eocene.

"var. *scabrata*" Shaw Chenglong, 1999a, p.45, figs.49–57. Holotype: Shaw Chenglong, 1999a, figs.49–51. **NOW** *Wetzeliella articulata*? subsp. *scabrata*. Originally *Wetzeliella articulata* var. *scabrata*, subsequently (and now) *Wetzeliella articulata*? subsp. *tabulata*. Age: Eocene.

?subsp. *taiwaniana* (Shaw Chenglong, 1999a, p.42,44–45, figs.37–48) Williams et al., 2015, p.317. Holotype: Shaw Chenglong, 1999a, figs.37–39. Originally *Wetzeliella articulata* var. *taiwaniana*, subsequently (and now) *Wetzeliella articulata*? subsp. *taiwaniana*. Questionable assignment: Williams et al. (2015, p.317). Age: Eocene.

"var. *taiwaniana*" Shaw Chenglong, 1999a, p.42,44–45, figs.37–48. Holotype: Shaw Chenglong, 1999a, figs.37–39. **NOW** *Wetzeliella articulata*? subsp. *taiwaniana*. Originally *Wetzeliella articulata* var. *taiwaniana*, subsequently (and now) *Wetzeliella articulata*? subsp. *taiwaniana*. Age: Eocene.

"*astra*" Denison in Costa et al., 1978, p.263, text-fig.2. Holotype: Costa et al., 1978, text-fig.2; Jolley and Spinner, 1989, pl.1, figs.3–4. **NOW** *Dracodinium*. Originally *Wetzeliella*, subsequently (and now) *Dracodinium*. N.I.A. Age: early Eocene.

?*astroides* Islam, 1983b, p.346,348, pl.3, fig.11. Holotype: Islam, 1983b, pl.3, fig.11. Questionable assignment: Williams et al. (2015, p.317). Age: early Eocene.

"*augusta*" Harland, 1979c, p.63, pl.2, figs.13–15. Holotype: Harland, 1979c, pl.2, fig.13. **NOW** *Axiodinium*. Originally *Wetzeliella* subgenus *Apectodinium*, subsequently *Apectodinium*, thirdly (and now) *Axiodinium*. Age: latest Paleocene.

caviarticulata Fensome et al., 2009, p.66, pl.11, figs.m–o,q–t. Holotype: Fensome et al., 2009, pl.11, figs.m–o. Age: youngest occurrence, early Lutetian.

"*clathrata*" Eisenack, 1938b, p.187; text-fig.5. Holotype: Eisenack, 1938b, text-fig.5; Eisenack, 1954b, pl.7, fig.12. **NOW** *Talladinium*? Originally *Wetzeliella*, subsequently *Kisselevia*?, thirdly *Charlesdowniea*, fourthly (and now) *Talladinium*? Taxonomic senior synonym: *Wetzeliella* (as *Hystrichosphaeridium*) *articulata*, according to Pastiels (1948, p.42) — however, this synonymy has not been generally accepted. Age: late Eocene–early Oligocene.

"subsp. *clathrata*" " Autonym. Holotype: Eisenack, 1938b, text-fig.5; Eisenack, 1954b, pl.7, fig.12. **Now redundant**. Originally *Wetzeliella clathrata* subsp. *clathrata*, subsequently *Kisselevia*? *clathrata* subsp. *clathrata*, thirdly *Charlesdowniea clathrata* subsp. *clathrata*.

"var. *clathrata*". Autonym. Holotype: Eisenack, 1938b, text-fig.5; Eisenack, 1954b, pl.7, fig.12. **Now redundant**.

"subsp. *fasciata*" (Rozen, 1965, p.296–297; pl.2, fig.13; text-fig.4) Lentin and Williams, 1973, p.141. Holotype: Rozen, 1965, pl.2, fig.13; text-fig.4. **NOW** *Charlesdowniea*? *fasciata*. Originally *Wetzeliella clathrata* var. *fasciata*, subsequently *Wetzeliella clathrata* subsp. *fasciata*, thirdly *Kisselevia*? *clathrata* subsp. *fasciata*, fourthly *Kisselevia fasciata*, fifthly *Charlesdowniea fasciata*, sixthly (and now) *Charlesdowniea*? *fasciata*. Age: late Eocene.

"var. *fasciata*" Rozen, 1965, p.296–297; pl.2, fig.13; text-fig.4. Holotype: Rozen, 1965, pl.2, fig.13; text-fig.4. **NOW** *Charlesdowniea*? *fasciata*. Originally *Wetzeliella clathrata* var. *fasciata*, subsequently *Wetzeliella clathrata* subsp. *fasciata*, thirdly *Kisselevia*? *clathrata* subsp. *fasciata*, fourthly *Kisselevia fasciata*, fifthly *Charlesdowniea fasciata*, sixthly (and now) *Charlesdowniea*? *fasciata*. Age: late Eocene.

"*coleothrypta*" Williams and Downie, 1966b, p.185–186, pl.18, fig.8; text-fig.47. Holotype: Williams and Downie, 1966b, pl.18, fig.8; text-fig.47; Bujak et al., 1980, pl.12, figs.7–8. **NOW** *Charlesdowniea*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly (and now) *Charlesdowniea*. Age: early Eocene.

"*condylos*" Williams and Downie, 1966b, p.193–194, pl.20, figs.1–2. Holotype: Williams and Downie, 1966b, pl.20, fig.1. **NOW** *Petalodinium*. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. N.I.A. Age: early Eocene.

"*coronata*" (Vozzhennikova, 1967, p.170–171, pl.89, figs.1–3,5; pl.90, figs.1–5) Lentin and Williams, 1976, p.131. Holotype: Vozzhennikova, 1967, pl.89, fig.1; pl.90, fig.4; Lentin and Vozzhennikova, 1990, text-fig.43; lost according to Lentin and Vozzhennikova (1990, p.80). Designated neotype: Iakovleva and Heilmann-Clausen, 2010, pl.12, fig.4. **NOW** *Dracodinium*. Originally *Rhombodinium*, subsequently *Wetzeliella*, thirdly (and now) *Dracodinium*. Taxonomic senior synonym: *Wetzeliella articulata*, according to Costa and Downie (1979, p.430); however, Iakovleva and Heilmann-Clausen (2010, p. 211,226) retained *Rhombodinium* (as *Wetzeliella*) *coronatum*. Age: Ypresian.

"subsp. *coronata*". Autonym. Holotype: Vozzhennikova, 1967, pl.89, fig.1; pl.90, fig.4; Lentin and Vozzhennikova, 1990, text-fig.43; lost according to Lentin and Vozzhennikova (1990, p.80). **Now redundant.**

"subsp. *magnifica*" Iakovleva and Kulkova, 2001, p.18, pl.6, figs.3–4; text-fig.11. Holotype: Iakovleva and Kulkova, 2001, pl.6, figs.3–4; text-fig.11. **NOW** *Dracodinium magnificum*. Originally *Wetzeliella coronata* subsp. *magnifica*, subsequently *Wetzeliella articulata* subsp. *magnifica*, thirdly (and now) *Dracodinium magnificum*. Age: Ypresian.

?*crassa* Mao Shaozhi and Norris, 1988, p.50–51, pl.15, figs.1–2. Holotype: Mao Shaozhi and Norris, 1988, pl.15, fig.1. Questionable assignment: Williams et al. (2015, p.317). Age: late Eocene.

"*crispa*" Agelopoulos, 1967, p.21–22, pl.3, fig.8; pl.4, figs.5a–b. Holotype: Agelopoulos, 1967, pl.3, fig.8. **NOW** *Dracodinium*. Originally *Wetzeliella*, subsequently (and now) *Dracodinium*. Age: late Eocene.

"*degenerata*" Yu Jingxian, 1989, p.152, pl.54, figs.2–3. Holotype: Yu Jingxian, 1989, pl.54, fig.2. **NOW** *Axiodinium*. Originally *Wetzeliella*, subsequently (and now) *Axiodinium*. Age: Paleocene.

distalis He Chengquan, 1991, p.101, pl.41, fig.7. Holotype: He Chengquan, 1991, pl.41, fig.7. Age: middle Eocene.

"*draco*" (Gocht, 1955, p.86; text-figs.1a–c) Alberti, 1961, p.8. Holotype: Gocht, 1955, text-fig.1c. **NOW** *Rhombodinium*. Originally (and now) *Rhombodinium*, subsequently *Wetzeliella* subgenus *Rhombodinium*. N.I.A. Age: middle Oligocene.

"*echinosuturata*" Wilson, 1967c, p.477,479, figs.3,22–25. Holotype: Wilson, 1967c, figs.22–24. **NOW** *Vallodinium?* Originally *Wetzeliella*, subsequently *Wilsonidium*, thirdly (and now) *Vallodinium?* Age: middle Eocene.

"*echinulata*" Vozzhennikova, 1967, p.164–165. Holotype: Vozzhennikova, 1960, pl.3, fig.3; Lentin and Vozzhennikova, 1990, text-fig.44; lost according to Lentin and Vozzhennikova (1990, p.81). **Taxonomic senior synonym:** *Wetzeliella articulata*, according to Costa and Downie (1979, p.40). This name was not validly published in Vozzhennikova (1960, pl.3, fig.3) since no description was given. No potential lectotype is available according to Lentin and Vozzhennikova (1990, p.81). Age: Eocene.

"*edwardsii*" Wilson, 1967c, p.477, figs.8–9. Holotype: Wilson, 1967c, fig.8. **NOW** *Piladinium*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Piladinium*. Age: early Eocene.

elongata He Chengquan, 1991, p.101–102, pl.41, fig.8. Holotype: He Chengquan, 1991, pl.41, fig.8. Age: middle Eocene

"*eocaenica*" Agelopoulos, 1967, p.16–17, pl.2, figs.6–7; pl.3, figs.1–7. Holotype: Agelopoulos, 1967, pl.3, fig.4. **NOW** *Dracodinium*. Originally *Wetzelietta*, subsequently (and now) *Dracodinium*. Taxonomic junior synonym: *Wetzelietta* (subsequently *Dracodinium*) *pachyderma*, by implication in Caro (1973, p.365), who considered the name *Wetzelietta eocaenica* to be not effectively published. Williams et al. (2015, p.304) also considered *Dracodinium pachydermum* to be a taxonomic junior synonym of *Dracodinium eocaenicum*. Age: latest Ypresian.

"*exinulata*" Vozzhennikova, 1960, pl.3, fig.3. **Name not validly published**: no description. Age: Eocene.

?*flexibilis* Yu Jingxian, 1989, p.154, pl.57, figs.1–3. Holotype: Yu Jingxian, 1989, pl.57, fig.2. Questionable assignment: Williams et al. (2015, p.317). Age: Eocene.

"*fornicalis*" (Yu Jingxian, 1989, p.155, pl.58, figs.1,3) Lentin and Williams, 1993, p.673. Holotype: Yu Jingxian, 1989, pl.58, fig.1. **NOW** *Rhombodinium*? Originally *Gochtodinium*, subsequently *Wetzelietta*, thirdly (and now) *Rhombodinium*? Age: Eocene.

"*glabra*" Cookson, 1956, p.186, pl.2, figs.1–5. Holotype: Cookson, 1956, pl.2, fig.1. **NOW** *Rhadinodinium*. Originally *Wetzelietta*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly *Rhombodinium*?, fifthly (and now) *Rhadinodinium*. Age: Eocene.

"var. *glabra*". Autonym. Holotype: Cookson, 1956, pl.2, fig.1. **Now redundant**.

"var. *granulata*" Wilson, 1967c, p.493, figs.29–30. Holotype: Wilson, 1967c, fig.30. **NOW** *Dracodinium granulatum*. Originally *Wetzelietta* subgenus *Rhombodinium glabra* var. *granulata*, subsequently *Rhombodinium glabrum* subsp. *granulatum*, thirdly (and now) *Dracodinium granulatum*. Age: late Eocene.

gochtii Costa and Downie, 1976, p.609–610, pl.92, figs.2–3. Holotype: Costa and Downie, 1976, pl.92, fig.2. Age: middle Oligocene.

?*hampdenensis* Wilson, 1967c, p.480–481, figs.17,19. Holotype: Wilson, 1967c, fig.19. Taxonomic senior synonym: *Wetzelietta articulata*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.290) retained *Wetzelietta hampdenensis*. Questionable assignment: Williams et al. (2015, p.317). Age: middle Eocene.

"*homomorpha*" Deflandre and Cookson, 1955, p.254, pl.5, fig.7; text-fig.19 (not text-figs.17–18 as indicated by Deflandre and Cookson, 1955, p.254). Emendation: Harland, 1979c, p.64, as *Apectodinium homomorphum*. Holotype: Deflandre and Cookson, 1955, pl.5, fig.7; text-fig.19; Eisenack and Klement, 1964, p.829; Fensome et al., 1995, figs.1–2 — p.1553. **NOW** *Apectodinium*. Originally *Wetzelietta*, subsequently *Wetzelietta* subgenus *Apectodinium*, thirdly (and now) *Apectodinium*. Taxonomic junior synonyms: *Apectodinium folliculum* and *Hystrichosphaeridium* (as *Apectodinium*) *caiobense*, both according to Williams et al. (1993, p.57). See also discussion under *Apectodinium pastielsii*. Age: early Eocene.

"subsp. *homomorpha*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.5, fig.7; text-fig.19; Eisenack and Klement, 1964, p.829; Fensome et al., 1995, figs.1–2 — p.1553. **Now redundant**. Originally *Wetzelietta homomorpha* subsp. *homomorpha*, subsequently *Apectodinium homomorphum* subsp. *homomorphum*.

"var. *homomorpha*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.5, fig.7; text-fig.19; Eisenack and Klement, 1964, p.829; Fensome et al., 1995, figs.1–2 — p.1553. **Now redundant**.

"subsp. *quinquelata*" (Williams and Downie, 1966b, p.191–192, pl.18, fig.7) Lentin and Williams, 1973, p.141. Holotype: Williams and Downie, 1966b, pl.18, fig.7. **NOW** *Apectodinium quinquelatum*. Originally *Wetzelietta homomorpha* var. *quinquelata*, subsequently *Wetzelietta homomorpha* subsp. *quinquelata*, thirdly *Apectodinium homomorphum* subsp. *quinquelatum*, fourthly *Wetzelietta quinquelata*, fifthly (and now) *Apectodinium quinquelatum*. Taxonomic senior synonym (at specific rank): *Hystrichosphaeridium* (now *Apectodinium*) *geometricum*, by implication in Harland (1979c, p.67), who

believed the latter to be the junior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. Age: early Eocene.

"var. *quinquelata*" Williams and Downie, 1966b, p.191–192, pl.18, fig.7. Holotype: Williams and Downie, 1966b, pl.18, fig.7. **NOW** *Apectodinium quinquelatum*. Originally *Wetzeliella homomorpha* var. *quinquelata*, subsequently *Wetzeliella homomorpha* subsp. *quinquelata*, thirdly *Apectodinium homomorphum* subsp. *quinquelatum*, fourthly *Wetzeliella quinquelata*, fifthly (and now) *Apectodinium quinquelatum*. Taxonomic senior synonym (at specific rank): *Hystriosphæridium* (now *Apectodinium*) *geometricum*, by implication in Harland (1979c, p.67), who believed the latter to be the senior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. Age: early Eocene.

"*horrida*" Jan du Chêne and Châteauneuf, 1975, p.28,30, pl.1, figs.1–7; pl.3, figs.1–6. Holotype: Jan du Chêne and Châteauneuf, 1975, pl.1, figs.1–4. **Taxonomic senior synonym:** *Wetzeliella articulata*, according to Stover and Evitt (1978, p.131). Age: early Eocene.

"*hyperacantha*" Cookson and Eisenack, 1965b, p.134–135, pl.16, figs.3–6. Holotype: Cookson and Eisenack, 1965b, pl.16, fig.5. **NOW** *Apectodinium*. Originally *Wetzeliella*, subsequently *Wetzeliella* subgenus *Apectodinium*, thirdly (and now) *Apectodinium*. Age: Paleocene.

"*intermedia*" Cookson and Eisenack, 1961b, p.40, pl.1, figs.5–6. Holotype: Cookson and Eisenack, 1961b, pl.1, fig.5. **NOW** *Castellodinium*. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly (and now) *Castellodinium*. Age: Eocene.

"*irregularis*" Cookson and Eisenack, 1958, p.28–29, pl.10, figs.1–2. Holotype: Cookson and Eisenack, 1958, pl.10, fig.1; Jan du Chêne et al., 1986a, pl.109, figs.1–2. **NOW** *Endoscrinium*. Originally *Wetzeliella*, subsequently *Wetzeliopsis* (name not validly published), thirdly *Scriniodinium?*, fourthly *Tubotuberella*, fifthly (and now) *Endoscrinium*. Taxonomic junior synonym: *Wetzeliella meckelfeldensis*, according to Costa and Downie (1979, p.43) — however, Lentin and Williams (1981, p.290) retained *Wetzeliella meckelfeldensis*. Age: Late Jurassic.

"*irtyschensis*" Alberti, 1961, p.8, pl.1, figs.11–12; pl.12, fig.8. Holotype: Alberti, 1961, pl.1, fig.12. **NOW** *Rhombodinium*. Originally *Wetzeliella*, subsequently (and now) *Rhombodinium*. Age: Priabonian.

"*leptavirgula*" Williams and Downie, 1966b, p.184. **Name not validly published:** no description.

"*lineidentata*" Deflandre and Cookson, 1955, p.253–254, pl.5, fig.5; text-figs.17–18. Holotype: Deflandre and Cookson, 1955, pl.5, fig.5. **NOW** *Stichodinium?*. Originally *Wetzeliella*, subsequently *Wilsonidium*, thirdly (and now) *Stichodinium?* This name was not validly published in Deflandre and Cookson (1954, p.1236), since these authors did not give a description. Age: Eocene.

"*lobisca*" (Williams and Downie, 1966b, p.196, pl.20, fig.3) Jolley and Spinner, 1989, p.369. Holotype: Williams and Downie, 1966b, pl.20, fig.3. **NOW** *Dracodinium lobiscum*. Originally *Wetzeliella symmetrica* var. *lobisca*, subsequently *Wetzeliella symmetrica* subsp. *lobisca*, thirdly *Wetzeliella meckelfeldensis* subsp. *lobisca*, fourthly *Wetzeliella lobisca*, fifthly (and now) *Dracodinium lobiscum*. Age: earliest Eocene.

"*longispinosa*" (Wilson, 1968, p.59–60, figs.1–10) Lentin and Williams, 1976, p.132. Holotype: Wilson, 1968, fig.4. **NOW** *Apectodinium*. Originally *Deflandrea*, subsequently *Wetzeliella*, thirdly (and now) *Apectodinium*. Age: Paleocene or early Eocene.

"*lunaris*" Gocht, 1969, p.13–15, pl.10, figs.1–3; text-fig.6. Holotype: Gocht, 1969, pl.10, fig.3. **NOW** *Axiodinium*. Originally *Wetzeliella*, subsequently (and now) *Axiodinium*. Age: early–?late Eocene.

"*meckelfeldensis*" Gocht, 1969, p.5–16, pl.10, figs.12–15. Holotype: Gocht, 1969, pl.10, fig.13. **NOW** *Stenodinium*. Originally *Wetzeliella*, subsequently (and now) *Stenodinium*. Age: early Eocene.

"subsp. *lobisca*" (Williams and Downie, 1966b, p.196, pl.20, fig.3) Costa and Downie, 1979, p.43. Holotype: Williams and Downie, 1966b, pl.20, fig.3. **NOW** *Dracodinium lobiscum*. Originally *Wetzeliella*

symmetrica var. *lobisca*, subsequently *Wetziella symmetrica* subsp. *lobisca*, thirdly *Wetziella meckelfeldensis* subsp. *lobisca*, fourthly *Wetziella lobisca*, fifthly (and now) *Dracodinium lobiscum*. Age: earliest Eocene.

"subsp. *meckelfeldensis*". Autonym. Holotype: Gocht, 1969, pl.10, fig.13. **Now redundant.**

"*minuscula*" Alberti, 1961, p.10–11, pl.1, fig.10; pl.12, fig.4. Holotype: Alberti, 1961, pl.1, fig.10. **NOW** *Palaeotetradinium*. Originally *Wetziella* subgenus *Rhombodinium?*, subsequently *Rhombodinium?*, thirdly *Inversidinium*, fourthly (and now) *Palaeotetradinium*. Taxonomic junior synonym: *Inversidinium exilimurum*, according to Stover and Evitt (1978, p.71). Age: early Eocene.

"?*neocomica*" Gocht, 1957, p.172–178, pl.19, figs.1–5; pl.20, figs.1–7; text-figs.7–16. Emendation: Helby, 1987, p.310–313, as *Phoberocysta neocomica*. Holotype: Gocht, 1957, pl.19, fig.1; text-fig.7. **NOW** *Phoberocysta*. Originally *Wetziella?*, subsequently (and now) *Phoberocysta*, thirdly *Muderongia*. Questionable assignment: Gocht (1957, p.172). Taxonomic junior synonym: *Muderongia tomaszowensis*, by implication in Monteil (1991b, p.477), who considered *Muderongia tomaszowensis* to be the senior name — however, this synonymy has not been generally followed. Age: Hauterivian.

"forma *circulata*" Gocht, 1957, p.178; text-fig.14. Holotype: Gocht, 1957, text-fig.14. Originally *Wetziella? neocomica* forma *circulata*, subsequently *Phoberocysta neocomica* subsp. *circulata*. **Taxonomic senior synonym:** *Wetziella?* (as *Muderongia*) *neocomica* subsp. *neocomica* (now redundant), by implication in Monteil (1991b, p.477), who listed this taxon as a taxonomic junior synonym of *Phoberocysta neocomica*. Age: Hauterivian.

"forma *convexa*" Gocht, 1957, p.178, pl.20, figs.1–2. Holotype: not designated. Lectotype: Gocht, 1957, pl.20, fig.1, designated by Lentin and Williams (1989, p.293). Originally *Wetziella? neocomica* forma *convexa*, subsequently *Phoberocysta neocomica* subsp. *convexa*. **Taxonomic senior synonym** (at specific rank): *Phoberocysta* (as *Muderongia*) *tabulata*, according to Monteil (1991b, p.476). Age: Hauterivian.

"forma *cruciformis*" Gocht, 1957, p.176–177, pl.19, fig.5; pl.20, fig.3; text-figs.9–10. Holotype: not designated. Lectotype: Gocht, 1957, pl.20, fig.3, designated by Lentin and Williams (1989, p.293). Originally *Wetziella? neocomica* forma *cruciformis*, subsequently *Phoberocysta neocomica* subsp. *cruciformis*. **Taxonomic senior synonym:** *Wetziella?* (as *Muderongia*) *neocomica* subsp. *neocomica* (now redundant), by implication in Monteil (1991b, p.477), who listed this taxon as a taxonomic junior synonym of *Phoberocysta neocomica*. Age: Hauterivian.

"forma *dedecosa*" Gocht, 1957, p.177; text-fig.11. Holotype: Gocht, 1957, text-fig.11. Originally *Wetziella? neocomica* forma *dedecosa*, subsequently *Phoberocysta neocomica* subsp. *dedecosa*. **Taxonomic senior synonym:** *Wetziella?* (as *Muderongia*) *neocomica* subsp. *neocomica* (now redundant), by implication in Monteil (1991b, p.477), who listed this taxon as a taxonomic junior synonym of *Phoberocysta neocomica*. Age: Hauterivian.

"forma *neocomica*". Autonym. Holotype: Gocht, 1957, pl.19, fig.1. **Now redundant.** Taxonomic junior synonyms: *Phoberocysta neocomica* subsp. *circulata*, *Phoberocysta neocomica* subsp. *cruciformis* and *Phoberocysta neocomica* subsp. *dedecosa*, by implication in Monteil (1991b, p.477), who listed these taxa as taxonomic junior synonyms of *Phoberocysta neocomica*.

"forma *pteridia*" Gocht, 1957, p.178, pl.20, fig.5. Holotype: Gocht, 1957, pl.20, fig.5. Originally *Wetziella? neocomica* forma *pteridia*, subsequently *Phoberocysta neocomica* subsp. *pteridia*. **Taxonomic senior synonym** (at specific rank): *Phoberocysta* (as *Muderongia*) *tabulata*, according to Monteil (1991b, p.476). Age: Hauterivian.

"forma *subovalis*" Gocht, 1957, p.177; text-figs.12–13. Holotype: not designated. Lectotype: Gocht, 1957, text-fig.13, designated by Lentin and Williams (1989, p.294). Originally *Wetziella? neocomica* forma *subovalis*, subsequently *Phoberocysta neocomica* subsp. *subovalis*. **Taxonomic senior synonym** (at

specific rank): *Phoberocysta* (as *Muderongia*) *tabulata*, according to Monteil (1991b, p.476). Age: Hauterivian.

"*ornata*" Wilson, 1967c, p.481–482, figs.33–34. Holotype: Wilson, 1967c, fig.33. **NOW** *Wilsonidium*. Originally *Wetzelietta*, subsequently (and now) *Wilsonidium*, thirdly *Rhombodinium?*. Age: early Eocene.

ovalis Eisenack, 1954b, p.59, pl.8, fig.5. Holotype: Eisenack, 1954b, pl.8, fig.5. Age: early Oligocene.

subsp. *ovalis*. Autonym. Holotype: Eisenack, 1954b, pl.8, fig.5.

subsp. *rotundata* Andreeva-Grigorovich and Savitskaya, 1993, p.44, pl.1, figs.3–4. Holotype: Andreeva-Grigorovich and Savitskaya, 1993, pl.1, fig.3; Andreeva-Grigorovich et al., 2011, pl.34, fig.4. Age: Eocene–Oligocene.

"*pachyderma*" Caro, 1973, p.365, pl.3, figs.4–6. Holotype: Caro, 1973, pl.3, fig.4. Originally *Wetzelietta*, subsequently *Dracodinium*. **Taxonomic senior synonym:** *Wetzelietta* (now *Dracodinium*) *eocaenica*, by implication in Caro (1973, p.365), who considered the name *Wetzelietta eocaenica* to be not effectively published. Williams et al. (2015, p.304) also considered *Dracodinium pachydermum* to be a taxonomic junior synonym of *Dracodinium eocaenicum*. Age: early Eocene.

"*paniculata*" Costa and Downie, 1976, p.608–609, pl.92, fig.1. Holotype: Costa and Downie, 1976, pl.92, fig.1. **NOW** *Apectodinium*. Originally *Wetzelietta* subgenus *Apectodinium*, subsequently (and now) *Apectodinium*. Taxonomic junior synonym: *Fibrocyta axialis*, according to Garg et al. (1995, p.364). Age: early Eocene.

"*parva*" Alberti, 1961, p.8–9, pl.1, figs.14–18; pl.12, figs.10–11. Emendation: Harland, 1979c, p.65–66, as *Apectodinium parvum*. Holotype: Alberti, 1961, pl.1, fig.14. **NOW** *Apectodinium*. Originally *Wetzelietta* subgenus *Wetzelietta*, subsequently *Wetzelietta* subgenus *Apectodinium*, thirdly (and now) *Apectodinium*. Age: late Paleocene–early Eocene.

"*pentagona*" (Vozzhennikova, 1967, p.171–172, pl.89, fig.4; pl.95, figs.1–5; pl.96, figs.1–6) Lentin and Williams, 1976, p.132. Holotype: Vozzhennikova, 1967, pl.96, fig.3, lost according to Lentin and Vozzhennikova (1990, p.78). Lectotype: Lentin and Vozzhennikova, 1990, pl.7, fig.4; text-fig.42, designated by Lentin and Vozzhennikova (1990, p.78). **NOW** *Rhombodinium?*. Originally *Rhombodinium*, subsequently *Wetzelietta*, thirdly (and now) *Rhombodinium?*. Taxonomic senior synonym: *Wetzelietta articulata*, according to Costa and Downie (1979, p.40) — however, Lentin and Williams (1981, p.291) retained *Wetzelietta pentagona*. Age: late Eocene–early Oligocene.

"*perforata*" Jan du Chêne and Châteauneuf, 1975, p.30–31, pl.1, figs.8–14; pl.3, figs.7–10. Holotype: Jan du Chêne and Châteauneuf, 1975, pl.1, figs.8–9. **NOW** *Rhombodinium*. Originally *Wetzelietta* subgenus *Rhombodinium*, subsequently (and now) *Rhombodinium*. Age: middle Lutetian–late Priabonian.

"*pilata*" Stanley, 1965, p.222, pl.21, figs.12–16. Holotype: Stanley, 1965, pl.21, figs.14–16. **NOW** *Spinidinium?* Originally *Wetzelietta*, subsequently *Wetzelietta?*, thirdly (and now) *Spinidinium?*, fourthly *Magallanesium*. Questionable assignment: Lentin and Williams (1976, p.132). Age: Paleocene.

"*quinquelata*" (Williams and Downie, 1966b, p.191–192, pl.18, fig.7) Harland, 1979c, p.67. Holotype: Williams and Downie, 1966b, pl.18, fig.7. **NOW** *Apectodinium quinquelatum*. Originally *Wetzelietta homomorpha* var. *quinquelata*, subsequently *Wetzelietta homomorpha* subsp. *quinquelata*, thirdly *Apectodinium homomorphum* subsp. *quinquelatum*, fourthly *Wetzelietta quinquelata*, fifthly (and now) *Apectodinium quinquelatum*. Taxonomic senior synonym (at specific rank): *Hystrichosphaeridium* (now *Apectodinium*) *geometricum*, by implication in Harland (1979c, p.67), who believed the latter to be the junior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. Age: early Eocene.

"*reticulata*" Williams and Downie, 1966b, p.187–188, pl.19, figs.3,6; text-fig.48. Holotype: Williams and Downie, 1966b, pl.19, figs.3,6; text-fig.48. **NOW** *Sophismatia*. Originally *Wetzelietta*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

"*rhomboidea*" Alberti, 1961, p.10, pl.1, figs.1–5; pl.12, fig.9. Holotype: Alberti, 1961, pl.1, fig.3; pl.12, fig.9. **NOW** *Petalodinium*. Originally *Wetzeliella* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: late Eocene.

?*robosta* Yu Jingxian, 1989, p.152, pl.54, figs.1,4; pl.55, figs.1–2,6. Holotype: Yu Jingxian, 1989, pl.54, fig.1. Questionable assignment: Williams et al. (2015, p.317). Age: Eocene.

"*rotundata*" Balteş, 1969, p.35, pl.5, fig.10. **Name not validly published:** provisional designation. Holotype: Balteş, 1969, pl.5, fig.10. **NOW** *Rhombodinium*. Originally *Wetzeliella* (name not validly published), subsequently (and now) *Rhombodinium*. Taxonomic junior synonym (at specific rank): *Rhombodinium draco* forma *freienwaldense* (as *Rhombodinium freienwaldense*), by implication in Costa and Downie (1979, p.44), who believed *Rhombodinium freienwaldense* to be the senior name — however, Grabowska in Malinowskiej and Piwockiego (1996, p.343) retained *Rhombodinium freienwaldense*. Age: Oligocene.

"?*rugosa*" Stanley, 1965, p.222–223, pl.21, figs.6–11. Holotype: Stanley, 1965, pl.21, figs.10–11. **NOW** *Spinidinium*. Originally *Wetzeliella*, subsequently *Wilsonidium?*, thirdly *Wetzeliella?*, fourthly (and now) *Spinidinium*. Questionable assignment: Stover and Evitt (1978, p.132). Age: Paleocene.

"*samlandica*" Eisenack, 1954b, p.59, pl.8, figs.11–12. Holotype: Eisenack, 1954b, pl.8, fig.11. **NOW** *Dracodinium*. Originally *Wetzeliella*, subsequently (and now) *Dracodinium*. Neumann (1990, p.163) retained this species in *Wetzeliella*; however, Williams et al. (2015, p.304) retained the species in *Dracodinium*. Age: early Eocene.

"*similis*" Eisenack, 1954b, p.58–59, pl.8, figs.8–10. Holotype: Eisenack, 1954b, pl.8, fig.10. **NOW** *Dracodinium*. Originally *Wetzeliella*, subsequently (and now) *Dracodinium*. Age: early Oligocene.

simplex (Bujak, 1979, p.312–313, pl.2, fig.10; pl.3, figs.1–12; text-figs.4B,8F) Lentin and Vozzhennikova, 1989, p.228. Holotype: Bujak, 1979, pl.3, figs.7–12; Bujak et al., 1980, pl.15, fig.5; Fensome et al., 1995, figs.1–5 — p.1793. Originally *Gochtodinium*, subsequently (and now) *Wetzeliella*. Age: middle Eocene (see Aubry, 1986).

"*solida*" (Gocht, 1955, p.88; text-figs.3a–b,4a–c,5a–c) Williams and Downie, 1966b, p.195. Holotype: Gocht, 1955, text-figs.3a–b. **NOW** *Dracodinium*. Originally (and now) *Dracodinium*, subsequently *Wetzeliella*. Age: Eocene or Oligocene.

"*spinula*" (Bujak, 1979, p.313, pl.2, figs.3–9; text-fig.8E) Lentin and Vozzhennikova, 1989, p.228. Holotype: Bujak, 1979, pl.2, figs.3–5; Bujak et al., 1980, pl.15, fig.6. **NOW** *Rhombodinium*. Originally *Gochtodinium*, subsequently *Wetzeliella*, thirdly (and now) *Rhombodinium*. N.I.A. Age: middle Eocene (see Aubry, 1986).

?*spinulosa* Wilson, 1988, p.32–33, pl.25, figs.1a–b,2a–b. Holotype: Wilson, 1988, pl.25, figs.2a–b; Fensome et al., 1996, figs.3–4 — p.2379. Questionable assignment: Williams et al. (2015, p.317). Age: early Eocene.

"*summissa*" Harland, 1979c, p.66–67, fig.12. Holotype: Harland, 1979c, pl.1, fig.12. **NOW** *Apectodinium*. Originally *Wetzeliella* subgenus *Apectodinium*, subsequently (and now) *Apectodinium*, thirdly *Krutzschidinium* (combination not validly published). Age: late Paleocene.

symmetrica Weiler, 1956, p.132–135, pl.11, figs.1–3; text-figs.2–5. Holotype: Weiler, 1956, pl.11, fig.1. Taxonomic junior synonym: *Hystriosphæridium saturnium*, according to Sarjeant (1983, p.107–108). Age: middle Oligocene.

subsp. *incisa* Gerlach, 1961, p.156–158, pl.25, fig.9. Holotype: Gerlach, 1961, pl.25, fig.9. Age: middle-late Oligocene.

"subsp. *lobisca*" (Williams and Downie, 1966b, p.196, pl.20, fig.3) Lentin and Williams, 1973, p.143. Holotype: Williams and Downie, 1966b, pl.20, fig.3. **NOW** *Dracodinium lobiscum*. Originally *Wetzeliella symmetrica* var. *lobisca*, subsequently *Wetzeliella symmetrica* subsp. *lobisca*, thirdly *Wetzeliella*

meckelfeldensis subsp. *lobisca*, fourthly *Wetzeliella lobisca*, fifthly (and now) *Dracodinium lobiscum*. Age: earliest Eocene.

"var. *lobisca*" Williams and Downie, 1966b, p.196, pl.20, fig.3. Holotype: Williams and Downie, 1966b, pl.20, fig.3. **NOW** *Dracodinium lobiscum*. Originally *Wetzeliella symmetrica* var. *lobisca*, subsequently *Wetzeliella symmetrica* subsp. *lobisca*, thirdly *Wetzeliella meckelfeldensis* subsp. *lobisca*, fourthly *Wetzeliella lobisca*, fifthly (and now) *Dracodinium lobiscum*. Age: earliest Eocene.

?subsp. *scabrata* (Shaw Chenglong, 1999a, p.42, figs.31–36) Williams et al., 2015, p.317. Holotype: Shaw Chenglong, 1999a, figs.31–33. Originally *Wetzeliella symmetrica* var. *scabrata*, subsequently (and now) *Wetzeliella symmetrica?* subsp. *scabrata*. Questionable assignment: Williams et al. (2015, p.318). Age: Eocene.

"var. *scabrata*" Shaw Chenglong, 1999a, p.42, figs.31–36. Holotype: Shaw Chenglong, 1999a, figs.31–33. **NOW** *Wetzeliella symmetrica?* subsp. *scabrata*. Originally *Wetzeliella symmetrica* var. *scabrata*, subsequently (and now) *Wetzeliella symmetrica?* subsp. *scabrata*. Age: Eocene.

subsp. *symmetrica*. Autonym. Holotype: Weiler, 1956, pl.11, fig.1.

"var. *symmetrica*". Autonym. Holotype: Weiler, 1956, pl.11, fig.1. **Now redundant**.

?subsp. *taiwaniana* (Shaw Chenglong, 1999a, p.41–42, figs.22–30) Williams et al., 2015, p.318. Holotype: Shaw Chenglong, 1999a, figs.22–24. Originally *Wetzeliella symmetrica* var. *taiwaniana*, subsequently (and now) *Wetzeliella symmetrica?* subsp. *taiwaniana*. Questionable assignment: Williams et al. (2015, p.318). Age: Eocene.

"var. *taiwaniana*" Shaw Chenglong, 1999a, p.41–42, figs.22–30. Holotype: Shaw Chenglong, 1999a, figs.22–24. **NOW** *Wetzeliella symmetrica?* subsp. *taiwaniana*. Originally *Wetzeliella symmetrica* var. *taiwaniana*, subsequently (and now) *Wetzeliella symmetrica?* subsp. *taiwaniana*. Age: Eocene.

"*tabulata*" Wilson, 1967c, p.473–474, figs.2a–b,4–7,10–11. Holotype: Wilson, 1967c, figs.4–6; Fensome et al., 1996, figs.1–3 — p.2397. **NOW** *Wilsonidium*. Originally *Wetzeliella*, subsequently (and now) *Wilsonidium*. Age: late Eocene.

"*tenuivirgula*" Williams and Downie, 1966b, p.188–189, pl.19, figs.1–2,4–5,7; text-figs.49–50. Holotype: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49. **NOW** *Sophismatia*. Originally *Wetzeliella*, subsequently *Kisselevia*, thirdly *Charlesdowniea*, fourthly (and now) *Sophismatia*. Age: early Eocene.

"subsp. *crassoramosa*" (Williams and Downie, 1966b, p.189–190; pl.19, figs.1,5,7; text-fig.50) Lentin and Williams, 1973, p.143. Holotype: Williams and Downie, 1966b, pl.19, fig.7. **NOW** *Sophismatia crassoramosa*. Originally *Wetzeliella tenuivirgula* var. *crassoramosa*, subsequently *Wetzeliella tenuivirgula* subsp. *crassoramosa*, thirdly *Kisselevia tenuivirgula* subsp. *crassoramosa*, fourthly *Kisselevia crassoramosa*, fifthly *Charlesdowniea crassoramosa*, sixthly (and now) *Sophismatia crassoramosa*. Age: early Eocene.

"var. *crassoramosa*" Williams and Downie, 1966b, p.189–190; pl.19, figs.1,5,7; text-fig.50. Holotype: Williams and Downie, 1966b, pl.19, fig.7. **NOW** *Sophismatia crassoramosa*. Originally *Wetzeliella tenuivirgula* var. *crassoramosa*, subsequently *Wetzeliella tenuivirgula* subsp. *crassoramosa*, thirdly *Kisselevia tenuivirgula* subsp. *crassoramosa*, fourthly *Kisselevia crassoramosa*, fifthly *Charlesdowniea crassoramosa*, sixthly (and now) *Sophismatia crassoramosa*. Age: early Eocene.

"subsp. *tenuivirgula*". Autonym. Holotype: Williams and Downie, 1966b, pl.19, figs.2,4; text-fig.49. **Now redundant**. Originally *Wetzeliella tenuivirgula* subsp. *tenuivirgula*, subsequently *Kisselevia tenuivirgula* subsp. *tenuivirgula*, thirdly *Charlesdowniea tenuivirgula* subsp. *tenuivirgula*.

"var. *tenuivirgula*". Autonym. Holotype: Williams and Downie, 1966b, pl.19, fig.7. **Now redundant**.

?tianshanensis He Chengquan, 1991, p.102, pl.40, fig.6; pl.63, figs.1–4. Holotype: He Chengquan, 1991, pl.40, fig.6. Questionable assignment: Williams et al. (2015, p.318). Age: middle Eocene.

"triangulata" (Yu Jingxian, 1989, p.155–156, pl.58, figs.2,5,8) Lentin and Williams, 1993, p.678. Holotype: Yu Jingxian, 1989, pl.58, fig.2. **NOW** *Epelidinium*. Originally *Gochtodinium*, subsequently *Wetzeliella*, thirdly *Wilsonidium*, fourthly (and now) *Epelidinium*. Age: Eocene.

"uncinata" Michoux, 1988, p.36,38, pl.7, figs.1–6; pl.8, figs.1–7: text-fig.12. Holotype: Michoux, 1988, pl.7, figs.1–5; text-fig.12. **NOW** *Dolichodinium*. Originally *Wetzeliella*, subsequently (and now) *Dolichodinium*. Age: early Eocene.

"unicaudalis" Caro, 1973, p.366,368, pl.5, figs.1,9. Holotype: Caro, 1973, pl.5, fig.1. **NOW** *Dolichodinium*? Originally *Wetzeliella*, subsequently (and now) *Dolichodinium*? Age: early Eocene.

"varielongituda" Williams and Downie, 1966b, p.196–197, pl.20, figs.4,8. Holotype: Williams and Downie, 1966b, pl.20, fig.4. **NOW** *Dracodinium*. Originally *Wetzeliella*, subsequently (and now) *Dracodinium*. Age: early Eocene.

"waipawaensis" Wilson, 1967c, p.493–494, figs.18,20. Holotype: Wilson, 1967c, fig.18. **NOW** *Petalodinium*. Originally *Wetzeliella* subgenus *Rhombodinium*, subsequently *Rhombodinium*, thirdly *Dracodinium*, fourthly (and now) *Petalodinium*. Age: early Eocene.

"wetzeli" Agelopoulos, 1967, p.17–18, pl.2, figs.4,5a–b. Holotype: Agelopoulos, 1967, pl.2, figs.5a–b. **NOW** *Dracodinium*. Originally *Wetzeliella*, subsequently (and now) *Dracodinium*. Age: Late Eocene.

xinjiangensis He Chengquan, 1991, p.102–103, pl.43, figs.1–9; pl.62, figs.1–5. Holotype: He Chengquan, 1991, pl.43, fig.3. Age: middle Eocene.

"WETZELIELLA subgenus APECTODINIUM" Costa and Downie, 1976, p.608. **NOW** *Apectodinium*. Originally *Wetzeliella* subgenus *Apectodinium*, subsequently (and now) *Apectodinium*. Costa and Downie (1976, p.608–609) assigned the following species to this subgenus: *Wetzeliella homomorpha*, *Wetzeliella hyperacantha*, *Wetzeliella parva* and *Wetzeliella paniculata*. Harland (1979c, p.63,66–67) assigned the following species to the subgenus: *Wetzeliella augusta*, *Wetzeliella quinquelata* and *Wetzeliella sumissa*. Entries for these species are included under the genus *Wetzeliella*. Type: Deflandre and Cookson, 1955, pl.5, fig.7; text-fig.19, as *Wetzeliella homomorpha*.

"WETZELIELLA subgenus RHOMBODINIUM" (Gocht, 1955, p.85) Alberti, 1961, p.9. **NOW** *Rhombodinium*. Originally (and now) *Rhombodinium*, subsequently *Wetzeliella* subgenus *Rhombodinium*. Alberti (1961, p.9–11) assigned the following species in this subgenus: *Wetzeliella draco*, *Wetzeliella rhomboidea* and questionably *Wetzeliella minuscula*. Wilson (1967c, p.493) assigned the following species to this subgenus: *Wetzeliella waipawaensis*. Jan du Chêne and Châteauneuf (1975, p.30) assigned the following species to this subgenus: *Wetzeliella perforata*. Entries for these species are included under the genus *Wetzeliella*. Type: Gocht, 1955, text-fig.1c, as *Rhombodinium draco*.

"WETZELIELLA subgenus WETZELIELLA". Autonym. **Now redundant**. Type: Eisenack, 1938b, fig.4, as *Wetzeliella articulata*.

"WETZELIOPSIS" Beju, 1978, p.4. **Name not validly published**: no description. **Taxonomic senior synonym**: *Endoscrinium*, by implication, as the type of *Wetzeliopsis* is now included in that genus. Type: Cookson and Eisenack, 1958, pl.10, fig.1, as *Wetzeliella irregularis*.

***"irregularis"** (Cookson and Eisenack, 1958, p.28–29, pl.10, figs.1–2) Beju, 1978, p.4. Holotype: Cookson and Eisenack, 1958, pl.10, fig.1; Jan du Chêne et al., 1986a, pl.109, figs.1–2. **Combination not validly published**:

basionym not fully referenced. **NOW** *Endoscrinium*. Originally *Wetzeliella*, subsequently *Wetzeliopsis* (name not validly published), thirdly *Scriniodinium?*, fourthly *Tubotuberella*, fifthly (and now) *Endoscrinium*. Taxonomic junior synonym: *Wetzeliella meckelfeldensis*, according to Costa and Downie (1979, p.43) — however, Lentin and Williams (1981, p.290) retained *Wetzeliella meckelfeldensis*. Age: Late Jurassic.

WHITECLIFFIA Pearce, 2010, p.68. Type: Clarke and Verdier, 1967, pl.17, fig.1, as *Pterospermopsis spinosa*.

**spinosa* (Clarke and Verdier, 1967, p.77–78, pl.17, figs.1–2; text-fig.31) Pearce, 2010, p.68. Holotype: Clarke and Verdier, 1967, pl.17, fig.1. Originally *Pterospermopsis* (Appendix A), subsequently *Pterospermella* (Appendix A), thirdly *Thalassiphora?*, fourthly (and now) *Whitecliffia*. Taxonomic junior synonym: *Hexagonifera perforata* (name not validly published), according to Slimani (2001a, p.194). Age: Santonian.

WIGGINSIELLA Lucas-Clark, 1987, p.160–161. This name was not validly published in Helenes (1984, p.111) since that author did not provide a description. Type: Lucas-Clark, 1987, pl.1, figs.1–9, as *WigginsIELLA grandstandica*.

canadensis (Singh, 1983, p.141, pl.49, figs.1–3) Lucas-Clark, 1987, p.164. Emendation: Lucas-Clark, 1987, p.164, as *WigginsIELLA canadensis*. Holotype: Singh, 1983, pl.49, fig.1; Jan du Chêne et al., 1986a, pl.114, fig.3. Originally *Spongodinium*, subsequently (and now) *WigginsIELLA*. Age: early Cenomanian.

**grandstandica* Lucas-Clark, 1987, p.162,164, pl.1, figs.1–14; text-figs.2A–E. Holotype: Lucas-Clark, 1987, pl.1, figs.1–9; Fensome et al., 1995, figs.1–4 — p.1523. Age: late Albian.

WILLEIDINIUM Feist-Burkhardt, 1995a, p.168,170–171. Type: Feist-Burkhardt, 1995a, pl.1, figs.1–3; text-fig.5, nos.1a–b, as *Willeidinium baiocassinum*.

**baiocassinum* Feist-Burkhardt, 1995a, p.171–172, pl.1, figs.1–6; pl.2, figs.1–6; pl.3, figs.1–6; pl.4, figs.1–6; text-figs.1A–D,2A–C,3A–B; text-fig.5, nos.1a–b,2,3a–b,4a–b. Holotype: Feist-Burkhardt, 1995a, pl.1, figs.1–3; text-fig.5, nos.1a–b. Age: late Bajocian–early Bathonian.

WILLIAMSIDINIUM Lentin, 1983, p.148,150. Type: Lentin, 1983, pl.1, figs.1a–b, as *Williamsidinium banksianum*.

**banksianum* Lentin, 1983, p.150, pl.1, figs.1a–b,2–7; text-fig.1. Holotype: Lentin, 1983, pl.1, figs.1a–b; Fensome et al., 1993a, figs.1–2 — p.963. Age: Maastrichtian.

diaphanes Kurita, 2004, p.43–44, pl.3, figs.1–9; text-fig.10a. Holotype: Kurita, 2004, pl.3, figs.1–3; text-fig.10a. Age: late Oligocene.

WILSONIDIUM Lentin and Williams, 1976, p.138–139. Emendation: Williams et al., 2015, p.318. Type: Wilson, 1967c, figs.4–6, as *Wetzeliella tabulata*.

"?*aechmophorum*" (Benedek, 1972, p.41, pl.5, figs.7,11; text-fig.17) Lentin and Williams, 1976, p.139. Emendation: Benedek and Sarjeant, 1981, p.340–341, as *Gerlachidium aechmophorum*. Holotype: Benedek, 1972, pl.5, fig.7; text-fig.17; Benedek and Sarjeant, 1981, figs.7,9, nos.1–2; Fensome et al., 1993a, figs.1–2 — p.887. **NOW** *Gerlachidium*. Originally *Lejeunia* (generic name illegitimate), subsequently *Wilsonidium?*, thirdly *Lejeunecysta*, fourthly (and now) *Gerlachidium*. Questionable assignment: Lentin and Williams (1976, p.139). Age: middle-late Oligocene.

"**compactum**" Michoux, 1988, p.38–39, pl.9, figs.1–9; pl.10, figs.1–9 (not fig.10); text-figs.13A–B,14. Holotype: Michoux, 1988, pl.9, figs.1–3; text-figs.13A–B. **NOW** *Castellodinium*. Originally *Wilsonidium*, subsequently (and now) *Castellodinium*. Age: middle Eocene.

conspicuum (He Chengquan, 1991, p.103–104, pl.44, figs.6–12) Williams et al., 2015, p.318. Holotype: He Chengquan, 1991, pl.44, fig.10. Originally *Wilsonidium lineidentatum* subsp. *conspicuum*, subsequently (and now) *Wilsonidium conspicuum*. Age: early Eocene.

"**echinosuturatum**" (Wilson, 1967c, p.477,479, figs.3,22–25) Lentin and Williams, 1976, p.139. Holotype: Wilson, 1967c, figs.22–24. **NOW** *Vallodinium*? Originally *Wetzeliella*, subsequently *Wilsonidium*, thirdly (and now) *Vallodinium*? Age: middle Eocene.

"**glabrum**" (Cookson, 1956, p.186, pl.2, figs.1–5) Costa and Downie, 1979, p.45. Holotype: Cookson, 1956, pl.2, fig.1. **NOW** *Rhadinodinium*. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly *Rhombodinium*?, fifthly (and now) *Rhadinodinium*. Age: Eocene.

"**intermedium**" (Cookson and Eisenack, 1961b, p.40, pl.1, figs.5–6) Costa and Downie, 1979, p.45. Holotype: Cookson and Eisenack, 1961b, pl.1, fig.5. **NOW** *Castellodinium*. Originally *Wetzeliella*, subsequently *Rhombodinium*, thirdly *Wilsonidium*, fourthly (and now) *Castellodinium*. Age: Eocene.

"**lineidentatum**" (Deflandre and Cookson, 1955, p.253–254, pl.5, fig.5; text-figs.17–18) Lentin and Williams, 1976, p.139. Holotype: Deflandre and Cookson, 1955, pl.5, fig.5. **NOW** *Stichodinium*? Originally *Wetzeliella*, subsequently *Wilsonidium*, thirdly (and now) *Stichodinium*? Age: Eocene.

"subsp. **conspicuum**" He Chengquan, 1991, p.103–104, pl.44, figs.6–12. Holotype: He Chengquan, 1991, pl.44, fig.10. **NOW** *Wilsonidium conspicuum*. Originally *Wilsonidium lineidentatum* subsp. *conspicuum*, subsequently (and now) *Wilsonidium conspicuum*. Age: early Eocene.

"subsp. **lineidentatum**". Autonym. Holotype: Deflandre and Cookson, 1955, pl.5, fig.5. **Now redundant**.

modicum Iakovleva, 2016, p.20 (on PDF initially published online), pl.7, figs.10–11; text-fig.4b (part). Holotype: Iakovleva, 2016, pl.7, figs.10–11. Age: earliest Eocene.

"**nigeriaense**" Jan du Chêne and Adedirán, 1985, p.31,33, pl.7, figs.1–6; pl.8, figs.1–6; pl.9, figs.1–5. Holotype: Jan du Chêne and Adedirán, 1985, pl.9, figs.1–2. **NOW** *Vallodinium*. Originally *Wilsonidium*, subsequently (and now) *Vallodinium*. Age: late Paleocene–early Eocene.

ornatum (Wilson, 1967c, p.481–482, figs.33–34) Lentin and Williams, 1976, p.139. Holotype: Wilson, 1967c, fig.33. Originally *Wetzeliella*, subsequently (and now) *Wilsonidium*, thirdly *Rhombodinium*?. Lentin and Williams (1981, p.244) retained this species in *Wilsonidium*. Age: early Eocene.

"**pechoricum**" Iakovleva and Heilmann-Clausen, 2007, p.1024,1025,1027–1031, fig.2, nos.1–5; fig.3, nos.1–12; fig.4, nos.1–6; fig.5, nos.1–4; fig.6, nos.1–4. Holotype: Iakovleva and Heilmann-Clausen, 2007, fig.2, nos.4–5, fig.3, no.1. **NOW** *Epelidinium*. Originally *Wilsonidium*, subsequently (and now) *Epelidinium*. Age: earliest Eocene.

"**?rugosum**" (Stanley, 1965, p.222–223, pl.21, figs.6–11) Lentin and Williams, 1976, p.140. Holotype: Stanley, 1965, pl.21, figs.10–11. **NOW** *Spinidinium*. Originally *Wetzeliella*, subsequently *Wilsonidium*?, thirdly *Wetzeliella*?, fourthly (and now) *Spinidinium*. Questionable assignment: Lentin and Williams (1976, p.140). Age: Paleocene.

stellatum Antolinez-Delgado and Oboh-Ikuenobe, 2007, p.60–61, pl.2, figs.1–2,6,8. Holotype: Antolinez-Delgado and Oboh-Ikuenobe, 2007, pl.2, fig.1. Age: Paleocene–?earliest Eocene.

"*subtile*" He Chengquan and Wang Kede, 1990, p.418,424, pl.2, fig.3; text-fig.2. Holotype: He Chengquan and Wang Kede, 1990, pl.2, fig.3; text-fig.2. **NOW** *Stichodinium*. Originally *Wilsonidium*, subsequently (and now) *Stichodinium*. Age: late early Eocene.

**tabulatum* (Wilson, 1967c, p.473–474, figs.2a–b,4–7,10–11) Lentin and Williams, 1976, p.138,140. Holotype: Wilson, 1967c, figs.4–6; Fensome et al., 1996, figs.1–3 — p.2397. Originally *Wetzelietta*, subsequently (and now) *Wilsonidium*. Age: late Eocene.

"*tesselatum*" (Châteauneuf and Gruas-Cavagnetto, 1978, p.65–66, pl.1, figs.1–2) Islam, 1983c, p.90. Holotype: Châteauneuf and Gruas-Cavagnetto, 1978, pl.1, figs.1–2. **NOW** *Axioidinium tessellatum*. Originally *Apectodinium homomorphum* subsp. *tessellatum*, subsequently *Wilsonidium tessellatum*, thirdly (and now) *Axioidinium tessellatum*. Age: early Eocene (Sparnacian).

"*triangulatum*" (Yu Jingxian, 1989, p.155–156, pl.58, figs.2,5,8) He Chengquan et al., 2009, p.505. Holotype: Yu Jingxian, 1989, pl.58, fig.2. **NOW** *Epelidinium*. Originally *Gochtodinium*, subsequently *Wetzelietta*, thirdly *Wilsonidium*, fourthly (and now) *Epelidinium*. Age: Eocene.

"*tuberosuturatum*" He Chengquan, 1991, p.103, pl.37, figs.7–8. Holotype: He Chengquan, 1991, pl.37, fig.8. **NOW** *Castellodinium?* Originally *Wilsonidium*, subsequently (and now) *Castellodinium?* Age: middle Eocene.

WILSONISPHAERA Slimani, 1994, p.67–68. Taxonomic junior synonym: *Glaphyrosphaera*, according to Schiøler and Wilson (1995, p.511). Type: Corradini, 1973, pl.31, fig.2, as *Thalassiphora?* *petila*.

**petila* (Corradini, 1973, p.186, pl.31, figs.1–2) Slimani, 1994, p.68–69. Emendation: Slimani, 1994, p.68, as *Wilsonisphaera petila*. Holotype: Corradini, 1973, pl.31, fig.2. Originally *Thalassiphora?*, subsequently *Disphaeria*, thirdly (and now) *Wilsonisphaera*. Taxonomic junior synonym: *Glaphyrosphaera glabra*, according to Schiøler and Wilson (1995, p.511). Age: Senonian.

WITTAUDINIUM Bucefalo Palliani and Riding, 1998, p.166,168–169. Type: Bucefalo Palliani and Riding, 1998, fig.11, no.1, as *Wittaudinium minutum*.

**minutum* Bucefalo Palliani and Riding, 1998, p.169–170, fig.10, nos.1–5; fig.11, nos.1–5. Holotype: Bucefalo Palliani and Riding, 1998, fig.11, no.1. Age: late Toarcian–Aalenian.

WOODINIA Riding and Helby, 2001d, p.97,99. Taxonomic junior synonym: *Taltarnia*, by implication in Riding and Helby (2001e, p.133), who included the only citation of this generic name, as "*Taltarnia* spp", in synonymy with *Woodinia bensonii*. Type: Riding and Helby, 2001d, figs.19K–M, as *Woodinia pedis*.

bensonii Riding and Helby, 2001e, p.133,135–136, figs.13A–T. Holotype: Riding and Helby, 2001e, figs.13A–B. Age: Oxfordian.

**pedis* Riding and Helby, 2001d, p.99, figs.19A–T. Holotype: Riding and Helby, 2001d, figs.19K–M. N.I.A. Age: late Callovian.

WREVITTIA Helenes and Lucas-Clark, 1997, p.186–187. Type: Eisenack and Cookson, 1960, pl.1, fig.4, as *Gonyaulax helicoidea*.

cassidata (Eisenack and Cookson, 1960, p.3, pl.1, figs.5–6) Helenes and Lucas-Clark, 1997, p.188. Emendations: Sarjeant, 1966b, p.125, as *Gonyaulacysta cassidata*; Helenes and Lucas-Clark, 1997, p.190, as *Wrevittia cassidata*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.5; Jan du Chêne et al., 1986a, pl.40, figs.6–7. Originally *Gonyaulax helicoidea* subsp. *cassidata*, subsequently *Gonyaulax cassidata*, thirdly *Gonyaulacysta cassidata*, fourthly (and now) *Wrevittia cassidata*. Age: Aptian–Cenomanian.

?*diutina* (Duxbury, 1977, p.34–35, pl.1, figs.3–4; text-fig.9) Helenes and Lucas-Clark, 1997, p.190. Holotype: Duxbury, 1977, pl.1, fig.3; text-fig.9.; Jan du Chêne et al., 1986a, pl.41, figs.3–4. Originally *Gonyaulacysta*, subsequently *Millioudodinium*, thirdly (and now) *Wrevittia*?. Questionable assignment: Helenes and Lucas-Clark (1997, p.190). Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*, now *Wrevittia*) *helicoidea*, according to Stover and Helby (1987d, p.287) — however, Jan du Chêne et al. (1986a, p.130) and Lentin and Williams (1989, p.152) retained *Gonyaulacysta* (now *Wrevittia*?) *diutina*. Age: Berriasian–Hauterivian.

subsp. *diutina*. Autonym. Holotype: Duxbury, 1977, pl.1, fig.3; text-fig.9; Jan du Chêne et al., 1986a, pl.41, figs.3–4. Originally *Gonyaulacysta diutina* subsp. *diutina*, subsequently (and now) *Wrevittia*? *diutina* subsp. *diutina*.

subsp. *tabulacornuta* (Prössl, 1990, p.102–103, pl.8, figs.1–2,4–5 ex Prössl, 1992b, p.113,115) Williams et al. 1998, p.642. Originally *Gonyaulacysta diutina* subsp. *tabulacornuta*, subsequently (and now) *Wrevittia*? *diutina* subsp. *tabulacornuta*. The name *Gonyaulacysta diutina* subsp. *tabulacornuta* was not validly published in Prössl (1990, p.102–103), since that author did not specify the lodgment of the holotype. Age: early Barremian.

**helicoidea* (Eisenack and Cookson, 1960, p.2–3, pl.1, figs.4–6,9 [figs.5–6 are now *Wrevittia cassidata*]) Helenes and Lucas-Clark, 1997, p.187. Emendations: Sarjeant, 1966b, p.116, as *Gonyaulacysta helicoidea*; Helenes and Lucas-Clark, 1997, p.187–188, as *Wrevittia helicoidea*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.4–5. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Wrevittia*. Taxonomic junior synonym: *Gonyaulacysta* (now *Wrevittia*?) *diutina*, according to Stover and Helby (1987d, p.287) -however, Jan du Chêne et al. (1986a, p.130) and Lentin and Williams (1989, p.152) retained *Gonyaulacysta* (now *Wrevittia*?) *diutina*. Age: Neocomian–Aptian.

?*perforobtusa* (Duxbury, 1977, p.39, pl.1, fig.1; text-fig.13) Helenes and Lucas-Clark, 1997, p.192. Holotype: Duxbury, 1977, pl.1, fig.1; text-fig.13; Jan du Chêne et al., 1986a, pl.44, figs.1–2. Originally *Gonyaulacysta*, subsequently *Gonyaulacysta*?, thirdly (and now) *Wrevittia*?. Questionable assignment: Helenes and Lucas-Clark (1997, p.192). Age: Hauterivian.

XANDARODINIUM Reid, 1977, p.446–447. Matsuoka (1992, p.451) considered *Sumatradinium* to be the possible taxonomic senior synonym of this genus. Type: Reid, 1977, pl.3, figs.27–28, as *Xandarodinium xanthum*.

"*variabile*" Bujak, 1984, p.194–195, pl.4, figs.7–10; text-fig.3. Holotype: Bujak, 1984, pl.4, fig.8; Head, 1994b, pl.11, figs.4–5,7–8; text-fig.3. **NOW** *Trinovantedinium*. Originally *Xandarodinium*, subsequently (and now) *Trinovantedinium*. Age: late Miocene–early Pleistocene.

**xanthum* Reid, 1977, p.447–448, pl.3, figs.27–29. Holotype: Reid, 1977, pl.3, figs.27–28; Fensome et al., 1995, figs.1–2 — p.1921. Motile equivalent: *Protoperidinium divaricatum* (Meunier, 1919) Parke and Dodge, 1976, according to Matsuoka (1984b, p.2) — however, see Head (1996b, p.1213). Age: Holocene.

XENASCUS Cookson and Eisenack, 1969, p.7. Emendations: Yun Hyesu, 1981, p.60; Stover and Helby, 1987a, p.128. Taxonomic senior synonym: *Phoberocysta*, by implication in Davey and Verdier (1971, p.27), who considered the "type species" of *Xenascus*, *Xenascus australensis*, to be a taxonomic junior synonym of *Hystrichosphaera* (as *Phoberocysta*, now *Xenascus*) *ceratioides* — however, Lentin and Williams (1973, p.143) retained *Xenascus*. Type: Cookson and Eisenack, 1969, figs.11–J, as *Xenascus australensis*.

asperatus Stover and Helby, 1987a, p.128–129, figs.26A–M,27. Holotype: Stover and Helby, 1987a, figs.26J–K; Fensome et al., 1996, figs.5–6 — p.2047. Age: late Albian.

**australensis* Cookson and Eisenack, 1969, p.7, figs.11–K. Holotype: Cookson and Eisenack, 1969, figs.11–J. Taxonomic senior synonym: *Hystrichosphaera* (as *Phoberocysta*, now *Xenascus*) *ceratioides*, according to Davey

and Verdier (1971, p.26) — however, Lentin and Williams (1985, p.374) retained *Xenascus australensis*. Age: Albian–Cenomanian.

blastema (Davey, 1970, p.356, pl.5, figs.4–5) Stover and Helby, 1987a, p.128. Holotype: Davey, 1970, pl.5, fig.4. Originally *Odontochitina*, subsequently (and now) *Xenascus*. Taxonomic senior synonym: *Hystrichosphaera* (as *Phoberocysta*, now *Xenascus*) *ceratioides*, according to Davey and Verdier (1971, p.27) — however, Stover and Helby (1987a, p.128) retained *Xenascus blastema*. N.I.A.. Age: Cenomanian.

ceratioides (Deflandre, 1937b, p.66–67, pl.12 [al. pl.9], figs.7–8) Lentin and Williams, 1973, p.144. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), figs.7–8; Fensome et al., 1991, fig.1 — p.601; fig.1 — p.605. Originally *Hystrichosphaera*, subsequently *Pseudoceratium*, thirdly *Spiniferites*, fourthly *Phoberocysta*, fifthly (and now) *Xenascus*. Taxonomic junior synonyms: *Endoceratium* (now *Xenascus*) *perforatum*, according to Davey and Verdier (1971, p.27) — however, Yun Hyesu (1981, p.62) retained *Endoceratium* (as *Xenascus*) *perforatum*; *Xenascus australensis*, according to Davey and Verdier (1971, p.26) — however, Lentin and Williams (1985, p.374) retained *Xenascus australensis*; *Odontochitina blastema*, according to Davey and Verdier (1971, p.27) — however, Stover and Helby (1987a, p.128) retained *Odontochitina* (as *Xenascus*) *blastema*. Age: Senonian.

subsp. **ceratioides**. Autonym. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), figs.7–8.

subsp. **procerus** Yun Hyesu, 1981, p.61, pl.14, figs.5,8–9. Holotype: Yun Hyesu, 1981, pl.14, fig.9; Fensome et al., 1991, fig.2 — p.601; fig.3 — p.717. Age: early Santonian.

?dubius (Corradini, 1973, p.182, pl.29, figs.6a–b) Lentin and Williams, 1993, p.681. Holotype: Corradini, 1973, pl.29, figs.6a–b. Originally *Phoberocysta?*, subsequently (and now) *Xenascus?*. Questionable assignment: Lentin and Williams (1993, p.681). This combination was not validly published in Monteil (1991b, p.471), since that author did not fully reference the basionym. Age: Senonian.

esbeckianus Yun Hyesu, 1981, p.61–62, pl.14, figs.2–4,6. Holotype: Yun Hyesu, 1981, pl.14, fig.3; Fensome et al., 1991, fig.2 — p.639. Age: early Santonian.

ghanaensis Masure et al., 1998, p.266–267, pl.3, figs.14–15. Holotype: Masure et al., 1998, pl.3, figs.14–15. Age: Maastrichtian.

gochti (Corradini, 1973, p.179–181, pl.29, figs.1a–b,3; text-fig.9) Stover and Evitt, 1978, p.88. Holotype: Corradini, 1973, pl.29, figs.1a–b; text-fig.9. Originally *Phoberocysta*, subsequently (and now) *Xenascus*. Age: Senonian.

perforatus (Vozzhennikova, 1967, p.188–189, pl.112, figs.1a–b,3; pl.113, fig.1) Yun Hyesu, 1981, p.62. Emendation: Yun Hyesu, 1981, p.62, as *Xenascus perforatus* — however, see Lentin and Vozzhennikova (1990, p.119). Holotype: Vozzhennikova, 1967, pl.112, fig.1a; Lentin and Vozzhennikova, 1990, pl.16, fig.5; text-fig.69. Originally *Endoceratium*, subsequently (and now) *Xenascus*. Taxonomic senior synonym: *Hystrichosphaera* (as *Phoberocysta*, now *Xenascus*) *ceratioides*, according to Davey and Verdier (1971, p.27) — however, Yun Hyesu (1981, p.62) retained *Xenascus perforatus*. Lentin and Vozzhennikova (1990, p.118–119) provided an "expanded description" for this species. Age: Late Cretaceous.

plotei Below, 1981a, p.21–22, pl.2, figs.8–9; pl.8, figs.20a–b,21; pl.14, fig.15; text-fig.10. Holotype: Below, 1981a, pl.2, fig.9; text-fig.10; Fensome et al., 1991, figs.2–3 — p.713. Age: late Aptian–early Cenomanian.

sarjeantii (Corradini, 1973, p.181, pl.29, figs.2a–b,4a–b; pl.37, fig.3) Stover and Evitt, 1978, p.88. Holotype: Corradini, 1973, pl.29, figs.2a–b. Originally *Phoberocysta*, subsequently (and now) *Xenascus*. Age: Senonian.

serpaglii (Corradini, 1973, p.181–182, pl.29, figs.5,7a–b; pl.37, fig.4) Stover and Evitt, 1978, p.88. Holotype: Corradini, 1973, pl.29, figs.7a–b. Originally *Phoberocysta*, subsequently (and now) *Xenascus*. Age: Senonian.

spinatus Prince et al., 2008, p.91, pl.2, figs.4–7. Holotype: Prince et al., 2008, pl.2, figs.4–5. Age: late Santonian.

velimensis Žitt et al., 1997, p.146–147, pl.4, figs.1–4; text-fig.5. Holotype: Žitt et al., 1997, pl.1, figs.1–4. Age: early Turonian.

wetzeli Slimani, 1996, p.380–381, pl.3, figs.F–G; pl.4, figs.A–B; text-figs.7A–B ex Slimani, 2001b, p.9, pl.2, figs.3–4,7–8. Holotype: Slimani, 1996, pl.4, figs.A–B; Slimani, 2001b, pl.2, figs.3–4. Taxonomic junior synonym: *Odontochitina wetzelii* (name not validly published), according to Slimani (2001a, p.194; 2001b, p.9). This name was not validly published in Slimani (1996) since no English or Latin description or diagnosis was provided. Age: Campanian–early Maastrichtian (Campanian–?Maastrichtian according to Slimani, 1996, p.381).

yunii Prince et al., 2008, p.91–92, pl. 2, fig.8,9. Holotype: Prince et al., 2008, pl.2, fig.8. Age: middle Santonian.

XENICODINIUM Klement, 1960, p.53–54. Taxonomic junior synonym: *Stomodinium*, according to Chen et al. (1988, p.31). Type: Klement, 1960, pl.5, figs.14–15, as *Xenicodinium densispinosum*.

conispinum Stover and Hardenbol, 1994, p.40, pl.7, figs.42a–b,43a–b. Holotype: Stover and Hardenbol, 1994, pl.7, figs.42a–b. Age: Rupelian.

crassum (He Chengquan, 1984a, p.770–771, pl.1, figs.12–14; text-fig.2) Chen et al., 1988, p.31. Holotype: He Chengquan, 1984a, pl.1, fig.12. Originally *Stomodinium*, subsequently (and now) *Xenicodinium*. Age: early-middle Eocene.

delicatum Hultberg, 1985c, p.157, pl.12, figs.J–K. Holotype: Hultberg, 1985c, pl.12, figs.J–K. Age: late Danian.

**densispinosum* Klement, 1960, p.54, pl.5, figs.14–15. Holotype: Klement, 1960, pl.5, figs.14–15. Age: early Kimmeridgian.

echiniferum Stover and Hardenbol, 1994, p.40–41, pl.7, figs.44a–c,45a–c. Holotype: Stover and Hardenbol, 1994, pl.7, figs.44a–c. Age: Rupelian.

"*hispidum*" Drugg, 1970a, p.120–121, figs.12–14 (not 15). Emendation: Lentin et al., 1994, p.571, as *Sumatradinium hispidum*. Holotype: Drugg, 1970a, fig.12; Lentin et al., 1994, pl.1, fig.1; Fensome et al., 1995, fig.1 — p.1545. **NOW** *Sumatradinium*. Originally *Xenicodinium*, subsequently (and now) *Sumatradinium*. Age: middle Miocene–Pliocene.

lubricum Morgenroth, 1968, p.554, pl.47, fig.9; pl.48, fig.1. Holotype: Morgenroth, 1968, pl.47, fig.9. Age: Danian.

meandriforme Hultberg, 1985c, p.156–157, pl.12, figs.H–I. Holotype: Hultberg, 1985c, pl.12, figs.H–I. Age: late Danian.

reticulatum Hansen, 1977, p.12, figs.20D–G. Holotype: Hansen, 1977, figs.20D–G. Age: Danian.

"*rugulatum*" Hansen, 1977, p.12–13, figs.20H–J. Holotype: Hansen, 1977, figs.20H–J. Originally *Xenicodinium*, subsequently *Tectatodinium*. **Taxonomic senior synonym:** *Tectatodinium pellitum*, questionably according to Head (1994a, p.308), and according to Head and Nøhr-Hansen (1999, p.577). Age: Danian.

suturispinosum (He Chengquan, 1991, p.120, pl.13, fig.8) Lentin and Williams, 1993, p.682. Holotype: He Chengquan, 1991, pl.13, fig.8. Originally *Stomodinium*, subsequently (and now) *Xenicodinium*. Age: early Eocene.

verrucosum (He Chengquan, 1991, p.119–120, pl.13, figs.1,7; text-fig.18) Lentin and Williams, 1993, p.683. Holotype: He Chengquan, 1991, pl.13, fig.7; text-fig.18. Originally *Stomodinium*, subsequently (and now) *Xenicodinium*. Age: middle Eocene.

XENIKOON Cookson and Eisenack, 1960a, p.14–16. Type: Cookson and Eisenack, 1960a, pl.3, fig.17, as *Xenikoon australis*.

"**americanus**" Habib, 1970, p.372, pl.10, fig.10. Holotype: Habib, 1970, pl.10, fig.10. **NOW** *Craspedodinium*. Originally *Xenikoon*, subsequently (and now) *Craspedodinium*. Age: Albian–Cenomanian.

***australis** Cookson and Eisenack, 1960a, p.16, pl.3, figs.16–17. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.17. Age: late Turonian–Campanian.

"**XIPHOPHORIDIUM**" Sarjeant, 1966b, p.146–147. **Taxonomic senior synonym:** *Dinopterygium*, according to Fensome et al. (2009, p.27). Taxonomic senior synonym: *Oodnadattia*, according to Below (1981a, p.64) — however, Lentin and Williams (1981, p.294) retained *Xiphophoridium*. Nomenclatural junior synonym: *Pyramidium*, which has the same type. Type: Cookson and Eisenack, 1962b, pl.2, fig.1, as *Hystrichodinium alatum*.

"***alatum**" (Cookson and Eisenack, 1962b, p.487–488, pl.2, figs.1–4) Sarjeant, 1966b, p.147. Emendation: Sarjeant, 1966b, p.147, as *Xiphophoridium alatum*. Holotype: Cookson and Eisenack, 1962b, pl.2, fig.1; Fensome et al., 1993a, fig.1 — p.893; Fauconnier and Masure, 2004, pl.80, fig.6. **NOW** *Dinopterygium*. Originally *Hystrichodinium*, subsequently *Xiphophoridium*, thirdly *Pyramidium* (genus name illegitimate), fourthly *Oodnadattia*, fifthly (and now) *Dinopterygium*. Age: Albian–Cenomanian.

"**asteriforme**" Yun Hyesu, 1981, p.57–58, pl.8, figs.7,9–10. Holotype: Yun Hyesu, 1981, pl.8, fig.9; Fensome et al., 1991, fig.2 — p.575; Fauconnier and Masure, 2004, pl.80, fig.4. **NOW** *Dinopterygium*. Originally *Xiphophoridium*, subsequently (and now) *Dinopterygium*. Age: early Santonian.

XISHADINIUM He Chengquan et al., 2009, p.525,647. Type: Wall and Dale, 1968c, pl.4, fig.19, as cyst of *Diplopsalis lenticula*.

***circulatum** He Chengquan et al., 2009, p.525,647, pl.16, figs.19–20. Holotype: Wall and Dale, 1968c, pl.4, fig.19, as cyst of *Diplopsalis lenticula*. Age: middle-late Pleistocene.

XUIDINIUM Mao Shaozhi and Norris, 1988, p.53–54. Type: Mao Shaozhi and Norris, 1988, pl.16, fig.10, as *Xuidinium laevigatum*.

***laevigatum** Mao Shaozhi and Norris, 1988, p.54, pl.16, figs.7–11. Holotype: Mao Shaozhi and Norris, 1988, pl.16, fig.10; Fensome et al., 1995, fig.3 — p.1593. Age: late Paleocene.

XYLOCHOARION Erkmen and Sarjeant, 1978, p.401,403–404. Type: Erkmen and Sarjeant, 1978, figs.1,5–6, as *Xylochoarion hacknessense*.

***hacknessense** Erkmen and Sarjeant, 1978, p.404,406, figs.1–11. Holotype: Erkmen and Sarjeant, 1978, figs.1,5–6; Fensome et al., 1995, figs.1–2,5 — p.1539. Age: Callovian.

YALKALPODINIUM Morgan, 1980, p.34. Emendation: Riding and Helby, 2001d, p.99. Type: Morgan, 1980, pl.31, figs.17–18, as *Yalkalpodinium scutum*.

"**areolatum**" (Cookson and Eisenack, 1960b, p.253, pl.38, figs.7–8) Morgan, 1980, p.34. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.8. **NOW** *Cyclonephelium*. Originally (and now) *Cyclonephelium*, subsequently *Yalkalpodinium*. Age: Tithonian.

elangianum Riding and Helby, 2001d, p.101–102, figs.20A–P. Holotype: Riding and Helby, 2001d, figs.20I–K. Age: late Callovian–Oxfordian.

indicum (Jain and Taugourdeau-Lantz, 1973, p.64, pl.4, figs.1–2) Morgan, 1980, p.34. Holotype: Jain and Taugourdeau-Lantz, 1973, pl.4, fig.1. Originally *Ovoidinium*, subsequently *Ovoidinium?*, thirdly (and now) *Yalkalpodinium*. Age: ?Aptian–early Albian.

playfordii Mantle, 2009b, p.98–100, pl.7, figs.1–5; text-figs.1A,B. Holotype: Mantle, 2009b, pl.7, fig.3. Age: Callovian.

**scutum* Morgan, 1980, p.34, pl.31, figs.15–18. Holotype: Morgan, 1980, pl.31, figs.17–18; Fensome et al., 1996, figs.3–4 — p.2345. N.I.A. Age: Barremian–late Albian.

YNEZIDINIUM Lucas-Clark and Helenes, 2000, p.114–115. Type: Lucas-Clark and Helenes, 2000, pl.1, figs.1–3, as *Ynezidinium malloyii*.

brevisulcatum (Michoux, 1985, p.144–145, pl.1, figs.9–11; text-fig.4) Lucas-Clark and Helenes, 2000, p.118. Holotype: Michoux, 1985, pl.1, fig.10; Jan du Chêne et al., 1986a, pl.56, figs.4–6. Originally *Impagidinium*, subsequently (and now) *Ynezidinium*. Age: middle Eocene.

latolineatum (Yun Hyesu, 1981, p.10–11, pl.9, figs.10a–b, 15a–b; text-figs.2a–c) Lucas-Clark and Helenes, 2000, p.118. Holotype: Yun Hyesu, 1981, pl.9, figs.10a–b; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.75, figs.12–14; Fensome et al., 1991, figs.1–4 — p.659. Originally *Leptodinium*, subsequently (and now) *Ynezidinium*. Age: early Santonian.

**malloyi* Lucas-Clark and Helenes, 2000, p.115, 117–118, pl.1, figs.1–10, text-figs.4–6. Holotype: Lucas-Clark and Helenes, 2000, pl.1, figs.1–3, text-fig.4. Age: late Paleocene.

pentahedrias (Damassa, 1979b, p.202, 204, pl.3, figs.22, 24–26, 28–29; pl.4, figs.1–3, 6; text-fig.4) Lucas-Clark and Helenes, 2000, p.120. Holotype: Damassa, 1979b, pl.3, fig.25; Jan du Chêne et al., 1986a, pl.59, figs.7–8. Originally *Impagidinium*, subsequently (and now) *Ynezidinium*. N.I.A. Age: early Paleocene.

tazaense Slimani et al., 2008, p.334, 336, figs.5A–L, 6A–B. Holotype: Slimani et al., 2008, figs.5A–D, 6A–B. Age: early Danian.

waipawaense (Wilson, 1988, p.24, pl.13, figs.1a–b; pl.14, figs.1a–c, 2a–b) Lucas-Clark and Helenes, 2000, p.120. Holotype: Wilson, 1988, pl.14, figs.1a–c; Fensome et al., 1996, figs.1–3 — p.2439. Originally *Impagidinium*, subsequently (and now) *Ynezidinium*. Age: early-middle Eocene.

YOLKINIGYMNIIUM Lentin and Vozzhennikova, 1990, p.30–31. Type: May, 1977, pl.2, figs.9–10, as *Dinogymnium lanceolatum*.

elongatum (May, 1977, p.112, 114, pl.2, figs.11–12) Lentin and Vozzhennikova, 1990, p.31. Holotype: May, 1977, pl.2, figs.11–12; Lentin and Vozzhennikova, 1990, Appendix, A, fig.42. Originally *Dinogymnium*, subsequently (and now) *Yolkinigymnium*. Age: late Campanian–early Maastrichtian.

expansum Firth, 1993, p.201, pl.5, figs.5–8. Holotype: Firth, 1993, pl.5, figs.6–7. Age: early Maastrichtian.

**lanceolatum* (May, 1977, p.115, pl.2, figs.9–10) Lentin and Vozzhennikova, 1990, p.30. Holotype: May, 1977, pl.2, figs.9–10; Lentin and Vozzhennikova, 1990, Appendix A, fig.41. Originally *Dinogymnium*, subsequently (and now) *Yolkinigymnium*. Age: late Campanian–early Maastrichtian.

ZHONGYUANDINIUM Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.71–72. Emendation: Mao Shaozhi et al., 1995, p.61–62. Type: He Chengquan et al., 1989, pl.10, fig.11; text-fig.12, as *Zhongyuandinium decorosum*.

biconicum Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.72, pl.8, fig.15. Holotype: He Chengquan et al., 1989, pl.8, fig.15. Age: Early Tertiary.

craciatum Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.72, pl.9, figs.11–16; text-fig.11. Holotype: He Chengquan et al., 1989, pl.9, fig.16; text-fig.11. Age: Early Tertiary.

***decorosum** Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.72–73, pl.10, figs.3–16, pl.28, figs.1–8; text-fig.12. Holotype: He Chengquan et al., 1989, pl.10, fig.11; text-fig.12. Taxonomic junior synonyms: *Zhongyuandinium granorugosum* and *Zhongyuandinium simplex*, both according to Mao Shaozhi et al. (1995, p.62). Age: Early Tertiary.

elongatum Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.73, pl.8, figs.16–21, pl.9, figs.1–3; text-fig.13. Holotype: He Chengquan et al., 1989, pl.9, fig.1; text-fig.13. Age: Early Tertiary.

"subsp. **elongatum**". Autonym. Holotype: He Chengquan et al., 1989, pl.9, fig.1; text-fig.13. **Now redundant**. Taxonomic junior synonym: *Zhongyuandinium elongatum* subsp. *latum*, according to Mao Shaozhi et al. (1995, p.63,99).

"subsp. **latum**" Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.73–74, pl.8, figs.16–21. Holotype: He Chengquan et al., 1989, pl.8, fig.18. **Taxonomic senior synonym:** *Zhongyuandinium elongatum* subsp. *elongatum*, according to Mao Shaozhi et al. (1995, p.63,99). Age: Early Tertiary.

"granorugosum" Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.74, pl.9, figs.8–10. Holotype: He Chengquan et al., 1989, pl.9, fig.9. **Taxonomic senior synonym:** *Zhongyuandinium decorosum*, according to Mao Shaozhi et al. (1995, p.62). Age: Early Tertiary.

intermedium Gao Ruiqi et al., 1992a, p.22,28, pl.3, figs.10–13. Holotype: Gao Ruiqi et al., 1992a, pl.3, fig.10. Age: Campanian.

minus Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.74, pl.9, figs.6–7. Holotype: He Chengquan et al., 1989, pl.9, fig.7. Age: Early Tertiary.

"simplex" Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.74, pl.10, figs.1–2. Holotype: He Chengquan et al., 1989, pl.10, fig.1. **Taxonomic senior synonym:** *Zhongyuandinium decorosum*, according to Mao Shaozhi et al. (1995, p.62). Age: Early Tertiary.

striatum Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.74–75, pl.9, figs.4–5. Holotype: He Chengquan et al., 1989, pl.9, fig.4. Age: Early Tertiary.

turbinatum Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.75, pl.8, figs.1–14; text-fig.14. Holotype: He Chengquan et al., 1989, pl.8, fig.9; text-fig.14. Age: Early Tertiary.

subsp. **pygmeum** Zhu Shenzhao, He Chengquan and Jin Guangxing in He Chengquan et al., 1989, p.75–76, pl.8, figs.1–4; text-fig.15. Holotype: He Chengquan et al., 1989, pl.8, fig.1; text-fig.15. Age: Early Tertiary.

subsp. **turbinatum**. Autonym. Holotype: He Chengquan et al., 1989, pl.8, fig.9; text-fig.14.

ZUEGELIA Özdikmen 2009, p.237. Calcareous dinoflagellate genus (see Streng et al., 2004, p.482 under *Normandia*; Elbrächter et al., 2008, p.1300, who noted that the cyst wall is pithonelloid and so a dinoflagellate affinity is questionable — also under *Normandia*; and Gottschling and Soehner, 2013, p.129). Substitute name for *Normandia* Zügel, non Hooker. Özdikmen (2009) cited this name as *Zugelia*, based on the name Zügel. Based on I.C.N. Article 60.6, the name should be spelled as *Zuegelia*. In proposing this name, Özdikmen (2009) considered it

to be a replacement for *Normandia* Pic 1900; however, *Normandia* Pic is an animal and under the I.C.N. it does not pre-empt *Normandia* Zügel. Type: Zügel, 1994, pl.3, figs.1–5, as *Normandia circumperforata*.

**circumperforata* (Zügel, 1994, p.30,32,34, pl.3, figs.1–15; text-figs.12–13) Özdikmen 2009, p.237. Holotype: Zügel, 1994, pl.3, figs.1–5. Originally *Normandia* (generic name illegitimate), subsequently (and now) *Zuegelia*. Although Özdikmen (2009) did not fully reference the basionym when proposing the transfer of this species to *Zuegelia*, he did so under the aegis of the I.C.Z.N., so the combination can be considered validly published. Age: early Turonian.

APPENDIX A

ACANTHODIACRODIUM Timofeev, 1958, p.831. Emendation: Deflandre and Deflandre-Rigaud, 1962, p.194. Acritarch genus. See Fensome et al. (1990, p.23) for synonymy. Type: Timofeev, 1958, pl.1, fig.2, as *Acanthodiacrodium dentiferum*.

"**echinulatum**" (Deflandre, 1937b, p.55, pl.11 [al. pl.8], fig.9) Deflandre, 1966, p.5. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), fig.9, lost according to Deflandre and Foucher (1967, p.4). Neotype: Deflandre and Foucher, 1967, pl.1, fig.6, designated by Deflandre and Foucher (1967, p.4). **Combination not validly published**: basionym not fully referenced. **NOW** *Diacrocanthidium* (Appendix A). Originally *Palaeostomocystis* (Appendix A), subsequently *Acanthodiacrodium* (combination not validly published), thirdly (and now) *Diacrocanthidium* (Appendix A). Taxonomic junior synonym: *Cleistosphaeridium parvum*, according to Bujak in Bujak et al. (1980, p.52). Age: Late Cretaceous.

"**hamatum**" (Downie, 1958, p.335, pl.16, fig.1; text-figs.2j–k) Martin, 1973, p.32–33. Holotype: Downie, 1958, pl.16, fig.1. **NOW** *Baltisphaeridium hamatum* (Appendix A). Originally *Hystrichosphaeridium hirsutoides* var. *hamatum*, subsequently *Baltisphaeridium hirsutoides* var. *hamatum* (Appendix A), thirdly *Micrhystridium hamatum* (Appendix A), fourthly *Acanthodiacrodium hamatum*, fifthly (and now) *Baltisphaeridium hamatum* (Appendix A). Age: Early Ordovician.

"**timofeevii**" Shakhmundes, 1971, p.438–439 (p.226 in published English translation), figs.1e–f. Holotype: Shakhmundes, 1971, fig.1e; Fedorova-Shakhmundes, 1976, pl.1, figs.2,2a. **NOW** *Neodiacrodium*. Originally *Acanthodiacrodium*, subsequently (and now) *Neodiacrodium*. Junior homonym: *Acanthodiacrodium timofeevii* Golub and Volkova in Volkova and Golub, 1985. Age: Cretaceous–early Aptian.

tuberatum (Downie, 1958, p.338, pl.17, fig.3; text-fig.3f) Martin, 1972, p.36. Holotype: Downie, 1958, pl.17, fig.3. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Acanthodiacrodium*, fourthly *Vulcanisphaera* (Appendix A), fifthly *Goniosphaeridium* (Appendix A). W.A.S.Sarjeant (personal communication) has suggested that this species be retained in *Acanthodiacrodium*, pending re-examination of the type. Age: Early Ordovician.

ALDRIDGEISPHAERA Kozur, 1984, p.131. Muellerisphaerid genus. Type: Kozur, 1984, pl.1, fig.1, as *Aldridgeisphaera latispinosa*.

mutabilis (Sannemann, 1955, p.331, pl.5, figs.5–6; text-figs.17a–d) Sarjeant and Vavrdova, 1997, p.6. Holotype: Sannemann, 1955, pl.5, fig.5. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Aldridgeisphaera*. Age: Devonian (late Givetian).

?**robusta** (Sannemann, 1955, p.331, pl.1, figs.6,8–9; pl.6, figs.7–9; text-figs.13–14a–c) Sarjeant and Vavrdova, 1997, p.6. Holotype: Sannemann, 1955, pl.6, fig.7. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination illegitimate, Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Aldridgeisphaera*?. Questionable assignment: Sarjeant and Vavrdova (1997, p.6). Age: Devonian (late Givetian).

subsp. **fissa** (Sannemann, 1955, p.331, pl.6, fig.9; text-figs.14a–c) Sarjeant and Vavrdova, 1997, p.6. Holotype: Sannemann, 1955, pl.6, fig.9. Originally *Hystrichosphaeridium robustum* subsp. *fissum*, subsequently *Baltisphaeridium robustum* subsp. *fissum* (combination illegitimate, Appendix A), thirdly *Multiplicisphaeridium robustum* subsp. *fissum* (Appendix A), fourthly (and now) *Aldridgeisphaera*? *robusta* subsp. *fissa*. Age: Devonian (late Givetian).

subsp. **robusta**. Autonym. Holotype: Sannemann, 1955, pl.6, fig.7. Originally *Hystrichosphaeridium robustum* subsp. *robustum*, subsequently *Multiplicisphaeridium robustum* subsp. *robustum*, thirdly (and now) *Aldridgeisphaera*? *robusta* subsp. *robusta*.

AMMONIDIUM Lister, 1970, p.48–49. Emendations: Le Hérissé, 1989, p.80–81, as a revised diagnosis; Sarjeant and Vavrdova, 1997, p.15. Acritarch genus. Type: Downie, 1963, pl.92, fig.6, as *Baltisphaeridium microcladum*.

"*lewisii*" (Deunff, 1954a, p.240, fig.3) Lister, 1970, p.49. Holotype: Deunff, 1954a, fig.3. **Combination not validly published:** Lister (1970, p.49) did not clearly use the name *Ammonidium lewisii*. **NOW** *Gorgonisphaeridium?* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Ammonidium* (combination not validly published), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Gorgonisphaeridium?* (Appendix A). Age: Middle Devonian.

microfurcatum (Deunff, 1957, p.6, fig.2 — p.13; fig.3 — p.14) Fensome et al., 1990, p.59. Holotype: Deunff, 1957, fig.2 — p.13. Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly (and now) *Ammonidium*. This combination was not validly published in Lister (1970, p.49) since that author did not clearly use the name *Ammonidium microfurcatum*. Age: Middle Devonian.

ANGULARIA Samoilovitch in Samoilovitch and Mtchedlishvili, 1961, p.255–256. Acritarch genus. Type: Samoilovitch and Mtchedlishvili, 1961, pl.83, figs.5a–c, as *Angularia viridula*.

granulata Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.51, pl.26, figs.18–21; text-fig.1. Holotype: Liu Zhili et al., 1992, pl.26, fig.21. The authors attributed this species to the dinoflagellates. Age: Early Tertiary.

?*obida* (Snopková and Samuel, 1982, p.132, pl.48, figs.1–3; pl.49, figs.1–2; pl.50, fig.1) Lentin and Williams, 1993, p.691. Holotype: Snopková and Samuel, 1982, pl.48, figs.1–3; pl.49, figs.1–2; pl.50, fig.1. Originally *Pentagonium* Snopková and Samuel (generic name illegitimate; Appendix A), subsequently (and now) *Angularia?*. Questionable assignment: Lentin and Williams (1993, p.691). Age: Priabonian.

"AQUADULCUM" Harland and Sarjeant, 1970, p.220–221. Acritarch genus. **Taxonomic senior synonym:** *Cobricosphaeridium* (Appendix A), according to Head et al. (2003, p.1164). Type: Harland and Sarjeant, 1970, pl.21, figs.7–8; text-fig.5, as *Aquadulcum serpens*.

"*awendae*" Burden et al., 1986, p.52,54, pl.1, figs.1–15. Emendation: Head et al., 2003, p.1167, 1169, as *Cobricosphaeridium awendae*. Holotype: Burden et al., 1986, pl.1, figs.1–3; Head et al., fig.4, nos.1–4. **NOW** *Cobricosphaeridium* (Appendix A). Originally *Aquadulcum*, subsequently (and now) *Cobricosphaeridium* (Appendix A). Age: Holocene.

"*myalupense*" (Churchill and Sarjeant, 1962, p.38–40, figs.5,22–23) Harland and Sarjeant, 1970, p.221–222. Holotype: Churchill and Sarjeant, 1962, figs.5,22. **NOW** *Cobricosphaeridium* (Appendix A). Originally *Palaeohystrichophora*, subsequently *Aquadulcum*, thirdly (and now) *Cobricosphaeridium* (Appendix A). Age: Holocene.

"*ovatum*" Gao Ruiqi et al., 1992b, p.48–49,61, pl.13, figs.18–20. Holotype: Gao Ruiqi et al., 1992b, pl.13, fig.20. **NOW** *Cobricosphaeridium?* (Appendix A). Originally *Aquadulcum*, subsequently (and now) *Cobricosphaeridium?* (Appendix A). Age: Late Cretaceous.

"*pikeae*" (Churchill and Sarjeant, 1962, p.40–41, figs.6,24) Harland and Sarjeant, 1970, p.222. Holotype: Churchill and Sarjeant, 1962, figs.6,24. **NOW** *Cobricosphaeridium* (Appendix A). Originally *Palaeohystrichophora*, subsequently *Aquadulcum*, thirdly (and now) *Cobricosphaeridium* (Appendix A). Age: Holocene.

"**serpens*" Harland and Sarjeant, 1970, p.221, pl.21, figs.7–8; text-fig.5. Holotype: Harland and Sarjeant, 1970, pl.21, figs.7–8; text-fig.5; Head et al., 2003, fig.8, nos.17–20; fig.9, no.1. **NOW** *Cobricosphaeridium* (Appendix A). Originally *Aquadulcum*, subsequently (and now) *Cobricosphaeridium* (Appendix A). Age: Holocene.

"*?vermiculatum*" Song Zhichen in Song Zhichen et al., 1985, p.39–40, pl.2, figs.9–10. Holotype: Song Zhichen et al., 1985, pl.2, figs.9–10. **NOW** *Cobricosphaeridium?* (Appendix A). Originally *Aquadulcum?*, subsequently (and

now) *Cobricosphaeridium*? (Appendix A). Questionable assignment: Song Zhichen in Song Zhichen et al. (1985, p.39–40). Age: early-middle Pleistocene.

"?*yanchepe*se" Harland and Sarjeant, 1970, p.222–223, pl.22, fig.3. Holotype: Harland and Sarjeant, 1970, pl.22, fig.3. **NOW** *Cobricosphaeridium* (Appendix A). Originally *Aquadulcum*?, subsequently (and now) *Cobricosphaeridium* (Appendix A). Questionable assignment: Harland and Sarjeant (1970, p.222–223). Age: Holocene.

ARCHAEODINIUM Ouyang Shu, 1979, p.10. Acritarch genus. Type: Ouyang Shu, 1979, pl.2, fig.13, as *Archaeodinium cingulatum*.

**cingulatum* Ouyang Shu, 1979, p.10, pl.2, figs.9–16; text-fig.16. Holotype: Ouyang Shu, 1979, pl.2, fig.13. Age: Late Permian?

"**ARCHAEOHYSTRICHOSPHAERIDIUM**" Timofeev, 1959, p.32 ex Loeblich Jr. and Tappan, 1976, p.303. Acritarch genus. **Taxonomic senior synonym:** *Cymatiogalea* (Appendix A), according to Loeblich Jr. and Tappan (1976, p.303) and Cramer and Diez (1979, p.65). For a full discussion, see Fensome et al. (1990, p.66). Type: Timofeev, 1959, pl.3, fig.6, as *Archaeohystrichosphaeridium bifurcatum*.

"*setigerfurcatum*" (Timofeev, 1959, p.52–53, pl.4, fig.6) Combaz and Peniguel, 1972, p.133. Holotype: Timofeev, 1959, pl.4, fig.6. **Combination not validly published:** generic name not validly published until 1976 and basionym not fully referenced. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Archaeohystrichosphaeridium* (combination not validly published). Age: Early Ordovician.

ARPYLORUS Calandra, 1964, p.4114. Emendation: Sarjeant, 1978b, p.173. Genus of possible annelid or arthropod eggs according to Le Herissé et al. (1995). Type: Calandra, 1964, fig.1, as *Arpylorus antiquus*.

**antiquus* Calandra, 1964, p.4114, figs.1–3. Emendation: Sarjeant, 1978b, p.174. Holotype: Calandra, 1964, fig.1; Sarjeant, 1978b, pl.2, figs.2,4; text-fig.1A. Age: Late Silurian.

ARTEMISIOCYSTA Benedek, 1972, p.49. Acritarch genus. Type: Benedek, 1972, pl.12, figs.8a–b, as *Artemisiocysta cladodichotoma*.

**cladodichotoma* Benedek, 1972, p.49, pl.12, figs.8a–b; text-fig.23. Holotype: Benedek, 1972, pl.12, figs.8a–b. Age: middle-late Oligocene.

zinglongtaiensis Jiabo, 1978, p.95, pl.26, fig.1. Holotype: Jiabo, 1978, pl.26, fig.1. Age: Early Tertiary.

ASCOSTOMOCYSTIS Drugg and Loeblich Jr., 1967, p.187. Acritarch genus. Type: Drugg and Loeblich Jr., 1967, pl.3, fig.15, as *Ascostomocystis hydria*.

gigantea Singh, 1983, p.129–130, pl.45, figs.1–2. Holotype: Singh, 1983, pl.45, fig.1. Age: early Cenomanian.

"*granosa*" Matsuoka, 1983b, p.141, pl.8, figs.5a–b,7a–b,8. Emendation: Matsuoka and Head, 1992, p.170, as *Cyclopsiella granosa*. Holotype: Matsuoka, 1983b, pl.8, figs.5a–b; Matsuoka and Head, 1992, pl.1, figs.12–15. Originally *Ascostomocystis*, subsequently *Cyclopsiella* (Appendix A). **Taxonomic senior synonym:** *Echigraminidites* (as and now *Cyclopsiella*) *lusaticus*, according to Strauss and Lund (1992, p.174). Taxonomic senior synonym: *Cyclopsiella granulata*, according to Head et al. (1989b, p.497) — however, Head et al. (1992, p.163) retained *Ascostomocystis* (as *Cyclopsiella*) *granosa*. Taxonomic junior synonym: *Cyclopsiella spiculosa*, according to Matsuoka and Head (1992, p.170). Age: early-middle Miocene.

"*granulata*" Châteauneuf, 1980, p.133, pl.19, figs.8,11 (not figs.9–10, as indicated by Châteauneuf, 1980, p.133). Holotype: Châteauneuf, 1980, pl.19, fig.8. **Substitute name:** *Cyclopsiella chateauneufii* (Appendix A); the name *Cyclopsiella granulata* is preoccupied. Originally *Ascostomocystis granulata*, subsequently (and now) *Cyclopsiella chateauneufii* (Appendix A). Age: late Eocene (Auversian)–Oligocene (Stampian).

**hydria* Drugg and Loeblich Jr., 1967, p.187, pl.3, figs.13–15; text-fig.5. Holotype: Drugg and Loeblich Jr., 1967, pl.3, fig.15. N.I.A. Age: early Eocene.

"*laevigata*" Châteauneuf, 1980, p.133, pl.19, figs.6,9 (not figs.7–8, as indicated by Châteauneuf, 1980, p.133). Holotype: Châteauneuf, 1980, pl.19, figs.6,9. **NOW** *Cyclopsiella?* (Appendix A). Originally *Ascostomocystis*, subsequently (and now) *Cyclopsiella?* (Appendix A). Age: late Eocene (Auversian).

maxima Singh, 1971, p.425–426, pl.79, figs.3–4. Holotype: Singh, 1971, pl.79, fig.3. Age: late Albian.

potana Drugg and Loeblich Jr., 1967, p.187–188, pl.3, figs.10–12; text-fig.6. Holotype: Drugg and Loeblich Jr., 1967, pl.3, figs.10,12. Age: Oligocene.

"AZONOTETRAPORINA" Teteryuk, 1958, p.1035. Zygnematalean genus. **Name not validly published:** no description.

"*horologia*" Staplin, 1960, p.6, pl.1, figs.4,6. Holotype: Staplin, 1960, pl.1, fig.4; Pestchevitskaya, 2003, pl.2, fig.16. **Name not validly published:** generic name not validly published. **NOW** *Horologinella*. Originally *Azonotetraporina* (name not validly published), subsequently *Tetraporina* (Appendix A), thirdly (and now) *Horologinella*. Questionable assignment: Staplin (1960, p.6). Age: Carboniferous (late Mississippian).

BACHMAYERELLA Rögl and Franz, 1979, p.87. Streng et al. (2004, p.1303) did not consider this a calcareous dinoflagellate genus; Elbrächter et al. (2008, p.1303) implied that it is a calcisphere. Type: Rögl and Franz, 1979, pl.1, figs.1–2; pl.2, fig.15; pl.3, fig.30, as *Bachmayerella laqueata*.

**laqueata* Rögl and Franz, 1979, p.87–90, pl.1, figs.1–8; pl.2, figs.15–22; pl.3, figs.23–30; pl.4, figs.31–34. Holotype: Rögl and Franz, 1979, pl.1, figs.1–2; pl.2, fig.15; pl.3, fig.30. Age: middle Miocene (Badenian).

tenuis Rögl and Franz, 1979, p.90–93, pl.1, figs.9–14; pl.4, figs.35–38; pl.5, figs.39–46. Holotype: Rögl and Franz, 1979, pl.1, fig.9; pl.4, figs.36–37. Age: middle Miocene (Badenian).

BACISPHAERIDIUM Eisenack, 1962, p.355–356. Acritarch genus. See Fensome et al. (1990, p.81) for synonymy. Type: Eisenack, 1934, pl.4, fig.20, as *Bion bacifer*.

**baciferum* (Eisenack, 1934, p.66, pl.4, figs.20–21) Eisenack, 1962, p.356. Holotype: Eisenack, 1934, pl.4, fig.20, lost according to Eisenack (1962, p.356). Neotype: Eisenack, 1962, pl.44, fig.3, designated by Eisenack (1962, p.356). Originally *Bion* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Veryhachium* (combination not validly published, Appendix A), fourthly (and now) *Bacisphaeridium*, fifthly *Baltisphaeridium* (combination not validly published, Appendix A). Age: Late Ordovician.

BALTISPHAERIDIUM Eisenack, 1958a, p.398–399. Emendations: Staplin et al., 1965, p.188; Eisenack, 1969b, p.249; Eiserhardt, 1989, p.88–90. Acritarch genus. Although the "type species", *Baltisphaeridium longispinosum*, was not validly transferred by Eisenack (1958a, p.398), the generic name *Baltisphaeridium* was validly published since it is based on a previously validly published specific name (I.C.N. Article 40.3). For synonymy see Fensome et al. (1990, p.82–83). Type: Eisenack, 1931, pl.5, fig.10, as *Ovum hispidum* subsp. *longispinosum*.

aculeatum (Timofeev, 1959, p.56, pl.4, fig.21) Downie and Sarjeant, 1965, p.87. Holotype: Timofeev, 1959, pl.4, fig.21. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.89), since these authors did not fully reference the basionym. Age: Early Ordovician.

apiculatum (Timofeev, 1959, p.52, pl.4, fig.3) Downie and Sarjeant, 1965, p.87. Holotype: Timofeev, 1959, pl.4, fig.3. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*, thirdly *Goniosphaeridium* (combination not validly published, Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.89), since these authors did not fully reference the basionym. Age: Early Ordovician.

"armatum" (Deflandre, 1937b, p.76–77, pl.16 [al. pl.13], figs.6–7) Downie and Sarjeant, 1965, p.87. Emendation: Davey, 1969a, p.153, as *Cleistosphaeridium armatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.6; Fauconnier and Masure, 2004, pl.23, figs.1–3. **NOW** *Downiesphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: late Senonian.

arrectum (Timofeev, 1959, p.53, pl.4, fig.8) Downie and Sarjeant, 1965, p.87. Holotype: Timofeev, 1959, pl.4, fig.8. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.89), since these authors did not fully reference the basionym. Age: Early-Mid Ordovician.

"ashdodense" (Rossignol, 1962, p.132, pl.2, fig.2) Downie and Sarjeant, 1965, p.87. Holotype: Rossignol, 1962, pl.2, fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Lingulodinium*) *machaerophorum*, according to Wall (1967, p.109). Age: Pleistocene.

"?astarte" (Sannemann, 1955, p.325, pl.4, fig.1; text-figs.1a–b) Eisenack et al., 1973, p.65. Holotype: Sannemann, 1955, pl.4, fig.1. **NOW** *Buedingiisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Buedingiisphaeridium* (Appendix A). Questionable assignment: Eisenack et al. (1973, p.65). N.I.A. Age: Devonian (late Givetian).

asteroideum (Maslov, 1956, p.262, pl.86, fig.13) Downie and Sarjeant, 1965, p.87. Holotype: Maslov, 1956, pl.86, fig.13. Originally *Hystrichosphaera*, subsequently *Hystrichosphaeridium*, thirdly (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.87), since these authors did not fully reference the basionym. Age: Late Cretaceous.

atavum (Naumova, 1968, p.38, pl.2, fig.11) Fensome et al., 1990, p.85. Holotype: Naumova, 1968, pl.2, fig.11. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. Since Naumova (1968), in a citation in her plate caption, referred to this species as *Baltisphaeridium atavum*, Fensome et al. (1990, p.85) validated the combination since this Cambrian species is clearly not assignable to *Hystrichosphaeridium*. Age: Cambrian.

"baciferum" (Eisenack, 1934, p.66, pl.4, figs.20–21) Cramer and Diez, 1979, p.44. Holotype: Eisenack, 1934, pl.4, fig.20, lost according to Eisenack (1962, p.356). Neotype: Eisenack, 1962, pl.44, fig.3, designated by Eisenack (1962, p.356). **Combination not validly published:** basionym not fully referenced. **NOW** *Bacisphaeridium* (Appendix A). Originally *Bion* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Veryhachium* (combination not validly published, Appendix A), fourthly (and now) *Bacisphaeridium* (Appendix A), fifthly *Baltisphaeridium* (combination not validly published). Cramer and Diez (1979) apparently did not intend to propose this as a new combination. Age: Late Ordovician.

"balticum" (Eisenack, 1951, p.190, pl.3, figs.10–11) Cramer, 1970, p.180. Holotype: Eisenack, 1951, pl.3, fig.10. **NOW** *Pachysphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Pulvinosphaeridium* (combination not validly published, Appendix A), thirdly *Veryhachium* (Appendix A), fourthly *Goniosphaeridium* (Appendix A), fifthly *Baltisphaeridium*, sixthly *Estiastra* (Appendix A), seventhly (and now) *Pachysphaeridium* (Appendix A). Age: Early Ordovician.

"*bifidum*" Clarke and Verdier, 1967, p.72–73, pl.17, figs.5–6. Emendation: Davey, 1969b, p.26,28, as *Exochosphaeridium bifidum*. Holotype: Clarke and Verdier, 1967, pl.17, fig.5. Originally *Baltisphaeridium*, subsequently (and now) *Exochosphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Exochosphaeridium*) *majus* according to Peyrot (2011, p.284). Age: Cenomanian–Campanian.

"*biformoides*" (Eisenack, 1954b, p.68–69, pl.11, figs.16–20) Downie and Sarjeant, 1965, p.87. Holotype: Eisenack, 1954b, pl.11, fig.18. **NOW** *Achilleodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Hystrichokolpoma*, fourthly (and now) *Achilleodinium*, fifthly *Florentinia*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: late Eocene–early Oligocene.

bimarginatum (Timofeev, 1959, p.54, pl.4, fig.12) Downie and Sarjeant, 1965, p.87. Holotype: Timofeev, 1959, pl.4, fig.12. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.89), since these authors did not fully reference the basionym. Age: Early Ordovician.

bohemicum (Eisenack, 1934, p.70–71, pl.5, fig.31 ex Eisenack, 1938a, p.12) Downie and Sarjeant, 1965, p.87. Holotype: Eisenack, 1934, pl.5, fig.31. Originally *Ovum hispidum* subsp. *bohemicum* (name not validly published), subsequently *Hystrichosphaeridium bohemicum*, thirdly (and now) *Baltisphaeridium bohemicum*. This combination was not validly published in Downie and Sarjeant (1963, p.89), since these authors did not fully reference the basionym. The name *Ovum hispidum* subsp. *bohemicum* was not validly published in Eisenack (1934) since the specific name *Ovum hispidum* was not validly published. Age: Silurian.

"*borracherosum*" Cramer, 1964, p.289, pl.1, fig.11; text-fig.16, no.6. Holotype: Cramer, 1964, pl.1, fig.11. **NOW** *Petaloferidium* (Appendix A). Originally *Baltisphaeridium*, subsequently *Multiplicisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published), fourthly (and now) *Petaloferidium* (Appendix A). Age: Silurian (Ludlow).

"*brevifurcatum*" (Eisenack, 1954a, p.207–208, pl.1, fig.2; text-fig.2) Downie and Sarjeant, 1965, p.88. Holotype: Eisenack, 1954a, pl.1, fig.2. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.89), since these authors did not fully reference the basionym. Age: Silurian (late Llandovery).

"*brevispinosum*" (Eisenack, 1931, p.111, pl.5, figs.3–5 ex Eisenack, 1938a, p.12) Eisenack, 1959, p.197–198. Holotype: Eisenack, 1931, pl.5, fig.3, as *Ovum hispidum* subsp. *brevispinosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197), lost according to Ribecai and Tongiorgi (1999, p.124). New Neotype: Eisenack, 1959, pl.15, fig.16, designated by Ribecai and Tongiorgi (1999, p.124). **NOW** *Pachysphaeridium brevispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *brevispinosum* (name not validly published), subsequently *Hystrichosphaeridium brevispinosum*, thirdly *Baltisphaeridium brevispinosum*, fourthly *Buedingiisphaeridium brevispinosum* (combination not validly published, Appendix A), fifthly *Pachysphaeridium brevispinosum* (Appendix A). This combination was not validly published in Eisenack (1958b, p.400), since that author did not fully reference the basionym. The name *Ovum hispidum* subsp. *brevispinosum* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Silurian.

subsp. *brevispinosum*. Autonym. Holotype: Eisenack, 1931, pl.5, fig.3, as *Ovum hispidum* subsp. *brevispinosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197). Originally *Hystrichosphaeridium brevispinosum* subsp. *brevispinosum*, subsequently (and now) *Baltisphaeridium brevispinosum* subsp. *brevispinosum*. See discussion under *Baltisphaeridium brevispinosum* subsp. *callosum*.

"var. *brevispinosum*". Autonym. Holotype: Eisenack, 1931, pl.5, fig.3, as *Ovum hispidum* subsp. *brevispinosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197). **Now redundant.** Originally *Hystrichosphaeridium brevispinosum* var. *brevispinosum*, subsequently *Baltisphaeridium brevispinosum* var. *brevispinosum*.

subsp. *callosum* (Sannemann, 1955, p.325–326, pl.1, figs.1–4,7; pl.3, figs.2–5,10; pl.4, figs.3–9; pl.6, figs.11–12; text-figs.2a–d) Fensome et al., 1990, p.87. Holotype: Sannemann, 1955, pl.4, fig.3. Originally *Hystrichosphaeridium brevispinosum* subsp. *callosum*, subsequently *Buedingiisphaeridium brevispinosum* subsp. *callosum* (combination not validly published, Appendix A), thirdly (and now) *Baltisphaeridium brevispinosum* subsp. *callosum*. This combination was not validly published in Downie and Sarjeant (1963 p.90), since these authors did not fully reference the basionym, nor was it validly published in Eisenack et al. (1973, p.79–80), since these authors did not give a clear indication of taxonomic rank. Le Herissé in Ribecai and Tongiorgi (1999, p.124) considered this taxon and *Baltisphaeridium brevispinosum* subsp. *castaneoides* to be "... related to mazuelloids or muellerisphaerids (mineralized microfossils)" and not conspecific with *Hystrichosphaeridium* (now *Pachysphaeridium*) *brevispinosum*, but no new taxonomic assignments were proposed. We feel that, although the species has been transferred to *Pachysphaeridium*, since this Index does not treat acritarchs or mineralized microfossils in detail, it would be inappropriate for us to make taxonomic proposals here; hence we leave two subspecies (and the autonym) "in limbo". Age: Devonian (late Givetian).

subsp. *castaneoides* (Sannemann, 1955, p.326, pl.4, figs.13–14; text-fig.3) Fensome et al., 1990, p.87. Holotype: Sannemann, 1955, pl.4, fig.13. Originally *Hystrichosphaeridium brevispinosum* subsp. *castaneoides*, subsequently (and now) *Baltisphaeridium brevispinosum* subsp. *castaneoides*. Kjellström (1971a, p.18) listed this subspecies questionably in his synonymy for *Baltisphaeridium brevispinosum*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym, nor was it validly published in Eisenack et al. (1973, p.81), since these authors did not give a clear indication of taxonomic rank. See discussion under *Baltisphaeridium brevispinosum* subsp. *callosum*. Age: Devonian (late Givetian).

"var. *nanus*" (Deflandre, 1945a, p.62–63, pl.1, figs.5–7) Downie, 1959, p.59. Holotype: Deflandre, 1945a, pl.1, figs.5–6. **Combination not validly published:** basionym not fully referenced. **NOW** *Polygonium nanus* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* var. *nanus*, subsequently *Baltisphaeridium brevispinosum* var. *nanus* (combination not validly published), thirdly *Baltisphaeridium nanus* (combination not validly published, Appendix A), fourthly *Micrhystridium nanus* (Appendix A), fifthly (and now) *Polygonium nanus* (Appendix A), sixthly *Solisphaeridium nanus* (Appendix A). Taxonomic junior synonym: *Baltisphaeridium brevispinosum* var. *wenlockense* (subgenus *Salopidium wenlockense*) Downie, 1959, an acritarch taxon, according to Lister (1970, p.54). N.I.A. Age: Silurian.

"*bulbosum*" (Ehrenberg, 1837b, pl.1, fig.17) Lentini and Williams, 1973, p.173. Emendation: Morgenroth, 1968, p.546–547, as *Hystrichokolpoma bulbosum*. Holotype: Ehrenberg, 1837b, pl.1, fig.17. Neotype: Morgenroth, 1968, pl.44, fig.6, designated by Morgenroth (1968, p.546). **Combination not validly published:** basionym not fully referenced. **NOW** *Hystrichokolpoma*. Originally *Xanthidium bulbosum* (Appendix A), subsequently *Hystrichosphaera bulbosa* (combination not validly published), thirdly *Hystrichosphaeridium bulbosum*, fourthly *Ovum hispidum* subsp. *bulbosum* (name not validly published, Appendix A), fifthly (and now) *Hystrichokolpoma bulbosum*, sixthly *Baltisphaeridium bulbosum* (combination not validly published). Taxonomic senior synonym: *Xanthidium* (as *Hystrichosphaeridium*) *tubiferum*, according to Stover and Evitt (1978, p.55) — however, Lentini and Williams (1981, p.134) retained *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*. This combination cannot be legitimized since it would create a junior homonym of *Baltisphaeridium bulbosum* Kjellström, 1971a. Age: Danian.

capillare (Li Wenben, 1974, p.370, pl.196, fig.15) Lu Mengning and Wang Ruoshan, 1980, p.375. Holotype: Li Wenben, 1974, pl.196, fig.15. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. Age: Late Triassic.

castanea (Eisenack, 1934, p.71, pl.5, fig.32 ex Eisenack, 1938a, p.12) Downie and Sarjeant, 1965, p.88. Holotype: Eisenack, 1934, pl.5, fig.32. Originally *Ovum hispidum* subsp. *castanea* (name not validly published), subsequently *Hystrichosphaeridium castanea*, thirdly (and now) *Baltisphaeridium castanea*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. The name *Ovum hispidum* subsp. *castanea* was not validly published in Eisenack (1934) since the specific name *Ovum hispidum* was not validly published. N.I.A. Age: Silurian.

"centrocarpum" (Deflandre and Cookson, 1955, p.272–273, pl.8, figs.3–4) Gerlach, 1961, p.192–193. Holotype: Deflandre and Cookson, 1955, pl.8, figs.3–4; Matsuoka et al., 1997, pl.1, figs.1–6. **NOW** *Operculodinium centrocarpum*. Originally *Hystrichosphaeridium centrocarpum*, subsequently *Baltisphaeridium centrocarpum*, thirdly *Cordosphaeridium centrocarpum*, fourthly *Cordosphaeridium tiara* subsp. *centrocarpum*, fifthly (and now) *Operculodinium centrocarpum*, sixthly *Cordosphaeridium microtriainum* subsp. *centrocarpum*, seventhly *Cleistosphaeridium centrocarpum*. Taxonomic junior synonyms: *Operculodinium?* *echigoense*, according to Matsuoka et al. (1997, p.22); *Membranilarnacia delicata*, according to Jain (1980, p.140). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859 (as *Gonyaulax grindleyi* Reinecke, 1967), according to Wall and Dale (1966, p.1025–1026) — however, see Head (1996b, p.1211). Age: Miocene.

"circumscissum" (Timofeev, 1959, p.53, pl.4, fig.9) Downie and Sarjeant, 1965, p.88. Holotype: Timofeev, 1959, pl.4, fig.9. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"clavicularum" (Deflandre, 1939a, p.191–192, pl.10, fig.4) Downie and Sarjeant, 1965, p.88. Emendation: Sarjeant, 1968, p.223, as *Solisphaeridium clavicularum*. Holotype: Deflandre, 1939a, pl.10, fig.4. **NOW** *Micrhystridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Solisphaeridium* (Appendix A), fourthly (and now) *Micrhystridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Jurassic.

"claviferum" (Wilkinson, 1849, p.89–92, pl.13, fig.1) Downie and Sarjeant, 1965, p.88. Holotype: Wilkinson, 1849, pl.13, fig.1. Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly (and now) *Baltisphaeridium*. According to Wilkinson (1849, p.89), "This species was originally named *Xanthidium tubiferum dilatatum*, but as the duplex trivial name is contrary to the rules of nomenclature, it has been thought advisable to alter it to *Xanthidium claviferum* ...". Wilkinson's contention is not necessarily the case since, as *Xanthidium tubiferum* var. *dilatatum*, the "earlier" name may have been validated. However, Wilkinson gave no further information regarding the source of the name "*Xanthidium tubiferum dilatatum*". This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"clavigerum" (Deflandre, 1937b, p.71, pl.14 [al. pl.11], figs.1–2) Downie and Sarjeant, 1963, p.88. Emendation: Davey and Verdier, 1976, as *Florentinia clavigera*. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.1–2. **Combination not validly published:** basionym not fully referenced. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (name not validly published), thirdly *Hystrichosphaera*, fourthly *Hystrichokolpoma*, fifthly (and now) *Florentinia*. Age: Senonian.

"cognitum" (Timofeev, 1959, p.54–55, pl.4, fig.15) Downie and Sarjeant, 1965, p.88. Holotype: Timofeev, 1959, pl.4, fig.15. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early-Mid Ordovician.

"colligerum" (Deflandre and Cookson, 1955, p.278–279, pl.7, fig.3) Downie and Sarjeant, 1965, p.88. Emendations: Cookson, 1965a, p.86; Goodman and Witmer, 1985, p.77–78, both as *Diphyes colligerum*. Holotype: Deflandre and Cookson, 1955, pl.7, fig.3. **NOW** *Diphyes*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Diphyes*. Taxonomic junior synonym: *Diphyes pseudoficusoides* according to Fensome et al. (2009, p.30). This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: early Eocene.

"coniferum" (Sannemann, 1955, p.327, pl.4, fig.2; text-figs.4a–b) Downie and Sarjeant, 1965, p.88. Holotype: Sannemann, 1955, pl.4, fig.2. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Multiplicisphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

conspicuum (Timofeev, 1959, p.54, pl.4, fig.14) Downie and Sarjeant, 1965, p.88. Holotype: Timofeev, 1959, pl.4, fig.14. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Late Cambrian.

corollatum (Timofeev, 1959, p.54, pl.4, fig.11) Downie and Sarjeant, 1965, p.89. Holotype: Timofeev, 1959, pl.4, fig.11. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"cristatum" (Downie, 1958, p.338–339, pl.16, fig.4; text-fig.4f) Downie and Sarjeant, 1965, p.165. Holotype: Downie, 1958, pl.16, fig.4. **NOW** *Cymatiogalea* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Priscogalea* (Appendix A), fourthly (and now) *Cymatiogalea* (Appendix A). Taxonomic junior synonym: *Cymatiogalea polygonomorpha* Górka, 1967, an acritarch species, according to Rasul (1974, p.56). Junior homonym: *Baltisphaeridium cristatum* Grishina in Grishina and Klenina, 1981, an acritarch species. This combination was not validly published in Eisenack (1958b, p.400), since that author did not fully reference the basionym. Age: Early Ordovician.

"danicum" (Wetzel, 1952, p.396–397, pl.A, figs.5–6; text-fig.8) Downie and Sarjeant, 1965, pl.89. Emendation: Sarjeant, 1984c, p.129–130, as *Achomosphaera danica*. Holotype: Wetzel, 1952, pl.A, fig.6; Dietz et al., 1999, text-fig.6b. **NOW** *Achomosphaera*. Originally *Areoligera*, subsequently *Baltisphaeridium*, thirdly *Hystrichosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Achomosphaera*. Taxonomic senior synonym: *Areoligera senonensis*, according to Lejeune-Carpentier and Sarjeant (1981, p.15) — however, Sarjeant (1984c, p.130) retained *Baltisphaeridium* (as *Achomosphaera*) *danicum*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Paleocene.

"delicatum" Wall, 1965a, p.156, pl.1, figs.11–13; pl.7, fig.6. Holotype: Wall, 1965a, pl.1, fig.11. **NOW** *Beaumontella?*. Originally *Baltisphaeridium*, subsequently, *Solisphaeridium* (combination not validly published, Appendix A), thirdly (and now) *Beaumontella?*. Age: Hettangian–early Sinemurian.

"densicomatum" (Maier, 1959, p.307–308, pl.29, figs.7–8) Gerlach, 1961, p.193. Emendation: Sarjeant, 1983, p.111–113, as *Sentusidinium densicomatum*. Holotype: Maier, 1959, pl.29, fig.7. **NOW** *Pilosidinium*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Impletosphaeridium?*, fifthly *Sentusidinium*, sixthly (and now) *Pilosidinium*. Age: middle Oligocene–middle Miocene.

"denticulatum" (Courteville in Deflandre, 1946a, card 895) Downie and Sarjeant, 1965, p.89. **Name not validly published**: no description. Originally *Hystrichosphaeridium* (name not validly published), subsequently *Baltisphaeridium* (name not validly published). This name cannot be legitimized since it would be a junior homonym of *Baltisphaeridium denticulatum* Stockmans and Willièrè, 1963. Górka (1969, p.47–48) believed this name to be the senior homonym of *Baltisphaeridium denticulatum* Stockmans and Willièrè, 1963.

"dictyophorum" (Cookson and Eisenack, 1958, p.44, pl.11, fig.14) Downie and Sarjeant, 1965, p.89. Holotype: Cookson and Eisenack, 1958, pl.11, fig.14; Fensome et al., 1993a, fig.1 — p.1125. **NOW** *Stiphrosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Oligosphaeridium*, fourthly (and now) *Stiphrosphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Jurassic.

differtum (Sannemann, 1955, p.327, pl.4, fig.15; text-figs.5a–c) Downie and Sarjeant, 1965, p.89. Holotype: Sannemann, 1955, pl.4, fig.15. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

"digitatum" (Eisenack, 1938a, p.20–22, pl.4, figs.3–5; text-fig.7) Eisenack, 1959, p.200. Emendation: Eisenack, 1959, p.200, as *Baltisphaeridium digitatum*. Holotype: Eisenack, 1938a, pl.4, fig.3, lost according to Eisenack

(1959, p.200). Neotype: Eisenack, 1959, pl.16, fig.11, designated by Eisenack (1959, p.200). **NOW** *Hoegklintia* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Hoegklintia* (Appendix A). Age: Ordovician (erratic).

dignum (Sannemann, 1955, p.327, pl.1, fig.5; pl.4, fig.11; text-fig.7) Downie and Sarjeant, 1965, p.89. Holotype: Sannemann, 1955, pl.4, fig.11. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

diploporum (Eisenack, 1951, p.190–191, pl.2, fig.6) Downie and Sarjeant, 1965, p.89. Holotype: Eisenack, 1951, pl.2, fig.6. Originally *Hystrichosphaeridium*, subsequently *Micrhystridium* (combination not validly published, Appendix A), thirdly (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Ordovician (erratic).

"divergens" (Eisenack, 1954b, p.67, pl.9, figs.13–16) Downie and Sarjeant, 1963, p.91. Holotype: Eisenack, 1954b, pl.9, fig.14. **Combination not validly published:** basionym not fully referenced. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published), thirdly *Cordosphaeridium*, fourthly (and now) *Operculodinium*. Age: early Oligocene.

"downiei" Sarjeant, 1960a, p.138–139. Holotype: Downie, 1957, pl.20, fig.10 (as *Hystrichosphaeridium pattei* Valensi, 1949); Jan du Chêne et al., 1986a, pl.3, figs.7–9. **NOW** *Cribroperidinium?*. Originally *Baltisphaeridium*, subsequently *Acanthaulax*, thirdly *Acanthaulax?*, fourthly *Cyclonephelium*, fifthly (and now) *Cribroperidinium?*. Age: Kimmeridgian.

"echinoides" (Maier, 1959, p.318–319, pl.32, figs.5–6) Downie and Sarjeant, 1965, p.90. Holotype: Maier, 1959, pl.32, fig.6. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*. **Taxonomic senior synonym:** *Xanthidium* (now *Spiniferites*) *ramosum*, according to Sarjeant (1983, p.91–92). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: middle Oligocene–middle Miocene.

"ehrenbergii" (Deflandre, 1947c, fig.1, no.5) Sarjeant, 1961a, p.103. Emendation: Masure in Fauconnier and Masure, 2004, p.337–338, as *Impletosphaeridium ehrenbergii*. Holotype: Deflandre, 1939a, pl.10, fig.9, as *Hystrichosphaeridium* cf. *hirsutum*; Deflandre, 1947c, fig.1, no.5; Fauconnier and Masure, 2004, pl.48, figs.9,11. **NOW** *Impletosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Impletosphaeridium*. Nomenclatural junior synonym: *Cleistosphaeridium deflandrei* Courtinat, 1989, which has the same type. For a full discussion, see *Impletosphaeridium ehrenbergii*. Age: Oxfordian.

eisenackianum (Deunff, 1959, p.23–24, pl.2, figs.26,30–31) Downie and Sarjeant, 1965, p.90. Holotype: Deunff, 1959, pl.2, fig.26. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Middle Ordovician.

var. **crozonense** (Deunff, 1959, p.24, pl.2, figs.25,27–29,32) Downie and Sarjeant, 1965, p.90. Holotype: Deunff, 1959, pl.2, fig.28. Originally *Hystrichosphaeridium eisenackianum* var. *crozonense*, subsequently (and now) *Baltisphaeridium eisenackianum* var. *crozonense*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Ordovician (Caradoc).

var. **eisenackianum**. Autonym. Holotype: Deunff, 1959, pl.2, fig.26. Originally *Hystrichosphaeridium eisenackianum* var. *eisenackianum*, subsequently (and now) *Baltisphaeridium eisenackianum* var. *eisenackianum*.

"eisenackii" (Sannemann, 1955, p.327–328, pl.4, figs.10,12; text-figs.8a–d) Downie and Sarjeant, 1965, p.90. Holotype: Sannemann, 1955, pl.4, fig.10. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Multiplicisphaeridium* (Appendix A).

This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Late Devonian (Givetian).

"**eoplanctonicum**" (Eisenack, 1955, p.178–179, pl.4, fig.14) Downie, 1959, p.60. Holotype: Eisenack, 1955, pl.4, fig.14. **NOW** *Oppilatala* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Oppilatala* (Appendix A). Taxonomic junior synonym: *Multiplicisphaeridium septispinosum* Lister, 1970, an acritarch species, according to Eisenack et al. (1973, p.617). Age: Silurian (Ludlow).

"**erectum**" (Manum and Cookson, 1964, p.14, pl.3, figs.5–6) Clarke and Verdier, 1967, p.73. Holotype: Manum and Cookson, 1964, pl.3, figs.5–6. **NOW** *Kiokansium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cordosphaeridium?*, fourthly *Cleistosphaeridium?*, fifthly (and now) *Kiokansium?*. Age: Albian–Turonian.

"**erraticum**" (Eisenack, 1954a, p.209, pl.1, figs.6–7; text-fig.7) Downie and Sarjeant, 1965, p.90. Holotype: Eisenack, 1954a, pl.1, fig.6. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90) and Cramer (1964, p.294), since these authors did not fully reference the basionym. Age: Silurian (late Ludlow).

"**ferox**" (Deflandre, 1937b, p.72, pl.14 [al. pl.11], figs.3–4) Downie and Sarjeant, 1965, p.90. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), figs.3–4. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Hystrichokolpoma*, fourthly *Silicisphaera*, fifthly (and now) *Florentinia*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Senonian.

"**fimbriatum**" (White, 1842, p.36, pl.4, div.3, fig.3) Downie and Sarjeant, 1965, p.91. Holotype: White, 1842, pl.4, div.3, fig.3; Sarjeant, 1991, fig.4.2. **NOW** *Filisphaeridium* (Appendix A). Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium*, fourthly *Comasphaeridium* (Appendix A), fifthly (and now) *Filisphaeridium* (Appendix A). This combination was not validly published in Sarjeant (1959, p.339) and Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"**flosculus**" (Deflandre, 1937b, p.75–76, pl.15 [al. pl.12], figs.5–6) Downie and Sarjeant, 1963, p.91. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.5. **Combination not validly published:** basionym not fully referenced. **NOW** *Florentinia?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published), thirdly *Litosphaeridium?*, fourthly *Silicisphaera?*, fifthly (and now) *Florentinia?*. Taxonomic junior synonym: *Eurysphaeridium fibratum* (name not validly published), according to Slimani (2001a, p.192). N.I.A. Age: Cretaceous (Senonian).

"**fluctuans**" (Eisenack, 1938c, p.230–231, pl.16, figs.1–3) Lentin and Williams, 1993, p.699. Holotype: Eisenack, 1938c, pl.16, fig.3. Originally *Bion* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?* (combination not validly published), fourthly (and now) *Baltisphaeridium*. Age: Silurian.

"**franconium**" (Sannemann, 1955, p.328, pl.3, fig.1; pl.5, figs.1–2) Downie and Sarjeant, 1965, p.90. Holotype: Sannemann, 1955, pl.5, fig.1. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

"**funginum**" Morgenroth, 1966a, p.17, pl.3, figs.7–8. Holotype: Morgenroth, 1966a, pl.3, fig.7. Originally *Baltisphaeridium*, subsequently *Lingulodinium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (as and now *Lingulodinium machaerophorum*, according to Kokinos and Anderson (1995, p.162). Age: early Eocene.

"**galea**" (Maier, 1959, p.306, pl.29, fig.4) Sarjeant, 1964a, p.176. Emendation: Sarjeant, 1983, p.110, as *Chiropteridium galea*. Holotype: Maier, 1959, pl.29, fig.4; Eisenack and Kjellström, 1975b, p.88a; Fensome et al., 1995, fig.1 — p.1495. **NOW** *Chiropteridium*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium*, thirdly *Areoligera*, fourthly *Areoligera?*, fifthly (and now) *Chiropteridium*. Taxonomic junior

synonyms: *Chiropteridium dispersum*, *Galea* (subsequently *Baltisphaeridium mespilana* and *Galea* (subsequently *Baltisphaeridium levis*), all according to Sarjeant (1983, p.108–109); *Membranophoridium multispinatum*, by implication in Brosius (1963, p.48) and Gocht (1969, p.63), who considered *Membranophoridium multispinatum* to be a taxonomic junior synonym of *Galea* (as *Chiropteridium dispersa*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium galea*); *Membranophoridium* (subsequently *Chiropteridium partispinatum*, by implication in Matsuoka and Bujak (1988, p.40), who considered *Membranophoridium partispinatum* to be a taxonomic junior synonym of *Galea* (as *Chiropteridium mespilana*, which is now a taxonomic junior synonym of *Galea* (now *Chiropteridium galea*). N.I.A. Age: Oligocene.

"**geometricum**" (Patiels, 1948, p.41, pl.4, figs.1–11 ex Downie and Sarjeant, 1965, p.90) Fensome et al., 1990, p.617. Holotype: Patiels, 1948, pl.4, fig.4. **NOW** *Apectodinium*. Originally *Hystrichosphaeridium geometricum* (name illegitimate), subsequently *Baltisphaeridium geometricum*, thirdly *Apectodinium pastielsii* (name illegitimate), fourthly (and now) *Apectodinium pastielsii*. Nomenclatural junior synonym: *Apectodinium pastielsii*, which has the same type. Taxonomic junior synonym (at specific rank): *Wetzeliella homomorpha* var. *quinquelata* (as *Wetzeliella quinquelata*; now *Apectodinium quinquelatum*), by implication in Harland (1979c, p.67), who believed the latter to be the senior name — however, Lentin and Williams (1989, p.18) retained *Apectodinium quinquelatum*. Age: Ypresian.

"**gotlandicum**" (Eisenack, 1954a, p.209, pl.1, fig.5; text-fig.6) Downie and Sarjeant, 1965, p.90. Holotype: Eisenack, 1954a, pl.1, fig.5. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Visbysphaera* (Appendix A). Taxonomic junior synonym: *Baltisphaeridium peltatum* Cramer, 1966, an acritarch species, according to Cramer (1970, p.157). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Silurian (late Llandovery).

"**granulosum**" (Deflandre, 1937b, p.77, pl.16 [al. pl.13], fig.4) Sarjeant, 1962b, p.264. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.4; Fauconnier and Masure, 2004, pl.66, fig.4. **NOW** *Prolixosphaeridium granulosum*. Originally *Hystrichosphaeridium xanthiopyxides* var. *granulosum*, subsequently *Baltisphaeridium xanthiopyxides* var. *granulosum* (combination not validly published, Appendix A), thirdly *Baltisphaeridium granulosum*, fourthly (and now) *Prolixosphaeridium granulosum*. Taxonomic junior synonyms (at specific rank): *Baltisphaeridium pilosum* var. *longispinosum* (as *Tenua pilosa* subsp. *longispinosa*), according to Sarjeant (1976c, p.19) — however, Erkmen and Sarjeant (1980, p.64–65) considered *Baltisphaeridium pilosum* var. *longispinosum* to be a taxonomic junior synonym (at specific rank) of *Prolixosphaeridium anasillum*; *Prolixosphaeridium anasillum*, according to Lentin and Williams (1993, p.539) — however, this synonymy was based on a mis-reading of Erkmen and Sarjeant (1980). Age: Senonian.

hamatum (Downie, 1958, p.335, pl.16, fig.1; text-figs.2j–k) Kjellström, 1976, p.18. Holotype: Downie, 1958, pl.16, fig.1. Originally *Hystrichosphaeridium hirsutoides* var. *hamatum*, subsequently *Baltisphaeridium hirsutoides* var. *hamatum* (Appendix A), thirdly *Micrhystridium hamatum* (Appendix A), fourthly *Acanthodiacrodium hamatum* (Appendix A), fifthly (and now) *Baltisphaeridium hamatum*. Age: Early Ordovician.

"**heteracanthum**" (Deflandre and Cookson, 1955, p.276, pl.2, figs.5–6; text-figs.40–41) Downie and Sarjeant, 1965, p.91. Emendation: Radmacher et al., 2014, p.33,36, as *Heterosphaeridium heteracanthum*. Holotype: Deflandre and Cookson, 1955, pl.2, fig.5; Fauconnier and Masure, 2004, pl.35, figs.7–8. **NOW** *Heterosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly (and now) *Heterosphaeridium*, fifthly *Heterosphaeridium?* Age: Late Cretaceous–early Eocene.

hippocrepicum (Timofeev, 1959, p.52, pl.4, fig.2) Downie and Sarjeant, 1965, p.91. Holotype: Timofeev, 1959, pl.4, fig.2. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Early Ordovician.

hirsutoides (Eisenack, 1951, p.189–190, pl.3, fig.8) Eisenack, 1959, p.196. Holotype: Eisenack, 1931, pl.5, fig.19, as "*Ovum hispidum* cf. *hirsutum* Ehrenb.", lost according to Eisenack et al. (1973, p.125). Neotype: Eisenack, 1951, pl.3, fig.8, designated by Eisenack et al. (1973, p.125). Originally *Hystrichosphaeridium*, subsequently (and now)

Baltisphaeridium. This combination was not validly published in Eisenack (1958b, p.400), since that author did not fully reference the basionym. Age: Late Ordovician.

"forma **asteroideum**" (Maslov, 1956, p.262, pl.86, fig.13) Eisenack, 1959, p.196. Holotype: Maslov, 1956, pl.86, fig.13. **NOW** *Baltisphaeridium asteroideum* (Appendix A). Originally *Hystrichosphaera asteroidea*, subsequently *Hystrichosphaeridium asteroideum*, thirdly *Baltisphaeridium hirsutoides* forma *asteroideum*, fourthly (and now) *Baltisphaeridium asteroideum* (Appendix A). Age: Late Cretaceous.

"var. **hamatum**" (Downie, 1958, p.335, pl.16, fig.1; text-figs.2j–k) Downie and Sarjeant, 1965, p.91. Holotype: Downie, 1958, pl.16, fig.1. **NOW** *Baltisphaeridium hamatum* (Appendix A). Originally *Hystrichosphaeridium hirsutoides* var. *hamatum*, subsequently *Baltisphaeridium hirsutoides* var. *hamatum*, thirdly *Micrhystridium hamatum* (Appendix A), fourthly *Acanthodiacrodium hamatum* (Appendix A), fifthly (and now) *Baltisphaeridium hamatum* (an acritarch species, Appendix A). Age: Early Ordovician.

"var. **hirsutoides**". Autonym. Holotype: Eisenack, 1931, pl.5, fig.19, as "*Ovum hispidum* cf. *hirsutum* Ehrenb.", lost according to Eisenack et al. (1973, p.125). Neotype: Eisenack, 1951, pl.3, fig.8, designated by Eisenack et al. (1973, p.125). **Now redundant**. Originally *Hystrichosphaeridium hirsutoides* var. *hirsutoides*, subsequently *Baltisphaeridium hirsutoides* var. *hirsutoides*.

"**hirsutum**" (Ehrenberg, 1837b, pl.1, figs.10, 13) Downie and Sarjeant, 1965, p.91. **Name not validly published**: Ehrenberg (1837b) did not intend to introduce a new species. Originally *Xanthidium hirsutum* (name not validly published, Appendix A), subsequently *Ovum hispidum* subsp. *hirsutum* (name not validly published, Appendix A), thirdly *Hystrichosphaera hirsuta* (name not validly published), fourthly *Hystrichosphaeridium hirsutum* (name not validly published), fifthly *Baltisphaeridium hirsutum* (name not validly published), sixthly *Operculodinium hirsutum* (name not validly published), seventhly *Operculodinium? hirsutum* (name not validly published). See discussion under *Operculodinium? hirsutum*. This name was not validly published additionally in Klement (1960, p.58), since that author did not fully reference the basionym. Age: Late Cretaceous.

"subsp. **amplum**" (Wetzel, 1955, p.38; text-fig.11) Downie and Sarjeant, 1965, p.91. Emendation: Sarjeant, 1984c, p.131, as *Operculodinium centrocarpum* subsp. *amplum*, Holotype: Wetzel, 1955, text-fig.11; Sarjeant, 1984a, pl.3, figs.1–3; text-fig.4. **Name not validly published**: specific name not validly published. **NOW** *Operculodinium centrocarpum* subsp. *amplum*. Originally *Hystrichosphaeridium hirsutum* subsp. *amplum* (name not validly published), subsequently *Baltisphaeridium hirsutum* subsp. *amplum* (name not validly published), thirdly *Operculodinium? hirsutum* subsp. *amplum*, fourthly (and now) *Operculodinium centrocarpum* subsp. *amplum*. In proposing this subspecies, Wetzel (1955) misspelled the specific epithet as "*hirtum*"; see Downie and Sarjeant (1965, p.166). Age: early Paleocene (Danian).

"forma **minus**" (Wetzel, 1933b, p.45–46, pl.4, fig.26) Downie and Sarjeant, 1965, p.91. Holotype: Wetzel, 1933b, pl.4, fig.26. **Name not validly published**: specific name not validly published. **NOW** *Coronifera striolata?* subsp. *minor*. Originally *Hystrichosphaera hirsuta* forma *minor* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *minus* (name not validly published), thirdly *Operculodinium hirsutum* subsp. *minus* (name not validly published), fourthly (and now) *Coronifera striolata?* subsp. *minor*. Age: Late Cretaceous.

"forma **varians**" (Wetzel, 1933b, p.47–48, pl.4, figs.27–29) Downie and Sarjeant, 1965, p.91. Holotype: Wetzel, 1933b, fig.29; designated by Lentin and Williams (1989, p.78). **Name not validly published**: specific name not validly published. **NOW** *Coronifera striolata?* subsp. *varians*. Originally *Hystrichosphaera hirsuta* forma *varians* (name not validly published), subsequently *Baltisphaeridium hirsutum* forma *varians* (name not validly published), thirdly *Operculodinium hirsutum* subsp. *varians* (name not validly published), fourthly (and now) *Coronifera striolata?* subsp. *varians*. Age: Late Cretaceous.

"**horridum**" (Deflandre, 1937b, p.74, pl.15 [al. pl.12], figs.7–8) Downie and Sarjeant, 1965, p.91. Emendation: Masure, 1986, p.112–113, as *Corradinisphaeridium horridum*. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), figs.7–8. **NOW** *Corradinisphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly

(and now) *Corradinisphaeridium*. Taxonomic junior synonym: *Lanternosphaeridium* (as *Fibrocyta?*) *mutinense*, according to Masure (1986, p.112). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*huecospinosum*" (Cramer, 1964, p.331, pl.6, fig.2; text-fig.36, no.7) Cramer, 1966, p.238. Holotype: Cramer, 1964, pl.6, fig.2. **Combination not validly published:** basionym not fully referenced. **NOW** *Umbellasphaeridium* (Appendix A). Originally *Hystrichosphaeridium?*, subsequently *Baltisphaeridium?* (combination not validly published), thirdly *Florisphaeridium* (Appendix A), fourthly (and now) *Umbellasphaeridium* (Appendix A). Questionable assignment: Cramer (1966, p.238). Age: Devonian (Emsian).

"*huguoniotii*" (Valensi, 1955a, p.38–39, text-fig.2a) Downie and Sarjeant, 1965, p.91. Holotype: Valensi, 1955a, text-fig.2a; Fauconnier and Masure, 2004, pl.72, figs.1–3. **NOW** *Sepispinula?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Chlamydophorella*, sixthly *Sepispinula*, seventhly (and now) *Sepispinula?*. Taxonomic senior synonym: *Micrhystridium* (as *Polysphaeridium*, now *Sepispinula?*) *ambiguum*, according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.500) retained *Hystrichosphaeridium* (as and now *Sepispinula?*) *huguoniotii*. Taxonomic junior synonym: *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, according to Clarke and Verdier (1967, p.54) — however, Masure in Fauconnier and Masure (2004, p.499) retained *Hystrichosphaeridium* (as and now *Sepispinula*) *ancoriferum*. Age: Late Cretaceous.

"*hymenoforum*" (Eisenack, 1938a, p.19, pl.3, figs.2–5) Downie and Sarjeant, 1965, p.91. Holotype: Eisenack, 1938a, pl.3, fig.2. **NOW** *Peteinosphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Peteinosphaeridium* (Appendix A). This combination was not validly published in Eisenack (1958b, p.400 and 1959, p.204) and Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Ordovician (erratic).

"*hystrichoreticulatum*" (Eisenack, 1938a, p.20, pl.3, figs.6A–B) Downie and Sarjeant, 1965, p.91. Holotype: Eisenack, 1938a, pl.3, figs.6A–B. **NOW** *Peteinosphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Peteinosphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Ordovician (erratic).

"*iaculigerum*" Klement, 1960, p.57–58, pl.7, fig.10. Emendation: Sarjeant, 1984a, p.171, as *Operculodinium?* *iaculigerum*. Holotype: Klement, 1960, pl.7, fig.10; Sarjeant, 1984a, pl.2, fig.5; text-fig.7; Fauconnier and Masure, 2004, pl.23, figs.4–5. **NOW** *Downiesphaeridium*. Originally *Baltisphaeridium*, subsequently *Operculodinium?*, thirdly *Cleistosphaeridium*, fourthly (and now) *Downiesphaeridium*. Taxonomic junior synonym: *Cleistosphaeridium polyacanthum*, according to Brenner (1988, p.42) — however, Islam (1993, p.84) retained *Cleistosphaeridium?* (as *Downiesphaeridium*) *polyacanthum*. Age: middle Kimmeridgian.

inconspicuum (Timofeev, 1959, p.54, pl.4, fig.13) Downie and Sarjeant, 1965, p.91. Holotype: Timofeev, 1959, pl.4, fig.13. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"*insigne*" (Fridriksone, 1971, p.14–16, pl.2, figs.10–22) Volkova, 1974, p.195. Holotype: Fridriksone, 1971, pl.2, fig.10. **NOW** *Skiagia* (Appendix A). Originally *Hystrichosphaeridium?*, subsequently *Baltisphaeridium*, thirdly (and now) *Skiagia* (Appendix A). Age: Early-Mid Cambrian.

"*integrum*" (Sannemann, 1955, p.329, pl.5, fig.12; text-fig.12) Downie and Sarjeant, 1965, p.91. Holotype: Sannemann, 1955, pl.5, fig.12. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Multiplicisphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

"*intermedium*" (Wetzel, 1933b, p.46; text-fig.14 ex Deflandre, 1937b, p.77) Downie and Sarjeant, 1965, p.91. Holotype: Wetzel, 1933b, text-fig.14. **NOW** *Hystrichosphaeridium?*. Originally *Hystrichosphaera* (name not

validly published), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium*, fourthly (and now) *Hystrichosphaeridium*?. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"israelianum" (Rossignol, 1962, p.132, pl.2, fig.3) Downie and Sarjeant, 1965, p.91. Holotype: Rossignol, 1962, pl.2, fig.3. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Operculodinium*, fifthly *Cordosphaeridium* (combination not validly published). Taxonomic junior synonyms: *Cleistosphaeridium cephalum*, according to Jain and Garg (1991, p.78); *Operculodinium crassum*, according to Edwards and Andrieu (1992, p.262) — however, Head (1996b, p.1231) retained *Operculodinium crassum*; and *Hystrichosphaeridium westii* (name not validly published), by implication in Wall and Dale (1968a, p.315, as "hystrichosphere type x of West"). Motile equivalent: *Peridinium* (now *Protoceratium*) *reticulatum* Claparède and Lachmann, 1859, questionably according to Wall and Dale (1968c, p.272), and without question according to Matsuoka (1989, p.224). Age: Pleistocene.

"korykos" (Maier, 1959, p.310–311, pl.30, figs.7–8) Sarjeant, 1964a, p.176. Holotype: Maier, 1959, pl.30, fig.7. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium*, thirdly *Chiropteridium*?, fourthly *Hystrichosphaeridium*?. **Taxonomic senior synonym:** *Xanthidium* (now *Spiniferites*) *ramosum*, according to Sarjeant (1983, p.91–92). N.I.A. Age: middle Miocene.

"leve" (Maier, 1959, p.308, pl.30, figs.1–2) Sarjeant, 1964a, p.176. Holotype: Maier, 1959, pl.30, fig.1; Sarjeant, 1983, pl.2, fig.3; pl.5, fig.1; text-fig.2. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*. **Taxonomic senior synonym:** *Galea* (now *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). Age: middle Oligocene–middle Miocene.

"lewisii" (Deunff, 1954a, p.240, fig.3) Downie and Sarjeant, 1965, p.92. Holotype: Deunff, 1954a, fig.3. **NOW** *Gorgonisphaeridium*? (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Ammonidium* (combination not validly published, Appendix A), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Gorgonisphaeridium*? (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Middle Devonian.

"ligospinosum" de Coninck, 1969, p.50, pl.15, figs.9–19. Holotype: de Coninck, 1969, pl.15, fig.19; Fauconnier and Masure, 2004, pl.49, fig.7. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium*, subsequently (and now) *Impletosphaeridium*. Age: early Eocene.

"liniferum" Cookson and Eisenack, 1967b, p.253, pl.40, fig.9; pl.41, figs.7–8. Holotype: Cookson and Eisenack, 1967b, pl.41, fig.8. **NOW** *Achomosphaera*. Originally *Baltisphaeridium*, subsequently *Taeniophora*, thirdly (and now) *Achomosphaera*. Age: late Paleocene.

"lobospinosum" (Gocht, 1960, p.222–223, 226–227, pl.17, figs.1–16; text-figs.1–15) Downie and Sarjeant, 1963, p.91. Holotype: Gocht, 1960, pl.17, fig.1; Fauconnier and Masure, 2004, pl.13, figs.3–4. **Combination not validly published:** basionym not fully referenced. **NOW** *Chiropteridium*. Originally *Hystrichosphaeridium* (name not validly published), subsequently (and now) *Chiropteridium*, thirdly *Baltisphaeridium* (combination not validly published). Age: middle Oligocene.

"longifurcatum" (Firtion, 1952, p.157–158, pl.9, fig.1; text-figs.1H–M) Downie and Sarjeant, 1965, p.92. Holotype: Firtion, 1952, pl.9, fig.1; lost according to Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.517). Neotype: Foucher, 1976, pl.5, figs.7–8, designated by Fauconnier and Pourtoy in Fauconnier and Masure (2004, p.518); Fauconnier and Masure, 2004, pl.74, figs.2–3. **NOW** *Surculosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Surculosphaeridium*, fourthly *Surculosphaeridium*?. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Cenomanian.

"longispinosoides" (Sannemann, 1955, p.329–330, pl.1, fig.10; pl.2, figs.1–4; pl.3, figs.6,8; pl.6, figs.1–6; text-figs.9a–b) Downie and Sarjeant, 1965, p.92. Holotype: Sannemann, 1955, pl.6, fig.1. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in

Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

***longispinosum** (Eisenack, 1931, p.110–111, pl.5, figs.6–17 ex Wetzel, 1933b, p.44) Eisenack, 1959, p.194–195. Holotype: Eisenack, 1931, pl.5, fig.10, as *Ovum hispidum* subsp. *longispinosum*, lost according to Eisenack (1959, p.194). Neotype: Eisenack, 1959, pl.15, fig.1, designated by Eisenack (1959, p.194). Originally *Ovum hispidum* subsp. *longispinosum* (name not validly published, Appendix A), subsequently *Hystrichosphaera longispinosa* (name not validly published), thirdly *Hystrichosphaeridium longispinosum*, fourthly (and now) *Baltisphaeridium longispinosum*, fifthly *Micrhystridium longispinosum* (combination not validly published, Appendix A). This combination was not validly published in Eisenack (1958a, p.398), since that author did not fully reference the basionym. The name *Ovum hispidum* subsp. *longispinosum* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Ordovician (erratic).

"var. **uncinatum**" (Downie, 1958, p.337, text-fig.2a) Downie and Sarjeant, 1965, p.92. Holotype: Downie, 1958, text-fig.2a. **NOW** *Stellechinatum uncinatum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum*, thirdly *Baltisphaeridium uncinatum* (Appendix A), fourthly *Micrhystridium uncinatum* (Appendix A), fifthly *Goniosphaeridium uncinatum* (Appendix A), sixthly *Polygonium uncinatum* (Appendix A), seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published, Appendix A), eighthly (and now) *Stellechinatum uncinatum* (Appendix A). Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

longofilum (Maier, 1959, p.317, pl.32, fig.7) Downie and Sarjeant, 1965, p.92. Holotype: Maier, 1959, pl.32, fig.7. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: middle Oligocene.

"lucidum" (Deunff, 1959, p.25–26, pl.9, figs.80,82–83,85–89) Downie and Sarjeant, 1965, p.92. Holotype: Deunff, 1959, pl.9, fig.82. **NOW** *Micrhystridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Solisphaeridium* (Appendix A), fourthly (and now) *Micrhystridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Ordovician (Caradoc).

"lumectum" Sarjeant, 1960a, p.139–140, pl.6, fig.1; text-fig.2. Holotype: Sarjeant, 1960a, pl.6, fig.1; text-fig.2. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly (and now) *Impletosphaeridium*. Age: late Oxfordian.

"lychneum" (Maier, 1959, p.310, pl.30, fig.6) Sarjeant, 1964a, p.176. Holotype: Maier, 1959, pl.30, fig.6. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium*, thirdly *Areoligera*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Achomosphaera*) *alcicornu*, according to Sarjeant (1983, p.100–101). Downie and Sarjeant (1965, p.92) also proposed this combination. Age: Miocene.

"machaerophorum" (Deflandre and Cookson, 1955, p.274, pl.9, figs.4,8) Gerlach, 1961, p.191–192. Holotype: Deflandre and Cookson, 1955, pl.9, fig.4. **NOW** *Lingulodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium* (combination not validly published), fourthly (and now) *Lingulodinium*. Taxonomic junior synonyms: *Cleistosphaeridium disjunctum*, according to Reid (1974, p.591); *Hystrichosphaeridium ashdodense*, according to Wall (1967, p.109); *Baltisphaeridium* (subsequently) *Lingulodinium funginum*, *Lingulodinium brevispinosum* and *Lingulodinium sadoense*, all according to Kokinos and Anderson (1995, p.162); *Hystrichosphaeridium redonense*, questionably according to Harland (1977b, p.94) and according to Rochon et al. (1999, p.20). Motile equivalent: *Gonyaulax polyedra* Stein, 1883, according to Wall and Dale (1968c, p.271). Age: Miocene.

"var. **filiforme**" Rossignol, 1964, p.91, pl.2, fig.13. Holotype: Rossignol, 1964, pl.2, fig.13. **NOW** *Lingulodinium machaerophorum* subsp. *filiforme*. Originally *Baltisphaeridium machaerophorum* var. *filiforme*, subsequently (and now) *Lingulodinium machaerophorum* subsp. *filiforme*. Age: Pleistocene.

"var. *machaerophorum*". Autonym. Holotype: Deflandre and Cookson, 1955, pl.9, fig.4. **Now redundant.**

"var. *megacanthum*" Rossignol, 1964, p.91, pl.2, fig.15. Holotype: Rossignol, 1964, pl.2, fig.15. **NOW** *Lingulodinium machaerophorum* subsp. *megacanthum*. Originally *Baltisphaeridium machaerophorum* var. *megacanthum*, subsequently (and now) *Lingulodinium machaerophorum* subsp. *megacanthum*. Age: Pleistocene.

"var. *strangulatum*" Rossignol, 1964, p.92, pl.2, fig.16. Holotype: Rossignol, 1964, pl.2, fig.16. **NOW** *Lingulodinium strangulatum*. Originally *Baltisphaeridium machaerophorum* var. *strangulatum*, subsequently *Lingulodinium machaerophorum* subsp. *strangulatum*, thirdly (and now) *Lingulodinium strangulatum*. Age: Pleistocene.

"*malleoferum*" (White, 1842, p.37, pl.4, div.3, fig.7) Downie and Sarjeant, 1965, p.92. Holotype: White, 1842, pl.4, div.3, fig.7; Sarjeant, 1991, fig.4.6. **NOW** *Achomosphaera*?. Originally *Xanthidium* (Appendix A), subsequently *Baltisphaeridium*, thirdly (and now) *Achomosphaera*?, fourthly *Hystrichosphaeridium* (combination not validly published). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*malum*" Cramer, 1964, p.297, pl.1, figs.6,8,10; text-fig.19, nos.10–12. Holotype: Cramer, 1964, pl.1, fig.8. **NOW** *Rhacobrachion* (Appendix A). Originally *Baltisphaeridium*, subsequently *Evittia Brito* (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Rhacobrachion* (Appendix A). Age: Silurian (Ludlow).

"*mariannae*" (Philippot, 1949, p.56–57; text-fig.2) Downie and Sarjeant, 1965, p.92. Holotype: Philippot, 1949, text-fig.2. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Achomosphaera*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*meson*" (Eisenack, 1955, p.179) Downie and Sarjeant, 1965, p.92. Holotype: Eisenack, 1954a, pl.1, fig.3. **NOW** *Visbysphaera mesa* (Appendix A). Originally *Hystrichosphaeridium intermedium* (name illegitimate), subsequently *Hystrichosphaeridium meson*, thirdly *Baltisphaeridium meson*, fourthly (and now) *Visbysphaera mesa* (Appendix A), fifthly *Multiplicisphaeridium meson* (Appendix A). *Hystrichosphaeridium meson* is the substitute name for *Hystrichosphaeridium intermedium* Eisenack, 1954a, p.208, pl.1, figs.3,9; text-figs.3–4 (an illegitimate name). Taxonomic junior synonym: *Baltisphaeridium* (subsequently *Multiplicisphaeridium*) *micropilare* Cramer, 1970, an acritarch species, according to Ye Xiaorong (1984, p.42). This combination was not validly published in Downie (1959, p.60 and 1963, p.641) and Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Silurian (late Llandovery–late Ludlow).

"*mespilanum*" (Maier, 1959, p.306–307, pl.29, figs.5–6) Sarjeant, 1964a, p.176. Holotype: Maier, 1959, pl.29, fig.5. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium*, thirdly *Chiropteridium*, fourthly *Hystrichosphaeridium*. **Taxonomic senior synonym:** *Galea* (now *Chiropteridium*) *galea*, according to Sarjeant (1983, p.108–109). Age: middle Oligocene–middle Miocene.

"*microfurcatum*" (Deunff, 1957, p.6, fig.2 — p.13; fig.3 — p.14) Stockmans and Willièrè, 1962b, p.92. Holotype: Deunff, 1957, fig.2 — p.13. **NOW** *Ammonidium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly *Baltisphaeridium*, fourthly (and now) *Ammonidium* (Appendix A). Age: Middle Devonian.

"*microspinosum*" (Eisenack, 1954a, p.209–210, pl.1, fig.8) Downie, 1959, p.60. Holotype: Eisenack, 1954a, pl.1, fig.8. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*, thirdly *Lophosphaeridium* (Appendix A), fourthly *Visbysphaera* (Appendix A), fifthly *Buedingiisphaeridium* (combination not validly published, Appendix A). Eiserhardt (1992, p.12) retained this species in *Baltisphaeridium*. Taxonomic junior synonym: *Baltisphaeridium listeri* Kiryanov, 1978, an acritarch species, according to Le Hérissé (1989, p.210). Age: Silurian (late Llandovery).

"mixtispinosum" Klement, 1960, p.58, pl.6, figs.17–19. Holotype: Klement, 1960, pl.6, figs.17–18; Sarjeant, 1984a, pl.4, fig.4; Fauconnier and Masure, 2004, pl.66, figs.2–3. **NOW** *Prolixosphaeridium*. Originally *Baltisphaeridium*, subsequently (and now) *Prolixosphaeridium*. Taxonomic junior synonym: *Prolixosphaeridium basifurcatum*, according to Courtinat (1989, p.182) — however, Fauconnier and Monteil in Fauconnier and Masure (2004, p.461) retained *Prolixosphaeridium basifurcatum*. Age: early Kimmeridgian.

"multifurcatum" (Deflandre, 1937b, p.76, pl.16 [al. pl.13], figs.1–3) Klement, 1960, p.59. Emendation: Masure in Fauconnier and Masure, 2004, p.270, as *Exochosphaeridium multifurcatum*. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), figs.1–2; Fensome et al., 1991, figs.1–2 — p.691; fig.1 — p.693; Fensome et al., 1993a, fig.1 — p.1261; figs.1–2 — p.1265; Fauconnier and Masure, 2004, pl.37, figs.10–11. **NOW** *Exochosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*, fourthly *Cleistosphaeridium?*, fifthly *Heterosphaeridium*, sixthly (and now) *Exochosphaeridium*. Age: Late Cretaceous.

multipilosum (Eisenack, 1931, p.111, pl.5, figs.20–22 ex Eisenack, 1938a, p.12) Eisenack, 1959, p.197. Holotype: Eisenack, 1931, pl.5, fig.22, as *Ovum hispidum* subsp. *multipilosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.11, designated by Eisenack (1959, p.197). Originally *Ovum hispidum* subsp. *multipilosum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium multipilosum*, thirdly (and now) *Baltisphaeridium multipilosum*. This combination was not validly published in Eisenack (1958b, p.400), since that author did not fully reference the basionym. The name *Ovum hispidum* subsp. *multipilosum* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Silurian.

subsp. **multipilosum**. Autonym. Holotype: Eisenack, 1931, pl.5, fig.22, as *Ovum hispidum* subsp. *multipilosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.11, designated by Eisenack (1959, p.197). Originally *Hystrichosphaeridium multipilosum* subsp. *multipilosum*, subsequently (and now) *Baltisphaeridium multipilosum* subsp. *multipilosum*.

subsp. **validum** (Sannemann, 1955, p.330, pl.5, figs.9–10; text-fig.10) Downie and Sarjeant, 1965, p.93. Holotype: Sannemann, 1955, pl.5, fig.9. Originally *Hystrichosphaeridium multipilosum* subsp. *validum*, subsequently (and now) *Baltisphaeridium multipilosum* subsp. *validum*. Age: Devonian (late Givetian).

"multispinosum" Singh, 1964, p.141, pl.20, figs.1–2. Holotype: Singh, 1964, pl.20, fig.1; Fauconnier and Masure, 2004, pl.23, fig.10. **NOW** *Cometodinium*. Originally *Baltisphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly *Downiesphaeridium*, fifthly (and now) *Cometodinium*. Junior homonyms: *Baltisphaeridium multispinosum* Nagy, 1965 and *Baltisphaeridium multispinosum* Xing Yusheng, 1982, both acritarch species. Age: middle Albian–early Cenomanian.

"mutabile" (Sannemann, 1955, p.331, pl.5, figs.5–6; text-figs.17a–d) Downie and Sarjeant, 1965, p.93. Holotype: Sannemann, 1955, pl.5, fig.5. **NOW** *Aldridgeisphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Aldridgeisphaera* (Appendix A). Junior homonym: *Baltisphaeridium mutabile* (Naumova, 1950) Downie and Sarjeant, 1965. See discussion in Fensome et al. (1990, p.111). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

"nanus" (Deflandre, 1945a, p.62–63, pl.1, figs.5–7) Stockmans and Willièrè, 1962a, p.54–55. Holotype: Deflandre, 1945a, pl.1, figs.5–6. **NOW** *Polygonium nanus* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* var. *nanus*, subsequently *Baltisphaeridium brevispinosum* var. *nanus* (combination not validly published, Appendix A), thirdly *Baltisphaeridium nanus*, fourthly *Micrhystridium nanus* (Appendix A), fifthly (and now) *Polygonium nanus* (Appendix A), sixthly *Solisphaeridium nanus* (Appendix A). Taxonomic junior synonym (at specific rank): *Baltisphaeridium brevispinosum* var. *wenlockense* (subsequently *Salopidium wenlockense*) Downie, 1959, an acritarch taxon, according to Lister (1970, p.54). N.I.A. Age: Silurian.

"neptuni" Eisenack, 1958a, p.399, pl.26, figs.7–8; text-fig.8. Emendations: Duxbury, 1983, p.55, as *Spiniferites neptuni*; Sarjeant, 1985a, p.89–90, 92, as *Florentinia? neptuni*. Holotype: Eisenack, 1958a, pl.26, fig.7. **NOW**

Achomosphaera?. Originally *Baltisphaeridium*, subsequently *Achomosphaera*, thirdly (and now) *Achomosphaera*?, fourthly *Spiniferites*, fifthly *Florentinia*?. For etymology, see *Achomosphaera neptuni*. Age: Early Cretaceous.

nudatum (Timofeev, 1959, p.53, pl.4, fig.10) Downie and Sarjeant, 1965, p.93. Holotype: Timofeev, 1959, pl.4, fig.10. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"ohioense" (Winslow, 1962, p.77, pl.19, figs.1,22; pl.22, fig.9) Downie and Sarjeant, 1965, p.93. Holotype: Winslow, 1962, pl.22, fig.9. **NOW** *Gorgonisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Gorgonisphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.93), since these authors did not fully reference the basionym. Age: Late Devonian.

"oligacanthum" (Wetzel, 1952, p.402–405, pl.A, figs.4,7–8,11a–b; text-figs.21–25) Downie and Sarjeant, 1965, p.93. Emendation: Wilson and Sarjeant in Sarjeant, 1984c, p.127–128, as *Laticavodinium oligacanthum*. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625; Dietz et al., 1999, text-fig.6g. **NOW** *Impletosphaeridium*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*?, fourthly *Laticavodinium*, fifthly (and now) *Impletosphaeridium*?. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Danian.

"subsp. ***complanatum***" (Wetzel, 1952, p.404–405, pl.A, figs.11a–b) Downie and Sarjeant, 1965, p.93. Emendation: Sarjeant, 1984c, p.142, as *Solisphaeridium stimulierum* subsp. *complanatum*. Holotype: Wetzel, 1952, pl.A, figs.11a–b; Sarjeant, 1984c, pl.4, fig.6; text-fig.13. **NOW** *Micrhystridium stimulierum*? subsp. *complanatum* (Appendix A). Originally *Hystrichosphaeridium oligacanthum* subsp. *complanatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *complanatum*, thirdly *Cleistosphaeridium? oligacanthum* subsp. *complanatum*, fourthly (and now) *Solisphaeridium stimulierum* subsp. *complanatum* (Appendix A), fifthly *Micrhystridium stimulierum*? subsp. *complanatum* (Appendix A). Age: Paleocene.

"subsp. ***granulatum***" (Wetzel, 1952, p.404; text-fig.25) Downie and Sarjeant, 1965, p.93. Emendation: Sarjeant, 1984c, p.136, as *Surculosphaeridium? granulatum*. Holotype: Wetzel, 1952, text-fig.25; Sarjeant, 1984c, pl.5, figs.1–3; text-fig.8. **NOW** *Surculosphaeridium? granulatum*. Originally *Hystrichosphaeridium oligacanthum* subsp. *granulatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *granulatum*, thirdly *Cleistosphaeridium? oligacanthum* subsp. *granulatum*, fourthly (and now) *Surculosphaeridium? granulatum*. Age: Paleocene.

"subsp. ***oligacanthum***". Autonym. Holotype: Wetzel, 1952, pl.A, fig.8; Sarjeant, 1984c, pl.2, figs.4–5; text-fig.2; Fensome et al., 1995, figs.1–5 — p.1625. **Now redundant**. Originally *Hystrichosphaeridium oligacanthum* subsp. *oligacanthum*, subsequently *Baltisphaeridium oligacanthum* subsp. *oligacanthum*, thirdly *Cleistosphaeridium? oligacanthum* subsp. *oligacanthum*.

"subsp. ***stella***" (Wetzel, 1952, p.403, pl.A, fig.4; text-fig.23) Downie and Sarjeant, 1965, p.93. Emendation: Sarjeant, 1984c, p.135, as *Surculosphaeridium phoenix* subsp. *stella*. Holotype: Wetzel, 1952, pl.A, fig.4; Dietz et al. 1999, text-fig.6f. **NOW** *Surculosphaeridium? stella*. Originally *Hystrichosphaeridium oligacanthum* subsp. *stella*, subsequently *Baltisphaeridium oligacanthum* subsp. *stella*, thirdly *Cleistosphaeridium? oligacanthum* subsp. *stella*, fourthly *Surculosphaeridium? phoenix* subsp. *stella*, fifthly (and now) *Surculosphaeridium? stella*. N.I.A. Age: Paleocene.

"subsp. ***velatum***" (Wetzel, 1952, p.403–404, pl.A, fig.7; text-fig.24) Downie and Sarjeant, 1965, p.93. Emendation: Sarjeant, 1984c, p.133, as *Cauca? velata*. Holotype: Wetzel, 1952, pl.A, fig.7; text-fig.24; Sarjeant, 1984c, pl.3, figs.4–6; text-fig.6. **NOW** *Cauca? velata*. Originally *Hystrichosphaeridium oligacanthum* subsp. *velatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *velatum*, thirdly *Cleistosphaeridium? oligacanthum* subsp. *velatum*, fourthly (and now) *Cauca? velata*. Age: Paleocene.

"oligofurcatum" (Eisenack, 1954a, p.208, pl.1, fig.4; text-fig.5) Downie and Sarjeant, 1965, p.94. Holotype: Eisenack, 1954a, pl.1, fig.4; text-fig.5. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.94), since these authors did not fully reference the basionym. Age: Silurian (late Llandovery).

ordovicum (Timofeev, 1959, p.56, pl.4, fig.20) Downie and Sarjeant, 1965, p.94. Holotype: Timofeev, 1959, pl.4, fig.20. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.94), since these authors did not fully reference the basionym. Age: Early Ordovician.

"palmatum" (Deflandre and Courteville, 1939, p.101, pl.3, fig.1) Downie and Sarjeant, 1965, p.93. Holotype: Deflandre and Courteville, 1939, pl.3, fig.1. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Exochosphaeridium*, fourthly *Exochosphaeridium?*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Pervosphaeridium*) *pseudhystrichodinium* Deflandre, 1937b, according to Yun Hyesu (1981, p.29). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"panniforme" Gerlach, 1961, p.196, pl.28, fig.13. Holotype: Gerlach, 1961, pl.28, fig.13. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium*, subsequently (and now) *Impletosphaeridium*, thirdly *Cleistosphaeridium*. Taxonomic senior synonym: *Hystrichosphaeridium* (now *Cleistosphaeridium*) *placacanthum*, according to Sarjeant (1984b, p.86–87) — however, Eaton et al. (2001, p.191) retained *Baltisphaeridium* (as *Impletosphaeridium*) *panniforme*. Age: middle Oligocene.

"parvispinum" (Deflandre, 1937b, p.77, pl.16 [al. pl.13], fig.5) Klement, 1960, p.59. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.5; Fauconnier and Masure, 2004, pl.66, figs.5–6. **NOW** *Prolixosphaeridium parvispinum*. Originally *Hystrichosphaeridium?* *xanthiopyxides* var. *parvispinum*, subsequently *Hystrichosphaeridium parvispinum*, thirdly *Baltisphaeridium parvispinum*, fourthly (and now) *Prolixosphaeridium parvispinum*. Taxonomic junior synonyms (at specific rank): *Prolixosphaeridium deirense*, according to Davey and Verdier (1974, p.636–637) — however, Harding (1990b, p.46) retained *Prolixosphaeridium deirense*; *Prolixosphaeridium elongatum*, according to Lentin and Williams (1985, p.294). Age: late Aptian.

pateum (Timofeev, 1959, p.52, pl.4, fig.4) Downie and Sarjeant, 1965, p.94. Holotype: Timofeev, 1959, pl.4, fig.4. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"pattei" (Valensi, 1949, p.539–540, fig.1) Sarjeant, 1960a, p.138–139. Holotype: Valensi, 1949, fig.1; Fauconnier and Masure, 2004, pl.62, figs.8–9. **NOW** *Hystrichosphaeridium*. Originally (and now) *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Lanterna*, fourthly *Lanterna?*, fifthly *Pandadinium*. Age: Bathonian.

"paucifurcatum" (Cookson and Eisenack, 1961b, p.44, pl.2, fig.15) Downie and Sarjeant, 1965, p.94. Holotype: Cookson and Eisenack, 1961b, pl.2, fig.15. **NOW** *Hystrichosphaeridium*. Originally (and now) *Hystrichosphaeridium*, subsequently *Baltisphaeridium*. Age: Eocene.

"pectiniforme" Gerlach, 1961, p.195, pl.28, fig.14; text-fig.18. Emendations: Sarjeant, 1984b, p.83–84,86, as *Areosphaeridium pectiniforme*; Stover and Williams, 1995, p.114, as *Enneadocysta pectiniformis*. Holotype: Gerlach, 1961, pl.28, fig.14; Sarjeant, 1984b, pl.1, fig.2; pl.4, fig.2; Fauconnier and Masure, 2004, pl.7, figs.4–5. **NOW** *Enneadocysta*. Originally *Baltisphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Areosphaeridium?*, fourthly *Areosphaeridium*, fifthly (and now) *Enneadocysta*. Taxonomic junior synonym: *Areosphaeridium* (now *Enneadocysta*) *multicornutum*, according to Sarjeant (1984b, p.83–84) — however, Stover and Williams (1995, p.112) retained *Areosphaeridium* (as *Enneadocysta*) *multicornutum*. Age: middle Oligocene.

"pilosum" (Ehrenberg, 1854, pl.37, section 8, fig.4) Sarjeant, 1961a, p.101. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **NOW** *Barbatocysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not

validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum*, fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published; Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatocysta pilosa*. Age: Oxfordian.

"var. **longispinosum**" Sarjeant, 1961a, p.102, pl.14, fig.8. Holotype: Sarjeant, 1961a, pl.14, fig.8. Originally *Baltisphaeridium pilosum* var. *longispinosum*, subsequently *Tenua pilosa* subsp. *longispinosa*. **Taxonomic senior synonym** (at specific rank): *Prolixosphaeridium anasillum*, according to Erkmen and Sarjeant (1980, p.64). Taxonomic senior synonym (at specific rank): *Hystrichosphaeridium xanthiopyxides* var. *granulosum* (now *Prolixosphaeridium granulosum*), according to Sarjeant (1976c, p.19) — however, Erkmen and Sarjeant (1980, p.64–65) considered *Baltisphaeridium pilosum* var. *longispinosum* to be a taxonomic junior synonym (at specific rank) of *Prolixosphaeridium anasillum*. Age: early Oxfordian.

"var. **pilosum**". Autonym. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **Now redundant.**

"**piriferum**" (Eisenack, 1954a, p.206–207, pl.1, figs.1a–b; text-fig.1) Downie and Sarjeant, 1965, p.94. Holotype: Eisenack, 1954a, pl.1, figs.1a–b. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Visbysphaera* (Appendix A). Taxonomic junior synonyms: *Baltisphaeridium hermosum* Cramer and Diez, 1968 (name not validly published), an acritarch species, according to Cramer (1970, p.148); *Baltisphaeridium* (now *Visbysphaera*) *dilatispinosum* Downie, 1963, an acritarch species, according to Eisenack (1965c, p.263) — however, Fensome et al. (1990, p.530) retained *Baltisphaeridium* (now *Visbysphaera*) *dilatispinosum*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Silurian (late Llandovery).

"**placacanthum**" (Deflandre and Cookson, 1955, p.276–277, pl.9, figs.1–3) Downie and Sarjeant, 1965, p.94. Emendation: May, 1980, p.68, as *Systematophora placacantha*. Holotype: Deflandre and Cookson, 1955, pl.9, figs.1–2; Fauconnier and Masure, 2004, pl.76, figs.14–16. **NOW** *Cleistosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Impletosphaeridium*, fourthly *Systematophora*, fifthly (and now) *Cleistosphaeridium*. Taxonomic junior synonyms: *Baltisphaeridium* (as *Cleistosphaeridium*) *panniforme*, according to Sarjeant (1984b, p.86–87); *Systematophora* (now *Cleistosphaeridium*) *ancyrea*, according to Stover and Evitt (1978, p.84) — however, Lentin and Williams (1981, p.272) retained *Systematophora ancyrea*. Age: Miocene.

"**plicatum**" (Maier, 1959, p.318, pl.33, fig.1) Downie and Sarjeant, 1965, p.94. Holotype: Maier, 1959, pl.33, fig.1. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. **Taxonomic senior synonym** (at subspecific rank): *Hystrichosphaera ramosa* var. *gracilis* (now *Spiniferites ramosus* subsp. *gracilis*), according to Sarjeant (1983, p.93). This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: middle Oligocene.

"**polygonale**" (Eisenack, 1931, p.113, pl.4, figs.16–20; pl.5, fig.18 ex Eisenack, 1938a, p.12) Eisenack, 1959, p.199–200. Holotype: Eisenack, 1931, pl.4, fig.19, as *Ovum hispidum* subsp. *polygonale*, lost according to Eisenack (1959, p.199). Neotype: Paris and Deunff, 1970, pl.1, fig.4, as *Veryhachium splendens*, designated by Fensome et al. (1990, p.235), which see. **NOW** *Polygonium polygonale* (Appendix A). Originally *Ovum hispidum* subsp. *polygonale* (combination not validly published, Appendix A), subsequently *Hystrichosphaeridium polygonale*, thirdly *Baltisphaeridium polygonale*, fourthly *Veryhachium polygonale* (combination not validly published, Appendix A), fifthly *Goniosphaeridium polygonale* (Appendix A), sixthly (and now) *Polygonium polygonale* (Appendix A). Taxonomic junior synonyms: *Impletosphaeridium? primordiale*, according to Eisenack et al. (1973, p.497–498); *Veryhachium* (subsequently *Goniosphaeridium*) *splendens* Paris and Deunff, 1970, an acritarch species, by implication in Turner (1984, p.113–114) who believed *Goniosphaeridium splendens* to be the senior name; *Hystrichosphaeridium* (subsequently *Baltisphaeridium*) *sexradiatum*, according to Eisenack (1965c, p.261). Age: Silurian (erratic).

"**polyozum**" Brosius, 1963, p.45, pl.1, fig.6; pl.6, fig.5; text-figs.2a–d. Holotype: Brosius, 1963, pl.1, fig.6. **NOW** *Impletosphaeridium?*. Originally *Baltisphaeridium*, subsequently *Cleistosphaeridium?*, thirdly *Surculosphaeridium*, fourthly (and now) *Impletosphaeridium?*. For etymology, see *Impletosphaeridium? polyozum*. Age: late Oxfordian.

"polytrichum" (Valensi, 1947, p.818; text-fig.4) Downie and Sarjeant, 1965, p.95. Holotype: Valensi, 1947, text-fig.4; Fauconnier and Masure, 2004, pl.24, figs.1–6. **NOW** *Impletosphaeridium?* Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Cleistosphaeridium*, fourthly *Impletosphaeridium*, fifthly *Downiesphaeridium*, sixthly (and now) *Impletosphaeridium?*. Taxonomic junior synonym: *Cleistosphaeridium* (as *Downiesphaeridium*) *polyacanthum*, according to Masure in Fauconnier and Masure (2004, p.196). This combination was not validly published in Sarjeant (1959, p.339 and 1962, p.487), since that author did not fully reference the basionym. Age: late Bajocian.

"pseudhystrichodinium" (Deflandre, 1937b, p.73, pl.15 [al. pl.12], figs.3–4) Downie and Sarjeant, 1965, p.95. Emendation: Davey, 1969a, p.163, as *Exochosphaeridium pseudhystrichodinium*. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.3; Eisenack and Kjellström, 1972, p.415; Fensome et al., 1995, fig.1 — p.1705. **NOW** *Pervosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Exochosphaeridium?*, fourthly (and now) *Pervosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Exochosphaeridium?*) *palmatum*, according to Yun Hyesu (1981, p.29). This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"subsp. **magnum**" (Wetzel, 1955, p.35,38, figs.9–10,14) Downie and Sarjeant, 1965, p.95. Emendation: Sarjeant, 1984c, p.138–139, as *Coronifera oceanica* subsp. *magna*. Holotype: Wetzel, 1955, fig.9; Sarjeant, 1984c, pl.5, figs.4–5; text-fig.11 (two illustrations); Fensome et al., 1991, figs.1–3 — p.663; fig.1 — p.697. **NOW** *Coronifera oceanica* subsp. *magna*. Originally *Hystrichosphaeridium pseudhystrichodinium* subsp. *magnum*, subsequently *Baltisphaeridium pseudhystrichodinium* subsp. *magnum*, thirdly (and now) *Coronifera oceanica* subsp. *magna*, fourthly *Coronifera pedata* subsp. *magna*. Age: Paleocene.

"subsp. **pseudhystrichodinium**". Autonym. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.3. **Now redundant**. Originally *Hystrichosphaeridium pseudhystrichodinium* subsp. *pseudhystrichodinium*, subsequently *Baltisphaeridium pseudhystrichodinium* subsp. *pseudhystrichodinium*.

"pumile" (Wetzel, 1933b, p.44, pl.4, fig.24 ex Deflandre, 1937b, p.78) Downie and Sarjeant, 1963, p.92. Emendation: Sarjeant, 1985b, p.162, as *Diacrocanthidium pumile*. Holotype: Wetzel, 1933b, pl.4, fig.24. **Combination not validly published**: basionym not fully referenced. **NOW** *Diacrocanthidium? pumile* (Appendix A). Originally *Hystrichosphaera longispinosa* forma *pumilis* (name not validly published), subsequently *Hystrichosphaeridium pumile*, thirdly *Baltisphaeridium pumile* (combination not validly published), fourthly *Micrhystridium pumile* (Appendix A), fifthly (and now) *Diacrocanthidium? pumile* (Appendix A). Age: Late Cretaceous (erratic).

quadriradiatum (Timofeev, 1959, p.57, pl.4, fig.25) Downie and Sarjeant, 1965, p.95. Holotype: Timofeev, 1959, pl.4, fig.25. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"ramuliferum" (Deflandre, 1937b, p.74, pl.14 [al. pl.11], figs.5–6; pl.17 [al. pl.14], fig.10) Downie and Sarjeant, 1963, p.92. Holotype: Deflandre, 1937b, pl.14 (al. pl.11), fig.5; Fensome et al., 1991, fig.1 — p.721; fig.1 — p.725. **Combination not validly published**: basionym not fully referenced. **NOW** *Achomosphaera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published), thirdly (and now) *Achomosphaera*, fourthly *Spiniferites*. Age: Late Cretaceous.

"ramusculosum" (Deflandre, 1945a, p.63, pl.1, figs.8–16; text-figs.38–39) Downie, 1959, p.59–60. Emendation: Lister, 1970, p.92–93, as *Multiplicisphaeridium ramusculosum*. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Evittia Brito* (combination not validly published, Appendix A), fourthly (and now) *Multiplicisphaeridium* (Appendix A), fifthly *Peteinosphaeridium* (combination not validly published, Appendix A), sixthly *Oppilatala* (Appendix A). Age: Silurian.

"var. *macrocladum*" (Deunff, 1955, p.146, text-fig.21) Downie and Sarjeant, 1965, p.95. Holotype: Deunff, 1955, text-fig.21. **NOW** *Multiplicisphaeridium ramusculosum* var. *macrocladum* (Appendix A). Originally *Hystrichosphaeridium ramusculosum* var. *macrocladum*, subsequently *Baltisphaeridium ramusculosum* var. *macrocladum*, thirdly *Multiplicisphaeridium ramusculosum* var. *macrocladum* (combination not validly published, Appendix A), fourthly *Oppilatala ramusculosa* var. *macroclada* (Appendix A), fifthly (and now) *Multiplicisphaeridium ramusculosum* var. *ramusculosum* (Appendix A). Age: Middle Devonian.

"var. *ramusculosum*". Autonym. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **NOW** *Multiplicisphaeridium ramusculosum* var. *ramusculosum* (Appendix A). Originally *Hystrichosphaeridium ramusculosum* var. *ramusculosum*, subsequently *Baltisphaeridium ramusculosum* var. *ramusculosum*, thirdly *Oppilatala ramusculosa* var. *ramusculosa* (Appendix A), fourthly (and now) *Multiplicisphaeridium ramusculosum* var. *ramusculosum* (Appendix A). Junior homonym: *Baltisphaeridium ramusculosum* var. *ramusculosum* Cramer and Diez, 1972, an acritarch varietas.

"*reginaldii*" (Mantell, 1844, p.240; text-fig.53, no.5) Downie and Sarjeant, 1965, p.95. Emendation: Sarjeant, 1967c, p.244–245, as *Hystrichosphaera reginaldii*. Holotype: Mantell, 1844, text-fig.53, no.5; Sarjeant, 1967c, figs.3A–B,4–5; Sarjeant, 1992a, figs.2,4a–b. **NOW** *Spiniferites*?. Originally *Xanthidium* (Appendix A), subsequently *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Baltisphaeridium*, fifthly (and now) *Spiniferites*?. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"*rehdense*" (Maier, 1959, p.317–318, pl.32, figs.3–4) Downie and Sarjeant, 1965, p.95. Holotype: Maier, 1959, pl.32, fig.4; Sarjeant, 1983, pl.1, fig.1. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Achomosphaera*) *ramuliferum*, according to Sarjeant (1983, p.97–99). This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: middle Miocene.

"*reticuloidum*" Jiabo, 1978, p.115–116, pl.31, figs.18–19. Holotype: Jiabo, 1978, pl.31, fig.19. **NOW** *Kallosphaeridium*?. Originally *Baltisphaeridium*, subsequently *Filisphaeridium* (Appendix A), thirdly (and now) *Kallosphaeridium*?. Age: late Oligocene.

"*rhabdophorum*" (Valensi, 1955b, p.593, pl.3, fig.7) Downie and Sarjeant, 1963, p.87. Holotype: Valensi, 1955b, pl.3, fig.7. **Combination not validly published:** basionym not fully referenced. **NOW** *Dapsilidinium*?. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination not validly published), thirdly *Polysphaeridium*?, fourthly (and now) *Dapsilidinium*?. Age: Late Cretaceous.

rigens (Timofeev, 1959, p.55, pl.4, fig.18) Downie and Sarjeant, 1965, p.95. Holotype: Timofeev, 1959, pl.4, fig.18. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

rjabininii (Timofeev, 1959, p.56, pl.4, fig.24) Downie and Sarjeant, 1965, p.95. Holotype: Timofeev, 1959, pl.4, fig.24. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"*robustum*" (Sannemann, 1955, p.331, pl.1, figs.6,8–9; pl.6, figs.7–9; text-figs.13,14a–c) Downie and Sarjeant, 1965, p.95. Holotype: Sannemann, 1955, pl.6, fig.7. **Combination illegitimate — senior homonym:** *Baltisphaeridium robustum* Eisenack, 1963b, an acritarch species. **NOW** *Aldridgeisphaera*? (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination illegitimate), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Aldridgeisphaera*? (Appendix A). Junior homonym: *Baltisphaeridium robustum* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species. This combination was not validly published in Downie and Sarjeant (1963), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

- "subsp. *fissum*" (Sannemann, 1955, p.331, pl.6, fig.9; text-figs.14a–c) Downie and Sarjeant, 1965, p.95. Holotype: Sannemann, 1955, pl.6, fig.9. **Combination illegitimate:** the specific name is illegitimate. **NOW** *Aldridgeisphaera? robusta* subsp. *fissa* (Appendix A). Originally *Hystrichosphaeridium robustum* subsp. *fissum*, subsequently *Baltisphaeridium robustum* subsp. *fissum* (combination illegitimate), thirdly *Multiplicisphaeridium robustum* subsp. *fissum* (Appendix A), fourthly (and now) *Aldridgeisphaera? robusta* subsp. *fissa* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).
- "*saturnium*" (Maier, 1959, p.319–320, pl.32, fig.8) Downie and Sarjeant, 1965, p.95. Holotype: Maier, 1959, pl.32, fig.8; Sarjeant, 1983, pl.4, figs.3–4. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*. **Taxonomic senior synonym:** *Wetziella symmetrica*, according to Sarjeant (1983, p.107–108). This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: middle Miocene.
- "*seminudum*" (Wetzel, 1952, p.405; text-fig.26) Downie and Sarjeant, 1965, p.96. Holotype: Wetzel, 1952, text-fig.26. **NOW** *Solisphaeridium?* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Solisphaeridium?* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: early Paleocene (Danian).
- "*septatum*" Cookson and Eisenack, 1967b, p.253–254, pl.42, figs.6–10; text-fig.1. Holotype: Cookson and Eisenack, 1967b, pl.42, fig.6; Eisenack and Kjellström, 1975b, uppermost figure — p.984w; Fensome et al., 1996, fig.1 — p.2355. **NOW** *Hafniasphaera*. Originally *Baltisphaeridium*, subsequently *Spiniferites*, thirdly (and now) *Hafniasphaera*, fourthly *Achomosphaera*, fifthly *Rivernookia*. Age: late Paleocene.
- setigerfurcatum* (Timofeev, 1959, p.52–53, pl.4, fig.6) Downie and Sarjeant, 1965, p.96. Holotype: Timofeev, 1959, pl.4, fig.6. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*, thirdly *Archaeohystrichosphaeridium* (combination not validly published, Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.
- "*severinii*" Cookson and Cranwell, 1967, p.208, pl.3, figs.1–2. Holotype: Cookson and Cranwell, 1967, pl.3, fig.1. **NOW** *Operculodinium*. Originally *Baltisphaeridium*, subsequently *Impletosphaeridium*, thirdly (and now) *Operculodinium*. Age: Eocene–Oligocene.
- "*sexradiatum*" (Timofeev, 1959, p.53, pl.4, fig.7) Downie and Sarjeant, 1965, p.96. Holotype: Timofeev, 1959, pl.4, fig.7. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*. **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Polygonium*) *polygonale*, according to Eisenack (1965c, p.261). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.
- "*spiciferum*" (Deunff, 1955, p.146, pl.3, fig.1; text-fig.26) Downie and Sarjeant, 1965, p.96. Holotype: Deunff, 1955, pl.3, fig.1. **NOW** *Stellechinatum* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly *Baltisphaeridium*, fourthly *Evittia* Brito (combination not validly published, Appendix A), fifthly *Multiplicisphaeridium* (Appendix A), sixthly (and now) *Stellechinatum* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Middle Devonian.
- spiculatum* (White, 1844, p.87, pl.9, fig.4) Downie and Sarjeant, 1965, p.96. Holotype: White, 1844, pl.9, fig.4. Originally *Xanthidium tubiferum* var. *spiculatum* (Appendix A), subsequently *Hystrichosphaeridium spiculatum*, thirdly (and now) *Baltisphaeridium spiculatum*. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Late Cretaceous.
- spinescens* (Timofeev, 1959, p.56, pl.4, fig.23) Downie and Sarjeant, 1965, p.96. Holotype: Timofeev, 1959, pl.4, fig.23. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"**spinosum**" (White, 1842, p.37, pl.4, fig.6) Downie and Sarjeant, 1965, p.96. Holotype: White, 1842, pl.4, fig.6; lost according to Sarjeant (1966b, p.141). **NOW** *Exochosphaeridium?*. Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium*, fourthly *Cordosphaeridium* (combination not validly published), fifthly *Exochosphaeridium*, sixthly (and now) *Exochosphaeridium?*. Junior homonym: *Baltisphaeridium spinosum* Rasul, 1979, an acritarch species. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Late Cretaceous.

"var. **deflandrei**" (Lejeune-Carpentier, 1941, p.84, fig.6) Downie and Sarjeant, 1965, p.96. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.14, as *Fibrocysta? deflandrei*. Holotype: Lejeune-Carpentier, 1941, fig.6; Lejeune-Carpentier and Sarjeant, 1981, pl.4, figs.5–6; text-fig.8. **NOW** *Fibrocysta? deflandrei*. Originally *Hystrichosphaeridium spinosum* var. *deflandrei*, subsequently *Baltisphaeridium spinosum* var. *deflandrei*, thirdly *Cordosphaeridium spinosum* var. *deflandrei* (combination not validly published), fourthly *Exochosphaeridium spinosum* var. *deflandrei*, fifthly *Exochosphaeridium spinosum* subsp. *deflandrei*, sixthly *Exochosphaeridium? spinosum* subsp. *deflandrei*, seventhly (and now) *Fibrocysta? deflandrei*. Age: Late Cretaceous.

"var. **spinosum**". Autonym. Holotype: White, 1842, pl.4, fig.6. **Now redundant**. Originally *Hystrichosphaeridium spinosum* var. *spinosum*, subsequently *Baltisphaeridium spinosum* var. *spinosum*, thirdly *Exochosphaeridium spinosum* var. *spinosum*.

"**spiralisetum**" (de Wit, 1943, p.383; text-figs.2,11) Downie and Sarjeant, 1965, p.97. Holotype: de Wit, 1943, text-figs.2,11, lost according to de Wit (personal communication to GLW). **NOW** *Impletosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cleistosphaeridium*, fourthly (and now) *Impletosphaeridium?*. Age: Late Cretaceous.

stellaeforme (Timofeev, 1959, p.57, pl.4, fig.26) Downie and Sarjeant, 1965, p.97. Holotype: Timofeev, 1959, pl.4, fig.26. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Early Ordovician.

"**stimuliferum**" (Deflandre, 1939a, p.192, pl.10, fig.10) Sarjeant, 1961a, p.100–101. Holotype: Deflandre, 1939a, pl.10, fig.10. **NOW** *Solisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Solisphaeridium* (Appendix A), fourthly *Filisphaeridium* (combination not validly published, Appendix A), fifthly *Micrhystridium* (Appendix A). Age: Late Jurassic.

"**striatoconum**" (Deflandre and Cookson, 1955, p.275, pl.2, fig.10; text-fig.36) Downie and Sarjeant, 1965, p.97. Holotype: Deflandre and Cookson, 1955, text-fig.36. **NOW** *Conosphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Litosphaeridium?*, fourthly (and now) *Conosphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: middle Senonian.

"**striolatum**" (Deflandre, 1937b, p.72, pl.15 [al. pl.12], figs.1–2) Downie and Sarjeant, 1965, p.97. Holotype: Deflandre, 1937b, pl.15 (al. pl.12), fig.1. **NOW** *Coronifera*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Exochosphaeridium*, fourthly (and now) *Coronifera*. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Late Cretaceous.

sylhetii (Baksi, 1962, p.17, pl.2, fig.26) Downie and Sarjeant, 1965, p.97. Holotype: Baksi, 1962, pl.2, fig.26. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*, thirdly *Hystrichosphaeridium?*. Lentin and Williams (1989, p.188) retained this species in *Baltisphaeridium*. Age: Eocene.

"**tiara**" (Klumpp, 1953, p.390–391, pl.17, figs.8–10) Downie and Sarjeant, 1965, p.97. Holotype: Klumpp, 1953, pl.17, figs.8–9. **NOW** *Operculodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Cordosphaeridium*, fourthly *Cleistosphaeridium*, fifthly (and now) *Operculodinium*. This combination was not

validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. N.I.A. Age: Eocene.

"*toyetae*" Cramer, 1964, p.302, pl.1, figs.14–15; text-fig.22, nos.7,7a. Holotype: Cramer, 1964, pl.1, fig.15. **NOW** *Florisphaeridium* (Appendix A). Originally *Baltisphaeridium*, subsequently *Multiplicisphaeridium?* (Appendix A), thirdly *Hystrichosphaeridium*, fourthly (and now) *Florisphaeridium* (Appendix A). Age: Devonian (middle Siegenian–Emsian).

"*triangulatum*" Gerlach, 1961, p.194–195, pl.29, fig.1. Emendation: Sarjeant, 1984b, p.82–83, as *Achomosphaera triangulata*. Holotype: Gerlach, 1961, pl.29, fig.1; Sarjeant, 1984b, pl.1, figs.4–5. **NOW** *Achomosphaera*. Originally *Baltisphaeridium*, subsequently (and now) *Achomosphaera*. Age: middle Oligocene–mid Miocene.

"*tribuliferum*" Sarjeant, 1962a, p.487, pl.70, fig.4; text-figs.6c,7. Holotype: Sarjeant, 1962a, pl.70, fig.4; Fauconnier and Masure, 2004, pl.23, fig.11. **NOW** *Downiesphaeridium*. Originally *Baltisphaeridium*, subsequently *Cleistosphaeridium*, thirdly *Cleistosphaeridium?*, fourthly *Impletosphaeridium*, fifthly (and now) *Downiesphaeridium*. Age: Oxfordian.

"*tridactylites*" (Valensi, 1955a, p.37–38, fig.1D) Downie and Sarjeant, 1965, p.97. Holotype: Valensi, 1955a, fig.1D. **NOW** *Florentinia*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Hystrichokolpoma* (combination not validly published), fourthly *Achomosphaera*, fifthly *Silicisphaera*, sixthly (and now) *Florentinia*. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Cretaceous.

"*trifurcatum*" (Eisenack, 1931, p.112, pl.4, figs.21–23 ex Eisenack, 1938a, p.12, 16–19) Eisenack, 1959, p.202. Holotype: Eisenack, 1931, pl.4, fig.21, as *Ovum hispidum* subsp. *trifurcatum*; Eisenack, 1938a, pl.2, fig.2; lost according to Eisenack (1959, p.202). Neotype: Eisenack, 1959, pl.17, fig.3, designated by Eisenack (1959, p.202). **NOW** *Peteinosphaeridium trifurcatum* (Appendix A). Originally *Ovum hispidum* subsp. *trifurcatum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium trifurcatum*, thirdly *Baltisphaeridium trifurcatum*, fourthly (and now) *Peteinosphaeridium trifurcatum* (Appendix A). Taxonomic junior synonyms: *Peteinosphaeridium bergstroemii* Staplin et al., 1965, an acritarch species, according to Eisenack (1969b, p.254–255); *Baltisphaeridium trifurcatum* subsp. *breviradiatum* (subsequently *Peteinosphaeridium breviradiatum*), by implication in Eisenack (1969b, p.255), who considered *Baltisphaeridium trifurcatum* subsp. *breviradiatum* to be the senior name. This combination was not validly published in Eisenack (1958b, p.400), since that author did not fully reference the basionym. Age: Ordovician (erratic).

"subsp. *consonum*" (Sannemann, 1955, p.332, pl.5, fig.7) Downie and Sarjeant, 1965, p.98. Holotype: Sannemann, 1955, pl.5, fig.7. **NOW** *Multiplicisphaeridium consonum* (Appendix A). Originally *Hystrichosphaeridium trifurcatum* subsp. *consonum*, subsequently *Baltisphaeridium trifurcatum* subsp. *consonum*, thirdly (and now) *Multiplicisphaeridium consonum* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

"subsp. *procerum*" (Sannemann, 1955, p.332, pl.5, fig.8; text-fig.18) Downie and Sarjeant, 1965, p.98. Holotype: Sannemann, 1955, pl.5, fig.8. **NOW** *Multiplicisphaeridium procerum* (Appendix A). Originally *Hystrichosphaeridium trifurcatum* subsp. *procerum*, subsequently *Baltisphaeridium trifurcatum* subsp. *procerum*, thirdly (and now) *Multiplicisphaeridium procerum* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.90), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

"subsp. *trifurcatum*". Autonym. Holotype: Eisenack, 1931, pl.4, fig.21, as *Ovum hispidum* subsp. *trifurcatum*; Eisenack, 1938a, pl.2, fig.2; lost according to Eisenack (1959, p.202). Neotype: Eisenack, 1959, pl.17, fig.3, designated by Eisenack (1959, p.202). **NOW** *Peteinosphaeridium trifurcatum* subsp. *trifurcatum* (Appendix A). Originally *Hystrichosphaeridium trifurcatum* subsp. *trifurcatum*, subsequently *Baltisphaeridium trifurcatum* subsp. *trifurcatum*, thirdly (and now) *Peteinosphaeridium trifurcatum* subsp. *trifurcatum* (Appendix A). Taxonomic junior synonym: *Baltisphaeridium trifurcatum* subsp. *breviradiatum* (subsequently *Peteinosphaeridium breviradiatum*) Eisenack, 1959 ex Eisenack, 1965a, an

acritarch taxon, according to Eisenack (1969b, p.255), who believed *Baltisphaeridium trifurcatum* subsp. *breviradiatum* (al. *Peteinosphaeridium breviradiatum*) to be the senior name.

triplicativum (Timofeev, 1959, p.55, pl.4, fig.16) Downie and Sarjeant, 1965, p.98. Holotype: Timofeev, 1959, pl.4, fig.16. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.90–91), since these authors did not fully reference the basionym. Age: Early Ordovician.

tripodes Morzadec-Kerfourn, 1966, p.140–141, pl.3, figs.3–4. Holotype: Morzadec-Kerfourn, 1966, pl.3, figs.3–4. **NOW** *Spiniferites*?. Originally *Baltisphaeridium*, subsequently (and now) *Spiniferites*?. Age: Holocene.

trispinosum (Eisenack, 1938a, p.14,16; text-figs.2–3) Schultz, 1967, p.176–177. Emendation: Stancliffe and Sarjeant, 1994, p.233, as *Veryhachium trispinosum*. Holotype: Eisenack, 1938a, text-fig.2, lost according to Eisenack et al. (1979, p.499). Neotype: Deunff, 1980, pl.1, fig.7, designated by Stancliffe and Sarjeant (1994, p.233). **NOW** *Veryhachium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Veryhachium* (Appendix A), thirdly *Baltisphaeridium*, fourthly *Micrhystridium* (combination not validly published, Appendix A). Taxonomic junior synonyms: *Veryhachium cucruse* Timofeev, 1962, an acritarch species, according to Martin (1969, p.106); *Veryhachium arctatum* Deunff, 1981, *Veryhachium concavum* Piskun, 1974a, *Veryhachium edenense* Colbath, 1979, *Veryhachium microgranuliferum* Piskun, 1974a and *Hystrichosphaeridium* (subsequently *Veryhachium*) *trisulcum*, all acritarch species, and all according to Stancliffe and Sarjeant (1994, p.233). Age: Silurian (erratic).

tschunense (Timofeev, 1962, caption to pl.11, fig.1) Downie and Sarjeant, 1965, p.98. Holotype: Timofeev, 1962, pl.11, fig.1. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. Age: Middle Ordovician.

tuberatum (Downie, 1958, p.338, pl.17, fig.3; text-fig.3f) Downie and Sarjeant, 1965, p.98. Holotype: Downie, 1958, pl.17, fig.3. **NOW** *Acanthodiacrodium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Acanthodiacrodium* (Appendix A), fourthly *Vulcanisphaera* (Appendix A), fifthly *Goniosphaeridium* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Hu Yunxu (1986, p.219) also proposed this combination. Age: Early Ordovician.

tuberosum (Sannemann, 1955, p.345, pl.4, fig.17; text-fig.16) Downie and Sarjeant, 1965, p.98. Holotype: Sannemann, 1955, pl.4, fig.17. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Devonian (Givetian).

twistringiense (Maier, 1959, p.308–309, pl.30, figs.3–4) Sarjeant, 1964a, p.176. Holotype: Maier, 1959, pl.30, fig.3; Sarjeant, 1983, pl.5, fig.3. **NOW** *Spiniferites*. Originally *Galea* (generic name illegitimate), subsequently *Baltisphaeridium*, thirdly *Areoligera*, fourthly (and now) *Spiniferites*. Taxonomic junior synonyms (at specific rank): *Hystrichosphaera ramosa* var. *multibrevis* (now *Spiniferites multibrevis*), according to Sarjeant (1983, p.94–95), who considered this species to be a taxonomic junior synonym of *Hystrichosphaera ramosa* var. *multibrevis* (as *Spiniferites ramosus* subsp. *multibrevis*); *Achomosphaera* (al. *Spiniferites*) *cambra*, by implication in Jain (1982, p.51). Age: middle Miocene.

uncinatum (Downie, 1958, p.337; text-fig.2a) Martin, 1966b, p.425. Holotype: Downie, 1958, text-fig.2a. **NOW** *Stellechinatum uncinatum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum* (Appendix A), thirdly *Baltisphaeridium uncinatum*, fourthly *Micrhystridium uncinatum* (Appendix A), fifthly *Goniosphaeridium uncinatum* (Appendix A), sixthly *Polygonium uncinatum* (Appendix A), seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published, Appendix A), eighthly (and now) *Stellechinatum uncinatum* (Appendix A). Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

varispinosum Sarjeant, 1959, p.338, pl.13, fig.7; text-fig.6. Holotype: Sarjeant, 1959, pl.13, fig.7; text-fig.6; Fauconnier and Masure, 2004, pl.49, fig.8. **NOW** *Impletosphaeridium*. Originally *Baltisphaeridium*, subsequently

Tenua Eisenack, thirdly *Sentusidinium*, fourthly *Sentusidinium?*, fifthly *Cleistosphaeridium*, sixthly (and now) *Impletosphaeridium*. Age: early Callovian.

"*veliferum*" (Downie, 1958, p.340, pl.17, fig.2) Downie and Sarjeant, 1965, p.98. Holotype: Downie, 1958, pl.17, fig.2. **NOW** *Cymatiogalea* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly (and now) *Cymatiogalea* (Appendix A). Age: Ordovician (Tremadoc).

"*venustum*" (Sannemann, 1955, p.345, pl.5, fig.11; text-fig.15) Downie and Sarjeant, 1965, p.98. Holotype: Sannemann, 1955, pl.5, fig.11. **NOW** *Hapsidopalla* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Hapsidopalla* (Appendix A). This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Devonian (late Givetian).

"*vestitum*" (Deflandre, 1939a, p.189–190, pl.11, figs.4–6) Sarjeant, 1960b, p.397. Emendation: Sarjeant, 1960b, p.397, as *Baltisphaeridium vestitum*. Holotype: Deflandre, 1939a, pl.11, fig.5; Fauconnier and Masure, 2004, pl.74, figs.11–12. **NOW** *Surculosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium*, thirdly *Surculosphaeridium*, fourthly (and now) *Surculosphaeridium?*, fifthly *Multiplicisphaeridium?* (Appendix A), sixthly *Systematophora*. Taxonomic junior synonym: *Polystephanosphaera valensii*, according to Courtinat (1989, p.173) — however, Stancliffe and Sarjeant (1990, p.209) retained *Polystephanosphaera* (as and now *Systematophora valensii*). Age: Oxfordian.

"*whitei*" (Deflandre and Courteville, 1939, p.103, pl.3, figs.5–6) Downie and Sarjeant, 1965, p.98. Emendation: Monteil, 1991a, p.444, as *Cometodinium? whitei*. Holotype: Deflandre and Courteville, 1939, pl.3, fig.5; Fauconnier and Masure, 2004, pl.16, figs.7–8. **NOW** *Cometodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Comasphaeridium* (Appendix A), fifthly *Cometodinium?*, sixthly (and now) *Cometodinium*. This combination was not validly published in Sarjeant (1959, p.339), since that author did not fully reference the basionym. Age: Senonian.

"*xanthiopyxides*" (Wetzel, 1933b, p.44–45, pl.4, fig.25 ex Deflandre, 1937b, p.77) Downie and Sarjeant, 1965, p.98. Emendations: Morgenroth, 1968, p.556, as *Hystrichosphaeridium? xanthiopyxides*; Sarjeant, 1985b, p.142–144, as *Tanyosphaeridium xanthiopyxides*. Holotype: Wetzel, 1933b, pl.4, fig.25, Morgenroth, 1968, pl.48, fig.5; Sarjeant, 1985b, pl.3, figs.2–3; Dietz et al., 1999, fig.10, no.8. **NOW** *Tanyosphaeridium*. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Baltisphaeridium*, fifthly *Prolixosphaeridium?*, sixthly (and now) *Tanyosphaeridium*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Tanyosphaeridium magdali*), according to Stover and Evitt (1978, p.85). This combination was not validly published in Klement (1960, p.59), since that author did not fully reference the basionym. Age: Late Cretaceous (?Maastrichtian, according to Sarjeant, 1985b, p.143).

"var. *granulosum*" (Deflandre, 1937b, p.77, pl.16 [al. pl.13], fig.4) Klement, 1960, p.59. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.4; Fauconnier and Masure, 2004, pl.66, fig.4. **Combination not validly published**: basionym not fully referenced. **NOW** *Prolixosphaeridium granulosum*. Originally *Hystrichosphaeridium xanthiopyxides* var. *granulosum*, subsequently *Baltisphaeridium xanthiopyxides* var. *granulosum* (combination not validly published), thirdly *Baltisphaeridium granulosum* (Appendix A), fourthly (and now) *Prolixosphaeridium granulosum*. Taxonomic junior synonyms (at specific rank): *Baltisphaeridium pilosum* var. *longispinosum* (as *Tenua pilosa* subsp. *longispinosa*), according to Sarjeant (1976c, p.19) — however, Erkmen and Sarjeant (1980, p.64–65) considered *Baltisphaeridium pilosum* var. *longispinosum* to be a taxonomic junior synonym (at specific rank) of *Prolixosphaeridium anasillum*; *Prolixosphaeridium anasillum*, according to Lentin and Williams (1993, p.539) — however, this synonymy was based on a mis-reading of Erkmen and Sarjeant (1980). Age: Senonian.

zonale (Timofeev, 1959, p.55, pl.4, fig.19) Downie and Sarjeant, 1965, p.99. Holotype: Timofeev, 1959, pl.4, fig.19. Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium*. This combination was not validly published in Downie and Sarjeant (1963, p.91), since these authors did not fully reference the basionym. Age: Early Ordovician.

BERINGIELLA Bujak, 1984, p.195. Acritarch genus. Type: Bujak, 1984, pl.4, figs.12–13, as *Beringiella fritilla*.

**fritilla* Bujak, 1984, p.195, pl.4, figs.12–14. Holotype: Bujak, 1984, pl.4, figs.12–13. Age: late Pleistocene.

BION Lohmann, 1904, p.24. Extant problematic plankton genus. For a complete listing of acritarch species that have been included in the genus, see Fensome et al. (1990, p.620–621).

"*baciferum*" Eisenack, 1934, p.66, pl.4, figs.20–21. Holotype: Eisenack, 1934, pl.4, fig.20, lost according to Eisenack (1962, p.356). Neotype: Eisenack, 1962, pl.44, fig.3, designated by Eisenack (1962, p.356). **NOW** *Bacisphaeridium* (Appendix A). Originally *Bion*, subsequently *Hystrichosphaeridium*, thirdly *Veryhachium* (combination not validly published, Appendix A), fourthly (and now) *Bacisphaeridium* (Appendix A), fifthly *Baltisphaeridium* (combination not validly published, Appendix A). Age: Late Ordovician.

"*fluctuans*" Eisenack, 1938c, p.230–231, pl.16, figs.1–3. Holotype: Eisenack, 1938c, pl.16, fig.3. **NOW** *Baltisphaeridium* (Appendix A). Originally *Bion*, subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?* (combination not validly published), fourthly (and now) *Baltisphaeridium* (Appendix A). Age: Silurian.

"*ramosum*" (Ehrenberg, 1837b, pl.1, fig.15) Eisenack, 1938c, p.243 (caption to pl.16, fig.5). Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). **NOW** *Spiniferites ramosus*. Originally *Xanthidium ramosum* (Appendix A), subsequently (and now) *Spiniferites ramosus*, thirdly *Hystrichosphaera ramosa*, fourthly *Ovum hispidum* subsp. *ramosum* (combination not validly published, Appendix A), fifthly *Bion ramosum*. Taxonomic junior synonyms: *Xanthidium* (as *Hystrichosphaera*) *furcatum*, according to Davey and Williams (1966a, p.29–33); *Galea korykos* and *Hystrichosphaeridium echinoides*, both according to Sarjeant (1983, p.91–92); *Areoligera birama*, according to Morgenroth (1968, p.550); *Geodia? tripunctata*, by implication in Sarjeant (1964a, p.175), who considered *Geodia? tripunctata* to be a taxonomic junior synonym of *Xanthidium* (as *Hystrichosphaera*) *furcatum*; *Hystrichosphaera* (subsequently *Spiniferites*) *bulloidea*, according to Harland (1977b, p.101–102) — however, Lentin and Williams (1981, p.259) retained *Hystrichosphaera* (as *Spiniferites*) *bulloidea*; *Homotryblium distinctum*, according to Jain and Garg (1982, p.69), who considered *Homotryblium distinctum* to be a taxonomic junior synonym of *Spiniferites ramosus* subsp. *ramosus*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). Age: Late Cretaceous.

BUEDINGIISPHAERIDIUM Schaarschmidt, 1963, p.69–70. Emendations: Lister, 1970, p.59,61; Sarjeant and Stancliffe, 1994, p.24. Acritarch genus. For synonymy see Fensome et al. (1990, p.136). Type: Schaarschmidt, 1963, pl.20, fig.6; text-fig.26, as *Buedingiisphaeridium permicum*.

astarte (Sannemann, 1955, p.325, pl.4, fig.1; text-figs.1a–b) Moreau-Benoit, 1974, p.77. Holotype: Sannemann, 1955, pl.4, fig.1. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Buedingiisphaeridium*. N.I.A. Age: Devonian (late Givetian).

"*brevispinosum*" (Eisenack, 1931, p.111, pl.5, figs.3–5 ex Eisenack, 1938a, p.12) Moreau-Benoit, 1974, p.77–78. Holotype: Eisenack, 1931, pl.5, fig.3, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197), lost according to Ribecai and Tongiorgi (1999, p.124). New Neotype: Eisenack, 1959, pl.15, fig.16, designated by Ribecai and Tongiorgi (1999, p.124). **Combination not validly published**: basionym not fully referenced. **NOW** *Pachysphaeridium brevispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *brevispinosum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium brevispinosum*, thirdly *Baltisphaeridium brevispinosum* (Appendix A), fourthly *Buedingiisphaeridium brevispinosum* (combination not validly published), fifthly (and now) *Pachysphaeridium brevispinosum* (Appendix A). Age: Silurian.

"subsp. *callosum*" (Sannemann, 1955, p.325–326, pl.1, figs.1–4,7; pl.3, figs.2–5,10; pl.4, figs.3–9; pl.6, figs.11–12; text-figs.2a–d) Moreau-Benoit, 1974, p.77–78. Holotype: Sannemann, 1955, pl.4, fig.3. **Combination not validly published**: specific name not validly published. **NOW** *Baltisphaeridium brevispinosum* subsp. *callosum* (Appendix A — see discussion therein). Originally *Hystrichosphaeridium*

brevispinosum subsp. *callosum*, subsequently *Buedingiisphaeridium brevispinosum* subsp. *callosum* (combination not validly published), thirdly (and now) *Baltisphaeridium brevispinosum* subsp. *callosum* (Appendix A). This combination was not validly published in Moreau-Benoit (1974) additionally since that author did not specify the taxonomic rank. Age: Devonian (late Givetian).

"*microspinosum*" (Eisenack, 1954a, p.209–210, pl.1, fig.8) Gardiner and Vanguetaine, 1971, p.183–184. Holotype: Eisenack, 1954a, pl.1, fig.8. **Combination not validly published**: basionym not fully referenced. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Lophosphaeridium* (Appendix A), fourthly *Visbysphaera* (Appendix A), fifthly *Buedingiisphaeridium* (combination not validly published). Taxonomic junior synonym: *Baltisphaeridium listeri* Kiryanov, 1978, an acritarch species, according to Le Hérissé (1989, p.210). Age: Silurian (late Llandovery).

CATILLOPSIS Drugg, 1970b, p.821. Acritarch genus. Type: Drugg, 1970b, fig.17D, as *Catillopsis abdita*.

**abdita* Drugg, 1970b, p.821, figs.17D–F,18A–C,19A–B. Holotype: Drugg, 1970b, fig.17D. Age: early Eocene.

CERATOCYSTIDIOPSIS Deflandre, 1937b, p.89. Acritarch genus. Type: Deflandre, 1937b, pl.17 (al. pl.14), fig.1, as *Ceratocystidiopsis simplex*.

"*incerta*" Deflandre-Rigaud, 1954, p.59; text-fig.3. Holotype: Deflandre-Rigaud, 1954, text-fig.3. **NOW** *Odontochitinopsis*. Originally *Ceratocystidiopsis*, subsequently (and now) *Odontochitinopsis*. Age: Late Cretaceous.

"*ludbrookiae*" Cookson and Eisenack, 1958, p.52–54, pl.5, figs.7–8. Emendation: Morgan, 1980, p.23, as *Endoceratium ludbrookiae*. Holotype: Cookson and Eisenack, 1958, pl.5, fig.7. **NOW** *Endoceratium*. Originally *Ceratocystidiopsis*, subsequently *Pseudoceratium*, thirdly (and now) *Endoceratium*. Age: Albian.

"*molesta*" Deflandre, 1937b, p.90, pl.17 (al. pl.14), figs.2–3. Holotype: Deflandre, 1937b, pl.17 (al. pl.14), figs.2–3. **NOW** *Odontochitinopsis*. Originally *Ceratocystidiopsis*, subsequently (and now) *Odontochitinopsis*. Age: Senonian.

**simplex* Deflandre, 1937b, p.89–90, pl.17 (al. pl.14), fig.1. Holotype: Deflandre, 1937b, pl.17 (al. pl.14), fig.1. Age: Late Cretaceous.

CHONESPHAERA Klumpp, 1953, p.395. Problematic genus: see discussion under *Chonesphaera incerta*. A calcisphere genus according to Elbrächter et al. (2008, p.1303). Type: Klumpp, 1953, pl.19, fig.9, as *Chonesphaera incerta*.

**incerta* Klumpp, 1953, p.395, pl.19, fig.9. Holotype: Klumpp, 1953, pl.19, fig.9. The type material is lost and Keupp in Lentin and Williams (1985, p.379) believed that this taxon is not a dinoflagellate. Age: late Eocene.

CIRRIFERA Cookson and Eisenack, 1960a, p.10. Acritarch genus. Type: Cookson and Eisenack, 1960a, pl.3, fig.8, as *Cirrifera unilateralis*.

**unilateralis* Cookson and Eisenack, 1960a, p.10, pl.3, fig.8. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.8. Age: late Albian–Cenomanian.

COBRICOSPHAERIDIUM Harland and Sarjeant, 1970, p.216–217. Emendation: Head et al., 2003, p.1164–1165,1167). Acritarch genus: see McMinn (1991, p.280), McMinn et al. (1992, p.316) and Head et al. (2003, p.1161,1163), who considered that this genus may represent copepod eggs. Taxonomic junior synonym:

- Aquadulcum* (Appendix A), according to Head et al. (2003, p.1164). Type: Harland and Sarjeant, 1970, pl.21, figs.1–2; text-fig.2, as *Cobricosphaeridium hebes*.
- awendae* (Burden et al., 1986, p.52,54, pl.1, figs.1–15) Head et al., 2003, p.1167. Emendation: Head et al., 2003, p.1167, 1169, as *Cobricosphaeridium awendae*. Holotype: Burden et al., 1986, pl.1, figs.1–3; Head et al., fig.4, nos.1–4. Originally *Aquadulcum* (Appendix A), subsequently (and now) *Cobricosphaeridium*. Age: Holocene.
- ?*giganteum* McMinn, 1991, p.280, pl.4, figs.1–12. Holotype: McMinn, 1991, pl.4, figs.7–8,10–11. Questionable assignment: Head et al., 2003, p.1177. McMinn et al. (1992, p.315) demonstrated through incubation experiments that *Cobricosphaeridium giganteum* may represent copepod eggs. Age: Holocene.
- **hebes* Harland and Sarjeant, 1970, p.217–218, pl.21, figs.1–2; text-fig.2. Emendation: Head et al., 2003, p.1169. Holotype: Harland and Sarjeant, 1970, pl.21, figs.1–2; text-fig.2; Head et al., 2003, fig.8, nos.1–7. N.I.A. Age: Holocene.
- hinojalense* Head et al., 2003, p.1171, fig.11, nos.12–21; fig.13, nos.1–4; fig.15, nos.12,14–15. Holotype: Head et al., 2003, fig.11, nos.16–19. Age: Holocene.
- myalupense* (Churchill and Sarjeant, 1962, p.38–40, figs.5,22–23) Head et al., 2003, p.1171. Holotype: Churchill and Sarjeant, 1962, figs.5,22. Originally *Palaeohystrichophora*, subsequently *Aquadulcum* (Appendix A), thirdly (and now) *Cobricosphaeridium*. Age: Holocene.
- ?*ovatum* (Gao Ruiqi et al., 1992b, p.48–49,61, pl.13, figs.18–20) Head et al., 2003, p.1177. Holotype: Gao Ruiqi et al., 1992b, pl.13, fig.20. Originally *Aquadulcum* (Appendix A), subsequently (and now) *Cobricosphaeridium*?. Questionable assignment: Head et al. (2003, p.1177). Age: Late Cretaceous.
- pikeae* (Churchill and Sarjeant, 1962, p.40–41, figs.6,24) Head et al., 2003, p.1171. Holotype: Churchill and Sarjeant, 1962, figs.6,24. Originally *Palaeohystrichophora*, subsequently *Aquadulcum* (Appendix A), thirdly (and now) *Cobricosphaeridium*. Age: Holocene.
- serpens* (Harland and Sarjeant, 1970, p.221, pl.21, figs.7–8; text-fig.5) Head et al., 2003, p.1173. Holotype: Harland and Sarjeant, 1970, pl.21, figs.7–8; text-fig.5; Head et al., 2003, fig.8, nos.17–20; fig.9, no.1. Originally *Aquadulcum* (Appendix A), subsequently (and now) *Cobricosphaeridium*. Age: Holocene.
- spiniferum* Harland and Sarjeant, 1970, p.218–220, pl.21, figs.3–6; text-figs.3–4. Emendation: Head et al., 2003, p.1173,1175. Holotype: Harland and Sarjeant, 1970, pl.21, figs.3,6; text-fig.3; Head et al., 2003, fig.9, nos.5–10. Age: Holocene.
- subsp. *elegans* Harland and Sarjeant, 1970, p.219–220, pl.21, figs.4–5; text-fig.4. Emendation: Head et al., 2003, p.1175,1177. Holotype: Harland and Sarjeant, 1970, pl.21, figs.4–5; text-fig.4; Head et al., 2003, fig.10, nos.1–6. Age: Holocene.
- subsp. *spiniferum*. Autonym. Holotype: Harland and Sarjeant, 1970, pl.21, figs.3,6; text-fig.3; Head et al., 2003, fig.9, nos.5–10. Head et al. (2003, p.1175) proposed an emended diagnosis for this subspecies.
- ?*vermiculatum* (Song Zhichen in Song Zhichen et al., 1985, p.39–40, pl.2, figs.9–10) Head et al., 2003, p.1179. Holotype: Song Zhichen et al., 1985, pl.2, figs.9–10. Originally *Aquadulcum*? (Appendix A), subsequently (and now) *Cobricosphaeridium*? Questionable assignment: Head et al. (2003, p.1179). Age: early-middle Pleistocene.
- yanchepense* (Harland and Sarjeant, 1970, p.222–223, pl.22, fig.3) Head et al., 2003, p.1177. Holotype: Harland and Sarjeant, 1970, pl.22, fig.3. Originally *Aquadulcum*? (Appendix A), subsequently (and now) *Cobricosphaeridium*. Age: Holocene.

COLLUMOSPHERA Jain and Dutta in Dutta and Jain, 1980, p.70. Acritarch genus. Taxonomic senior synonym: *Cyclopsiella* (Appendix A), according to Lentin and Williams (1985, p.66) — however, Lentin and Williams (1989, p.70) retained *Collumosphaera*. Type: Dutta and Jain, 1980, pl.4, fig.33, as *Collumosphaera fruticosa*.

**fruticosa* Jain and Dutta in Dutta and Jain, 1980, p.70–71, pl.4, figs.28–36; pl.5, figs.38–43. Holotype: Dutta and Jain, 1980, pl.4, fig.33. Originally (and now) *Collumosphaera*, subsequently *Cyclopsiella* (Appendix A). Age: late Paleocene.

garoensis Saxena and Sarkar, 2000, p.257,259, pl.1, figs.5–6. Holotype: Saxena and Sarkar, 2000, pl.1, fig.5. Age: middle Eocene.

COMASPHAERIDIUM Staplin et al., 1965, p.192. Emendation: Sarjeant and Stancliffe, 1994, p.25. Acritarch genus. For synonymy see Fensome et al. (1990, p.149). Type: Valensi, 1949, fig.5, no.6, as *Micrhystridium cometes*.

"*capillatum*" Courtinat in Courtinat and Gaillard, 1980, p.75, pl.2, fig.15. Holotype: Courtinat and Gaillard, 1980, pl.2, fig.15. **NOW** *Filisphaeridium? courtinatii* (Appendix A). Originally *Comasphaeridium capillatum*, subsequently *Trichodinium capillatum*, thirdly (and now) *Filisphaeridium? courtinatii* (Appendix A). Age: late Oxfordian.

"*fimbriatum*" (White, 1842, p.36, pl.4, div.3, fig.3) Sarjeant, 1991, p.88. Holotype: White, 1842, pl.4, div.3, fig.3; Sarjeant, 1991, fig.4.2. **NOW** *Filisphaeridium* (Appendix A) Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Comasphaeridium*, fifthly (and now) *Filisphaeridium* (Appendix A). Age: Late Cretaceous.

"*whitei*" (Deflandre and Courteville, 1939, p.103, pl.3, figs.5–6) de Coninck, 1969, p.59. Emendation: Monteil, 1991a, p.444, as *Cometodinium? whitei*. Holotype: Deflandre and Courteville, 1939, pl.3, fig.5; Fauconnier and Masure, 2004, pl.16, figs.7–8. **NOW** *Cometodinium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Impletosphaeridium*, fourthly *Comasphaeridium* (Appendix A), fifthly *Cometodinium?*, sixthly (and now) *Cometodinium*. Age: Senonian.

CRYPTOMERIAPOLLENITES Kremp, 1949, p.58 ex Potonié, 1958, p.58. Pollen genus. Type: Kremp, 1949, pl.5, fig.30 as "cf. *Cryptomeria* — Poll. largus".

"*coralliensis*" Lantz, 1958, p.927, pl.5, figs.55–56; pl.6, fig.57. Holotype: Lantz, 1958, pl.5, fig.55. **Taxonomic senior synonym:** *Pareodinia ceratophora*, according to Sarjeant (1962b, p.263). Age: Oxfordian.

CUPRITIA Courtinat in Courtinat and Gaillard, 1980, p.23. Acritarch genus. Type: Courtinat and Gaillard, 1980, pl.2, figs.7,10, as *Cupritia minima*.

**minima* Courtinat in Courtinat and Gaillard, 1980, p.23–24, pl.2, figs.7,10; text-fig.3. Holotype: Courtinat and Gaillard, 1980, pl.2, figs.7,10. According to Jansonius in Lentin and Williams (1985, p.84), Courtinat does not now consider this species to be a dinoflagellate. Age: late Oxfordian.

simplex (Yu Jingxian, 1982, p.253, pl.8, figs.18–19) Brenner, 1988, p.97. Holotype: Yu Jingxian, 1982, pl.8, fig.18. Originally *Palaeotetradinium*, subsequently (and now) *Cupritia*. Age: late Kimmeridgian–Berriasian.

CYCLODICTYON Cookson and Eisenack, 1958, p.58. Acritarch genus. Type: Cookson and Eisenack, 1958, pl.12, fig.1, as *Cyclodictyon minus*.

minus Pocock, 1972, p.101, pl.23, fig.10. Holotype: Pocock, 1972, pl.23, fig.10. According to Jansonius in Lentin and Williams (1989, p.87), this is possibly an acritarch. Age: Callovian.

**paradoxum* Cookson and Eisenack, 1958, p.58–59, pl.12, figs.1–2. Holotype: Cookson and Eisenack, 1958, pl.12, fig.1. Age: Cenomanian–early Turonian.

CYCLOPSIELLA Drugg and Loeblich Jr., 1967, p.188,190. Emendations: Jain and Dutta in Dutta and Jain, 1980, p.71 — however, see Head et al. (1989c, p.496–497); Head et al., 1989c, p.496. Acritarch genus. Taxonomic junior synonym: *Collumosphaera* (Appendix A), according to Lentin and Williams (1985, p.88) — however, Lentin and Williams (1989, p.70) retained *Collumosphaera*. Type: Drugg and Loeblich Jr., 1967, pl.3, figs.1–2, as *Cyclopsiella elliptica*.

angusta He Chengquan, 1991, p.190–191, pl.53, figs.12–13. Holotype: He Chengquan, 1991, pl.53, fig.12. Age: Paleocene.

?*chateauneufii* Head et al., 1989c, p.497. Holotype: Châteauneuf, 1980, pl.19, fig.8. Originally *Ascotomocystis granulata* (Appendix A), subsequently (and now) *Cyclopsiella? chateauneufii*. Questionable assignment: Head et al. (1989c, p.497). Substitute name for *Ascotomocystis granulata* Châteauneuf, 1980, p.133, pl.19, figs.8,11 (Appendix A); the name *Cyclopsiella granulata* is preoccupied. Age: middle Eocene–early Oligocene.

coniata Jain and Tandon, 1981, p.14, pl.2, figs.32–33. Holotype: Jain and Tandon, 1981, pl.2, fig.33. Age: middle Eocene.

deltoides He Chengquan and Li Peng, 1981, p.70, pl.35, fig.1. Holotype: He Chengquan and Li Peng, 1981, pl.35, fig.1. Age: late Oligocene.

**elliptica* Drugg and Loeblich Jr., 1967, p.190, pl.3, figs.1–6; text-fig.7. Holotype: Drugg and Loeblich Jr., 1967, pl.3, figs.1–2. Age: Oligocene.

"fruticosa" (Jain and Dutta in Dutta and Jain, 1980, p.70–71, pl.4, figs.28–36; pl.5, figs.38–43) Lentin and Williams, 1985, p.88. Holotype: Dutta and Jain, 1980, pl.4, fig.33. **NOW** *Collumosphaera* (Appendix A). Originally (and now) *Collumosphaera* (Appendix A), subsequently *Cyclopsiella*. Age: late Paleocene.

"granosa" (Matsuoka, 1983b, p.141, pl.8, figs.5a–b,7a–b,8) Head et al., 1992, p.163. Emendation: Matsuoka and Head, 1992, p.170, as *Cyclopsiella granosa*. Holotype: Matsuoka, 1983b, pl.8, figs.5a–b; Matsuoka and Head, 1992, pl.1, figs.12–15. Originally *Ascotomocystis* (Appendix A), subsequently *Cyclopsiella*. **Taxonomic senior synonym:** *Echigraminidites* (as and now *Cyclopsiella*) *lusaticus* (Appendix A), according to Strauss and Lund (1992, p.174). Taxonomic senior synonym: *Cyclopsiella granulata* (Appendix A), according to Head et al. (1989c, p.497) — however, Head et al. (1992, p.163) retained *Cyclopsiella granosa*. Taxonomic junior synonym: *Cyclopsiella spiculosa* (Appendix A), according to Matsuoka and Head (1992, p.170). This combination was not validly published in Head et al. (1989c, p.497), since these authors did not accept *Cyclopsiella granosa* to be the correct name. Age: early-middle Miocene.

granulata He Chengquan and Li Peng, 1981, p.69–70, pl.35, figs.4–8. Holotype: He Chengquan and Li Peng, 1981, pl.35, fig.5. Taxonomic junior synonym: *Ascotomocystis granosa* (Appendix A), according to Head et al. (1989c, p.497) — however, Head et al. (1992, p.163) retained *Ascotomocystis* (as *Cyclopsiella*) *granosa*. Age: late Oligocene.

?*laevigata* (Châteauneuf, 1980, p.133, pl.19, figs.8,11) Head et al., 1989c, p.497. Holotype: Châteauneuf, 1980, pl.19, fig.8. Originally *Ascotomocystis* (Appendix A), subsequently (and now) *Cyclopsiella*. Questionable assignment: Head et al. (1989c, p.497). Age: late Eocene.

laxa He Chengquan, 1991, p.191, pl.53, fig.11. Holotype: He Chengquan, 1991, pl.53, fig.11. Age: Paleocene.

lusatica (Kruttsch, 1970, p.70, pl.8, figs.8–15,16,16a,17,17a,18) Strauss and Lund, 1992, p.174. Holotype: Kruttsch, 1970, pl.8, figs.11–15. Originally *Echigraminidites* (Appendix A), subsequently (and now) *Cyclopsiella*.

Taxonomic junior synonyms: *Ascostomocystis granosa* (Appendix A) and *Cyclopsiella spiculata* (Appendix A), according to Strauss and Lund (1992, p.174). Age: middle Miocene.

minor Yu Jingxian, 1989, p.159–160, pl.51, figs.21,23. Holotype: Yu Jingxian, 1989, pl.51, fig.23. Age: early Eocene.

?murus Duxbury, 1983, p.67, pl.9, fig.15. Holotype: Duxbury, 1983, pl.9, fig.15. Originally *Cyclopsiella*, subsequently (and now) *Cyclopsiella?*. Questionable assignment: Head et al. (1989c, p.497). N.I.A. Age: early Albian.

ornamenta Jain, 1977b, p.187, pl.6, fig.72. Holotype: Jain, 1977b, pl.6, fig.72. Age: early Albian.

rhomboidalis He Chengquan and Li Peng, 1981, p.70, pl.35, fig.2; text-fig.7. Holotype: He Chengquan and Li Peng, 1981, pl.35, fig.2; text-fig.7. Age: late Oligocene.

"spiculosa" Head et al., 1989c, p.497–498, pl.5, figs.20–21. Holotype: Head et al., 1989c, pl.5, fig.21. **Taxonomic senior synonym:** *Echigraminidites* (as and now *Cyclopsiella*) *lusaticus* (Appendix A), according to Strauss and Lund (1992, p.174). Taxonomic senior synonym: *Cyclopsiella granosa* (Appendix A), according to Matsuoka and Head (1992, p.170), which is now considered a taxonomic junior synonym of *Echigraminidites* (as *Cyclopsiella*) *lusaticus* (Appendix A). Age: Miocene.

?trematophora (Cookson and Eisenack, 1967a, p.136, pl.19, fig.13) Lentin and Williams, 1977b, p.39. Holotype: Cookson and Eisenack, 1967a, pl.19, fig.13. Originally *Leiosphaeridia* (Appendix A), subsequently *Cyclopsiella*, thirdly (and now) *Cyclopsiella?*. Questionable assignment: Head et al. (1989c, p.497). Age: late Eocene.

vieta Drugg and Loeblich Jr., 1967, p.192,194, pl.3, figs.7–9; text-fig.8. Holotype: Drugg and Loeblich Jr., 1967, pl.3, fig.7. Age: Oligocene.

CYMATIOGALEA Deunff, 1961a, p.41–42. Emendation: Deunff, 1964, p.121. Acritarch genus. For synonymy see Fensome et al. (1990, p.163). Type: Deunff, 1961a, pl.1, fig.1, as *Cymatiogalea margaritata*.

cristata (Downie, 1958, p.338–339, pl.16, fig.4; text-fig.4f) Rauscher, 1973, p.65. Holotype: Downie, 1958, pl.16, fig.4. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Priscogalea* (Appendix A), fourthly (and now) *Cymatiogalea*. Taxonomic junior synonym: *Cymatiogalea polygonophora* Górka, 1967, an acritarch species, according to Rasul (1974, p.56). Eisenack et al. (1973, p.219–220), Rasul (1974, p.56) and Deunff et al. (1974, p.11) also proposed this combination. Age: Early Ordovician.

velifera (Downie, 1958, p.340, pl.17, fig.2) Martin, 1969, p.133. Holotype: Downie, 1958, pl.17, fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Cymatiogalea*. Age: Ordovician (Tremadoc).

CYMATIOSPHAERA Wetzel, 1933b, p.27 ex Deflandre, 1954, p.257. Prasinophyte genus. For a full discussion, see Fensome et al. (1990, p.167). Type: Wetzel, 1933b, pl.4, fig.8, as *Cymatiosphaera radiata*.

"cingulata" Wetzel, 1933b, p.28, pl.4, fig.10. Holotype: Wetzel, 1933b, pl.4, fig.10. **NOW** *Pterodinium*. Originally *Cymatiosphaera*, subsequently *Hystrichosphaera*, thirdly *Spiniferites*, fourthly *Spiniferites?*, fifthly (and now) *Pterodinium*. Taxonomic junior synonym: *Cymatiosphaera* (as *Spiniferites?*) *pterota*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *pterota*. Age: Senonian.

"membranacea" (Philippot, 1949, p.57–58; text-fig.3) Davey and Williams in Davey et al., 1969 (December), p.5. Holotype: Philippot, 1949, text-fig.3. **Name illegitimate** — **senior homonym:** *Cymatiosphaera membranacea* (Deunff, 1955 ex Deunff, 1961b) Stockmans and Willièrè, 1969 (April). **Substitute name:** *Cymatiosphaera philippotii* (Appendix A). Originally *Hystrichosphaeridium membranaceum*, subsequently *Cymatiosphaera*

membranacea (name illegitimate), thirdly (and now) *Cymatiosphaera philippotii* (Appendix A). Junior homonym: *Cymatiosphaera membranacea* Kiryanov, 1974, a prasinophyte species. This combination was not validly published in Davey and Williams (1966b, p.104), since these authors did not fully reference the basionym. Age: Late Cretaceous.

philippotii Fensome et al., 1990, p.173. Holotype: Philippot, 1949, text-fig.3. Originally *Hystrichosphaeridium membranaceum*, subsequently *Cymatiosphaera membranacea* (name illegitimate), thirdly (and now) *Cymatiosphaera philippotii*. Substitute name for *Cymatiosphaera membranacea* (Philippot, 1949, p.57–58; text-fig.3) Davey and Williams in Davey et al., 1969, p.5 (an illegitimate name). Age: Late Cretaceous.

pterothora (Deflandre and Courteville, 1939, p.102, pl.2, figs.4–5) Downie and Sarjeant, 1965, p.106. Holotype: Deflandre and Courteville, 1939, pl.2, figs.4–5. Originally *Hystrichosphaeridium*, subsequently *Cymatiosphaera*, thirdly *Oodnadattia*, fourthly (and now) *Dinopterygium*. This combination was not validly published in Downie and Sarjeant (1963, p.92), since these authors did not fully reference the basionym. Age: Late Cretaceous.

pterotha Cookson and Eisenack, 1958, p.50, pl.11, fig.7. Emendation: Pavlishina, 1990, p.95, as *Pterodinium?* *pterotum*. Holotype: Cookson and Eisenack, 1958, pl.11, fig.7. **NOW** *Pterodinium?* Originally *Cymatiosphaera* (Appendix A), subsequently *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Spiniferites?*, fifthly (and now) *Pterodinium?*. Taxonomic senior synonym: *Cymatiosphaera* (as and now *Pterodinium*) *cingulata*, according to Below (1981a, p.114) — however, Pavlishina (1990, p.95) retained *Cymatiosphaera* (now *Pterodinium?*) *pterotha*. Taxonomic junior synonyms: *Hystrichosphaera* (as *Spiniferites*) *crassimurata*, according to Kjellström (1973, p.44) and Pavlishina (1990, p.95); (at specific rank) *Hystrichosphaera cingulata* var. *polygonalis*, according to Pavlishina (1990, p.95) — however, Paul et al. (1994, p.722) retained *Hystrichosphaera cingulata* subsp. *polygonalis* (as *Pterodinium cingulatum* subsp. *polygonale*). Age: Albian–Maastrichtian.

radiata Wetzel, 1933b, p.27, pl.4, fig.8. Emendation: Sarjeant, 1985b, p.161–162. Holotype: Wetzel, 1933b, pl.4, fig.8. Taxonomic junior synonym: *Cymatiosphaera* (subsequently *Cymatiosphaeropsis*) *stigmata* Cookson and Eisenack, 1958, a prasinophyte species, according to Sarjeant (1985b, p.161). Junior homonym: *Cymatiosphaera radiata* Yankauskas and Posti, 1976, a prasinophyte species. This name was not validly published in Wetzel (1932, pl.2, fig.13). Age: Late Cretaceous.

"forma ***radiata***". Autonym. Holotype: Wetzel, 1933b, pl.4, fig.8. **Now redundant.**

"forma ***serratocycla***" Wetzel, 1933b, p.27–28, pl.4, fig.9. Emendation: Sarjeant, 1985b, p.144–145, as *Litosphaeridium serratocyclum*. Holotype: Wetzel, 1933b, pl.4, fig.9; Sarjeant, 1985b, pl.1, fig.6. **NOW** *Litosphaeridium serratocyclum*. Originally *Cymatiosphaera radiata* forma *serratocycla*, subsequently (and now) *Litosphaeridium serratocyclum*. Age: Late Cretaceous.

striata Eisenack and Cookson, 1960, p.9, pl.3, figs.10–11. Holotype: Eisenack and Cookson, 1960, pl.3, fig.11. **NOW** *Heslertonia*. Originally *Cymatiosphaera*, subsequently (and now) *Heslertonia*. Age: Cenomanian.

teichophera Sarjeant, 1961a, p.107–108, pl.15, fig.9; text-figs.9a–b. Emendation: Below, 1990, p.42–43, as *Arkellea teichophera*. Holotype: Sarjeant, 1961a, pl.15, fig.9; text-figs.9a–b; Sarjeant, 1976c, pl.6, fig.3. **NOW** *Arkellea*. Originally *Cymatiosphaera*, subsequently *Heslertonia*, thirdly (and now) *Arkellea*. Age: early Oxfordian.

CYSTIDIOPSIS Nagy, 1965, p.209. Acritarch genus. Type: Nagy, 1965, pl.5, figs.27–29, as *Cystidiopsis certa*.

certa Nagy, 1965, p.209–210, pl.5, figs.27–30. Holotype: Nagy, 1965, pl.5, figs.27–29. Age: middle Miocene.

DAILLYDIUM Stockmans and Willière, 1969, p.33. Acritarch genus. Type: Stockmans and Willière, 1962a, pl.1, fig.18, as *Hystrichosphaeridium quadridactylites*.

quadridactylites" (Stockmans and Willière, 1962a, p.67–68, pl.1, fig.18; text-fig.29) Stockmans and Willière, 1969, p.33–35. Holotype: Stockmans and Willière, 1962a, pl.1, fig.18. Originally *Hystrichosphaeridium*,

subsequently *Daillydium*. **Taxonomic senior synonym:** *Cymatiosphaera* (now *Daillydium*) *pentaster* Staplin, 1961, a prasinophyte species, according to Playford in Playford and Dring (1981, p.17–18). Taxonomic senior synonym: *Cymatiosphaera tetraster* Staplin, 1961, a prasinophyte species, according to Górká (1974, p.134), which is now considered a taxonomic junior synonym of *Cymatiosphaera* (now *Daillydium*) *pentaster*. The nomenclatural type of the genus *Daillydium* remains the holotype of *Daillydium quadridactylites*. Age: Devonian (Frasnian).

"DEFLANDRIDIUM" Nagy, 1969, p.294. Zygnematalean genus (Head, 1992, p.249). **Taxonomic senior synonym:** *Planctonites* (Appendix A), according to Head (1992, p.249). Type: Nagy, 1969, pl.2, figs.3–4,6, as *Deflandridium stellatum*.

"*stellatum" Nagy, 1969, p.294, pl.2, figs.1,3–4,6. Holotype: Nagy, 1969, pl.2, figs.3–4,6. **NOW** *Planctonites stellatus* (Appendix A). Originally *Deflandridium stellatum*, subsequently *Planctonites nagyae* (name illegitimate), thirdly (and now) *Planctonites stellatus*. As noted by Head (1992, p.250,252), Fensome et al. (1990, p.187) were incorrect in stating that this name was not validly published. Age: late Miocene.

DEUNFFIA Downie, 1960, p.198. Emendation: Thusu, 1973, p.806–807. Acritarch genus. Type: Downie, 1960, pl.1, fig.8, as *Deunffia monospinosa*.

monacantha (Deunff, 1951, p.323; text-fig.4) Downie, 1960, p.198. Holotype: Deunff, 1951, text-fig.4. Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly (and now) *Deunffia*. Cramer and Diez (1979, p.47) considered this species to be a possible taxonomic junior synonym of *Hystrichosphaeridium* (now *Veryhachium*) *trispinosum* or *Veryhachium trisulcum* (Appendix A). Age: Middle Ordovician.

DIACROCANTHIDIUM Deflandre and Foucher, 1967, p.3. Acritarch genus. Although the "type species" was not validly transferred by Deflandre and Foucher (1967), the generic name *Diacrocanthidium* was validly published by these authors, since it is based on a previously validly published species name (I.C.N. Article 40.3). Type: Deflandre, 1937b, pl.11 (al. pl.8), fig.9, as *Palaeostomocystis echinulata*.

?**costatum** Habib and Knapp, 1982, p.366, pl.11, figs.1–3. Holotype: Habib and Knapp, 1982, pl.11, figs.1,3. Questionable assignment: Habib and Knapp (1982, p.366). Age: early Hauterivian.

***echinulatum** (Deflandre, 1937b, p.55, pl.11 [al. pl.8], fig.9) Loeblich Jr. and Loeblich III, 1970b, p.200. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), fig.9, lost according to Deflandre and Foucher (1967, p.4). Neotype: Deflandre and Foucher, 1967, pl.1, fig.6, designated by Deflandre and Foucher (1967, p.4). Originally *Palaeostomocystis* (Appendix A), subsequently *Acanthodiacrodium* (combination not validly published, Appendix A), thirdly (and now) *Diacrocanthidium*. Taxonomic junior synonym: *Cleistosphaeridium parvum*, according to Bujak in Bujak et al. (1980, p.52). This combination was not validly published in Deflandre and Foucher (1967, p.4), since these authors did not fully reference the basionym. Age: Late Cretaceous.

?**granulatum** Habib and Knapp, 1982, p.366, pl.11, figs.4–5. Holotype: Habib and Knapp, 1982, pl.11, figs.4–5. Questionable assignment: Habib and Knapp (1982, p.366). Age: late Hauterivian.

?**psilatum** Habib and Knapp, 1982, p.366–368, pl.11, fig.6. Holotype: Habib and Knapp, 1982, pl.11, fig.6. Questionable assignment: Habib and Knapp (1982, p.366). Age: late Hauterivian.

?**pumile** (Wetzel, 1933b, p.4, pl.4, fig.24 ex Deflandre, 1937b, p.78) Sarjeant, 1985b, p.162. Emendation: Sarjeant, 1985b, p.162, as *Diacrocanthidium pumile*. Holotype: Wetzel, 1933b, pl.4, fig.24. Originally *Hystrichosphaera longispinosa* forma *pumilis* (name not validly published), subsequently *Hystrichosphaeridium pumile*, thirdly *Baltisphaeridium pumile* (name not validly published; Appendix A), fourthly *Micrhystridium pumile* (Appendix A), fifthly (and now) *Diacrocanthidium?* *pumile*. Questionable assignment: Sarjeant (1985b, p.162). See *Hystrichosphaera longispinosa* forma *pumilis* for discussion. Age: Late Cretaceous (erratic).

"*spinigerum*" de Coninck, 1969, p.43–44, pl.13, figs.11–13. Holotype: de Coninck, 1969, pl.13, figs.11–12. **NOW** *Paucilobimorpha* (Appendix A). Originally *Diacrocanthidium*, subsequently (and now) *Paucilobimorpha* (Appendix A). Age: Ypresian.

ungaricum Fedorova-Shakhmundes, 1976, p.93–94, pl.1, fig.1. Holotype: Fedorova-Shakhmundes, 1976, pl.1, fig.1. Age: early Valanginian.

DICTYOCHA Ehrenberg, 1837c, p.61. Silicoflagellate genus. Type: not designated?; "type species" — *Dictyocha fibula*.

"*elegans*" Ehrenberg, 1844a, p.79. Holotype: Ehrenberg, 1854, pl.22, fig.51. **NOW** *Actiniscus*. Originally *Dictyocha*, subsequently (and now) *Actiniscus*. Dumitrică (1973, p.822) considered *Dictyocha* (now *Actiniscus*) *pentasterias* to be the questionable taxonomic senior synonym of this species. Age: Pliocene.

"*sirius*" Ehrenberg, 1841, p.150. Holotype: not designated **NOW** *Actiniscus*. Originally *Dictyocha* subgenus *Actiniscus*, subsequently (and now) *Actiniscus*, thirdly *Distephanus* (name not validly published; Appendix A), fourthly *Gymmaster*. Illustrations of this species were provided by Ehrenberg (1854, pl.18, figs.59,60; and pl.33 (XV), fig.1. Dumitrică (1973, p.822) considered *Dictyocha* (now *Actiniscus*) *pentasterius* to be the questionable taxonomic senior synonym of this species. N.I.A. Age: Miocene.

"*pentasteria*" Ehrenberg, 1841, p.111,149. Holotype: not designated. **NOW** *Actiniscus*. Originally *Dictyocha* subgenus *Actiniscus*, subsequently (and now) *Actiniscus*, thirdly *Gymmaster*. Downie and Sarjeant (1965, p.82) retained this species in *Actiniscus*. Dumitrică (1973, p.822) considered *Dictyocha* (now *Actiniscus*) *elegans* and *Dictyocha* (now *Actiniscus*) *sirius* to be questionable taxonomic junior synonyms of this species. Age: Pliocene.

"*sirius*" (Ehrenberg, 1844a) Ehrenberg, 1854. Holotype: Ehrenberg, 1854, pl.18, fig.59. **Name not validly published**: see discussion under *Actiniscus sirius*. **NOW** *Actiniscus*. Originally (and now) *Actiniscus* (name not validly published), subsequently *Dictyocha* (name not validly published), thirdly *Distephanus* (name not validly published, Appendix A), fourthly *Gymmaster*, fifthly (and now) *Actiniscus*. Further information not available. N.I.A. Age: Miocene.

"*stella*" Ehrenberg, 1839a, p.129, pl.4, fig.11p. Holotype: Ehrenberg, 1839a, pl.4, fig.11p. **NOW** *Actiniscus*?. Originally *Dictyocha*?, subsequently *Dictyocha* subgenus *Actiniscus*, thirdly *Actiniscus*, fourthly and now) *Actiniscus*? Ehrenberg (1839a, p.129) provided the plate citation indicated here, but location of a pertinent specimen is not obvious in the plate. N.I.A. Age: Pliocene.

"**DICTYOCHA** subgenus **ACTINISCUS**" Ehrenberg 1841, p.149–150. **NOW** *Actiniscus*. Originally *Dictyocha* subgenus *Actiniscus*, subsequently (and now) *Actiniscus*. See genus entry for *Actiniscus* and species entries for *Dictyocha elegans*, *Dictyocha pentasterias* and *Dictyocha sirius*. Type: not designated; "type species" is *Actiniscus pentasterias*, designated by Downie and Sarjeant (January, 1965, p.81–82) for *Actiniscus*.

DICTYOSPHAERIDIUM Wetzel, 1952, p.406. Emendation: Sarjeant, 1984c, p.140–141. Acritarch genus. Junior homonym: *Dictyosphaeridium* Timofeev, 1969. Type: Wetzel, 1952, pl.A, figs.12a–b, as *Dictyosphaeridium deflandrei*.

**deflandrei* Wetzel, 1952, p.406, pl.A, figs.12a–b. Emendation: Sarjeant, 1984c, p.141. Holotype: Wetzel, 1952, pl.A, figs.12a–b; Sarjeant, 1984c, pl.7, fig.3; text-fig.12; Dietz et al., text-fig.6c. Age: Danian.

DICTYOTIDIUM Eisenack 1955, p.179. Acritarch genus. See Fensome et al. (1991, p.193) for further information. Type: Eisenack, 1938a, pl. 3, fig 8a as *Leiosphaera dictyota*.

"*asperatum*" Jiabo, p.110, pl.41, figs.18–20. Holotype: Jiabo, pl.41, fig.18. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: late Eocene–early Oligocene.

"*circulareticulatum*" Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.90, pl.20, figs.7–9. Holotype: Liu Zhili et al. 1992, pl.20, fig.8. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*debiliconspicuum*" Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.90, pl.20, figs.4–6. Holotype: Liu Zhili et al. 1992, pl.20, fig.4. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*densureticulatum*" Zheng Yuefang and Liu Zhili in Liu Zhili et al. 1992, p.90–91, pl.21, figs.6. Holotype: Liu Zhili et al. 1992, pl.21, figs.6. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*jiaboi*" Fensome et al., 1990, p.195. Holotype: Jiabo, 1978, pl.41, fig.17. **NOW** *Pyxidinospis jiaboi*. Originally *Dictyotidium reticulatum* Jiabo, 1978 (name illegitimate), subsequently *Dictyotidium jiaboi*, thirdly *Pyxidinospis reticulata* (Jiabo, 1978) (name illegitimate), fourthly (and now) *Pyxidinospis jiaboi*. Substitute name for *Dictyotidium reticulatum* Jiabo, 1978, p.111, pl.41, figs.13–17. Age: late Eocene–early Oligocene.

"*macroreticulatum*" Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.91, pl.21, figs.4–5. Holotype: Liu Zhili et al. 1992, pl.21, fig.4. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*microreticulatum*" Jiabo, 1978, p.111, pl.41, figs.6–9. Holotype: Jiabo, 1978, pl.41, fig.8. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"*pachydermum*" Jiabo, 1978, p.111, pl.41, figs.10–12; pl.46, figs.2a–b. Holotype: Jiabo, 1978, pl.41, fig.12. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: late Oligocene.

"*reticulatum*" Jiabo, 1978, p.111, pl.41, figs.13–17. Holotype: Jiabo, 1978, pl.41, fig.17. Name illegitimate: senior homonyms: *Dictyotidium reticulatum* Schulz, 1965 and *Dictyotidium reticulatum* (Eisenack, 1938a) Eisenack et al., 1976. **NOW** *Pyxidinospis jiaboi*. Originally *Dictyotidium reticulatum* Jiabo, 1978 (name illegitimate), subsequently *Dictyotidium jiaboi*, thirdly *Pyxidinospis reticulata* (Jiabo, 1978) (name illegitimate), fourthly (and now) *Pyxidinospis jiaboi*. Age: late Eocene–early Oligocene.

"*rugireticulatum*" Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.92, pl.20, figs.18–20. Holotype: Liu Zhili et al. 1992, pl.20, fig.19. **Taxonomic senior synonym:** *Pyxidinospis minor*, according to He Chengquan et al. (2009, p. 244). Age: Oligocene.

"*spinoreticulatum*" Jiabo, 1978, p.111–112, pl.42, figs.5–6. Holotype: Jiabo, 1978, pl.42, fig.5. **NOW** *Pyxidinospis*. Originally *Dictyotidium*, subsequently (and now) *Pyxidinospis*. Age: late Eocene–early Oligocene.

DILATISPHAERA Lister, 1970, p.65. Acritarch genus. Taxonomic senior synonym: *Hystrichosphaeridium*, according to Eisenack et al. (1973, p.407) — however, Cramer and Diez (1979, p.76) retained *Dilatisphaera*. Type: Lister, 1970, pl.6, fig.10, as *Dilatisphaera laevigata*.

"*dameryensis*" Dorning, 1981, p.188, pl.2, fig.6. Holotype: Dorning, 1981, pl.2, fig.6. **NOW** *Dilatisphaera williereae* subsp. *dameryensis*. Originally *Dilatisphaera dameryensis*, subsequently *Palaeohystrichosphaeridium williereae* subsp. *dameryense* (Appendix A), thirdly (and now) *Dilatisphaera williereae* subsp. *dameryensis*. Age: Silurian (Llandovery).

**laevigata* Lister, 1970, p.66, pl.6, figs.10–12; text-figs.18,20d. Holotype: Lister, 1970, pl.6, fig.10. Originally (and now) *Dilatisphaera*, subsequently *Hystrichosphaeridium*. Cramer and Diez (1979, p.76) retained this species in *Dilatisphaera*. Age: Silurian (Wenlock).

williereae (Martin, 1966a, p.389–391, pl.1, fig.23; text-figs.33–34) Le Hérisse, 1989, p.115. Holotype: Martin, 1966a, pl.1, fig.23. Originally *Hystrichosphaeridium*, subsequently *Dilatisphaera* (combination not validly published), thirdly *Palaeohystrichosphaeridium* (Appendix A), fourthly (and now) *Dilatisphaera*. Taxonomic junior synonym: *Ozotobrachion? podolicus* Sheshegova, 1973, an acritarch species, according to Kiryanov (1978, p.90). This combination was not validly published in Lister (1970, p.65) since that author did not clearly use the name *Dilatisphaera williereae*. Age: Silurian.

subsp. *dameryensis* (Dorning, 1981, p.188, pl.2, fig.6) Williams et al. 1998, p.683. Holotype: Dorning, 1981, pl.2, fig.6. Originally *Dilatisphaera dameryensis*, subsequently *Palaeohystrichosphaeridium williereae* subsp. *dameryense* (Appendix A), thirdly (and now) *Dilatisphaera williereae* subsp. *dameryensis*. Age: Silurian (Llandovery).

DIPLOFUSA Cookson and Eisenack, 1960a, p.10. Acritarch genus. Type: Cookson and Eisenack, 1960a, pl.3, fig.10, as *Diplofusa gearlensis*.

**gearlensis* Cookson and Eisenack, 1960a, p.10, pl.3, fig.10. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.10. Age: Cenomanian.

DISCOSPHAERA Haeckel, 1884, p.111. Coccolithophorid genus. Type: information not available; "type species" — *Discosphaera thomsonii*.

"*regalis*" Gaarder, 1954, p.8, fig.5. Holotype: Gaarder, 1954, fig.5. **NOW** *Scrippsiella* (Appendix B). Originally *Discosphaera*, subsequently *Rhabdothorax*, thirdly (and now) *Scrippsiella* (Appendix B). Taxonomic junior synonym: *Rhabdothorax gerenus* (name not validly published), according to Gaarder in Gaarder and Heimdal (1973, p.89). Age: extant.

"**DISTEPHANUS**" Stöhr, 1880, p.121. Silicoflagellate genus. **Name illegitimate: senior homonym:** *Distephanus* Cassini 1817. Type: uncertain; "type species", *Distephanus rotundus*.

"*sirius*" (Ehrenberg, 1841, p.150) Haeckel (according to Schütt, 1891, p.20). Holotype: not designated. **NOW** *Actiniscus*. Originally *Dictyochoa* subgenus *Actiniscus*, subsequently (and now) *Actiniscus*, thirdly *Distephanus* (name not validly published; Appendix A), fourthly *Gymmaster*. In his synonymy list for this species, Schütt (1891) indicated that the name *Distephanus sirius* was cited by Haeckel (date not specified). Dumitrică (1973, p.822) considered *Dictyochoa* (now *Actiniscus*) *pentasterius* to be the questionable taxonomic senior synonym of this species. N.I.A. Age: Miocene.

DOMASIA Downie, 1960, p.199. Emendation: Hill, 1974, p.17. Acritarch genus. Type: Downie, 1960, pl.1, fig.7, as *Domasia trispinosa*.

"*discophora*" Cookson and Eisenack, 1962b, p.492–493, pl.7, figs.17–21. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.17. **NOW** *Domasiella* (Appendix A). Originally *Domasia*, subsequently (and now) *Domasiella* (Appendix A). Age: Aptian–Albian.

DOMASIELLA Eisenack, 1969a, p.111–112. Acritarch genus. Although the "type species" was not validly transferred by Eisenack (1969a), the generic name *Domasiella* was validly published by that author, since it is based on a previously validly published species name (I.C.N. Article 40.3). Type: Cookson and Eisenack, 1962b, pl.7, fig.17, as *Domasiella discophora*.

**discophora* (Cookson and Eisenack, 1962b, p.492–493, pl.7, figs.17–21) Loeblich Jr. and Loeblich III, 1970b, p.200. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.17. Originally *Domasia* (Appendix A), subsequently (and

now) *Domasiella*. This combination was not validly published in Eisenack (1969a, p.112), since that author did not fully reference the basionym. Age: Aptian–Albian.

DORSENNIDIUM Wicander, 1974, p.20. Emendation: Sarjeant and Stancliffe, 1994, p.39. Acritarch genus. Type: Wicander, 1974, pl.9, fig.12, as *Dorsennidium patulum*.

hyalodermum (Cookson, 1956, p.188–189, pl.1, figs.12–16) Sarjeant and Stancliffe, 1994, p.40. Holotype: Cookson, 1956, pl.1, fig.12. Originally *Palaeotetradinium*, subsequently *Veryhachium* (Appendix A), thirdly *Goniosphaeridium* (Appendix A), fourthly (and now) *Dorsennidium*. Age: Albian–Cenomanian.

ECHIGRAMINIDITES Krutzsch, 1970, p.17–18. Pollen genus. Type: Krutzsch, 1970, pl.8, figs.1–1a, as *Echigraminidites maravicus*.

lusaticus Krutzsch, 1970, p.70, pl.8, figs.8–15,16,16a,17,17a,18. Holotype: Krutzsch, 1970, pl.8, figs.11–15. **NOW** *Cyclopsiella*. Originally *Echigraminidites*, subsequently (and now) *Cyclopsiella*. Taxonomic junior synonyms: *Ascostomocystis granosa* and *Cyclopsiella spiculata*, according to Strauss and Lund (1992, p.174). Age: middle Miocene.

ENIGMADINIUM Wrenn and Hart, 1988, p.353–354. Acritarch genus. Type: Wrenn and Hart, 1988, fig.24, no.1, as *Enigmadinium cylindrifloriferum*.

***cylindrifloriferum** Wrenn and Hart, 1988, p.354, fig.24, nos.1–3; fig.45, nos.1–6. Holotype: Wrenn and Hart, 1988, fig.24, no.1; Fensome et al., 1993a, fig.1 — p.1087. Age: early Eocene.

EPICEPHALOPYXIS Deflandre, 1937b, p.92. Acritarch genus. This name was not validly published in Deflandre (1935), since no type was designated, this being a requirement of the I.C.Z.N. at that time. Type: Deflandre, 1937b, pl.18, fig.6, as *Epicephalopyxis adhaerens*, designated by Lentin and Williams (1989, p.130).

***adhaerens** Deflandre, 1937b, p.92–93, pl.18, figs.4–7. Holotype: Deflandre, 1937b, pl.18, fig.6. This species was not validly published in Deflandre (1935, p.234) since no type was designated, this being a requirement of the I.C.Z.N. at that time. Age: Late Cretaceous.

"**indentata**" Deflandre and Cookson, 1955, p.292, pl.9, figs.5–7; text-fig.56. Emendation: Elsie, 1977, p.96, as *Paralecaniella indentata*. Holotype: Deflandre and Cookson, 1955, pl.9, fig.6. **NOW** *Paralecaniella* (Appendix A). Originally *Epicephalopyxis*, subsequently (and now) *Paralecaniella* (Appendix A). Taxonomic junior synonym: *Scriniodinium nilsii*, according to Jan du Chêne et al. (1986a, p.318). Age: Paleocene–Miocene.

"**spectabilis**" Deflandre and Cookson, 1955, p.293, pl.3, figs.12–14. Holotype: Deflandre and Cookson, 1955, pl.3, fig.14. **NOW** *Wanaea*. Originally *Epicephalopyxis*, subsequently (and now) *Wanaea*. Age: Oxfordian.

ESTIASTRA Eisenack, 1959, p.201. Emendation: Sarjeant and Stancliffe, 1994, p.50. Acritarch genus. Type: Eisenack, 1959, pl.16, fig.17, as *Estiastra magna*.

"**baltica**" (Eisenack, 1951, p.190, pl.3, figs.10–11) Sarjeant and Stancliffe, 1994, p.50. Holotype: Eisenack, 1951, pl.3, fig.10. **NOW** *Pachysphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Pulvinosphaeridium* (combination not validly published, Appendix A), thirdly *Veryhachium* (Appendix A), fourthly *Goniosphaeridium* (Appendix A), fifthly *Baltisphaeridium* (Appendix A), sixthly *Estiastra*, seventhly (and now) *Pachysphaeridium* (Appendix A). Age: Early Ordovician.

?**oligospinosa** (Eisenack, 1934, p.64–65, pl.4, figs.15–18 ex Eisenack, 1938a, p.12) Jacobson and Achab, 1985, p.182. Holotype: Eisenack, 1934, pl.4, fig.18, lost according to Eisenack et al. (1973, p.494). Originally *Ovum*

hispidum subsp. *oligospinosum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium oligospinosum*, thirdly *Pulvinosphaeridium oligospinosum* (Appendix A), fourthly *Veryhachium oligospinosum* (Appendix A), fifthly *Goniosphaeridium oligospinosum* (Appendix A), sixthly (and now) *Estiastra? oligospinosum*. Questionable assignment: Jacobson and Achab (1985, p.182). The name *Ovum hispidum* subsp. *oligospinosa* was not validly published in Eisenack (1934) since the specific name *Ovum hispidum* was not validly published. Age: Silurian (erratic).

EVITTIA Brito, 1967, p.477. Emendations: Lister, 1970, p.66–67; Eiserhardt, 1992, p.24; Sarjeant and Vavrdova, 1997, p.20. Acritarch genus. For synonymy see Fensome et al. (1990, p.216–217). Junior homonym: *Evittia* Pocock, 1972 (see main index). Type: Brito, 1967, pl.1, fig.9, as *Evittia sommeri*.

"*mala*" (Cramer, 1964, p.297, pl.1, figs.6,8,10; text-fig.19, nos.10–12) Lister, 1970, p.70–71. Holotype: Cramer, 1964, pl.1, fig.8. **NOW** *Rhacobrachion* (Appendix A). Originally *Baltisphaeridium* (Appendix A), subsequently *Evittia* Brito, thirdly *Hystrichosphaeridium* (combination not validly published), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Rhacobrachion* (Appendix A). Age: Silurian (Ludlow).

"*ramusculosa*" (Deflandre, 1945a, p.63, pl.1, figs.8–16; text-figs.38–39) Lister, 1970, p.67. Emendation: Lister, 1970, p.92–93, as *Multiplicisphaeridium ramusculosum*. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **Combination not validly published:** the name *Evittia ramusculosa* was not clearly used. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Evittia* Brito (combination not validly published), fourthly (and now) *Multiplicisphaeridium* (Appendix A), fifthly *Peteinosphaeridium* (combination not validly published, Appendix A), sixthly *Oppilatala* (Appendix A). Age: Silurian–Devonian (late Llandovery–Emsian).

"*spicifera*" (Deunff, 1955, p.146, pl.3, fig.1; text-fig.26) Lister, 1970, p.67. Holotype: Deunff, 1955, pl.3, fig.1. **Combination not validly published:** the name *Evittia spicifera* was not clearly used. **NOW** *Stellechinatum* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly *Evittia* Brito (combination not validly published), fifthly *Multiplicisphaeridium* (Appendix A), sixthly (and now) *Stellechinatum* (Appendix A). Age: Middle Devonian.

"**FENTONIA**" Bailey and Hogg, 1995, p.58. Acritarch genus. **Taxonomic senior synonym:** *Limbicysta* (Appendix A), according to MacRae et al. (1996, p.1479). Nomenclatural junior synonym: *Neofentonia* (Appendix A). Özdikmen (2009, p.234) considered *Fentonia* Bailey and Hogg, 1995 to be illegitimate because it is a junior homonym of *Fentonia* Butler 1881; however, *Fentonia* Butler 1881 is an animal and under the I.C.N. it does not pre-empt *Fentonia* Bailey and Hogg. Type: Smelror, 1987, fig.4G, as *Parvocysta bjaerkei*.

"**bjaerkei*" (Smelror, 1987, p.227,230, figs.4G,8C–D; text-fig.9) Bailey and Hogg, 1995, p.58. Emendation: Bailey and Hogg, 1995, p.58, as *Fentonia bjaerkei*. Holotype: Smelror, 1987, fig.4G. **NOW** *Limbicysta* (Appendix A). Originally *Parvocysta*, subsequently *Fentonia*, thirdly (and now) *Limbicysta* (Appendix A), fourthly *Neofentonia* (generic name illegitimate; Appendix A). Age: late Callovian.

FIBROSPHAERA de Lapparent, 1924. Cited as "*Fibroesphaerae*" in Colom (1935, p.12). Further information not available.

"*minutissima*" Colom, 1935, p.12, pl.2, fig.8; text-fig.4a (four specimens). **Name not validly published:** holotype not designated. Originally *Fibrosphaera* (name not validly published), subsequently *Stomiosphaera* (name not validly published), thirdly *Colomisphaera* (name not validly published), fourthly *Schizosphaerella* (name not validly published). Designation of a holotype was a requirement of the I.C.Z.N. at the time that Colom (1935) proposed this name. Age: Late Early Jurassic.

"*stephanoidea*" Colom, 1935, p.12, text-fig.4b. Holotype: Colom, 1935, text-fig.4b. **NOW** *Stomiosphaera*. Originally *Fibrosphaera*, subsequently (and now) *Stomiosphaera*. Age: Late Early Jurassic.

FILISPHAERIDIUM Staplin et al., 1965, p.192. Acritarch genus. For synonymy see Fensome et al. (1990, p.223). Type: Jansonius, 1962, pl.16, fig.50, as *Micrhystridium setasessitante*.

"*aspersum*" Jiabo, 1978, p.116, pl.31, figs.1–6; pl.49, figs.2–4. Holotype: Jiabo, 1978, pl.31, fig.1. **NOW** *Kallosphaeridium?*. Originally *Filisphaeridium*, subsequently (and now) *Kallosphaeridium?*. Age: Oligocene.

?*courtinatii* Sarjeant and Stancliffe, 1994, p.29. Holotype: Courtinat and Gaillard, 1980, pl.2, fig.15. Originally *Comasphaeridium capillatum* (Appendix A), subsequently *Trichodinium capillatum*, thirdly (and now) *Filisphaeridium? courtinatii*. Substitute name for *Comasphaeridium capillatum* Courtinat in Courtinat and Gaillard, 1980, p.75, pl.2, fig.15; the name *Filisphaeridium capillatum* is preoccupied. Questionable assignment: Sarjeant and Stancliffe (1994, p.29). Age: late Oxfordian.

fimbriatum (White, 1842, p.36, pl.4, div.3, fig.3) Sarjeant and Stancliffe, 1994, p.29. Holotype: White, 1842, pl.4, div.3, fig.3; Sarjeant, 1991, fig.4, no.2. Originally *Xanthidium* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Comasphaeridium* (Appendix A), fifthly (and now) *Filisphaeridium*. Age: Late Cretaceous.

reticuloidum (Jiabo, 1978, p.115–116, pl.31, figs.18–19) Song Zhichen et al., 1985, p.55–56. Holotype: Jiabo, 1978, pl.31, fig.19. **NOW** *Kallosphaeridium?*. Originally *Baltisphaeridium* (Appendix A), subsequently *Filisphaeridium*, thirdly (and now) *Kallosphaeridium?*. Age: late Oligocene.

"*stimuliferum*" (Deflandre, 1939a, p.192, pl.10, fig.10) Cramer and Diez, 1979, p.52. Holotype: Deflandre, 1939a, pl.10, fig.10. **Combination not validly published**: basionym not fully referenced. **NOW** *Solisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Solisphaeridium* (Appendix A), fourthly *Filisphaeridium* (combination not validly published), fifthly *Micrhystridium* (Appendix A). Age: Late Jurassic.

FISSURINA Information not available.

"*ovalis*" (Kaufmann in Heer, 1865, p.196–197, figs.107a–b) Colom et al., 1953, p.529. Holotype: not designated. **NOW** *Pithonella*. Originally *Lagena* (Appendix A), subsequently (and now) *Pithonella*, thirdly *Fissurina*. Taxonomic junior synonym: *Lagena* (now *Pithonella*) *sphaerica*, according to Lorenz (1902, p.46).- however, Bonet (1956, p.450) retained *Lagena* (as *Stomiosphaera*) *sphaerica*. Age: late Cenomanian–Turonian (based on later studies by Bolli — P. Hochuli, personal communication).

FLORISPHAERIDIUM Lister, 1970, p.74. Acritarch genus. Type: Lister, 1970, pl.7, figs.11–12, as *Florisphaeridium castellum*.

"*huecospinosum*" (Cramer, 1964, p.331, pl.6, fig.2; text-fig.36, no.7) Eisenack et al., 1973, p.471. Holotype: Cramer, 1964, pl.6, fig.2. **NOW** *Umbellasphaeridium* (Appendix A). Originally *Hystrichosphaeridium?*, subsequently *Baltisphaeridium* (combination not validly published, Appendix A), thirdly *Florisphaeridium*, fourthly (and now) *Umbellasphaeridium* (Appendix A). Age: Devonian (Emsian).

toyetae (Cramer, 1964, p.302, pl.1, figs.14–15) Cramer and Diez, 1976, p.83–84. Holotype: Cramer, 1964, pl.1, fig.15. Originally *Baltisphaeridium* (Appendix A), subsequently *Multiplicisphaeridium?* (Appendix A), thirdly *Hystrichosphaeridium*, fourthly (and now) *Florisphaeridium*. Age: Devonian (middle Siegenian–Emsian).

FROMEA Cookson and Eisenack, 1958, p.55. Emendation: Yun Hyesu, 1981, p.55–56. Acritarch genus. Type: Cookson and Eisenack, 1958, pl.5, fig.10, as *Fromea amphora*.

acambra Sah et al., 1970, p.148, pl.2, fig.28. Holotype: Sah et al., 1970, pl.2, fig.28. Originally (and now) *Fromea*, subsequently *Palaeostomocystis* (Appendix A). Jansonius (1989, p.65) retained this species in *Fromea*. Age: Late Cretaceous.

**amphora* Cookson and Eisenack, 1958, p.56, pl.5, figs.10–11. Holotype: Cookson and Eisenack, 1958, pl.5, fig.10. Taxonomic junior synonym: *Fromea warlinghamensis* (Appendix A), according to Riley (1979, p.221) — however, Jansonius (1989, p.67) retained *Fromea warlinghamensis*. Age: Albian–Cenomanian.

apertulata Fedorova, 1989, p.70–71, pl.30, figs.1,1a,2. Holotype: Fedorova, 1989, pl.30, figs.1,1a. Age: Ryazanian.

apiculata (Cookson and Eisenack, 1960a, p.12, pl.3, fig.15) Stover and Evitt, 1978, p.48. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.15. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea*?, thirdly (and now) *Fromea*. Questionable assignment: Stover and Evitt (1978, p.48) — however, Jansonius (1989, p.65) included this species in *Fromea* without question. Age: Santonian–Campanian.

"*atlantica*" (Habib, 1972, p.375, pl.4, figs.2,5) Davies, 1983, p.31. Holotype: Habib, 1972, pl.4, fig.2. **NOW** *Valvaeodinium*. Originally *Tenua* Eisenack, subsequently *Sentusidinium*?, thirdly *Fromea*, fourthly *Kylindrocysta*, fifthly (and now) *Valvaeodinium*. Taxonomic junior synonym: *Fromea complicata* (Appendix A), according to Davies (1983, p.31) — however, Jansonius (1989, p.65) retained *Fromea complicata*. Age: Callovian–Oxfordian.

callia Zatonkaya, 1975, p.34, pl.1, fig.4. Holotype: Zatonkaya, 1975, pl.1, fig.4. Age: Callovian.

chinensis He Chengquan, 1991, p.50–51, pl.6, figs.11–13. Holotype: He Chengquan, 1991, pl.6, fig.12. This name was not validly published in He Chengquan and Wang Kede (1990, p.411), who by citing the name as "*Fromea* cf. *chinensis* He" clearly regarded it as provisional. Age: middle Eocene.

chytra (Drugg, 1967, p.35, pl.6, fig.12) Stover and Evitt, 1978, p.48. Holotype: Drugg, 1967, pl.6, fig.12. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Fromea*. Taxonomic junior synonym: *Palaeostomocystis minor* (Appendix A), according to Xu Jinli et al. (1997, p.41). Age: Maastrichtian–Danian.

circulata Lang Yan et al., 1999, p.379,388–389, pl.1, figs.8–9. Holotype: Lang Yan et al., 1999, pl.1, fig.9. Age: Early Cretaceous.

complicata Brideaux, 1977, p.18–19, pl.7, figs.1–6. Holotype: Brideaux, 1977, pl.7, figs.1–2. Taxonomic senior synonym: *Tenua* (as *Fromea*) *atlantica*, according to Davies (1983, p.31) — however, Jansonius (1989, p.65) retained *Fromea complicata*. Age: Aptian–Albian.

cooksoniae Fedorova-Shakhmundes, 1980, p.5–6, pl.1, figs.1–2. Holotype: Fedorova-Shakhmundes, 1980, pl.1, fig.1. Age: early Aptian.

crassisoma Zatonkaya, 1975, p.34–35, pl.1, fig.6. Holotype: Zatonkaya, 1975, pl.1, fig.6. Age: Late Jurassic.

cryptofoveolata Fedorova, 1989, p.71, pl.30, figs.3,3a. Holotype: Fedorova, 1989, pl.30, figs.3,3a. Age: late Volgian.

cylindrica (Cookson and Eisenack, 1960b, p.258, pl.39, fig.16) Stover and Evitt, 1978, p.48. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.16. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea*?, thirdly (and now) *Fromea*. Questionable assignment: Stover and Evitt (1978, p.48) — however, Jansonius (1989, p.65) included this species in *Fromea* without question. Age: Late Jurassic–Neocomian.

"?*elongata*" Beju, 1971, p.289–290, pl.3, figs.7–10; text-figs.6A–E. Emendations: Feist-Burkhardt and Monteil, 1994, p.9, as *Andreedinium elongatum*; Riding, 1994, p.16, as *Phallocysta elongata*. Holotype: Beju, 1971, pl.3, fig.7; text-fig.6A. **NOW** *Phallocysta*. Originally *Fromea*, subsequently *Fromea*?, thirdly *Walloodinium*, fourthly *Palaeostomocystis* (Appendix A), fifthly *Andreedinium*, sixthly (and now) *Phallocysta*. Questionable assignment: Stover and Evitt (1978, p.48). Junior homonym: *Fromea elongata* Jain and Millepied, 1975. Nomenclatural junior

synonym: *Phallocysta minuta*, which see for details. Taxonomic senior synonym: *Prismatocystis* (now *Walloodinium*) *cylindrica*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Andreedinium elongatum*. Taxonomic junior synonym: *Phallocysta subconica*, according to Riding (1994, p.16). Junior homonym: *Fromea elongata* Jain and Millepied, 1975 (Appendix A). Age: Bajocian–Oxfordian.

"*elongata*" Jain and Millepied, 1975, p.141, pl.2, figs.29–30. Holotype: Jain and Millepied, 1975, pl.2, fig.30. **Name illegitimate — senior homonym:** *Fromea elongata* Beju, 1971. **Substitute name:** *Fromea granulata* (Appendix A). Originally *Fromea elongata* (name illegitimate), subsequently (and now) *Fromea granulata* (Appendix A), thirdly *Fromea senegalensis* (name illegitimate; Appendix A). Age: Aptian–Albian.

endogranulata Fedorova, 1989, p.71–72, pl.30, figs.4,5,5a. Holotype: Fedorova, 1989, pl.30, figs.5,5a. Age: Ryazanian.

expolita (Brideaux, 1977, p.20, pl.7, figs.12–14) Lentin and Williams, 1981, p.105. Holotype: Brideaux, 1977, pl.7, figs.12–14. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Fromea*. Age: Barremian.

fragilis (Cookson and Eisenack, 1962b, p.496–497, pl.7, figs.10–11) Stover and Evitt, 1978, p.48. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.11. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Fromea*. Age: Aptian–Cenomanian.

glabella (Singh, 1971, p.428–429, pl.80, fig.4) Lentin and Williams, 1981, p.106. Holotype: Singh, 1971, pl.80, fig.4. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Fromea*. Age: late Albian.

grandis Jansonius, 1989, p.65, pl.1, fig.1; text-fig.2. Holotype: McIntyre and Brideaux, 1980, pl.5, fig.9, as "*Fromea* sp. cf. *Fromea fragilis*"; Jansonius, 1989, pl.1, fig.1; text-fig.2. Age: Valanginian.

granulata Lentin and Williams, 1977b, p.61. Holotype: Jain and Millepied, 1975, pl.2, fig.30. Originally *Fromea elongata* Jain and Millepied (name illegitimate; Appendix A), subsequently (and now) *Fromea granulata*, thirdly *Fromea senegalensis* (name illegitimate; Appendix A). Substitute name for *Fromea elongata* Jain and Millepied, 1975, p.141, pl.2, figs.29–30 (an illegitimate name; Appendix A). The substitute name *Fromea senegalensis* (Appendix A) postdates *Fromea granulata* by one month (Lentin and Williams, 1985, p.137). Age: Aptian–Albian.

"*granulosa*" (Cookson and Eisenack, 1974, p.79, pl.28, fig.10) Stover and Evitt, 1978, p.48. Holotype: Cookson and Eisenack, 1974, pl.28, fig.10. **NOW** *Batiacasphaera*. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea*, thirdly (and now) *Batiacasphaera*. Age: Albian–Cenomanian.

"*irregularis*" Courtinat in Courtinat and Gaillard, 1980, p.27–28, pl.3, figs.5,8. Holotype: Courtinat and Gaillard, 1980, pl.3, fig.8. **Taxonomic senior synonym:** *Fromea warlinghamensis* (Appendix A), according to Jansonius (1989, p.65). Age: late Oxfordian.

?*laevigata* (Drugg, 1967, p.35, pl.6, figs.14–15) Stover and Evitt, 1978, p.48. Holotype: Drugg, 1967, pl.6, fig.14. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea*, thirdly (and now) *Fromea*?. Questionable assignment: Stover and Evitt (1978, p.48). Junior homonym: *Fromea laevigata* (Jiabo, 1978) Lentin and Williams, 1981 (Appendix A). Age: Maastrichtian–Danian.

"*laevigata*" (Jiabo, 1978, p.126–127, pl.32, fig.23) Lentin and Williams, 1981, p.106. Holotype: Jiabo, 1978, pl.32, fig.23. **Name illegitimate — senior homonym:** *Fromea laevigata* (Drugg, 1967) Stover and Evitt, 1978 (Appendix A). Substitute name: *Fromea psilata* (Appendix A). **NOW** *Bosedinia laevigata*. Originally *Palaeostomocystis laevigata* (name illegitimate; Appendix A), subsequently *Bosea laevigata* (generic name illegitimate), thirdly *Fromea laevigata* (name illegitimate), fourthly *Fromea psilata* (Appendix A), fifthly (and now) *Bosedinia laevigata*. Age: Early Tertiary.

latisecta Fedorova, 1989, p.72–73, pl.30, figs.6–7. Holotype: Fedorova, 1989, pl.30, fig.6. Age: late Volgian.

macroplicata Zatonskaya, 1975, p.35, pl.1, fig.7. Holotype: Zatonskaya, 1975, pl.1, fig.7. Age: Late Jurassic.

madurensis Cookson and Eisenack, 1982, p.29, pl.1, fig.9. Holotype: Cookson and Eisenack, 1982, pl.1, fig.9. Questionable assignment: Cookson and Eisenack (1982, p.29) — however, Jansonius (1989, p.67) included the species in *Fromea* without question. Age: Senonian.

"*microgranulosa*" Jain, 1977b, p.176, pl.6, fig.74. Holotype: Jain, 1977b, pl.6, fig.74. **NOW** *Bosedinia*. Originally *Fromea*, subsequently (and now) *Bosedinia*. Age: early Albian.

"*minor*" (Jiabo, 1978, p.127, pl.32, figs.14–21) Lentin and Williams, 1981, p.106. Holotype: Jiabo, 1978, pl.32, fig.20. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea*. **Taxonomic senior synonym:** *Fromea chytra*, according to Xu Jinli et al. (1997, p.41). Age: Early Tertiary.

monilifera Backhouse, 1987, p.223, figs.13E–H. Holotype: Backhouse, 1987, fig.13E. Age: late Barremian–early Aptian.

nicosia Jansonius, 1989, p.67, pl.1, figs.2–7; text-fig.1. Holotype: Ioannides, 1986, pl.13, fig.10, as *Fromea fragilis*; Jansonius, 1989, pl.1, fig.4; text-fig.1. Age: Santonian–early Paleocene.

"*oblonga*" (Deflandre, 1945b, card 852) Stover and Evitt, 1978, p.48. Holotype: Deflandre, 1945b, card 852. **Name not validly published:** no description. Originally *Palaeostomocystis* (name not validly published; Appendix A), subsequently *Fromea* (name not validly published). Age: Late Cretaceous.

pachyderma Kar, 1979, p.35, pl.4, fig.75. Holotype: Kar, 1979, pl.4, fig.75. Jain (1980, p.142) considered this taxon to be a pteridophytic spore. Age: ?Oligocene.

"*pachythea*" (Cookson and Eisenack, 1971, p.222, pl.11, figs.7–9) Lentin and Williams, 1985, p.138. Holotype: Cookson and Eisenack, 1971, pl.11, fig.8. **NOW** *Palaeostomocystis* (Appendix A). Originally (and now) *Palaeostomocystis* (Appendix A), subsequently *Fromea*. Age: Middle Cretaceous.

paksensis Fedorova, 1989, p.73, pl.30, figs.8–9. Holotype: Fedorova, 1989, pl.30, fig.8. Age: early Valanginian.

"*psilata*" Lentin and Williams, 1981, p.106. Holotype: Jiabo, 1978, pl.32, fig.23. **NOW** *Bosedinia laevigata*. Originally *Palaeostomocystis laevigata* (name illegitimate; Appendix A), subsequently *Bosea laevigata* (generic name illegitimate), thirdly *Fromea laevigata* (name illegitimate; Appendix A), fourthly *Fromea psilata*, fifthly (and now) *Bosedinia laevigata*. Substitute name for *Fromea laevigata* (Jiabo, 1978 p.126–127, pl.32, fig.23) Lentin and Williams, 1981, p.106 (an illegitimate name). Age: Early Tertiary.

quadrugata Duxbury, 1980, p.134, pl.4, figs.12–15; text-fig.15. Holotype: Duxbury, 1980, pl.4, figs.12–13; text-fig.15. Age: Barremian.

"*reticulata*" (Davey, 1969b, p.14, pl.4, figs.3–4,6) Stover and Evitt, 1978, p.48. Holotype: Davey, 1969b, pl.4, fig.3. **NOW** *Batiacasphaera*?. Originally *Chytroeisphaeridia*, subsequently *Fromea*, thirdly *Batiacasphaera*, fourthly (and now) *Batiacasphaera*?. Age: Campanian–Maastrichtian.

rugosa Zatonkaya, 1975, p.35, pl.1, fig.8. Holotype: Zatonkaya, 1975, pl.1, fig.8. Age: Late Jurassic.

"*scabrata*" (Jiabo, 1978, p.127, pl.32, figs.24–25; pl.46, figs.3a–b) Lentin and Williams, 1981, p.107. Holotype: Jiabo, 1978, pl.32, fig.25. **NOW** *Bosedinia*. Originally *Palaeostomocystis* (Appendix A), subsequently *Fromea*, thirdly (and now) *Bosedinia*. Age: Early Tertiary.

"*senegalensis*" Jain and Millepieid, 1977, p.284. Holotype: Jain and Millepieid, 1975, pl.2, fig.30. **Name illegitimate** — **nomenclatural senior synonym:** *Fromea granulata* Lentin and Williams, 1977b, which has the same holotype. **NOW** *Fromea granulata* (Appendix A). Originally *Fromea elongata* Jain and Millepieid (name illegitimate; Appendix A), subsequently *Fromea granulata* (Appendix A), thirdly *Fromea senegalensis* (name illegitimate). Substitute name for *Fromea elongata* Jain and Millepieid, 1975, p.141, pl.2, figs.29–30 (an illegitimate

name; Appendix A). The substitute name *Fromea granulata* predates *Fromea senegalensis* by one month (Lentin and Williams, 1985, p.137). Age: Aptian–Albian.

senilis (McIntyre and Brideaux, 1980, p.18, pl.5, fig.12; pl.6, fig.1) Lentin and Williams, 1981, p.107. Holotype: McIntyre and Brideaux, 1980, pl.5, fig.12; pl.6, fig.1. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Fromea*. Age: Valanginian (type material reworked from Aalenian strata according to Poulton et al., 1990, p.171; fig.3).

"*simplex*" Yun Hyesu, 1981, p.56–57, pl.13, figs.10,15. Holotype: Yun Hyesu, 1981, pl.13, fig.15. **NOW** *Batioladinium*. Originally *Fromea*, subsequently (and now) *Batioladinium*. Age: early Santonian.

staveia Elsik, 1977, p.100,102, pl.2, figs.12–14. Holotype: Elsik, 1977, pl.2, fig.12. Age: late Eocene.

thomsenii Poulsen, 1996, p.88, pl.42, figs.6–9. Holotype: Poulsen, 1996, pl.42, fig.7. Age: middle Volgian.

tornatilis (Drugg, 1978, p.71–72, pl.7, figs.4–6) Lentin and Williams, 1981, p.107. Holotype: Drugg, 1978, pl.7, fig.5. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Fromea*. Age: Callovian–Oxfordian.

torosa Zatonkaya, 1975, p.34, pl.1, fig.5. Holotype: Zatonkaya, 1975, pl.1, fig.5. Age: Late Jurassic–Early Cretaceous.

triquetra (Brideaux, 1977, p.20–21, pl.8, figs.1–6) Yun Hyesu, 1981, p.56. Holotype: Brideaux, 1977, pl.8, figs.1–2. Originally *Palaeostomocystis* (Appendix A), subsequently (and now) *Fromea*. Age: Barremian.

warlinghamensis Gitmez and Sarjeant, 1972, p.188–189, pl.1, figs.6,8; pl.9, figs.5–6. Holotype: Gitmez and Sarjeant, 1972, pl.1, fig.6. Taxonomic senior synonym: *Fromea amphora* (Appendix A), according to Riley (1979, p.221) — however, Jansonius (1989, p.67) retained *Fromea warlinghamensis*. Taxonomic junior synonym: *Fromea irregularis* (Appendix A), according to Jansonius (1989, p.65). Age: Kimmeridgian.

zhongyuanensis He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.46, pl.3, figs.1–5. Holotype: He Chengquan et al., 1989, pl.3, fig.3. Age: Early Tertiary.

GEODIA Lamarck, 1816. Sponge genus. Type: information not available.

"*austini*" Merrill, 1895, p.16; text-fig.11. Holotype: Merrill, 1895, text-fig.11. Originally *Geodia?*, subsequently *Systematophora?*. Questionable assignment: Merrill (1895, p.16). **Taxonomic senior synonym:** *Xanthidium* (as *Hystrichosphaera*, now *Spiniferites*) *ramosum*, according to Sarjeant (1966a, p.5). Age: Early Cretaceous.

"*hillii*" Merrill, 1895, p.17; text-fig.21. Holotype: Merrill, 1895, text-fig.21. **NOW** *Hystrichosphaeridium?*. Originally *Geodia?*, subsequently *Hystrichosphaeridium*, thirdly (and now) *Hystrichosphaeridium?*. Questionable assignment: Merrill (1895, p.17). Age: Early Cretaceous.

"*irregularis*" Merrill, 1895, p.16; text-fig.4. Holotype: Merrill, 1895, text-fig.4. Originally *Geodia? irregularis*, subsequently *Hystrichosphaeridium irregulare* (combination illegitimate), thirdly *Hystrichosphaeridium? irregulare* (combination illegitimate), fourthly *Hystrichosphaeridium speciale*. Questionable assignment: Merrill (1895, p.16). **Taxonomic senior synonym** (at specific rank): *Xanthidium tubiferum* var. *complex* (now *Oligosphaeridium complex*), according to Harker and Sarjeant in Harker et al. (1990, p.59). Age: Early Cretaceous.

"*spinipansata*" Merrill, 1895, p.17; text-fig.20. Holotype: Merrill, 1895, text-fig.20. **NOW** *Hystrichosphaeridium?*. Originally *Geodia?*, subsequently *Hystrichosphaeridium*, thirdly (and now) *Hystrichosphaeridium?*. Questionable assignment: Merrill (1895, p.17). Age: Early Cretaceous.

"*tripunctata*" Merrill, 1895, p.16; text-fig.15. Holotype: Merrill, 1895, text-fig.15. Questionable assignment: Merrill (1895, p.16). **Taxonomic senior synonym:** *Xanthidium* (now *Spiniferites*) *ramosum*, by implication in Sarjeant (1964a, p.175), who considered *Geodia? tripunctata* to be a taxonomic junior synonym of *Xanthidium* (as

Hystrichosphaera furcatum, which is now a taxonomic junior synonym of *Spiniferites ramosus*. Age: Early Cretaceous.

"**GONIOSPHAERIDIUM**" Eisenack, 1969a, p.256. Emendations: Kjellström, 1971a, p.43; Turner, 1984, p.111–112; Eiserhardt, 1992, p.28. Acritarch genus. **Taxonomic senior synonym:** *Polygonium* (Appendix A), according to Le Hérissé (1989, p.181) and Sarjeant and Stancliffe (1996, p.358). For further synonymy see Fensome et al. (1990, p.232). Type: Eisenack, 1931, pl.4, fig.19, as *Ovum hispidum* subsp. *polygonale*.

"**apiculatum**" (Timofeev, 1959, p.52, pl.4, fig.3) Wolf, 1980, p.125. Holotype: Timofeev, 1959, pl.4, fig.3. **Combination not validly published:** basionym not fully referenced. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Goniosphaeridium* (combination not validly published). Age: Early Ordovician.

"**balticum**" (Eisenack, 1951, p.190, pl.3, figs.10–11) Eisenack, 1969a, p.258. Holotype: Eisenack, 1951, pl.3, fig.10, lost according to Eisenack et al. (1973, p.478). **NOW** *Pachysphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Pulvinosphaeridium* (combination not validly published, Appendix A), thirdly *Veryhachium* (Appendix A), fourthly *Goniosphaeridium*, fifthly *Baltisphaeridium* (Appendix A), sixthly *Estriastra* (Appendix A), seventhly (and now) *Pachysphaeridium* (Appendix A). Eisenack et al. (1973, p.477–479) retained this species in *Goniosphaeridium*. Age: Early Ordovician.

"**hyalodermum**" (Cookson, 1956, p.188–189, pl.1, figs.12–16) Cookson and Eisenack, 1982, p.51. Holotype: Cookson, 1956, pl.1, fig.12. **NOW** *Dorsennidium* (Appendix A). Originally *Palaeotetradinium*, subsequently *Veryhachium* (Appendix A), thirdly *Goniosphaeridium* (Appendix A), fourthly (and now) *Dorsennidium* (Appendix A). Age: Albian–Cenomanian.

"**oligospinosum**" (Eisenack, 1934, p.64–65, pl.4, figs.15–18 ex Eisenack, 1938a, p.12) Eisenack, 1969a, p.256–257. Holotype: Eisenack, 1934, pl.4, fig.18, lost according to Eisenack et al. (1973, p.494). **NOW** *Estriastra?* *oligospinosa* (Appendix A). Originally *Ovum hispidum* subsp. *oligospinosum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium oligospinosum*, thirdly *Pulvinosphaeridium oligospinosum* (Appendix A), fourthly *Veryhachium oligospinosum* (Appendix A), fifthly *Goniosphaeridium oligospinosum*, sixthly (and now) *Estiastra?* *oligospinosa* (Appendix A). Age: Silurian (erratic).

"***polygonale**" (Eisenack, 1931, p.113, pl.4, figs.16–20; pl.5, fig.18 ex Eisenack, 1938a, p.12) Eisenack, 1969a, p.257–258. Holotype: Eisenack, 1931, pl.4, fig.19, as *Ovum hispidum* subsp. *polygonale*, lost according to Eisenack (1959, p.199). Neotype: Paris and Deunff, 1970, pl.1, fig.4, as *Veryhachium splendens*, designated by Fensome et al. (1990, p.235), which see. **NOW** *Polygonium* (Appendix A). Originally *Ovum hispidum* subsp. *polygonale* (combination not validly published, Appendix A), subsequently *Hystrichosphaeridium polygonale*, thirdly *Baltisphaeridium polygonale* (Appendix A), fourthly *Veryhachium polygonale* (combination not validly published, Appendix A), fifthly *Goniosphaeridium polygonale*, sixthly (and now) *Polygonium polygonale* (Appendix A). Taxonomic junior synonyms: *Impletosphaeridium? primordiale*, according to Eisenack et al. (1973, p.497–498); *Veryhachium* (subsequently *Goniosphaeridium*) *splendens* Paris and Deunff, 1970, an acritarch species, according to Turner (1984, p.113–114) who believed *Goniosphaeridium splendens* to be the senior name; *Hystrichosphaeridium* (subsequently *Baltisphaeridium*) *sexradiatum*, an acritarch species, according to Eisenack (1965c, p.261). For discussion see Fensome et al. (1990, p.235). Age: Silurian (erratic).

"subsp. **uncinatum**" (Downie, 1958, p.337; text-fig.2a) Tynni, 1982, p.72. Holotype: Downie, 1958, text-fig.2a. **Combination not validly published:** basionym not fully referenced. **NOW** *Stellechinatum uncinatum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum* (Appendix A), thirdly *Baltisphaeridium uncinatum* (Appendix A), fourthly *Micrhystridium uncinatum* (Appendix A), fifthly *Goniosphaeridium uncinatum* (Appendix A), sixthly *Polygonium uncinatum* (Appendix A), seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published), eighthly (and now) *Stellechinatum uncinatum* (Appendix A). Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

"tuberatum" (Downie, 1958, p.338, pl.17, fig.3; text-fig.3f) Welsch, 1986, p.49. Holotype: Downie, 1958, pl.17, fig.3. **NOW** *Acanthodiacrodium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Acanthodiacrodium* (Appendix A), fourthly *Vulcanisphaera* (Appendix A), fifthly *Goniosphaeridium*. Age: Early Ordovician.

"uncinatum" (Downie, 1958, p.337; text-fig.2a) Kjellström, 1971b, p.27. Holotype: Downie, 1958, text-fig.2a. **NOW** *Stellechinatum uncinatum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum* (Appendix A), thirdly *Baltisphaeridium uncinatum* (Appendix A), fourthly *Micrhystridium uncinatum* (Appendix A), fifthly *Goniosphaeridium uncinatum*, sixthly *Polygonium uncinatum* (Appendix A), seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published, Appendix A), eighthly (and now) *Stellechinatum uncinatum* (Appendix A). Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

GORGONISPHAERIDIUM Staplin et al., 1965, p.192–193. Emendation: Kiryanov, 1978, p.14–15. Acritarch genus. Type: Staplin et al., 1965, pl.19, fig.20, as *Gorgonisphaeridium winslowiae*.

"ambiguum" (Deflandre, 1937b, p.81, pl.16 [al. pl.13], figs.8–9) Sarjeant and Stancliffe, 1994, p.31. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. **NOW** *Sepispinula?*. Originally *Micrhystridium* (Appendix A), subsequently *Cleistosphaeridium*, thirdly *Polysphaeridium*, fourthly *Chlamydophorella*, fifthly *Dapsilidinium*, sixthly *Gorgonisphaeridium*, seventhly (and now) *Sepispinula?*. Taxonomic junior synonyms: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) and *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, both according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499–500) retained *Sepispinula ancorifera* and *Sepispinula? huguoniotii*. Age: Late Cretaceous.

lewisii (Deunff, 1954a, p.240, fig.3) Sarjeant and Vavrdova, 1997, p.24. Holotype: Deunff, 1954a, fig.3. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Ammonidium* (combination not validly published, Appendix A), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Gorgonisphaeridium*. Age: Middle Devonian.

ohioense (Winslow, 1962, p.77, pl.19, figs.1,22; pl.22, fig.9) Wicander, 1974, p.26. Holotype: Winslow, 1962, pl.22, fig.9. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Gorgonisphaeridium*. Age: Late Devonian.

GRANODISCUS Mädler, 1963, p.340–341. Acritarch genus. Type: Mädler, 1963, pl.23, fig.3, as *Granodiscus granulatus*.

"pylomicus" Jiabo, 1978, p.103, pl.39, figs.11–14. Holotype: Jiabo, 1978, pl.39, fig.14. **NOW** *Pyxidinospis*. Originally *Granodiscus*, subsequently (and now) *Pyxidinospis*. Age: Oligocene.

"vesiculus" Liu Zhili and Zheng Yuefang in Liu Zhili et al. 1992, p.96, pl.22, figs.5–9. Holotype: Liu Zhili et al. 1992, pl.22, fig.7. **NOW** *Pyxidinospis*. Originally *Granodiscus*, subsequently (and now) *Pyxidinospis*. Age: Oligocene.

HALODINIUM Bujak, 1984, p.196. Acritarch genus. Type: Bujak, 1984, pl.4, fig.17, as *Halodinium majus*.

***majus** Bujak, 1984, p.196, pl.4, figs.15–17. Holotype: Bujak, 1984, pl.4, fig.17. Age: Pleistocene.

minus Bujak, 1984, p.196, pl.4, figs.18–20. Holotype: Bujak, 1984, pl.4, figs.18–19. Age: Pleistocene.

scopaem Head, 1993, p.47, fig.27, no.14; fig.28, nos.1–5. Holotype: Head, 1993, fig.27, no.14. Age: latest Pliocene.

HALOPHORIDIA Cookson and Eisenack, 1962a, p.271. Acritarch genus. Type: Cookson and Eisenack, 1962a, pl.37, fig.6, as *Halophoridia xena*.

spinosa Singh, 1983, p.132–133, pl.45, figs.9–11. Holotype: Singh, 1983, pl.45, fig.9. Age: early Cenomanian.

**xena* Cookson and Eisenack, 1962a, p.271, pl.37, figs.6–8. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.6. Age: Albian–Cenomanian.

HAPSIDOPALLA Playford, 1977, p.25. Emendation: Wicander and Wood, 1981, p.42–43. Acritarch genus. Type: Deunff, 1957, fig.1 — p.13, as *Micrhystridium sannemannii*.

?*venusta* (Sannemann, 1955, p.345, pl.5, fig.11; text-fig.15) Playford, 1977, p.25. Holotype: Sannemann, 1955, pl.5, fig.11. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Hapsidopalla*. Questionable assignment: Sarjeant and Vavrdova (1997, p.25). Sarjeant and Vavrdova (1997, p.25) postulated that this species may represent muellerisphaerids. Age: Devonian (late Givetian).

HOEGKLINTIA Dorning, 1981, p.192. Emendation: Eiserhardt, 1992, p.41. Acritarch genus. Type: Eisenack, 1959, pl.16, fig.12, as *Baltisphaeridium visbyense*.

digitata (Eisenack, 1938a, p.20–22, pl.4, figs.3–5; text-fig.7) Dorning, 1981, p.192. Holotype: Eisenack, 1938a, pl.4, fig.3, lost according to Eisenack (1959, p.200). Neotype: Eisenack, 1959, pl.16, fig.11, designated by Eisenack (1959, p.200). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Hoegklintia*. Le Hérissé (1989, p.147) also proposed this combination. Age: Ordovician (erratic).

HUNGARODISCUS Kriván-Hutter, 1963, p.76. Acritarch genus. Type: Kriván-Hutter, 1963, pl.5, figs.1–6; pl.6, figs.1–7, as *Hungarodiscus fragilis*.

"*fissilis*" Jiabo, 1978, p.100–101, pl.35, figs.3–9. Emendation: Mao Shaozhi et al., 1995, p.43. Holotype: Jiabo, 1978, pl.35, fig.4. **NOW** *Lacunodinium*. Originally *Hungarodiscus*, subsequently (and now) *Lacunodinium*. Taxonomic junior synonym: *Hungarodiscus foveolatus*, according to Mao Shaozhi et al. (1995, p.43). Age: Oligocene.

"*foveolatus*" Jiabo, 1978, p.101, pl.3, figs.1–4. Holotype: Jiabo, 1978, pl.3, fig.2. **Taxonomic senior synonym:** *Hungarodiscus* (now *Lacunodinium*) *fissilis*, according to Mao Shaozhi et al. (1995, p.43). Age: Oligocene.

"*punctatus*" Jiabo, 1978, p.101, pl.35, figs.1–2. Holotype: Jiabo, 1978, pl.35, fig.1. **NOW** *Lacunodinium*. Originally *Hungarodiscus*, subsequently (and now) *Lacunodinium*. Age: late Oligocene.

KOFOIDOPSIS Tasch, 1963, p.333. The "type species" of this genus is based on a mineral grain according to Stover and Evitt (1978, p.265,294). Type: Tasch, 1963, pl.1, figs.7–8, as *Kofoidopsis coronata*.

**coronata* Tasch, 1963, p.333–334, pl.1, figs.7–8. Holotype: Tasch, 1963, pl.1, figs.7–8. This species is based on a mineral grain according to Stover and Evitt (1978, p.265). Age: Early Permian.

KOROJONIA Cookson and Eisenack, 1958, p.54. Acritarch genus. Type: Cookson and Eisenack, 1958, pl.12, fig.13, as *Korojonia dubiosa*.

**dubiosa* Cookson and Eisenack, 1958, p.54, pl.12, fig.13. Holotype: Cookson and Eisenack, 1958, pl.12, fig.13. Age: Cenomanian–early Maastrichtian.

LAGENA (Walker and Jacob in Kanmacher, 1798) Brown, 1827. A foraminifer genus.

"*diffringens*" de Lapparent, 1918, p.21–22 [name first used on p.22], pl.2, fig.1–part; pl.3, figs.1–part,2–part. Holotype: not designated. **NOW** *Microconus*. Originally *Lagena*, subsequently *Stomiosphaera*, thirdly (and now) *Microconus*. Age: Late Cretaceous? (according to Vogler, 1941, "Inhalt" and p.283).

"*gracillima*" Seguenza in de Lapparent, 1918, p.19, pl.3, fig.1–part. Holotype: not designated: although the caption to de Lapparent's pl.3, fig.1 suggests a single specimen ("g"), there is no indication as to which specimen this refers. **NOW** *Cadosina*. Originally *Lagena*, subsequently (and now) *Cadosina*. Age: Cretaceous.

"*orbularia*" de Lapparent, 1918, p.20, pl.2, figs.1–part,2–part; pl.3, fig.2–part. Holotype: not designated. **NOW** *Inocardion*. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly *Sphaerella* (generic name illegitimate), fourthly *Stomiodinium?*, fifthly (and now) *Inocardion*. Taxonomic senior synonym: *Lagena* (now *Pithonella*) *sphaerica*, according to Bonet (1956, p.450) — however, Masters and Scott (1978, p.215) retained this species as type of *Inocardion*. Age: Late Cretaceous.

"*ovalis*" Kaufmann in Heer, 1865, p.196–197, figs.107a–b. Holotype: not designated. **NOW** *Pithonella*. Originally *Lagena*, subsequently (and now) *Pithonella*, thirdly *Fissurina* (Appendix A). Taxonomic junior synonym: *Lagena* (now *Pithonella*) *sphaerica*, according to Lorenz (1902, p.46) — however, Bonet (1956, p.450) retained *Lagena* (as *Stomiosphaera*) *sphaerica*. Age: late Cenomanian–Turonian (based on later studies by Bolli — P. Hochuli, personal communication).

"*sphaerica*" Kaufmann in Heer, 1865, p.196, figs.104,106a–b. Holotype: not designated. **NOW** *Pithonella*. Originally *Lagena* (Appendix A), subsequently *Stomiosphaera*, thirdly *Palinosphaera* (generic name not validly published), fourthly (and now) *Pithonella*. Taxonomic senior synonym: *Lagena* (now *Pithonella*) *ovalis*, according to Lorenz (1902, p.46) — however, Bonet (1956, p.450) retained *Lagena* (as *Stomiosphaera*) *sphaerica*. Taxonomic junior synonym: *Lagena orbularia* (Appendix A), according to Bonet (1956, p.450) — however, Masters and Scott (1978, p.215) retained the latter species as type of *Inocardion*. Age: late Cenomanian–Turonian (based on later studies by Bolli — P. Hochuli, personal communication).

LECANIELLA Cookson and Eisenack, 1962a, p.269. Zygmematalean genus (Head, 1992, p.246). Type: Cookson and Eisenack, 1962a, pl.37, fig.16, as *Lecaniella margostriata*.

dictyota Cookson and Eisenack, 1962a, p.270, pl.37, figs.18–20. Holotype: Cookson and Eisenack, 1962a, fig.18. Age: Aptian–Cenomanian.

foveata Singh, 1971, p.426, pl.79, figs.5–10; pl.80, fig.1. Holotype: Singh, 1971, pl.79, figs.5–6. Age: late Albian.

foveolata Filatoff, 1975, p.93–94, pl.30, figs.11–12. Holotype: Filatoff, 1975, pl.30, fig.12. Age: Bajocian.

**margostriata* Cookson and Eisenack, 1962a, p.269–270, pl.37, figs.16–17. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.16. Age: Albian–Cenomanian.

proteiformis Wan Chuanbiao et al., 1995, p.58,61, pl.1, figs.1–5,7–12,14; text-figs.3A–E. Holotype: Wan Chuanbiao et al., 1995, pl.1, figs.1,3–4. Age: Early Cretaceous.

LEFFINGWELLIA Head and Norris, 2003, p.12. Acritarch genus. Type: Head and Norris, 2003, fig.12, nos.16–18, as *Leffingwellia costata*.

costata Head and Norris, 2003, p.12,14, fig.10; fig.12, nos.16–25. Holotype: Head and Norris, 2003, fig.12, nos.16–18. Age: late early–late Pliocene.

LEIOFUSA Eisenack, 1938a, p.28. Emendations: Eisenack, 1965a, p.140; Combaz et al., 1967, p.297. Acritarch genus. Type: Eisenack, 1934, pl.4, fig.19, as *Ovum hispidum* subsp. *fusiforme* (name not validly published).

"*lidiae*" Górka, 1963, p.37, pl.5, fig.6. Emendation: Davey, 1969b, p.12, as *Palaeocystodinium lidiae*. Holotype: Górka, 1963, pl.5, fig.6. **NOW** *Palaeocystodinium*. Originally *Leiofusa*, subsequently (and now) *Palaeocystodinium*. Age: Maastrichtian.

"**LEIOSPHAERA**" Eisenack, 1938a, p.12,22–24. Acritarch genus. **Taxonomic senior synonym:** *Tasmanites* (Appendix A), according to Schopf et al. (1944, p.18). Type: Eisenack, 1931, pl.5, fig.2, as *Bion solida*.

"*scrobiculata*" Deflandre and Cookson, 1955, p.291, pl.3, fig.3; text-fig.57. Holotype: Deflandre and Cookson, 1955, pl.3, fig.3. **NOW** *Pyxidiella?*. Originally *Leiosphaera*, subsequently *Pyxidiella*, thirdly *Leiosphaeridia* (Appendix A), fourthly *Palaeostomocystis* (Appendix A), fifthly (and now) *Pyxidiella?*, sixthly *Batiacasphaera*. Age: Santonian–Eocene.

LEIOSPHAERIDIA Eisenack, 1958c, p.2. Emendations: Downie and Sarjeant, 1963, p.94–95; Turner, 1984, p.116. Acritarch genus. For synonymy see Fensome et al. (1990, p.271–272). Type: Eisenack, 1958c, pl.2, fig.5, as *Leiosphaeridia baltica*.

"*asymmetrica*" Pocock, 1972, p.107, pl.26, figs.29–30. Holotype: Pocock, 1972, pl.26, fig.29; Fauconnier and Masure, 2004, pl.63, fig.15. **NOW** *Pilosidinium*. Originally *Leiosphaeridia*, subsequently *Sentusidinium*, thirdly (and now) *Pilosidinium*. Taxonomic junior synonym: *Sentusidinium* (as *Pilosidinium*) *fibrosum*, according to Courtinat in Fauconnier and Masure, 2004, p.447. Age: late Bajocian–early Bathonian.

"*chytrooides*" Sarjeant, 1962a, p.493, pl.70, figs.13,16. Emendation: Davey, 1979d, as *Chytroeisphaeridia chytrooides*. Holotype: Sarjeant, 1962a, pl.70, fig.13. **NOW** *Chytroeisphaeridia*. Originally *Leiosphaeridia* subgenus *Chytroeisphaeridia*, subsequently (and now) *Chytroeisphaeridia*. Age: Oxfordian.

"*ovata*" Wilson, 1967b, p.230, figs.23–26. Holotype: Wilson, 1967b, fig.23. **NOW** *Palaeostomocystis* (Appendix A). Originally *Leiosphaeridia*, subsequently (and now) *Palaeostomocystis* (Appendix A). Age: Maastrichtian (see Wilson, 1972).

"*scrobiculata*" (Deflandre and Cookson, 1955, p.291, pl.3, fig.3; text-fig.57) Rossignol, 1964, p.92–94. Holotype: Deflandre and Cookson, 1955, pl.3, fig.3. **NOW** *Pyxidiella?*. Originally *Leiosphaera* (Appendix A), subsequently *Pyxidiella*, thirdly *Leiosphaeridia*, fourthly *Palaeostomocystis* (Appendix A), fifthly (and now) *Pyxidiella?*, sixthly *Batiacasphaera*. Age: Santonian–Eocene.

"*similis*" Cookson and Eisenack, 1960b, p.254, pl.38, fig.14. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.14. **NOW** *Nummus* (Appendix A). Originally *Leiosphaeridia*, subsequently (and now) *Nummus* (Appendix A). Age: Tithonian.

"*trematophora*" Cookson and Eisenack, 1967a, p.136, pl.19, fig.13. Holotype: Cookson and Eisenack, 1967a, pl.19, fig.13. **NOW** *Cyclopsiella*. Originally *Leiosphaeridia*, subsequently (and now) *Cyclopsiella*. Age: late Eocene.

"**LEIOSPHAERIDIA** subgenus **CHYTROEISPHAERIDIA**" Sarjeant, 1962a, p.492. **NOW** *Chytroeisphaeridia*. Originally *Leiosphaeridia* subgenus *Chytroeisphaeridia*, subsequently (and now) *Chytroeisphaeridia*. Type: Sarjeant, 1962a, pl.70, fig.13, as *Leiosphaeridia* subgenus *Chytroeisphaeridia chytrooides*.

LEPTODERMELLA von Höhnel 1915, p.212. A fungal genus.

"*maastrichtiensis*" Visser, 1951, p.211, pl.7, fig.13. Holotype: Visser, 1951, pl.7, fig.13. **NOW** *Inocardion*. Originally *Leptodermella*, subsequently *Bonetocardiella*, thirdly and now *Inocardion*. Taxonomic junior synonym: *Stomiosphaera cardiiformis* (name not validly published), according to Villain (1975, p.198). Age: Maastrichtian.

LIMBICYSTA Marshall, 1989, p.28–32. Acritarch genus. Taxonomic junior synonyms: *Fentonia* (Appendix A), according to MacRae et al. (1996, p.1479); and *Neofentonia* (Appendix A), which is a nomenclatural junior synonym of *Fentonia*. Type: Marshall, 1989, pl.1, figs.1–5, as *Limbicysta pediformis*.

bjaerkei (Smelror, 1987, p.227,230, figs.4G,8C–D; text-fig.9) MacRae et al., 1996, p.1481. Emendation: Bailey and Hogg, 1995, p.58, as *Fentonia bjaerkei*. Holotype: Smelror, 1987, fig.4G. Originally *Parvocysta*, subsequently *Fentonia*, thirdly (and now) *Limbicysta* (Appendix A), fourthly *Neofentonia* (generic name illegitimate; Appendix A). Age: late Callovian.

LOPHODICTYOTIDIUM Pocock, 1972, p.109. Acritarch genus. Type: Pocock, 1972, pl.25, fig.5, as *Lophodictyotidium sarjeantii*.

**sarjeantii* Pocock, 1972, p.109, pl.25, fig.5. Holotype: Pocock, 1972, pl.25, fig.5. Although the holotype appears to be tabulate, Jansonius in Lentin and Williams (1989, p.231) indicated that this is not a dinoflagellate. Age: late Bajocian.

LOPHOSPHAERIDIUM Timofeev, 1959, p.29 ex Downie, 1963, p.630. Emendation: Lister, 1970, p.61. Acritarch genus. For full details, see Fensome et al. (1990, p.301). Type: Timofeev, 1959, pl.2, fig.5, as *Lophosphaeridium rarum*.

"*microspinosum*" (Eisenack, 1954a, p.209–210, pl.1, fig.8) Downie, 1963, p.631. Holotype: Eisenack, 1954a, pl.1, fig.8. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Lophosphaeridium*, fourthly *Visbysphaera* (Appendix A), fifthly *Buedingiisphaeridium* (combination not validly published, Appendix A). Taxonomic junior synonym: *Baltisphaeridium listeri* Kiryanov, 1978, according to Le Hérissé (1989, p.210). Age: Silurian (late Llandovery).

MATHUROSPHAERA Varma and Dangwal, 1964, p.70. Acritarch genus. Type: Varma and Dangwal, 1964, pl.2, figs.11–12, as *Mathurophaera rajivii*.

**rajivii* Varma and Dangwal, 1964, p.70, pl.2, figs.11–12. Holotype: Varma and Dangwal, 1964, pl.2, figs.11–12. Age: Eocene–Oligocene.

MESOCENA Ehrenberg 1843c, p.401. A dictyophycean genus.

?*heptagonus* Ehrenberg, 1843c, p.417, pl.1, section 3, fig.26. Holotype: Ehrenberg, 1843c, p.417, pl.1, section 3, fig.26. Originally *Mesocena*?, subsequently (and now) *Actiniscus*? Questionable assignment: Ehrenberg 1843c, p.417. Age: Pliocene.

MICRHYSTRIDIUM Deflandre, 1937b, p.79. Emendations: Staplin, 1961, p.408; Sarjeant, 1967c, p.204; Lister, 1970, p.77; Sarjeant and Stancliffe, 1994, p.12. Acritarch genus. Taxonomic junior synonym: *Solisphaeridium* (Appendix A), according to Sarjeant and Stancliffe (1994, p.12) — however, Moczyłowska (1998, p.98) retained *Solisphaeridium*. For further synonymy, see Fensome et al. (1990, p.315) and Sarjeant and Stancliffe (1994, p.12). Type: Deflandre, 1937b, pl.12 (al. pl.9), fig.11, as *Micrhystridium inconspicuum*.

"ambiguum" Deflandre, 1937b, p.81, pl.16 (al. pl.13), figs.8–9. Holotype: Deflandre, 1937b, pl.16 (al. pl.13), fig.8; Fauconnier and Masure, 2004, pl.71, figs.6–7. **NOW** *Sepispinula?*. Originally *Micrhystridium*, subsequently *Cleistosphaeridium*, thirdly *Polysphaeridium*, fourthly *Chlamydochorella*, fifthly *Dapsilidinium*, sixthly *Gorgonisphaeridium* (Appendix A), seventhly (and now) *Sepispinula?*. Taxonomic junior synonyms: *Hystrichosphaeridium* (now *Sepispinula?*) *huguoniotii*, according to Clarke and Verdier (1967, p.54) and *Hystrichosphaeridium* (now *Sepispinula*) *ancoriferum*, both according to Yun Hyesu (1981, p.44) and Schiøler and Wilson (1998, p.328) — however, Masure in Fauconnier and Masure (2004, p.499–500) retained *Sepispinula ancorifera* and *Sepispinula? huguoniotii*. Age: Late Cretaceous.

clavicularum (Deflandre, 1939a, p.191–192, pl.10, fig.4) Sarjeant and Stancliffe, 1994, p.16. Emendation: Sarjeant, 1968, p.223, as *Solisphaeridium clavicularum*. Holotype: Deflandre, 1939a, pl.10, fig.4. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium* (Appendix A), fourthly (and now) *Micrhystridium*. Age: Late Jurassic.

"diploporum" (Eisenack, 1951, p.190–191, pl.2, fig.6) Downie and Sarjeant, 1963, p.90. Holotype: Eisenack, 1951, pl.2, fig.6. **Name not validly published**: basionym not fully referenced. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Micrhystridium*, thirdly (and now) *Baltisphaeridium* (Appendix A). Age: Ordovician (erratic).

"fucosum" Valensi, 1955a, p.40; text-fig.2b. Holotype: Valensi, 1955a, text-fig.2b; Fauconnier and Masure, 2004, pl.52, figs.8–11. **NOW** *Litosphaeridium*. Originally *Micrhystridium*, subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium?*, fourthly *Dapsilidinium?*, fifthly (and now) *Litosphaeridium*. Taxonomic junior synonyms (at specific rank): *Hystrichosphaeridium tubiferum* subsp. *brevispinum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.190) retained *Hystrichosphaeridium tubiferum* subsp. *brevispinum*; *Hystrichosphaeridium* (as and now *Litosphaeridium*) *arundum*, according to Below (1982c, p.29) — however, Lentin and Williams (1985, p.227) retained *Litosphaeridium arundum*. Age: Late Cretaceous.

"hamatum" (Downie, 1958, p.335, pl.16, fig.1; text-figs.2j–k) Deflandre and Deflandre-Rigaud, 1965, fiche 2248. Holotype: Downie, 1958, pl.16, fig.1. **NOW** *Baltisphaeridium hamatum* (Appendix A). Originally *Hystrichosphaeridium hirsutoides* var. *hamatum*, subsequently *Baltisphaeridium hirsutoides* var. *hamatum* (Appendix A), thirdly *Micrhystridium hamatum*, fourthly *Acanthodiacrodium hamatum* (Appendix A), fifthly (and now) *Baltisphaeridium hamatum* (Appendix A). Age: Early Ordovician.

***inconspicuum** Deflandre, 1935, p.233, pl.9, figs.11–12 ex Deflandre, 1937b, p.80. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), fig.11. Originally *Hystrichosphaera* (name not validly published), subsequently (and now) *Micrhystridium*. The name *Hystrichosphaera inconspicua* was not validly published in Deflandre (1935) since the generic name *Hystrichosphaera* was not validly published until 1937, and additionally since no holotype was designated, a requirement of the I.C.Z.N. at that time. Age: Late Cretaceous.

"longispinosum" (Eisenack, 1931, p.110–111, pl.5, figs.6–17 ex Wetzel, 1933b, p.44) Cramer et al., 1979, p.42. Holotype: Eisenack, 1931, pl.5, fig.10, lost according to Eisenack (1959, p.194). Neotype: Eisenack, 1959, pl.15, fig.1, designated by Eisenack (1959, p.194). **Combination not validly published**: basionym not fully referenced. **NOW** *Baltisphaeridium longispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *longispinosum* (name not validly published; Appendix A), subsequently *Hystrichosphaera longispinosa* (name not validly published), thirdly *Hystrichosphaeridium longispinosum*, fourthly (and now) *Baltisphaeridium longispinosum* (Appendix A), fifthly *Micrhystridium longispinosum* (name not validly published). Age: Ordovician (early Caradoc).

lucidum (Deunff, 1959, p.25–26, pl.9, figs.80,82–83,85–89) Sarjeant and Stancliffe, 1994, p.17. Holotype: Deunff, 1959, pl.9, fig.82. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium* (Appendix A), fourthly (and now) *Micrhystridium*. Age: Ordovician (Caradoc).

"nanus" (Deflandre, 1945a, p.62–63, pl.1, figs.5–7) Deflandre and Deflandre-Rigaud, 1965, fiche 2296. Holotype: Deflandre, 1945a, pl.1, figs.5–6. **NOW** *Polygonium nanus* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* var. *nanus*, subsequently *Baltisphaeridium brevispinosum* var. *nanus* (combination not validly published, Appendix A), thirdly *Baltisphaeridium nanus* (Appendix A), fourthly *Micrhystridium nanus*, fifthly (and now) *Polygonium nanus* (Appendix A), sixthly *Solisphaeridium nanus* (Appendix A). Taxonomic junior synonym:

Baltisphaeridium brevispinosum var. *wenlockense* (subsequently *Salopidium wenlockense*) Downie, 1959, an acritarch taxon, according to Lister (1970, p.54). N.I.A. Age: Silurian.

"?*oceaniae*" de Coninck, 1969, p.60, pl.17, figs.12–21. Holotype: de Coninck, 1969, pl.17, figs.20–21. **NOW** *Surculosphaeridium*?. Originally *Micrhystridium*, subsequently *Surculosphaeridium*, thirdly (and now) *Surculosphaeridium*?. Questionable assignment: de Coninck (1969, p.60). Age: Ypresian.

"*paulinae*" Valensi, 1953, p.48, pl.12, fig.6. Holotype: Valensi, 1953, pl.12, fig.6. **NOW** *Dapsilidinium*?. Originally *Micrhystridium*, subsequently *Hystrichosphaeridium*, thirdly *Polysphaeridium*?, fourthly (and now) *Dapsilidinium*?. Age: Middle Jurassic.

"*picoricum*" Cramer, 1964, p.303, pl.11, figs.1–3; text-fig.24. Holotype: Cramer, 1964, pl.11, fig.2. Originally *Micrhystridium*, subsequently *Multiplicisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published). **Taxonomic senior synonym:** *Baltisphaeridium* (now *Multiplicisphaeridium*) *cladum* Downie, 1963, an acritarch species, according to Colbath (1979, p.20–21). Age: Devonian (middle Siegenian–Emsian).

"*pumile*" (Wetzel, 1933b, p.44, pl.4, fig.24 ex Deflandre, 1937b, p.78) Downie and Sarjeant, 1965, p.133. Holotype: Wetzel, 1933b, pl.4, fig.24. **NOW** *Diacrocanthidium?* *pumile* (Appendix A). Originally *Hystrichosphaera longispinosa* forma *pumilis* (name not validly published), subsequently *Hystrichosphaeridium pumile*, thirdly *Baltisphaeridium pumile* (combination not validly published, Appendix A), fourthly *Micrhystridium pumile*, fifthly (and now) *Diacrocanthidium?* *pumile* (Appendix A). Age: Late Cretaceous (erratic).

?*seminudum* (Wetzel, 1952, p.405; text-fig.26) Sarjeant and Stancliffe, 1994, p.18. Holotype: Wetzel, 1952; text-fig.26. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium* (Appendix A), fourthly (and now) *Micrhystridium*. Questionable assignment: Sarjeant and Stancliffe (1994, p.18). Age: Danian.

"*singulare*" Firtion, 1952, p.160, pl.8, figs.1–2. Holotype: Firtion, 1952, pl.8, figs.1–2. **NOW** *Raphidodinium*?. Originally *Micrhystridium*, subsequently *Veryhachium* (Appendix A), thirdly (and now) *Raphidodinium*?. Taxonomic junior synonym: *Baltisphaeridium crameri* Singh, 1971, an acritarch species, according to Burger (1980a, p.91). Age: early Cenomanian.

stimuliferum (Deflandre, 1939a, p.192, pl.10, fig.10) Sarjeant and Stancliffe, 1994, p.18. Holotype: Deflandre, 1939a, pl.10, fig.10. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium* (Appendix A), fourthly *Filisphaeridium* (combination not validly published, Appendix A), fifthly (and now) *Micrhystridium*. This combination was not validly published in Cramer and Diez (1979, p.52) since these authors did not fully reference the basionym. Age: Late Jurassic.

?subsp. *complanatum* (Wetzel, 1952, p.404–405, pl.A, figs.11a–b) Sarjeant and Stancliffe, 1994, p.18. Emendation: Sarjeant, 1984c, p.142, as *Solisphaeridium stimuliferum* subsp. *complanatum* (Appendix A). Holotype: Wetzel, 1952, pl.A, figs.11a–b; Sarjeant, 1984c, pl.4, fig.6; text-fig.13. Originally *Hystrichosphaeridium oligacanthum* subsp. *complanatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *complanatum* (Appendix A), thirdly *Cleistosphaeridium?* *oligacanthum* subsp. *complanatum*, fourthly *Solisphaeridium stimuliferum* subsp. *complanatum*, fifthly (and now) *Micrhystridium stimuliferum?* subsp. *complanatum*. Questionable assignment: Sarjeant and Stancliffe (1994, p.18). Age: Paleocene.

subsp. *stimuliferum*. Autonym. Holotype: Deflandre, 1939a, pl.10, fig.10. Originally *Solisphaeridium stimuliferum* subsp. *stimuliferum*, subsequently *Micrhystridium stimuliferum* subsp. *stimuliferum*.

"*suemegense*" Góczán, 1962, p.192, pl.2, figs.12–14. Holotype: Góczán, 1962, pl.2, figs.12–14. **NOW** *Chlamydophorella*?. Originally *Micrhystridium*, subsequently (and now) *Chlamydophorella*?. Age: early Aptian.

"*trispinosum*" (Eisenack, 1938a, p.14,16, text-figs.2–3) Eisenack et al., 1979, p.499. Emendation: Stancliffe and Sarjeant, 1994, p.233, as *Veryhachium trispinosum*. Holotype: Eisenack, 1938a, text-fig.2, lost according to Eisenack et al. (1979, p.499). Neotype: Deunff, 1980, pl.1, fig.7, designated by Stancliffe and Sarjeant (1994,

p.233). **Combination not validly published**: the combination was not intended. **NOW** *Veryhachium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Veryhachium* (Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly *Micrhystridium* (combination not validly published). Taxonomic junior synonyms: *Veryhachium cucruse* Timofeev, 1962, an acritarch species, according to Martin (1969, p.106) and *Veryhachium arctatum* Deunff, 1981, *Veryhachium concavum* Piskun, 1974a, *Veryhachium edenense* Colbath, 1979, *Veryhachium microgranuliferum* Piskun, 1974a and *Hystrichosphaeridium* (subsequently *Veryhachium*) *trisulcum*, all acritarch species, and all according to Stancliffe and Sarjeant (1994, p.233). Age: Silurian (erratic).

"*tubulatum*" Menéndez, 1965, p.13, pl.2, fig.7; pl.3, fig.17. Holotype: Menéndez, 1965, pl.2, fig.7. **NOW** *Oligosphaeridium*?. Originally *Micrhystridium*, subsequently (and now) *Oligosphaeridium*?. Age: Oligocene.

"*uncinatum*" (Downie, 1958, p.337; text-fig.2a) Cramer, 1970, p.107. Holotype: Downie, 1958, text-fig.2a. **NOW** *Stellechinatum uncinatum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum* (Appendix A), thirdly *Baltisphaeridium uncinatum* (Appendix A), fourthly *Micrhystridium uncinatum*, fifthly *Goniosphaeridium uncinatum* (Appendix A), sixthly *Polygonium uncinatum* (Appendix A), seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published, Appendix A), eighthly (and now) *Stellechinatum uncinatum* (Appendix A). Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

"*veligerum*" Deflandre, 1937b, p.81, pl.12 (al. pl.9), fig.9. Emendations: Lejeune-Carpentier, 1943, B24–B25, as *Ceratocorys veligera*; Lejeune-Carpentier and Sarjeant, 1983, p.5–6, as *Rhiptocorys veligera*. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), fig.9; Fensome et al., 1995, fig.1 — p.1885. **NOW** *Rhiptocorys*. Originally *Micrhystridium*, subsequently *Ceratocorys* (Appendix B), thirdly *Microdinium*, fourthly *Microdinium*?, fifthly (and now) *Rhiptocorys*, sixthly *Phanerodinium*, seventhly *Phanerodinium*?. Taxonomic junior synonyms: *Microdinium irregulare* and *Ceratocorys* (as *Microdinium*; now *Rhiptocorys*) *smolenskiensis*, both according to Below (1987b, p.56) — however, Lentin and Vozzhennikova (1990, p.112) retained *Ceratocorys* (as *Rhiptocorys*) *smolenskiensis*. Age: Senonian.

MIRIFICYSTA Yu Jingxian, 1982, p.237–238. Acritarch genus. Type: Yu Jingxian, 1982, pl.1, fig.20, as *Mirificysta lineata*.

**lineata* Yu Jingxian, 1982, p.238, pl.1, fig.20; text-fig.3. Holotype: Yu Jingxian, 1982, pl.1, fig.20. Age: Late Jurassic–Early Cretaceous.

MULTIPLICISPHAERIDIUM Staplin, 1961, p.410. Emendations: Staplin et al., 1965, p.180; Eisenack, 1969a, p.258; Lister, 1970, p.83–86; Turner, 1984, p.120; Eiserhardt, 1992, p.49; Sarjeant and Vavrdova, 1997, p.2–3. Acritarch genus. For synonymy see Fensome et al. (1990, p.338–339). Type: Staplin, 1961, pl.48, fig.24, as *Multiplicisphaeridium ramispinosum*.

"*borracherosum*" (Cramer, 1964, p.289, pl.1, fig.11; text-fig.16, no.6) Eisenack et al., 1973, p.543–544. Holotype: Cramer, 1964, pl.1, fig.11. **NOW** *Petaloferidium* (Appendix A). Originally *Baltisphaeridium* (Appendix A), subsequently *Multiplicisphaeridium*, thirdly *Hystrichosphaeridium* (combination not validly published), fourthly (and now) *Petaloferidium* (Appendix A). This combination was not validly published in Lister (1970, p.84) since that author did not clearly use the name *Multiplicisphaeridium borracherosum*. Age: Silurian (Ludlow).

"*brevifurcatum*" (Eisenack, 1954a, p.207–208, pl.1, fig.2; text-fig.2) Eisenack et al., 1973, p.547–548. Holotype: Eisenack, 1954a, pl.1, fig.2. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium*. Age: Silurian (late Llandovery).

coniferum (Sannemann, 1955, p.327, pl.4, fig.2; text-figs.4a–b) Eisenack et al., 1973, p.567. Holotype: Sannemann, 1955, pl.4, fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now)

Multiplicisphaeridium. Sarjeant and Vavrdova (1997, p.6) considered this species to represent muellerisphaerids. Age: Devonian (late Givetian).

consonum (Sannemann, 1955, p.332, pl.5, fig.7) Eisenack et al., 1973, p.569–570. Holotype: Sannemann, 1955, pl.5, fig.7. Originally *Hystrichosphaeridium trifurcatum* subsp. *consonum*, subsequently *Baltisphaeridium trifurcatum* subsp. *consonum* (Appendix A), thirdly (and now) *Multiplicisphaeridium consonum*. Sarjeant and Vavrdova (1997, p.6) considered this species to represent muellerisphaerids. Age: Devonian (late Givetian).

?cruciatum (Wetzel, 1933b, p.94–95, pl.4, fig.30 ex Lejeune-Carpentier, 1940, p.B222) Stancliffe and Sarjeant, 1994, p.235. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.22–23, as *Veryhachium cruciatum*. Holotype: Wetzel, 1933b, pl.4, fig.30. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Veryhachium* (Appendix A), fifthly (and now) *Multiplicisphaeridium?*. Questionable assignment: Stancliffe and Sarjeant (1994, p.235). The name *Hystrichosphaera cruciata* was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. Age: Late Cretaceous.

"digitatum" (Eisenack, 1938a, p.20–22, pl.4, figs.3–5; text-fig.7) Eisenack, 1969a, p.259. Holotype: Eisenack, 1938a, pl.4, fig.3, lost according to Eisenack (1959, p.200). Neotype: Eisenack, 1959, pl.16, fig.11, designated by Eisenack (1959, p.200). **NOW** *Hoegklintia* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium*, fourthly (and now) *Hoegklintia* (Appendix A). Age: Ordovician (erratic).

eisenackii (Sannemann, 1955, p.327–328, pl.4, figs.10–12; text-figs.8a–d) Eisenack et al., 1973, p.615. Holotype: Sannemann, 1955, pl.4, fig.10. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Multiplicisphaeridium*. Sarjeant and Vavrdova (1997, p.6) considered this species to represent muellerisphaerids. Age: Devonian (late Givetian).

"eoplanktonicum" (Eisenack, 1955, p.178–179, pl.4, fig.14) Lister, 1970, p.89. Holotype: Eisenack, 1955, pl.4, fig.14. **NOW** *Oppilatala* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium*, fourthly (and now) *Oppilatala* (Appendix A). Taxonomic junior synonym: *Multiplicisphaeridium septispinosum* Lister, 1970, an acritarch species, according to Eisenack et al. (1973, p.617). Age: late Ludlow.

"erraticum" (Eisenack 1954a, p.209, pl.1, figs.6–7; text-fig.7) Eisenack et al., 1973, p.621–622. Holotype: Eisenack, 1954a, pl.1, fig.6. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium*. Age: Silurian (late Ludlow).

"gotlandicum" (Eisenack, 1954a, p.209, pl.1, fig.5; text-fig.6) Eisenack et al., 1973, p.651–652. Holotype: Eisenack, 1954a, pl.1, fig.5. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium*, fourthly (and now) *Visbysphaera* (Appendix A). Taxonomic junior synonym: *Baltisphaeridium peltatum* Cramer, 1966, an acritarch species, according to Cramer (1970, p.157). Age: Silurian (late Llandovery).

integrum (Sannemann, 1955, p.329, pl.5, fig.12; text-fig.12) Eisenack et al., 1973, p.661. Holotype: Sannemann, 1955, pl.5, fig.12. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Multiplicisphaeridium*. Sarjeant and Vavrdova (1997, p.6) considered this species to represent muellerisphaerids. Age: Devonian (late Givetian).

"lewisii" (Deunff, 1954a, p.240, fig.3) Elaouad-Debbaj, 1981, p.45. Holotype: Deunff, 1954a, fig.3. **NOW** *Gorgonisphaeridium?* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Ammonidium* (combination not validly published, Appendix A), fourthly *Multiplicisphaeridium*, fifthly (and now) *Gorgonisphaeridium?* (Appendix A). Age: Middle Devonian.

"malum" (Cramer, 1964, p.297, pl.1, figs.6,8,10; text-fig.19, nos.10–12) Eisenack et al., 1973, p.677–678. Holotype: Cramer, 1964, pl.1, fig.8. **NOW** *Rhacobrachion* (Appendix A). Originally *Baltisphaeridium* (Appendix

A), subsequently *Evittia* Brito (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published), fourthly *Multiplicisphaeridium*, fifthly (and now) *Rhacobranchion* (Appendix A). Age: Silurian (Ludlow).

"**meson**" (Eisenack, 1955, p.179) Eisenack et al., 1973, p.681–682. Holotype: Eisenack, 1954a, pl.1, fig.3. **NOW** *Visbysphaera mesa* (Appendix A). Originally *Hystrichosphaeridium intermedium* (name illegitimate), subsequently *Hystrichosphaeridium meson*, thirdly *Baltisphaeridium meson* (Appendix A), fourthly (and now) *Visbysphaera mesa* (Appendix A), fifthly *Multiplicisphaeridium meson*. *Hystrichosphaeridium meson* is the substitute name for *Hystrichosphaeridium intermedium* Eisenack, 1954a, p.208, pl.1, figs.3,9; text-figs.3–4 (an illegitimate name). Taxonomic junior synonym: *Baltisphaeridium* (subsequently *Multiplicisphaeridium micropilare*) Cramer, 1970, an acritarch species, according to Ye Xiaorong (1984, p.42). Age: Silurian (late Llandovery–late Ludlow).

"**?mutabile**" (Sannemann, 1955, p.331, pl.5, figs.5–6; text-figs.17a–d) Eisenack et al., 1973, p.699–700. Holotype: Sannemann, 1955, pl.5, fig.5. **NOW** *Aldridgeisphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium?*, fourthly (and now) *Aldridgeisphaera* (Appendix A). Questionable assignment: Eisenack et al. (1973, p.699). Age: Devonian (late Givetian).

"**oligofurcatum**" (Eisenack, 1954a, p.208–209, pl.1, fig.4; text-fig.5) Eisenack et al., 1973, p.703–704. Holotype: Eisenack, 1954a, pl.1, fig.4; text-fig.5. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Visbysphaera* (Appendix A), fourthly *Multiplicisphaeridium*. Age: Silurian (late Llandovery).

"**picoricum**" (Cramer, 1964, p.303–304, pl.11, figs.1–3; text-fig.24) Lister, 1970, p.92. Holotype: Cramer, 1964, pl.11, fig.2. Originally *Micrhystridium* (Appendix A), subsequently *Multiplicisphaeridium*, thirdly *Hystrichosphaeridium* (combination not validly published). **Taxonomic senior synonym:** *Baltisphaeridium* (now *Multiplicisphaeridium*) *cladum* Downie, 1963, an acritarch species, according to Colbath (1979, p.20). Age: Devonian (middle Siegenian–Emsian).

"**piriferum**" (Eisenack, 1954a, p.206–207, pl.1, figs.1a–b; text-fig.1) Eisenack et al., 1973, p.737–739. Holotype: Eisenack, 1954a, pl.1, figs.1a–b. **NOW** *Visbysphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium*, fourthly (and now) *Visbysphaera* (Appendix A). Taxonomic junior synonyms: *Baltisphaeridium hermosum* Cramer and Diez, 1968 (name not validly published), an acritarch species, according to Cramer (1970, p.148); *Baltisphaeridium* (now *Visbysphaera*) *dilatipinosum*, according to Eisenack (1965c, p.263) — however, Fensome et al. (1990, p.530) retained *Baltisphaeridium* (now *Visbysphaera*) *dilatipinosum*. Age: Silurian (late Llandovery).

"**procerum**" (Sannemann, 1955, p.332, pl.5, fig.8; text-fig.18) Eisenack et al., 1973, p.743–744. Holotype: Sannemann, 1955, pl.5, fig.8. Originally *Hystrichosphaeridium trifurcatum* subsp. *procerum*, subsequently *Baltisphaeridium trifurcatum* subsp. *procerum* (Appendix A), thirdly (and now) *Multiplicisphaeridium procerum*. Sarjeant and Vavrdova (1997, p.6) considered this species to represent muellerisphaerids. Age: Devonian (late Givetian).

"**ramusculosum**" (Deflandre, 1945a, p.63, pl.1, figs.8–16; text-figs.38–39) Lister, 1970, p.92. Emendation: Lister, 1970, p.92–93, as *Multiplicisphaeridium ramusculosum*. Holotype: Deflandre, 1945a, pl.1, figs.8–10. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Evittia* Brito (combination not validly published, Appendix A), fourthly (and now) *Multiplicisphaeridium*, fifthly *Peteinosphaeridium* (combination not validly published, Appendix A), sixthly *Oppilatala* (Appendix A). Sarjeant and Vavrdova (1997, p.6) retained this species in *Multiplicisphaeridium*. Age: Silurian.

var. **macrocladum** (Deunff, 1955, p.146, text-fig.21) Williams et al., 1998, p.698. Holotype: Deunff, 1955, text-fig.21. Originally *Hystrichosphaeridium ramusculosum* var. *macrocladum*, subsequently *Baltisphaeridium ramusculosum* var. *macrocladum*, thirdly *Multiplicisphaeridium ramusculosum* var. *macrocladum* (combination not validly published), fourthly *Oppilatala ramusculosum* var. *macrocladum*, fifthly (and now) *Multiplicisphaeridium ramusculosum* var. *macrocladum*. This combination was not validly published in Eisenack et al. (1973, p.759), since those authors did not specify the taxonomic rank. Age: Middle Devonian.

var. **ramusculosum**. Autonym. Holotype: Deflandre, 1945a, pl.1, figs.8–10. Originally *Hystrichosphaeridium ramusculosum* var. *ramusculosum*, subsequently *Baltisphaeridium ramusculosum* var. *ramusculosum* (Appendix A), thirdly *Oppilatala ramusculosa* var. *ramusculosa*, fourthly (and now) *Multiplicisphaeridium ramusculosum* subsp. *ramusculosum*.

"**robustum**" (Sannemann, 1955, p.331, pl.1, figs.6,8–9; pl.6, figs.7–9; text-figs.13,14a–c) Eisenack et al., 1973, p.779. Holotype: Sannemann, 1955, pl.6, fig.7. **NOW** *Aldridgeisphaera?* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (combination illegitimate, Appendix A), thirdly *Multiplicisphaeridium*, fourthly (and now) *Aldridgeisphaera?* (Appendix A). Age: Devonian (late Givetian).

"subsp. **fissum**" (Sannemann, 1955, p.331, pl.6, fig.9; text-figs.14a–c) Fensome et al., 1990, p.355. Holotype: Sannemann, 1955, pl.6, fig.9. **NOW** *Aldridgeisphaera? robusta* subsp. *fissa* (Appendix A). Originally *Hystrichosphaeridium robustum* subsp. *fissum*, subsequently *Baltisphaeridium robustum* subsp. *fissum* (combination illegitimate, Appendix A), thirdly *Multiplicisphaeridium robustum* subsp. *fissum*, fourthly (and now) *Aldridgeisphaera? robusta* subsp. *fissa* (Appendix A). This combination was not validly published in Eisenack et al. (1973, p.781) since these authors did not clearly indicate the taxonomic rank. Age: Devonian (late Givetian).

"subsp. **robustum**". Autonym. Holotype: Sannemann, 1955, pl.6, fig.7. **NOW** *Aldridgeisphaera? robusta* subsp. *robusta* (Appendix A). Originally *Hystrichosphaeridium robustum* subsp. *robustum*, subsequently *Multiplicisphaeridium robustum* subsp. *robustum*, thirdly (and now) *Aldridgeisphaera? robusta* subsp. *robusta* (Appendix A).

"**spiciferum**" (Deunff, 1955, p.146, pl.3, fig.1; text-fig.26) Eisenack et al., 1973, p.801. Holotype: Deunff, 1955, pl.3, fig.1. **NOW** *Stellechinatum* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly *Evittia Brito* (combination not validly published, Appendix A), fifthly *Multiplicisphaeridium*, sixthly (and now) *Stellechinatum* (Appendix A). Age: Middle Devonian.

"**toyetae**" (Cramer, 1964, p.302, pl.1, figs.14–15; text-fig.22, nos.7–7a) Eisenack et al., 1973, p.815–816. Holotype: Cramer, 1964, pl.1, fig.15. **NOW** *Florisphaeridium* (Appendix A). Originally *Baltisphaeridium* (Appendix A), subsequently *Multiplicisphaeridium?*, thirdly *Hystrichosphaeridium*, fourthly (and now) *Florisphaeridium* (Appendix A). Questionable assignment: Eisenack et al. (1973, p.815). Age: Devonian (middle Siegenian–Emsian).

"**venustum**" (Sannemann, 1955, p.345, pl.5, fig.11; text-fig.15) Eisenack et al., 1973, p.827. Holotype: Sannemann, 1955, pl.5, fig.11. **NOW** *Hapsidopalla* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium*, fourthly (and now) *Hapsidopalla* (Appendix A). Sarjeant and Vavrdova (1997, p.6) postulated that this species may be a muellerisphaerid. Age: Devonian (late Givetian).

"**vestitum**" (Deflandre, 1939a, p.189–190, pl.11, figs.4–6) Pocock, 1972, p.116. Emendation: Sarjeant, 1960b, p.397, as *Baltisphaeridium vestitum*. Holotype: Deflandre, 1939a, pl.11, fig.5; Fauconnier and Masure, 2004, pl.74, figs.11–12. **NOW** *Surculosphaeridium?*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Surculosphaeridium*, fourthly (and now) *Surculosphaeridium?*, fifthly *Multiplicisphaeridium?*, sixthly *Systematophora*. Questionable assignment: Pocock (1972, p.116). Taxonomic junior synonym: *Polystephanosphaera valensii*, according to Courtinat (1989, p.173) — however, Stancliffe and Sarjeant (1990, p.209) retained *Polystephanosphaera* (as and now *Systematophora*) *valensii*. Age: Jurassic (Oxfordian).

NANNOBARBOPHORA Habib and Knapp, 1982, p.347. Emendation: Head, 2003b, p.383. Acritarch genus. Taxonomic junior synonym: *Svenkodinium*, according to Head (2003b, p.383). Type: Habib and Knapp, 1982, pl.4, figs.5–6, as *Nannobarbophora barbata*.

gedlii Head, 2003b, p.383,385, fig.2, nos.1–10. Holotype: Head, 2003b, fig.2, nos.1–4. Taxonomic junior synonyms: *Svenkodium versteeghii* (name not validly published) and *Svenkodium minimum* (name not validly published), both according to Head (2003b, p.383). Age: late early-middle Miocene.

walldalei Head, 1996a, p.565,567, fig.17. Holotype: Head, 1996a, fig.17. Taxonomic junior synonym: *Impletosphaeridium acropora*, according to Head and Westphal (1999, p.20). Age: early Pliocene–early Pleistocene.

NANNOCERATOPSIELLA Tasch, 1963, p.333. This genus is based on a mineral grain, according to Stover and Evitt (1978, p.265,295). Type: Tasch, 1963, pl.1, figs.4–6, as *Nannoceratopsiella permiana*.

**permiana* Tasch, 1963, p.333, pl.1, figs.4–6. Holotype: Tasch, 1963, pl.1, figs.4–6. This taxon is based on a mineral grain according to Stover and Evitt (1978, p.265). Age: Early Permian.

wellingtoniana (Tasch, 1963, p.336, pl.1, fig.9) Lentin and Williams, 1976, p.45. Holotype: Tasch, 1963, pl.1, fig.9. Originally *Deflandrea?*, subsequently (and now) *Nannoceratopsiella*. This taxon is based on a mineral grain, according to Stover and Evitt (1978, p.265). Age: Early Permian.

"**NEOFENTONIA**" Özdikmen, 2009, p.234. Acritarch genus. **Name illegitimate — nomenclatural senior synonym:** *Fentonia* (Appendix A), which has the same type. **Taxonomic senior synonym:** *Limbicysta* (Appendix A), which is now considered to be the senior synonym of *Fentonia*. Özdikmen (2009, p.234) considered *Fentonia* Bailey and Hogg, 1995 to be illegitimate because it is a junior homonym of *Fentonia* Butler, 1881; however, *Fentonia* Butler, 1881 is an animal and under the I.C.N. it does not pre-empt *Fentonia* Bailey and Hogg. In proposing *Neofentonia*, in the header for the relevant section Özdikmen (2009) misspelled the generic name as "*Noefentonia*", clearly intending it to be *Neofentonia*. Type: Smelror, 1987, fig.4G, as *Parvocysta bjaerkei*.

"**bjaerkei*" (Smelror, 1987, p.227,230, figs.4G,8C–D; text-fig.9) Özdikmen, 2009, p.235. Emendation: Bailey and Hogg, 1995, p.58, as *Fentonia bjaerkei*. Holotype: Smelror, 1987, fig.4G. **NOW** *Limbicysta* (Appendix A). Originally *Parvocysta*, subsequently *Fentonia* (Appendix A), thirdly (and now) *Limbicysta* (Appendix A), fourthly *Neofentonia* (generic name illegitimate; Appendix A). Although Özdikmen (2009) did not fully reference the basionym when proposing the transfer of this species to *Neofentonia*, he did so under the aegis of the I.C.Z.N., so the combination can be considered validly published. Age: late Callovian.

NUMMUS Morgan, 1975, p.163. Acritarch genus. Type: Morgan, 1975, pl.3, figs.1a–d, as *Nummus monoculatus*.

"*ambitomegasimilis*" Morgan in Riding and Helby, 2001d, p.102. **Name not validly published:** no description. **Taxonomic senior synonym:** *Nummus apiculus*, according to Riding and Helby (2001d, p.102).

apiculus Riding and Helby, 2001d, p.102,103, figs.21A–P. Holotype: Riding and Helby, 2001d, fig.21K. Taxonomic junior synonym: *Nummus ambitomegasimilis* (name not validly published), according to Riding and Helby (2001d, p. 102). N.I.A. Age: latest Bathonian–Callovian.

mallajoharensis Jain and Garg in Jain et al., 1984, p.72, pl.3, figs.59–61. Holotype: Jain et al., 1984, pl.3, fig.60. Age: Kimmeridgian–early Tithonian.

"*minisimilis*" Morgan in Riding and Helby, 2001g, p.214. **Name not validly published:** no description. **Taxonomic senior synonym:** *Nummus tithonicus*, according to Riding and Helby (2001g, p.214).

**monoculatus* Morgan, 1975, p.163, pl.3, figs.1a–d,4a–c. Holotype: Morgan, 1975, pl.3, figs.1a–d; Helby et al., 1987, fig.28I. Age: late Neocomian–Aptian.

parvus Backhouse, 1988, p.112, pl.43, figs.13–14,15a–b,16; text-fig.33C. Holotype: Backhouse, 1988, pl.43, fig.14; text-fig.33C. Age: late Valanginian–?early Aptian.

pentagonus Backhouse, 1988, p.112, pl.44, figs.1–4,5a–b,6–7; text-fig.33E. Holotype: Backhouse, 1988, pl.44, figs.5a–b; text-fig.33E. Age: Barremian–?early Aptian.

similis (Cookson and Eisenack, 1960b, p.254, pl.38, fig.14) Burger, 1980b, p.275. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.14. Originally *Leiosphaeridia* (Appendix A), subsequently (and now) *Nummus*. Age: Tithonian.

tithonicus Riding and Helby, 2001g, p.214, figs.18A–P. Holotype: Riding and Helby, 2001g, fig.18E. Taxonomic junior synonym: *Nummus minisimilis* (name not validly published), according to Riding and Helby (2001g, p.214). Age: Oxfordian–Berriasian.

OLLULA Góczán, 1962, p.194,200. Acritarch genus. Góczán (1962) originally considered this genus to be incertae sedis. The generic name *Ollula* and its "type species", *Ollula ollula*, were described under the I.C.Z.N. Thus, the generic name was available (i.e. validly published) as of 1962. However, under the I.C.N., the original name of the "type species" is an inadmissible tautonym and was replaced with *Ollula goczanii* by Loeblich Jr. and Loeblich III (1966, p.442). Type: Góczán, 1962, pl.3, figs.11–16, as *Ollula ollula*.

***goczanii** Loeblich Jr. and Loeblich III, 1966, p.442. Holotype: Góczán, 1962, pl.3, figs.11–16. Originally *Ollula ollula* (name inadmissible; Appendix A), subsequently (and now) *Ollula goczanii*. Substitute name for *Ollula ollula* Góczán, 1962, p.195,201, pl.3, figs.11–16 (an inadmissible name). Age: Cretaceous.

"**ollula**" Góczán, 1962, p.195,201; pl.3, figs.11–16. Holotype: Góczán, 1962, pl.3, figs.11–16. **Substitute name:** *Ollula goczanii*; the name *Ollula ollula*, since it is a tautonym, is inadmissible under the I.C.N. Originally *Ollula ollula* (name inadmissible), subsequently (and now) *Ollula goczanii*. The name of this species was originally established under the I.C.Z.N., according to which it is an available (i.e. validly published) name. However, under I.C.N. Article 23.4, the epithet is an invalid tautonym. Hence, Loeblich Jr. and Loeblich III (1966, p.42) erected the new name, *Ollula goczanii*, for this species. Age: Late Cretaceous.

OPPILATALA Loeblich Jr. and Wicander, 1976, p.19. Acritarch genus. Type: Loeblich Jr. and Wicander, 1976, pl.6, fig.13, as *Oppilatala vulgaris*.

eoplanktonica (Eisenack, 1955, p.178–179, pl.4, fig.14) Dorning, 1981, p.196. Holotype: Eisenack, 1955, pl.4, fig.14. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Oppilatala*. Taxonomic junior synonym: *Multiplicisphaeridium septispinosum* Lister, 1970, an acritarch species, according to Eisenack et al. (1973, p.617). Age: Silurian (late Ludlow).

"**ramusculosa**" (Deflandre, 1945a, p.63, pl.1, figs.8–16; text-figs.38–39) Dorning, 1981, p.196. Emendation: Lister, 1970, p.92–93, as *Multiplicisphaeridium ramusculosum*. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **NOW** *Multiplicisphaeridium*. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Evittia* Brito (combination not validly published, Appendix A), fourthly (and now) *Multiplicisphaeridium* (Appendix A), fifthly *Peteinosphaeridium* (combination not validly published, Appendix A), sixthly *Oppilatala*. Age: Silurian.

"var. **macroclada**" (Deunff, 1955, p.146; text-fig.21) Fensome et al., 1990, p.373. Holotype: Deunff, 1955, text-fig.21. **NOW** *Multiplicisphaeridium ramusculosum* var. *macrocladum*. Originally *Hystrichosphaeridium ramusculosum* var. *macrocladum*, subsequently *Baltisphaeridium ramusculosum* var. *macrocladum* (Appendix A), thirdly *Multiplicisphaeridium ramusculosum* var. *macrocladum* (combination not validly published, Appendix A), fourthly *Oppilatala ramusculosa* var. *macroclada*, fifthly (and now) *Multiplicisphaeridium ramusculosum* var. *macrocladum*. Age: Middle Devonian.

"var. **ramusculosa**". Autonym. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **NOW** *Multiplicisphaeridium ramusculosum* subsp. *ramusculosum*. Originally *Hystrichosphaeridium ramusculosum* var. *ramusculosum*, subsequently *Baltisphaeridium ramusculosum* var. *ramusculosum* (Appendix A), thirdly *Oppilatala*

ramusculosa var. *ramusculosa*, fourthly (and now) *Multiplicisphaeridium ramusculosum* subsp. *ramusculosum*.

OVOIDITES Potonié, 1951, p.151 ex Krutzsch, 1959, p.249–250. Zygnemataceous zygosporic genus. Type: Potonié, 1951, pl.21, fig.185, as *Ovoidites ligneolus*.

"**fragile**" Harris, 1965, p.97, pl.27, figs.4–5. Holotype: Harris, 1965, pl.27, fig.5. **NOW** *Cassidium*. Originally *Ovoidites*, subsequently (and now) *Cassidium*. Age: early Eocene.

"**OVUM**" Eisenack, 1931, p.110. **Name not validly published**: it coincides with a morphological term and is thus contrary to I.C.N. Article 20.2. "Ovum" is Latin for egg. According to Fensome et al. (1990, p.379): "In giving the heading '*Ova hispida* Lohm.', Eisenack (1931) was clearly referring to the inadmissible two-word, unhyphenated generic name *Ovum hispidum* ... apparently proposed by Lohmann (1904). However, by giving citations such as '*Ovum hispidum longispinosum* n. subsp.' it is clear that Eisenack (1931) considered *Ovum* to be a generic name and *Ovum hispidum* (plural: *Ova hispida*) to be a specific name. *Ovum hispidum* can thus be considered the single (and type) species assigned to *Ovum* by Eisenack (1931), a description being provided on his p.110. "Type species": *Ovum hispidum* Eisenack, 1931 (an invalid name)." Type: not designated.

"***hispidum**" Eisenack, 1931, p.110, pl.4, figs.16–23; pl.5, figs.3–24. Holotype: not designated. **Name not validly published**: generic name not validly published. See the discussion under the generic entry for *Ovum*. Age: Silurian.

"subsp. **bohemicum**" Eisenack, 1934, p.70–71, pl.5, fig.31. Holotype: Eisenack, 1934, pl.5, fig.31. **Name not validly published**: specific name is not validly published. **NOW** *Baltisphaeridium bohemicum* (Appendix A). Originally *Ovum hispidum* subsp. *bohemicum* (name not validly published), subsequently *Hystrichosphaeridium bohemicum*, thirdly (and now) *Baltisphaeridium bohemicum* (Appendix A). Age: Silurian.

"subsp. **brevispinosum**" Eisenack, 1931, p.111, pl.5, figs.3–5. Holotype: Eisenack, 1931, pl.5, fig.3, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197); lost according to Ribecai and Tongiorgi (1999, p.124). New Neotype: Eisenack, 1959, pl.15, fig.16, designated by Ribecai and Tongiorgi (1999, p.124). **Name not validly published**: specific name not validly published. **NOW** *Pachysphaeridium brevispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *brevispinosum* (name not validly published), subsequently *Hystrichosphaeridium brevispinosum*, thirdly *Baltisphaeridium brevispinosum* (Appendix A), fourthly *Buedingiisphaeridium brevispinosum* (combination not validly published, Appendix A), fifthly (and now) *Pachysphaeridium brevispinosum* (Appendix A). Age: Silurian.

"subsp. **bulbosum**" (Ehrenberg, 1837b, pl.1, fig.17) Downie and Sarjeant, 1965, p.174. Emendation: Morgenroth, 1968, p.546–547, as *Hystrichokolpoma bulbosum*. Holotype: Ehrenberg, 1837b, pl.1, fig.17. Neotype: Morgenroth, 1968, pl.44, fig.6, designated by Morgenroth (1968, p.546). **Combination not validly published**: specific name not validly published and combination not intended. **NOW** *Hystrichokolpoma bulbosum*. Originally *Xanthidium bulbosum* (Appendix A), subsequently *Hystrichosphaera bulbosa* (combination not validly published), thirdly *Hystrichosphaeridium bulbosum*, fourthly *Ovum hispidum bulbosum* (combination not validly published), fifthly (and now) *Hystrichokolpoma bulbosum*, sixthly *Baltisphaeridium bulbosum* (combination not validly published, Appendix A). Taxonomic senior synonym: *Xanthidium* (as *Hystrichosphaeridium*) *tubiferum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1981, p.134) retained *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*. Downie and Sarjeant (1965, p.174) gave the citation "*O. [Ovum] hispidum bulbosum* (Ehrenberg, 1838a [1837b herein]) Lohmann, 1904, now *Hystrichosphaeridium*." However, we have not been able to locate the combination *Ovum hispidum* subsp. *bulbosum* in Lohmann (1904). Age: Danian.

"subsp. **castanea**" Eisenack, 1934, p.71, pl.5, fig.32. Holotype: Eisenack, 1934, pl.5, fig.32. **Name not validly published**: specific name not validly published. **NOW** *Baltisphaeridium castanea* (Appendix A).

Originally *Ovum hispidum* subsp. *castanea* (name not validly published), subsequently *Hystrichosphaeridium castanea*, thirdly (and now) *Baltisphaeridium castanea* (Appendix A). N.I.A. Age: Silurian.

"subsp. *furcatum*" (Ehrenberg, 1837b, pl.1, figs.12,14) Downie and Sarjeant, 1965, p.174. Holotype: not designated. **Combination not validly published**: specific name not validly published, basionym not fully referenced, and combination not intended. Originally *Xanthidium furcatum* (Appendix A), subsequently *Hystrichosphaera furcata*, thirdly *Ovum hispidum* subsp. *furcatum* (combination not validly published), fourthly *Spiniferites furcatus* (combination not validly published). **Taxonomic senior synonym**: *Xanthidium* (as *Hystrichosphaera*; now *Spiniferites*) *ramosum*, according to Davey and Williams (1966a, p.29–33). Taxonomic junior synonym: *Geodia? tripunctata* (Appendix A), according to Sarjeant (1964a, p.175). Downie and Sarjeant (1965, p.174) attributed this combination to Lohmann (1904); however, the combination apparently was not proposed in the latter publication. Age: Late Cretaceous.

"subsp. *hirsutum*" (Ehrenberg, 1837b, pl.1, figs.10,?13) Eisenack, 1931, p.111. **Name not validly published**: Ehrenberg (1837b) did not intend to introduce a new species and specific name not validly published. Originally *Xanthidium hirsutum* (name not validly published, Appendix A), subsequently *Ovum hispidum* subsp. *hirsutum* (name not validly published, Appendix A), thirdly *Hystrichosphaera hirsuta* (name not validly published), fourthly *Hystrichosphaeridium hirsutum* (name not validly published), fifthly *Baltisphaeridium hirsutum* (name not validly published, Appendix A), sixthly *Operculodinium hirsutum* (name not validly published), seventhly *Operculodinium? hirsutum* (name not validly published). See discussion under *Operculodinium? hirsutum*. Age: Late Cretaceous.

"subsp. *longispinosum*" Eisenack, 1931, p.110–111, pl.5, figs.6–17. Holotype: Eisenack, 1931, pl.5, fig.10, lost according to Eisenack (1959, p.194). Neotype: Eisenack, 1959, pl.15, fig.1, designated by Eisenack (1959, p.194). **Name not validly published**: specific name not validly published. **NOW** *Baltisphaeridium longispinosum* (Appendix A). Originally *Ovum hispidum* subsp. *longispinosum* (name not validly published), subsequently *Hystrichosphaera longispinosa* (name not validly published), thirdly *Hystrichosphaeridium longispinosum*, fourthly (and now) *Baltisphaeridium longispinosum* (Appendix A), fifthly *Micrhystridium longispinosum* (combination not validly published, Appendix A). Age: Ordovician (erratic).

"subsp. *multipilosum*" Eisenack, 1931, p.111, pl.5, figs.20–22. Holotype: Eisenack, 1931, pl.5, fig.22, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.11, designated by Eisenack (1959, p.197). **Name not validly published**: specific name not validly published. **NOW** *Baltisphaeridium multipilosum* (Appendix A). Originally *Ovum hispidum* subsp. *multipilosum* (name not validly published), subsequently *Hystrichosphaeridium multipilosum*, thirdly (and now) *Baltisphaeridium multipilosum* (Appendix A). Age: Silurian.

"subsp. *oligospinosum*" Eisenack, 1934, p.64–65, pl.4, figs.15–18. Holotype: Eisenack, 1934, pl.4, fig.18, lost according to Eisenack et al. (1973, p.494). **Name not validly published**: specific name not validly published. **NOW** *Estiastra? oligospinosa* (Appendix A). Originally *Ovum hispidum* subsp. *oligospinosum* (name not validly published), subsequently *Hystrichosphaeridium oligospinosum*, thirdly *Pulvinosphaeridium oligospinosum* (Appendix A), fourthly *Veryhachium oligospinosum* (Appendix A), fifthly *Goniosphaeridium oligospinosum* (Appendix A), sixthly (and now) *Estiastra? oligospinosa* (Appendix A). Age: Ordovician (early Caradoc).

"subsp. *penicillatum*" (Ehrenberg, 1843b, p.62 ex Ehrenberg, 1854, pl.37, section 8, fig.3) Downie and Sarjeant, 1965, p.174 Holotype: Ehrenberg, 1854, pl.37, section 8, fig.3. **Combination not validly published**: specific name not validly published, basionym not fully referenced, and combination not intended. **NOW** *Systematophora penicillata*. Originally *Xanthidium penicillatum* (Appendix A), subsequently *Hystrichosphaera penicillata* (combination not validly published), thirdly *Hystrichosphaeridium penicillatum*, fourthly *Ovum hispidum* subsp. *penicillatum* (combination not validly published), fifthly *Hystrichosphaeridium? penicillatum*, sixthly (and now) *Systematophora penicillata*. Taxonomic junior synonym: *Systematophora fasciculigera*, according to Sarjeant (1980a, p.282). Downie

and Sarjeant (1965, p.174) attributed this combination to Lohmann (1904); however, the combination apparently was not proposed in the latter publication. Age: late Oxfordian.

"subsp. *pilosum*" (Ehrenberg, 1854, pl.37, section 8, fig.4) Downie and Sarjeant, 1965, p.174. Emendation: Erkmén and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.4. **Combination not validly published:** specific name not validly published, basionym not fully referenced, and combination not intended. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum* (Appendix A), subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (combination not validly published), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. Downie and Sarjeant (1965, p.174) attributed this combination to Lohmann (1904); however, the combination apparently was not proposed in the latter publication. Age: Oxfordian.

"subsp. *polygonale*" Eisenack, 1931, p.113, pl.4, figs.16–20; pl.5, fig.18. Holotype: Eisenack, 1931, pl.4, fig.19, lost according to Eisenack (1959, p.199). Neotype: Paris and Deunff, 1970, pl.1, fig.4, as *Veryhachium splendens*, designated by Fensome et al. (1990, p.235), which see. **Name not validly published:** specific name not validly published. **NOW** *Polygonium polygonale* (Appendix A). Originally *Ovum hispidum* subsp. *polygonale* (name not validly published), subsequently *Hystrichosphaeridium polygonale*, thirdly *Baltisphaeridium polygonale* (Appendix A), fourthly *Veryhachium polygonale* (combination not validly published, Appendix A), fifthly *Goniosphaeridium polygonale* (Appendix A), sixthly (and now) *Polygonium polygonale* (Appendix A). Taxonomic junior synonyms: *Impletosphaeridium? primordiale*, according to Eisenack et al. (1973, p.497–498); *Veryhachium* (subsequently *Goniosphaeridium*) *splendens* Paris and Deunff, 1970, an acritarch species, according to Turner (1984, p.113–114) who believed *Goniosphaeridium splendens* to be the senior name; *Hystrichosphaeridium* (subsequently *Baltisphaeridium*) *sexradiatum* Timofeev, 1959, an acritarch species, according to Eisenack (1965c, p.261). Age: Silurian (erratic).

"subsp. *ramosum*" (Ehrenberg, 1837b, pl.1, fig.15) Eisenack, 1931, p.112. Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). **Combination not validly published:** specific name not validly published. **NOW** *Spiniferites*. Originally *Xanthidium ramosum* (Appendix A), subsequently (and now) *Spiniferites ramosus*, thirdly *Ovum hispidum* subsp. *ramosum* (combination not validly published), fourthly *Hystrichosphaera ramosa*, fifthly *Bion ramosum* (Appendix A). Taxonomic junior synonyms: *Xanthidium* (as *Hystrichosphaera*) *furcatum*, according to Davey and Williams (1966a, p.29–33); *Galea korykos* and *Hystrichosphaeridium echinoides*, both according to Sarjeant (1983, p.91–92); *Areoligera birama*, according to Morgenroth (1968, p.550); *Geodia? tripunctata*, by implication in Sarjeant (1964a, p.175), who considered *Geodia? tripunctata* to be a taxonomic junior synonym of *Hystrichosphaera furcata*; *Hystrichosphaera* (as *Spiniferites*) *bulloidea*, according to Harland (1977b, p.101–102) — however, Lentin and Williams (1981, p.259) retained *Hystrichosphaera* (as *Spiniferites*) *bulloidea*; *Homotryblium distinctum*, according to Jain and Garg (1982, p.69), who considered *Homotryblium distinctum* to be a taxonomic junior synonym of *Spiniferites ramosus* subsp. *ramosus*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). Downie and Sarjeant (1965, p.174) attributed this combination to Lohmann (1904); however, the combination was apparently not proposed in this latter publication. Age: Late Cretaceous.

"subsp. *trifurcatum*" Eisenack, 1931, p.112, pl.4, figs.21–23. Holotype: Eisenack, 1931, pl.4, fig.21. **Name not validly published:** specific name not validly published. **NOW** *Peteinosphaeridium trifurcatum* (Appendix A). Originally *Ovum hispidum* subsp. *trifurcatum* (name not validly published), subsequently *Hystrichosphaeridium trifurcatum*, thirdly *Baltisphaeridium trifurcatum* (Appendix A), fourthly (and now) *Peteinosphaeridium trifurcatum* (Appendix A). Taxonomic junior synonyms: *Peteinosphaeridium bergstroemii* Staplin et al., 1965, an acritarch species, according to Eisenack (1969a, p.254–255); *Baltisphaeridium trifurcatum* subsp. *breviradiatum* (subsequently *Peteinosphaeridium breviradiatum*), according to Eisenack (1969a, p.255), who considered *Baltisphaeridium trifurcatum* subsp. *breviradiatum* to be the senior name. Age: Ordovician (erratic).

"subsp. *tubiferum*" (Ehrenberg, 1837b, pl.1, fig.16) Downie and Sarjeant, 1965, p.174. Emendation: Davey and Williams, 1966b, p.56–58. Holotype: Ehrenberg, 1837b, pl.1, fig.16. **Combination not validly published**: specific name not validly published, basionym not fully referenced, and combination not intended. **NOW** *Hystrichosphaeridium tubiferum*. Originally *Xanthidium tubiferum* (Appendix A), subsequently *Hystrichosphaera tubifera* (combination not validly published), thirdly (and now) *Hystrichosphaeridium tubiferum*, fourthly *Ovum hispidum* subsp. *tubiferum* (combination not validly published). Taxonomic junior synonym: *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1989, p.134) retained *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*. Downie and Sarjeant (1965, p.174) attributed this combination to Lohmann (1904); however, the combination was apparently not proposed in that publication. Age: Late Cretaceous?

"**OVUM HISPIDUM**" Lohmann, 1904, p.25. **Name not validly published**: it comprises two unhyphenated words. Fensome et al. (1990, p.637) stated: "Lohmann clearly intended this to be a generic name. As such, it is inadmissible under I.C.N. Article 20.3 since it is composed of two words unhyphenated. It is not inadmissible on the grounds that it coincides with morphological terms since I.C.N. Article 20.2 does not apply to generic names proposed before 1912. We have not been able to verify the relationship, if any, between the generic name *Ovum hispidum* Lohmann and the species name *Ovulum hispidum* Ehrenberg, 1854 (fide Loeblich Jr. and Loeblich III, 1970a, p.539)."OVUM-HISPIDUM

PACHYSPHAERIDIUM Burmann, 1970, p.310–311. Acritarch genus. Type: Eisenack, 1959, pl.15, fig.2, as *Baltisphaeridium longispinosum* (now accommodated in *Pachysphaeridium robustum* — see Fensome et al., 1990, p.383).

balticum (Eisenack, 1951, p.190, pl.3, figs.10–11) Ribecai and Tongiorgi, 1999, p.122. Holotype: Eisenack, 1951, pl.3, fig.10. Originally *Hystrichosphaeridium*, subsequently *Pulvinosphaeridium* (combination not validly published, Appendix A), thirdly *Veryhachium* (Appendix A), fourthly *Goniosphaeridium* (Appendix A), fifthly *Baltisphaeridium* (Appendix A), sixthly *Estiastra* (Appendix A), seventhly (and now) *Pachysphaeridium*. Age: Early Ordovician.

brevispinosum (Eisenack, 1931, p.111, pl.5, figs.3–5 ex Eisenack, 1938a, p.12) Ribecai and Tongiorgi, 1999, p.123. Holotype: Eisenack, 1931, pl.5, fig.3, as *Ovum hispidum* subsp. *brevispinosum*, lost according to Eisenack (1959, p.197). Neotype: Eisenack, 1959, pl.15, fig.13, designated by Eisenack (1959, p.197), lost according to Ribecai and Tongiorgi (1999, p.124). New Neotype: Eisenack, 1959, pl.15, fig.16, designated by Ribecai and Tongiorgi (1999, p.124). Originally *Ovum hispidum* subsp. *brevispinosum* (name not validly published), subsequently *Hystrichosphaeridium brevispinosum*, thirdly *Baltisphaeridium brevispinosum* (Appendix A), fourthly *Buedingiisphaeridium brevispinosum* (combination not validly published, Appendix A), fifthly (and now) *Pachysphaeridium brevispinosum*. Age: Silurian.

PALAEODINOPHYSIS Vozzhennikova and Sheshegova, 1989, p.442. Problematic genus. Type: Vozzhennikova and Sheshegova, 1989, figs.1a,d, as *Palaeodinophysis altaica*.

***altaica** Vozzhennikova and Sheshegova, 1989, p.444–445, figs.1a–d,2. Holotype: Vozzhennikova and Sheshegova, 1989, figs.1a,d. Age: Devonian.

PALAEOHYSTRICHOSPHAERIDIUM Eiserhardt, 1986, p.177. Acritarch genus. Type: Eisenack, 1968, pl.24, fig.2, as *Hystrichosphaeridium wimanii*.

"**williereae**" (Martin, 1966b, p.389–391, pl.1, fig.23; text-figs.33–34) Eiserhardt, 1986, p.181. Holotype: Martin, 1966b, pl.1, fig.23. **NOW** *Dilatitphaera* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Dilatitphaera* (combination not validly published, Appendix A), thirdly *Palaeohystrichosphaeridium*, fourthly (and

now) *Dilatisphaera*. Taxonomic junior synonym: *Ozotobrachion? podolicus* Sheshegova, 1973, an acritarch species, according to Kiryanov (1978, p.90). Age: Silurian (Llandovery).

"subsp. *dameryense*" (Dorning, 1981, p.188, pl.2, fig.6) Fensome et al., 1990, p.384. Holotype: Dorning, 1981, pl.2, fig.6. **NOW** *Dilatisphaera williereae* subsp. *dameryensis*. Originally *Dilatisphaera dameryensis* (Appendix A), subsequently *Palaeohystrichosphaeridium williereae* subsp. *dameryense*, thirdly (and now) *Dilatisphaera williereae* subsp. *dameryensis*. The combination *Palaeohystrichosphaeridium williereae* subsp. *dameryense* was not validly published in Eiserhardt (1986, p.182) since that author did not specify the taxonomic rank; he gave the citation "*Palaeohystrichosphaeridium williereae dameryensis*." Age: Silurian (Llandovery).

"subsp. *williereae*". Autonym. Holotype: Martin, 1966b, pl.1, fig.23. **NOW** *Dilatisphaera williereae* subsp. *williereae*. Originally *Palaeohystrichosphaeridium williereae* subsp. *williereae*, subsequently (and now) *Dilatisphaera williereae* subsp. *williereae*.

**wimani* (Eisenack, 1968, p.92, pl.24, figs.1–3) Eiserhardt, 1986, p.177,180. Holotype: Eisenack, 1968, pl.24, fig.2. Originally *Hystrichosphaeridium*, subsequently (and now) *Palaeohystrichosphaeridium*. Age: Silurian (Llandovery).

PALAEOSTOMOCYSTIS Deflandre, 1937b, p.52. Acritarch genus. Taxonomic junior synonym: *Cladopyxidium*, by implication in Marheinecke (1992, p.105), who transferred the "type species", *Palaeostomocystis reticulata*, to *Cladopyxidium* — however, Lentin and Williams (1993, p.483) retained *Cladopyxidium*. This name was not validly published in Deflandre (1935, p.234) since no type was designated. According to Stover and Evitt (1978, p.6), Deflandre (1966, p.6) emended the diagnosis of this genus; however, no formal emendation was proposed in Deflandre (1966). Type: Deflandre, 1937b, pl.12 (al. pl.9), fig.4, as *Palaeostomocystis reticulata*.

"*acambra*" (Sah et al., 1970, p.148, pl.2, fig.28) Yun Hyesu, 1981, p.73. Holotype: Sah et al., 1970, pl.2, fig.28. **NOW** *Fromea* (Appendix A). Originally (and now) *Fromea* (Appendix A), subsequently *Palaeostomocystis*. Age: Late Cretaceous.

"*apiculata*" Cookson and Eisenack, 1960a, p.12, pl.3, fig.15. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.15. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently *Fromea?* (Appendix A), thirdly (and now) *Fromea* (Appendix A). Age: Santonian–Campanian.

"*bakonyensis*" Góczán, 1962, p.193–194,200, pl.3, figs.4–10. Holotype: Góczán, 1962, pl.3, figs.4–5. **NOW** *Pyxidinospis*. Originally *Palaeostomocystis*, subsequently (and now) *Pyxidinospis*. Age: Maastrichtian.

"*chytra*" Drugg, 1967, p.35, pl.6, fig.12. Holotype: Drugg, 1967, pl.6, fig.12. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently (and now) *Fromea* (Appendix A). Taxonomic junior synonym: *Palaeostomocystis minor*, according to Xu Jinli et al. (1997, p.41). Age: Maastrichtian–Danian.

cretacea (Wetzel, 1933a, p.175, pl.2, figs.28–29) Deflandre, 1937b, p.54. Holotype: Wetzel, 1933a, pl.2, fig.28. Originally *Trachelomonas?* (Appendix A), subsequently (and now) *Palaeostomocystis*. This combination was not validly published in Deflandre (1935, p.234) since the generic name *Palaeostomocystis* was not validly published until 1937. Age: Late Cretaceous.

"*cylindrica*" Cookson and Eisenack, 1960b, p.258, pl.39, fig.16. Holotype: Cookson and Eisenack, 1960b, pl.39, fig.16. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently *Fromea?* (Appendix A), thirdly (and now) *Fromea* (Appendix A). Age: Late Jurassic–Neocomian.

"*decora*" Deflandre, 1945b, card 850, figs.1–2. Holotype: Deflandre, 1945b, fig.1. **Name not validly published:** no description. This name, attributed to Deflandre, was also not validly published in Wetzel (1942, p.42). Age: Late Cretaceous.

"*echinulata*" Deflandre, 1937b, p.55, pl.11 (al. pl.8), fig.9. Holotype: Deflandre, 1937b, pl.11 (al. pl.8), fig.9. **NOW** *Diacrocanthidium* (Appendix A). Originally *Palaeostomocystis*, subsequently *Acanthodiacrodium* (combination not validly published, Appendix A), thirdly (and now) *Diacrocanthidium* (Appendix A). Taxonomic junior synonym: *Cleistosphaeridium parvum*, according to Bujak in Bujak et al. (1980, p.52). Age: Late Cretaceous.

"*elongata*" (Beju, 1971, p.289–290, pl.3, figs.7–10; text-figs.6A–E) Yun Hyesu, 1981, p.73. Emendations: Feist-Burkhardt and Monteil, 1994, p.9, as *Andreedinium elongatum*; Riding, 1994, p.16, as *Phallocysta elongata*. Holotype: Beju, 1971, pl.3, fig.7; text-fig.6A. **NOW** *Phallocysta*. Originally *Fromea* (Appendix A), subsequently *Fromea?* (Appendix A), thirdly *Wallodinium*, fourthly *Palaeostomocystis*, fifthly *Andreedinium*, sixthly (and now) *Phallocysta*. Taxonomic senior synonym: *Prismatocystis* (now *Wallodinium*) *cylindrica*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Palaeostomocystis* (as *Andreedinium*) *elongata*. Nomenclatural junior synonym: *Phallocysta minuta*: refer to that species for details. Taxonomic junior synonym: *Phallocysta subconica*, according to Riding (1994, p.16). Age: Bajocian–Oxfordian.

"*expolita*" Brideaux, 1977, p.20, pl.7, figs.12–14. Holotype: Brideaux, 1977, pl.7, figs.12–14. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently (and now) *Fromea* (Appendix A). Age: Barremian.

foveolata Slimani, 1994, p.42–43, pl.7, figs.15–17,54–58. Holotype: Slimani, 1994, pl.7, figs.15–17,54–55. Age: late Campanian–early Maastrichtian.

"*fragilis*" Cookson and Eisenack, 1962b, p.496–497, pl.7, figs.10–11. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.11. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently (and now) *Fromea* (Appendix A). Age: Aptian–Cenomanian.

"*glabella*" Singh, 1971, p.428–429, pl.80, fig.4. Holotype: Singh, 1971, pl.80, fig.4. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently (and now) *Fromea* (Appendix A). Age: late Albian.

globosa Louwye, 1999, p.121, pl.5, figs.3–7. Holotype: Louwye, 1999, pl.5, figs.3–6. Age: late Miocene.

"*granulosa*" Cookson and Eisenack, 1974, p.79, pl.28, fig.10. Holotype: Cookson and Eisenack, 1974, pl.28, fig.10. **NOW** *Batiacasphaera*. Originally *Palaeostomocystis*, subsequently *Fromea* (Appendix A), thirdly (and now) *Batiacasphaera*. Age: Albian–Cenomanian.

"*laevigata*" Drugg, 1967, p.35, pl.6, figs.14–15. Holotype: Drugg, 1967, pl.6, fig.14. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently *Fromea?* (Appendix A), thirdly (and now) *Fromea* (Appendix A). Junior homonym: *Palaeostomocystis laevigata* Jiabo, 1978 (Appendix A). Age: Maastrichtian–Danian.

"*laevigata*" Jiabo, 1978, p.126–127, pl.32, fig.23. Holotype: Jiabo, 1978, pl.32, fig.23. **Name illegitimate** — **senior homonym**: *Palaeostomocystis laevigata* Drugg, 1967. **NOW** *Bosedinia laevigata*. Originally *Palaeostomocystis laevigata* (name illegitimate), subsequently *Bosea laevigata* (generic name illegitimate), thirdly *Fromea laevigata* (name illegitimate; Appendix A), fourthly *Fromea psilata* (Appendix A), fifthly (and now) *Bosedinia laevigata*. Age: Early Tertiary.

"*minor*" Jiabo, 1978, p.127, pl.32, figs.14–21. Holotype: Jiabo, 1978, pl.32, fig.20. Originally *Palaeostomocystis*, subsequently *Fromea* (Appendix A). Jansonius (1989, p.67) retained this species in *Palaeostomocystis*. **Taxonomic senior synonym**: *Fromea chytra* (Appendix A), according to Xu Jinli et al. (1997, p.41). Age: Early Tertiary.

"*oblonga*" Deflandre, 1945b, card 852, figs.1–5. Holotype: Deflandre, 1945a, fig.1. **Name not validly published**: no description. Originally *Palaeostomocystis* (name not validly published), subsequently *Fromea* (name not validly published; Appendix A). This name was also not validly published in Wetzel (1942, p.42), who attributed it to Deflandre.

ovata (Wilson, 1967b, p.230, figs.23–26) Eisenack et al., 1973, p.873. Holotype: Wilson, 1967b, fig.23. Originally *Leiosphaeridia* (Appendix A), subsequently (and now) *Palaeostomocystis*. Age: Maastrichtian (see Wilson, 1972).

pachythea Cookson and Eisenack, 1971, p.222, pl.11, figs.7–9. Holotype: Cookson and Eisenack, 1971, pl.11, fig.8. Originally (and now) *Palaeostomocystis*, subsequently *Fromea* (Appendix A). Jansonius (1989, p.67) retained this species in *Palaeostomocystis*. Age: Middle Cretaceous.

"*pergamentacea*" Burger, 1980a, p.88, pl.47, figs.2–3. Holotype: Burger, 1980a, pl.47, fig.3. **NOW** *Leberidocysta*?. Originally *Palaeostomocystis*, subsequently (and now) *Leberidocysta*?, thirdly *Craspedodinium*. Age: Aptian.

pulchella Conrad, 1941, p.10; text-fig.3. Holotype: Conrad, 1941, text-fig.3. Age: Maastrichtian.

punctulosa Deflandre, 1941, p.22–23, pl.6, fig.11. Holotype: Deflandre, 1941, pl.6, fig.11. Age: Kimmeridgian.

**reticulata* Deflandre, 1937b, p.53–54, pl.12 (al. pl.9), figs.4–5. Emendation: Marheinecke, 1992, p.105–106, as *Cladopyxidium reticulata* (combination illegitimate). Holotype: Deflandre, 1935, pl.9, fig.13; Deflandre, 1936a, fig.133; Deflandre, 1937b, pl.12 (al. pl.9), fig.4. Originally (and now) *Palaeostomocystis*, subsequently *Cladopyxidium* (combination illegitimate). This name was not validly published in Deflandre (1935, caption to pl.9, fig.13; 1936a, caption to fig.133 — p.77) since no description was provided. Age: Late Cretaceous.

"*scabrata*" Jiabo, 1978, p.127, pl.32, figs.24–25; pl.46, figs.3a–b. Holotype: Jiabo, 1978, pl.32, fig.25. **NOW** *Bosedinia*. Originally *Palaeostomocystis*, subsequently *Fromea* (Appendix A), thirdly (and now) *Bosedinia*. Age: Early Tertiary.

"*scrobiculata*" (Deflandre and Cookson, 1955, p.291, pl.3, fig.3; text-fig.57) Eisenack et al., 1973, p.881–882. Holotype: Deflandre and Cookson, 1955, pl.3, fig.3. **NOW** *Pyxidiella*?. Originally *Leiosphaera* (Appendix A) subsequently (and now) *Pyxidiella*?, thirdly *Leiosphaeridia* (Appendix A), fourthly *Palaeostomocystis*, fifthly *Batiacasphaera*. Cookson and Eisenack (1974, p.79) also proposed this combination. Age: Santonian–Eocene.

"*senilis*" McIntyre and Brideaux, 1980, p.18, pl.5, fig.12; pl.6, fig.1. Holotype: McIntyre and Brideaux, 1980, pl.5, fig.12; pl.6, fig.1. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently (and now) *Fromea* (Appendix A). Age: Valanginian.

"*sinuosa*" Cookson and Eisenack, 1960b, p.258, pl.38, figs.16–17. Emendation: Helby and Stover, 1987b, p.160, as *Dollidinium sinuosum*. Holotype: Cookson and Eisenack, 1960b, pl.38, fig.16; Fensome et al., 1996, fig.1 — p.2363; lost according to Helby and Stover (1987b, p.164). Lectotype: Helby and Stover, 1987b, figs.4A–C; Fensome et al., 1996, fig.1 — p.2363; designated as a neotype by Helby and Stover (1987b, p.164). **NOW** *Dollidinium*. Originally *Palaeostomocystis*, subsequently (and now) *Dollidinium*. Age: Tithonian–Berriasian.

sphaerica Deflandre, 1937b, p.54, pl.12 (al. pl.9), fig.6. Holotype: Deflandre, 1935, pl.9, fig.14; Deflandre, 1936a, fig.134; Deflandre, 1937b, pl.12 (al. pl.9), fig.6. This name was not validly published in Deflandre (1935, caption to pl.9, fig.14 — p.234; 1936a, caption to fig.134 — p.77) since no description was provided. Age: Cretaceous.

"*tornatilis*" Drugg, 1978, p.71–72, pl.7, figs.4–6. Holotype: Drugg, 1978, pl.7, fig.5. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently (and now) *Fromea* (Appendix A). Age: Callovian–Oxfordian.

"*triquetra*" Brideaux, 1977, p.20–21, pl.8, figs.1–6. Holotype: Brideaux, 1977, pl.8, figs.1–2. **NOW** *Fromea* (Appendix A). Originally *Palaeostomocystis*, subsequently (and now) *Fromea* (Appendix A). Age: Barremian.

PALHISTIODINIA Deflandre, 1939a, p.185. Problematic genus. Type: Deflandre, 1939a, pl.5, fig.10, as *Palhistiodinia arcana*.

**arcana* Deflandre, 1939a, p.185, pl.5, fig.10. Holotype: Deflandre, 1939a, pl.5, fig.10. Sarjeant (1978a, p.38) noted that the holotype is severely damaged and recommended that the genus and species names should be allowed to fall into disuse. It shows no evidence of dinoflagellate affinity. Age: Oxfordian.

PARALECANIELLA Cookson and Eisenack, 1970b, p.323. Emendation: Elsik, 1977, p.96. Acritarch or schizosporous algal genus (Elsik, 1977, p.96). Type: Deflandre and Cookson, 1955, pl.9, fig.6, as *Epicephalopyxis indentata*.

**indentata* (Deflandre and Cookson, 1955, p.292, pl.9, figs.5–7; text-fig.56) Cookson and Eisenack, 1970b, p.323. Emendation: Elsik, 1977, p.96, as *Paralecaniella indentata*. Holotype: Deflandre and Cookson, 1955, pl.9, fig.6. Originally *Epicephalopyxis* (Appendix A), subsequently (and now) *Paralecaniella*. Taxonomic junior synonym: *Scriniodium nilsii*, according to Jan du Chêne et al. (1986a, p.318). Age: Paleocene–Miocene.

PAUCILOBIMORPHA de Coninck, 1986b, p.22. Emendation: Prössl, 1994, p.400. Acritarch genus. Type: de Coninck, 1986b, pl.11, figs.19–20, as *Paucilobimorpha triradiata*.

?*apiculata* (Cookson and Eisenack, 1962a, p.272, pl.37, fig.4) Prössl, 1994, p.401. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.4; Pestchevitskaya, 2001, pl.2, fig.13; Pestchevitskaya, 2003, pl.2, fig.6. Originally *Horologinella*, subsequently (and now) *Paucilobimorpha*?. Questionable assignment: Prössl (1994, p.401). Pestchevitskaya (2001, p.106; 2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: Campanian.

extrema (Cookson and Eisenack, 1962a, p.272–273, pl.37, fig.10) Prössl, 1994, p.401. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.10; Pestchevitskaya, 2001, pl.2, fig.16; Pestchevitskaya, 2003, pl.2, fig.4. Originally *Horologinella*, subsequently (and now) *Paucilobimorpha*. Pestchevitskaya (2001, p.106; 2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: Cenomanian.

incurvata (Cookson and Eisenack, 1962a, p.272, pl.37, fig.5) Prössl, 1994, p.402. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.5; Pestchevitskaya, 2001, pl.2, fig.14; Pestchevitskaya, 2003, pl.2, fig.5. Originally *Horologinella*, subsequently (and now) *Paucilobimorpha*. Pestchevitskaya (2001, p.106; 2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: early Eocene.

spinigera (de Coninck, 1969, p.43–44, pl.13, figs.11–13) Prössl, 1994, p.403. Holotype: de Coninck, 1969, pl.13, figs.11–12. Originally *Diacrocanthidium* (Appendix A), subsequently (and now) *Paucilobimorpha*. Age: Ypresian.

spinosa (Cookson, 1965a, p.89, pl.10, figs.10–12; pl.11, fig.10) Prössl, 1994, p.403. Holotype: Cookson, 1965a, pl.10, fig.11; Pestchevitskaya, 2003, pl.2, fig.14. Originally *Horologinella*?, subsequently (and now) *Paucilobimorpha*. This combination was not validly published in de Coninck (1986b, p.22), since that author did not fully reference the basionym. Pestchevitskaya (2003, p.53) included this species in *Horologinella* but did not mention its transfer to *Paucilobimorpha*. Age: late Eocene.

**triradiata* de Coninck, 1986b, p.23, pl.11, figs.17–21,26. Holotype: de Coninck, 1986b, pl.11, figs.19–20. Age: middle Eocene–early Oligocene.

"**PENTAGONIUM**" Snopková and Samuel, 1982, p.132. Acritarch genus. **Name illegitimate — senior homonym:** *Pentagonium* Schauer, 1843. Type: Snopková and Samuel, 1982, pl.48, figs.1–3; pl.49, figs.1–2; pl.50, fig.1, as *Pentagonium obidum*.

obidum* Snopková and Samuel, 1982, p.132, pl.48, figs.1–3; pl.49, figs.1–2; pl.50, fig.1. Holotype: Snopková and Samuel, 1982, pl.48, figs.1–3; pl.49, figs.1–2; pl.50, fig.1. **NOW *Angularia*? (Appendix A). Originally *Pentagonium* Snopková and Samuel (generic name illegitimate), subsequently (and now) *Angularia*? (Appendix A). Following I.C.N. Article 55.1, the species name *Pentagonium obidum* is validly published even though the generic name *Pentagonium* Snopková and Samuel is illegitimate. Age: late Eocene (Priabonian).

PETALOFERIDIUM Jacobson, 1978, p.295–296. Emendation: Sarjeant and Vavrdova, 1997, p.29. Acritarch genus. Type: Jacobson, 1978, pl.1, fig.5, as *Petaloferidium stigii*.

borracherosum (Cramer, 1964, p.289, pl.1, fig.11; text-fig.16, no.6) Sarjeant and Vavrdova, 1997, p.29. Holotype: Cramer, 1964, pl.1, fig.11. Originally *Baltisphaeridium* (Appendix A), subsequently *Multiplicisphaeridium* (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published), fourthly (and now) *Petaloferidium*. Age: Silurian (Ludlow).

PETEINOSPHAERIDIUM Staplin et al., 1965, p.194. Acritarch genus. For synonymy see Fensome et al. (1990, p.389). Type: Staplin et al., 1965, pl.20, fig.13, as *Peteinosphaeridium bergstroemii*.

hymeniferum (Eisenack, 1938a, p.19, pl.3, figs.2–5) Fensome et al., 1990, p.390. Holotype: Eisenack, 1938a, pl.3, fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Peteinosphaeridium*. This combination was not validly published in Eisenack (1969a, p.254), since that author did not fully reference the basionym. Age: Ordovician (erratic).

?**hystrichoreticulatum** (Eisenack, 1938a, p.20, pl.3, figs.6A–B) Eisenack et al., 1973, p.905–906. Holotype: Eisenack, 1938a, pl.3, figs.6A–B, lost according to Eisenack et al. (1973, p.905). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Peteinosphaeridium*?. Questionable assignment: Eisenack et al. (1973, p.905). Age: Ordovician (erratic).

"**ramusculosum**" (Deflandre, 1945a, p.63, pl.1, figs.8–16; text-figs.38–39) Piskun, 1974b, caption to pl.12, fig.9. Emendation: Lister, 1970, p.92–93, as *Multiplicisphaeridium ramusculosum*. Holotype: Deflandre, 1945a, pl.1, figs.8–10. **Combination not validly published**: basionym not fully referenced. **NOW** *Multiplicisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Evittia* Brito (combination not validly published, Appendix A), fourthly (and now) *Multiplicisphaeridium* (Appendix A), fifthly *Peteinosphaeridium* (combination not validly published), sixthly *Oppilatala* (Appendix A). Age: Silurian.

?**sibiricum** (Timofeev, 1966, p.46–47, pl.9, fig.3) Eisenack et al., 1979, p.101. Holotype: Timofeev, 1966, pl.9, fig.3. Originally *Hystrichosphaeridium*, subsequently (and now) *Peteinosphaeridium*. Questionable assignment: Eisenack et al. (1979, p.101). Age: Late Ordovician.

+**trifurcatum** (Eisenack, 1931, p.112, pl.4, figs.21–23 ex Eisenack, 1938a, p.12,16–19) Eisenack, 1969a, p.254. Holotype: Eisenack, 1931, pl.4, fig.21, as *Ovum hispidum* subsp. *trifurcatum*; Eisenack, 1938a, pl.2, fig.2; lost according to Eisenack (1959, p.202). Neotype: Eisenack, 1959, pl.17, fig.3, designated by Eisenack (1959, p.202). Originally *Ovum hispidum* subsp. *trifurcatum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium trifurcatum*, thirdly *Baltisphaeridium trifurcatum* (Appendix A), fourthly (and now) *Peteinosphaeridium trifurcatum*. Taxonomic senior synonym: *Xanthidium* (now *Spiniferites*) *ramosum*, according to Wetzel (1933b, p.36) — however, the latter species is a dinoflagellate. Taxonomic junior synonyms: *Peteinosphaeridium bergstroemii* Staplin et al., 1965, an acritarch species, according to Eisenack (1969a, p.254–255); *Baltisphaeridium trifurcatum* subsp. *breviradiatum* (subsequently *Peteinosphaeridium breviradiatum*), by implication in Eisenack (1969a, p.255), who considered *Baltisphaeridium trifurcatum* subsp. *breviradiatum* to be the senior name. The nomenclatural type of the genus *Peteinosphaeridium* remains the holotype of *Peteinosphaeridium bergstroemii*. The name *Ovum hispidum* subsp. *trifurcatum* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. For further discussion see Fensome et al. (1990, p.392). Age: Ordovician (erratic).

subsp. **trifurcatum**. Autonym. Holotype: Eisenack, 1931, pl.4, fig.21, as *Ovum hispidum* subsp. *trifurcatum* and Eisenack, 1938a, pl.2, fig.2, lost according to Eisenack (1959, p.202). Neotype: Eisenack, 1959, pl.17, fig.3, designated by Eisenack (1959, p.202). Originally *Hystrichosphaeridium trifurcatum* subsp. *trifurcatum*, subsequently *Baltisphaeridium trifurcatum* subsp. *trifurcatum* (Appendix A), thirdly (and now) *Peteinosphaeridium trifurcatum* subsp. *trifurcatum*. Nomenclatural junior synonym: *Baltisphaeridium trifurcatum* forma *typicum* Eisenack, 1959, an acritarch taxon, which has the same type. Taxonomic junior synonym: *Baltisphaeridium* (subsequently *Peteinosphaeridium*) *trifurcatum* subsp. *breviradiatum* Eisenack, 1959, an acritarch taxon, by implication in Eisenack (1969a, p.255), who believed *Baltisphaeridium trifurcatum* subsp. *breviradiatum* to be the senior name.

PINOCCHIODINIUM Torricelli, 2000, p.263. Acritarch genus. Type: Torricelli, 2000, pl.13, fig.7, as *Pinocchiodinium erbae*.

**erbae* Torricelli, 2000, p.264, pl.13, figs.1–12. Holotype: Torricelli, 2000, pl.13, fig.7. Age: Aptian.

PIPERODINIUM Mudie in Scott et al., 1984, p.214. Acritarch genus. Head (1996b, p.1231) questionably regarded this genus as representing dinoflagellates, but in our view it lacks unequivocal evidence of dinoflagellate affinity. Type: Scott et al., 1984, pl.1, figs.1–3, as *Piperodinium perplexum*.

**perplexum* Mudie in Scott et al., 1984, p.214–215, pl.1, figs.1–3. Holotype: Scott et al., 1984, pl.1, fig.1. Age: Holocene.

PLANCTONITES Krutzsch in Krutzsch et al., 1960, p.141. Zygnematalean genus (Head, 1992, p.249). Taxonomic junior synonym: *Deflandridium*, according to Head (1992, p.249). Fensome et al. (1990, p.395) were incorrect in stating that this name was not validly published in Krutzsch et al. (1960) since the "type species" had a valid name, *Sporites stellarius*, even though the combination *Planctonites stellarius* was not validly published. Type: not designated; "type species" — *Sporites stellarius* Potonié, 1934.

"*nagya*e" Head, 1992, p.250,252. Holotype: Nagy, 1969, pl.2, figs.3–4,6. **Name illegitimate — nomenclatural senior synonym:** *Deflandridium* (now *Planctonites*) *stellatum*, which has the same type. **NOW** *Planctonites stellatus*. Originally *Deflandridium stellatum*, subsequently *Planctonites nagya*e (name illegitimate), thirdly (and now) *Planctonites stellatus*. Substitute name for *Deflandridium stellatum* Nagy, 1969, p.294, pl.2, figs.1,3–4,6. Head (1992, p.250) considered that transfer of *Deflandridium stellatum* to *Planctonites* would create an illegitimate junior homonym of *Planctonites stellarius* (Potonié, 1934) Krutzsch and Vanhoorne, 1977; however, the two epithets are not identical. Age: late Miocene.

stellatus (Nagy, 1969, p.294, pl.2, figs.1,3–4,6) Williams et al., 1998, p.708. Holotype: Nagy, 1969, pl.2, figs.3–4,6. Originally *Deflandridium stellatum*, subsequently *Planctonites nagya*e (name illegitimate), thirdly (and now) *Planctonites stellatus*. Age: late Miocene.

PLATYCYSTIDIA Cookson and Eisenack, 1960a, p.12. Acritarch genus. Type: Cookson and Eisenack, 1960a, pl.3, fig.22, as *Platycystidia diptera*.

**diptera* Cookson and Eisenack, 1960a, p.14, pl.3, fig.22. Holotype: Cookson and Eisenack, 1960a, pl.3, fig.22. Age: ?late Albian–Cenomanian.

eisenackii (Mehrotra and Sarjeant, 1984c, p.46–48, pl.1, figs.1–7; pl.2, figs.1–7; text-figs.1a–d,2a–c,3a–b) Backhouse, 1988, p.114. Holotype: Mehrotra and Sarjeant, 1984c, pl.1, fig.6; text-fig.1c. Originally *Polygonifera*, subsequently *Leberidocysta*?, thirdly (and now) *Platycystidia*. Age: Aptian.

PLEUROZONARIA Wetzel, 1933b, p.29. Prasinophyte genus (although Elbrächter et al., 2008, p.1301 listed this as a questionable calcareous dinoflagellate genus). Taxonomic senior synonyms: *Pithonella*, according to Foucher and Taugourdeau-Lantz (1975, p.1677–1679); *Tasmanites* (Appendix A), by implication in Morgenroth (1966a, p.41–42) who transferred the "type species" of *Pleurozonaria*, *Pleurozonaria globulus*, to *Tasmanites* — however, Fensome et al. (1990, p.395) retained *Pleurozonaria*. Taxonomic junior synonym: *Crassosphaera* Cookson and Manum, 1960, a prasinophyte genus, according to Mädler (1963, p.328) — however, Fensome et al. (1990, p.159) retained *Crassosphaera*. Type: Wetzel, 1933b, pl.4, fig.12, as *Pleurozonaria globulus*.

**globulus* Wetzel, 1933b, p.29, pl.4, fig.12. Holotype: Wetzel, 1933b, pl.4, fig.12; Sarjeant, 1985b, pl.2, fig.3; Dietz et al., 1999, fig.10, no.4. Originally (and now) *Pleurozonaria*, subsequently *Tasmanites* (Appendix A), thirdly *Pithonella*. Fensome et al. (1990, p.396) retained the species in *Pleurozonaria*. N.I.A. Age: Late Cretaceous.

POLYGONIUM Vavrdová, 1966, p.412–413. Emendations: Le Hérisse, 1989, p.181; Sarjeant and Stancliffe, 1994, p.42. Acritarch genus. Taxonomic junior synonyms: *Goniosphaeridium* (Appendix A), according to Le Hérisse (1989, p.181) and Sarjeant and Stancliffe (1996, p.358); *Celtiberium* Fombella, 1977, an acritarch genus, according to Sarjeant and Stancliffe (1996, p.358). See also Fensome et al. (1990, p.405). Type: Vavrdová, 1966, pl.1, fig.3; text-fig.3b (not pl.2, fig.3), as *Polygonium gracile*.

nanus (Deflandre, 1945a, p.62–63, pl.1, figs.5–7) Jacobson, 1978, p.297. Holotype: Deflandre, 1945a, pl.1, figs.5–6. Originally *Hystrichosphaeridium brevispinosum* var. *nanus*, subsequently *Baltisphaeridium nanus* (Appendix A), thirdly *Baltisphaeridium brevispinosum* var. *nanus* (combination not validly published, Appendix A), fourthly *Micrhystridium nanus* (Appendix A), fifthly (and now) *Polygonium nanus*, sixthly *Solisphaeridium nanus* (Appendix A). Sarjeant and Stancliffe (1994, p.21) retained this species in *Polygonium*. Taxonomic junior synonym: *Baltisphaeridium brevispinosum* var. *wenlockense* (subsequently *Salopidium wenlockense*) Downie, 1959, an acritarch taxon, according to Lister (1970, p.54). N.I.A. Age: Silurian.

polygonale (Eisenack, 1931, p.113, pl.4, figs.16–20; pl.5, fig.18 ex Eisenack, 1938a, p.12) Le Hérisse, 1989, p.182. Holotype: Eisenack, 1931, pl.4, fig.19, as *Ovum hispidum* subsp. *polygonale*, lost according to Eisenack (1959, p.199). Neotype: Paris and Deunff, 1970, pl.1, fig.4, as *Veryhachium splendens*, designated by Fensome et al. (1990, p.235), which see. Originally *Ovum hispidum* subsp. *polygonale* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium polygonale*, thirdly *Baltisphaeridium polygonale* (Appendix A), fourthly *Veryhachium polygonale* (combination not validly published, Appendix A), fifthly *Goniosphaeridium polygonale* (Appendix A), sixthly (and now) *Polygonium polygonale*. Taxonomic junior synonyms: *Impletosphaeridium? primordiale*, according to Eisenack et al. (1973, p.497–498); *Veryhachium* (subsequently *Goniosphaeridium*) *splendens* Paris and Deunff, 1970, an acritarch species, according to Turner (1984, p.113–114), who believed *Goniosphaeridium splendens* to be the senior name; *Hystrichosphaeridium* (subsequently *Baltisphaeridium*) *sexradiatum*, according to Eisenack (1965c, p.261). This combination was not validly published in Wright and Meyers (1981, p.28) since these authors did not fully reference the basionym. The name *Ovum hispidum* subsp. *polygonale* was not validly published in Eisenack (1931) since the specific name *Ovum hispidum* was not validly published. Age: Silurian (erratic).

"uncinatum" (Downie, 1958, p.337; text-fig.2a) Richardson and Rasul, 1978, p.450. Holotype: Downie, 1958, text-fig.2a. **NOW** *Stellechinatum uncinatum* (Appendix A). Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum* (Appendix A), thirdly *Baltisphaeridium uncinatum* (Appendix A), fourthly *Micrhystridium uncinatum* (Appendix A), fifthly *Goniosphaeridium uncinatum* (Appendix A), sixthly *Polygonium uncinatum*, seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published, Appendix A), eighthly (and now) *Stellechinatum uncinatum* (Appendix A). Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

PRINSIOSPHAERA Jafar, 1983, p.232–233. A calcisphere genus according to Elbrächter et al. (2008, p.1303). Type: Jafar, 1983, fig.8, nos.1a–c, as *Prinsiosphaera triassica*.

"geometrica" Jafar, 1983, p.233, fig.10, nos.5–6; fig.11, no.6. Holotype: Jafar, 1983, fig.10, no.5. **NOW** *?Orthopithonella*. Originally *Prinsiosphaera*, subsequently *Orthopithonella*, thirdly *Thoracosphaera*, fourthly (and now) *?Orthopithonella*. Taxonomic junior synonyms (at specific rank): *Prinsiosphaera triassica* subsp. *hyalina* and *Prinsiosphaera triassica* subsp. *noeliae*, according to Janofske (1987, p.50). Age: Rhaetian.

***triassica** Jafar, 1983, p.234–235,237, fig.6, nos.7a–b,8a–d,9a–d; fig.7, nos.1a–c,2a–c,3a–c,4a–c,5a–b,6a–b; fig.8, nos.1a–c,2a–c,3a–b,4a–c,5–6,7a–b,8a–c,9a–b; fig.9, nos.1a–c,2,3a–c,4a–b,5–6,7a–b,8a–b,9a–b; fig.10, nos.1–4. Holotype: Jafar, 1983, fig.8, nos.1a–c. Age: Carnian–Rhaetian.

"subsp. *hyalina*" Jafar, 1983, p.234, fig.9, nos.1a–c,2,7a–b. Holotype: Jafar, 1983, fig.9, nos.1a–c. **Taxonomic senior synonym** (at specific rank): *Prinsiosphaera* (now *Orthopithonella*) *geometrica*, according to Janofske (1987, p.50). Age: late Norian.

"subsp. *noeliae*" Jafar, 1983, p.234, fig.9, nos.3a–c,4a–b,5–6,8a–b,9a–b; fig.10, nos.1–4. Holotype: Jafar, 1983, fig.9, nos.8a–b. **Taxonomic senior synonym** (at specific rank): *Prinsiosphaera* (now *Orthopithonella*) *geometrica*, according to Janofske (1987, p.50). Janofske (1987, p.50) considered some specimens of this taxon illustrated by Jafar (1983 — figs.9, nos.3a–c,4a–b,8a–b,9a–b), including the type, to belong to *Orthopithonella geometrica*. Age: Rhaetian.

PRISCOGALEA Deunff, 1961a, p.40. Emendation: Rasul, 1974, p.47. Acritarch genus. Type: Deunff, 1961a, pl.1, fig.7, as *Priscogalea barbara*.

"*cristata*" (Downie, 1958, p.338–339, pl.16, fig.4; text-fig.4f) Martin, 1969, p.85. Holotype: Downie, 1958, pl.16, fig.4. **NOW** *Cymatiogalea* (Appendix A). Originally *Hystriosphæridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Priscogalea*, fourthly (and now) *Cymatiogalea* (Appendix A). Taxonomic junior synonym: *Cymatiogalea polygonomorpha* Górka, 1967, an acritarch species, according to Rasul (1974, p.56). Age: Early Ordovician.

PRISMATOCYSTIS Habib, 1969, p.98. Acritarch genus. Type: Habib, 1969, pl.3, fig.11, as *Prismatocystis ewingii*.

"*cylindrica*" Habib, 1970, p.374, pl.10, fig.2. Emendations: Prauss, 1989, p.47–48; Feist-Burkhardt and Monteil, 1994, p.7; Riding, 1994, p.18, all as *Wallodinium cylindricum*. Holotype: Habib, 1970, pl.10, fig.2. **NOW** *Wallodinium*. Originally *Prismatocystis*, subsequently *Hexagonifera*, thirdly (and now) *Wallodinium*. Taxonomic junior synonym: *Fromea* (as *Wallodinium*, now *Phallocysta*) *elongata*, according to Duxbury (1983, p.68) — however, Feist-Burkhardt and Monteil in Feist-Burkhardt (1990, p.615) retained *Fromea* (as *Andreedinium*) *elongata*. Age: Albian–Cenomanian.

**ewingii* Habib, 1969, p.98, pl.3, fig.11. Holotype: Habib, 1969, pl.3, fig.11. Age: Albian–early Cenomanian.

PROLIXOSPHAERIDIOPSIS Hogg and Bailey, 1997, p.50. Acritarch genus. Type: McIntyre and Brideaux, 1980, pl.7, figs.1–4, as *Cleistosphaeridium spissum*.

**spissa* (McIntyre and Brideaux, 1980, p.20, pl.7, figs.1–9) Hogg and Bailey, 1997, p.50. Holotype: McIntyre and Brideaux, 1980, pl.7, figs.1–4. Originally *Cleistosphaeridium*, subsequently *Prolixosphaeridium*?, thirdly (and now) *Prolixosphaeridiopsis*. Age: Valanginian.

PSEUDOFROMEA Burger, 1980b, p.276. Acritarch genus. Type: Burger, 1980b, fig.12A, as *Pseudofromea collaris*.

**collaris* Burger, 1980b, p.276–277, figs.12A–C,13. Holotype: Burger, 1980b, fig.12A. Age: Barremian.

PSEUDOPITHONELLA Trejo, 1983, p.11. A calcisphere genus according to Elbrächter et al. (2008, p.1303). This name was proposed under the I.C.Z.N. and the homonym *Pseudopithonella* Versteegh does not compete against it unless it is brought under the I.C.N. Elbrächter et al. (2008, p.1301) stated "Trejo (1983) validly published *Pseudopithonella* Trejo under the I.C.Z.N., but we do not consider this fossil as belonging to any group of organisms governed by the I.C.B.N. [now I.C.N.] (... even the Dinophyceae)".

PTEROCYSTIDIOPSIS Deflandre, 1937b, p.90. Acritarch genus. Taxonomic junior synonym: *Caddasphaera*, by implication in Courtinat in Courtinat and Gaillard (1980, p.80), who transferred the "type species" of *Caddasphaera*, *Caddasphaera halosa*, to *Pterocystidiopsis* — however, Lentin and Williams (1981, p.31,237) retained *Caddasphaera*. This name was not validly published in Deflandre (1935, p.234) since no description was given. Type: Deflandre, 1937b, pl.17 (al. pl.14), figs.7–8, as *Pterocystidiopsis stephaniana*.

albertii Ioannides et al., 1977, p.465, pl.5, fig.20. Holotype: Ioannides et al., 1977, pl.5, fig.20. Age: Kimmeridgian.

?*angulosa* Deflandre, 1941, p.23–24, pl.6, figs.6–10. Holotype: Deflandre, 1941, pl.6, fig.6. Questionable assignment: Deflandre (1941, p.23). Age: Late Jurassic.

bottnica Tynni, 1976, p.35, pl.4, fig.8; text-fig.39b. Holotype: Tynni, 1976, pl.4, fig.8; text-fig.39b. Age: Middle Ordovician.

durandiae Henry, 1969, p.90–91, pl.12, figs.87–88. Holotype: Henry, 1969, pl.12, fig.88. Age: Caradoc.

elegans Tynni, 1976, p.35, pl.4, fig.7; text-fig.39a. Holotype: Tynni, 1976, pl.4, fig.7; text-fig.39a. Age: Middle Ordovician.

"*halosa*" (Filatoff, 1975, p.91, pl.29, figs.10–11) Courtinat in Courtinat and Gaillard, 1980, p.80. Emendation: Prauss, 1989, p.42, as *Pareodinia halosa*. Holotype: Filatoff, 1975, pl.29, fig.10. **NOW** *Pareodinia*. Originally *Kalyptea*, subsequently *Kalyptea*?, thirdly *Caddasphaera*, fourthly *Pterocystidiopsis*, fifthly (and now) *Pareodinia*. Age: Bajocian.

magnaiensis Song Zhichen in Zhu Zunghao et al., 1985, p.59, pl.2, fig.8. Holotype: Zhu Zunghao et al., 1985, pl.2, fig.8. Age: early-middle Miocene.

ornata Deflandre, 1937b, p.91–92, pl.18 (al. pl.15), figs.1–3. Holotype: Deflandre, 1937b, pl.18 (al. pl.15), figs.1–3. Age: Late Cretaceous.

**stephaniana* Deflandre, 1937b, p.91, pl.17 (al. pl.14), figs.7–9. Holotype: Deflandre, 1935, pl.9, fig.2; Deflandre, 1937b, pl.17 (al. pl.14), figs.7–8. This species was not validly published in Deflandre (1935, p.234; caption to pl.9, fig.2) since that author did not provide a description. Age: Cenomanian.

treptensis Courtinat in Courtinat and Gaillard, 1980, p.81–82, pl.6, figs.4,6. Holotype: Courtinat and Gaillard, 1980, pl.6, fig.4. Originally (and now) *Pterocystidiopsis*, subsequently *Caddasphaera*. Lentin and Williams (1993, p.550) retained this species in *Pterocystidiopsis*. Age: late Oxfordian.

"*velata*" Deflandre and Cookson, 1955, p.291, pl.8, fig.8. Holotype: Deflandre and Cookson, 1955, pl.8, fig.8. **NOW** *Thalassiphora*. Originally *Pterocystidiopsis*, subsequently (and now) *Thalassiphora*, thirdly *Disphaeria*. Taxonomic senior synonym: *Pterospermopsis* (now *Thalassiphora*) *pelagica*, according to Benedek and Gocht (1981, p.59) and Sarjeant (1981, p.117) — however, Brinkhuis and Biffi (1993, p.179) retained *Pterocystidiopsis* (as and now *Thalassiphora*) *velata*. Age: Early Tertiary.

PTEROSPERMA Pouchet, 1893, p.178. Modern prasinophyte genus. Type: information not available.

"*labyrinthus*" Ostefeld, 1903, p.578, fig.127. Holotype: Ostefeld, 1903, fig.127. **NOW** *Nematosphaeropsis*. Originally *Pterosperma*, subsequently *Pterococcus* (combination illegitimate), thirdly *Coccopterum*, fourthly (and now) *Nematosphaeropsis*. Taxonomic junior synonym: *Nematosphaeropsis balcombiana*, according to Reid (1974, p.592) — however, Wrenn (1988, p.139) retained *Nematosphaeropsis balcombiana*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). N.I.A. Age: extant.

PTEROSPERMELLA Eisenack, 1972, p.597. Prasinophyte genus. For discussion of status of this genus see Fensome et al. (1990, p.425). Type: Cookson and Eisenack, 1958, pl.9, fig.11, as *Pterospermopsis aureolata*.

"*spinosa*" (Clarke and Verdier, 1967, p.77–78, pl.17, figs.1–2; text-fig.31) Eisenack et al., 1973, p.1011–1012. Holotype: Clarke and Verdier, 1967, pl.17, fig.1. **NOW** *Whitecliffia*. Originally *Pterospermopsis* (Appendix A), subsequently *Pterospermella* (Appendix A), thirdly *Thalassiphora*?, fourthly (and now) *Whitecliffia*. Taxonomic

junior synonym: *Hexagonifera perforata* (name not validly published), according to Slimani (2001a, p.194). Age: Santonian.

PTEROSPERMOPSIS Wetzel, 1952, p.411. Emendation: Sarjeant, 1984a, p.143–145. Acritarch genus. For synonymy see Fensome et al. (1990, p.429). Type: Wetzel, 1952, pl.16, fig.34 as *Pterospermopsis danica*.

danica Wetzel, 1952, p.412, pl.16, fig.34. Emendation: Sarjeant, 1984c, p.145–146. Holotype: Wetzel, 1952, pl.16, fig.34; Dietz et al., 1999, text-fig.6d. Age: Danian.

"pelagica" Eisenack, 1954b, p.71, pl.12, figs.17–18. Emendation: Benedek and Gocht, 1981, p.59–61, as *Thalassiphora pelagica*. Holotype: Eisenack, 1954b, pl.12, fig.17. **NOW** *Thalassiphora*. Originally *Pterospermopsis*, subsequently (and now) *Thalassiphora*, thirdly *Disphaeria*. Taxonomic junior synonyms: *Thalassiphora sueroi* and *Thalassiphora* (as *Disphaeria*) *balcanica*, both according to Stover and Evitt (1978, p.194) — however, Sütő-Szentai (2000, p.162) retained *Thalassiphora* (as *Spiniferites*) *balcanica*. *Pterocystidiopsis* (as *Thalassiphora*) *velata* and *Adnatosphaeridium* (as *Thalassiphora*) *patulum*, both according to Benedek and Gocht (1981, p.59) — however, Lentin and Williams (1985, p.354) retained *Thalassiphora patula* and Brinkhuis and Biffi (1993, p.179) retained *Pterocystidiopsis* (as and now *Thalassiphora*) *velata*; *Subathua sahnii*, according to Lentin and Williams (1985, p.340) — however, *Subathua sahnii* is now considered to be a taxonomic junior synonym of *Adnatosphaeridium* (as and now *Thalassiphora*) *patulum*; *Subathua spinosa*, according to Lentin and Williams (1985, p.340) — however, Stover and Williams (1987, p.207) retained *Subathua* (as *Thalassiphora*) *spinosa* (now *Thalassiphora simlaensis*). Age: late Eocene–early Oligocene.

"spinosa" Clarke and Verdier, 1967, p.77–78, pl.17, figs.1–2; text-fig.31. Holotype: Clarke and Verdier, 1967, pl.17, fig.1. **NOW** *Whitecliffia*. Originally *Pterospermopsis* (Appendix A), subsequently *Pterospermella* (Appendix A), thirdly *Thalassiphora?*, fourthly (and now) *Whitecliffia*. Taxonomic junior synonym *Hexagonifera perforata* (name not validly published), according to Slimani (2001a, p.194). Age: Santonian.

"?vancampoe" Rossignol, 1962, p.134, pl.2, fig.1. Holotype: Rossignol, 1962, pl.2, fig.1. **NOW** *Tuberculodinium*. Originally *Pterospermopsis?*, subsequently (and now) *Tuberculodinium*, thirdly *Pyrophacus* (Appendix B). Questionable assignment: Rossignol (1962, p.134). Taxonomic junior synonym: *Membranilarnacia donaensis*, according to Jain and Garg (1990, p.108). Motile equivalent: *Pyrophacus steinii* (Schiller, 1935) Wall and Dale, 1971, according to Matsuoka et al. (1989, p.94). Age: Pleistocene.

PULVINOSPHAERIDIUM Eisenack, 1954a, p.210. Emendation: Sarjeant and Stancliffe, 1994, p.52. Acritarch genus. For synonymy see Fensome et al. (1990, p.433). Type: Eisenack, 1954a, pl.1, fig.10, as *Pulvinosphaeridium pulvinellum*.

"balticum" (Eisenack, 1951, p.190, pl.3, figs.10–11) Eisenack, 1954a, p.210. Holotype: Eisenack, 1951, pl.3, fig.10. **Combination not validly published:** basionym not fully referenced. **NOW** *Pachysphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Pulvinosphaeridium* (combination not validly published), thirdly *Veryhachium* (Appendix A), fourthly *Goniosphaeridium* (Appendix A), fifthly *Baltisphaeridium* (Appendix A), sixthly *Estiastra* (Appendix A), seventhly (and now) *Pachysphaeridium* (Appendix A). Age: Early Ordovician.

"oligospinosum" (Eisenack, 1934, p.64–65, pl.4, figs.15–18 ex Eisenack, 1938a, p.12) Eisenack, 1954a, p.210. Holotype: Eisenack, 1934, pl.4, fig.18, lost according to Eisenack et al. (1973, p.494). **NOW** *Estiastra?* *oligospinosa* (Appendix A). Originally *Ovum hispidum* subsp. *oligospinosum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium oligospinosum*, thirdly *Pulvinosphaeridium oligospinosum*, fourthly *Veryhachium oligospinosum* (Appendix A), fifthly *Goniosphaeridium oligospinosum* (Appendix A), sixthly (and now) *Estiastra?* *oligospinosa* (Appendix A). Age: Silurian (erratic).

QUADRINA Bujak in Bujak et al., 1980, p.90. Acritarch genus. Type: Bujak et al., 1980, pl.22, fig.9, as *Quadrina pallida*.

?*condita* de Verteuil and Norris, 1992, p.420,423, pl.6, figs.7–12; pl.12, fig.1; text-fig.11. Holotype: de Verteuil and Norris, 1992, pl.6, fig.7. Questionable assignment: de Verteuil and Norris (1992, p.420), who regarded this species as algae incertae sedis. Age: middle-late Miocene.

**pallida* Bujak in Bujak et al., 1980, p.90–91, pl.22, figs.9–11. Holotype: Bujak et al., 1980, pl.22, fig.9. Age: middle Eocene.

RHABDOSPHAERA Haeckel, 1894. Extant coccolithophorid genus. Further information not available.

"*erinacea*" Kamptner, 1937, p.71. Holotype: Kamptner, 1937, pl.1, figs.6–7; fig.2. Epitype: Kretschmann et al. 2014, figs.4–5, designated by Kretschmann et al. (2014, figs.4–5). **NOW** *Scrippsiella* (Appendix B). Originally *Rhabdosphaera*, subsequently *Rhabdothorax*, thirdly (and now) *Scrippsiella* (Appendix B). Taxonomic senior synonym: *Glenodinium* (now *Scrippsiella*) *trochoideum* (Appendix B, under *Scrippsiella*), according to Janofske (2000, p.180); however Kretschmann et al. (2014, p.403) retained this species. Age: extant.

RHACOBRACTION Dorning, 1981, p.198. Acritarch genus. The second part of the generic name is based on the Greek masculine noun "*brachion*" (arm), and hence adjectival specific epithets should be conjugated accordingly. Type: Cramer, 1964, pl.1, fig.8, as *Baltisphaeridium malum*.

**malus* (Cramer, 1964, p.297, pl.1, figs.6,8,10; text-fig.19, nos.10–12) Dorning, 1981, p.198. Holotype: Cramer, 1964, pl.1, fig.8. Originally *Baltisphaeridium* (Appendix A), subsequently *Evittia* Brito (Appendix A), thirdly *Hystrichosphaeridium* (combination not validly published), fourthly *Multiplicisphaeridium* (Appendix A), fifthly (and now) *Rhacobracion*. Sarjeant and Vavrdova (1997, p.10) retained this species in *Rhacobracion*. Age: Silurian (Ludlow).

RHOMBODELLA Cookson and Eisenack, 1962b, p.496. Emendations: Jiabo, 1978, p.49; Mao Shaozhi et al., 1995, p.60. Acritarch genus. Taxonomic senior synonym: *Palaeotetradinium*, according to Stover and Evitt (1978, p.70–71) — however, Duxbury (1980, p.134–135) retained *Rhombodella*. Type: Cookson and Eisenack, 1962b, pl.7, fig.13, as *Rhombodella natans*.

acantha Xu Jinli et al., 1997, p.45–46, pl.42, figs.10–11 ex He Chengquan et al., 2009, p.474,661–662. Holotype: Xu Jinli et al., 1997, pl.42, fig.10. This name was not validly published in Xu Jinli et al. (1997), since no English or Latin description was provided; He Chengquan et al. (2009, p.661–662) validated the name by publishing an English diagnosis. Age: Oligocene.

baculata Jiabo, 1978, p.49, pl.24, figs.14–15. Holotype: Jiabo, 1978, pl.24, fig.14. Age: Early Tertiary.

"*bifurcata*" Jiabo, 1978, p.50, pl.24, figs.16–17. Holotype: Jiabo, 1978, pl.24, fig.17. **NOW** *Pararhombodella*. Originally *Rhombodella*, subsequently (and now) *Pararhombodella*. Age: Early Tertiary.

"*commixtum*" Tang in Cai Zhiguo et al., 1998, p.245, pl.82, fig.10 Holotype: Cai Zhiguo et al., 1998, pl.82, fig.10. **Name not validly published:** no Latin or English description or diagnosis. The specific epithet was given as "*commixtun*" in the protologue. Age: information not available

elongata He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.64, pl.19, fig.2. Holotype: He Chengquan et al., 1989, pl.19, fig.2. Mao Shaozhi et al. (1995, p.99) indicated that this name should be restricted to the holotype. Age: Early Tertiary.

"*formosa*" Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.82, pl.8, figs.14–18. Holotype: Liu Zhili et al., 1992, pl.8, fig.16. **Taxonomic senior synonym:** *Rhombodella* (now *Pararhombodella*) *verruciformis*, according to Xu Jinli et al. (1997, p.96). Age: Early Tertiary.

granulata Zheng Yuefang and Liu Xuexian in Liu Zhili et al., 1992, p.82, pl.8, figs.19–22. Holotype: Liu Zhili et al., 1992, pl.8, fig.19. The authors attributed this species to the dinoflagellates. Age: Early Tertiary.

"kendelbachia" Morbey, 1975, p.38, pl.14, figs.1–4; pl.17, figs.1–3. Holotype: Morbey, 1975, pl.14, fig.1; pl.17, fig.1. **NOW** *Heibergella*. Originally *Rhombodella*, subsequently *Chytroeisphaeridia*, thirdly (and now) *Heibergella*. Age: Rhaetian.

laevigata Liu Zhili and Zheng Yuefang in Liu Zhili et al., 1992, p.82, pl.8, figs.1–5. Holotype: Liu Zhili et al., 1992, pl.8, fig.5. The authors attributed this species to the dinoflagellates. Age: Early Tertiary.

"*natans" Cookson and Eisenack, 1962b, p.496, pl.7, figs.12–13. Holotype: Cookson and Eisenack, 1962b, pl.7, fig.13. Originally *Rhombodella*, subsequently *Palaeotetradinium*. **Taxonomic senior synonym:** *Palaeohystrichophora* (as and now *Rhombodella paucispina*, according to Stover and Evitt (1978, p.71). The nomenclatural type of the genus *Rhombodella* remains the holotype of *Rhombodella natans*. Age: Aptian–Albian.

papillifera He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.64, pl.19, fig.1. Holotype: He Chengquan et al., 1989, pl.19, fig.1. Mao Shaozhi et al. (1995, p.99) indicated that this name should be restricted to the holotype. Age: Early Tertiary.

+paucispina (Alberti, 1961, p.19–20, pl.3, fig.25) Duxbury, 1980, p.136. Holotype: Alberti, 1961, pl.3, fig.25. Originally *Palaeohystrichophora*, subsequently *Palaeotetradinium*, thirdly (and now) *Rhombodella*. Lentin and Williams (1981, p.242) retained this species in *Rhombodella*. Taxonomic junior synonym: *Rhombodella natans*, according to Stover and Evitt (1978, p.71). The nomenclatural type of the genus *Rhombodella* remains the holotype of *Rhombodella natans*. Age: Albian.

"symphyanthera" He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.64–65, pl.19, figs.3–5. Holotype: He Chengquan et al., 1989, pl.19, fig.5. **Taxonomic senior synonym:** *Rhombodella* (as and now *Pararhombodella*) *tubiforma*, according to Xu Jinli et al. (1997, p.92). Age: Early Tertiary.

"tubiforma" Jiabo, 1978, p.50, pl.24, figs.12–13. Holotype: Jiabo, 1978, pl.24, fig.12. **NOW** *Pararhombodella*. Originally *Rhombodella*, subsequently (and now) *Pararhombodella*. Age: Early Tertiary.

"variabilis" Jiabo, 1978, p.50, pl.24, figs.7–11. Holotype: Jiabo, 1978, pl.24, fig.11. **NOW** *Pararhombodella*. Originally *Rhombodella*, subsequently (and now) *Pararhombodella*. Age: Early Tertiary.

"verruciformis" He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.65–66, pl.19, figs.9–11. Holotype: He Chengquan et al., 1989, pl.19, fig.10. **NOW** *Pararhombodella*. Originally *Rhombodella*, subsequently (and now) *Pararhombodella*. Taxonomic junior synonym: *Rhombodella formosa*, according to Xu Jinli et al. (1997, p.96). Age: Early Tertiary.

vesca Duxbury, 1980, p.135–136, pl.5, figs.7,10; text-fig.16. Holotype: Duxbury, 1980, pl.5, figs.7,10. Age: Barremian.

RUGASPHAERA Jiabo, 1978, p.105–106. Acritarch genus. Junior homonym: *Rugasphaera* Martin in Martin and Dean, 1988, an acritarch genus. Type: Jiabo, 1978, pl.40, fig.13, as *Rugasphaera corrugis*.

"operculata" Jiabo, 1978, p.107, pl.40, figs.17–20; pl.48, figs.3a–b. Holotype: Jiabo, 1978, pl.40, fig.19. **NOW** *Bosedinia*. Originally *Rugasphaera*, subsequently *Bosea* (combination illegitimate), thirdly (and now) *Bosedinia*. Age: late Eocene–Oligocene.

"SARJEANTIA" Horowitz, 1975, p.25. Emendation: Fensome and Sarjeant, 1982, p.51,53. Spore genus. **Taxonomic senior synonym:** *Aratrisporites* Leschik, 1956, a monoete spore, according to Conway and Cousminer (1983, p.35) and Fensome et al. (1993b, p.191). Sarjeant (1988, p.177–180) maintained that this genus represents dinoflagellates. Type: Horowitz, 1975, pl.1, fig.7, as *Sarjeantia triassica*.

"**triassica*" Horowitz, 1975, p.25, pl.1, fig.7. Emendation: Fensome and Sarjeant, 1982, p.53–54. Holotype: Horowitz, 1975, pl.1, fig.7. **Taxonomic senior synonym:** *Aratrisporites fimbriatus* Playford and Dettmann, 1965, a monolete spore, according to Conway and Cousminer (1983, p.35). Age: Late Triassic.

SCHIZOCYSTIA Cookson and Eisenack, 1962a, p.270. Acritarch genus. Taxonomic senior synonym: *Tetraporina* (Appendix A), by implication in Elsik (1968, p.286), who transferred the "type species", *Schizocystia rugosa*, to *Tetraporina* — however, most subsequent authors (e.g. Backhouse, 1988, p.115), retained *Schizocystia*. Type: Cookson and Eisenack, 1962a, pl.37, fig.11, as *Schizocystia rugosa*.

?*bicornuta* Jardiné et al., 1974, p.116, pl.1, fig.5. Holotype: Jardiné et al., 1974, pl.1, fig.5. Questionable assignment: Jardiné et al. (1974, p.116). Age: Famennian.

"*laevigata*" Cookson and Eisenack, 1962a, p.270–271, pl.37, figs.13–14. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.13. **Taxonomic senior synonym:** *Schizocystia rugosa*, according to Elsik (1968, p.286). Age: ?late Albian–Cenomanian.

lundii Poulsen, 1996, p.88–89, pl.45, figs.3–4. Holotype: Poulsen, 1996, pl.45, fig.4. Age: Rhaetian–Toarcian.

nonmarina Chlonova, 1976, p.63–64, pl.1, figs.16–17; pl.20, figs.23–26. Holotype: Chlonova, 1976, pl.1, fig.17; pl.20, figs.24–26. Age: ?Albian–Cenomanian.

pilosa Jardiné et al., 1972, p.297, pl.1, figs.7–8. Holotype: Jardiné et al., 1972, pl.1, fig.8. Age: ?Gedinnian.

rara Playford and Dettmann, 1965, p.160–161, pl.17, figs.67–69. Holotype: Playford and Dettmann, 1965, pl.17, fig.67. Age: Triassic (Rhaetian)–Early Jurassic.

**rugosa* Cookson and Eisenack, 1962a, p.270, pl.37, figs.11–12. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.11. Originally (and now) *Schizocystia*, subsequently *Tetraporina* (Appendix A). Backhouse (1988, p.115) retained this species in *Schizocystia*. Taxonomic junior synonym: *Schizocystia laevigata*, according to Elsik (1968, p.286). Age: ?late Albian–Cenomanian.

saharica Jardiné et al., 1974, p.116, pl.1, fig.3. Holotype: Jardiné et al., 1974, pl.1, fig.3. Age: ?Gedinnian.

SCHIZOSPHAERELLA Deflandre and Dangeard, 1938, p.1115–1117. Calcisphere genus (see Streng et al., 2004, p.481 and Elbrächter et al., 2008, p.1303). Kálin and Bernoulli (1984, p.414–415) provisionally attributed this genus to the dinoflagellates; and Řehánek and Cecca (1993, p.156) firmly attributed it to the dinoflagellate order Thoracosphaerales. Type: none designated — "type species" *Schizosphaerella punctulata*.

"*astraea*" Moshkovitz, 1979, p.458–459, pl.2, figs.1–8. **Name not validly published:** holotype not designated. Age: Sinemurian–Pliensbachian.

"*minutissima*" (Colom, 1935, p.12, pl.2, fig.8; text-fig.4a [four specimens]) Řehánek and Cecca, 1993, p.156. **Name not validly published:** holotype not designated. Originally *Fibrosphaera* (name not validly published; Appendix A), subsequently *Stomiosphaera* (name not validly published), thirdly *Colomisphaera* (name not validly published), fourthly *Schizosphaerella* (name not validly published). Designation of a holotype was a requirement of the I.C.Z.N. at the time that Colom (1935) proposed this name. Age: Late Early Jurassic.

**punctulata* Deflandre and Dangeard, 1938, p.1115–1117, figs.1–6. Holotype: not designated. Age: Hettangian–Kimmeridgian.

SHANBEIPOLLENITES Qian Lijun and Wu Jingyun in Qian Lijun et al., 1987, p.72. Gymnosperm pollen genus. Emendation: Schrank, 2004, p.303–304. Type: Qian Lijun et al., 1987, pl.14, fig.29, as *Shanbeipollenites quadrangulatus*.

quadratum (Kumar, 1987a, p.242, pl.2, figs.8–9) Schrank, 2004, p.304. Holotype: Kumar, 1987a, pl.2, fig.8. Originally *Mendicodinium*, subsequently (and now *Shanbeipollenites*). Age: early Kimmeridgian–Tithonian.

SICYOIDIUM He Chengquan, 1980, p.8. Acritarch genus. Type: He Chengquan, 1980, pl.1, fig.21, as *Sicyoidium ansatum*.

***ansatum** He Chengquan, 1980, p.8, pl.1, figs.21–22. Holotype: He Chengquan, 1980, pl.1, fig.21. Age: Oligocene.

circulare He Chengquan et al., 2009, p.246, 550,646, pl.177, fig.6. Holotype: He Chengquan et al., 2009, pl.177, fig.6. Age: Oligocene.

opimum He Chengquan, 1984b, p.186, pl.10, figs.15–18. Holotype: He Chengquan, 1984b, pl.10, fig.15. Age: middle-late Oligocene.

SKIAGIA Downie, 1982, p.262–263. Acritarch genus. Type: Downie, 1982, fig.9c, as *Skiagia scottica*.

insignis (Fridriksone, 1971, p.14–16, pl.2, figs.10–22) Downie, 1982, p.263–264. Holotype: Fridriksone, 1971, pl.2, fig.10. Originally *Hystrichosphaeridium?*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Skiagia*. Age: Early-Mid Cambrian.

SOLISPHAERIDIUM Staplin et al., 1965, p.183–184. Emendations: Sarjeant, 1968, p.222; Moczydłowska, 1998, p.98–99. Acritarch genus. Taxonomic senior synonym: *Micrhystridium* (Appendix A), according to Sarjeant and Stancliffe (1994, p.12) — however, Moczydłowska (1998, p.98) retained *Solisphaeridium*. For synonymy see Fensome et al. (1990, p.453). Type: Deflandre, 1939a, pl.10, fig.10, as *Hystrichosphaeridium stimulierum*.

"clavicularum" (Deflandre, 1939a, p.191–192, pl.10, fig.4) Sarjeant, 1968, p.223. Emendation: Sarjeant, 1968, p.223, as *Solisphaeridium clavicularum*. Holotype: Deflandre, 1939a, pl.10, fig.4. **NOW** *Micrhystridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium*, fourthly (and now) *Micrhystridium* (Appendix A). Age: Late Jurassic.

"delicatum" (Wall, 1965a, p.156, pl.1, figs.11–13; pl.7, fig.6) Riley and Sarjeant, 1972, table 1. Holotype: Wall, 1965a, pl.1, fig.11. **Combination not validly published:** basionym not fully referenced. **NOW** *Beaumontella?*. Originally *Baltisphaeridium* (Appendix A), subsequently *Solisphaeridium* (combination not validly published), thirdly (and now) *Beaumontella?*. Age: Hettangian–early Sinemurian.

"filamentosum" Heisecke, 1970, p.256, pl.8, fig.6; pl.11, figs.2–3. Holotype: Heisecke, 1970, pl.8, fig.6; pl.11, fig.2. **Taxonomic senior synonym:** *Cleistosphaeridium* (now *Lingulodinium*) *bergmannii*, according to Quattrocchio and Sarjeant, 2003, p.142. Age: Paleocene.

"lucidum" (Deunff, 1959, p.25–26, pl.9, figs.80,82–83,85–89) Turner, 1985, p.226–228. Holotype: Deunff, 1959, pl.9, fig.82. **NOW** *Micrhystridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium*. Age: Ordovician (Caradoc).

"nanus" (Deflandre, 1945a, p.62–63, pl.1, figs.5–7) Turner, 1984, p.136–137. Holotype: Deflandre, 1945a, pl.1, figs.5–6. **NOW** *Polygonium nanus* (Appendix A). Originally *Hystrichosphaeridium brevispinosum* var. *nanus*, subsequently *Baltisphaeridium brevispinosum* var. *nanus* (combination not validly published, Appendix A), thirdly *Baltisphaeridium nanus* (Appendix A), fourthly *Micrhystridium nanus* (Appendix A), fifthly (and now) *Polygonium nanus* (Appendix A), sixthly *Solisphaeridium nanus*. Taxonomic junior synonym: *Baltisphaeridium brevispinosum*

var. *wenlockense* (subsequently *Salopidium wenlockense*) Downie, 1959, an acritarch species, according to Lister (1970, p.54). N.I.A. Age: Silurian.

"?*seminudum*" (Wetzel, 1952, p.405, text-fig.26) Sarjeant, 1984a, p.143. Holotype: Wetzel, 1952, text-fig.26. **NOW** *Micrhystridium*? (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Solisphaeridium*, fourthly (and now) *Micrhystridium* (Appendix A). Questionable assignment: Sarjeant (1984a, p.143). Age: Paleocene (Danian).

**stimuliferum* (Deflandre, 1939a, p.192; pl.10, fig.10) Pocock, 1972, p.113. Holotype: Deflandre, 1939a, pl.10, fig.10. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Solisphaeridium*, fourthly *Filisphaeridium* (combination not validly published, Appendix A), fifthly *Micrhystridium* (Appendix A). Moczyłowska (1998, p.98) retained this species in *Solisphaeridium*. Age: Late Jurassic.

"subsp. *complanatum*" (Wetzel, 1952, p.404–405, pl.A, figs.11a–b) Sarjeant, 1984c, p.142. Emendation: Sarjeant, 1984c, p.142, as *Solisphaeridium stimuliferum* subsp. *complanatum*. Holotype: Wetzel, 1952, pl.A, figs.11a–b; Sarjeant, 1984c, pl.4, fig.6; text-fig.13. **NOW** *Micrhystridium stimuliferum*? subsp. *complanatum* (Appendix A). Originally *Hystrichosphaeridium oligacanthum* subsp. *complanatum*, subsequently *Baltisphaeridium oligacanthum* subsp. *complanatum* (Appendix A), thirdly *Cleistosphaeridium? oligacanthum* subsp. *complanatum*, fourthly *Solisphaeridium stimuliferum* subsp. *complanatum*, fifthly (and now) *Micrhystridium stimuliferum*? subsp. *complanatum* (Appendix A). Age: Paleocene.

"subsp. *stimuliferum*". Autonym. Holotype: Deflandre, 1939a, pl.10, fig.10. **NOW** *Micrhystridium stimuliferum* subsp. *stimuliferum* (Appendix A). Originally *Solisphaeridium stimuliferum* subsp. *stimuliferum* (Appendix A), subsequently (and now) *Micrhystridium stimuliferum* subsp. *stimuliferum* (Appendix A).

SPICADINIUM Batten and Lister, 1988, p.357. Acritarch genus. Type: Batten and Lister, 1988, figs.5j–k, as *Spicadinium akidoton*.

**akidoton* Batten and Lister, 1988, p.357–358, figs.4d,5j–k. Holotype: Batten and Lister, 1988, figs.5j–k. Taxonomic junior synonym: *Cleistosphaeridium nenjiangense*, according to Mao Shaozhi et al. (1999, p.159). Age: Hauterivian.

"*nenjiangense*" (Gao Ruiqi et al., 1992a, p.18,24, pl.3, figs.1–9; pl.4, figs.1–7) Schrank, 2001, p.204. Holotype: Gao Ruiqi et al., 1992a, pl.3, fig.1. Originally *Cleistosphaeridium*, subsequently *Impletosphaeridium*, thirdly *Spicadinium*. **Taxonomic senior synonym:** *Spicadinium akidoton*, according to Mao Shaozhi et al. (1999, p.159). This combination was also proposed by Masure in Fauconnier and Masure (2004, p.346). In proposing this combination, neither Schrank nor Masure acknowledged the synonymy proposed by Mao Shaozhi et al. (1999); we therefore follow the latter treatment. Age: Campanian.

SPINULIFERITES Huang Tsengchieng, 1981, p.51. Acritarch genus. Type: Huang Tsengchieng, 1981, pl.2, fig.13, as *Spinuliferites taiwanensis*.

**taiwanensis* Huang Tsengchieng, 1981, p.51, pl.2, fig.13. Holotype: Huang Tsengchieng, 1981, pl.2, fig.13. Age: Miocene.

STELLECHINATUM Turner, 1984, p.137. Acritarch genus. Type: Martin, 1969, pl.4, fig.206, as *Veryhachium celestum*.

spiciferum (Deunff, 1955, p.146, pl.3, fig.1; text-fig.26) Sarjeant and Vavrdova, 1997, p.31. Holotype: Deunff, 1955, pl.3, fig.1. Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published, Appendix A), thirdly *Baltisphaeridium* (Appendix A), fourthly *Evittia Brito* (combination not validly published,

Appendix A), fifthly *Multiplicisphaeridium* (Appendix A), sixthly (and now) *Stellechinatum*. Age: Middle Devonian.

uncinatum (Downie, 1958, p.337; text-fig.2a) Molyneux, 1987, p.342,344. Holotype: Downie, 1958, text-fig.2a. Originally *Hystrichosphaeridium longispinosum* var. *uncinatum*, subsequently *Baltisphaeridium longispinosum* var. *uncinatum* (Appendix A), thirdly *Baltisphaeridium uncinatum* (Appendix A), fourthly *Micrhystridium uncinatum* (Appendix A), fifthly *Goniosphaeridium uncinatum* (Appendix A), sixthly *Polygonium uncinatum* (Appendix A), seventhly *Goniosphaeridium polygonale* subsp. *uncinatum* (combination not validly published, Appendix A), eighthly (and now) *Stellechinatum uncinatum*. Taxonomic junior synonym: *Goniosphaeridium regulare* Yin Leiming in Chen Junyuan et al., 1985, an acritarch species, according to Yin Leiming (1986, p.347). Age: Early Ordovician.

STRIATOTHECA Burmann, 1970, p.299–300. Emendation: Sarjeant and Stancliffe, 1994, p.46. Acritarch genus. Type: Burmann, 1970, pl.11, fig.1, as *Striatotheca principalis*.

geometrica (Deflandre, 1945a, p.64–65, pl.2, figs.2–5) Sarjeant and Stancliffe, 1994, p.46. Holotype: Deflandre, 1945a, pl.2, fig.2. Originally *Hystrichosphaeridium geometricum*, subsequently *Veryhachium geometricum* (Appendix A), thirdly *Veryhachium trispinosum* subsp. *geometricum* (combination not validly published, Appendix A), fourthly (and now) *Striatotheca geometrica*. Age: Middle Silurian.

"SVENKODINIUM" Gedl, 1996, p.214. **Name not validly published:** type not validly published. Acritarch genus. **Taxonomic senior synonym:** *Nannobarbophora* (Appendix A), according to Head (2003b, p.383). Type: Gedl, 1996, figs.16i–k, as *Svenkodium minimum*.

"*minimum" Gedl, 1996, p.214, figs.12J,16a–b,i–k,N–P,R. **Name not validly published:** repository of holotype not indicated. Holotype: Gedl, 1996, figs.16i–k. **Taxonomic senior synonym:** *Nannobarbophora gedlii* (Appendix A), according to Head (2003b, p.383). Age: middle Miocene.

"versteeghii" Gedl, 1996, p.214, figs.12K–L,16c–h,l,M,P. **Name not validly published:** repository of holotype not indicated. Holotype: Gedl, 1996, figs.16d,h,l. **Taxonomic senior synonym:** *Nannobarbophora gedlii* (Appendix A), according to Head (2003b, p.383). Age: middle Miocene.

TASMANITES Newton, 1875, p.341. Prasinophyte genus. For synonymy see Fensome et al. (1990, p.471). Type: not designated.

"globulus" (Wetzel, 1933b, p.29, pl.4, fig.12) Morgenroth, 1966a, p.41–42. Holotype: Wetzel, 1933b, pl.4, fig.12; Sarjeant, 1985b, pl.2, fig.3; Dietz et al., 1999, fig.10, no.4. **NOW** *Pleurozonaria* (Appendix A). Originally (and now) *Pleurozonaria* (Appendix A), subsequently *Tasmanites*, thirdly *Pithonella*. N.I.A. Age: Late Cretaceous.

TETRANGULADINIUM Yu Jingxian et al., 1983, p.68. Genus representing zygospores of cyanobacteria. Earlier authors considered this genus to represent acritarchs (Chen et al., 1988, p.33; Fensome et al., 1990, p.477) and dinoflagellate cysts (Batten and Lister, 1988, p.358–359). Chen et al. (1988, p.34) and the authors of pre-2004 versions of this Index were incorrect in considering that Yu Jingxian et al. (1983) did not designate a holotype for the type of the genus: hence the genus and its type were validly published when proposed. Type: Yu Jingxian et al., 1983, pl.30, fig.2, as *Tetranguladinium conspicuum*.

***conspicuum** Yu Jingxian et al., 1983, p.68, pl.29, fig.9; pl.30, figs.2–6. Holotype: Yu Jingxian et al., 1983, pl.30, fig.2. See discussion under the generic entry. Age: Cretaceous.

cruciforme Yu Jingxian et al., 1983, p.69, pl.29, figs.6–8; pl.30, fig.1. Holotype: Yu Jingxian et al., 1983, pl.29, fig.8. In contrast to indications in pre-2004 versions of this Index, *Tetranguladinium cruciforme* was validly published originally because the generic name was validly published. Age: Cretaceous.

minqiaoense Qian Zeshu et al., 1986, p.24, pl.1, fig.39. Holotype: Qian Zeshu et al., 1986, pl.1, fig.39. In contrast to indications in pre-2004 versions of this Index, *Tetranguladinium minqiaoense* was validly published originally because the generic name was validly published. Age: Paleocene–Eocene.

opimum He Chengquan, Zhu Shenzhao and Jin Guangxing in He Chengquan et al., 1989, p.71, pl.20, fig.18. Holotype: He Chengquan et al., 1989, pl.20, fig.18. Age: Early Tertiary.

rectangulatum Yi Sangheon, 1997, p.530–531, figs.10c,14e–f. Holotype: Yi Sangheon, 1997, fig.14e. Age: late Maastrichtian.

reticulatum Yi Sangheon, 1997, p.531,537, figs.10b,14g–h,15a. Holotype: Yi Sangheon, 1997, fig.14g–h. Age: late Maastrichtian.

TETRAPORINA Naumova, 1939, p.357 ex Bolkhovitina, 1953, p.102. Zygnematalean genus. Taxonomic junior synonym: *Schizocystia* (Appendix A), by implication in Elsik (1968, p.286), who transferred the "type species", *Schizocystia rugosa*, to *Tetraporina* — however, most subsequent authors (e.g. Backhouse, 1988, p.115) retained *Schizocystia*. Type: information not available.

"*horologia*" Staplin, 1960, p.6, pl.1, figs.4,6 ex Playford, 1963, p.659. Holotype: Staplin, 1960, pl.1, fig.4; Pestchevitskaya, 2003, pl.2, fig.16. **NOW** *Horologinella*. Originally *Azonotetraporina* (name not validly published, Appendix A), subsequently *Tetraporina*, thirdly (and now) *Horologinella*. The name *Azonotetrapirina horologia* was not validly published in Staplin (1960) since the generic name *Azonotetraporina* was not validly published. Age: Carboniferous (late Mississippian).

"*rugosa*" (Cookson and Eisenack, 1962a, p.270, pl.37, figs.11–12) Elsik, 1968, p.286. Holotype: Cookson and Eisenack, 1962a, pl.37, fig.11. **NOW** *Schizocystia* (Appendix A). Originally (and now) *Schizocystia* (Appendix A), subsequently *Tetraporina*. Taxonomic junior synonym: *Schizocystia laevigata*, according to Elsik (1968, p.286). Age: ?late Albian–Cenomanian.

TRUNCATISPHAERIDIUM Riding and Duxbury, 1993, p.58–59. Acritarch genus. Type: Riding and Duxbury, 1993, pl.1, figs.1–2, as *Truncatisphaeridium clevelandense*.

**clevelandense* Riding and Duxbury 1993, p.59–60,62, pl.1, figs.1–6; text-fig.2. Holotype: Riding and Duxbury, 1993, pl.1, figs.1–2. Age: Aalenian–early Bajocian.

TUBULIFERA Schumacker-Lambry, 1978, p.52–53. Acritarch genus. Type: Schumacker-Lambry, 1978, pl.8, fig.6, as *Tubulifera heterosolenia*.

**heterosolenia* Schumacker-Lambry, 1978, p.53, pl.8, figs.4–7. Holotype: Schumacker-Lambry, 1978, pl.8, fig.6. Age: late Paleocene (Landenian).

UMBELLASPHAERIDIUM Jardiné et al., 1972, p.302–303. Acritarch genus. Type: Jardiné et al., 1972, pl.2, fig.12, as *Umbellasphaeridium saharicum*.

huecospinosum (Cramer, 1964, p.331, pl.6, fig.2; text-fig.36, no.7) Cramer and Diez, 1976, p.96. Holotype: Cramer, 1964, pl.6, fig.2. Originally *Hystrichosphaeridium*?, subsequently *Baltisphaeridium*? (combination not validly published, Appendix A), thirdly *Florisphaeridium* (Appendix A), fourthly (and now) *Umbellasphaeridium*. Age: Devonian (Emsian).

VERYHACHIUM Deunff, 1954b, p.305–306. Emendations: Downie and Sarjeant, 1963, p.93–94; Turner, 1984, p.139; Sarjeant and Stancliffe, 1994, p.33. Acritarch genus. For synonymy see Fensome et al. (1990, p.510) and Stancliffe and Sarjeant (1994, p.229). Type: Deunff, 1959, pl.1, fig.4, as *Veryhachium trisulcum*.

"baciferum" (Eisenack, 1934, p.66, pl.4, figs.20–21) Deunff, 1954b, p.306. Holotype: Eisenack, 1934, pl.4, fig.20, lost according to Eisenack (1962, p.356). Neotype: Eisenack, 1962, pl.44, fig.3, designated by Eisenack (1962, p.356). **Combination not validly published:** basionym not fully referenced. **NOW** *Bacisphaeridium* (Appendix A). Originally *Bion* (Appendix A), subsequently *Hystrichosphaeridium*, thirdly *Veryhachium* (combination not validly published), fourthly (and now) *Bacisphaeridium* (Appendix A), fifthly *Baltisphaeridium* (combination not validly published, Appendix A). This combination was not validly published in Deunff (1954b, p.306) additionally since that author did not clearly use the name *Veryhachium baciferum*. Age: Late Ordovician.

"balticum" (Eisenack, 1951, p.190, pl.3, figs.10–11) Eisenack, 1959, p.204. Holotype: Eisenack, 1951, pl.3, fig.10. **NOW** *Pachysphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Pulvinosphaeridium* (combination not validly published, Appendix A), thirdly *Veryhachium*, fourthly *Goniosphaeridium* (Appendix A), fifthly *Baltisphaeridium* (Appendix A), sixthly *Estiastra* (Appendix A), seventhly (and now) *Pachysphaeridium* (Appendix A). Junior homonym: *Veryhachium balticum* Yankauskas and Vaitekunene, 1972, an acritarch species. This combination was not validly published in Deunff (1954b, p.306), since that author did not fully reference the basionym or clearly use the name *Veryhachium balticum*. Age: Early Ordovician.

"cruciatum" (Wetzel, 1933b, p.94–95, pl.4, fig.30 ex Lejeune-Carpentier, 1940, p.B222) Lejeune-Carpentier and Sarjeant, 1981, p.22. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.22–23, as *Veryhachium cruciatum*. Holotype: Wetzel, 1933b, pl.4, fig.30. **NOW** *Multiplicisphaeridium?* (Appendix A). Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium*, thirdly *Hystrichosphaeridium?*, fourthly *Veryhachium*, fifthly (and now) *Multiplicisphaeridium?* (Appendix A). Age: Late Cretaceous.

"geometricum" (Deflandre, 1945a, p.64–65, pl.2, figs.2–5) Stockmans and Willière, 1963, p.452. Holotype: Deflandre, 1945a, pl.2, fig.2. **NOW** *Striatotheca geometrica* (Appendix A). Originally *Hystrichosphaeridium geometricum*, subsequently *Veryhachium geometricum*, thirdly *Veryhachium trispinosum* subsp. *geometricum* (combination not validly published, Appendix A), fourthly (and now) *Striatotheca geometrica* (Appendix A). This combination was not validly published in Deunff (1954b, p.306), since that author did not fully reference the basionym or clearly use the name *Veryhachium geometricum*. Age: Middle Silurian.

"hermesinoides" (Wetzel, 1940, p.138–140, pl.5, fig.7) Deflandre and Deflandre-Rigaud, 1964, fiche 1998. Holotype: Wetzel, 1940, pl.5, fig.7. **NOW** *Villosacapsula?* (Appendix A). Originally *Palaeotetradinium*, subsequently *Veryhachium*, thirdly (and now) *Villosacapsula?* (Appendix A). Age: Late Cretaceous.

"hyalodermum" (Cookson, 1956, p.188–189, pl.1, figs.12–16) Schaarschmidt, 1963, p.62–63. Holotype: Cookson, 1956, pl.1, fig.12. **NOW** *Dorsennidium* (Appendix A). Originally *Palaeotetradinium*, subsequently *Veryhachium*, thirdly *Gorgonisphaeridium* (Appendix A), fourthly (and now) *Dorsennidium* (Appendix A). Age: Albian–Cenomanian.

"lairdii" Deflandre, 1946c, card 1112 ex Loeblich Jr., 1970, p.742. Holotype: Deunff, 1959, pl.8, fig.75, designated by Loeblich Jr. (1970, p.742). Originally *Hystrichosphaeridium* (name not validly published), subsequently *Veryhachium*. **Taxonomic senior synonym:** *Veryhachium valiente* Cramer, 1964, an acritarch species, according to Martin (1969, p.95), who believed *Veryhachium lairdii* to be the senior name. **Taxonomic junior synonym:** *Veryhachium bromidense* Loeblich Jr., 1970, an acritarch species, according to Turner (1984, p.142). The name *Hystrichosphaeridium lairdii* was not validly published in Deflandre (1946c) since that author did not provide a description. Age: Middle Silurian.

"mensula" Wetzel, 1933b, p.49–50, pl.4, fig.32 ex Downie and Sarjeant, 1963, p.151. Holotype: Wetzel, 1933b, pl.4, fig.32. Originally *Hystrichosphaera* (name not validly published), subsequently *Hystrichosphaeridium* (name not validly published), thirdly (and now) *Veryhachium*. This combination was not validly published in Downie and Sarjeant (1963, p.94), since these authors did not reference the "basionym". The name *Hystrichosphaera mensula* was not validly published in Wetzel (1933b) since the generic name *Hystrichosphaera* was not validly published until 1937. N.I.A. Age: Late Cretaceous.

"*microfurcatum*" (Deunff, 1957, p.6, fig.2 — p.13, fig.3 — p.14) Deunff, 1957, caption to fig.3 — p.14. Holotype: Deunff, 1957, fig.2 — p.13. **Combination not validly published:** unintended citation of the name *Hystrichosphaeridium* (now *Ammonidium*) *microfurcatum*. **NOW** *Ammonidium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published), thirdly *Baltisphaeridium* (Appendix A), fourthly (and now) *Ammonidium* (Appendix A). Age: Middle Devonian.

"*monacanthum*" (Deunff, 1951, p.323; text-fig.4) Deunff, 1954b, p.305–307. Holotype: Deunff, 1951, text-fig.4. **Combination not validly published:** basionym not fully referenced and name not clearly used. **NOW** *Deunffia* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published), thirdly (and now) *Deunffia* (Appendix A). Questionable assignment: Deunff (1959, p.29). This combination was also not validly published in Deunff (1959, p.29) and Cramer (1963, p.215), since these authors did not fully reference the basionym. Age: Middle Ordovician.

"*oligospinosum*" (Eisenack, 1934, p.64–65, pl.4, figs.15–18 ex Eisenack, 1938a, p.12) Downie and Sarjeant, 1965, p.152. Holotype: Eisenack, 1934, pl.4, fig.18, lost according to Eisenack et al. (1973, p.494). **NOW** *Estiastra?* *oligospinosa* (Appendix A). Originally *Ovum hispidum* subsp. *oligospinosum* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium oligospinosum*, thirdly *Pulvinosphaeridium oligospinosum* (Appendix A), fourthly *Veryhachium oligospinosum*, fifthly *Goniosphaeridium oligospinosum* (Appendix A), sixthly (and now) *Estiastra? oligospinosa* (Appendix A). This combination was not validly published in Deunff (1954b, p.306), since that author did not fully reference the basionym or clearly use the name *Veryhachium oligospinosum*. It was not validly published in Downie and Sarjeant (1963, p.94) and Eisenack (1963b, p.209), since these authors did not fully reference the basionym. Age: Silurian (erratic).

"*polygonale*" (Eisenack, 1931, p.113, pl.4, figs.16–20; pl.5, fig.18 ex Eisenack, 1938a, p.12) Eisenack, 1963b, p.209. Holotype: Eisenack, 1931, pl.4, fig.19, as *Ovum hispidum* subsp. *polygonale*, lost according to Eisenack (1959, p.199). Neotype: Paris and Deunff, 1970, pl.1, fig.4, as *Veryhachium splendens*, designated by Fensome et al. (1990, p.235), which see. **Combination not validly published:** basionym not fully referenced. **NOW** *Polygonium polygonale* (Appendix A). Originally *Ovum hispidum* subsp. *polygonale* (name not validly published, Appendix A), subsequently *Hystrichosphaeridium polygonale*, thirdly *Baltisphaeridium polygonale* (Appendix A), fourthly *Veryhachium polygonale* (combination not validly published), fifthly *Goniosphaeridium polygonale* (Appendix A), sixthly (and now) *Polygonium polygonale* (Appendix A). Taxonomic junior synonyms: *Impletosphaeridium? primordiale*, according to Eisenack et al. (1973, p.497–498); *Veryhachium* (subsequently *Goniosphaeridium*) *splendens* Paris and Deunff, 1970, an acritarch species, according to Turner (1984, p.113–114) who believed *Goniosphaeridium splendens* to be the senior name; *Hystrichosphaeridium* (subsequently *Baltisphaeridium*) *sexradiatum*, according to Eisenack (1965c, p.261). This combination was also not validly published in Deflandre and Deflandre-Rigaud (1964, fiche 2061), since these authors did not fully reference the basionym. Age: Silurian (erratic).

"*singulare*" (Firtion, 1952, p.160, pl.8, figs.1–2) Burger, 1980a, p.91. Holotype: Firtion, 1952, pl.8, figs.1–2. **NOW** *Raphidodinium?*. Originally *Micrhystridium* (Appendix A), subsequently *Veryhachium*, thirdly (and now) *Raphidodinium?*. Taxonomic junior synonym: *Baltisphaeridium crameri* Singh, 1971, an acritarch species, according to Burger (1980a, p.91). Age: early Cenomanian.

"*spiciferum*" (Deunff, 1955, p.146, pl.3, fig.1; text-fig.26) Deunff, 1955, caption to pl.3, fig.1. Holotype: Deunff, 1955, pl.3, fig.1. **Combination not validly published:** unintended citation of the name *Hystrichosphaeridium spiciferum*. **NOW** *Stellechinatum* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Veryhachium* (combination not validly published), thirdly *Baltisphaeridium* (Appendix A), fourthly *Evittia* Brito (combination not validly published, Appendix A), fifthly *Multiplicisphaeridium* (Appendix A), sixthly (and now) *Stellechinatum* (Appendix A). Age: Middle Devonian.

staurasteroides (Deflandre, 1945a, p.25–26, pl.2, figs.7–9) Downie and Sarjeant, 1965, p.152. Emendation: Stancliffe and Sarjeant, 1994, p.234, as *Veryhachium staurasteroides*. Holotype: Deflandre, 1945a, pl.2, fig.7. Originally *Hystrichosphaeridium*, subsequently (and now) *Veryhachium*. This combination was not validly published in Deunff (1954b, p.306), since that author did not fully reference the basionym or clearly use the name. Age: Middle Silurian.

+*trispinosum* (Eisenack, 1938a, p.14,16; text-figs.2–3) Stockmans and Willièrè, 1962a, p.46–47. Emendation: Stancliffe and Sarjeant, 1994, p.233, as *Veryhachium trispinosum*. Holotype: Eisenack, 1938a, text-fig.2, lost according to Eisenack et al. (1979, p.499). Neotype: Deunff, 1980, pl.1, fig.7, designated by Stancliffe and Sarjeant (1994, p.233). Originally *Hystrichosphaeridium*, subsequently (and now) *Veryhachium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Micrhystridium* (combination not validly published, Appendix A). This species was retained in *Veryhachium* by Cramer and Diez (1979, p.59). Taxonomic junior synonyms: *Veryhachium cucruse* Timofeev, 1962, an acritarch species, according to Martin (1969, p.106); *Veryhachium arctatum* Deunff, 1981, *Veryhachium concavum* Piskun, 1974a, *Veryhachium edenense* Colbath, 1979, *Veryhachium microgranuliferum* Piskun, 1974a and *Hystrichosphaeridium* (ultimately *Veryhachium*) *trisulcum*, all acritarch species, and all according to Stancliffe and Sarjeant (1994, p.233). The nomenclatural type of the genus *Veryhachium* remains the holotype of *Hystrichosphaeridium* (ultimately *Veryhachium*) *trisulcum*. This combination was not validly published in Deunff (1954b, p.306) and Stockmans and Willièrè (1960, p.2,5–6), since these authors did not fully reference the basionym. It was not validly published in Deunff (1954b) additionally since that author did not clearly use the name *Veryhachium trispinosum*. Cramer and Diez (1979, p.47) considered *Veryhachium trispinosum* (or *Veryhachium trisulcum*) to be the possible taxonomic senior synonym of *Hystrichosphaeridium* (now *Deunffia*) *monacanthum*. Age: Silurian (erratic).

"subsp. *geometricum*" (Deflandre, 1945a, p.64–65, pl.2, figs.2–5) Tynni, 1982, p.84. Holotype: Deflandre, 1945a, pl.2, fig.2. **Combination not validly published:** basionym not fully referenced. **NOW** *Striatotheca geometrica* (Appendix A). Originally *Hystrichosphaeridium geometricum*, subsequently *Veryhachium geometricum* (Appendix A), thirdly *Veryhachium trispinosum* subsp. *geometricum* (combination not validly published), fourthly (and now) *Striatotheca geometrica* (Appendix A). Age: Middle Silurian.

"subsp. *trisulcum*" (Deunff, 1951, p.323, caption to text-fig.3 ex Deunff, 1959, p.27–28; pl.1, figs.1–4,8,10,12–14,16–17,20,22–23) Tynni, 1982, p.85. Holotype: Deunff, 1959, pl.1, fig.4 (see Fensome et al., 1990, p.526, under *Veryhachium trisulcum*). **Combination not validly published:** basionym not fully referenced. Originally *Hystrichosphaeridium trisulcum* (name not validly published), subsequently *Veryhachium trisulcum* (name not validly published), thirdly *Veryhachium trisulcum* (Appendix A), fourthly *Veryhachium trispinosum* subsp. *trisulcum* (combination not validly published). **Taxonomic senior synonym** (at specific rank): *Hystrichosphaeridium* (now *Veryhachium*) *trispinosum*, according to Stancliffe and Sarjeant (1994, p.233). Age: Middle Ordovician.

"**trisulcum*" Deunff, 1951, p.323, caption to text-fig.3 ex Deunff, 1959, p.27–28, pl.1, figs.1–4,8,10,12–14,16–17,20,22–23. Holotype: Deunff, 1959, pl.1, fig.4 (see Fensome et al., 1990, p.526). Originally *Hystrichosphaeridium trisulcum* (name not validly published), subsequently *Veryhachium trisulcum* (name not validly published), thirdly *Veryhachium trisulcum*, fourthly *Veryhachium trispinosum* subsp. *trisulcum* (combination not validly published, Appendix A). **Taxonomic senior synonym:** *Hystrichosphaeridium* (now *Veryhachium*) *trispinosum*, according to Stancliffe and Sarjeant (1994, p.233). The nomenclatural type of the genus *Veryhachium* remains the holotype of *Hystrichosphaeridium* (subsequently *Veryhachium*) *trisulcum*. The names *Hystrichosphaeridium trisulcum* and *Veryhachium trisulcum* were not validly published respectively in Deunff (1951, caption to text-fig.3) and Deunff (1954b, p.306), since no description was provided in the former publication and no illustration was provided in the latter publication. This name was not validly published in Deunff (1954b, p.306) since no illustration was provided. The name *Hystrichosphaeridium trisulcum* was not validly published in Deunff (1951, p.323) since no description was provided. Cramer and Diez (1979, p.47) considered *Veryhachium trisulcum* (or *Veryhachium trispinosum*) to be the possible taxonomic senior synonym of *Hystrichosphaeridium* (now *Deunffia*) *monacanthum*. Beju (1972, p.718) and Tynni (1976, p.38) misspelled the specific epithet as "*trisulcatum*". Age: Middle Ordovician.

VILLOSACAPSULA Loeblich Jr. and Tappan, 1976, p.307–308. Acritarch genus. Type: Loeblich Jr., 1970, fig.36A, as *Veryhachium setosapelliculum*.

?*hermesinoides* (Wetzel, 1940, p.138–140, pl.5, fig.7) Sarjeant and Stancliffe, 1994, p.47. Holotype: Wetzel, 1940, pl.5, fig.7. Originally *Palaeotetradinium*, subsequently *Veryhachium* (Appendix A), thirdly (and now) *Villosacapsula*. Questionable assignment: Sarjeant and Stancliffe (1994, p.47). Age: Late Cretaceous.

VISBYSPHAERA Lister, 1970, p.98. Emendations: Kiryanov, 1978, p.21; Le Hérisse, 1989, p.198–199. Acritarch genus. For synonymy see Fensome et al. (1990, p.529). Type: Downie, 1963, pl.92, fig.4, as *Baltisphaeridium dilatispinosum*.

brevifurcata (Eisenack, 1954a, p.207–208, pl.1, fig.2; text-fig.2) Lister, 1970, p.100. Holotype: Eisenack, 1954a, pl.1, fig.2. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Visbysphaera*, fourthly *Multiplicisphaeridium* (Appendix A). Priewalder (1987, p.60) retained this species in *Visbysphaera*. Le Hérisse (1989, p.201) also proposed this combination. Age: Silurian (late Llandovery).

erratica (Eisenack, 1954a, p.209, pl.1, figs.6–7; text-fig.7) Lister, 1970, p.98. Holotype: Eisenack, 1954a, pl.1, fig.6. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Visbysphaera*, fourthly *Multiplicisphaeridium* (Appendix A). Priewalder (1987, p.60) retained this species in *Visbysphaera*. Age: Silurian (late Ludlow).

gotlandica (Eisenack, 1954a, p.209, pl.1, fig.5; text-fig.6) Kiryanov, 1978, p.87–88. Holotype: Eisenack, 1954a, pl.1, fig.5. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Visbysphaera*. Taxonomic junior synonym: *Baltisphaeridium peltatum* Cramer, 1966, an acritarch species, according to Cramer (1970, p.157). This combination was not validly published in Lister (1970, p.98) since that author did not clearly use the name *Visbysphaera gotlandica*. Age: Silurian (late Llandovery).

mesa (Eisenack, 1955, p.179) Lister, 1970, p.100. Holotype: Eisenack, 1954a, pl.1, fig.3. Originally *Hystrichosphaeridium intermedium* (name illegitimate), subsequently *Hystrichosphaeridium meson*, thirdly *Baltisphaeridium meson* (Appendix A), fourthly (and now) *Visbysphaera mesa*, fifthly *Multiplicisphaeridium meson* (Appendix A). Priewalder (1987, p.62) retained this species in *Visbysphaera*. *Hystrichosphaeridium meson* is the substitute name for *Hystrichosphaeridium intermedium* Eisenack, 1954a, p.208, pl.1, figs.3,9; text-figs.3–4 (an illegitimate name). Taxonomic junior synonym: *Baltisphaeridium* (subsequently *Multiplicisphaeridium*) *micropilare* Cramer, 1970, an acritarch species, according to Ye Xiaorong (1984, p.42). Age: Silurian (late Llandovery–late Ludlow).

"*microspinoso*" (Eisenack, 1954a, p.209–210, pl.1, fig.8) Lister, 1970, p.99. Holotype: Eisenack, 1954a, pl.1, fig.8. **NOW** *Baltisphaeridium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently (and now) *Baltisphaeridium* (Appendix A), thirdly *Lophosphaeridium* (Appendix A), fourthly *Visbysphaera*, fifthly *Buedingiisphaeridium* (combination not validly published, Appendix A). Priewalder (1987, p.62) retained this species in *Visbysphaera*. Taxonomic junior synonym: *Baltisphaeridium listeri* Kiryanov, 1978, an acritarch species, according to Le Hérisse (1989, p.210). Age: Silurian (late Llandovery).

oligofurcata (Eisenack, 1954a, p.208, pl.1, fig.4; text-fig.5) Lister, 1970, p.100. Holotype: Eisenack, 1954a, pl.1, fig.4; text-fig.5. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Visbysphaera*, fourthly *Multiplicisphaeridium* (Appendix A). Priewalder (1987, p.63) retained this species in *Visbysphaera*. Age: Silurian (late Llandovery).

pirifera (Eisenack, 1954a, p.206–207, pl.1, figs.1a–b; text-fig.1) Kiryanov, 1978, p.89–90. Holotype: Eisenack, 1954a, pl.1, figs.1a–b. Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly *Multiplicisphaeridium* (Appendix A), fourthly (and now) *Visbysphaera*. Taxonomic junior synonym: *Baltisphaeridium hermosum* Cramer and Diez, 1968 (name not validly published), an acritarch species, according to Cramer (1970, p.148); *Baltisphaeridium* (now *Visbysphaera*) *dilatispinosum* Downie, 1963, an acritarch species, according to Eisenack (1965c, p.263) — however, Fensome et al. (1990, p.530) retained *Visbysphaera dilatispinosa*. This combination was not validly published in Lister (1970, p.98) since that author did not clearly use the name. Age: Silurian (late Llandovery).

VULCANISPHAERA Deunff, 1961a, p.42. Emendation: Rasul, 1976, p.479. Acritarch genus. Type: Deunff, 1961a, pl.2, fig.1, as *Vulcanisphaera africana*.

"*tuberata*" (Downie, 1958, p.338, pl.17, fig.3; text-fig.3f) Eisenack et al., 1973, p.1087–1088. Holotype: Downie, 1958, pl.17, fig.3. **NOW** *Acanthodiacrodium* (Appendix A). Originally *Hystrichosphaeridium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Acanthodiacrodium* (Appendix A), fourthly *Vulcanisphaera*, fifthly *Goniosphaeridium* (Appendix A). Age: Early Ordovician.

WETZELODINIUM Deflandre, 1936b, p.168. Radiolarian genus. Type: Wetzel, 1933a, pl.2, fig.23, as *Wetzelodinium tentaculatum*.

**tentaculatum* (Wetzel, 1933a, p.171, pl.2, fig.23; text-fig.4) Deflandre, 1936b, p.168–169. Holotype: Wetzel, 1933a, pl.2, fig.23. Originally *Polykrikos* (Appendix B), subsequently (and now) *Wetzelodinium*. This is a radiolarian; Pessagno in Sarjeant (1985b, p.164) stated that the holotype of this species represents "a broken multicyrtd Nassellarian". Age: ?Senonian.

XANTHIDIUM Ehrenberg, 1834, p.317. Extant desmid genus.

"*bulbosum*" Ehrenberg, 1837b, pl.1, fig.17. Emendation: Morgenroth, 1968, p.546–547, as *Hystrichokolpoma bulbosum*. Holotype: Ehrenberg, 1837b, pl.1, fig.17. Neotype: Morgenroth, 1968, pl.44, fig.6, designated by Morgenroth (1968, p.546). **NOW** *Hystrichokolpoma bulbosum*. Originally *Xanthidium bulbosum*, subsequently *Hystrichosphaera bulbosa* (combination not validly published), thirdly *Hystrichosphaeridium bulbosum*, fourthly *Ovum hispidum* subsp. *bulbosum* (combination not validly published, Appendix A), fifthly (and now) *Hystrichokolpoma bulbosum*, sixthly *Baltisphaeridium bulbosum* (combination not validly published, Appendix A). Taxonomic senior synonym: *Xanthidium* (as *Hystrichosphaeridium*) *tubiferum*, according to Stover and Evitt (1978, p.55) — however, Lentin and Williams (1989, p.134) retained *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*. This name may not have been validly published in Ehrenberg (1837b) since no description in that publication has been referenced or found. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Danian.

"*claviferum*" Wilkinson, 1849, p.89–92, pl.13, fig.1. Holotype: Wilkinson, 1849, pl.13, fig.1. **NOW** *Baltisphaeridium* (Appendix A). Originally *Xanthidium*, subsequently *Hystrichosphaeridium*, thirdly (and now) *Baltisphaeridium* (Appendix A). Age: Late Cretaceous.

"*complex*" (White, 1842, p.39, pl.4, fig.11) Bronn, 1848, p.1375. Holotype: White, 1842, pl.4, fig.11, lost according to Davey and Williams (1966b, p.74). Neotype: Davey and Williams, 1966b, pl.7, fig.1, designated by Davey and Williams (1966b, p.71). **NOW** *Oligosphaeridium complex*. Originally *Xanthidium tubiferum* var. *complex* (Appendix A), subsequently *Xanthidium complex*, thirdly *Hystrichosphaeridium complex*, fourthly (and now) *Oligosphaeridium complex*. Taxonomic junior synonyms: *Hystrichosphaeridium elegantulum*, according to Deflandre (1946b, p.111); *Hystrichosphaeridium himalayense*, according to Jain and Garg (1986b, p.64); *Oligosphaeridium cephalum*, according to Lejeune-Carpentier and Sarjeant (1981, p.9) and Jain (1982, p.52). Age: Senonian.

"*crassipes*" Reade, 1839, pl.9, figs.2–5. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.10, as *Hystrichokolpoma? crassipes*. Holotype: Reade, 1839, pl.9, fig.2, lost according to Lejeune-Carpentier and Sarjeant (1981, p.11). Neotype: Lejeune-Carpentier, 1941, fig.9; Lejeune-Carpentier and Sarjeant, 1981, pl.3, fig.3; text-fig.6; designated by Lejeune-Carpentier and Sarjeant (1981, p.11). **NOW** *Hystrichokolpoma*. Originally *Xanthidium*, subsequently *Hystrichosphaeridium*, thirdly *Litosphaeridium?*, fourthly (and now) *Hystrichokolpoma*. Taxonomic junior synonym: *Hystrichosphaeridium* (as *Pervosphaeridium*, now *Raetiaedinium*) *truncigerum*, by implication in Yun Hyesu (1981, p.27), who considered *Pervosphaeridium truncigerum* to be the senior name — however, Lentin and Williams (1985, p.282) retained *Pervosphaeridium truncigerum*. Age: Late Cretaceous.

"fimbriatum" White, 1842, p.36, pl.4, div.3, fig.3. Holotype: White, 1842, pl.4, div.3, fig.3; Sarjeant, 1991, fig.4.2. **NOW** *Filisphaeridium* (Appendix A). Originally *Xanthidium*, subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Comasphaeridium* (Appendix A), fifthly (and now) *Filisphaeridium* (Appendix A). Age: Late Cretaceous.

"furcatum" Ehrenberg, 1837b, pl.1, figs.12,14. Holotype: not designated. Originally *Xanthidium furcatum*, subsequently *Hystrichosphaera furcata*, thirdly *Ovum hispidum* subsp. *furcatum* (combination not validly published), fourthly *Spiniferites furcatus* (combination not validly published). **Taxonomic senior synonym:** *Xanthidium* (now *Spiniferites*) *ramosum*, according to Davey and Williams (1966a, p.29–33). Taxonomic junior synonym: *Geodia? tripunctata* (Appendix A), according to Sarjeant (1964a, p.175). Age: Late Cretaceous.

"hirsutum" Ehrenberg, 1837b, pl.1, figs. 10,?13. **Name not validly published:** Ehrenberg (1837b) did not intend to introduce a new species. Originally *Xanthidium hirsutum* (name not validly published), subsequently *Ovum hispidum* subsp. *hirsutum* (name not validly published, Appendix A), thirdly *Hystrichosphaera hirsuta* (name not validly published), fourthly *Hystrichosphaeridium hirsutum* (name not validly published), fifthly *Baltisphaeridium hirsutum* (name not validly published, Appendix A), sixthly *Operculodinium hirsutum* (name not validly published), seventhly *Operculodinium? hirsutum* (name not validly published). See discussion under *Operculodinium? hirsutum*. Age: Late Cretaceous.

"malleoferum" White, 1842, p.37, pl.4, div.3, fig.7. Holotype: White, 1842, pl.4, div.3, fig.7; Sarjeant, 1991, fig.4.6. **NOW** *Achomosphaera?*. Originally *Xanthidium*, subsequently *Baltisphaeridium* (Appendix A), thirdly (and now) *Achomosphaera?*, fourthly *Hystrichosphaeridium* (combination not validly published). Age: Late Cretaceous.

"palmatum" (White, 1842, p.39–40, pl.4, fig.12) Bronn, 1848, p.1375. Holotype: White, 1842, pl.4, fig.12. Originally *Xanthidium tubiferum* var. *palmatum* (Appendix A), subsequently *Xanthidium palmatum*, thirdly *Spiniferites palmatus*, fourthly *Cordosphaeridium palmatum*, fifthly *Hystrichosphaeridium recurvatum* (combination illegitimate), sixthly *Hystrichosphaeridium duplum* (name illegitimate). **Nomenclatural senior synonym:** *Xanthidium tubiferum* var. *recurvatum* (as *Hystrichosphaeridium recurvatum*), which has the same holotype. Nomenclatural junior synonyms: *Xanthidium tubiferum* var. *palmaforme* and *Hystrichosphaeridium duplum*, both of which have the same holotype as *Hystrichosphaeridium palmatum*. This is not an illegitimate combination. See *Hystrichosphaeridium recurvatum* for a full discussion. Age: Senonian.

"penicillatum" Ehrenberg, 1843b, p.61 ex Ehrenberg, 1854, pl.37, section 8, fig.3. Holotype: Ehrenberg, 1854, pl.37, section 8, fig.3. **NOW** *Systematophora penicillata*. Originally *Xanthidium penicillatum* (Appendix A), subsequently *Hystrichosphaera penicillata* (combination not validly published), thirdly *Hystrichosphaeridium penicillatum*, fourthly *Ovum hispidum* subsp. *penicillatum* (combination not validly published), fifthly *Hystrichosphaeridium? penicillatum*, sixthly (and now) *Systematophora penicillata*. Taxonomic junior synonym: *Systematophora fasciculigera*, according to Sarjeant (1980a, p.282). The name *Xanthidium penicillatum* was not validly published in Ehrenberg (1843b), with neither description nor illustration being provided. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1854) did not provide a description. Age: late Oxfordian.

"pilosum" Ehrenberg, 1854, pl.37, section 8, fig. 4. Emendation: Erkmen and Sarjeant, 1980, p.51, as *Sentusidinium pilosum*. Holotype: Ehrenberg, 1854, pl.37, section 8, fig. 4. **NOW** *Barbatacysta pilosa*. Originally *Xanthidium pilosum*, subsequently *Hystrichosphaera pilosa* (combination not validly published), thirdly *Hystrichosphaeridium? pilosum*, fourthly *Baltisphaeridium pilosum* (Appendix A), fifthly *Ovum hispidum* subsp. *pilosum* (Appendix A), sixthly *Cleistosphaeridium pilosum* (combination not validly published), seventhly *Tenua pilosa*, eighthly *Sentusidinium pilosum*, ninthly *Batiacasphaera pilosa*, tenthly (and now) *Barbatacysta pilosa*. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1854) did not provide a description. Age: Oxfordian.

"ramosum" Ehrenberg, 1837b, pl.1, fig.15. Holotype: not designated. Lectotype: Ehrenberg, 1837b, pl.1, fig.15, designated by Davey and Williams (1966a, p.32). **NOW** *Spiniferites ramosus*, Originally *Xanthidium ramosum*, subsequently (and now) *Spiniferites ramosus*, thirdly *Ovum hispidum* subsp. *ramosum* (combination not validly published, Appendix A), fourthly *Hystrichosphaera ramosa*, fifthly *Bion ramosum* (Appendix A). Taxonomic junior synonyms: *Xanthidium* (as *Hystrichosphaera*) *furcatum*, according to Davey and Williams (1966a, p.29–33);

Galea korykos and *Hystrichosphaeridium echinoides*, both according to Sarjeant (1983, p.91–92); *Areoligera birama*, according to Morgenroth (1968, p.550); *Geodia? tripunctata* (Appendix A), by implication in Sarjeant (1964a, p.175), who considered *Geodia? tripunctata* to be a taxonomic junior synonym of *Hystrichosphaera furcata*; *Hystrichosphaera* (as *Spiniferites*) *bulloidea*, according to Harland (1977b, p.101–102) — however, Lentin and Williams (1981, p.259) retained *Hystrichosphaera* (as *Spiniferites*) *bulloidea*; *Homotryblium distinctum*, according to Jain and Garg (1982, p.69), who considered *Homotryblium distinctum* to be a taxonomic junior synonym of *Spiniferites ramosus* subsp. *ramosus*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dodge (1989, p.289). The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous.

"**reginaldii**" Mantell, 1844, p.240; text-fig.53, no.5. Emendation: Sarjeant, 1967c, p.244–245, as *Hystrichosphaera reginaldii*. Holotype: Mantell, 1844, text-fig.53, no.5; Sarjeant, 1967c, figs.3A–B,4–5; Sarjeant, 1992a, figs.2,4a–b. **NOW** *Spiniferites?*. Originally *Xanthidium*, subsequently *Spiniferites*, thirdly *Hystrichosphaera*, fourthly *Baltisphaeridium* (Appendix A), fifthly (and now) *Spiniferites?*. Age: Late Cretaceous.

"**simplex**" White, 1842, p.38, pl.4, fig.10. Holotype: White, 1842, pl.4, fig.10. **NOW** *Dapsilidinium*. Originally *Xanthidium tubiferum* var. *simplex* (Appendix A), subsequently *Xanthidium simplex*, thirdly *Hystrichosphaeridium simplex*, fourthly *Polysphaeridium? simplex*, fifthly (and now) *Dapsilidinium simplex*. Age: Late Cretaceous.

"**spinosum**" White, 1842, p.37, pl.4, fig.6. Holotype: White, 1842, pl.4, fig.6; lost according to Sarjeant (1966b, p.141). **NOW** *Exochosphaeridium?*. Originally *Xanthidium*, subsequently *Hystrichosphaeridium*, thirdly *Baltisphaeridium* (Appendix A), fourthly *Cordosphaeridium* (combination not validly published), fifthly *Exochosphaeridium*, sixthly (and now) *Exochosphaeridium?*. Age: Late Cretaceous.

"**tubiferum**" Ehrenberg, 1837b, pl.1, fig.16. Emendation: Davey and Williams, 1966b, p.56–58, as *Hystrichosphaeridium tubiferum*. Holotype: Ehrenberg, 1837b, pl.1, fig.16. **NOW** *Hystrichosphaeridium tubiferum*. Originally *Xanthidium tubiferum*, subsequently *Hystrichosphaera tubifera* (combination not validly published), thirdly (and now) *Hystrichosphaeridium tubiferum*, fourthly *Ovum hispidum* subsp. *tubiferum* (combination not validly published; Appendix A). Taxonomic junior synonym: *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*, according to Stover and Eviitt (1978, p.55) — however, Lentin and Williams (1989, p.134) retained *Xanthidium* (as *Hystrichokolpoma*) *bulbosum*. The validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous?.

"var. **complex**" White, 1842, p.39, pl.4, fig.11. Holotype: White, 1842, pl.4, fig.11, lost according to Davey and Williams (1966b, p.74). Neotype: Davey and Williams, 1966b, pl.7, fig.1, designated by Davey and Williams (1966b, p.71). **NOW** *Oligosphaeridium complex*. Originally *Xanthidium tubiferum* var. *complex*, subsequently *Xanthidium complex* (Appendix A), thirdly *Hystrichosphaeridium complex*, fourthly (and now) *Oligosphaeridium complex*. Taxonomic junior synonyms: *Hystrichosphaeridium elegantulum*, according to Deflandre (1946b, p.111); *Hystrichosphaeridium himalayense*, according to Jain and Garg (1986b, p.64); *Oligosphaeridium cephalum*, according to Lejeune-Carpentier and Sarjeant (1981, p.9) and Jain (1982, p.52). Age: Senonian.

"var. **dilatatum**" Wilkinson, 1849, p.89. **Name not validly published**: no description. See discussion under *Baltisphaeridium claviferum* (Appendix A).

"var. **palmaforme**" White, 1842, p.39, pl.4, fig.12. Holotype: White, 1842, pl.4, fig.12. **Nomenclatural senior synonym**: *Xanthidium tubiferum* var. *recurvatum* (as *Hystrichosphaeridium recurvatum*), which has the same holotype. Nomenclatural senior synonym: *Xanthidium tubiferum* var. *palmatum*, which has the same holotype. Nomenclatural junior synonym: *Hystrichosphaeridium duplum*, which has the same holotype. This is not an illegitimate name. For a full discussion, see *Hystrichosphaeridium recurvatum*. Age: Senonian.

"var. **palmatum**" White, 1842, p.39–40, pl.4, fig.12. Holotype: White, 1842, pl.4, fig.12. Originally *Xanthidium tubiferum* var. *palmatum*, subsequently *Xanthidium palmatum* (Appendix A), thirdly *Spiniferites palmatus*, fourthly *Cordosphaeridium palmatum*, fifthly *Hystrichosphaeridium palmatum* (combination illegitimate), sixthly *Hystrichosphaeridium duplum* (name illegitimate). **Nomenclatural**

senior synonym: *Xanthidium tubiferum* var. *recurvatum* (as *Hystrichosphaeridium recurvatum*), which has the same holotype. Nomenclatural junior synonyms: *Xanthidium tubiferum* var. *palmaforme* and *Hystrichosphaeridium duplum*, both of which have the same holotype as *Hystrichosphaeridium palmatum*. This is not an illegitimate name. For a full discussion, see *Hystrichosphaeridium recurvatum*. Age: Senonian.

"var. **recurvatum**" White, 1842, p.39, pl.4, fig.12. Holotype: White, 1842, pl.4, fig.12. **NOW** *Hystrichosphaeridium recurvatum*. Originally *Xanthidium tubiferum* var. *recurvatum*, subsequently (and now) *Hystrichosphaeridium recurvatum*. Nomenclatural junior synonyms: *Xanthidium tubiferum* var. *palmaforme*, *Xanthidium tubiferum* var. *palmatum* and *Hystrichosphaeridium duplum*, all of which have the same holotype as *Xanthidium tubiferum* var. *recurvatum*. Age: Senonian.

"var. **simplex**" White, 1842, p.38, pl.4, fig.10. Holotype: White, 1842, pl.4, fig.10. **NOW** *Dapsilidinium*. Originally *Xanthidium tubiferum* var. *simplex*, subsequently *Xanthidium simplex* (Appendix A), thirdly *Hystrichosphaeridium simplex*, fourthly *Polysphaeridium? simplex*, fifthly (and now) *Dapsilidinium simplex*. Age: Late Cretaceous.

"var. **spiculatum**" White, 1844, p.87, pl.9, fig.4. Holotype: White, 1844, pl.9, fig.4. **NOW** *Baltisphaeridium spiculatum* (Appendix A). Originally *Xanthidium tubiferum* var. *spiculatum*, subsequently *Hystrichosphaeridium spiculatum*, thirdly (and now) *Baltisphaeridium spiculatum* (Appendix A). Age: Late Cretaceous.

"**vestitum**" White, 1842, p.36, pl.4, div.3, fig.2. Holotype: White, 1842, pl.4, div.3, fig.2. **NOW** *Eatonicysta?*. Originally *Xanthidium*, subsequently (and now) *Eatonicysta?*. Age: Late Cretaceous.

APPENDIX B

AMPHIDINIUM Claparède and Lachmann, 1859, p.276.

"**mitratum**" Vozzhennikova, 1967, p.40, pl.1, figs.2–3; pl.5, figs.1–2,4. Emendation: Lentin and Vozzhennikova, 1990, p.29–30, as *Amphigymnium mitratum*. Holotype: Vozzhennikova, 1967, pl.1, fig.2; Lentin and Vozzhennikova, 1990, pl.1, figs.10–11; text-fig.12; Appendix A, fig.38. **NOW** *Amphigymnium*. Originally *Amphidinium*, subsequently *Dinogymnium*, thirdly (and now) *Amphigymnium*. Age: Turonian–Senonian.

"**sibiricum**" Vozzhennikova, 1965. **Name not validly published:** no illustration.

CENTRODINIUM Kofoid, 1907a, p.185.

palaeofusum Wetzel, 1971, p.91, fig.8. Holotype: Wetzel, 1971, fig.8. Age: Senonian.

CERATIUM F. von P. Schrank, 1793, p.34.

fusus (Ehrenberg) Dujardin, 1841. Modern species defined from the motile stage. Further information not available. N.I.A. Age: extant.

"forma **filosum**" Wetzel, 1933a, p.169, pl.2, fig.20. Holotype: Wetzel, 1933a, pl.2, fig.20. **NOW** *Palaeocystodinium? rhomboides* subsp. *filosum*. Originally *Ceratium fusus* forma *filosum*, subsequently (and now) *Palaeocystodinium rhomboides* subsp. *filosum*. Wetzel (1933a, p.169) gave the following citation, "Form d: *Ceratium (Amphiceratium)* cf. *fusus*, forma *filosum* n.f." Age: Senonian.

"forma **incertum**" Deflandre, 1936b, p.188, pl.10, figs.8–9 (not fig.5). Holotype: not designated. Lectotype: Deflandre, 1936b, pl.10, fig.8, designated by Lentin and Williams (1993, p.476). **NOW** *Palaeocystodinium? rhomboides* forma *incertum*. Originally *Ceratium fusus* forma *incertum*, subsequently (and now) *Palaeocystodinium? rhomboides* forma *incertum*. Age: Senonian.

"forma **nodosum**" Wetzel, 1933a, p.169, pl.2, fig.19. Holotype: Wetzel, 1933a, pl.2, fig.19; Dietz et al., 1999, fig.10, no.5. Originally *Ceratium fusus* forma *nodosum*, subsequently *Palaeocystodinium? rhomboides* subsp. *nodosum*. **Taxonomic senior synonym** (at specific rank): *Deflandrea delineata*, according to Sarjeant (1985b, p.157). Wetzel (1933a, p.169) gave the following citation, "Form c: *Ceratium (Amphiceratium)* cf. *fusus*, forma *nodosum* n.f." Age: Senonian.

"forma **ovatum**" Wetzel, 1933a, p.168, pl.2, fig.18. Holotype: Wetzel, 1933a, pl.2, fig.18. **NOW** *Palaeocystodinium rhomboides* subsp. *ovatum*. Originally *Ceratium fusus* forma *ovatum*, subsequently (and now) *Palaeocystodinium? rhomboides* subsp. *ovatum*. Wetzel (1933a, p.168) gave the following citation, "Form b: *Ceratium (Amphiceratium)* cf. *fusus*, forma *ovatum* n.f." Age: Senonian.

"forma **rhomboides**" Wetzel, 1933a, p.168, pl.2, fig.17. Holotype: Wetzel, 1933a, pl.2, fig.17. **NOW** *Palaeocystodinium rhomboides*. Originally *Ceratium fusus* forma *rhomboides*, subsequently (and now) *Palaeocystodinium? rhomboides*. Wetzel (1933a, p.168) gave the following citation, "Form a: *Ceratium (Amphiceratium)* cf. *fusus*, forma *rhomboides* n.f." Age: Senonian.

"**operculatum**" Wetzel, 1933a, p.170, pl.2, figs.21–22; text-fig.3. Holotype: Wetzel, 1933a, pl.2, fig.21. **NOW** *Odontochitina operculata*. Originally *Ceratium (Euceratium) operculatum*, subsequently *Palaeoceratium* (combination not validly published), thirdly (and now) *Odontochitina*. Taxonomic junior synonym: *Odontochitina silicorum*, according to Deflandre and Cookson (1955, p.292). Wetzel (1933a, p.170) gave the following citation, "*Ceratium (Euceratium) operculatum* n. sp." Age: Senonian.

CERATOCORYS Stein, 1883, p.20.

"*smolenskiensis*" Vozzhennikova, 1967, p.93, pl.34, figs.1–6; pl.35, fig.6; pl.36, fig.4. Emendation: Lentin and Vozzhennikova, 1990, p.112, as *Rhiptocorys smolenskiensis*. Holotype: Vozzhennikova, 1967, pl.36, fig.4, lost according to Lentin and Vozzhennikova (1990, p.112). Lectotype: Lentin and Vozzhennikova, 1990, pl.13, figs.1–3; text-fig.65, designated by Lentin and Vozzhennikova (1990, p.112). **NOW** *Rhiptocorys*. Originally *Ceratocorys*, subsequently *Microdinium*, thirdly *Microdinium?*, fourthly (and now) *Rhiptocorys*. Taxonomic senior synonym: *Micrhystridium* (as *Phanerodinium*, now *Rhiptocorys*) *veligerum*, according to Below (1987b, p.39) — however, Lentin and Vozzhennikova (1990, p.112) retained *Ceratocorys* (as *Rhiptocorys*) *smolenskiensis*. Age: Late Cretaceous.

"*veligera*" (Deflandre, 1937b, p.81, pl.12 [al. pl.9], fig.9) Lejeune-Carpentier, 1943, p.B24–B25. Emendations: Lejeune-Carpentier, 1943, p.B24–B25, as *Ceratocorys veligera*; and Lejeune-Carpentier and Sarjeant, 1983, p.5–6, as *Rhiptocorys veligera*. Holotype: Deflandre, 1937b, pl.12 (al. pl.9), fig.9; Fensome et al., 1995, fig.1 — p.1885. **NOW** *Rhiptocorys*. Originally *Micrhystridium* (Appendix A), subsequently *Ceratocorys*, thirdly *Microdinium*, fourthly *Microdinium?*, fifthly (and now) *Rhiptocorys*, sixthly *Phanerodinium*, seventhly *Phanerodinium?*. Taxonomic junior synonyms: *Microdinium irregulare* and *Microdinium smolenskiense*, both according to Below (1987b, p.56) — however, Lentin and Vozzhennikova (1990, p.112) retained *Ceratocorys* (as *Rhiptocorys*) *smolenskiensis*. Age: Senonian.

CLADOPYXIS Stein, 1883, p.18.

"*svalbardensis*" Below, 1987b, p.60, pl.29, figs.1–6; text-figs.13a–g. Holotype: Below, 1987b, pl.29, figs.1,3–4,6; text-figs.13c–g; Fensome et al., 1993a, figs.1,3–4,6 — p.1361. **NOW** *Cladopyxidium*. Originally *Cladopyxis*, subsequently (and now) *Cladopyxidium*. Age: Toarcian.

GONIODOMA Stein, 1883, p.9,13,16,19,21.

"*milneri*" (Murray and Whitting, 1899, p.325, pl.27, figs.2a–d) Kofoid, 1911, p.203. Holotype: not designated. **NOW** *Lingulodinium*. Originally *Gonyaulax* (Appendix B), subsequently *Goniodoma*, thirdly (and now) *Lingulodinium*. This species represents living motile cells. Age: extant.

polyedrica (Pouchet, 1883, p.42, fig.34) Jörgensen, 1900, p.33. Holotype: Pouchet, 1883, fig.34. Originally *Peridinium* (Appendix B), subsequently (and now) *Goniodoma*, thirdly *Heteraulacysta*. Lentin and Williams (1973, p.67–68) retained this species in *Goniodoma*, restricting it to modern forms. Morgenroth (1966a, p.7) included Eocene fossils in this modern, motile-based species. Lentin and Williams (1973, p.67–68) proposed *Heteraulacysta fehmarnensis* for fossil cysts which resemble *Goniodoma polyedrica*. Age: extant.

GONYAULAX Diesing, 1866, p.305,382. Fensome et al. (1993b, p.93) considered *Gonyaulax* to be a possible taxonomic junior synonym of *Spiniferites*. Type: specimen not designated originally or apparently subsequently; "type species" *Peridinium* (now *Gonyaulax*) *spiniferum* Claparède and Lachmann, 1859.

"*acanthosphaera*" Sarjeant, 1961a, p.94–95, pl.13, fig.14; text-fig.4. Emendation: Sarjeant, 1976c, p.12, as *Meiourogonyaulax? acanthosphaera*. Holotype: Sarjeant, 1961a, pl.13, fig.14; text-fig.4; Sarjeant, 1976c, pl.5, figs.2,4. **NOW** *Meiourogonyaulax?*. Originally *Gonyaulax*, subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Meiourogonyaulax*, fifthly (and now) *Meiourogonyaulax?*, sixthly *Lithodinia*, seventhly *Lithodinia?*. Age: early Oxfordian.

"*aceras*" Eisenack, 1958a, p.391, pl.21, figs.1–2. Emendation: Sarjeant, 1985a, p.57,59, as *Cribroperidinium aceras*. Holotype: Eisenack, 1958a, pl.21, fig.1; Sarjeant, 1985a, pl.4, figs.1–2; Jan du Chêne et al., 1986a, pl.2, figs.6–7. **NOW** *Cribroperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Leptodinium*, fourthly *Acanthaulax?*, fifthly (and now) *Cribroperidinium*. Age: Aptian.

"*aculeata*" Klement, 1960, p.42, pl.5, figs.6–9; text-fig.21. Holotype: Klement, 1960, pl.5, figs.6–7. **NOW** *Tehamadinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Acanthaulax*, fourthly *Occisucysta*, fifthly (and now) *Tehamadinium*. Age: early Kimmeridgian.

"*amabilis*" Deflandre, 1939b, p.143, pl.6, fig.8. Emendation: Kunz, 1990, p.18–19, as *Leptodinium amabile*. Holotype: Deflandre, 1939b, pl.6, fig.8; Jan du Chêne et al., 1986a, pl.69, figs.1–3. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently (and now) *Leptodinium*, thirdly *Gonyaulacysta*, fourthly *Leptodinium?*. Age: Kimmeridgian.

"*ambigua*" Deflandre, 1939b, p.144, pl.6, fig.2. Holotype: Deflandre, 1939b, pl.6, fig.2; Jan du Chêne et al., 1986a, pl.68, figs.1–3. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly (and now) *Leptodinium*. Age: Kimmeridgian.

"*apionis*" Cookson and Eisenack, 1958, p.36, pl.3, fig.7; text-figs.3–4. Holotype: Cookson and Eisenack, 1958, text-figs.3–4; Jan du Chêne et al., 1986a, pl.33, fig.6. **NOW** *Criproperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Criproperidinium*. Taxonomic senior synonym: *Gonyaulax* (now *Criproperidinium*) *edwardsii*, according to Burger (1980a, p.82) — however, Jan du Chêne et al. (1986a, p.76) retained *Gonyaulax* (as *Criproperidinium*) *apionis*. Age: Albian.

"*areolata*" Sarjeant, 1961a, p.95–96, pl.13, fig.13; text-fig.5. Holotype: Sarjeant, 1961a, pl.13, fig.13; text-fig.5; Jan du Chêne et al., 1986a, pl.3, figs.1–2. **Name illegitimate** — **senior homonym**: *Gonyaulax areolata* Kofoid and Michener, 1911. Substitute name: *Gonyaulacysta scarburghensis*. **NOW** *Trichodinium scarburghense*. Originally *Gonyaulax areolata* (name illegitimate), subsequently *Gonyaulacysta scarburghensis*, thirdly *Gonyaulacysta areolata* (combination illegitimate), fourthly *Acanthaulax areolata* (combination illegitimate), fifthly *Acanthaulax scarburghensis*, sixthly *Liesbergia scarburghensis*, seventhly (and now) *Trichodinium scarburghense*. Taxonomic junior synonym: *Acanthaulax senta*, according to Berger (1986, p.343) and Jan du Chêne et al. (1986a, p.25). Age: late Callovian–early Oxfordian.

"*bulloidea*" Cookson and Eisenack, 1960b, p.247, pl.37, fig.11; text-figs.4a–b. Emendation: Riding and Helby, 2001g, p.206, as *Meiourogonyaulax bulloidea*. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.11. Originally *Gonyaulax*, subsequently (and now) *Meiourogonyaulax*, thirdly *Lithodinia*. Age: Tithonian.

"*cassidata*" (Eisenack and Cookson, 1960, p.3, pl.1, figs.5–6) Cookson and Eisenack, 1962b, p.486. Emendations: Sarjeant, 1966b, p.125, as *Gonyaulacysta cassidata*; Helenes and Lucas-Clark, 1997, p.190, as *Wrevittia cassidata*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.5; Jan du Chêne et al., 1986a, pl.40, figs.6–7. **NOW** *Wrevittia cassidata*. Originally *Gonyaulax helicoidea* subsp. *cassidata*, subsequently *Gonyaulax cassidata*, thirdly *Gonyaulacysta cassidata*, fourthly (and now) *Wrevittia cassidata*. Age: Aptian–Cenomanian.

"*caytonensis*" Sarjeant, 1959, p.330–332, pl.13, fig.1; text-fig.1. Holotype: Sarjeant, 1959, pl.13, fig.1; text-fig.1. **NOW** *Meiourogonyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Lithodinia*. Age: early Callovian.

"*chaloneri*" Sarjeant, 1963b, p.354; text-figs.2 (right)-3. Holotype: Sarjeant, 1963b, text-figs.2 (right)-3. **NOW** *Rhaetogonyaulax rhaetica* subsp. *chaloneri*. Originally *Gonyaulax chaloneri*, subsequently *Rhaetogonyaulax chaloneri*, thirdly *Rhaetogonyaulax rhaetica* var. *chaloneri*, fourthly (and now) *Rhaetogonyaulax rhaetica* subsp. *chaloneri*. Age: Carnian.

"*cladophora*" Deflandre, 1939a, p.173–176, pl.7, figs.1–5; text-figs.5–6. Holotype: Deflandre, 1939a, pl.7, fig.1; and Jan du Chêne et al., 1986a, pl.94, fig.6. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. Taxonomic junior synonyms: *Gonyaulacysta gottisii*, according to Jan du Chêne et al. (1986a, p.48) and Jan du Chêne and Fauconnier (1986, p.55); *Gonyaulacysta canadensis* and *Gonyaulacysta downiei*, both according to Fisher and Riley (1980, p.320) and Kunz (1990, p.23). Age: early Oxfordian.

"subsp. *cladophora*". Autonym. Holotype: Deflandre, 1939a, pl.7, fig.1; Jan du Chêne et al., 1986a, pl.94, fig.6. **NOW** *Rhynchodiniopsis cladophora* subsp. *cladophora*. Originally *Gonyaulax cladophora* subsp.

cladophora, subsequently *Gonyaulacysta cladophora* subsp. *cladophora*, thirdly *Hystrichogonyaulax cladophora* subsp. *cladophora*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *cladophora*. Taxonomic junior synonyms: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *extensa*, *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *hemipolyedrica* and *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *isovalvata*, all by implication in Brenner (1988, p.72), who listed these subspecies as taxonomic junior synonyms of the species *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained all three subspecies.

"subsp. *extensa*" Klement, 1960, p.36–37, pl.4, figs.1–4; text-fig.16. Holotype: Klement, 1960, pl.4, figs.1–3; Jan du Chêne et al., 1986a, pl.95, figs.4–5. **NOW** *Rhynchodiniopsis cladophora* subsp. *extensa*. Originally *Gonyaulax cladophora* subsp. *extensa*, subsequently *Gonyaulacysta cladophora* subsp. *extensa*, thirdly *Hystrichogonyaulax cladophora* subsp. *extensa*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *extensa*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *extensa*. Age: early Kimmeridgian.

"subsp. *hemipolyedrica*" Klement, 1960, p.36, pl.3, figs.10–12; text-figs.14–15. Holotype: Klement, 1960, pl.3, figs.10–11. **NOW** *Rhynchodiniopsis cladophora* subsp. *hemipolyedrica*. Originally *Gonyaulax cladophora* subsp. *hemipolyedrica*, subsequently *Gonyaulacysta cladophora* subsp. *hemipolyedrica*, thirdly *Hystrichogonyaulax cladophora* subsp. *hemipolyedrica*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *hemipolyedrica*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *hemipolyedrica*. Age: early Kimmeridgian.

"subsp. *isovalvata*" Klement, 1960, p.37–38, pl.4, figs.5–9; text-fig.17. Holotype: Klement, 1960, pl.4, figs.5–6. **NOW** *Rhynchodiniopsis cladophora* subsp. *isovalvata*. Originally *Gonyaulax cladophora* subsp. *isovalvata*, subsequently *Gonyaulacysta cladophora* subsp. *isovalvata*, thirdly *Hystrichogonyaulax cladophora* subsp. *isovalvata*, fourthly (and now) *Rhynchodiniopsis cladophora* subsp. *isovalvata*. Taxonomic senior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *cladophora*, by implication in Brenner (1988, p.72), who listed this subspecies as a taxonomic junior synonym of *Rhynchodiniopsis cladophora* — however, Lentin and Williams (1993, p.566) retained *Gonyaulax* (as *Rhynchodiniopsis*) *cladophora* subsp. *isovalvata*. Age: early Kimmeridgian.

"*clathrata*" Cookson and Eisenack, 1960b, p.246–247, pl.37, fig.5; text-fig.2. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.5; text-fig.2; Jan du Chêne et al., 1986a, pl.71, figs.10–12. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently (and now) *Leptodinium*, thirdly *Gonyaulacysta*. Age: ?Tithonian.

"*confusa*" Vozzhennikova, 1967, p.80, pl.17, figs.1a–b; pl.25, figs.4–5; pl.27, figs.3–4. Holotype: Vozzhennikova, 1967, pl.25, fig.5, lost according to Lentin and Vozzhennikova (1990, p.93). **NOW** *Apteodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Apteodinium*. Age: Late Jurassic.

"*cornigera*" Valensi, 1953, p.27, pl.1, figs.4,8,10; pl.2, figs.1–2; pl.13, fig.5; text-fig.2a. Emendation: Jan du Chêne et al., 1985b, p.110, as *Ctenidodinium cornigerum*. Holotype: Valensi, 1953, pl.1, fig.8. **NOW** *Ctenidodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Hystrichogonyaulax*, fourthly (and now) *Ctenidodinium*. Woollam (1983, p.193) considered *Ctenidodinium combazii* to be a possible taxonomic junior synonym of this species. Age: Bathonian.

"*crassicornuta*" Klement, 1960, p.38–39, pl.5, figs.1–3. Emendation: Sarjeant, 1984a, p.158–160, as *Rhynchodiniopsis crassicornuta*. Holotype: Klement, 1960, pl.5, fig.1; Sarjeant, 1984a, pl.2, figs.1–2; text-fig.2; Jan du Chêne et al., 1986a, pl.45, figs.1–4. **NOW** *Gonyaulacysta?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Gonyaulacysta?*, fourthly *Rhynchodiniopsis*. Age: early Kimmeridgian.

"*cretacea*" Neale and Sarjeant, 1962, p.441–443, pl.19, figs.1–2; text-figs.2a–b. Holotype: Neale and Sarjeant, 1962, pl.19, figs.1–2; text-figs.2a–b. **NOW** *Stanfordella*?. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Stanfordella*?. Age: Hauterivian.

"*crispa*" Wetzel, 1967a, p.870, pl.15, figs.4a–b. Emendations: Sarjeant, 1980b, p.119–120, as *Hystrichogonyaulax crispa*; Fenton, 1981, p.255,257, as *Cribroperidinium crispum*. Holotype: Wetzel, 1967a, pl.15, figs.4a–b; Dietz et al., 1999, text-fig.5a. **NOW** *Cribroperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Hystrichogonyaulax*, fifthly (and now) *Cribroperidinium*, sixthly *Acanthaulax*. Age: Middle Jurassic.

"?*crystalata*" Sarjeant, 1959, p.332–334, pl.13, fig.2; text-fig.2. Holotype: Sarjeant, 1959, pl.13, fig.2; text-fig.2. **NOW** *Meiourogonyaualax*. Originally *Gonyaulax*?, subsequently *Meiourogonyaualax*?, thirdly *Lithodinia*?, fourthly (and now) *Meiourogonyaualax*, fifthly *Lithodinia*. Questionable assignment: Sarjeant (1959, p.332). Age: early Callovian.

"*culmula*" Norris, 1965, p.793–795, figs.1–2,6–9. Holotype: Norris, 1965, figs.8–9. **NOW** *Dichadogonyaulax*. Originally *Gonyaulax*, subsequently (and now) *Dichadogonyaulax*, thirdly *Ctenidodinium*, fourthly *Avellodinium*. N.I.A. Age: Portlandian.

"*decapitata*" Wetzel, 1967a, p.869, pl.16, figs.7a–b. Emendation: Sarjeant, 1980b, p.121, as *Meiourogonyaualax decapitata*. Holotype: Wetzel, 1967a, pl.16, figs.7a–b; Sarjeant, 1980b, pl.3, figs.1–3; text-fig.3; Dietz et al., 1999, text-fig.5b. Originally *Gonyaulax*, subsequently *Meiourogonyaualax*, thirdly *Lithodinia*, fourthly *Meiourogonyaualax*? **Taxonomic senior synonym:** *Meiourogonyaualax* (as *Lithodinia*) *valensii* Sarjeant, 1966b, according to Fenton (1981, p.253) and Williams et al. (1993, p.56). Age: Bajocian.

"*diaphana*" Cookson and Eisenack, 1958, p.36, pl.3, figs.13–14; text-figs.10–11. Holotype: Cookson and Eisenack, 1958, pl.3, figs.13–14; text-figs.10–11; Jan du Chêne et al., 1986a, pl.32, fig.6. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Cribroperidinium*. **Taxonomic senior synonym:** *Gonyaulax* (now *Cribroperidinium*) *muderongensis*, according to Backhouse (1988, p.80). Age: Aptian.

digitale (Pouchet, 1883, p.443, pl.18–19, fig.14) Kofoid, 1911, p.214. Holotype: information not available. Originally *Protoperidinium* (Appendix B), subsequently (and now) *Gonyaulax*. N.I.A. Age: extant.

subsp. *digitalis*. Autonym. Holotype: information not available. N.I.A.

"subsp. *prima*" Sütő-Szentai, 1988, p.355, pl.3, fig.2. **Name not validly published:** no description. This name was also specified as new but not validly published, for the same reason, in Sütő-Szentai (1991, p.190; pl.F, figs.a–b). Age: late Miocene.

"subsp. *quatuor*" Sütő-Szentai, 1988, p.356, pl.3, fig.5. **Name not validly published:** no description. This name was also specified as new but not validly published, for the same reason, in Sütő-Szentai (1991, p.192; pl.G, figs.f). Age: late Miocene.

subsp. *secunda* Fuchs and Sütő-Szentai, 1991, p.24, pl.8, figs.1–5; text-fig.2, nos.2 (two illustrations), 3. Holotype: Fuchs and Sütő-Szentai, 1991, pl.8, fig.5, text-fig.2, no.2 (two illustrations). This name was not validly published in Sütő-Szentai (1988, p.344, pl.3, fig.4) and Sütő-Szentai (1991, p.190, pl.F, fig.d), since these authors did not provide a description. Age: late Miocene.

"subsp. *tertia*" Sütő-Szentai, 1988, p.356, pl.3, fig.6. **Name not validly published:** no description. This name was also specified as new but not validly published, for the same reason, in Sütő-Szentai (1991, p.192; pl.G, fig.e). Age: late Miocene.

"subsp. *transformis*" Sütő-Szentai, 1991, p.190, pl.F, fig.c. **Name not validly published:** no description. Age: late Miocene.

"*edwardsii*" Cookson and Eisenack, 1958, p.32, pl.3, figs.5–6; text-fig.7. Holotype: Cookson and Eisenack, 1958, pl.3, fig.6; text-fig.7; Jan du Chêne et al., 1986a, pl.32, fig.4; pl.33, fig.3. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Cribroperidinium*, fourthly (and now) *Cribroperidinium?*. Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *apione*, according to Burger (1980a, p.82) — however, Jan du Chêne et al. (1986a, p.76) retained *Cribroperidinium apione*; and *Gonyaulax* (as *Cribroperidinium*) *orthoceras*, according to Davey and Verdier (1971, p.17) — however, Lentin and Williams (1985, p.79) retained *Gonyaulax* (as *Cribroperidinium*) *orthoceras*. Age: Albian–early Turonian.

"*eisenackii*" Deflandre, 1939a, p.171, pl.6, figs.7–10; text-figs.3–4. Emendation: Sarjeant, 1982b, p.32–33, as *Gonyaulacysta eisenackii*. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. **NOW** *Gonyaulacysta*. Originally *Gonyaulax*, subsequently (and now) *Gonyaulacysta*, thirdly *Endoscrinium*, fourthly *Tubotuberella*. Taxonomic junior synonym: *Tubotuberella sphaerocephala*, according to Sarjeant (1982b, p.32). Age: Oxfordian.

"subsp. *eisenackii*". Autonym. Holotype: Deflandre, 1939a, pl.6, figs.7–8; text-figs.3–4; Jan du Chêne et al., 1986a, pl.125, figs.5–9. **Now redundant**. Originally *Gonyaulax eisenackii* subsp. *eisenackii*, subsequently *Gonyaulacysta eisenackii* subsp. *eisenackii*, thirdly *Endoscrinium eisenackii* subsp. *eisenackii*, fourthly *Tubotuberella eisenackii* subsp. *eisenackii*. Taxonomic junior synonym: *Gonyaulax* (as *Gonyaulacysta*) *eisenackii* subsp. *oligodentata*, according to Sarjeant (1982b, p.32).

"subsp. *oligodentata*" Cookson and Eisenack, 1958, p.30, pl.2, fig.11. Holotype: Cookson and Eisenack, 1958, pl.2, fig.11; Jan du Chêne et al., 1986a, pl.125, figs.10–11. Originally *Gonyaulax eisenackii* subsp. *oligodentata*, subsequently *Gonyaulacysta eisenackii* subsp. *oligodentata*, thirdly *Endoscrinium eisenackii* subsp. *oligodentatum*, fourthly *Tubotuberella eisenackii* subsp. *oligodentata*. **Taxonomic senior synonym**: *Gonyaulax eisenackii* subsp. *eisenackii*, according to Sarjeant (1982b, p.32). Age: Late Jurassic.

"*elongate*" (Reid, 1974, p.602–603, pl.3, figs.23–24) Ellegaard et al., 2003, p.154. Holotype: Reid, 1974, pl.3, figs.23–24. **NOW** *Spiniferites*. Originally (and now) *Spiniferites*, subsequently *Gonyaulax*. Because we follow the dual approach to the nomenclature of dinoflagellates (see Head et al. 2016), we retain this species in *Spiniferites*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45). Age: Holocene.

"*eumorpha*" Cookson and Eisenack, 1960b, p.246, pl.37, figs.1–3; text-fig.3. Holotype: Cookson and Eisenack, 1960b, pl.37, fig.1; Jan du Chêne et al., 1986a, pl.75, fig.4. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*. Age: Late Jurassic.

"*freakei*" Sarjeant, 1963c, p.85–86, pl.1, figs.1–3. Holotype: Sarjeant, 1963c, pl.1, figs.1–3; Jan du Chêne et al., 1986a, pl.67, figs.13–14. Originally *Gonyaulax*, subsequently *Gonyaulacysta?* (combination not validly published), thirdly *Leptodinium*. **Taxonomic senior synonym**: *Leptodinium subtile*, according to Brenner (1988, p.60). Age: early Oxfordian.

"*giuseppeii*" Morgenroth, 1966a, p.5, pl.2, figs.3–6. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **NOW** *Cribroperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Cribroperidinium*. Age: early Eocene.

"subsp. *giuseppeii*". Autonym. Holotype: Morgenroth, 1966a, pl.2, figs.3–4. **Now redundant**. Originally *Gonyaulax giuseppeii* subsp. *giuseppeii*, subsequently *Gonyaulacysta giuseppeii* subsp. *giuseppeii*, thirdly *Millioudodinium?* *giuseppeii* subsp. *giuseppeii*, fourthly *Rhynchodiniopsis?* *giuseppeii* subsp. *giuseppeii*, fifthly *Cribroperidinium giuseppeii* subsp. *giuseppeii*. Taxonomic junior synonym: *Gonyaulax* (as *Rhynchodiniopsis*) *giuseppeii* subsp. *major*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81). Age: early Eocene.

"subsp. *major*" Morgenroth, 1966a, p.6, pl.2, figs.5–6. Holotype: Morgenroth, 1966a, pl.2, figs.5–6. Originally *Gonyaulax giuseppeii* subsp. *major*, subsequently *Gonyaulacysta giuseppeii* subsp. *major*, thirdly *Millioudodinium?* *giuseppeii* subsp. *majus*, fourthly *Rhynchodiniopsis?* *giuseppeii* subsp. *major*, fifthly

Cribroperidinium giuseppei subsp. *majus*. **Taxonomic senior synonym:** *Gonyaulax giuseppei* subsp. *giuseppei*, according to Helenes (1984, p.121) and Lentin and Williams (1989, p.81). Age: early Eocene.

"**granulata**" Klement, 1960, p.39–41, pl.4, figs.10–13; text-figs.18–20. Emendation: Sarjeant, 1984a, p.161–162, as *Meristaulax granulata*. Holotype: Klement, 1960, pl.4, figs.10–11; text-figs.18–20; Fensome et al., 1995, figs.1–2 — p.1525; disintegrated according to Sarjeant (1984a, p.162). Lectotype (designated by Sarjeant, 1984a, p.162): Sarjeant, 1984a, pl.3, figs.3–4; text-fig.3; Jan du Chêne et al., 1986a, pl.27, figs.7–10; Brenner, 1988, pl.3, figs.2a–b; Fensome et al., 1995, figs.5–6 — p.1525 — however, Brenner (1988, p.35) argued that this specimen is not conspecific with the holotype. Lectotype (designated by Brenner, 1988, p.35): Brenner, 1988, pl.1, figs.3a–c; Fensome et al., 1995, figs.7–9 — p.1525. **NOW** *Cribroperidinium*. Originally *Gonyaulax* (Appendix B), subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Meristaulax* Sarjeant, sixthly *Acanthaulax*. Poulsen (1996, p.73) retained this species in *Cribroperidinium*. Taxonomic junior synonyms: *Gonyaulax* (as *Cribroperidinium*) *venusta*, according to Schrank (2005, p.56); *Gonyaulax* (now *Cribroperidinium*) *granuligera*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156–158) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*; *Gonyaulacysta* (as *Acanthaulax*?, now *Cribroperidinium*) *angulosa*, according to Fisher and Riley (1980, p.321) — however, Sarjeant and Gocht in Sarjeant (1984a, p.160) retained *Gonyaulacysta* (as *Meristaulax*) *angulosa*. For further discussion, see *Cribroperidinium granulatum*. Age: middle Oxfordian–early Kimmeridgian.

"**granuligera**" Klement, 1960, p.41–42, pl.5, figs.4–5. Emendation: Sarjeant, 1984a, p.156, as *Cryptarchaeodinium granuligerum*. Holotype: Klement, 1960, pl.5, figs.4–5; Sarjeant, 1984a, pl.1, figs.3–4; text-fig.1; and Jan du Chêne et al., 1986a, pl.27, figs.11–14. **NOW** *Cribroperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Rhynchodiniopsis*, fifthly *Cryptarchaeodinium*, sixthly *Acanthaulax*. Taxonomic senior synonym: *Gonyaulax* (as *Gonyaulacysta*, now *Cribroperidinium*) *granulata*, according to Fisher and Riley (1980, p.321) — however, Sarjeant (1984a, p.156) retained *Gonyaulax* (as *Cryptarchaeodinium*) *granuligera*. Age: middle Oxfordian–early Kimmeridgian.

"**helicoidea**" Eisenack and Cookson, 1960, p.2–3, pl.1, figs.4–6,9 (figs.5–6 are now *Gonyaulacysta cassidata*). Emendations: Sarjeant, 1966b, p.116, as *Gonyaulacysta helicoidea*; Helenes and Lucas-Clark, 1997, p.187–188, as *Wrevittia helicoidea*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.4–5. **NOW** *Wrevittia*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Wrevittia*. Taxonomic junior synonym: *Gonyaulacysta* (now *Wrevittia*?) *diutina*, according to Stover and Helby (1987d, p.287) — however, Jan du Chêne et al. (1986a, p.131) and Lentin and Williams (1989, p.152) retained *Gonyaulacysta* (now *Wrevittia*?) *diutina*. Age: Neocomian–Aptian.

"subsp. **cassidata**" Eisenack and Cookson, 1960, p.3, pl.1, figs.5–6. Emendations: Sarjeant, 1966b, p.125, as *Gonyaulacysta cassidata*; Helenes and Lucas-Clark, 1997, p.190, as *Wrevittia cassidata*. Holotype: Eisenack and Cookson, 1960, pl.1, fig.5; Jan du Chêne et al., 1986a, pl.40, figs.6–7. **NOW** *Wrevittia cassidata*. Originally *Gonyaulax helicoidea* subsp. *cassidata*, subsequently *Gonyaulax cassidata*, thirdly *Gonyaulacysta cassidata*, fourthly (and now) *Wrevittia cassidata*. Age: Aptian–Cenomanian.

"subsp. **helicoidea**". Autonym. Holotype: Eisenack and Cookson, 1960, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.4–5. **Now redundant**.

"var. **helicoidea**". Autonym. Holotype: Eisenack and Cookson, 1960, pl.1, fig.4; Jan du Chêne et al., 1986a, pl.40, figs.4–5. **Now redundant**. Originally *Gonyaulax helicoidea* var. *helicoidea*, subsequently *Gonyaulacysta helicoidea* var. *helicoidea*.

"var. **tuberculata**" Vozzhennikova, 1967, p.83, pl.41, figs.3a–b. Emendation: Lentin and Vozzhennikova, 1990, p.100, as *Gonyaulacysta? tuberculata*. Holotype: Vozzhennikova, 1967, pl.41, figs.3a–b; Lentin and Vozzhennikova, 1990, text-fig.56; lost according to Lentin and Vozzhennikova (1990, p.99). Neotype: Lentin and Vozzhennikova, 1990, pl.14, figs.7–8, designated by Lentin and Vozzhennikova (1990, p.99). **NOW** *Gonyaulacysta? tuberculata*. Originally *Gonyaulax helicoidea* var. *tuberculata*, subsequently *Gonyaulacysta helicoidea* var. *tuberculata*, thirdly *Gonyaulacysta helicoidea* subsp. *tuberculata*, fourthly (and now) *Gonyaulacysta? tuberculata*. Age: Tithonian.

"*heslertonensis*" Neale and Sarjeant, 1962, p.440, pl.19, fig.5; pl.20, fig.5. Emendation: Duxbury, 1980, p.124, as *Heslertonia heslertonensis*. Holotype: Neale and Sarjeant, 1962, pl.19, fig.5; text-fig.1. **NOW** *Heslertonia*. Originally *Gonyaulax*, subsequently (and now) *Heslertonia*. Age: Hauterivian–Barremian.

"*hyalodermopsis*" Cookson and Eisenack, 1958, p.34, pl.3, figs.11–12; text-figs.5–6. Holotype: Cookson and Eisenack, 1958, pl.3, figs.11–12; text-figs.5–6; Jan du Chêne et al., 1986a, pl.74, figs.9–10. **NOW** *Leptodinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Leptodinium?*, fourthly *Rhynchodiniopsis*. Age: Neocomian–Aptian.

"*jurassica*" Deflandre, 1939a, p.168, pl.6, figs.2–5; text-figs.1–2. Emendation: Sarjeant, 1982b, p.28–30, as *Gonyaulacysta jurassica*. Holotype: Deflandre, 1939a, pl.6, figs.2–3; text-figs.1–2; Jan du Chêne et al., 1986a, pl.37, figs.1–3. **NOW** *Gonyaulacysta*. Originally *Gonyaulax*, subsequently (and now) *Gonyaulacysta*. Taxonomic junior synonym: *Psaligonyaulax* (as *Gonyaulacysta*) *dualis*, according to Sarjeant (1982b, p.29) — however, Jan du Chêne et al. (1986a, p.131) retained *Gonyaulacysta dualis*. Age: Oxfordian.

"var. *jurassica*". Autonym. Holotype: Deflandre, 1939a, pl.6, figs.2–3; text-figs.1–2; and Jan du Chêne et al., 1986a, pl.37, figs.1–3. **NOW** *Gonyaulacysta jurassica* var. *jurassica*. Originally *Gonyaulax jurassica* var. *jurassica*, subsequently (and now) *Gonyaulacysta jurassica* var. *jurassica*.

"var. *longicornis*" Deflandre, 1939a, p.171, pl.6, fig.6. Emendation: Sarjeant, 1982b, p.31, as *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Holotype: Deflandre, 1939a, pl.6, fig.6; Jan du Chêne et al., 1986a, pl.37, figs.7–8. **NOW** *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Originally *Gonyaulax jurassica* var. *longicornis*, subsequently *Gonyaulacysta jurassica* var. *longicornis*, thirdly *Gonyaulacysta jurassica* subsp. *longicornis*, fourthly (and now) *Gonyaulacysta jurassica* subsp. *adecta* var. *longicornis*. Taxonomic junior synonym: *Gonyaulacysta jurassica* var. *brevis* (as *Gonyaulacysta jurassica* subsp. *brevis*), according to Sarjeant (1982b, p.31). Age: Oxfordian.

"*kostromiensis*" Vozzhennikova, 1967, p.85–86, pl.26, figs.1–6; pl.27, figs.1–2. Emendation: Harding, 1996, p.353,355, as *Nelchinopsis kostromiensis*. Holotype: Vozzhennikova, 1967, pl.26, figs.1–6; Jan du Chêne et al., 1986a, pl.44, figs.7–8; Lentin and Vozzhennikova, 1990, text-fig.64; lost according to Lentin and Vozzhennikova (1990, p.109). Lectotype: Lentin and Vozzhennikova, 1990, pl.15, figs.5–6, designated by Lentin and Vozzhennikova (1990, p.109); and Harding, 1996, pl.1, fig.1. **NOW** *Nelchinopsis*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Nelchinopsis*. Taxonomic junior synonym: *Alaskadinium wigginsii*, according to Stover and Williams (1987, p.11). Age: Neocomian, ?Valanginian or early Hauterivian.

"*longicornis*" Downie, 1957, p.420, pl.20, fig.8; text-figs.2a–b. Holotype: Downie, 1957, pl.20, fig.8; text-figs.2a–b; Jan du Chêne et al., 1986a, pl.30, fig.1. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly *Millioudodinium*, fifthly (and now) *Cribroperidinium?*. Age: late Kimmeridgian.

"*mamillifera*" Deflandre, 1939b, p.143, pl.6, fig.1. Holotype: Deflandre, 1939b, pl.6, fig.1; Jan du Chêne et al., 1986a, pl.72, figs.1–8. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta?*, thirdly *Millioudodinium?*, fourthly *Rhynchodiniopsis?*, fifthly (and now) *Leptodinium*. Age: Kimmeridgian.

"*margaritifera*" Cookson and Eisenack, 1960a, p.5–6, pl.2, figs.1–2; text-fig.1. Holotype: Cookson and Eisenack, 1960a, pl.2, fig.1; Jan du Chêne et al., 1986a, pl.54, fig.6. **NOW** *Impagidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta* (combination not validly published), thirdly *Leptodinium*, fourthly (and now) *Impagidinium*. Age: Campanian.

"*membranacea*" (Rossignol, 1964, p.86, pl.1, figs.4,9–10; pl.3, figs.7,12) Ellegaard et al., 2003, p.157. Holotype: Rossignol, 1964, pl.1, figs.4,9–10. **NOW** *Spiniferites*. Originally *Hystrichosphaera furcata* var. *membranacea*, subsequently *Hystrichosphaera ramosa* var. *membranacea*, thirdly *Hystrichosphaera membranacea*, fourthly (and now) *Spiniferites membranaceus*, fifthly *Gonyaulax membranacea*. Because we follow the dual approach to the nomenclature of dinoflagellates (see Head et al. 2016), we retain this species in *Spiniferites*. Motile equivalent: *Gonyaulax spinifera* (Claparède and Lachmann, 1859) Diesing, 1866, according to Dale (1976, table 2 — p.45) and Dodge (1989, p.289). Age: Pleistocene–Holocene.

"*microceras*" Eisenack, 1958a, p.391, pl.21, fig.13. Emendation: Sarjeant, 1985a, p.67, as *Rhynchodiniopsis microceras*. Holotype: Eisenack, 1958a, pl.21, fig.13; Sarjeant, 1985a, pl.6, figs.5–6; pl.7, fig.6; text-fig.4; Jan du Chêne et al., 1986a, pl.99, figs.5–6. **NOW** *Rhynchodiniopsis*?. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Rhynchodiniopsis*, fourthly (and now) *Rhynchodiniopsis*?. Age: late Aptian.

"*millioudii*" Sarjeant, 1963c, p.87–88, pl.1, figs.4–7. Holotype: Sarjeant, 1963c, pl.1, figs.4–7; Jan du Chêne et al., 1986a, pl.71, figs.4–7. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*. Age: early Oxfordian.

"*milneri*" Murray and Whitting, 1899, p.325, pl.27, figs.2a–d. Holotype: not designated. **NOW** *Lingulodinium*. Originally *Gonyaulax*, subsequently *Goniodoma* (Appendix B), thirdly (and now) *Lingulodinium*. Age: extant.

"*muderongensis*" Cookson and Eisenack, 1958, p.32, pl.3, figs.3–4; text-fig.15. Holotype: Cookson and Eisenack, 1958, pl.3, fig.3; text-fig.15. **NOW** *Cribroperidinium*?. Originally *Gonyaulax*, subsequently *Gonyaulacysta* (combination not validly published), thirdly *Cribroperidinium*, fourthly (and now) *Cribroperidinium*?. Taxonomic junior synonym: *Gonyaulax* (as *Cribroperidinium*) *diaphana*, according to Backhouse (1988, p.80). Age: Aptian.

"*nannotrix*" Deflandre, 1939b, p.143, pl.6, fig.7. Holotype: Deflandre, 1939b, pl.6, fig.7; Jan du Chêne et al., 1986a, pl.69, figs.4–6. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta*?, fourthly *Rhynchodiniopsis*?, fifthly (and now) *Leptodinium*. Age: Kimmeridgian.

"*nealei*" Sarjeant, 1962a, p.480–481, pl.69, fig.1; text-fig.2. Holotype: Sarjeant, 1962a, pl.69, fig.1; text-fig.2. **NOW** *Rhynchodiniopsis*?. Originally *Gonyaulax*, subsequently *Gonyaulacysta*? (combination not validly published), thirdly *Hystrichogonyaulax*, fourthly *Hystrichogonyaulax*?, fifthly *Rhynchodiniopsis*, sixthly (and now) *Rhynchodiniopsis*?. Age: Oxfordian.

"*nuciformis*" Deflandre, 1939a, p.180, pl.8, figs.4–6 ex Sarjeant, 1962a, p.482–483. Holotype: Deflandre, 1938, pl.8, fig.6; Jan du Chêne et al., 1986a, pl.11, figs.1–3. **NOW** *Cribroperidinium*. Originally *Palaeoperidinium* (name not validly published), subsequently *Gonyaulax*, thirdly *Gonyaulacysta*, fourthly *Apteodinium*, fifthly *Millioudodinium*, sixthly (and now) *Cribroperidinium*. Taxonomic junior synonym: *Palaeoperidinium nuciformoides*, according to Sarjeant (1968, p.227). The name *Palaeoperidinium nuciforme* was not validly published in Deflandre (1939a) since the generic name *Palaeoperidinium* was not validly published until 1967. Age: Oxfordian.

"*obscura*" Lejeune-Carpentier, 1946, p.B191, figs.3–5. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.4, as *Gonyaulacysta? obscura*. Holotype: Lejeune-Carpentier, 1946, figs.3–4; Lejeune-Carpentier and Sarjeant, 1981, pl.2, figs.3–4; text-fig.2. **NOW** *Gonyaulacysta*?. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Gonyaulacysta*?, fourthly *Millioudodinium*. Age: Senonian.

"*orthoceras*" Eisenack, 1958a, p.388, pl.21, figs.3–11; pl.24, fig.1. Emendation: Sarjeant, 1985a, p.51,53, as *Cribroperidinium orthoceras*. Holotype: Eisenack, 1958a, pl.21, fig.5; Sarjeant, 1985a, pl.1, figs.1,4; text-fig.1; Jan du Chêne et al., 1986a, pl.24, figs.7–8. **NOW** *Cribroperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium*, fourthly *Cribroperidinium*?. Taxonomic senior synonym: *Gonyaulax* (as *Cribroperidinium*) *edwardsii*, according to Davey and Verdier (1971, p.17) — however, Lentin and Williams (1985, p.79) retained *Cribroperidinium orthoceras*. Age: Aptian.

"*pachyderma*" Deflandre, 1939a, p.176–178, pl.7, figs.6–10; text-figs.7–10. Holotype: Deflandre, 1939a, pl.7, figs.6–7. **NOW** *Korystocysta*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Ctenidodinium*, fourthly *Ctenidodinium*?, fifthly (and now) *Korystocysta*, sixthly *Dichadogonyaulax*. Taxonomic junior synonyms: *Leptodinium norrisii*, according to Benson (1985, p.154); *Dichadogonyaulax* (subsequently *Korystocysta*) *kettonensis*, by implication in Conway (1990, p.35), who considered *Dichadogonyaulax kettonensis* to be the senior name — however, Lentin and Williams (1993, p.374) retained *Dichadogonyaulax* (as *Korystocysta*) *kettonensis*. Age: Oxfordian.

"*paliuro*" Sarjeant, 1962a, p.260, pl.1, fig.7; text-fig.5. Holotype: Sarjeant, 1962a, pl.1, fig.7. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Acanthaulax?*, fifthly (and now) *Cribroperidinium?*. Age: Oxfordian.

"*pannonica*" Nagy, 1965, p.200–201, pl.1, figs.1–2; pl.2, fig.10; text-figs.1–2. Holotype: Nagy, 1965, pl.1, figs.1–2; pl.2, fig.10; Jan du Chêne et al., 1986a, pl.31, figs.1–4. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. Age: early Pliocene.

"*perforans*" Cookson and Eisenack, 1958, p.30–32, pl.2, figs.1–4,7–8; text-figs.8–9. Holotype: Cookson and Eisenack, 1958, pl.2, fig.1; text-figs.8–9; Jan du Chêne et al., 1986a, pl.32, fig.2. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Leptodinium?*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium*, sixthly (and now) *Cribroperidinium?*. Age: Late Jurassic.

"var. *kunzeviensis*" Vozzhennikova, 1967, p.87, pl.27, fig.6; pl.30, fig.2; pl.33, fig.6. Holotype: Vozzhennikova, 1967, pl.30, fig.2, lost according to Lentin and Vozzhennikova (1990, p.94). **NOW** *Cribroperidinium?* *perforans* subsp. *kunzeviense*. Originally *Gonyaulax perforans* var. *kunzeviensis*, subsequently *Gonyaulacysta kunzeviensis*, thirdly *Gonyaulacysta perforans* var. *kunzeviensis* (combination not validly published), fourthly (and now) *Cribroperidinium?* *perforans* subsp. *kunzeviense*. Age: Valanginian.

"var. *perforans*". Autonym. Holotype: Cookson and Eisenack, 1958, pl.2, fig.1; text-figs.8–9; Jan du Chêne et al., 1986a, pl.32, fig.2. **Now redundant.**

"*polyedra*" Stein, 1883, p.13, pl.4, figs.7–9. Holotype: not designated. **NOW** *Lingulodinium*. Originally *Gonyaulax*, subsequently (and now) *Lingulodinium*. This species represents living dinoflagellates. N.I.A. Age: extant.

"*porosa*" Lejeune-Carpentier, 1946, p.B193,B196; text-fig.6. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.7–8, as *Leptodinium porosum*. Holotype: Lejeune-Carpentier, 1946, text-fig.6; Strel et al., 1977, pl.2, fig.4; Lejeune-Carpentier and Sarjeant, 1981, pl.3, figs.1–2; text-fig.4. **NOW** *Leptodinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta* (combination not validly published), thirdly (and now) *Leptodinium*, fourthly *Leptodinium?*. Age: Late Cretaceous.

"*pyrum*" Drugg, 1967, p.14, pl.1, fig.17; pl.9, figs.6a–b. Holotype: Drugg, 1967, pl.1, fig.17; Jan du Chêne et al., 1986a, pl.27, figs.3–5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Cribroperidinium?*. N.I.A. Age: Maastrichtian–Danian.

"*reticulata*" Nagy, 1969, p.293, pl.1, figs.7,10; text-figs.4a–b. Holotype: Nagy, 1969, pl.1, figs.7,10; Jan du Chêne et al., 1986a, pl.74, figs.5–6. **NOW** *Leptodinium?*. Originally *Gonyaulax*, subsequently *Leptodinium*, thirdly (and now) *Leptodinium?*. Age: late Miocene.

"*rhaetica*" Sarjeant, 1963b, p.353; text-figs.1–2(left). Emendations: Harland et al., 1975, p.862; Fisher and van Helden, 1979, p.270; Below, 1987a, p.105–106, all as *Rhaetogonyaulax rhaetica*. Holotype: Sarjeant, 1963b, text-figs.1–2 (left). **NOW** *Rhaetogonyaulax*. Originally *Gonyaulax*, subsequently (and now) *Rhaetogonyaulax*. Taxonomic junior synonyms: *Rhaetogonyaulax testacea*, *Rhaetogonyaulax tortuosa* and *Rhaetogonyaulax uncinata*, all according to Below (1987a, p.105). Age: Late Triassic.

"*sarjeantii*" Vozzhennikova, 1967, p.87–89, pl.25, figs.1–2; pl.28, fig.4; pl.31, figs.1a–b,2a–b,3; pl.32, figs.1,2a–c,3,4a–b. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova, 1967, pl.31, fig.3; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly *Rhynchodiniopsis*, fifthly *Cribroperidinium?*, sixthly (and now) *Cribroperidinium*. Age: Tithonian.

"var. *sarjeantii*". Autonym. Holotype: Vozzhennikova, 1967, pl.31, fig.1a; Lentin and Vozzhennikova, 1990, text-fig.53; lost according to Lentin and Vozzhennikova (1990, p.95). Neotype: Vozzhennikova,

1967, pl.31, fig.3; Lentin and Vozzhennikova, 1990, pl.16, fig.4; designated by Lentin and Vozzhennikova (1990, p.95). **Now redundant.**

"var. *sphaerica*" Vozzhennikova, 1967, p.89, pl.25, figs.1–2; pl.28, fig.4; pl.32, figs.1–4. Holotype: Vozzhennikova, 1967, pl.28, fig.4; Jan du Chêne et al., 1986a, pl.20, fig.9; lost according to Lentin and Vozzhennikova (1990, p.97). Lectotype: Lentin and Vozzhennikova, 1990, pl.16, figs.1–2, designated by Lentin and Vozzhennikova (1990, p.97). **NOW** *Cribroperidinium sarjeantii* subsp. *sphaericum*. Originally *Gonyaulax sarjeantii* var. *sphaerica*, subsequently *Gonyaulacysta sarjeantii* subsp. *sphaerica*, thirdly *Millioudodinium sarjeantii* subsp. *sphaericum*, fourthly *Rhynchodiniopsis sarjeantii* subsp. *sphaerica*, fifthly *Cribroperidinium? sarjeantii* subsp. *sphaericum*, sixthly (and now) *Cribroperidinium sarjeantii* subsp. *sphaericum*. Age: Tithonian.

"*scottii*" Cookson and Eisenack, 1958, p.30, pl.2, figs.5–6. Holotype: Cookson and Eisenack, 1958, pl.2, fig.5; Jan du Chêne et al., 1986a, pl.33, fig.5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium?*, fourthly (and now) *Cribroperidinium?*. Age: early-middle Kimmeridgian.

"*serrata*" Cookson and Eisenack, 1958, p.34, pl.3, fig.2; text-figs.12–14. Holotype: Cookson and Eisenack, 1958, pl.3, fig.2; Jan du Chêne et al., 1986a, pl.99, figs.3–4. **NOW** *Rhynchodiniopsis*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Hystrichogonyaulax*, fourthly (and now) *Rhynchodiniopsis*. Age: Late Jurassic–Neocomian.

"*superornata*" Wetzel, 1967a, p.869–870, pl.16, figs.8a–b. Emendation: Sarjeant, 1980b, p.124–125, as *Meiourogonyaulax superornata*. Holotype: Wetzel, 1967a, pl.16, figs.8a–b; Sarjeant, 1980b, pl.1, figs.2–3; text-fig.4; Dietz et al., 1999, text-fig.5c. **NOW** *Meiourogonyaulax*. Originally *Gonyaulax* (Appendix B), subsequently (and now) *Meiourogonyaulax*, thirdly *Gonyaulacysta?*, fourthly *Lithodinia*, fifthly *Lithodinia?*. Age: late Bathonian.

"*tenuiceras*" Eisenack, 1958a, p.389–391, pl.21, figs.14–15; pl.22, figs.1–3; pl.24, fig.2; text-figs.4a–c,5. Emendations: Sarjeant, 1985a, p.63,65–66, as *Acanthaulax? tenuiceras*; Jan du Chêne et al., 1986b, p.29–30, as *Tehamadinium tenuiceras*. Holotype: Eisenack, 1958a, pl.21, fig.15; Sarjeant, 1985a, pl.6, figs.1–2; text-fig.3; Jan du Chêne et al., 1986a, pl.118, fig.1; Jan du Chêne et al., 1986b, pl.24, fig.5. **NOW** *Cribroperidinium?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta?*, thirdly *Diacanthum*, fourthly *Occisucysta*, fifthly *Acanthaulax?*, sixthly *Tehamadinium*, seventhly (and now) *Cribroperidinium?*. Taxonomic junior synonym: *Occisucysta victorii*, according to Pöthe de Baldis and Ramos (1988, p.33). Age: late Barremian–Aptian.

"*tenuitabulata*" Gerlach, 1961, p.159, pl.25, figs.10–11; text-figs.1–3. Emendation: Sarjeant, 1984b, p.76, as *Rhynchodiniopsis tenuitabulata*. Holotype: Gerlach, 1961, pl.25, figs.10–11. **NOW** *Cribroperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Millioudodinium*, fourthly (and now) *Cribroperidinium*, fifthly *Rhynchodiniopsis*. Age: middle Oligocene–mid Miocene.

"*transparens*" Sarjeant, 1959, p.334, pl.13, fig.3; text-fig.3. Holotype: Sarjeant, 1959, pl.13, fig.3. **NOW** *Gonyaulacysta?*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly (and now) *Gonyaulacysta?*. Age: early Callovian.

"*venusta*" Klement, 1960, p.44–45, pl.5, figs.10–13; text-fig.22. Holotype: Klement, 1960, pl.5, figs.10–11. **Taxonomic senior synonym:** *Gonyaulax* (as *Cribroperidinium*) *granulata*, according to Schrank (2005, p.56). Originally *Gonyaulax* (Appendix B), subsequently *Acanthogonyaulax* (combination not validly published), thirdly *Acanthaulax*, fourthly *Gonyaulacysta*, fifthly *Cribroperidinium*. Age: middle Oxfordian–Kimmeridgian.

"*wetzelii*" Lejeune-Carpentier, 1939, p.B526; text-figs.1–2. Emendations: Lejeune-Carpentier, 1946, p.B189–B190, as *Gonyaulax wetzelii*; Lejeune-Carpentier and Sarjeant, 1981, p.2–3, as *Gonyaulacysta wetzelii*. Holotype: Lejeune-Carpentier, 1939, text-figs.1–2; Lejeune-Carpentier and Sarjeant, 1981, pl.5, figs.5–6. **NOW** *Cribroperidinium*. Originally *Gonyaulax*, subsequently *Gonyaulacysta*, thirdly *Gonyaulacysta?*, fourthly (and now) *Cribroperidinium*, fifthly *Millioudodinium*. Age: Senonian.

GYMNODINIUM Stein, 1878, p.89–91,97.

"*albertii*" Vozzhennikova, 1967, p.41–42, pl.5, figs.7–8. Emendation: Lentin and Vozzhennikova, 1990, p.23, as *Dinogymnium vozzhennikovae*. Holotype: Vozzhennikova, 1967, pl.5, fig.7; Lentin and Vozzhennikova, 1990, pl.3, figs.2–3; text-fig.9. **Substitute name:** *Dinogymnium vozzhennikovae*. Originally *Gymnodinium albertii*, subsequently (and now) *Dinogymnium vozzhennikovae*. Age: Turonian.

"*attadalense*" Cookson and Eisenack, 1958, p.25, pl.1, fig.7. Holotype: Cookson and Eisenack, 1958, pl.1, fig.7; Jan du Chêne et al., 1986a, pl.112, figs.4–7; Riding and Fensome, 2003, text-fig.4B. **NOW** *Endoscrinium*. Originally *Gymnodinium* (Appendix B), subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*. Age: Aptian.

"*australiense*" Deflandre and Cookson, 1955, p.248, pl.5, fig.1. Holotype: Deflandre and Cookson, 1955, pl.5, fig.1. **NOW** *Apteodinium*. Originally *Gymnodinium*, subsequently *Emslandia* (combination not validly published), thirdly *Scriniodinium*, fourthly (and now) *Apteodinium*. Taxonomic junior synonym: *Emslandia crassimurata*, according to Lucas-Clark (1987, p.174). Age: middle Miocene.

"*avellanum*" Lejeune-Carpentier, 1951, p.B309; text-fig.3. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.10–11, as *Dinogymnium avellanum*. Holotype: Lejeune-Carpentier, 1951, text-fig.3; Streel et al., 1977, pl.2, fig.7. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: Maastrichtian.

"*cretaceum*" Deflandre, 1936b, p.164–165, pl.2, figs.1–3. Holotype: Deflandre, 1934, figs.9–10; Deflandre, 1935, pl.5, figs.6–7; text-figs.4–5; Deflandre, 1936b, pl.2, figs.1–2. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. This name was not validly published in Deflandre (1934, caption to figs.9–10 — p.967; 1935, p.225) since no description was given. Age: ?Senonian.

"*crystallinum*" Deflandre, 1939a, p.165, pl.5, figs.1–3. Emendation: Riding and Fensome, 2003, p.12–13. Holotype: Deflandre, 1939a, pl.5, figs.1–2; Jan du Chêne et al., 1986a, pl.104, figs.1–4. **NOW** *Scriniodinium*. Originally *Gymnodinium*, subsequently (and now) *Scriniodinium*. Age: Oxfordian.

"*curvatum*" Vozzhennikova, 1967, p.43, pl.1, figs.10–12; pl.4, figs.2–3. Holotype: Vozzhennikova, 1967, pl.1, fig.10; Lentin and Vozzhennikova, 1990, text-fig.5b, lost according to Lentin and Vozzhennikova (1990, p.18). Originally *Gymnodinium*, subsequently *Dinogymnium*. **Taxonomic senior synonym:** *Gymnodinium* (as *Dinogymnium*) *longicorne*, according to Lentin and Vozzhennikova (1990, p.18). Age: Senonian.

"*dabendorfense*" Alberti, 1961, p.5, pl.3, fig.4. Holotype: Alberti, 1961, pl.3, fig.4. **NOW** *Luxadinium*?. Originally *Gymnodinium*, subsequently *Diconodinium*, thirdly (and now) *Luxadinium*?. Age: Valangian.

"*decorum*" Deflandre, 1943, p.503–504 pl.17, fig.2; text-figs.8–9. Holotype: Deflandre, 1943, pl.17, fig.2; text-figs.8–9. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: Senonian.

"*denticulatum*" Alberti, 1961, p.5, pl.3, figs.2–3. Holotype: Alberti, 1961, pl.3, fig.2. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: Senonian.

"*digitus*" Deflandre, 1936b, p.166–167, pl.2, figs.4–5. Holotype: Deflandre, 1935, text-figs.7–8; Deflandre, 1936b, pl.2, figs.4–5. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. This name was not validly published in Deflandre (1935, p.225) since no description was given. N.I.A. Age: Senonian.

"var. *crassum*" Vozzhennikova, 1967, p.44, pl.5, figs.3,9–10. Holotype: Vozzhennikova, 1967, pl.5, fig.9; Lentin and Vozzhennikova, 1990, text-fig.3; lost according to Lentin and Vozzhennikova (1990, p.16). **NOW** *Dinogymnium digitus* subsp. *crassum*. Originally *Gymnodinium digitus* var. *crassum*, subsequently (and now) *Dinogymnium digitus* subsp. *crassum*. Age: Turonian.

"var. *digitus*". Autonym. Holotype: Deflandre, 1935, text-figs.7–8. **Now redundant**. N.I.A.

"*dorsispirale*" Churchill and Sarjeant, 1962, p.33, pl.1, fig.18; text-fig.2. Holotype: Churchill and Sarjeant, 1962, pl.1, fig.18; text-fig.2. **NOW** *Muiradinium*. Originally *Gymnodinium*, subsequently (and now) *Muiradinium*. Age: Holocene.

"*fehmarrense*" Morgenroth, 1966a, p.4–5, pl.1, fig.1. Holotype: Morgenroth, 1966a, pl.1, fig.1. **NOW** *Diconodinium*?. Originally *Gymnodinium*, subsequently (and now) *Diconodinium*?. Age: early Eocene.

"?*gabonense*" Deflandre, 1965, p.388,390, pl.1, figs.1–9. Holotype: Deflandre, 1965, pl.1, figs.1–3. **NOW** *Dinogymnium*. Originally ?*Gymnodinium*, subsequently (and now) *Dinogymnium*. Questionable assignment: Deflandre (1965, p.388). Age: Tertiary.

"*galeritum*" Deflandre, 1939a, p.167, pl.5, figs.7–9; pl.6, fig.1. Holotype: Deflandre, 1939a, pl.5, figs.7–8; Eisenack and Klement, 1964, p.759,761; Jan du Chêne et al., 1986a, pl.104, figs.10–11; Fensome et al., 1995, fig.1 — p.1501; figs.1–2 — p.1505. **NOW** *Endoscrinium*. Originally *Gymnodinium*, subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*. Age: Oxfordian.

"*heterocostatum*" Deflandre, 1936b, p.165–166, pl.2, fig.6. Holotype: Deflandre, 1935, text-fig.6; Deflandre, 1936b, pl.2, fig.6. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. This name was not validly published in Deflandre (1935, p.225) since no description was given. Age: ?Senonian.

"var. *heterocostatum*". Autonym. Holotype: Deflandre, 1935, text-fig.6; Deflandre, 1936b, pl.2, fig.6. **Now redundant.**

"var. *kolpaschevii*" Vozzhennikova, 1967, p.45, pl.3, fig.5. Holotype: Vozzhennikova, 1967, pl.3, fig.5; Lentin and Vozzhennikova, 1990, pl.3, fig.1; text-fig.4. **NOW** *Dinogymnium heterocostatum* subsp. *kolpaschevii*. Originally *Gymnodinium heterocostatum* var. *kolpaschevii*, subsequently (and now) *Dinogymnium heterocostatum* subsp. *kolpaschevii*. Lentin and Vozzhennikova (1990, p.17) provided an "expanded description" for this taxon. Age: Senonian.

"*hexagonum*" Deflandre-Rigaud, 1954, p.58; text-figs.1–2. Holotype: Deflandre-Rigaud, 1954, text-figs.1–2. **NOW** *Dinogymnium*?. Originally *Gymnodinium*, subsequently *Dinogymnium*, thirdly (and now) *Dinogymnium*?. Age: Campanian–?Maastrichtian.

"*hyalinum*" Vozzhennikova, 1967, p.45, pl.1, fig.9; pl.2, fig.6; pl.3, fig.4; pl.5, fig.11. Holotype: Vozzhennikova, 1967, pl.3, fig.4; Lentin and Vozzhennikova, 1990, pl.2, fig.8; text-fig.7; lost according to Lentin and Vozzhennikova (1990, p.21). Originally *Gymnodinium*, subsequently *Dinogymnium*. **Taxonomic senior synonym:** *Gymnodinium* (as *Dinogymnium*) *nelsonense*, according to Lentin and Vozzhennikova (1990, p.21). Age: Senonian.

"*kasachstanicum*" Vozzhennikova, 1967, p.45–46, pl.2, figs.4a–b; pl.3, figs.9a–b. Holotype: Vozzhennikova, 1967, pl.2, figs.4a–b; pl.3, figs.9a–b; Lentin and Vozzhennikova, 1990, pl.1, figs.3–7; text-fig.2. Originally *Gymnodinium*, subsequently *Dinogymnium*. **Taxonomic senior synonym:** *Dinogymnium acuminatum*, according to Lentin and Vozzhennikova (1990, p.15). Age: Campanian–Maastrichtian.

"*laticinctum*" Deflandre, 1943, p.501,503, pl.17, fig.3; text-fig.11. Holotype: Deflandre, 1943, pl.17, fig.3; text-fig.11. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: ?Senonian.

"*longicorne*" Vozzhennikova, 1967, p.46, pl.1, fig.8; pl.3, fig.6; pl.4, figs.6a–b,7. Emendation: Lentin and Vozzhennikova, 1990, p.18–19, as *Dinogymnium longicorne*. Holotype: Vozzhennikova, 1967, pl.1, fig.8; Lentin and Vozzhennikova, 1990, pl.2, figs.1–2; text-fig.5a. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Taxonomic junior synonym: *Gymnodinium* (as *Dinogymnium*) *curvatum*, according to Lentin and Vozzhennikova (1990, p.18). Age: Senonian.

"*luridum*" Deflandre, 1939a, p.166, pl.5, figs.4–6. Holotype: Deflandre, 1939a, pl.5, figs.4–5; Jan du Chêne et al., 1986a, pl.109, figs.6–8. **NOW** *Endoscrinium*. Originally *Gymnodinium*, subsequently *Scriniodinium*, thirdly (and now) *Endoscrinium*, fourthly *Tubotuberella*. Age: early Oxfordian.

"*marthae*" Deflandre, 1943, p.500, pl.17, fig.1; text-figs.1–4. Holotype: Deflandre, 1943, pl.17, fig.1; text-figs.1–4. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: Senonian.

"*muticum*" Vozzhennikova, 1967, p.46–47, pl.1, figs.6–7; pl.2, fig.9. Emendation: Lentin and Vozzhennikova, 1990, p.19–20, as *Dinogymnium muticum*. Holotype: Vozzhennikova, 1967, pl.1, fig.6; Lentin and Vozzhennikova, 1990, text-fig.6a; lost according to Lentin and Vozzhennikova (1990, p.19). Neotype: Vozzhennikova, 1967, pl.1, fig.7; Lentin and Vozzhennikova, 1990, pl.2, figs.13–14; text-fig.6b; designated by Lentin and Vozzhennikova (1990, p.20). **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: Senonian.

"*nelsonense*" Cookson, 1956, p.183, pl.1, figs.8–11. Holotype: Cookson, 1956, pl.1, fig.10; Helby et al., 1987, fig.42C; Lentin and Vozzhennikova, 1990, pl.2, fig.8. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Taxonomic junior synonym: *Gymnodinium* (as *Dinogymnium*) *hyalinum*, according to Lentin and Vozzhennikova (1990, p.21). Age: Senonian.

"*parvimarginatum*" Cookson and Eisenack, 1958, p.24, pl.1, fig.6. Holotype: Cookson and Eisenack, 1958, pl.1, fig.6; Jan du Chêne et al., 1986a, pl.112, figs.10–12. **NOW** *Scriniodinium*. Originally *Gymnodinium*, subsequently (and now) *Scriniodinium*. Age: Late Jurassic.

"*pontis-mariae*" Deflandre, 1936b, p.167, pl.2, figs.7–9. Holotype: Deflandre, 1936b, pl.2, fig.7. **NOW** *Subtilisphaera*. Originally *Gymnodinium*, subsequently *Deflandrea*, thirdly *Ascodinium*, fourthly (and now) *Subtilisphaera*. Age: ?Senonian.

"*sibiricum*" Vozzhennikova, 1967, p.47–48, pl.2, figs.2,3a–b; pl.3, figs.2–3. Emendation: Lentin and Vozzhennikova, 1990, p.21–22, as *Dinogymnium sibiricum*. Holotype: Vozzhennikova, 1967, pl.3, figs.2–3; Lentin and Vozzhennikova, 1990; text-fig.8; lost according to Lentin and Vozzhennikova (1990, p.22). Lectotype: Vozzhennikova, 1967, pl.2, fig.2, designated by Lentin and Vozzhennikova (1990, p.22). **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. This name was not validly published in Vozzhennikova (1963, text-fig.49b), who did not provide a description. Age: Senonian.

"*sphaerocephalum*" Vozzhennikova, 1967, p.48, pl.2, fig.7; pl.3, fig.1. Emendation: Lentin and Vozzhennikova, 1990, p.25–26, as *Alisogymnium sphaerocephalum*. Holotype: Vozzhennikova, 1967, pl.3, fig.1; Lentin and Vozzhennikova, 1990, pl.2, figs.6,11–12; text-fig.10. **NOW** *Alisogymnium*. Originally *Gymnodinium*, subsequently *Dinogymnium*, thirdly (and now) *Alisogymnium*. Taxonomic junior synonym: *Dinogymnium assamicum*, according to Jain (1977a, p.133–134) — however, Lentin and Vozzhennikova (1990, p.28) retained *Dinogymnium* (as *Alisogymnium*) *assamicum*. Age: Senonian.

"var. *laeve*" Vozzhennikova, 1967, p.48, pl.1, fig.4; pl.2, fig.5. Emendation: Lentin and Vozzhennikova, 1990, p.26–27, as *Alisogymnium laeve*. Holotype: Vozzhennikova, 1967, pl.2, fig.5; Lentin and Vozzhennikova, 1990, pl.2, fig.7a; lost according to Lentin and Vozzhennikova (1990, p.26). Neotype: Harland, 1973, pl.85, figs.2–3 (as *Dinogymnium longicornis*); Lentin and Vozzhennikova, 1990, pl.2, fig.7b; designated by Lentin and Vozzhennikova (1990, p.27). **NOW** *Alisogymnium laeve*. Originally *Gymnodinium sphaerocephalum* var. *laeve*, subsequently *Dinogymnium sphaerocephalum* subsp. *laeve*, thirdly (and now) *Alisogymnium laeve*. Age: Senonian.

"var. *sphaerocephalum*". Autonym. Holotype: Vozzhennikova, 1967, pl.3, fig.1; Lentin and Vozzhennikova, 1990, pl.2, figs.6,11–12; text-fig.10. **Now redundant.**

"*strombomorphum*" Deflandre, 1943, p.501, pl.17, figs.4–6; text-figs.5–7. Holotype: Deflandre, 1943, pl.17, figs.4–6; text-figs.5–7. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: ?Senonian.

"*torulosum*" Deflandre, 1943, p.504–505, pl.17, figs.7–8; text-figs.17–25. Holotype: Deflandre, 1943, pl.17, figs.7–8; text-figs.17–20; Jan du Chêne et al., 1986a, pl.104, figs.5–6. **NOW** *Scriniodinium*?. Originally *Gymnodinium*, subsequently (and now) *Scriniodinium*?. Age: Senonian.

"*ventriosum*" Alberti, 1961, p.5–6, pl.3, fig.5. Holotype: Alberti, 1961, pl.3, fig.5. **NOW** *Diconodinium*. Originally *Gymnodinium*, subsequently (and now) *Diconodinium*. Age: Turonian.

"*westralium*" Cookson and Eisenack, 1958, p.25, pl.1, fig.9. Emendation: May, 1977, p.118, as *Dinogymnium westralium*. Holotype: Cookson and Eisenack, 1958, pl.1, fig.9. **NOW** *Dinogymnium*. Originally *Gymnodinium*, subsequently (and now) *Dinogymnium*. Age: Senonian.

LEBESSPHAERA Meier et al., 2002, p.610. Calcareous dinoflagellate genus based on an extant cyst (see Streng et al., 2004, p.482 and Elbrächter et al., 2008, p.1300). Type: Meier et al., 2002, figs.7a–b, as *Lebessphaera urania*.

**urania* Meier et al., 2002, p.610–612, text-fig.6; figs.7a–i. Holotype: Meier et al., 2002, figs.7a–b. N.I.A. Age: extant.

PERIDINIUM Ehrenberg, 1832a, p.38. The current status of fossil dinoflagellate taxa formerly included in *Peridinium* is given below.

"*basilium*" Drugg, 1967, p.13, pl.1, figs.9–11; pl.9, figs.1a–b. Holotype: Drugg, 1967, pl.1, fig.11. Originally *Peridinium*, subsequently *Palaeoperidinium*. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Stover and Evitt (1978, p.218). Age: ?Maastrichtian–Danian.

"*comatum*" Morgenroth, 1966b, p.1, pl.1, figs.1–2. Holotype: Morgenroth, 1966b, pl.1, fig.1. **NOW** *Phthanoperidinium*. Originally *Peridinium* (Appendix B), subsequently (and now) *Phthanoperidinium*. Taxonomic junior synonyms: *Phthanoperidinium tritonium*, according to Bujak in Bujak et al. (1980, p.72); however, Fensome et al. (2009, p.54–55) considered *Phthanoperidinium tritonium* to be a taxonomic junior synonym of *Phthanoperidinium coreoides*; *Hystrichogonyaulax* (now *Phthanoperidinium*) *coreoides*, according to Stover and Evitt (1978, p.118) — however, Benedek and Sarjeant (1981, p.328–330) retained *Phthanoperidinium coreoides*. Eaton (1976, p.294) also proposed this combination. Age: early Oligocene.

"*conicum*" (Gran, 1900, p.47) Ostenfeld and Schmidt, 1901, p.174. Holotype: information not available. **NOW** *Protoperidinium conicum* (Appendix B). Originally *Peridinium divergens* var. *conicum*, subsequently *Peridinium conicum*, thirdly (and now) *Protoperidinium conicum* (Appendix B). Modern species defined from the motile stage. Fossil cysts assigned to this species by Deflandre (1939b) were included in *Palaeoperidinium deflandrei* Lentin and Williams, 1973, by Lentin and Williams (1973, p.105). Age: extant.

"var. *conicum*". Autonym. **Now redundant.**

"var. *larjakiense*" Vozzhennikova, 1967, p.71–72, pl.16, figs.1a–b, 2a–b. Holotype: Vozzhennikova, 1967, pl.16, figs.1a–b; Lentin and Vozzhennikova, 1990, text-fig.32; lost according to Lentin and Vozzhennikova (1990, p.61). Originally *Peridinium conicum* var. *larjakiense*, subsequently *Palaeoperidinium deflandrei* subsp. *larjakiense*, thirdly *Cooksoniella larjakiensis*, fourthly *Palaeoperidinium larjakiense*. **Taxonomic senior synonym:** *Peridinium* (now *Palaeoperidinium*) *pyrophorum*, according to Lentin and Vozzhennikova (1990, p.61). Age: Paleocene.

crassipes Kofoid, 1907b, p.309, pl.31, figs.46–47. Holotype: Kofoid, 1907b, pl.31, figs.46–47. Modern species defined from the motile stage. Age: extant.

"forma *altum*" Wetzel, 1933a, p.163, pl.2, figs.8–9. Holotype: not designated. **Taxonomic senior synonym** (at specific rank): *Deflandrea* (now *Phelodinium*) *magnifica*, according to Sarjeant (1985b, p.159). Wetzel (1933a, p.163) gave the following citation, "*Peridinium* cf. *crassipes* Kofoid, forma *altum* n.f." Age: Senonian.

"*crenulatum*" de Coninck, 1975, p.96, pl.17, figs.5–7, 12–13, 14–15. Emendation: Heilmann-Clausen, 1985, p.24–25, as *Phthanoperidinium crenulatum*. Holotype: de Coninck, 1975, pl.17, figs.12–13. **NOW** *Phthanoperidinium*. Originally *Peridinium*, subsequently (and now) *Phthanoperidinium*. Age: early Eocene (Ypresian).

"*damasii*" Lejeune-Carpentier, 1942, p.B185–B186, figs.9–14. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.16, as *Deflandrea? damasii*. Holotype: Lejeune-Carpentier, 1942, fig.10; Lejeune-Carpentier and Sarjeant, 1981,

pl.6, fig.3; text-fig.9a. **NOW** *Deflandrea*?. Originally *Peridinium*, subsequently *Cooksoniella*?, thirdly *Palaeoperidinium*, fourthly *Deflandrea*, fifthly (and now) *Deflandrea*?. Age: Senonian.

"*delitiense*" Ehrenberg, 1837b, pl.1, fig.6. Emendation: Lucas-Clark, 1987, p.167, as *Spongodinium delitiense*. Holotype: Ehrenberg, 1837b, pl.1, fig.6. **NOW** *Spongodinium*. Originally *Peridinium*, subsequently (and now) *Spongodinium*. Of the two illustrations provided by Ehrenberg (1837b), only his pl.1, fig.6 shows a single specimen, which can thus be accepted as the type. However, the validity/authorship of this name may need to be reconsidered as it appears that Ehrenberg (1837b) did not provide a description. Age: Late Cretaceous.

"*diamantum*" Churchill and Sarjeant, 1962, p.34–36, pl.1, fig.19; text-fig.3. Holotype: Churchill and Sarjeant, 1962, pl.1, fig.19; text-fig.3. **NOW** *Gonyaulacysta*. Originally *Peridinium*, subsequently *Phthanoperidinium*?, thirdly (and now) *Gonyaulacysta*. Questionable assignment: Churchill and Sarjeant (1962, p.34). Age: Holocene.

divergens Ehrenberg, 1840, p.201. Holotype: information not available. Modern species defined from the motile stage.

"var. *conicum*" Gran, 1900, p.47. Holotype: information not available. **NOW** *Protooperidinium conicum* (Appendix B). Originally *Peridinium divergens* var. *conicum*, subsequently *Peridinium conicum*, thirdly (and now) *Protooperidinium conicum* (Appendix B). Modern taxon defined from the motile stage. Fossil cysts assigned to this taxon by Deflandre (1939b) were included in *Palaeoperidinium deflandrei* by Lentin and Williams (1973, p.105). Age: extant.

"*eocenicum*" Cookson and Eisenack, 1965a, p.119–120, pl.11, figs.1–5. Holotype: Cookson and Eisenack, 1965a, pl.11, figs.1–2. **NOW** *Phthanoperidinium*?. Originally *Peridinium*, subsequently (and now) *Phthanoperidinium*?. Age: late Eocene.

"*galeatum*" Lejeune-Carpentier, 1942, p.B186–B188, figs.15–20. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.18–19, as *Deflandrea galeata*. Holotype: Lejeune-Carpentier, 1942, figs.15–16; Lejeune-Carpentier and Sarjeant, 1981, pl.5, figs.1–2; text-fig.10. **NOW** *Deflandrea*. Originally *Peridinium*, subsequently (and now) *Deflandrea*. Age: Senonian.

"*hansonianum*" Traverse, 1955, p.77–79, pl.13, fig.147. Holotype: Traverse, 1955, pl.13, fig.147; Traverse, 1994, pl.1, fig.1. **NOW** *Saeptodinium*. Originally *Peridinium*, subsequently *Palaeoperidinium*, thirdly (and now) *Saeptodinium*. Evitt (1974, p.4) indicated that this species has affinities with the modern species *Peridinium limbatum* (Stokes, 1887) Lemmermann, 1899. Age: latest Oligocene (middle early Miocene, according to Traverse, 1994).

"*illustrans*" Wetzel, 1933a, p.167, pl.2, fig.15. Holotype: Wetzel, 1933a, pl.2, fig.15. **NOW** *Phthanoperidinium*?. Originally *Peridinium*, subsequently (and now) *Phthanoperidinium*?. Age: Senonian.

"*kansanum*" Tasch in Tasch et al., 1964, p.196, pl.1, fig.1. Holotype: Tasch et al., 1964, pl.1, fig.1. **NOW** *Ovoidinium*?. Originally *Peridinium*, subsequently *Deflandrea*?, thirdly (and now) *Ovoidinium*?, fourthly *Ascodinium*?. Age: Albian.

"*lambdoideum*" E. Nagy, 1966, p.39–40, pl.1, figs.1–3; text-figs.1a–b. Holotype: E. Nagy, 1966, pl.1, figs.1–3; text-figs.1a–b. **NOW** *Phthanoperidinium*?. Originally *Peridinium*, subsequently *Phthanoperidinium*, thirdly (and now) *Phthanoperidinium*?. Age: early Pliocene.

"*paleocenicum*" Cookson and Eisenack, 1965c, p.142–143, pl.19, figs.1–4; text-figs.2a–b. Holotype: Cookson and Eisenack, 1965c, pl.19, figs.2–3. **NOW** *Ginginodinium*. Originally *Peridinium*, subsequently *Cooksoniella*?, thirdly *Palaeoperidinium*, fourthly (and now) *Ginginodinium*. Age: middle Paleocene.

pedunculatum Schütt, 1895, pl.14, fig.47, nos.1–3 — p.158. Holotype: not designated. This species was not described by Schütt (1895) and thus the name *Peridinium pedunculatum* was not validly published at that time. This name has presumably been subsequently validated, though investigation of this issue is beyond the scope of the present work. Age: extant.

- "forma *divaricans*" Wetzel, 1933a, p.165–166, text-fig.2. Holotype: Wetzel, 1933a, text-fig.2. Originally *Peridinium pedunculatum* forma *divaricans*, subsequently *Phelodinium tricuspis* subsp. *divaricans*.
Taxonomic senior synonym (at specific rank): *Deflandrea* (now *Cerodinium*) *albertii*, according to Sarjeant (1985b, p.158) and Lentin and Williams (1993, p.504,511). Age: Late Cretaceous.
- "*pleum*" Tasch in Tasch et al., 1964, p.196, pl.1, fig.15. Holotype: Tasch et al., 1964, pl.1, fig.15. **NOW** *Deflandrea*?. Originally *Peridinium*, subsequently (and now) *Deflandrea*?, thirdly *Gonyaulacysta*?. Age: Albian.
- "*polyedricum*" Pouchet, 1883, p.42, fig.34. Holotype: Pouchet, 1883, fig.34. **NOW** *Goniodoma* (Appendix B). Originally *Peridinium*, subsequently (and now) *Goniodoma* (Appendix B), thirdly *Heteraulacacysta*. Age: extant.
- ponticum* Wall and Dale in Wall et al., 1973, p.24–25, pl.1, figs.16–20; pl.2, figs.7–9. Holotype: Wall et al., 1973, pl.1, figs.16–17. Originally (and now) *Peridinium*, subsequently *Proto-peridinium* (combination not validly published). This species is based on fossil cysts. Age: late Quaternary.
- "*pyrophorum*" Ehrenberg, 1837b, pl.1, figs.1,4 ex Wetzel, 1933a, p.164–165. Emendations: Sarjeant, 1967b, p.246–247; Gocht and Netzel, 1976, p.403–405, both as *Palaeoperidinium pyrophorum*. Holotype: Ehrenberg, 1837b, pl.1, fig.4; Lejeune-Carpentier, 1938b, figs.1–4. **NOW** *Palaeoperidinium*. Originally *Peridinium*, subsequently (and now) *Palaeoperidinium*. Taxonomic junior synonyms: *Peridinium* (now *Palaeoperidinium*) *basilium* and *Palaeoperidinium deflandrei*, both according to Stover and Evitt (1978, p.218); *Pentagonum marginatum*, *Pentagonum sibiricum*, and *Peridinium conicum* var. *larjakiense* (as *Palaeoperidinium larjakiense*), all according to Lentin and Vozzhennikova (1990, p.61). This name was not validly published in Ehrenberg (1837b) and Ehrenberg (1854, caption to pl.37) since no description was provided. Of Ehrenberg's (1837b) illustrations, only pl.1, fig.4 is of a single specimen, which thus has subsequently been accepted as the holotype. The specimen illustrated by Sarjeant (1967b, fig.3) as the holotype appears to be a different specimen. Age: Late Cretaceous.
- "*resistente*" Morgenroth, 1966a, p.5, pl.2, figs.1–2. Holotype: Morgenroth, 1966a, pl.2, figs.1–2. **NOW** *Phthanoperidinium*. Originally *Peridinium*, subsequently (and now) *Phthanoperidinium*. Age: early Eocene.
- "*schizokeras*" de Coninck, 1975, p.97, pl.17, figs.16–17. Holotype: de Coninck, 1975, pl.17, figs.16–17. **NOW** *Phthanoperidinium*?. Originally *Peridinium*, subsequently *Phthanoperidinium*, thirdly (and now) *Phthanoperidinium*?. Age: early Eocene (Ypresian).
- "*stellatum*" Wall in Wall and Dale, 1968c, p.275, pl.2, figs.13–15; pl.3, figs.16–21. Holotype: Wall and Dale, 1968c, pl.3, figs.16–21. **NOW** *Proto-peridinium* (Appendix B). Originally *Peridinium*, subsequently *Stelladinium*, thirdly (and now) *Proto-peridinium* (Appendix B). Taxonomic senior synonym: *Peridinium* (now *Proto-peridinium*) *compressum* Abé, 1927, according to Loeblich III (1970, p.895–896) and Head (1996b, p.1228) — however, Head in Rochon et al. (1999, p.48) retained *Peridinium* (as *Proto-peridinium*) *stellatum*. Age: Holocene.
- "*stockmansii*" de Coninck, 1975, p.97–98, pl.17, figs.18–37. Holotype: de Coninck, 1975, pl.17, figs.26–27. **NOW** *Phthanoperidinium*. Originally *Peridinium*, subsequently (and now) *Phthanoperidinium*. Taxonomic junior synonym: *Phthanoperidinium echinatum*, according to de Coninck (1977, p.40). Age: early Eocene (Ypresian).
- "*subconicoides*" Lejeune-Carpentier, 1942, p.B183–B185; text-figs.1–8. Holotype: Lejeune-Carpentier, 1942, text-figs.1–2; Streel et al., 1977, pl.2, fig.3. **NOW** *Palaeoperidinium*?. Originally *Peridinium*, subsequently (and now) *Palaeoperidinium*?. Age: Late Cretaceous.
- "*tricuspe*" Wetzel, 1933a, p.166, pl.2, fig.14. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.20, as *Lejeunecysta tricuspis*. Holotype: Wetzel, 1933a, pl.2, fig.14; Lejeune-Carpentier, 1942, fig.21; Lejeune-Carpentier and Sarjeant, 1981, pl.6, fig.5. **NOW** *Phelodinium*. Originally *Peridinium*, subsequently *Lejeunia* (combination illegitimate), thirdly *Astro-cysta*, fourthly *Senegalinium*, fifthly *Lejeunecysta*, sixthly (and now) *Phelodinium*. Taxonomic junior synonym: *Lejeunia* (now *Phelodinium*) *kozłowskii*, according to Harker and Sarjeant (1975, p.223) — however, Lindgren (1984, p.181) retained *Phelodinium kozłowskii*. This name was not validly published in Wetzel (1932, p.142 caption to pl.2, fig.11), since no description was given. Age: Senonian.

"*ventriosum*" Wetzel, 1933a, p.161–162, pl.2, figs.4–6; text-figs.1,8. Emendation: Lejeune-Carpentier and Sarjeant, 1981, p.5, as *Cribroperidinium ventriosum*. Holotype: Wetzel, 1933a, pl.2, fig.4; Lejeune-Carpentier, 1946, fig.2; Lejeune-Carpentier and Sarjeant, 1981, pl.1, figs.3–4; text-fig.3. **NOW** *Cribroperidinium*. Originally *Peridinium*, subsequently *Palaeoperidinium* (combination not validly published), thirdly (and now) *Cribroperidinium*. Age: Senonian.

POLYKRIKOS Bütschli, 1873, p.673.

"*tentaculatus*" Wetzel, 1933a, p.171, pl.2, fig.23; text-fig.4. Holotype: Wetzel, 1933a, pl.2, fig.23; text-fig.4. **NOW** *Wetzelodinium* (Appendix A). Originally *Polykrikos*, subsequently (and now) *Wetzelodinium* (Appendix A). Pessagno in Sarjeant (1985b, p.164) noted that the holotype represents a broken radiolarian. This name was not validly published in Wetzel (1932, p.135), since no description was given. Age: ?Senonian.

PROTOPERIDINIUM Bergh, 1881a, p.63.

"*catomus*" Harland in Harland et al., 1991, p.651,653, figs.4d–e. Holotype: Harland et al., 1991, fig.4d. **NOW** *Lejeunecysta*. Originally *Protoperidinium* subgenus *Protoperidinium* section *Lejeunecysta* (section name not validly published), subsequently (and now) *Lejeunecysta*. N.I.A. Age: early Pleistocene.

conicum (Gran, 1900, p.47) Balech, 1974, p.58. Holotype: information not available. Originally *Peridinium divergens* var. *conicum* (Appendix B), subsequently *Peridinium conicum* (Appendix B), thirdly (and now) *Protoperidinium conicum*. Modern species defined from the motile stage. Fossil cysts assigned to this taxon by Deflandre (1939b) were included in *Palaeoperidinium deflandrei* by Lentin and Williams (1973, p.105). Age: Holocene.

"*digitale*" Pouchet, 1883, p.443, pl.18–19, fig.14. Holotype: information not available. **NOW** *Gonyaulax* (Appendix B). Originally *Protoperidinium*, subsequently (and now) *Gonyaulax* (Appendix B). N.I.A. Age: extant.

"*harpeza*" Harland in Harland et al., 1991, p.653–654, fig.4f. Holotype: Harland et al., 1991, fig.4f. Originally *Protoperidinium* subgenus *Protoperidinium* section *Selenopemphix* (section name not validly published), subsequently *Selenopemphix*. **Taxonomic senior synonym:** *Selenopemphix dionaeacysta*, according to Head (1993, p.36). N.I.A. Age: early Pleistocene.

"*marieae*" Harland in Harland et al., 1991, p.653, figs.4j–l. Holotype: Harland et al., 1991, fig.4j. **NOW** *Lejeunecysta*. Originally *Protoperidinium* subgenus *Protoperidinium* section *Lejeunecysta* (section name not validly published), subsequently (and now) *Lejeunecysta*. Age: early Pleistocene.

"*ponticum*" (Wall and Dale in Wall et al., 1973, p.24–25, pl.1, figs.16–20; pl.2, figs.7–9) Matsuoka, 1985b, table 2 — p.5. **Combination not validly published:** basionym not fully referenced. **NOW** *Peridinium* (Appendix B). Originally (and now) *Peridinium* (Appendix B), subsequently *Protoperidinium* (combination not validly published). This species is based on fossil cysts. Age: late Quaternary.

stellatum (Wall in Wall and Dale, 1968c, p.275, pl.2, figs.13–15; pl.3, figs.16–21) Head in Rochon et al., 1999, p.48. Holotype: Wall and Dale, 1968c, pl.3, figs.16–21. Originally *Peridinium*, subsequently *Stelladinium*, thirdly (and now) *Protoperidinium*. Taxonomic senior synonym: *Peridinium* (now *Protoperidinium*) *compressum* Abé, 1927, according to Loeblich III (1970, p.895–896) and Head (1996b, p.1228) — however, Head in Rochon et al. (1999, p.48) retained *Peridinium* (as *Protoperidinium*) *stellatum*. Age: Holocene.

"*tholus*" (Bradford, 1975, p.3072,3074, figs.17–22) Bradford and Wall, 1984, p.49. Holotype: Bradford, 1975, fig.17. **Combination not validly published:** basionym not fully referenced. **NOW** *Selenopemphix*. Originally *Omanodinium*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Selenopemphix* (combination not validly published), thirdly *Selenopemphix* (combination not validly published), fourthly (and now) *Selenopemphix*. N.I.A. Age: Holocene.

tricingulatum Kawami et al., 2009, p.262–264, figs.2a–l,3a–p,4. Holotype: Kawami et al., 2009, figs.3a–p. Originally (and now) *Protoperidinium*, subsequently *Islandinium* (combination not validly published). This species is based on an motile cell. Age: extant.

PROTOPERIDINIUM subgenus **ARCHAEPERIDINIUM** (Jørgensen, 1912, p.6) Lebour, 1922, p.809. Modern subgenus defined from the motile stage. Originally *Archaeperidinium*, subsequently (and now) *Protoperidinium* subgenus *Archaeperidinium*.

PROTOPERIDINIUM subgenus **ARCHAEPERIDINIUM** section **ARCHAEPERIDINIUM**. Autonym. Modern section defined from the motile stage. Harland (1982, p.372) included fossilizable cysts in this taxon.

PROTOPERIDINIUM subgenus **ARCHAEPERIDINIUM** section **FUSCUSASPHAERIDIUM** Harland, 1982, p.395. Modern section defined from the motile stage. Harland (1982, p.372) included fossilizable cysts in this taxon.

"**PROTOPERIDINIUM** subgenus **ARCHAEPERIDINIUM** section **STELLADINIUM**" (Bradford, 1975, p.3065–3066) Harland, 1982, p.395. **Combination not validly published:** basionym not fully referenced. **NOW** *Stelladinium*. Originally (and now) *Stelladinium*, subsequently *Protoperidinium* subgenus *Archaeperidinium* section *Stelladinium* (combination not validly published). Type: Bradford, 1975, fig.2, as *Stelladinium reidii*.

PROTOPERIDINIUM subgenus **PROTOPERIDINIUM**. Autonym. Modern subgenus defined from the motile stage.

PROTOPERIDINIUM subgenus **PROTOPERIDINIUM** section **ASYMMETROPEDINIUM** Harland, 1982, p.396. Modern section defined from the motile stage. Harland (1982, p.372) included fossilizable cysts in this taxon.

"**PROTOPERIDINIUM** subgenus **PROTOPERIDINIUM** section **BRIGANTEDINIUM**" (Reid, 1977, p.432) Harland, 1982, p.396. **Name not validly published:** see discussion under *Brigantedinium*. **NOW** *Brigantedinium*. Originally *Brigantedinium* (name not validly published), subsequently *Protoperidinium* subgenus *Protoperidinium* section *Brigantedinium* (name not validly published), thirdly (and now) *Brigantedinium*. In proposing this combination, Harland (1982, p.396) did not fully reference the basionym. Type: Wall, 1965b, text-figs.7,20, as *Chytroeisphaeridia simplex*.

"**PROTOPERIDINIUM** subgenus **PROTOPERIDINIUM** section **LEJEUNECYSTA**" (Artzner and Dörhöfer, 1978, p.1381) Harland et al., 1991, p.651. **Combination not validly published:** basionym not fully referenced. **NOW** *Lejeunecysta*. Originally *Lejeunia* Gerlach, 1961 (generic name illegitimate), subsequently (and now) *Lejeunecysta*, thirdly *Protoperidinium* subgenus *Protoperidinium* section *Lejeunecysta* (combination not validly published). Harland in Harland et al. (1991, p.651,653) included *Protoperidinium* (now *Lejeunecysta*) *catomus* and *Protoperidinium* (now *Lejeunecysta*) *mariae* in this section. Taxonomic senior synonym: *Quinquecuspis*, by implication in Matsuoka (1987, p.57), who incorrectly considered *Lejeunecysta* to be the senior name — however, this synonymy has not been generally followed. Type: Gerlach, 1961, pl.26, figs.10–11, as *Lejeunia hyalina*.

PROTOPERIDINIUM subgenus **PROTOPERIDINIUM** section **PROTOPERIDINIUM**. Autonym. Modern section defined from the motile stage. Harland (1982, p.372) included fossilizable cysts in this section.

"**PROTOPERIDINIUM** subgenus **PROTOPERIDINIUM** section **QUINQUECUSPIS**" (Harland, 1977b, p.106) Harland, 1982, p.396–397. Emendation: Harland, 1982, p.396–397, as *Protoperidinium* subgenus *Protoperidinium* section *Quinquecuspis*. **Combination not validly published**: basionym not fully referenced. **NOW** *Quinquecuspis*. Originally (and now) *Quinquecuspis*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Quinquecuspis* (combination not validly published). Taxonomic junior synonym: *Lejeunecysta*, by implication in Matsuoka (1987, p.57), who incorrectly considered *Lejeunecysta* to be the senior name — however, this synonymy has not been generally followed. Type: Reid, 1977, pl.26, figs.10–11, as *Trinovantedinium concretum*.

PROTOPERIDINIUM subgenus **PROTOPERIDINIUM** section **SELENOPEMPHIX** (Benedek, 1972, p.47) Harland, 1982, p.396. Emendations: Bujak in Bujak et al., 1980, p.82; Head, 1993, p.32, both as *Selenopemphix*. **Combination not validly published**: basionym not fully referenced. **NOW** *Selenopemphix*. Originally (and now) *Selenopemphix*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Selenopemphix* (name not validly published). Taxonomic junior synonyms: *Omanodinium*, according to Bradford and Wall (1984, p.49) and Head (1993, p.32); *Multispinula*, according to Matsuoka (1985a, p.51) and Head (1993, p.31–32). Head (1993, p.32) considered by implication that the acritarch genus *Margosphaera* Nagy, 1965, is the possible taxonomic senior synonym of this taxon. Type: Benedek, 1972, pl.11, fig.13, as *Selenopemphix nephroides*.

"**PROTOPERIDINIUM** subgenus **PROTOPERIDINIUM** section **TRINOVANTEDINIUM**" (Reid, 1977, p.436–437) Harland, 1982, p.397. **Combination not validly published**: basionym not fully referenced. **NOW** *Trinovantedinium*. Originally (and now) *Trinovantedinium*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Trinovantedinium* (combination not validly published). Type: Reid, 1977, pl.1, figs.6–8, as *Trinovantedinium capitatum*.

"**PROTOPERIDINIUM** subgenus **PROTOPERIDINIUM** section **VOTADINIUM**" (Reid, 1977, p.444) Harland, 1982, p.396. **Combination not validly published**: basionym not fully referenced. **NOW** *Votadinium*. Originally (and now) *Votadinium*, subsequently *Protoperidinium* subgenus *Protoperidinium* section *Votadinium* (combination not validly published). Type: Reid, 1977, pl.2, fig.21, as *Votadinium calvum*.

PYROPHACUS Stein, 1883, p.9,26,28–29. Taxonomic junior synonym: *Tuberculodinium*, by implication in Wall and Dale (1971, p.234), who included the "type species", *Tuberculodinium vancampoae*, in *Pyrophacus* — however, Head (1996b, p.1232) retained *Tuberculodinium*.

"**vancampoae**" (Rossignol, 1962, p.134, pl.2, fig.1) Wall and Dale, 1971, p.234. Holotype: Rossignol, 1962, pl.2, fig.1. **NOW** *Tuberculodinium*. Originally *Pterospermopsis* (Appendix A), subsequently (and now) *Tuberculodinium*, thirdly *Pyrophacus*. Taxonomic junior synonym: *Membranilarnacia donaensis*, according to Jain and Garg (1990, p.108). Motile equivalent: *Pyrophacus steinii* (Schiller, 1935) Wall and Dale, 1971, according to Matsuoka et al. (1989, p.94). Age: Pleistocene.

"**RHABDOTHORAX**" Kamptner, 1958, p.88–90 ex Gaarder and Heimdal 1973, p.97. Calcareous dinoflagellate genus (see Elbrächter et al., 2008, p.1301). **Taxonomic senior synonym**: *Scrippsiella* (Appendix B), according to Janofske (2000, p.180). This name was not validly published in Kamptner (1958) since that author did not provide a Latin diagnosis. The generic name *Rhabdothorax* is validly published even though the proposed name for its type, *Rhabdothorax erinaceus*, is not validly published; this is because the basionym, *Rhabdosphaera erinacea*, is a validly published name. Type: information not available; "type species" — *Rhabdosphaera erinacea*.

"***erinaceus**" (Kamptner, 1937, p.71–74, pl.1, figs.6–7; fig.2) Gaarder and Heimdal 1973, p.97. Holotype: Kamptner, 1937, pl.1, figs.6–7; fig.2. Epitype: Kretschmann et al. 2014, figs.4–5, designated by Kretschmann et al. (2014, figs.4–5). **Combination not validly published**: basionym not fully referenced. **NOW** *Scrippsiella*. Originally *Rhabdosphaera* (Appendix A), subsequently *Rhabdothorax* (combination not validly published), thirdly (and now) *Scrippsiella* (Appendix B). Taxonomic senior synonym: *Glenodinium* (now *Scrippsiella*) *trochoideum*

(Appendix B, under *Scrippsiella*), according to Janofske (2000, p.180) — however, Kretschmann et al. (2014, p.403) retained this species, as *Scrippsiella*. This combination was also not validly published in Kamptner (1958, p.89) since the generic name was not validly published. Age: extant.

"*gerenus*" Kamptner, 1967, p.146, pl.8, fig.60; pl.9, fig.63. Holotype: information not available. **Name not validly published:** generic name not validly published. **Taxonomic senior synonym:** *Discosphaera* (as *Rhabdothorax*, now *Scrippsiella*) *regalis* (Appendix B, under *Scrippsiella*), according to Gaarder in Gaarder and Heimdal (1973, p.89). Age: extant.

"*regalis*" (Gaarder, 1954, p.8, fig.5) Gaarder in Gaarder and Heimdal, 1973, p.89. Holotype: Gaarder, 1954, fig.5. **NOW** *Scrippsiella* (Appendix B). Originally *Discosphaera* (Appendix A), subsequently *Rhabdothorax*, thirdly (and now) *Scrippsiella* (Appendix B). Taxonomic junior synonym: *Rhabdothorax gerenus* (name not validly published), according to Gaarder in Gaarder and Heimdal (1973, p.89). Age: extant.

SCRIPPSIELLA Balech, 1959, p.196 ex Loeblich III, 1965, p.15. Emendation: Janofske, 2000, p.180. Taxonomic junior synonym: *Rhabdothorax*, according to Janofske (2000, p.180).

erinaceus (Kamptner, 1937, p.71) Kretschmann et al., 2014, p.403. Holotype: Kamptner, 1937, pl.1, figs.6–7; fig.2. Epitype: Kretschmann et al. 2014, figs.4–5, designated by Kretschmann et al. (2014, figs.4–5). Originally *Rhabdosphaera* (Appendix A), subsequently *Rhabdothorax* (combination not validly published), thirdly (and now) *Scrippsiella*. Taxonomic senior synonym: *Glenodinium* (now *Scrippsiella*) *trochoideum* (Appendix B, under *Scrippsiella*), according to Janofske (2000, p.180) — however, Kretschmann et al. (2014, p.403) retained this species, as *Scrippsiella*. Age: extant.

regalis (Gaarder, 1954, p.8, fig.5) Janofske, 2000, p.183. Holotype: Gaarder, 1954, fig.5. Emendation: Janofske, 2000, p.183–184. Originally *Discosphaera* (Appendix A), subsequently *Rhabdothorax*, thirdly (and now) *Scrippsiella*. Taxonomic junior synonym: *Rhabdothorax gerenus* (name not validly published), according to Gaarder in Gaarder and Heimdal (1973, p.89). Gaarder in Gaarder and Heimdal (1973, p.89) considered *Discoaster planctonicus* Lecal, 1952, a discoaster species, to be a possible taxonomic junior synonym of this species. Age: extant.

triquetracapitata Meier et al., 2002, p.612–613, text-fig.8, figs.9a–i. Holotype: Meier et al., 2002, figs.9a–b. This name is based on cysts from surface sediment. Age: Holocene.

**trochoidea* (Stein, 1883, pl.3, figs.27–29) Loeblich III, 1976, p.25. Holotype: Stein, 1883, pl.3, figs.27–29. Originally *Glenodinium* (modern dinoflagellate; not indexed), subsequently *Peridinium* (not indexed herein), thirdly (and now) *Scrippsiella*. Taxonomic junior synonyms: *Peridinium faeroense* (not indexed herein), *Rhabdosphaera erinacea* and *Scrippsiella sweeneyae* (not indexed herein), all according to Janofske (2000, p.180). For further details, see Head (1996b, p.1229) and Janofske (2000, p.180–183). Age: extant.

THORACOSPHERA Kamptner, 1927, p.180–184. Emendation: Fütterer, 1976, p.119,130 — see below. Extant calcareous dinoflagellate genus (see Streng et al., 2004, p.483 and Elbrächter et al., 2008, p.1302), currently containing some fossil-based species. According to Tangen et al. (1982), the "type species", *Thoracosphaera heimii*, represents the calcareous cell wall of a dinoflagellate vegetative stage. It is unlikely, however, that all the species listed below are dinoflagellates. Fütterer (1976) provided a diagnosis for *Thoracosphaera* which was not labelled an emendation or revision; in his abstract, however, he refers to the "redefined and revised genus *Thoracosphaera*". Type: Kamptner, 1927, text-fig.6, as *Syracosphaera pelagica*.

"*albatrosiana*" Kamptner, 1963, p.177–178, pl.5, fig.30. Holotype: Kamptner, 1963, pl.5, fig.30. **NOW** *Calciadinellum*. Originally *Thoracosphaera*, subsequently *Orthopithonella*, thirdly *Sphaerodinella*, fourthly (and now) *Calciadinellum*. Taxonomic junior synonyms: *Thoracosphaera ricosea*, according to Fütterer (1976, p.134); and *Thoracosphaera rela* according to Fütterer (1978, p.716). Age: Pleistocene.

"*arctica*" Gilbert and Clark, 1983, p.400, pl.1, figs.1–15. Holotype: Gilbert and Clark, 1983, pl.1, fig.1. **NOW** *Caracomia*. Originally *Thoracosphaera*, subsequently *Sphaerodinella*, thirdly (and now) *Caracomia*. Age: late Miocene–Holocene.

"*atlantica*" Haq and Lohmann, 1976, p.183, pl.3, figs.11–12. Holotype: Haq and Lohmann, 1976, pl.3, fig.13. **Taxonomic senior synonym:** *Thoracosphaera* (now *Operculodinella*) *operculata*, according to Fütterer (1990, p.540). Age: Paleocene–Eocene.

"*candora*" Kamptner, 1967, p.157, pl.17, figs.100,102; pl.18, figs.105–106. **Name not validly published:** holotype not designated. **Taxonomic senior synonym:** *Thoracosphaera* (now *Pernambugia*) *tuberosa*, according to Fütterer (1976, p.132). Age: extant.

"*corsena*" Kamptner, 1967, p.157, pl.12, figs.81–85. **Name not validly published:** holotype not designated. **Taxonomic senior synonym:** *Syracosphaera* (as and now *Thoracosphaera*) *heimii*, according to Fütterer (1976, p.131). Age: extant.

"*deflandrei*" Kamptner, 1956, p.448–455, figs.1–4. Holotype: Kamptner, 1956, fig.1. **NOW** *Fuettererella*. Originally *Thoracosphaera*, subsequently *Orthopithonella*, thirdly (and now) *Fuettererella*. Taxonomic junior synonyms: *Thoracosphaera* (now *Orthopithonella*) *johnstonei* and *Orthopithonella?* *minuta*, according to Kohring (1993a, p.30) — however, Streng et al. (2004, p.482) retained *Pithonella* (as *Pirumella*) *johnstonei* and *Orthopithonella?* *minuta*. Age: Eocene.

"*edwardsii*" Müller, 1976, p.52, pl.4, figs.3–6; pl.5, fig.6; pl.6, fig.1. Holotype: Müller, 1976, pl.5, fig.6. **Taxonomic senior synonym:** *Calciodinellum operosum*, according to Fütterer (1978, p.718). Age: Quaternary.

?*eichstaettensis* Keupp, 1978, p.88–89, figs.1–2. Holotype: Keupp, 1978, fig.1. Questionable assignment: Streng et al. (2004, p.483). Age: early Tithonian.

"*geometrica*" (Jafar, 1983, p.233, fig.10, nos.5–6) Bown, 1987, p.82. Holotype: Jafar, 1983, fig.10, no.5. **NOW** ?*Orthopithonella*. Originally *Prinsiosphaera*, subsequently *Orthopithonella*, thirdly *Thoracosphaera*, fourthly (and now) ?*Orthopithonella*. Taxonomic junior synonyms (at specific rank): *Prinsiosphaera triassica* subsp. *hyalina* and *Prinsiosphaera triassica* subsp. *noeliae* (both Appendix A), according to Janofske (1987, p.50). Age: Rhaetian.

"*granifera*" Fütterer, 1978, p.715, pl.2, figs.1–12. Emendation: Janofske and Karwath, 2000, p.107–108, as *Leonella granifera*. Holotype: Fütterer, 1978, pl.2, figs.1,4,7. **NOW** *Leonella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Orthopithonella*, fourthly (and now) *Leonella*. Age: late Pliocene–Pleistocene.

"*granulosa*" Kamptner, 1963, p.178–179, pl.5, fig.28. Holotype: Kamptner, 1963, pl.5, fig.28. **Taxonomic senior synonym:** *Syracosphaera* (as and now *Thoracosphaera*) *heimii*, according to Fütterer (1976, p.130). Age: Paleocene.

+*heimii* (Lohmann, 1920, p.117–118, fig.29) Kamptner, 1944, p.145. Holotype: Lohmann, 1920, fig.29. Originally *Syracosphaera*, subsequently (and now) *Thoracosphaera*. Taxonomic junior synonyms: *Thoracosphaera pelagica*, according to Kamptner (1944, p.145); *Thoracosphaera corsena* and *Thoracosphaera granulosa* according to Fütterer (1976, p.130–131); and *Thoracosphaera imperforata*, according to Fütterer (1978, p.714). The nomenclatural type of the genus *Thoracosphaera* remains the holotype of *Thoracosphaera pelagica*. According to Tangen et al. (1982), this species represents the calcareous cell wall of a dinoflagellate vegetative stage. Age: extant.

"*imperforata*" Kamptner, 1955, p.37,66–71; pl.8, fig.98. Holotype: Kamptner, 1955, pl.8, fig.98. **Taxonomic senior synonym:** *Syracosphaera* (as and now *Thoracosphaera*) *heimii*, according to Fütterer (1978, p.714). Age: extant.

"*narena*" Kamptner, 1967, p.158, pl.15, figs.96–97; pl.16, figs.98–99; pl.17, figs.101,103. **Name not validly published:** holotype not designated. **Taxonomic senior synonym:** *Thoracosphaera* (now *Pernambugia*) *tuberosa*, according to Fütterer (1976, p.132). Age: extant.

"*operculata*" Bramlette and Martini, 1964, p.305–306, pl.5, figs.3–7. Emendation: Streng et al., 2004, p.467, as *Cervisiella operculata*. Holotype: Bramlette and Martini, 1964, pl.5, figs.4–5. **NOW** *Cervisiella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella*, thirdly *Pirumella*, fourthly *Operculodinella*, fifthly (and now) *Cervisiella*. Taxonomic junior synonym: *Thoracosphaera atlantica*, according to Fütterer (1990, p.540). Age: Maastrichtian–Paleocene.

"**pelagica*" Kamptner, 1927, p.180–184, text-fig.6. Holotype: Kamptner, 1927, text-fig.6. **Taxonomic senior synonym:** *Syracosphaera* (as and now *Thoracosphaera*) *heimii*, according to Kamptner (1944, p.145). The nomenclatural type of the genus *Thoracosphaera* remains the holotype of *Thoracosphaera pelagica*. Age: extant.

?*prolata* Bukry and Bramlette, 1969, p.141, pl.3, figs.15–17. Holotype: Bukry and Bramlette, 1969, pl.3, figs.16–17. Questionable assignment: Streng et al. (2004, p. 483). Age: middle Eocene to early Oligocene.

"*rela*" Kamptner, 1967, p.158–159, pl.19, figs.107–108. Holotype: Kamptner, 1967, pl.19, figs.107–108. **Taxonomic senior synonym:** *Thoracosphaera* (now *Calciodinellum*) *albatrosiana*, according to Fütterer (1978, p.716). Age: extant.

"*reliana*" Kamptner, 1967, p.159, pl.20, figs.109–110; pl.21, figs.111–112; pl.22, figs.113–114. **Name not validly published:** holotype not designated. Age: extant.

"*ricoseta*" Kamptner, 1967, p.159, pl.13, fig.87. Holotype: Kamptner, 1967, pl.13, fig.87. **Taxonomic senior synonym:** *Thoracosphaera* (now *Sphaerodinella*) *albatrosiana*, according to Fütterer (1976, p.134). Age: extant.

"*saxea*" Stradner, 1961, p.84, fig.71. Holotype: Stradner, 1961, fig.71. **NOW** *Cervisiella*. Originally *Thoracosphaera*, subsequently *Obliquipithonella* (combination not validly published), thirdly *Pirumella*, fourthly (and now) *Cervisiella*. Age: Danian.

"*spinosa*" Keupp, 1979a, p.17–18, pl.1, fig.6. Holotype: Keupp, 1979a, pl.1, fig.6. **NOW** *Pirumella*. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

"*strobila*" Keupp, 1979a, p.18, pl.2, figs.1–3. Holotype: Keupp, 1979a, pl.2, figs.1–2. **NOW** *Pirumella*. Originally *Thoracosphaera*, subsequently *Pithonella*, thirdly *Obliquipithonella*, fourthly (and now) *Pirumella*. Age: early Barremian.

"*tesserula*" Fütterer, 1978, p.715, pl.3, figs.1–8,10–11. Holotype: Fütterer, 1978, pl.3, figs.1,4,7,10. **NOW** *Fuettererella*. Originally *Thoracosphaera*, subsequently *Orthopithonella* (combination not validly published), thirdly (and now) *Fuettererella*. N.I.A. Age: Paleocene–late Oligocene.

"*thoracata*" Keupp, 1979a, p.19, pl.2, figs.8–11. Holotype: Keupp, 1979a, pl.2, figs.8,11. **Taxonomic senior synonym:** *Pithonella* (now *Pirumella*) *sheilasantawae*, according to Keupp (1981, p.63). Age: early Barremian.

"*tuberosa*" Kamptner, 1963, p.179–180, pl.4, fig.26. Emendation: Janofske and Karwath, 2000, p.114–115, as *Pernambugia tuberosa*. Holotype: Kamptner, 1963, pl.4, fig.26. **NOW** *Pernambugia*. Originally *Thoracosphaera*, subsequently *Sphaerodinella* (combination not validly published), thirdly *Sphaerodinella?*, fourthly (and now) *Pernambugia*. Taxonomic junior synonyms: *Thoracosphaera candora* and *Thoracosphaera narena*, both according to Fütterer (1976, p.132). Age: Pleistocene.

wombatensis Bralower et al. 1991, p.135, pl.7, figs.1–19. Holotype: Bralower et al., 1991, pl.7, fig.1. Streng et al. (2004, p.481) considered this species to probably belong to *Schizosphaerella*. Age: Late Triassic.

"**ZYGABIKODINIUM**" Loeblich Jr. and Loeblich III, 1970a, p.541. Substitute name for *Diplopeltopsis* Pavillard, 1913, p.7 (an illegitimate name). **Taxonomic senior synonym:** *Preperidinium* Mangin, 1913 (an extant dinoflagellate genus), according to Elbrächter (1993, p.174).

"**lenticulatum*" (Mangin, 1911, p.30,32, figs.3–4) Loeblich Jr. and Loeblich III, 1970a, p.541. Holotype: Mangin, 1911, figs.3–4 — p.30. **Taxonomic senior synonym:** *Peridinium* (now *Preperidinium*) *meunieri* Pavillard, 1912, an extant dinoflagellate species, according to Elbrächter (1993, p.176). Mudie (1987, p.806) recorded cysts of this species from upper Pliocene-Pleistocene sediments, citing the name as "*Zygabikodinium lenticulatum* Wall and Dale, 1968 [1968c herein] emend. Bujak and Davies, 1983." Age: extant.

REFERENCES

- Abbink, O.A., Callomon, J.H., Riding, J.B., Williams, P.D.B. and Wolfard, A.
2001: Biostratigraphy of Jurassic-Cretaceous boundary strata in the Terschelling Basin, The Netherlands. Proceedings of the Yorkshire Geological Society, v.53, pt.4, p.275–302.
- Abé, T.H.
1927: Report of the biological survey of Mutsu Bay. 3. Notes on the protozoan fauna of Mutsu Bay. I. Peridinales. Tokyo Imperial University, Science Reports, 4th Series, Biology, v.2, no.4, p.383–438.
- Agelopoulos, J.
1964: *Hystrichostrogylon membraniphorum* n.g. n.sp. aus dem Heiligenhafener Kieselton (Eozän). Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.11, p.673–675.
1967: Hystrichosphären, Dinoflagellaten und Foraminiferen aus dem eozänen Kieselton von Heiligenhafen, Holstein. Dissertation des Grades eines Doktors der mathematisch-naturwissenschaftlichen Fakultät der Eberhard-Karls-Universität, Tübingen, 74 p., 14 pl. (Published thesis.)
- Akselman, R. and Keupp, H.
1990: Recent obliquipithonelloid calcareous cysts of *Scrippsiella patagoica* [sic] sp. nov. (Peridiniaceae, Dinophyceae) from plankton of the Golfo San Jorge (Patagonia, Argentina). Marine Micropaleontology, v.16, p.169–179, pl.1.
- Albert, N.R., Evitt, W.R. and Stein, J.A.
1986: *Lacrymodinium*, n. gen., a gonyaulacoid dinoflagellate with intercalary archeopyle from the Jurassic and Early Cretaceous of California and Alaska. Micropaleontology, v.32, no.4, p.303–315, pl.1–2.
- Alberti, G.
1959a: Über *Pseudodeflandrea* n.gen. (Dinoflag.) aus dem Mittel-Oligozän Norddeutschland. Mitteilungen aus dem Geologischen Staatsinstitut in Hamburg, v.28, p.91–92.
1959b: Zur Kenntnis der Gattung *Deflandrea* Eisenack (Dinoflag.) in der Kreide und im Alttertiär Nord- und Mitteldeutschlands. Mitteilungen aus dem Geologischen Staatsinstitut in Hamburg, v.28, p.93–105, pl.8–9.
1961: Zur Kenntnis mesozoischer und alttertiärer Dinoflagellaten und Hystrichosphaerideen von Nord- und Mitteldeutschland sowie einigen anderen europäischen Gebieten. Palaeontographica, Abteilung A, v.116, p.1–58, pl.1–2.
- Anderson, R.Y.
1960: Cretaceous-Tertiary palynology, eastern side of the San Juan Basin, New Mexico. State Bureau of Mines and Mineral Resources, New Mexico Institute of Mining and Technology, Memoir 6, p.1–59, pl.1–11.
- Anderson, H., Batten, D.J., Cantrill, D.J., Cleal, C., Feist-Burkhardt, S., Fensome, R., Head, M., Herendeen, M., Holmes, H., Jaramillo, C., Kvaček, J., McLoughlin, S., Skog, J., Takahashi, M. and Wicander, R.
2016: Proposal to treat the use of a hyphen in the name of a fossil-genus as an orthographical error. Taxon, v.64, p.863.
- Andreeva, E.M.
1966: Opisanie iskopaemykh spor predstavitelei Bryophyta, Lycopsida, Sphenopsida, Filicinae i rastitelnykh mikrofosilii neyasnogo sistematicheskogo polzheniya — rastitelnye mikrofosilii neyasnogo sistematicheskogo polozheniya. In: Part II. Morfologiya iskopaemykh spor, pyltsy i drugikh rastitelnykh mikrofosilii imeyushchikh naibolee vazhnoe stratigraficheskoe znachenie. In: I.M. Pokrovskaya (editor), Paleopalinologiya. Tom I. Metodika paleopalinologicheskikh issledovaniy i morfologiya nekotorykh iskopaemykh spor, pyltsy i drugikh rastitelnykh mikrofosilii; Vsesoyuznyi Nauchno-Issledovatel'skii Geologicheskii Institut, Leningrad (VSEGEI), Trudy, Novaya Seriya, no.141, p.114–135. (For plate citations, see Pokrovskaya, 1966.)

1973: Rukovodyashchie komplekсы rastitelnykh mikrofosilii verkhneproterozoiskikh i nizhnepaleozoiskikh otlozhenii Russkoi platformy. In: Palynologicheskii Metod v Stratigrafii; Vsesoyuznyi Nauchno-Issledovatel'skii Geologicheskii Institut, Leningrad (VSEGEI), Trudy, no.195, p.188–195.

Andreeva-Grigorovich, A.S. and Savitskaya, N.A.

1993: Novy vidi dinotsist z Paleogenovikh vidkladiv deyakikh regioniv Ukraini, Rosii ta Kazakhstanu. Paleontologicheskii Sbornik, v.29, p.43–46, pl.1–2. (In Russian with English summary.)

Andreeva-Grigorovich, A.S., Zaporozhchak, N.I., Shevchenko, T.V., Aleksandrova, G.N., Vasilyeva, O.N., Iakovleva, A.I., Stotland, A.B., Savitskaya, N.A.

2011: Atlas of Paleogene dinocysts of Ukraine, Russia and adjacent countries. Kiev Naukoma Dumka, 224p, 64 pl.

Andres, A.

1883: Le Attinie (Monografia). Col Tipi der Salviucci, Roma, 460 p.

Andri, E.

1972: Mise au point et données nouvelles sur la famille des Calcisphaerulidae Bonet 1956: les genres *Bonetocardiella*, *Pithonella* et "*Stomiosphaera*". Revue de micropaléontologie, v.15, no.1, p.12–34, pl.1–3.

Antolinez-Delgado, H. and Oboh-Ikuenobe, F.E.

2007: New species of dinoflagellate cysts for the Paleocene of the Anambra Basin, southeast Nigeria. Palynology, v.31, p.53–62, pl.1–2.

Antonescu, E.

1974: Un nouveau genre de dinoflagellé dans le Jurassique moyen de Roumanie. Revue de micropaléontologie, v.17, p.61–65, pl.1.

Archangelsky, S.

1969a: Sobre el paleomicroplancton del Terciario inferior de Río Turbio, Provincia de Santa Cruz. Ameghiniana, v.5, no.10, p.406–416, pl.1–2.

1969b: Estudio del paleomicroplancton de la Formación Río Turbio (Eoceno), Provincia de Santa Cruz.

Ameghiniana, v.6, no.3, p.181–218, pl.1–5.

Århus, N.

1992: Some dinoflagellate cysts from the Lower Cretaceous of Spitsbergen. Grana, v.31, p.305–314.

Århus, N., Birkelund, T. and Smelror, M.

1989: Biostratigraphy of some Callovian and Oxfordian cores off Vega, Helgeland, Norway. Norsk Geologisk Tidsskrift, v.69, p.39–56.

Århus, N., Kelly, S.R.A., Collins, J.S.H. and Sandy, M.R.

1990: Systematic palaeontology and biostratigraphy of two Early Cretaceous condensed sections from the Barents Sea. Polar Research, v.8, p.165–194.

Aristova, K.E.

1971: Pyltsa i mikroplankton iz pogranichnykh otlozhenii eotsena i oligotsena Bakhchisaraiskogo raiona Kryma. In: Palynologiya i stratigrafiya paleozoya, mezozoya i paleogena Evropeiskoi chasti SSSR i srednei Azii; Contributions to the 3rd international Palynological Conference, Novosibirsk, 1971; Vsesoyuznyi Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad (VNIGRI), Trudy, no. 106, p.116–123, pl.1.

Artzner, D.G. and Dörhöfer, G.

1978: Taxonomic note: *Lejeunecysta* nom. nov. pro *Lejeunia* Gerlach 1961 emend. Lentin and Williams 1976 — dinoflagellate cyst genus. Canadian Journal of Botany, v.56, p.1381–1382.

Ashraf, A.R.

1979: Die rätö-jurassischen Floren des Iran und Afghanistans. 6. Jurassische und unterkretazische Dinoflagellaten und Acritarchen aus Nordafghanistan. *Palaeontographica*, Abteilung B, v.169, p.122–158, pl.1–11.

Aubry, M.-P.

1986: Paleogene calcareous nannoplankton biostratigraphy of northwestern Europe. *Palaeogeography, Palaeoclimatology, Palaeoecology*, v.55, p.267–334, pl.1–8.

Aurisano, R.W.

1984: Three new dinoflagellate species from the subsurface Upper Cretaceous Atlantic Coastal Plain of New Jersey. *Journal of Paleontology*, v.58, no.1, p.1–8.

1989: Upper Cretaceous dinoflagellate biostratigraphy of the subsurface Atlantic Coastal Plain of New Jersey and Delaware, U.S.A. *Palynology*, v.13, p.143–179, pl.1–6.

Aurivillius, C.W.S.

1898: Vergleichende tiergeographische Untersuchungen über die Plankton-Fauna des Skageraks in den Jahren 1893–1897. *Kungliga Svenska Vetenskapsakademien*, v.30, no.3, p.1–427.

Ayala Castañares, A. and Seigle, G.A.

1962: *Stomiosphaera cardiformis* n.sp. del Cretacico superior de Cuba. *Paleont. Mexicana*, no.12, p.11–22, pl.1.

Azéma, I.

1966: Observations sur la microfaune du Crétacé supérieur de la région de Fortuna, Prébétique méridional (Province de Murcie, Espagne). *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, v.262, p.838–840, pl.1.

Backhouse, J.

1987: Microplankton zonation of the Lower Cretaceous Warnbro Group, Perth Basin, Western Australia. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.205–226.

1988: Late Jurassic and Early Cretaceous palynology of the Perth Basin, Western Australia. *Geological Survey of Western Australia, Bulletin*, no.135, 233 p., 51 pl.

2006: Albian (Lower Cretaceous) dinoflagellate cyst biostratigraphy of the lower Gearle Siltstone, Southern Carnarvon Basin, Western Australia. *Palynology*, v.30, p.43–68, pl.1–6.

Bailey, D.A.

1987: *Durotrigia daveyi* gen. et sp. nov., an Early Bajocian dinocyst with a variable precingular archaeopyle. *Journal of Micropalaeontology*, v.6, no.2, p.89–96, pl.1–2.

1990: Some dinoflagellate cysts from latest Bajocian and Bathonian sediments in southern England. *Palynology*, v.14, p.135–144, pl.1–3.

1993: Selected *Cribroperidinium* species (Dinophyceae) from the Kimmeridgian and Volgian of northwest Europe. *Journal of Micropalaeontology*, v.12, no.2, p.219–225, pl.1–3.

Bailey, D.A. and Hogg, N.M.

1995: *Fentonia bjaerkei* gen. et comb. nov.: transfer from *Parvocysta* Bjaerke 1980. *Journal of Micropalaeontology*, v.14, no.1, p.58.

Bailey, D.A. and Loy, A.

1997: *Oligosphaeridium junctum* sp. nov. A Hauterivian dinoflagellate cyst from the North Sea. *Journal of Micropalaeontology*, v.16, no.2, p.159–162, pl.1–2.

Bailey, D.A. and Partington, M.

- 1991: Some Middle Jurassic dinocysts from the Brent Group of the northern North Sea. *Journal of Micropalaeontology*, v.9, no.2, p.245–252, pl.1–3.
- Bailey, D.A., Milner, P. and Varney, T.
1997: Some dinoflagellate cysts from the Kimmeridge Clay Formation in North Yorkshire and Dorset, U.K. *Proceedings of the Yorkshire Geological Society*, v.51, pt.3, p.235–243.
- Baksi, S.K.
1962: Palynological investigation of Simsang River Tertiaries, south Shillong Front, Assam. *Geological, Mining and Metallurgical Society of India, Bulletin*, no.26, p.1–22, pl.1–5.
- Balech, E.
1959: Two new genera of dinoflagellates from California. *The Biological Bulletin*, v.116, no.2, p.195–203.
- 1967: Dinoflagelados nuevos o interesantes del Golfo de Mexico y Caribe. *Museo Argentino de ciencias naturales "Bernardino Rivadavia" e Instituto nacional de investigación de las ciencias naturales, Revista, Hidrobiología*, v.2, p.77–126.
- 1974: El género "*Protoperidinium*" Bergh, 1881 ("*Peridinium*" Ehrenberg, 1831, partim). *Revista del Museo Argentino de ciencias naturales "Bernardino Rivadavia"*, *Hidrobiología*, v.4, no.1, p.1–79.
- 1990: Four new dinoflagellates. *Helgoländer Meeresuntersuchungen*, v.44, p.387–396.
- Baltes, N.
1963: Dinoflagellate și hystrichosphaeride cretacice din Platforma moezică. *Petrol și Gaze*, v.14, no.12, p.581–589, pl.1–8.
- 1969: Distribution stratigraphique des dinoflagellés et des acritarches tertiaires en Roumanie. In: Brönnimann, P. and Renz, H.H. (editors), 1st International Conference on Planktonic Microfossils, Geneva, 1967, *Proceedings*, v.1, p.26–45, pl.1–5; E.J. Brill, Leiden, The Netherlands.
- 1971: Pliocene Dinoflagellata and Acritarcha in Romania. In: Farinacci, A. (editor), 2nd Planktonic Conference, Rome, 1970, *Proceedings*, p.1–16, pl.1–5; Edizioni Tecnoscienza, Rome, Italy.
- Banasová, M., Kopčáková, J. and Reháková, D.
2007: Bádenské asociácie vápnitých dinoflagelát z vrtu Stupava HGP-3 a Malacky-1 01 (viedenská panva). *Mineralia Slovaca*, v.39, p.107–122.
- Banerjee, D.
1972: Cretaceous microflora from Rajasthan, India. In: Ghosh, A.K. et al. (editors), Seminar on Paleopalynology and Indian Stratigraphy, *Proceedings*, p.134–139; University of Calcutta, Calcutta, India.
- Banerjee, D. and Rawat, R.S.
1991: Palynological evidences for pre-Miocene/Miocene boundary in northeast India. *Oil and Natural Gas Commission, Dehra Dun, India, Bulletin*, v.26, no.2, p.37–45.
- Barbosa-Rodrigues
1877: *Gen. Sp. Orchid. Nov. 1.* (Cited, but complete reference not given, in Farr et al., 1979, p.877.)
- Barski, M.
2002: *Eodinia poulsenii* sp.nov., a dinoflagellate cyst from Middle Jurassic of central Poland. *Journal of Micropalaeontology*, v.21, pt.1, p.43–49, pl.1–2.
- Batten, D.J.
1985: Two new dinoflagellate cyst genera from the non-marine Lower Cretaceous of southeast England. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.7, p.427–437.

- Batten, D.J. and Lister, J.K.
1988: Early Cretaceous dinoflagellate cysts and chlorococcalean algae from freshwater and low salinity palynofacies in the English Wealden. *Cretaceous Research*, v.9, p.337–367.
- Bayly, I.A.E. and Arnott, G.H.
1969: A new centropagid genus (Copepoda: Calanoida) from Australian estuarine waters. *Australian Journal of Marine and Freshwater Research*, v.20, p.189–198.
- Beilstein, U.
1994: Mikroflora (Sporomorphen, Dinophyceen) aus der regressiven Oberkreide des Benue-Troges, Nigeria. *Geologisches Institut der Universität zu Köln, Sonderveröffentlichungen*, no.95, p.1–305, pl.1–38.
- Beju, D.
1971: Jurassic microplankton from the Carpathian Foreland of Roumania. *Annales Institutii Geologice Publici Hungarici*, v.54, no.2, p.275–317, pl.1–8.
1972: Zonare și corelare a paleozoicului din Platforma moesică pe baza asociațiilor palino-protistologice. 1. *Petrol și Gaze*, v.23, no.12, p.714–722.
1978: New dinocyst taxa from the Upper Jurassic of Pakistan. *American Association of Stratigraphic Palynologists, Eleventh Annual Meeting, Program with Abstracts*, Phoenix, Arizona, p.4.
1979: A new dinoflagellate cyst from the Middle Jurassic of England. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.1, p.1–6.
1983: *Burtonia polygonalis*, a new dinoflagellate from the Bathonian of southern England. *Journal of Paleontology*, v.57, no.1, p.106–111.
- Below, R.
1981a: Dinoflagellaten-Zysten aus dem oberen Hauterive bis unteren Cenoman Süd-West-Marokkos. *Palaeontographica, Abteilung B*, v.176, p.1–145, pl.1–15.
1981b: Dinoflagellaten-Zysten aus dem Platylenticeras-Schichten (unteres Mittel-Valendis) der Ziegeleitongrube Schnepfer in Suddendorf/Nordwest-Deutschland. *Newsletters on Stratigraphy*, v.10, no.2, p.115–125, pl.1.
1982a: Dinoflagellate cysts from Valanginian to Lower Hauterivian sections near Ait Hamouch, Morocco. *Revista española de micropaleontología*, v.14, no.1–3, p.23–52, pl.1–4.
1982b: *Rigaudella*, ein neues Genus von Dinoflagellaten-Zysten. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.3, p.137–150.
1982c: Scolochorate Zysten der Gonyaulacaceae (Dinophyceae) aus der Unterkreide Marokkos. *Palaeontographica, Abteilung B*, v.182, p.1–51, pl.1–9.
1982d: Zur Kenntnis der Dinoflagellaten-Zysten-Populationen im Ober-Apt der Tongrube "Otto Gott" in Sarstedt/Norddeutschland. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.164, no.3, p.339–363.
1984: 23. Aptian to Cenomanian dinoflagellate cysts from the Mazagan Plateau, northwest Africa (Sites 545 and 547, Deep Sea Drilling Project Leg 79). In: Hinz, K. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.79, p.621–649, pl.1–10.
1987a: Evolution und Systematik von Dinoflagellaten-Zysten aus der Ordnung Peridinales. I. Allgemeine Grundlagen und Subfamilie Rhaetogonyaulacoideae (Familie Peridiniaceae). *Palaeontographica, Abteilung B*, v.205, p.1–164, pl.1–26.

1987b: Evolution und Systematik von Dinoflagellaten-Zysten aus der Ordnung Peridiniales. II. Cladopyxiaceae und Valvaeodiniaceae. *Palaeontographica*, Abteilung B, v.206, p.1–115, pl.1–29.

1990: Evolution und Systematik von Dinoflagellaten-Zysten aus der Ordnung Peridiniales. III. Familie Pareodiniaceae. *Palaeontographica*, Abteilung B, v.220, no.1–4, p.1–96, pl.1–20.

Benedek, P.N.

1972: Phytoplanktonen aus dem Mittel- und Oberoligozän von Tönisberg (Niederrheingebiet). *Palaeontographica*, Abteilung B, v.137, p.1–71, pl.1–16.

Benedek, P.N. and Gocht, H.

1981: *Thalassiphora pelagica* (Dinoflagellata, Tertiär): elektronenmikroskopische Untersuchung und Gedanken zur Paläobiologie. *Palaeontographica*, Abteilung B, v.180, p.39–64, pl.1–5.

Benedek, P.N. and Sarjeant, W.A.S.

1981: Dinoflagellate cysts from the Middle and Upper Oligocene of Tönisberg (Niederrheingebiet): a morphological and taxonomic restudy. *Nova Hedwigia*, v.35, p.313–356.

Benedek, P.N., Gocht, H. and Sarjeant, W.A.S.

1982: The dinoflagellate cyst genus *Pentadinium* Gerlach: a re-examination. *Neues Jahrbuch für Geologie und Paläontologie*, Abhandlungen, v.162, no.3, p.265–285.

Benson, D.G.

1976: Dinoflagellate taxonomy and biostratigraphy at the Cretaceous-Tertiary boundary, Round Bay, Maryland. *Tulane Studies in Geology and Paleontology*, v.12, no.4, p.169–233, pl.1–15.

1985: Observations and recommendations on the fossil dinocyst genera *Ctenidodinium*, *Dichadogonyaulax*, and *Korystocysta*. *Tulane Studies in Geology and Paleontology*, v.18, no.4, p.145–155, pl.1–3.

Berger, J.-P.

1986: Dinoflagellates of the Callovian-Oxfordian boundary of the "Liesberg-Dorf" Quarry (Berner Jura, Switzerland). *Neues Jahrbuch für Geologie und Paläontologie*, Abhandlungen, v.172, no.3, p.331–355.

Bergh, R.S.

1881a: Bidrag til cilioflagellaternes naturhistorie. Forelobige meddelelser. *Dansk Naturhistoriskforening i Kjobenhavn, Videnskabelige Meddelelser*, Series 4, v.3, p.60–76.

1881b: Der Organismus der Cilioflagellaten. Eine phylogenetische Studie. *Morphologisches Jahrbuch*, v.7, no.2, p.177–288, pl.12–16.

Biffi, U. and Grignani, D.

1983: Peridinioid dinoflagellate cysts from the Oligocene of the Niger Delta, Nigeria. *Micropaleontology*, v.29, no.2, p.126–145, pl.1–7.

Biffi, U. and Manum, S.B.

1988: Late Eocene-Early Miocene dinoflagellate cyst stratigraphy from the Marche Region (central Italy). *Bollettino della Società paleontologica italiana*, v.27, no.2, p.163–212, pl.1–15.

Bignot, G. and Lezard, L.

1964: Contribution à l'étude des pithonelles de la craie parisienne. *Revue de micropaléontologie*, v.7, no.2, p.138–152.

Bijl, P.K. and Brinkhuis, H.

2015: A new genus and two new species of dinoflagellate cysts from lower Eocene marine sediments of the Wilkes Land Margin, Antarctica. *Review of Palaeobotany and Palynology*, v.220, p.88–97, pl.1–4.

Bint, A.N.

1983: *Umbodinium crustov* gen. et sp. nov., a peridinioid dinoflagellate with two intercalaries from the Albian of Kansas. *Palynology*, v.7, p.171–182, pl.1.

1986: Fossil Ceratiaceae: a restudy and new taxa from the mid-Cretaceous of the Western Interior, U.S.A. *Palynology*, v.10, p.135–180, pl.1–9.

1988: Recent dinoflagellate cysts from Mermaid Sound, northwestern Australia. In: P.A. Jell and G. Playford (editors), *Palynological and Palaeobotanical Studies in Honour of Basil E. Balme*; *Memoir of the Association of Australasian Palaeontologists*, no.5, p.329–341.

Bison, K-M., Wendler, J., Versteegh, G.J.M. and Willems, H.

2004: *Tetratropis terrina* sp. nov., a new calcareous dinoflagellate cyst from the Upper Campanian *polyplacum* zone of Lägerdorf (NW Germany). *Journal of Micropalaeontology*, v.23, p.127–132.

Bjaerke, T.

1980: Mesozoic palynology of Svalbard IV. Toarcian dinoflagellates from Spitsbergen. *Palynology*, v.4, p.57–77, pl.1–5.

Black, M.

1971: Coccoliths of the Speeton Clay and Sutterby Marl. *Yorkshire Geological Society, Proceedings*, v.38, p.381–424.

Boalch, G.T. and Guy-Ohlson, D.

1992: *Tasmanites*, the correct name for *Pachysphaera* (Prasinophyceae, Pterospermataceae). *Taxon*, v.41, p.529–531.

Böhm, A.

1931: Perideen aus dem Persischen Golf und dem Golf von Oman. *Archiv für Protistenkunde und Protozoen-Algen-Pilze*, v.74, p.188–197.

Bolkhovitina, N.A.

1953: Sporovo-pyltsevaya kharakteristika melovykh otlozhenii tsentralnykh oblastei SSSR. *Geologicheskii Institut, Akademiya Nauk SSSR, Trudy*, v. 145, no. 61, 184 p. pl.1–16.

Bolli, H.M.

1974: Jurassic and Cretaceous Calcisphaerulidae from D.S.D.P. Leg 27, eastern Indian Ocean. In: Veevers, J.J. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.27, p.843–907, pl.1–24.

1978a: Cretaceous and Paleogene Calcisphaerulidae from D.S.D.P. Leg 40, southeastern Atlantic. In: Bolli, H.M. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.40, p.819–838, pl.1–7.

1978b: Upper Jurassic Calcisphaerulidae from D.S.D.P. Leg 44, Hole 391C, Blake-Bahama Basin, western North Atlantic. In: Benson, W.E. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.44, p.911–919, pl.1–3.

1980: Calcisphaerulidae and Calpionellidae from the Upper Jurassic and Lower Cretaceous of D.S.D.P. Hole 416A, Moroccan Basin. In: Lancelot, Y. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.50, p.525–543, pl.1–7.

Boltenhagen, E.

1977: Microplancton du Crétacé supérieur du Gabon. *Cahiers de paléontologie*, 1977, unnumbered, p.1–150, pl.1–25.

Bonet, F.

1956: Zonificación microfaunística de las Calizas Cretácicas del este de México. *Asociación mexicana de geólogos petroleros, Boletín*, v.8, no.7–8, p.389–488, pl.1–31.

Borza, K.

1964: Die Gattung *Stomiosphaera* Wanner, 1940 in den Westkarpaten. Geologicky Sbornik, v.15, no.2, p.189–195, pl.1–2.

1969: Die Mikrofazies und Mikrofossilien des Oberjuras und der Unterkreide der Klippenzone der Westkarpaten. Vydav. Slov. Akad. Vied, p.9–301.

1972: Neue Arten der Gattungen *Cadosina* Wanner, *Pithonella* Lorenz und *Palinosphaera* Reinsch aus der oberen Kreide. Geologicky Sbornik — Geologica Carpathica, v.23, no.1, p.139–150, pl.1–2.

Bowman, V.C., Francis, J.E., Riding, J.B., Hunter, S.J. and Haywood, A.M.

2012: A latest Cretaceous to earliest Paleogene dinoflagellate cyst zonation from Antarctica, and implications for phytoprovincialism in the high southern latitudes. Review of Palaeobotany and Palynology, v.171, p.40–56, pl.1–2.

Bowman, V.C., Riding, J.B., Francis, J.E., Crame, J.A. and Hannah, M.J.

2013: The taxonomy and palaeobiogeography of small chorate dinoflagellate cysts from the Late Cretaceous to Quaternary of Antarctica. Palynology, v.37, p.151–169, pl.1–3.

Bown, P.R.

1987: Taxonomy, evolution and biostratigraphy of Late Triassic–Early Jurassic calcareous nannofossils. Special Papers in Palaeontology, no.38, 118 p.

Bradford, M.R.

1975: New dinoflagellate cyst genera from the recent sediments of the Persian Gulf. Canadian Journal of Botany, v.53, p.3064–3074.

1977: New species attributable to the dinoflagellate cyst genus *Lejeunia* Gerlach, 1961 emend. Lentin and Williams 1975. Grana, v.16, p.45–59.

Bradford, M.R. and Wall, D.A.

1984: The distribution of Recent organic-walled dinoflagellate cysts in the Persian Gulf, Gulf of Oman, and northwestern Arabian Sea. Palaeontographica, Abteilung B, v.192, p.16–84, pl.1–6.

Bralower, J.J., Bown, P.R. and Siesser, W.G.

1991: Significance of Upper Triassic nannofossils from the southern hemisphere (ODP Leg 122, Wombat Plateau, N.W. Australia). Marine Micropaleontology, v.17, p.119–154, pl.1–9.

Bramlette, M.N. and Martini, E.

1964: The great change in calcareous nannoplankton fossils between the Maestrichtian and Danian. Micropaleontology, v.10, no.3, p.291–322, pl.1–7.

Brenner, W.

1988: Dinoflagellaten aus dem unteren Malm (oberer Jura) von Süddeutschland; Morphologie, Ökologie, Stratigraphie. Tübinger Mikropaläontologische Mitteilungen, no.6, p.1–116, pl.1–20.

Brenner, W. and Dürr, G.

1986: *Neuffenia willei* n.g. n.sp., eine neue Peridiniaceae aus dem oberen Oxfordien Südwestdeutschlands. *Neuffenia willei* n. g. n. sp., a new peridiniacean from the upper Oxfordian of southwest Germany. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.1, p.11–15.

Brideaux, W.W.

1971: Palynology of the Lower Colorado Group, central Alberta, Canada. I. Introductory remarks. Geology and microplankton studies. Palaeontographica, Abteilung B, v.135, no.3–6, p.53–114, pl.21–30.

- 1975: Taxonomic note: redefinition of the genus *Broomea* and its relationship to *Batioladinium* gen. nov. (Cretaceous). *Canadian Journal of Botany*, v.53, no.12, p.1239–1243.
- 1977: Taxonomy of Upper Jurassic-Lower Cretaceous microplankton from the Richardson Mountains, District of Mackenzie, Canada. *Geological Survey of Canada, Bulletin*, no.281, p.1–89, pl.1–16.
- Brideaux, W.W. and Fisher, M.J.
1976: Upper Jurassic-Lower Cretaceous dinoflagellate assemblages from arctic Canada. *Geological Survey of Canada, Bulletin*, no.259, p.1–53, pl.1–7.
- Brideaux, W.W. and McIntyre, D.J.
1973: *Lunatadinium dissolutum* gen. et sp. nov., a dinoflagellate cyst from Lower Cretaceous rocks, Yukon Territory and northern District of Mackenzie. *Bulletin of Canadian Petroleum Geology*, v.21, no.3, p.395–402, pl.1.
- 1975: Miospores and microplankton from Aptian-Albian rocks along Horton River, District of Mackenzie. *Geological Survey of Canada, Bulletin*, no.252, p.1–85, pl.1–14.
- Brinkhuis, H.
1992: Late Eocene to Early Oligocene dinoflagellate cysts from central and northeast Italy. Ph.D. thesis, University of Utrecht, 169 p., 23 pl. (Publisher/printer not specified.)
- 1994: Late Eocene to Early Oligocene dinoflagellate cysts from the Priabonian type-area (northeast Italy): biostratigraphy and paleoenvironmental interpretation. *Palaeogeography, Palaeoclimatology, Palaeoecology*, v.107, p.121–163, pl.1–7.
- Brinkhuis, H. and Biffi, U.
1993: Dinoflagellate cyst stratigraphy of the Eocene/Oligocene transition in central Italy. *Marine Micropaleontology*, v.22, p.131–183, pl.1–10.
- Brinkhuis, H. and Leereveld, H.
1988: Dinoflagellate cysts from the Cretaceous/Tertiary boundary sequence of El Kef, northwest Tunisia. *Review of Palaeobotany and Palynology*, v.56, p.5–19, pl.1–2.
- Brinkhuis, H. and Zachariasse, W.J.
1988: Dinoflagellate cysts, sea level changes and planktonic foraminifers across the Cretaceous-Tertiary boundary at El Haria, northwest Tunisia. *Marine Micropaleontology*, v.13, p.153–191, pl.1–9.
- Brinkhuis, H., Powell, A.J. and Zevenboom, D.
1992: High resolution dinoflagellate cyst stratigraphy of the Oligocene/Miocene transition interval in northwest and central Italy. In: Head, M.J. and Wrenn, J.H. (editors), *Neogene and Quaternary Dinoflagellate Cysts and Acritarchs*, p.219–258, pl.1–10; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.
- Brinkhuis, H., Klinkenberg, E., Williams, G.L. and Fensome, R.A.
2000: Two unusual new dinoflagellate cyst genera from the Bunde Borehole, Maastrichtian type area, southern Netherlands. *Review of Palaeobotany and Palynology*, v.110, p.93–110, pl.1–7.
- Brito, I.M.
1967: Silurian and Devonian Acritarcha from Maranhão Basin, Brazil. *Micropaleontology*, v.13, no.4, p.473–482, pl.1–2.
- Brongniart
1874: *Ann. Sci. Nat. Bot. Ser.* 5, v.20. (Cited, but complete reference not given, in Farr et al., 1979, p.555.)
- Bronn, H.G.
1848: *Index Palaeontologicus oder Übersicht der bis jetzt bekannten fossilen Organismen*. XXXIV + 1381 p.; E. Schweizerbart'sche Verlagshandlung und Druckerei, Stuttgart.

- Brosius, M.
1963: Plankton aus dem nordhessischen Kasseler Meeressand (Oberoligozän). *Zeitschrift der Deutschen Geologischen Gesellschaft*, v.114, no.1, p.32–56, pl.1–8.
- Brown, R.
1811: In: Aiton, W. and Aiton, W.T., *Hortus Kewensis*, Edition 2, no.3. (Cited, but complete reference not given, in Farr et al., 1979, p. 251.)
- Brown, T.
1827: *Illustrations of the Conchology of Great Britain and Ireland*. W., H. and D. Lizar, Edinburgh, U.K.
- Brown, S.
1986: *Nematosphaeropsis downii* sp. nov.: a new Miocene dinoflagellate cyst from the Bay of Biscay. *Journal of Micropalaeontology*, v.5, no.1, p.7–10, pl.1.
- Bucefalo Palliani, R. and Mattioli, E.
1995: Ecology of dinoflagellate cysts and calcareous nannofossils from bituminous facies of the Early Toarcian, central Italy. *Europal, European Palaeontological Association Newsletter*, no.8, p.60–62
- Bucefalo Palliani, R. and Riding, J.B.
1997a: *Umbriadinium mediterraneense* gen. et sp. nov. and *Valvaeodinium hirsutum* sp. nov.: two dinoflagellate cysts from the Lower Jurassic of the Tethyan Realm. *Palynology*, v.21, p.197–206.
- 1997b: The influence of palaeoenvironmental change on dinoflagellate cyst distribution. An example from the Lower and Middle Jurassic of Quercy, southwest France. Influence des changements du paléoenvironnement sur la répartition des kystes de dinoflagellés. Exemple du Jurassique inférieur et moyen du Quercy (sud-ouest de la France). *Bulletin du Centre de recherches Elf exploration production*, v.21, no.1, p.107–123, pl.1.
- 1998: The palynology of the Toarcian-Aalenian transition in the Wittnau borehole (Oberrhein, southwest Germany). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.210, no.2, p.143–184.
- 2000: A palynological investigation of the Lower and lowermost Middle Jurassic strata (Sinemurian to Aalenian) from North Yorkshire, UK. *Proceedings of the Yorkshire Geological Society*, v.53, pt.1, p.1–16.
- Bucefalo Palliani, R., Riding, J.B. and Torricelli, S.
1997a: The dinoflagellate cyst *Mendicodinium* Morgenroth, 1970, emend. from the lower Toarcian (Jurassic) of central Italy. *Review of Palaeobotany and Palynology*, v.96, p.99–111, pl.1–3.
- 1997b: The dinoflagellate cyst *Luehndea* Morgenroth, 1970, emend. from the upper Pliensbachian (Lower Jurassic) of Hungary. *Review of Palaeobotany and Palynology*, v.96, p.113–120, pl.1–2.
- Bujak, J.P.
1976: An evolutionary series of Late Eocene dinoflagellate cysts from southern England. *Marine Micropaleontology*, v.1, p.101–117, pl.1–4.
- 1979: Proposed phylogeny of the dinoflagellates *Rhombodinium* and *Gochtodinium*. *Micropaleontology*, v.25, no.3, p.308–324, pl.1–3.
- 1984: Cenozoic dinoflagellate cysts and acritarchs from the Bering Sea and northern North Pacific, D.S.D.P. Leg 19. *Micropaleontology*, v.30, no.2, p.180–212, pl.1–4.
- 1994: New dinocyst taxa from the Eocene of the North Sea. *Journal of Micropalaeontology*, v.13, pt.2, p.119–131, pl.1–4.
- Bujak, J.P. and Davies, E.H.

1983: Modern and fossil Peridiniineae. American Association of Stratigraphic Palynologists, Contributions Series, no.13, 203 p., 12 pl.

Bujak, J.P. and Fisher, M.J.

1976: Dinoflagellate cysts from the Upper Triassic of arctic Canada. *Micropaleontology*, v.22, no.1, p.44–70, pl.1–9.

Bujak, J.P. and Matsuoka, K.

1986: Taxonomic reallocation of Cenozoic dinoflagellate cysts from Japan and the Bering Sea. *Palynology*, v.10, p.235–241.

Bujak, J.P., Downie, C., Eaton, G.L. and Williams, G.L.

1980: Dinoflagellate cysts and acritarchs from the Eocene of southern England. *Special Papers in Palaeontology*, no.24, 100 p., pl.1–22.

Bukry, D. and Bramlette, M.N.

1969: Some new and stratigraphically useful calcareous nannofossils of the Cenozoic. *Tulane Studies in Geology and Paleontology*, v.7, no.3, p.131–142.

Burden, E.T., McAndrews, J.H. and Norris, G.

1986: Palynology of Indian and European forest clearance and farming in lake sediment cores from Awenda Provincial Park, Ontario. *Canadian Journal of Earth Sciences*, v.23, p.43–54, pl.1.

Burger, D.

1980a: Palynological studies in the Lower Cretaceous of the Surat Basin, Australia. Bureau of Mineral Resources, Geology and Geophysics, Bulletin, no.189, p.1–106, pl.1–48. (Cover title: Palynology of the Lower Cretaceous in the Surat Basin.)

1980b: Early Cretaceous (Neocomian) microplankton from the Carpentaria Basin, northern Queensland.

Alcheringa, v.4, p.263–279.

Burger, D. and Sarjeant, W.A.S.

1995: A new species of *Dissiliodinium* (Dinophyceae) from the Jurassic/Cretaceous of Australia. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.197, no.1, p.119–128, figs.1–14.

Burgess, J.D.

1971: Palynological interpretation of Frontier environments in central Wyoming. *Geoscience and Man*, v.3, p.69–82, pl.1.

Burmann, G.

1970: Weitere organische Mikrofossilien aus dem unteren Ordovizium. *Paläontologische Abhandlungen, Abteilung B*, v.3, no.3–4, p.289–332, pl.2–19.

Butler, A.G.

1881: Description of new genera and species of heterocerous Lepidoptera from Japan. *Transactions of the Entomological Society of London*, 1881, p.1–23.

Butler, N.

1995: *Mendicodinium morgenrothum*, a new species of dinocyst from the Middle Jurassic, Aalenian to lowermost Bajocian Ness Formation (Brent Group), northern North Sea. *Journal of Micropalaeontology*, v.14, pt.1, p.25–28, pl.1.

Bütschli, O.

1873: Einiges über Infusorien. *Archiv für Mikroskopische Anatomie*, v.9, p.657–678, pl.25–26.

1885: Erster Band. Protozoa. In: Dr. H.G. Bronn's Klassen und Ordnungen des Thier-Reichs, wissenschaftlich dargestellt in Wort und Bild; p.865–1088; C.F. Winter'sche Verlagsbuchhandlung, Leipzig and Heidelberg, Germany.

Cai Zhiguo, Zheng Guoguang, Cui Zhantang, et al.

1998: Tertiary stratigraphy and micropalaeontology of the Central Hebei petroliferous area. 550 p., 143 pl.; Science Press, Beijing, China. (Authorship is as given in original.)

Calandra, F.

1964: Micropaléontologie: sur un présumé dinoflagellé *Arpylorus* nov. gen. du Gothlandien de Tunisie. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.258, p.4112–4114.

Caro, Y.

1973: Contribution à la connaissance des dinoflagellés du Paléocène-Eocène inférieur des Pyrénées espagnoles. Revista española de micropaleontología, v.5, no.3, p.329–372, pl.1–5.

Cassini

1817: Bull. Sci. Soc. Philom. Paris. (Cited, but complete reference not given, in Farr et al., 1979, p.564.)

Châteauneuf, J.-J.

1980: Palynostratigraphie et paléoclimatologie de l'Eocène supérieur et de l'Oligocène du Bassin de Paris. Mémoires du Bureau de recherches géologiques et minières (BRGM), no.116, p.1–360, pl.1–31.

Châteauneuf, J.-J. and Gruas-Cavagnetto, C.

1978: Les zones de Wetzeliellaceae (Dinophyceae) du bassin de Paris. Comparaison et corrélations avec les zones du Paléogène des bassins du nord-ouest de l'Europe. Bulletin du Bureau des recherches géologiques et minières (Deuxième série), Section IV, no.2–1978, p.59–93, pl.1–5.

Chen, Y.Y.

1982: Recognition of the dinocyst genus *Komewuia* with assignable species from Madagascar. Micropaleontology, v.28, p.31–42, pl.1–3.

2013: *Palaecysta* gen. nov., the greatest *Systematophora* imposter no more: introducing a lineage of latest Jurassic to Early Cretaceous (Tithonian-Hauterivian) dinoflagellate cysts from Madagascar. Palynology, v.37, p.259–297, pl.1–15.

Chen, Y.Y., Harland, R., Stover, L.E. and Williams, G.L.

1988: Fossil dinoflagellate taxa by Chinese authors, 1978–1984. Canadian Technical Report of Hydrography and Ocean Sciences, no.103, p.1–40.

Chen Junyuan, Qian Yiyuan, Lin Yaokun, Zhang Junming, Wang Zhihao, Yin Leiming and Erdtmann, B.-D.

1985: Study on Cambrian-Ordovician boundary strata and its biota in Dayangcha, Hunjiang, Jilin, China. In: Contribution to the Calgary Cambrian-Ordovician Boundary Meeting, p.1–137, pl.1–33; China Prospect Publishing House, Beijing, China.

Cheng Jinhui and He Chengquan

2001: Early Cretaceous dinoflagellates from the Didao Formation in the Jixi Basin, eastern Heilongjiang Province, NE China. Acta Palaeontologica Sinica, v.40, no.1, p.127–133.

2006: Middle-Late Jurassic marine dinoflagellate cysts from the eastern Qiangtang Basin in the Qinghai-Tibet Plateau, China. Progress in Natural Science, v.16, p.274–283.

Chibrikova, E.V.

1972: Rastitelnye mikrofosilii yuzhnogo Urala i Priuralya (iz siluriyskikh i devonskikh otlozheniy). 220 p., 28 pl.; Akademiya Nauk USSR, Bashkirskii Filial, Institut Geologii.

Chlonova, A.F.

1976: Palinologicheskaya kharakteristika melovykh otlozheniy na r. Kiye (Zapadnaya Sibir). K IV Mezhdunarodnoy palinologicheskoy konferentsii, Laknau, Indiya, 1976; Instituta Geologii i Geofiziki (Novosibirsk), Trudy, v.312, p.1–103.

Churchill, D.M. and Sarjeant, W.A.S.

1962: Freshwater microplankton from Flandrian (Holocene) peats of southwestern Australia. *Grana Palynologica*, v.3, no.3, p.29–53, pl.1–2.

Claparède, E. and Lachmann, J.

1859: Études sur les infusoires et les rhizopodes. Institut national génevois, Mémoires, v.6 (Mémoire 1), p.261–482, pl.14–24. (Cover date 1858, issue date 1859, according to Loeblich Jr. and Loeblich III, 1966.)

Clarke, R.F.A. and Verdier, J.-P.

1967: An investigation of microplankton assemblages from the Chalk of the Isle of Wight, England. *Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afdeling Natuurkunde, Eerste Reeks*, v.24, no.3, p.1–96, pl.1–17.

Clarke, R.F.A., Davey, R.J., Sarjeant, W.A.S. and Verdier, J.-P.

1968: A note on the nomenclature of some Upper Cretaceous and Eocene dinoflagellate taxa. *Taxon*, v.17, p.181–183.

Cleve, P.T.

1900: Notes on some Atlantic plankton-organisms. *Kongliga Svenska Vetenskaps-Akademiens Handlingar*, v.34, no.1, p.1–22.

Clowes, C.D.

1985: *Stoveracysta*, a new gonyaulacacean dinoflagellate genus from the upper Eocene and lower Oligocene of New Zealand. *Palynology*, v.9, p.27–35, pl.1–2.

Clowes, C.

2013: *Graptodinium*, a new Paleogene dinoflagellate cyst. *Palynology*, v.37, p.316–324, pl.1–2.

Clowes, C.D. and Wilson, G.J.

2006: Some new species of *Corrudinium* Stover & Evitt 1978 (Dinophyceae) from the Eocene of New Zealand. *New Zealand Journal of Geology and Geophysics*, v.49, no.3, p.399–408.

Clowes, C.D., Hannah, M.J., Wilson, G.J. and Wrenn, J.H.

2016: Marine palynostratigraphy and new species from the Cape Roberts drill-holes, Victoria Land basin, Antarctica. *Marine Micropaleontology*, v.126, p.65–84.

Colbath, G.K.

1979: Organic-walled microphytoplankton from the Eden Shale (Upper Ordovician), Indiana, U.S.A. *Palaeontographica, Abteilung B*, v.171, no.1–3, p.1–38, pl.1–14.

Cole, J.M.

1992: Freshwater dinoflagellate cysts and acritarchs from Neogene and Oligocene sediments of the South China Sea and adjacent areas. In: Head, M.J. and Wrenn, J.H. (editors), *Neogene and Quaternary Dinoflagellate Cysts and Acritarchs*, p.181–196, pl.1–3; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

Colom, G.

1935: Estudios litológicos sobre el Jurásico de Mallorca. *Association pour l'étude géologique de la Méditerranée occidentale, Géologie des Pays catalans*, v.3 (1930-1934), partie 5, no.4, p.3–17, pl.1–2.

1955: Jurassic-Cretaceous pelagic sediments of the western Mediterranean zone and Atlantic area. *Micropaleontology*, v.1.

- Colom, G. and Allard, P.L.
1958: Présence au Maroc des microorganismes de Wanner. *Revue de Micropaléontologie*, v.1, p.31–32.
- Colom, G., Castany, G. and Durand Delga, M.
1953: Microfaunes pélagiques (calpionelles, fissurines) dans le nord-est de la Berbérie. *Bulletin de la Société géologique de France*, 6e Série, v.3, no.4–6, p.517–534.
- Combaz, A. and Peniguel, G.
1972: Étude palynostratigraphique de l'Ordovicien dans quelques sondages du Bassin de Canning (Australie occidentale). *Société nationale des pétroles d'Aquitaine, Centre de recherches de Pau, Bulletin*, v.6, no.1, p.121–167, pl.1–4.
- Combaz, A., Lange, F.W. and Pansart, J.
1967: Les "Leiofusidae" Eisenack, 1938. *Review of Palaeobotany and Palynology*, v.1, p.291–307, pl.1–2.
- Conrad, W.
1941: Notes protistologiques, XIX. Quelques microfossiles des silex crétacés. *Bulletin du Musée royal d'histoire naturelle de Belgique*, v.17, no.36, p.1–10, pl.1.
- Conway, B.H.
1978: Microplankton from the Upper Bathonian of Zohar 5 and Yinnon 1 boreholes in southern Israel. *Review of Palaeobotany and Palynology*, v.26, p.337–362.
- 1990: Paleozoic-Mesozoic palynology of Israel. II. Palynostratigraphy of the Jurassic succession in the subsurface of Israel. *Geological Survey of Israel, Bulletin*, v.82, p.1–39, pl.1–18.
- Conway, B.H. and Cousminer, H.L.
1983: Transfert of *Sarjeantia triassica* (Dinophyceae) to *Aratrisporites fimbriatus* (Sporites, Monoletes). *Grana*, v.22, p.35–38.
- Cookson, I.C.
1953: Records of the occurrence of *Botryococcus braunii*, *Pediastrum* and the Hystrichosphaerideae in Cainozoic deposits of Australia. *National Museum, Melbourne, Memoir*, no.18, p.107–123, pl.1–2.
- 1956: Additional microplankton from Australian Late Mesozoic and Tertiary sediments. *Australian Journal of Marine and Freshwater Research*, v.7, no.1, p.183–191, pl.1–2.
- 1965a: Cretaceous and Tertiary microplankton from south-eastern Australia. *Proceedings of the Royal Society of Victoria*, v.78, no.1, p.85–93, pl.9–11.
- 1965b: Microplankton from the Paleocene Pebble Point Formation, south-western Victoria. *Proceedings of the Royal Society of Victoria*, v.78, p.137–141, pl.24–25.
- Cookson, I.C. and Cranwell, L.M.
1967: Lower Tertiary microplankton, spores and pollen grains from southernmost Chile. *Micropaleontology*, v.13, no.2, p.204–216, pl.1–3.
- Cookson, I.C. and Dettmann, M.E.
1959: On *Schizosporis*, a new form genus from Australian Cretaceous deposits. *Micropaleontology*, v.5, no.2, p.213–216, pl.1.
- Cookson, I.C. and Eisenack, A.
1958: Microplankton from Australian and New Guinea Upper Mesozoic sediments. *Proceedings of the Royal Society of Victoria*, v.70, no.1, p.19–79, pl.1–12.

- 1960a: Microplankton from Australian Cretaceous sediments. *Micropaleontology*, v.6, no.1, p.1–18, pl.1–3.
- 1960b: Upper Mesozoic microplankton from Australia and New Guinea. *Palaeontology*, v.2, no.2, p.243–261, pl.37–39.
- 1961a: Upper Cretaceous microplankton from the Belfast No. 4 Bore, south-western Victoria. *Proceedings of the Royal Society of Victoria*, v.74, no.1, p.69–76, pl.11–12.
- 1961b: Tertiary microplankton from the Rottneest Island Bore, Western Australia. *Journal of the Royal Society of Western Australia*, v.44, p.39–47, pl.1–2.
- 1962a: Some Cretaceous and Tertiary microfossils from Western Australia. *Proceedings of the Royal Society of Victoria*, v.75, p.269–273, pl.37.
- 1962b: Additional microplankton from Australian Cretaceous sediments. *Micropaleontology*, v.8, no.4, p.485–507, pl.1–7.
- 1965a: Microplankton from the Browns Creek Clays, sw. Victoria. *Proceedings of the Royal Society of Victoria*, v.79, p.119–131, pl.11–15.
- 1965b: Microplankton from the Dartmoor Formation, sw. Victoria. *Proceedings of the Royal Society of Victoria*, v.79, p.133–137, pl.16–17.
- 1965c: Microplankton from the Paleocene Pebble Point Formation, south-western Victoria. *Proceedings of the Royal Society of Victoria*, v.79, p.139–146, pl.18–19.
- 1967a: Some Early Tertiary microplankton and pollen grains from a deposit near Strahan, western Tasmania. *Proceedings of the Royal Society of Victoria*, v.80, no.1, p.131–140, pl.17–21.
- 1967b: Some microplankton from the Paleocene Rivernook Bed, Victoria. *Proceedings of the Royal Society of Victoria*, v.80, no.2, p.247–257, pl.39–42.
- 1968: Microplankton from two samples from Gingin Brook No. 4 Borehole, Western Australia. *Journal of the Royal Society of Western Australia*, v.51, p.110–122.
- 1969: Some microplankton from two bores at Balcatta, Western Australia. *Journal of the Royal Society of Western Australia*, v.52, p.3–8.
- 1970a: Cretaceous microplankton from the Eucla Basin, Western Australia. *Proceedings of the Royal Society of Victoria*, v.83, no.2, p.137–157, pl.10–14.
- 1970b: Die Familie der Lecaniellaceae n. fam. — fossile Chlorophyta, Volvocales? *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.6, p.321–325.
- 1971: Cretaceous microplankton from Eyre No.1 Bore Core 20, Western Australia. *Proceedings of the Royal Society of Victoria*, v.84, no.2, p.217–226, pl.7–11.
- 1974: Mikroplankton aus australischen mesozoischen und tertiären Sedimenten. *Palaeontographica, Abteilung B*, v.148, no.1–3, p.44–93, pl.20–29.
- 1982: Mikrofossilien aus australischen mesozoischen und tertiären Sedimenten. Zweiter Teil. *Palaeontographica, Abteilung B*, v.184, no.1–3, p.23–63, pl.1–9.
- Cookson, I.C. and Hughes, N.F.
1964: Microplankton from the Cambridge Greensand (mid-Cretaceous). *Palaeontology*, v.7, no.1, p.37–59, pl.5–11.

Cookson, I.C. and Manum, S.B.

1960: On *Crassosphaera*, a new genus of microfossils from Mesozoic and Tertiary deposits. *Nytt Magasin for Botanikk*, v.8, p.5–9, pl.1–2.

1964: On *Deflandrea victoriensis* n. sp. and *D. tripartita* Cookson and Eisenack, and related species. *Proceedings of the Royal Society of Victoria*, v.77, p.521–524, pl.76.

Corradini, D.

1973: Non-calcareous microplankton from the Upper Cretaceous of the northern Apennines. *Bollettino della Società paleontologica italiana*, v.11, p.119–197, pl.19–39.

Corradini, D. and Biffi, U.

1988: Étude des dinokystes à la limite Messinien-Pliocène dans la coupe Cava Serredi, Toscane, Italie. Dinocyst study at the Messinian-Pliocene boundary in the Cava Serredi section, Tuscany, Italy. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.12, no.1, p.221–236, pl.1–5.

Costa, L.I. and Downie, C.

1976: The distribution of the dinoflagellate *Wetzeliella* in the Palaeogene of north-western Europe. *Palaeontology*, v.19, p.591–614, pl.92.

1979: The Wetzeliellaceae; Palaeogene dinoflagellates. In: *Proceedings of the 4th International Palynological Conference, Lucknow (1976-77)*, v.2, p.34–46.

Costa, L.I., Dennison, C. and Downie, C.

1978: The Paleocene/Eocene boundary in the Anglo-Paris Basin. *Journal of the Geological Society*, v.135, p.261–264.

Courteville, H.

1948: Séance du 30 Janvier 1948. *Bulletin de la Société Linnéenne du nord de la France*, v.430, p.9–11.

Courtinat, B.

1989: Les organoclastes des formations lithologiques du Malm dans le Jura méridional. Systématique, biostratigraphie et éléments d'interprétation paléocéologique. *Laboratoires de géologie de la Faculté des sciences de Lyon, Documents*, no.105, 361 p., 35 pl.

1999: Review of the dinoflagellate cyst *Stephanelytron* Sarjeant 1961 emend. *Journal of Micropalaeontology*, v.18, pt.2, p.169–182, pl.1.

2000: Review of the dinoflagellate cyst *Subtilisphaera? inaffecta* (Drugg, 1978) Bujak & Davies, 1983 and *S.? paemiosa* (Drugg, 1978) Bujak & Davies, 1983. *Journal of Micropalaeontology*, v.19, pt.2, p.165–175, pl.1.

Courtinat, B. and Gaillard, C.

1980: Les dinoflagellés des calcaires lites de Trept (Oxfordien supérieur). Inventaire et repartition comparée à celle de la microfaune benthique. *Laboratoires de géologie de la Faculté des sciences de Lyon, Documents*, no.78, 123 p., 10 pl.

Cramer, F.H.

1963: Nota provisional sobre la presencia de microplankton y esporomorfos en las rocas sedimentarias del Devónico Inferior en las Montañas Cantábricas. *Estudios geológicos*, v.19, p.215–218, pl.1–2.

1964: Microplankton from three Palaeozoic formations in the Province of León, NW Spain. *Leidse Geologische Mededelingen*, v.30, p.253–361, pl.1–24.

1966: Palynology of Silurian and Devonian rocks in northwest Spain. *Instituto geológico y minero de España, Boletín*, v.77, p.225–286, pl.1–4.

1970: Distribution of selected Silurian acritarchs. An account of the palynostratigraphy and paleogeography of selected Silurian acritarch taxa. *Revista española de micropaleontología*, número extraordinario, p.1–203, pl.1–23.

Cramer, F.H. and Diez, M.del C. R.

1968: Consideraciones taxonómicas sobre las acritarcas del Silúrico medio y superior del Norte de España. Instituto geológico y minero de España, *Boletín*, v.79, no.6, p.541–574, pl.1–21.

1972: North American Silurian palynofacies and their spatial arrangement: acritarchs. *Palaeontographica*, Abteilung B, v.138, no.5–6, p.107–180, pl.31–36.

1976: Acritarchs from the La Vid Shales (Emsian to lower Couvinian) at Colle, León, Spain. *Palaeontographica*, Abteilung B, v.158, no.1–4, p.72–103, pl.1–7.

1979: Lower Paleozoic acritarchs. p.17–160; Instituto de investigaciones palinológicas, Apartado 244, León, Spain.

Cramer, F.H., Diez, M.del C. R. and Kjellström, G.

1979: Acritarchs. In: Jaanusson, V., Laufeld, S. and Skoglund, R., Lower Wenlock faunal and floral dynamics — Vattenfallet section, Gotland. *Sveriges Geologiska Undersökning*, Serie C, no.762, p.39–53.

Crouch, E.M., Willumsen, P.S., Kulhanek, D.K. and Gibbs, S.J.

2014: A revised Palaeocene (Teurian) dinoflagellate cyst zonation from eastern New Zealand. *Review of Palaeobotany and Palynology*, v.202, p.47–79, pl.1–8.

Cuvier, G.

1817: (Cited by Gerlach, 1961, p.198, but full reference not given.)

Dale, B.

1976: Cyst formation, sedimentation, and preservation: factors affecting dinoflagellate assemblages in Recent sediments from Trondheimsfjord, Norway. *Review of Palaeobotany and Palynology*, v.22, p.39–60, pl.1.

1983: Dinoflagellate resting cysts: "benthic plankton". In: Fryxell, G.A. (editor), *Survival Strategies of the Algae*, p.69–136; Cambridge University Press, Cambridge, U.K.

Damassa, S.P.

1979a: Eocene dinoflagellates from the Coastal Belt of the Franciscan Complex, northern California. *Journal of Paleontology*, v.53, p.815–840, pl.1–8.

1979b: Danian dinoflagellates from the Franciscan Complex, Mendocino County, California. *Palynology*, v.3, p.191–207, pl.1–5.

1984: Morphologic variability and paraplate configuration of the dinoflagellate genus *Danea* Morgenroth 1968. *Palynology*, v.8, p.51–69, pl.1–6.

1988: *Carpatella cornuta* Grigorovich 1969 (Dinophyceae) — a member of the Aptiana-Ventriosum Complex. *Palynology*, v.12, 167–177 p., pl.1–3.

1997: Dinoflagellate cysts without walls: *Evittosphaerula paratabulata* Manum, 1979 and *Chaenosphaerula magnifica* gen. et sp. nov. from Deep Sea Drilling Project Site 338, Norwegian Sea. *Review of Palaeobotany and Palynology*, v.98, p.159–176, pl.1–3.

Daniels, C.H.V., Lund, J.J., Lund-Christensen, J. and Uffenorde, H.

1990: The Langenfeldian (Miocene) of Gross Pampau, Schlesweg-Holstein. Foraminifer, dinocyst, and ostracod stratigraphy and paleoecology (preliminary account). *Veröffentlichungen aus dem Übersee-Museum Bremen*, Series A, v.10, p.11–38, pl.8–10.

Davey, R.J.

- 1968: *Gonyaulacysta parorthoceras*, a new species of dinoflagellate cyst. *Palaeontologia Africana*, v.11, p.1.
- 1969a: Non-calcareous microplankton from the Cenomanian of England, northern France and North America, part I. *British Museum (Natural History) Geology, Bulletin*, v.17, p.103–180, pl.1–11.
- 1969b: Some dinoflagellate cysts from the Upper Cretaceous of northern Natal, South Africa. *Palaeontologia Africana*, v.12, p.1–23, pl.1–4.
- 1969c: The evolution of certain Upper Cretaceous hystrichospheres from South Africa. *Palaeontologia Africana*, v.12, p.25–51, pl.1–4.
- 1970: Non-calcareous microplankton from the Cenomanian of England, northern France and North America, part II. *British Museum (Natural History) Geology, Bulletin*, v.18, no.8, p.333–397, pl.1–10.
- 1974: Dinoflagellate cysts from the Barremian of the Speeton Clay, England. In: *Symposium on Stratigraphic Palynology*; Birbal Sahni Institute of Palaeobotany, Special Publication, no.3, p.41–75, pl.1–9.
- 1975: A dinoflagellate cyst assemblage from the Late Cretaceous of Ghana. *Proceedings of the 5th West African Colloquium on Micropaleontology*, series 7, no.5, p.150–173, pl.1–3.
- 1978: Marine Cretaceous palynology of Site 361, D.S.D.P. Leg 40, off southwestern Africa. In: Bolli, H.M. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.40, p.883–913, pl.1–9.
- 1979a: Two new Early Cretaceous dinocyst species from the northern North Sea. *Palaeontology*, v.22, p.427–437, pl.48–50.
- 1979b: Marine Apto-Albian palynomorphs from Holes 400A and 402A, IPOD Leg 48, northern Bay of Biscay. In: Montadert, L. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.48, p.547–577, pl.1–8.
- 1979c: The stratigraphic distribution of dinocysts in the Portlandian (latest Jurassic) to Barremian (Early Cretaceous) of northwest Europe. *American Association of Stratigraphic Palynologists, Contributions Series*, no.5B, v.2, p.48–81, pl.1–4.
- 1979d: A re-appraisal of the genus *Chytroisphaeridia* Sarjeant, 1962. *Palynology*, v.3, p.209–218, pl.1–2.
- 1982a: Die Verbreitung der Palynomorphen im späten Apt und frühen Alb Nordwestdeutschlands. *Geologisches Jahrbuch, Hannover, Reihe A*, v.65, p.365–403, pl.6.3–1 — pl.6.3–6.
- 1982b: Dinocyst stratigraphy of the latest Jurassic to Early Cretaceous of the Haldager No. 1 borehole, Denmark. *Danmarks Geologiske Undersøgelse, Series B*, no.6, p.1–57, pl.1–10.
- 1988: Palynological zonation of the Lower Cretaceous, Upper and uppermost Middle Jurassic in the northwestern Papuan Basin of Papua New Guinea. *Geological Survey of Papua New Guinea, Memoir*, no.13, p.1–77, pl.1–12.
- 1994: Preliminary study of the Lower Cretaceous and Middle Jurassic palynology of the Gelendzhik region, Caucasus, Russia. *Cahiers de micropaléontologie, Nouvelle série*, v.9, no.2, p.5–14, pl.1–2.
- 1999: Revised palynological zonation for the Late Cretaceous, Early Cretaceous and Late Jurassic of Papua New Guinea. *Geological Survey of Papua New Guinea, Memoir*, no.17, 51 p.
- Davey, R.J. and Verdier, J.-P.
 1971: An investigation of microplankton assemblages from the Albian of the Paris Basin. *Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afdeling Natuurkunde, Eerste Reeks*, v.26, p.1–58, pl.1–7.

1973: An investigation of microplankton assemblages from latest Albian (Vraconian) sediments. *Revista española de micropaleontología*, v.5, p.173–212, pl.1–5.

1974: Dinoflagellate cysts from the Aptian type sections at Gargas and La Bédoule, France. *Palaeontology*, v.17, p.623–653, pl.91–93.

1976: A review of certain non-tabulate Cretaceous hystrichospherid dinocysts. *Review of Palaeobotany and Palynology*, v.22, p.307–335, pl.1–4.

Davey, R.J. and Williams, G.L.

1966a: IV. The genera *Hystrichosphaera* and *Achomosphaera*. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., *Studies on Mesozoic and Cainozoic dinoflagellate cysts*; British Museum (Natural History) *Geology, Bulletin, Supplement 3*, p.28–52.

1966b: V. The genus *Hystrichosphaeridium* and its allies. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., *Studies on Mesozoic and Cainozoic dinoflagellate cysts*; British Museum (Natural History) *Geology, Bulletin, Supplement 3*, p.53–106.

1969: Generic reallocations. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., Appendix to "Studies on Mesozoic and Cainozoic dinoflagellate cysts"; British Museum (Natural History) *Geology, Bulletin, Appendix to Supplement 3*, p.4–7.

Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L.

1966: VII. Fossil dinoflagellate cysts attributed to *Baltisphaeridium*. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., *Studies on Mesozoic and Cainozoic dinoflagellate cysts*; British Museum (Natural History) *Geology, Bulletin, Supplement 3*, p.157–175.

1969: Generic reallocations. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., Appendix to "Studies on Mesozoic and Cainozoic dinoflagellate cysts"; British Museum (Natural History) *Geology, Bulletin, Appendix to Supplement 3*, p.15–17.

Davies, E.H.

1983: The dinoflagellate Opper-zonation of the Jurassic-Lower Cretaceous sequences in the Sverdrup Basin, arctic Canada. *Geological Survey of Canada, Bulletin*, no.359, p.1–59, pl.1–10.

de Coninck, J.

1965: Microfossiles planctoniques du sable Yprésien à Merelbeke. *Dinophyceae et Acritarcha. Mémoires de l'Académie royale des sciences, des lettres et des beaux-arts de Belgique, Classe des sciences, Collection in-8°*, v.36, no.2, p.1–55, pl.1–14.

1969: *Dinophyceae et Acritarcha de l'Yprésien du sondage de Kallo. Mémoires de l'Institut royal des sciences naturelles de Belgique*, no.161, p.1–67, pl.1–17. (Cover date 1968, issue date 1969, according to frontispiece of publication.)

1975: Microfossiles à paroi organique de l'Yprésien du Bassin Belge. *Service géologique de Belgique, Professional Paper 1975*, no.12, p.1–151, pl.1–22.

1977: Organic walled microfossils from the Eocene of the Woensdrecht borehole, southern Netherlands. *Mededelingen Rijks Geologische Dienst, Nieuwe Serie*, v.28, no.3, p.33–64, pl.1–8.

1985: Microfossiles à paroi organique dans les Sables de Lede (Eocene Moyen) du Sondage de Mol (Belgique). *Bulletin de la Société belge de géologie*, v.94, no.1, p.65–78, pl.1–3.

1986a: Microfossiles à paroi organique de l'Yprésien inférieur à Quenast. *Service géologique de Belgique, Professional Paper 1986/1*, no.224, p.1–59, pl.1–5.

1986b: Organic walled phytoplankton from the Bartonian and Eo-Oligocene transitional deposits of the Woensdrecht Borehole, southern Netherlands. *Mededelingen van de Rijks Geologische Dienst*, v.40, no.2, p.1–49, pl.1–11.

2001: Organic-walled microfossils in the Oligocene Grimmeringen and Neerrepn sand members from the Grimmeringen type locality. *Service géologique de Belgique, Professional Paper 2001/2*, no.294, p.1–57, pl.1–13.

de Lapparent, J.

1918: Étude lithologique des terrains crétacés de la région d'Hendaye. *Mémoires pour servir à l'explication de la Carte géologique détaillée de la France*, p.1–155, pl.1–10.

1924: Les calcaires à globigerines du Crétacé supérieur et des couches de passage à l'Éocène dans les Pyrénées occidentales. *Bulletin de la Société géologique de France*, v.24, no.7–8.

De Schepper, S. and Head, M.J.

2008: New dinoflagellate cyst and acritarch taxa from the Pliocene and Pleistocene of the eastern North Atlantic (DSDP Site 610). *Journal of Systematic Palaeontology*, v.6, no.1, p.101–117, pl.1–6.

De Schepper, S., Head, M.J. and Louwye, S.

2004: New dinoflagellate cyst and incertae sedis taxa from the Pliocene of northern Belgium, southern North Sea Basin. *Journal of Paleontology*, v.78, no.4, p.625–644.

de Vernal, A., Goyette, C. and Rodrigues, C.

1989: Contribution palynostratigraphique (dinokystes, pollen et spores) à la connaissance de la mer de Champlain: coupe de Saint-Césaire, Québec. *Canadian Journal of Earth Sciences*, v.26, no.12, p.2450–2464, pl.1–2.

de Vernal, A., Londeix, L., Mudie, P. J., Harland, R., Morzadec-Kerfourn, M.T., Turon, J.-L. and Wrenn, J.H.

1992: Quaternary organic-walled dinoflagellate cysts of the North Atlantic Ocean and adjacent seas: ecostratigraphy and biostratigraphy. In: Head, M.J. and Wrenn, J.H. (editors), *Neogene and Quaternary dinoflagellate cysts and acritarchs*, p.289–328, pl.1–8; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

de Vernal, A., Henry, M., Matthiessen, J., Mudie, P.J., Rochon, A., Boessenkool, K.P., Eynaud, F., Grøsfeld, K., Guiot, J., Hamel, D., Harland, R., Head, M.J., Kunz-Pirring, M., Levac, E., Loucheur, V., Peyron, O., Pospelova, V., Radi, T., Turon, J.-L. and Voronina, E.

2001: Dinoflagellate cyst assemblages as tracers of sea-surface conditions in the northern North Atlantic, Arctic and sub-Arctic seas; the new 'n = 677' data base and its application for quantitative palaeoceanographic reconstructions. *Journal of Quaternary Science*, v.16, no.7, p.681–698.

de Verteuil, L. and Norris, G.

1992: Miocene protoperidiniacean dinoflagellate cysts from the Maryland and Virginia coastal plain. In: Head, M.J. and Wrenn, J.H. (editors), *Neogene and Quaternary dinoflagellate cysts and acritarchs*, p.391–430, pl.1–12; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

1996a: Miocene dinoflagellate stratigraphy and systematics of Maryland and Virginia. *Micropaleontology*, v.42, supplement, viii + 172 p, 18 pl.

1996b: Middle to upper Miocene *Geonettia clineae*, an opportunistic coastal embayment dinoflagellate of the *Homotryblium* complex. *Micropaleontology*, v.42, no.3, p.263–284, pl.1–6.

de Wildeman, E.

1896: Quelques notes sur la nomenclature générique des champignons. *Annales de la Société belge de microscopie*, v.22, p.108–119.

de Wit, R.

1943: Hystrichosphaeridae uit Limburgse vuursteen. *Verhandelingen van het Geologisch-Mijnbouwkundig Genootschap voor Nederland en Kolonien*, v.13, p.363–392.

Deflandre, G.

1933: Note préliminaire sur un péridinien fossile *Lithoperidinium oamaruense* n. g., n. sp. Bulletin de la Société zoologique de France, v.58, p.265–273.

1934: Sur les microfossiles d'origine planctonique, conservés à l'état de matière organique dans les silex de la craie. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.199, p.966–968.

1935: Considérations biologiques sur les microorganismes d'origine planctonique conservés dans les silex de la craie. Bulletin biologique de la France et de la Belgique, v.69, p.213–244, pl.5–9.

1936a: Les flagellés fossiles. Aperçu biologique et paléontologique. Rôle géologique. Actualités scientifiques et industrielles, no.335, 98 p.

1936b: Microfossiles des silex crétacés. Première partie. Généralités. Flagellés. Annales de paléontologie, v.25, p.151–191, pl.1–10.

1937a: *Phanerodinium*, genre nouveau de dinoflagellé fossile des silex. La Société française de microscopie, Bulletin, v.6, p.109–115.

1937b: Microfossiles des silex crétacés. Deuxième partie. Flagellés incertae sedis. Hystrichosphaeridés. Sarcodinés. Organismes divers. Annales de paléontologie, v.26, p.51–103 (al. 3–55), pl.11–18 (al. pl.8–15).

1938: Sur le microplancton des mers jurassiques, conservé à l'état de matière organique dans les marnes des Villers-sur-Mer. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.206, p.687–689.

1939a: Microplancton des mers jurassiques conservé dans les marnes de Villers-sur-Mer (Calvados). Étude liminaire et considérations générales. Station zoologique de Wimereux, Travaux, v.13, p.147–200, pl.5–11. (Cover date 1938, issue date January 1939, according to Farr et al., 1979, p.1145; Riding and Schmidt, 2009, have contended that the article was effectively published in 1938, but for now we prefer to follow Farr et al.'s assessment.)

1939b: Sur les dinoflagellés des schistes bitumineux d'Orbagnoux (Jura). La Société française de microscopie, Bulletin, v.8, p.141–145, pl.6.

1940: Sur un nouveau péridinien fossile à thèque originellement siliceuse. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.211, p.265–268.

1941: Le microplancton kiméridgien d'Orbagnoux et l'origine des huiles sulfurées naturelles. Mémoires de l'Académie des sciences (France), v.65, no.5, p.1–32, pl.1–7.

1942: Sur les hystrichosphères des calcaires siluriens de la Montagne Noire. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.215, no.20, p.475–476.

1943: Sur quelques nouveaux dinoflagellés des silex crétacés. Bulletin de la Société géologique de France, 5e Série, v.13, p.499–509, pl.17.

1945a: Microfossiles des calcaires siluriens de la Montagne Noire. Annales de paléontologie, v.31, p.41–75, pl.1–3.

1945b: Fichier micropaléontologique — série 5. Dinoflagellés II. Gymnodinales et dinoflagellés incertae sedis. Flagellés incertae sedis. Archives originales, Centre de documentation; Centre national de la recherche scientifique, France, no.207, p.I–XII, fiches 752–859.

1946a: Fichier micropaléontologique — série 6. Hystrichosphaeridés II. Espèces du Secondaire et du Tertiaire. Archives originales, Centre de documentation; Centre national de la recherche scientifique, France, no.235, p.I–V, fiches 860–1019.

- 1946b: Remarques sur la systématique des hystrichosphaeridés. Comptes rendus de la Société géologique de France, v.7, p.110–111.
- 1946c: Fichier micropaléontologique — série 8. Hystrichosphaeridés III. Espèces du Primaire. Archives originales, Centre de documentation; Centre national de la recherche scientifique, France, no.257, p.I–V, fiches 1096–1185.
- 1947a: Sur une nouvelle hystrichosphère des silex créacés et sur les affinités du genre *Cannosphaeropsis* O. We. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.224, p.1574–1576.
- 1947b: *Calciodinellum* nov. gen., premier représentant d'une famille nouvelle de dinoflagellés fossiles à thèque calcaire. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.224, p.1781–1782.
- 1947c: Le problème des hystrichosphères. Institut océanographique (Monaco), Bulletin, no.918, p.1–23.
- 1947d: Sur quelques microorganismes planctoniques des silex Jurassiques. Institut océanographique, Monaco, Bulletin, no.921, p.1–12.
- 1948: Les calciodinellidés. Dinoflagellés fossiles à thèque calcaire. Le Botaniste, Série 34, p.191–219.
- 1954: Systématique des hystrichosphaeridés: sur l'acception du genre *Cymatiosphaera* O.Wetzel. Compte rendu sommaire et bulletin de la Société géologique de France, v.4, no.9–10, p.257–258.
- 1964: Remarques sur la classification des dinoflagellés fossiles, à propos d'*Evittodinium*, nouveau genre créacé de la famille des Deflandreaceae. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.258, p.5027–5030.
- 1965: Groupement des protistologues de langue française. État actuel de nos connaissances sur l'ancienneté des dinoflagellés. Archives de zoologie expérimentale et générale, v.105, p.381–394.
- 1966: Addendum à mon mémoire: Microfossiles des silex créacés. Archives originales, Centre de documentation, no. 419, Cahiers de micropaléontologie, Série 1, no.2, p.1–9, 1 pl.
- 1968: *Stenopyxinium* n.g. *grassei* n.sp., nouveau type de kyste de dinoflagellé fossile d'un silex créacé. Protistologica, v.3, no.4, p.423–426. (Cover date 1967, issue date 1968.)
- Deflandre, G. and Cookson, I.C.
1954: Sur le microplancton fossile conservé dans diverses roches sédimentaires australiennes s'étageant du Crétacé inférieur au Miocène supérieur. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.239, p.1235–1238.
- 1955: Fossil microplankton from Australian Late Mesozoic and Tertiary sediments. Australian Journal of Marine and Freshwater Research, v.6, no.2, p.242–313, pl.1–9.
- Deflandre, G. and Courteville, H.
1939: Note préliminaire sur les microfossiles des silex créacés du Cambrésis. Bulletin de la société française de microscopie, v.8, p.95–106, pl.2–4.
- Deflandre, G. and Dangeard, L.
1938: *Schizosphaerella*, un nouveau microfossile méconnu du Jurassique moyen et supérieur. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.207, p.1115–1117.
- Deflandre, G. and Deflandre-Rigaud, M.
1958: Fichier micropaléontologique — série 10. Hystrichosphaeridés IV et genres incertae sedis. Espèces du Secondaire et Tertiaire (Supplément 1). Archives originales, Centre de documentation; Centre national de la recherche scientifique (France), no.366, p.I–XX, fiches 1294–1750.

1962: Nomenclature et systématique des hystrichosphères (sens.lat.), observations et rectifications. *Revue de Micropaléontologie*, v.4, no.4, p.190–196.

1964: Fichier micropaléontologique général — série 12. Acritarches I. Polygonomorphitae-Netromorphitae pro parte. Appendice: genres *Deflandrastrum* Combaz et *Wilsonastrum* Jansonius. Archives originales, Centre de documentation, Centre national de la recherche scientifique, no.392, p.I–X, fiches 1948–2175. (Authorship cited on the cover as G. and M. Deflandre.)

1965: Fichier micropaléontologique générale — Série 13. Acritarchs II. Acanthomorphitae 1. Genre *Micrhystridium* Deflandre sens.lat. Archives originales, Centre de documentation, Centre national de la recherche scientifique, no.402, p.I–V, fiches 2176–2521.

1966: Fichier micropaléontologique — série 15. Dinoflagellés V. Archives originales, Centre de documentation, Centre national de la recherche scientifique, p.I–X, fiches 2876–3175.

Deflandre, G. and Foucher, J.-C.

1967: *Diacrocanthidium* nov. gen., diacrodien présumé du Crétacé, pourvu d'un archeopyle. Affinités péridiniennes des diacrodien? *Cahiers de micropaléontologie*, Série 1, no.5, Archives originales, Centre de documentation, Centre national de la recherche scientifique, no.439, p.1–5, pl.1–2.

Deflandre, G. and Sarjeant, W.A.S.

1970: Nouvel examen de quelques holotypes de dinoflagellés fossiles et d'acritarches. *Cahiers de micropaléontologie*, Série 2, no.1 (Archives originales, Centre de documentation, Centre national de la recherche scientifique), no.466, p.1–10, 1 pl.

Deflandre-Rigaud, M.

1954: Microfossiles des silex sénoniens du Bassin de Paris. *Compte rendu sommaire des séances de la Société géologique de France*, Série 6, v.4, no.3, p.58–59.

Demetrescu, E.

1989: *Achomosphaera argesensis*: a new dinoflagellate species from the early Pliocene of the southern Carpathians foredeep, Romania. *Review of Palaeobotany and Palynology*, v.59, p.51–55, pl.1–2.

Deslongchamps, E.

1855: Note sur deux nouveaux brachiopodes des terrains crétacés du département de la Manche, Normandie. *Bulletin de la Société linnéenne de Normandie*, 1, 1855–1856, p.95–102.

Deunff, J.

1951: Sur la présence de microorganismes (hystrichosphères) dans les schistes ordoviciens du Finistère. *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, v.233, no.4, p.321–323.

1954a: Microorganismes planctoniques (hystrichosphères) dans le Dévonien du Massif armoricain. *Compte rendu sommaire de la Société géologique de France*, sér.6, v.4, p.239–242.

1954b: *Veryhachium*, genre nouveau d'hystrichosphères du Primaire. *Compte rendu sommaire des séances de la Société géologique de France*, no.13, p.305–306.

1955: Un microplancton fossile Dévonien à hystrichosphères du Continent Nord-Américain. *Bulletin de microscopie appliquée*, sér.2, v.5, no.11–12, p.138–149, pl.1–4.

1957: Microorganismes nouveaux (hystrichosphères) du Dévonien de l'Amérique du Nord. *Bulletin de la Société géologique et minéralogique de Bretagne*, Nouvelle série, no.2, p.5–14.

1959: Microorganismes planctoniques du primaire Armoricaïn. I. Ordovicien du Veryhac'h (presqu'île de Crozon). *Bulletin de la Société géologique et minéralogique de Bretagne*, Nouvelle série, no.2, p.1–41, pl.1–11. (Cover date 1958, issue date 1959, according to Loeblich Jr. and Tappan, 1976, p.306.)

- 1961a: Un microplancton à hystrichosphères dans le Tremadoc du Sahara. *Revue de micropaléontologie*, v.4, no.1, p.37–52, pl.1–3.
- 1961b: Quelques précisions concernant les Hystrichosphaeridées du Dévonien du Canada. *Compte rendu sommaire des séances de la Société géologique de France*, no.8, p.216–218.
- 1964: Systématique de microplancton fossile à acritarches; révision de deux genres de l'Ordovicien inférieur. *Revue de micropaléontologie*, v.7, no.2, p.119–124, pl.1.
- 1967: Recherches sur les microplanctons du Devonien (acritarches et Dinophyceae). *Bulletin de la Société géologique et minéralogique de Bretagne, Nouvelle série*, p.17–25.
- 1980: Le paléoplancton des Grès de Landévennec (Gédinnien de la Rade de Brest-Finistère) étude biostratigraphique. *Geobios*, v.13, no.4, p.483–539, pl.1–8.
- 1981: Observations préliminaires sur le paléophytoplancton de la coupe de Caffiers (Givétien-Frasnien du Boulonnais, France). *Annales de la Société géologique du nord*, v.100, p.65–71, pl.3–4.
- Deunff, J., Gorka, H. and Rauscher, R.
1974: Observations nouvelles et précisions sur les acritarches à large ouverture polaire du Paléozoïque inférieur. *Geobios*, v.7, no.1, p.5–18, pl.1–7.
- Diesing, C.M.
1866: Revision der Prothelminthen, Abtheilung: Mastigophoren. *Akademie der Wissenschaften zu Wien, Sitzungsberichte, Mathematisch-naturwissenschaftliche Klasse*, v.52, no.8, p.287–401.
- Dietz, L.F., Sarjeant, W.A.S. and Mitchell, T.A.
1999: The dreamer and the pragmatist: a joint biography of Walter Wetzel and Otto Wetzel, with a survey of their contributions to geology and micropaleontology. *Earth Sciences History*, v.18, no.1, p.4–50.
- Doben, K.
1973: Kalkflagellaten (*Thoracosphaera* und *Stomiosphaera*) im Mitteltithon von Neuberg an der Donau. *Geologica Bavarica*, v.67, p.169–171.
- Dodekova, L.
1967: Les dinoflagellés et acritarches de l'Oxfordien-Kiméridgien de la Bulgarie du nord-est. *Annuaire de l'Université de Sofia, Faculté de Géologie et Géographie*, v.60, Livre 1, Géologie, 1965–1966, p.9–30, pl.1–3.
1969: Dinoflagellés et acritarches du Tithonique aux environs de Pleven, Bulgarie central du nord. *Bulgarska Akademiya na Naukite, Izvestiya na Geologicheskaya Institut, Seriya Paleontologiya*, v.18, p.13–24, pl.1–5.
1971: Dinoflagelati i acritarchi ot Titona v tsentralni severna Bulgariya. *Bulgarska Akademiya na Naukite, Izvestiya na Geologicheskaya Institut, Seriya Paleontologiya*, v.20, p.5–22, pl.1–5.
1974: *Compositosphaeridium* gen. n. — a new genus dinoflagellate cyst. *Bulgarska Akademiya na Naukite, Izvestiya na Geologicheskaya Institut, Seriya Paleontologiya*, v.23, p.25–30, pl.1–2.
1975: New Upper Bathonian dinoflagellate cysts from northeastern Bulgaria. *Bulgarska Akademiya na Naukite, Paleontologiya, Stratigrafiya i Litologiya*, v.2, p.17–34, pl.1–6. (In English with Russian abstract.)
1990: Dinoflagellate cysts from the Bathonian-Tithonian (Jurassic) of north Bulgaria. I. Taxonomy of Bathonian and Callovian dinoflagellate cysts. *Geologica Balcanica*, v.20, no.2, p.3–45, pl.1–10.
1992: Dinoflagellate cysts from the Bathonian-Tithonian (Jurassic) of north Bulgaria. II. Taxonomy of Oxfordian and Kimmeridgian dinoflagellate cysts. *Geologica Balcanica*, v.22, no.3, p.33–69, pl.1–10.

1994: Dinoflagellate cysts from the Bathonian-Tithonian (Jurassic) of north Bulgaria. III. Tithonian dinoflagellate cysts. *Geologica Balcanica*, v.24, no.5, p.11–46, pl.1–12.

Dodge, J.D.

1989: Some revisions of the family Gonyaulacaceae (Dinophyceae) based on a scanning electron microscope study. *Botanica Marina*, v.32, p.275–298.

Dodsworth, P.

2004: The palynology of the Cenomanian-Turonian (Cretaceous) boundary succession at Aksudere in Crimea, Ukraine. *Palynology*, v.28, p.129–141, pl.1–3.

Dolby, G.

2014: *Lopsidinium* gen. nov., a dinoflagellate cyst from the Early Cretaceous (Early and Middle Albian) of northern Alberta, Canada. *Palynology*, v.38, no.1, p.171–178, pl.1.

Dolding, P.J.D.

1992: Palynology of the Marambio Group (Upper Cretaceous) of northern Humps Island. *Antarctic Science*, v.4, no.3, p.311–326.

Dörhöfer, G. and Davies, E.H.

1980: Evolution of archeopyle and tabulation in rhaetogonyaulacinean dinoflagellate cysts. *Miscellaneous Publication*, 91 p.; Royal Ontario Museum, Life Sciences Division, Toronto, Canada.

Dorning, K.J.

1981: Silurian acritarchs from the type Wenlock and Ludlow of Shropshire, England. *Review of Palaeobotany and Palynology*, v.34, no.2, p.175–203, pl.1–3.

Downie, C.

1957: Microplankton from the Kimeridge Clay. *Quarterly Journal of the Geological Society of London*, v.112, p.413–434, pl.20.

1958: An assemblage of microplankton from the Shineton Shales (Tremadocian). *Proceedings of the Yorkshire Geological Society*, v.31, no.12, p.331–349, pl.16–17.

1959: Hystrichospheres from the Silurian Wenlock Shale of England. *Palaeontology*, v.2, no.1, p.56–71, pl.10–12. (Cover date October 1959.)

1960: *Deunffia* and *Domasia*, new genera of hystrichospheres. *Micropaleontology*, v.6, no.2, p.197–202, pl.1.

1963: 'Hystrichospheres' (acritarchs) and spores of the Wenlock Shales (Silurian) of Wenlock, England.

Palaeontology, v.6, no.4, p.625–652, pl.91–92.

1982: Lower Cambrian acritarchs from Scotland, Norway, Greenland and Canada. *Transactions of the Royal Society of Edinburgh*, v.72, p.257–285.

Downie, C. and Sarjeant, W.A.S.

1963: On the interpretation and status of some hystrichosphere genera. *Palaeontology*, v.6, no.1, p.83–96.

1965: Bibliography and index of fossil dinoflagellates and acritarchs. *Geological Society of America, Memoir*, no.94, p.1–180. (Cover date December, 1964, issue date January, 1965.)

Downie, C., Williams, G.L. and Sarjeant, W.A.S.

1961: Classification of fossil microplankton. *Nature*, v.192, no.4801, p.471.

Downie, C., Evitt, W.R. and Sarjeant, W.A.S.

1963: Dinoflagellates, hystrichospheres, and the classification of the acritarchs. Stanford University Publications, Geological Sciences, v.7, p.1–16.

Drugg, W.S.

1964: *Glyphanodinium*, a new dinoflagellate genus from the Paleocene of California. Proceedings of the Biological Society of Washington, v.77, p.237–240.

1967: Palynology of the Upper Moreno Formation (Late Cretaceous-Paleocene) Escarpado Canyon, California. Palaeontographica, Abteilung B, v.120, no.1–4, p.1–71, pl.1–9.

1970a: Two new Neogene species of *Tuberculodinium* and one of *Xenicodinium* (Pyrrhophyta). Proceedings of the Biological Society of Washington, v.83, p.115–122.

1970b: Some new genera, species, and combinations of phytoplankton from the Lower Tertiary of the Gulf Coast, U.S.A. Proceedings of the North American Paleontological Convention, Chicago, September 1969, part G, p.809–843.

1978: Some Jurassic dinoflagellate cysts from England, France and Germany. Palaeontographica, Abteilung B, v.168, no.1–3, p.61–79, pl.1–8.

Drugg, W.S. and Loeblich, A.R. Jr.

1967: Some Eocene and Oligocene phytoplankton from the Gulf Coast, U.S.A. Tulane Studies in Geology, v.5, no.4, p.181–194, pl.1–3.

Duane, A.M.

1997: Taxonomic investigations of palynomorphs from the Byers Group (Upper Jurassic — Lower Cretaceous), Livingston and Snow Islands, Antarctic Peninsula. Palynology, v.21, p.123–144, pl.1–5.

Dufour, T.

1968: Quelques remarques sur les organismes incertae sedis de la famille des Calcisphaerulidae Bonet (1956). Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.266, p.1947–1949.

Dujardin, F.

1841: Histoire Naturelle des Zoophytes. Infusoires. Comprenant la Physiologie et la Classification de ces Animaux, et la Manière de les Étudier à l'Aide du Microscope. xii + 684p., 22pl.; Librairie Encyclopédique de Roret, Paris, France.

Dumitrică, P.

1968: Consideratii micropaleontologice asupra orizontului argilos cu radiolari din tortonianul regiunii Carpatice. Studii si Cercetari de Geologie, Geofizica, Geografie, Bucharest, serie Geologie, v.13, no.1, p.227–241, pl.1–4.

1973: Cenozoic endoskeletal dinoflagellates in southwestern Pacific sediments cored during Leg 21 of the DSDP. In: Burns, R.E. et al., Deep Sea Drilling Project, Washington, Initial Reports, v.21, p.819–835, pl.1–5.

Dumortier

1822: Commentat. (Cited, but complete reference not given, in Farr et al., 1979 p.394.)

Dupin, F.

1968: Deux nouvelles espèces de dinoflagellés du Jurassique d'Aquitaine. Cahiers de micropaléontologie, Série 1, no.8, Archives originales, Centre de documentation, Centre national de la recherche scientifique, no.450, p.1–5, pl.1.

Durand Delga, M.

1957: Quelques remarques sur les fibrosphères. Publications du Service de la Carte géologique de l'Algérie, Nouvelle série, Bulletin, v.13, p.153–164.

Dürr, G.

1987: Dinoflagellaten-Zysten aus dem Weissjura δ (Mittelkimmeridgien) der westlichen schwäbischen Alb (Süddeutschland). Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.176, no.1, p.67–80.

1988: Palynostratigraphie des Kimmeridgium und Tithonium von Süddeutschland und Korrelation mit borealen Floren. Tübinger Mikropaläontologische Mitteilungen, no.5, p.1–159, pl.1–11.

Dutta, S.K. and Jain, K.P.

1980: Geology and palynology of the area around Lumshnong, Jaintia Hills, Meghalaya, India. Biological Memoirs, v.5, no.1, p.56–81, pl.1–7.

Duxbury, S.

1977: A palynostratigraphy of the Berriasian to Barremian of the Speeton Clay of Speeton, England. Palaeontographica, Abteilung B, v.160, no.1–3, p.17–67, pl.1–15.

1979a: Three new genera of dinoflagellate cysts from the Speeton Clay (Early Cretaceous) of Speeton, England. Micropalaeontology, v.25, no.2, p.198–205, pl.1–2.

1979b: On *Lagenorhytis* Duxbury nom. nov. Taxon, v.28, p.587.

1980: Barremian phytoplankton from Speeton, east Yorkshire. Palaeontographica, Abteilung B, v.173, no.4–6, p.107–146, pl.1–13.

1983: A study of dinoflagellate cysts and acritarchs from the Lower Greensand (Aptian to Lower Albian) of the Isle of Wight, southern England. Palaeontographica, Abteilung B, v.186, no.1–3, p.18–80, pl.1–10.

2001: A palynological zonation scheme for the Lower Cretaceous — United Kingdom sector, central North Sea. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.219, nos.1–2, p.97–137.

2002: Two new Early Cretaceous dinocyst species from the Central North Sea Basin. Journal of Micropalaeontology, v.21, pt.1, p.75–80.

Dybkjær, K.

2004: Morphological and abundance variations in *Homotryblium*-cyst assemblages related to depositional environments: uppermost Oligocene — lower Miocene, Jylland, Denmark. Palaeogeography. Palaeoclimatology. Palaeoecology. v.206, p.41–58, pl.1–2.

Eaton, G.L.

1971: A morphogenetic series of dinoflagellate cysts from the Bracklesham Beds of the Isle of Wight, Hampshire, England. In: Farinacci, A. (editor), Proceedings of the 2nd Planktonic Conference, Rome, 1970, p.355–379, pl.1–4; Edizioni Tecnoscienza, Rome.

1976: Dinoflagellate cysts from the Bracklesham Beds (Eocene) of the Isle of Wight, southern England. British Museum (Natural History) Geology, Bulletin, v.26, p.227–332, pl.1–21.

1996: *Seriliodinium*, a new Late Cenozoic dinoflagellate from the Black Sea. Review of Palaeobotany and Palynology, v.91, p.151–169, pl.1–4.

Eaton, G.L., Fensome, R.A., Riding, J.B. and Williams, G.L.

2001: Re-evaluation of the status of the dinoflagellate cyst genus *Cleistosphaeridium*. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.219, nos.1–2, p.171–205.

Edwards, L.E.

1982: Biostratigraphically important species of *Pentadinium* Gerlach 1961 and a likely ancestor, *Hafniasphaera goodmanii* n. sp. and from the Eocene of the Atlantic and Gulf coastal plains. Palynology, v.6, p.105–117, pl.1–4.

1984: Miocene dinocysts from Deep Sea Drilling Project Leg 81, Rockall Plateau, eastern North Atlantic Ocean. Deep Sea Drilling Project, Washington, Initial Reports, v.81, p.581–594, pl.1–5.

1996: Chapter 25A. Graphic correlation of the Marlboro Clay and Nanjemoy Formation (uppermost Paleocene and Lower Eocene) of Virginia and Maryland. In: Jansonius, J. and McGregor, D.C. (editors), *Palynology: Principles and Applications*, v.3, p.989–999; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

2001: Dinocyst biostratigraphy of Tertiary sediments from five cores from Screven and Burke counties, Georgia. In: Edwards, L.E. (editor), *Geology and paleontology of five cores from Screven and Burke counties, eastern Georgia*; United States Geological Survey Professional Paper, no.1603, iv+G1-G25, pl.1–6.

Edwards, L.E. and Andrieu, V.A.S.

1992: Distribution of selected dinoflagellate cysts in modern marine sediments. In: Head, M.J. and Wrenn, J.H. (editors), *Neogene and Quaternary Dinoflagellate Cysts and Acritarchs*, p.259–288; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

Edwards, L.E. and Bebout, J.W.

1981: Emendation of *Phthanoperidinium* Drugg and Loeblich 1967, and a description of *P. brooksii* sp. nov. from the Eocene of the mid-Atlantic outer continental shelf. *Palynology*, v.5, p.29–41, pl.1–2.

Ehrenberg, C.G.

1832a: Beiträge zur Kenntnis der Organisation der Infusorien und ihrer geographischen Verbreitung, besonders in Sibirien. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, aus dem Jahre 1830, Physikalische Klasse*, p.1–88, pl.1–8. [Cited as Ehrenberg 1830 in Fensome and Williams, 2004, following Farr et al., 1979, p.1290; however, from the publication it is clear that the work was presented in March 1830 and published in 1832.]

1832b: Über die Entwicklung und Lebensdauer der Infusionsthier; nebst ferneren Beiträgen zu einer Vergleichung ihrer organischen Systeme. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, aus dem Jahre 1831, Physikalische Klasse*, p. 1–154. [From the publication it is clear that the work was presented in June 1831 and published in January 1832.]

1834: Dritter Beitrag zur Erkenntniss grosser Organisation in der Richtung des kleinsten Raumes. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, aus dem Jahre 1833*, p.145–336. [From the publication it is clear that this work was presented in July 1832, published as a separate in May 1834, and published in the journal in 1835; thus, effective publication was May 1834.]

1836: Das Leuchten des Meeres. Neue Beobachtungen nebst Übersicht der Hauptmomente der geschichtlichen Entwicklung dieses merkwürdigen Phänomens. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, aus dem Jahre 1834*, p. 411–575, pl. 1–2. [It is clear from the publication that the paper was presented in April 1834 and the journal volume was published 1836; there is no mention of a separate.]

1837a: Zusätze zur Erkenntnis grosser organischer Ausbildung in den kleinsten thierschen Organismen. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, aus dem Jahre 1835, Physikalische Klasse*, p.151–180, pl.1. [Cited in Fensome and Williams, 2004, as Ehrenberg, 1836 based on their contention that a separate was published in 1836. However, it is clear from the journal that the paper was presented in May 1835 and the journal volume was published 1837; there is no mention of a separate.]

1837b: Über das Massenverhältniss der jetzt lebenden Kiesel-Infusorien und über ein neues Infusorien-Conglomerat als Polirschiefer von Jastraba in Ungarn. *Abhandlungen der Königlichen Akademie der Wissenschaften zu Berlin, aus dem Jahre 1836, Physikalische Klasse*, p.109–135, pl.1–2. [Cited as Ehrenberg, 1838, in Fensome and Williams, 2004. However, from the journal it is clear that the work was presented in July or August 1837, published as a separate in December 1837, and published in the journal in 1838. Thus the date of effective publication is 1837.]

1837c: Gesamtsitzung der Akademie. Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussischen Akademie der Wissenschaften zu Berlin, p. 57–61. [Full reference not available; cited as Ehrenberg 1837 in Fensome and Williams, 2004.]

1838: Die Infusionsthierchen als vollkommene Organismen. Ein Blick in das tiefere organische Leben der Natur. Leipzig, Leopold Voss, xvii+547 p., 64 pl.

1839a: Über das im Jahre 1868 in Curland vom Himmel gefallene Meteorpapier und über dessen Zusammensetzung aus Conferven und Infusorien. Abhandlungen der Königlich Akademie der Wissenschaften zu Berlin, aus dem Jahre 1838, Physikalische Klasse, p.45–147, 1 table, pl.1–4. [From the journal it is clear that the work was presented in December 1838 and published in the journal in 1839.]

1839b: Über jetzt wirklich noch zahlreich lebende Thier-Arten der Kreideformation der Erde. Königlich Preussische Akademie der Wissenschaften zu Berlin, Bericht über die zur Bekanntmachung geeigneten Verhandlungen, 1839, p.152–159. [Not seen.]

1840: 274 Blätter von ihm selbst ausgeführter Zeichnungen von ebenso vielen Arten. Königlich Preussische Akademie der Wissenschaften zu Berlin, Bericht über die zur Bekanntmachung geeigneten Verhandlungen, 1840, p.197–219. [Cited as Ehrenberg, 1840b, in Fensome and Williams, 2004.]

1841: Über noch jetzt zahlreich lebende Thierarten der Kreidebildung und den Organismus der Polythalamien. Abhandlungen der Königlich Akademie der Wissenschaften zu Berlin, aus dem Jahre 1839, Physikalische Klasse, p.81–174, pl.1–4. (From the journal it is clear that the work was presented in October 1839, published as a separate in January 1840, and published in the journal in 1841.) [This was cited in Fensome and Williams, 2004, as Ehrenberg 1840a, following indications by Loeblich and Loeblich, 1966, p.14,70 and Farr et al., 1979, p.22, that the publication date was 1840. However, it is clear from the publication that the work was read in October 1838 with additions in January 1840, but that the publication date was 1841.]

1843a: Hr. Ehrenberg las den ersten Theil seiner Beobachtungen über die Verbreitung des jetzt wirkenden kleinsten organischen Lebens in Asien, Australien und Afrika und über die vorherrschende Bildung auch des Oolithkalkes der Juraformation aus kleinen polythalamischen Thieren. Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussische Akademie der Wissenschaften zu Berlin, aus dem Jahre 1843, p.100–106.

1843b: 1. Über einige Jura-Infusorien-Arten des Corallrags bei Krakau. Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussische Akademie der Wissenschaften zu Berlin, aus dem Jahre 1843, p.61–63.

1843c: Verbreitung und Einfluss des mikroskopischen Lebens in Süd und Nord-Amerika. Abhandlungen der Königlich Akademie der Wissenschaften zu Berlin, aus dem Jahre 1841, erste Theile, p.291–446, pl.1–4. [Read in 1841 and printed in 1843.]

1844a: Hr. Ehrenberg las eine Mittheilung über zwei neue Lager von Gebirgsmassen aus Infusorien als Meeres-Absatz in Nord-Amerika und eine Vergleichung derselben mit den organischen Kreide-Gebilden in Europa und Afrika. Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussische Akademie der Wissenschaften zu Berlin, aus dem Jahre 1844, p.57–97.

1844b: Herr Ehrenberg legte seine Untersuchungen über die kleinsten Lebensformen im Quellenlande des Euphrats und Araxes, so wie über eine an neuen Formen sehr reiche marine Tripelbildung von den Bermuda-Inseln vor. Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussische Akademie der Wissenschaften zu Berlin, aus dem Jahre 1844, p.253–275, 1 pl.

1845: Hr. Ehrenberg übergab zuerst der Akademie einige Zusätze zu seinen letzten Mittheilungen über die mikroskopische Lebensformen von Portugall und Spanien, Sud-Afrika, Hinter-Indien, Japan und Kurdistan, und legte die folgenden Diagnosen von den im October verzeichneten, jene Erdstriche characterisirenden 5 neuen Generibus und 129 neuen Arten vor. Bericht über die zur Bekanntmachung geeigneten Verhandlungen der Königlich Preussische Akademie der Wissenschaften zu Berlin, aus dem Jahre 1845, p. 357–381.

1854: Mikrogeologie. Das Erden und Felsen schaffende Wirken des unsichtbaren kleinen selbständigen Lebens auf der Erde. Leipzig, Leopold Voss, 374+31+88 p., 40 pl.

1860: Nachtrag zur Hrn. Ehrenbergs Mittheilung vom 8. Decbr. 1859. Monatsberichte der Königl. Preuss. Akademie der Wissenschaften zu Berlin, aus dem Jahre 1859, p. 791–793.

1873: Die das Funkeln und Aufblitzen des Mittelmeeres bewirkenden unsichtbar kleinen Lebensformen. Festschrift zur Feier des Hundertjährigen Bestehens der Gessellschaft Naturforschender Freunde zu Berlin; Berlin, Ferd. Dümmlers Verlagsbuchhandlung, p. 1–4, pl. 1.

Eisenack, A.

1931: Neue Mikrofossilien des baltischen Silurs. 1. Paläontologische Zeitschrift, v.13, no.1–2, p.74–118, pl.1–5.

1934: Neue Mikrofossilien des baltischen Silurs III und neue Mikrofossilien des böhmischen Silurs I. Paläontologische Zeitschrift, v.16, no.1–2, p.52–76, pl.4–5.

1935: Mikrofossilien aus Doggergeschieben Ostpreussens. Zeitschrift für Geschiebeforschung, v.11, p.167–184, pl.4–5.

1936: *Eodinia pachythea* n.g., n.sp., ein primitiver Dinoflagellat aus einem Kelloway-Geschiebe Ostpreussens. Zeitschrift für Geschiebeforschung und Flachlandsgeologie, v.12, p.72–75.

1938a: Hystrichosphaerideen und verwandte Formen im baltischen Silur. Zeitschrift für Geschiebeforschung und Flachlandsgeologie, v.14, no.1, p.1–30, pl.1–4.

1938b: Die Phosphoritknollen der Bernsteinformation als Überlieferer tertiären Planktons. Schriften der Physikalisch-Ökonomischen Gesellschaft zu Königsberg, v.70, no.2, p.181–188.

1938c: Neue Mikrofossilien des baltischen Silurs IV. Paläontologische Zeitschrift, v.19, no.3–4, p.217–243, pl.15–16. (Cover date 1937, issue date 1938.)

1951: Über Hystrichosphaerideen und andere Kleinformen aus baltischem Silur und Kambrium. Senckenbergiana, v.32, no.1–4, p.187–204, pl.1–4.

1954a: Hystrichosphären aus dem baltischen Gotlandium. Senckenbergiana, v.34, no.4–6, p.205–211, pl.1.

1954b: Mikrofossilien aus Phosphoriten des samländischen Unteroligozäns und über die Einheitlichkeit der Hystrichosphaerideen. Palaeontographica, Abteilung A, v.105, no.3–6, p.49–95, pl.7–12.

1955: Chitinozoen, Hystrichosphären und andere Mikrofossilien aus dem *Beyrichia*-Kalk. Senckenbergiana Lethaea, v.36, no.1–2, p.157–188, pl.1–5.

1958a: Mikroplankton aus dem norddeutschen Apt, nebst einigen Bemerkungen über fossile Dinoflagellaten. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.106, no.3, p.383–422, pl.21–27.

1958b: Mikrofossilien aus dem Ordovizium des Baltikums. 1. Markasitschicht, Dictyonema-Schiefer, Glaukonitsand, Glaukonitkalk. Senckenbergiana Lethaea, v.39, no.5–6, p.389–405, pl.1–2.

1958c: *Tasmanites* Newton 1875 und *Leiosphaeridia* n.g. als Gattungen der Hystrichosphaeridea. Palaeontographica, Abteilung A, v.110, no.1–3, p.1–19, pl.1–2.

1959: Neotypen baltischer Silur-Hystrichosphären und neue Arten. Palaeontographica, Abteilung A, v.112, no.5–6, p.193–211, pl.15–17.

- 1961: Einige Erörterungen über fossile Dinoflagellaten nebst Übersicht über die zur Zeit bekannten Gattungen. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.112, no.3, p.281–324, pl.33–37.
- 1962: Mikrofossilien aus dem Ordovizium des Baltikums. 2. Vaginatenkalk bis Lyckholmer Stufe. Senckenbergiana Lethaea, v.43, no.5, p.349–366, pl.44.
- 1963a: Zur *Membranilarnax*-Frage. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.2, p.98–103.
- 1963b: *Cordosphaeridium* n.g., ex *Hystrichosphaeridium*, Hystrichosphaeridea. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.118, p.260–265, pl.29.
- 1963c: Hystrichosphären. Biological Reviews, v.38, p.107–139.
- 1965a: Die Mikrofauna der Ostseekalke. 1. Chitinozoen, Hystrichosphären. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.123, no.2, p.115–148, pl.9–13.
- 1965b: Über einige Mikrofossilien des samländischen und norddeutschen Tertiärs. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.123, no.2, p.149–159, pl.14–15.
- 1965c: Mikrofossilien aus dem Silur Gotlands. Hystrichosphären, Problematika. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.122, no.3, p.257–274, pl.21–24.
- 1967: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band I. Dinoflagellaten. 1. Ergänzungslieferung. III + 241 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- 1968: Mikrofossilien eines Geschiebes der Borkholmer Stufe, baltisches Ordovizium, FSUBSCRIPT(2). Mitteilungen aus dem Geologischen Staatsinstitut in Hamburg, no.37, p.81–94, pl.23–25.
- 1969a: Kritische Bemerkungen und Richtigstellungen im Gebiet der fossilen Dinoflagellaten und Acritarchen. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.134, no.2, p.101–116.
- 1969b: Zur Systematik einiger paläozoischer Hystrichosphären (Acritarcha) des baltischen Gebietes. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.133, no.3, p.245–266.
- 1972: Kritische Bemerkung zur Gattung *Pterospermopsis* (Chlorophyta, Prasinophyceae). Critical remarks about *Pterospermopsis*. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.10, p.596–601.
- Eisenack, A. and Cookson, I.C.
1960: Microplankton from Australian Lower Cretaceous sediments. Proceedings of the Royal Society of Victoria, v.72, p.1–11, pl.1–3.
- Eisenack, A. and Gocht, H.
1960: Neue Namen für einige Hystrichosphären der Bernsteinformation Ostpreussens. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.11, p.511–518.
- Eisenack, A. and Kjellström, G.
1971: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band I. Dinoflagellaten. 2. Ergänzungslieferung. III + 215p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- 1972: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band II. Dinoflagellaten. III + 1132 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany. (Cover date 1971, issue date 1972.)

- 1975a: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band I. Dinoflagellaten. 3. Ergänzungslieferung. III + 254 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- 1975b: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band II. Dinoflagellaten. 1. Ergänzungslieferung. III + 518 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- 1981a: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band I. Dinoflagellaten. 4. Ergänzungslieferung. III + 124 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- 1981b: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band II. Dinoflagellaten. 2. Ergänzungslieferung. III + 462 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- Eisenack, A. and Klement, K.W.
1964: Katalog der Fossilen Dinoflagellaten, Hystrichosphären und Verwandten Mikrofossilien. Band I. Dinoflagellaten. Ergänzungslieferung. II + 888 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- Eisenack, A., Cramer, F.H. and Diez, M. del C. R.
1973: Katalog der fossilen Dinoflagellaten, Hystrichosphären und verwandten Mikrofossilien. Band III Acritarcha 1. Teil. 1104 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- 1976: Katalog der fossilen Dinoflagellaten, Hystrichosphären und verwandten Mikrofossilien. Band IV Acritarcha 2. Teil. 863 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- 1979: Katalog der fossilen Dinoflagellaten, Hystrichosphären und verwandten Mikrofossilien. Band VI. Acritarcha, 3. Teil. 533p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.
- Eiserhardt, K.-H.
1986: *Palaeohystrichosphaeridium wimani* (Eisenack 1968), n.g. — ein ordovizischer Dinoflagellat?
Palaeohystrichosphaeridium wimani (Eisenack 1968), n.g. — an Ordovician dinoflagellate? Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.3, p.175–191.
- 1989: Baltisphären aus Gotländer Öjlemyrflint (Acritarcha, Oberordoviz, Geschiebe, Schweden). Mitteilungen aus dem Geologisch-Paläontologischen Institut der Universität Hamburg, v.68, p.79–129, pl.1–10.
- 1992: Die Acritarcha des Öjlemyrflintes. Palaeontographica, Abteilung B, v.226, no.1–6, p.1–132, pl.1–15.
- El Mehdawi, A.D.
1998: *Odontochitina tabulata* sp. nov. A late Santonian-early Campanian dinoflagellate cyst from SE Sirte Basin, Libya. Journal of Micropaleontology, v.17, pt.2, p.173–178, pl.1–2.
- Elaouad-Debbaj, Z.
1981: Acritarches de l'Ordovicien supérieur du Synclinal de Buçaco (Portugal); systematique-biostratigraphie-intérêt paléogéographique. Bulletin de la Société géologique et minéralogique de Bretagne, Série C, v.10, no.2, p.1–101, pl.1–18. (Cover date 1978, issue date 1981.)
- Elbrächter, M.
1993: *Kolkwitziella* Lindemann 1919 and *Preperidinium* Mangin 1913: correct generic names in the *Diplopsalis*-group (Dinophyceae). Nova Hedwigia, v.56, nos.1–2, p.173–178.
- Elbrächter, M., Gottschling, M., Hildebrand-Habel, T., Keupp, H., Kohring, R., Lewis, J., Meier, K.J.S., Montresor, M., Streng, M., Versteegh, G.J.M., Willems, H. and Zonneveld, K.

2008: Establishing an agenda for calcareous dinoflagellate research (Thoracosphaeraceae, Dinophyceae) including a nomenclatural synopsis of generic names. *Taxon*, v.57, no.4, p.1289–1303.

Ellegaard, M., Daugbjerg, N., Rochon, A., Lewis, J. and Harding I.

2003: Morphologic and LSU rDNA sequence variation within the *Gonyaulax/Spiniferites* group (Dinophyceae), and proposals of *Gonyaulax elongata* nov. comb. and *G. membranacea* comb. nov. *Phycologia*, v.42, p.151–164.

Elsik, W.C.

1968: Palynology of a Paleocene Rockdale lignite, Milam County, Texas. I. Morphology and taxonomy. *Pollen et Spores*, v.10, no.2, p.263–314, pl.1–15.

1977: *Paralecaniella indentata* (Defl. & Cooks. 1955) Cookson and Eisenack 1970 and allied dinocysts.

Palynology, v.1, p.95–102, pl.1–2.

Engelhardt, D.W.

1976: *Geiselodinium tyonekensis* sp. nov. and a dinoflagellate cyst from the nonmarine Tertiary (Miocene) of Alaska. *Geoscience and Man*, v.15, p.121–124, pl.1.

Erkmen, U. and Sarjeant, W.A.S.

1978: *Xylochoarion*, new genus of dinoflagellate cysts from the Hackness Rock (Middle Jurassic: Callovian) of Yorkshire, England. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.7, p.400–407.

1980: Dinoflagellate cysts, acritarchs and tasmanitids from the uppermost Callovian of England and Scotland: with a reconsideration of the "*Xanthidium pilosum*" problem. *Geobios*, Lyon, no.13 (1), p.45–99, pl.1–8.

Esper, O. and Zonneveld, K.

2001: 2. Distribution of organic-walled dinoflagellate cysts in surface sediments of the Southern Ocean (eastern Atlantic sector) between the Subtropical Front and the Weddell Gyre. In: Esper, O., Reconstruction of Recent and late Quaternary oceanographic conditions in the eastern South Atlantic Ocean based on calcareous- and organic-walled dinoflagellate cysts; *Berichte aus dem Fachbereich Geowissenschaften der Universität Bremen*, no.189, p.9–43, pl.1–3.

2002: Distribution of organic-walled dinoflagellate cysts in surface sediments of the Southern Ocean (eastern Atlantic sector) between the Subtropical front and the Weddell Gyre. *Marine Micropaleontology*, v.46, p.177–208.

Evitt, W.R.

1961a: *Dapcodinium priscum* n. gen., n.sp., a dinoflagellate from the Lower Lias of Denmark. *Journal of Paleontology*, v.35, no.5, p.996–1002, pl.119.

1961b: The dinoflagellate *Nannoceratopsis* Deflandre; morphology, affinities and infraspecific variability. *Micropaleontology*, v.7, p.305–316, pl.1–2.

1961c: Observations on the morphology of fossil dinoflagellates. *Micropaleontology*, v.7, no.4, p.385–420, pl.1–9.

1962: Dinoflagellate synonyms: *Nannoceratopsis deflandrei* Evitt junior to *N.? gracilis* Alberti. *Journal of Paleontology*, v.36, no.5, p.1129–1130.

1963: A discussion and proposals concerning fossil dinoflagellates, hystrichospheres, and acritarchs, I. National Academy of Sciences, Washington, Proceedings, v.49, p.158–164.

1974: Restudy of an Oligocene freshwater dinoflagellate from Vermont. *Geoscience and Man*, v.9, p.1–6, pl.1.

1975: The archeopyle in Cretaceous *Palaeoperidinium eurypylum* (Manum and Cookson) comb. nov. and similar dinoflagellates. *Geoscience and Man*, v.11, p.77–86, pl.1.

Evitt, W.R., Clarke, R.F.A. and Verdier, J.-P.

1967: Dinoflagellate studies III. *Dinogymnium acuminatum* n. gen., n.sp. (Maastrichtian) and other fossils formerly referable to *Gymnodinium* Stein. Stanford University Publications, Geological Sciences, v.10, no.4, p.1–27, pl.1–3.

Evitt, W.R., Damassa, S.P. and Albert, N.R.

1998: A tiger by the tail: the exophragm of the Cretaceous-Paleocene dinoflagellate *Palaeoperidinium* and its implications. *Palynology*, v.22, p.1–55, pl.1–18.

Farr, E.R., Leussink, J.A. and Stafleu, F.A. (editors)

1979: *Index Nominum Genericorum (Plantarum)*. *Regnum Vegetabile*, v.100-102, 1896 p. (Published in three volumes.)

Farr, E.R., Leussink, J.A. and Zijlstra, G.

1986: *Index Nominum Genericorum. Supplementum I*. *Regnum vegetabile*, v.113, xvi + 126 p.

Fauconnier, D and Masure, E. (co-ordinators)

2004: Les dinoflagellés fossiles. Guide pratique de détermination. Les genres à processus et à archéopyle apical. 602 p., 80 pl. BRGM Editions

Fechner, G.G.

1985: Quantitative investigations of a mid-Cretaceous dinoflagellate cyst assemblage from SE-France, supplemented by notes on the palaeogeography and the palaeoenvironment. *Berliner Geowissenschaftliche Abhandlungen, Serie A*, v.60, p.111–137, pl.1–5.

Fechner, G.G. and Mohr, B.

1986: Zur tertiären Dinoflagellaten-Gattung *Carpatella* Grigorovich 1969 (Gonyaulacystaceae). *Paläontologische Zeitschrift*, v.60, p.181–188.

Fedorova, V.A.

1980: Rol organogennoho mikrofitoplanktona pri korrelatzii udalennykh razrezov (na primere izutcheniya aptskikh otlaoshenii severnogo Prikaspiya). In Timoshina, N.A. (editor), *Mikrofitofossilii v neftyanoi geologii*, p.60–78, pl.1–3; Vsesoyuznyi Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad (VNIGRI), Leningrad, Russia.

1989: New dinoflagellate cyst species and prasinophytes from boreal Upper Jurassic-Lower Cretaceous deposits on the territory of the USSR. In: *Phytostratigraphy and Morphology of Ancient Plant Spores from Oil-Gas Bearing Provinces of the USSR*, p.69–80; Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, (VNIGRI), Leningrad, USSR.

Fedorova-Shakhmundes, V.A.

1976: Neodiacromorphitae — novaya podgruppya melovykh akritarkh. *Vsesoyuznyi Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad (VNIGRI), Trudy*, no.374, p.90–101, pl.1.

1980: Novye rannemelovye peridinei Severnogo Prikaspiya. In: Mesezhnikov, M.S. (editor-in chief), Azbel, A.Y. et al. (editors), *Novye rody i vidy drevnykh rastenii i bespozvonochnykh SSSR*, p.5–7; Vsesoyuznyi Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad (VNIGRI), Nedra, Leningradskoe Otdelenie, Leningrad, Russia.

Feist-Burkhardt, S.

1990: Dinoflagellate cyst assemblages of the Hausen coreholes (Aalenian to early Bajocian), southwest Germany. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.14, no.2, p.611–633, pl.1–6.

1995a: *Willeidinium baiocassinum* gen. et sp. nov., a Middle Jurassic dinoflagellate cyst with an unusual paratabulation pattern. *Palynology*, v.19, p.167–182, pl.1–4.

1995b: *Weiachia fenestrata* gen. et sp. nov., a new phallogocystean dinoflagellate cyst from the Lower Jurassic of Switzerland. *Palynology*, v.19, p.211–219, pl.1.

Feist-Burkhardt, S. and Monteil, E.

1994: *Walloclinium cylindricum* and *Walloclinium elongatum*: stratigraphical problem and taxonomical solution. Cahiers de micropaléontologie, Nouvelle série, v.9, no.3, p.5–15, pl.1–5.

1997: Dinoflagellate cysts from the Bajocian stratotype (Calvados, Normandy, western France). Kystes de dinoflagellés du stratotype du Bajocien (Calvados, Normandie, France). Bulletin du Centre de recherches Elf exploration production, v.21, no.1, p.31–105, pl.1–25.

2001: Gonyaulacacean dinoflagellate cysts with multi-plate precingular archaeopyle. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.219, nos.1–2, p.33–81.

Feist-Burkhardt, S. and Pross, J.

1999: Morphological analysis and description of Middle Jurassic dinoflagellate cyst marker species using confocal laser scanning microscopy, digital optical microscopy, and conventional light microscopy. Analyse morphologique et description de kystes de dinoflagellés du Jurassique moyen à partir de microscopie confocale à balayage laser, de microscopie optique digitale et de microscopie conventionnelle en lumière transmise. Bulletin du Centres de recherches Elf exploration production, v.22, no.1, p.103–145, 16 pl.

Felix, C.J. and Burbridge, P.P.

1973: A Maastrichtian age microflora from arctic Canada. Geoscience and Man, v.7, p.1–29, pl.1–4.

Fensome, R.A.

1979: Dinoflagellate cysts and acritarchs from the Middle and Upper Jurassic of Jameson Land, east Greenland. Grønlands Geologiske Undersøgelse, Bulletin, no.132, p.1–98, pl.1–9.

1981: The Jurassic dinoflagellate genera *Wanaea* and *Energlynia*: their morphology and evolution. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.161, p.47–61.

Fensome, R.A. and Sarjeant, W.A.S.

1982: The dinoflagellate cyst genus *Sarjeantia* Horowitz and its associated microfossils. Grana, v.21, p.51–58.

Fensome, R.A. and Skog, J.E.

1997: (04-05) Two proposals to amend provisions regarding form-genera of fossil plants. Taxon, v.46, p.557–562.

Fensome, R.A. and Williams, G.L.

2004: The Lentin and Williams Index of fossil dinoflagellates: 2004 edition. American Association of Stratigraphic Palynologists Contributions Series, no.42, 909p.

Fensome, R.A., Williams, G.L., Barss, M.S., Freeman, J.M. and Hill, J.M.

1990: Acritarchs and fossil prasinophytes: an index to genera, species and infraspecific taxa. American Association of Stratigraphic Palynologists, Contributions Series, no.25, 771 p.

Fensome, R.A., Gocht, H., Stover, L.E. and Williams, G.L.

1991: The Eisenack Catalog of Fossil Dinoflagellates. New Series. Volume 1. 828 p.; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.

1993a: The Eisenack Catalog of Fossil Dinoflagellates. New Series. Volume 2. p.829–1461; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany. (Cited as **Fensome et al., 1993a** in text.)

Fensome, R.A., Taylor, F.J.R., Norris, G., Sarjeant, W.A.S., Wharton, D.I. and Williams, G.L.

1993b: A classification of fossil and living dinoflagellates. Micropaleontology Press Special Paper, no.7, 351 p. (Cited as **Fensome et al., 1993b** in text.)

Fensome, R.A., Gocht, H. and Williams, G.L.

1995: The Eisenack Catalog of Fossil Dinoflagellates. New Series. Volume 3. p.1463–2008; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.

1996: The Eisenack Catalog of Fossil Dinoflagellates. New Series. Volume 4. P.2009–2548; E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, Germany.

Fensome, R.A., Jansonius, J. and Skog, J.E.

1998a: Proposals to amend provisions regarding typification of the names of fossil plants. *Taxon*, v.47, no.2, p.489–490.

1998b: Typification and the names of fossil plants — a review and discussion. *Taxon*, v.47, p.695–702.

Fensome, R.A., Bucefalo Palliani, R., Davies, E.H., Edwards, L.E., Harland, R., Lentin, J.K., Norris, G., Powell, A.J., Riding, J.B., Sarjeant, W.A.S. and Williams, G.L.

1998c: (1362) Proposal to conserve the name Rhaetogonyaulacaceae against Shublikodiniaceae (Dinophyceae). *Taxon*, v.47, p.731–732. (Cited as **Fensome et al., 1998c** in text.)

Fensome, R.A., Guerstein, G.R. and Williams, G.L.

2007: New insights on the Paleogene dinoflagellate cyst genera *Enneadocysta* and *Licracysta* gen. nov. based on material from offshore eastern Canada and southern Argentina. *Micropaleontology*, v.52, no.5, p.385–410, pl.1–5. (Cover date 2006, issue date 2007)

Fensome, R.A., MacRae, R.A. and Williams, G.L.

2008: DINOFLAJ2, Version 1. American Association of Stratigraphic Palynologists, Data Series no. 1. http://dinoflaj.smu.ca/wiki/Main_Page

Fensome, R.A., Williams, G.L. and MacRae, R.A.

2009: Late Cretaceous and Cenozoic fossil dinoflagellates and other palynomorphs from the Scotian Margin, offshore eastern Canada. *Journal of Systematic Palaeontology*, v.7, no.1, p.1–79, pl.1–11.

Fensome, R.A., Nøhr-Hansen, H. and Williams, G.L.

2016: Cretaceous and Cenozoic dinoflagellate cysts and other palynomorphs from the western and eastern margins of the Labrador-Baffin Seaway. *Geological Survey of Denmark and Greenland, Bulletin*.

Fenton, J.P.G.

1981: Taxonomic revision of selected dinoflagellate cysts from the Late Bajocian (Middle Jurassic) of northwest Germany. *Review of Palaeobotany and Palynology*, v.31, p.249–260, pl.1–3.

Fenton, J.P.G. and Fisher, M.J.

1978: Regional distribution of marine microplankton in the Bajocian and Bathonian of northwest Europe. *Palinologiá, Número extraordinario*, no.1, p.233–243, pl.1.

Fenton, J.P.G., Neves, R. and Piel, K.M.

1980: Dinoflagellate cysts and acritarchs from Upper Bajocian to Middle Bathonian strata of central and southern England. *Palaeontology*, v.23, no.1, p.151–170, pl.14–16.

Filatoff, J.

1975: Jurassic palynology of the Perth Basin, Western Australia. *Palaeontographica, Abteilung B*, v.154, p.1–113, pl.1–30.

Filipescu, M.G.

1943: Lés dépôts à silicoflagellidées et à radiolaires du Miocène de la région subcarpathique de Roumanie. *L'Academie Roumaine Bukhaust, Sectuinea Stintifica, Bulletin*, v.26, no.4, p.261–271.

1959: Formes nouvelles de silicoflagellidées dans le Miocène sous-carpathique (Roumanie). *Revue Roumaine de Géologie, Géophysique, et Géographie, Série de Géologie*, v.3, no.2, p.167–171, 1 pl.

Firth, J.V.

1987: Dinoflagellate biostratigraphy of the Maastrichtian to Danian interval in the U.S. Geological Survey Albany Core, Georgia, U.S.A. *Palynology*, v.11, p.199–216, pl.1–3.

1993: Dinoflagellate assemblages and sea-level fluctuations in the Maastrichtian of southwest Georgia. *Review of Palaeobotany and Palynology*, v.79, p.179–204, pl.1–6.

Firtion, F.

1952: Le Cénomanién inférieur du Nouvion-en-Thiérache: examen micropaléontologique. *Annales de la Société géologique du Nord*, v.72, p.150–163, pl.8–10.

Fisher, M.J. and Riley, L.A.

1976: The stratigraphic distribution of dinoflagellate cysts at the boreal Jurassic-Cretaceous boundary. 4th International Palynology Conference, Lucknow, India, December-January, 1976–1977, Abstracts, p.52.

1980: The stratigraphic distribution of dinoflagellate cysts at the boreal Jurassic-Cretaceous boundary. 4th International Palynology Conference, Lucknow, 1976–77, Proceedings, v.2, p.313–329, pl.1–4.

1982: A note on the nomenclature of some Upper Jurassic dinoflagellate cyst taxa. *Journal of Micropalaeontology*, v.1, p.53.

Fisher, M.J. and van Helden, B.G.T.

1979: Some observations on the fossil dinocyst genus *Rhaetogonyaulax* Sarjeant, 1966. *Palynology*, v.3, p.265–276, pl.1–4.

Fombella, M.A.

1977: Acritarcos de edad Cámbrico medio-inferior de la Provincia de León, España. *Revista española de micropaleontología*, v.9, no.1, p.115–124, pl.1.

Foucher, J.-C.

1975: Dinoflagellés et acritarches des silex crétaqués du Bassin de Paris — une synthèse stratigraphique. *Annales scientifiques de l'Université de Reims et de l'ARERS (Association régionale pour l'étude et la recherche scientifique)*, v.13, no.1–2, p.8–10, pl.1–2.

1976: Les dinoflagellés des silex et la stratigraphie du Crétacé supérieur français. *Revue de micropaléontologie*, v.18, no.4, p.213–220, pl.1–2.

Foucher, J.-C. and Taugourdeau-Lantz, J.

1975: À propos de la suppression du genre *Pleurozonaria* O.Wetzel, 1933. *Comptes rendus hebdomadaires des séances de l'Académie des sciences, Série D*, v.280, p.1677–1680.

Fridriksone, A.I.

1971: Akritarkhi *Baltisphaeridium* i gistriksosfery(?) iz kembriiskikh otlozhenii Latvii., Geological Survey Institute, Vilnius, no.3, p.5–22, pl.1–3. (Russian original not available to present authors.)

Fuchs, R. and Sütő-Szentai, M.

1991: Organisches Mikroplankton (Phytoplankton) aus dem Pannonien des Wiener Beckens (Österreich) und Korrelationsmöglichkeiten mit dem zentralen pannonischen Becken (Ungarn). *Jubiläumsschrift 20 Jahre Geologische Zusammenarbeit Österreich — Ungarn*, v.1, p.19–34, pl.1–9.

Fuji, N.

1966: Fossil pollen grains and spores from the Neogene-Tertiary diatomaceous mudstones in Noto Peninsula, central Japan. *Scientific Studies on the Diatomaceous Mudstones in Noto Peninsula, Central Japan*, p.53–62, pl.9–12; Ishikawa Prefectural Government, Kanazawa City, Japan.

Fütterer, D.

1976: Kalkige Dinoflagellaten ("Calciodinelloideae") und die systematische Stellung der Thoracosphaeroideae. Calcareous dinoflagellates ("Calciodinelloideae") and the taxonomic position of the Thoracosphaeroideae. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.151, no.2, p.119–141, pl.1–4.

1978: Distribution of calcareous dinoflagellates in Cenozoic sediments of Site 366, eastern North Atlantic. In: Lancelot, Y. et al., Deep Sea Drilling Project, Washington, Initial Reports, v.41, p.709–737. (Cover date 1977, issue date 1978.)

1984: Pithonelloid calcareous dinoflagellates from the Upper Cretaceous and Cenozoic of the southeastern Atlantic Ocean. In: Moore, T.C. Jr. et al., Deep Sea Drilling Project, Washington, Initial Reports, v.74, p.533–541, pl.1–4.

1990: Distribution of calcareous dinoflagellates at the Cretaceous-Tertiary boundary of Queen Maud Rise, eastern Weddell Sea, Antarctica (ODP Leg 113). In: Barker, P.F. et al., Ocean Drilling Program, Scientific Results, Proceedings, Volume 113, p.533–548, pl.1–5.

Gaarder, K.R.

1954: Coccolithineae, Silicoflagellatae, Pterospermataceae and other forms from the 'Michael Sars' North Atlantic Deep Sea Expedition 1910. Report on the Scientific Results of the "Michael Sars" North Atlantic Deep-Sea Expedition, 1910, v.2, p.1–20.

Gaarder, K.R. and Heimdal, B.R.

1973: Light and scanning electron microscope observations on *Rhabdothorax regale* (Gaarder) Gaarder nov. comb. Norwegian Journal of Botany, v.20, p.89–97.

Gao Ruiqi, He Chengquan and Qiao Xiuyun

1992a: A new genus and species of Cretaceous dinoflagellates from two transgressive beds in Songliao Basin, NE China. Acta Palaeontologica Sinica, v.31, no.1, p.17–29, pl.1–4. (In Chinese with English summary.) **(Cited in the text as Gao Ruiqi et al., 1992a.)**

1992b: Cretaceous non-marine dinoflagellates, chlorophytes and acritarchs from the Songliao Basin. p.1–68, pl.1–20; Nanking University Press, Nanjing, China. (In Chinese and English.) **(Cited in the text as Gao Ruiqi et al., 1992b.)**

Gao Ruiqi, Qiao Xiuyun and He Chengquan

1992c: Cretaceous microphytoplankton from the Songliao Basin and its depositional environment. Acta Micropalaeontologica Sinica, v.9, no.2, p.111–126, pl.1–4. (In Chinese with English summary.) **(Cited in the text as Gao Ruiqi et al., 1992c.)**

Gardiner, P.R.R. and Vanguetaine, M.

1971: Cambrian and Ordovician microfossils from south-east Ireland and their implications. Geological Survey of Ireland, Bulletin, v.1, no.2, p.163–210, pl.1–2.

Garg, R., Khowaja-Ateequzaman and Jain, K.P.

1995: Occurrence of the marker dinoflagellate cyst *Apectodinium* in Narsapur Well-1, Krishna-Godavari Basin, India. The Palaeobotanist, v.42, no.3, p.363–371, pl.1.

Gazdzicka, E.

1978: Calcareous nannoplankton from the uppermost Cretaceous and Paleogene deposits of the Lublin Upland. Acta Geologica Polonica, v.28, no.3, p.335–375.

Gedl, P.

1995: Middle Eocene dinoflagellate cysts from the Rogoźnik section, Flysch Carpathians, Poland. Acta Palaeobotanica, v.35, no.2, p.195–231, pl.1–10.

1996: Middle Miocene dinoflagellate cysts from the Korytnica clays (Góry Świętokrzyskie Mountains, Poland). *Annales societatis geologorum poloniae*, v.66, p.191–218.

Gerlach, E.

1961: Mikrofossilien aus dem Oligozän und Miozän Nordwestdeutschlands, unter besonderer Berücksichtigung der Hystrichosphaeren und Dinoflagellaten. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.112, no.2, p.143–228, pl.25–29.

Gilbert, M.W. and Clark, D.L.

1983: Central Arctic Ocean paleoceanographic interpretation based on Late Cenozoic calcareous dinoflagellates. *Marine Micropaleontology*, v.7, p.385–401.

Gitmez, G.U.

1970: Dinoflagellate cysts and acritarchs from the basal Kimmeridgian (Upper Jurassic) of England, Scotland and France. *British Museum (Natural History) Geology, Bulletin*, v.18, no.7, p.231–331, pl.1–14.

Gitmez, G.U. and Sarjeant, W.A.S.

1972: Dinoflagellate cysts and acritarchs from the Kimmeridgian (Upper Jurassic) of England, Scotland and France. *British Museum (Natural History) Geology, Bulletin*, v.21, no. 5, p.171–257, pl.1–17.

Gocht, H.

1955: *Rhombodinium* und *Dracodinium*, zwei neue Dinoflagellaten-Gattungen aus dem norddeutschen Tertiär. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.2, p.84–92.

1957: Mikroplankton aus dem nordwestdeutschen Neokom (Teil I). *Paläontologische Zeitschrift*, v.31, p.163–185, pl.18–20.

1959: Mikroplankton aus dem nordwestdeutschen Neokom (Teil II). *Paläontologische Zeitschrift*, v.33, p.50–89, pl.3–8.

1960: Die Gattung *Chiropteridium* n.gen. (Hystrichosphaeridea) im deutschen Oligozän. *Paläontologische Zeitschrift*, v.34, p.221–232, pl.17–18.

1964: Planktonische Kleinformen aus dem Lias/Dogger-Grenzbereich Nord- und Süddeutschlands. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.119, no.2, p.113–133, pl.15–17.

1968: Zur Morphologie und Ontogenie von *Thalassiphora* (Dinoflagellata). *Palaeontographica, Abteilung A*, v.129, p.149–156, pl.25–27.

1969: Formengemeinschaften alttertiären Mikroplanktons aus Bohrproben des Erdölfeldes Meckelfeld bei Hamburg. *Palaeontographica, Abteilung B*, v.126, p.1–100, pl.1–11.

1970a: Dinoflagellaten-Zysten aus einem Geschiebefeuerstein und ihr Erhaltungszustand. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.3, p.129–140.

1970b: Dinoflagellaten-Zysten aus dem Bathonium des Erdölfeldes Aldorf (NW-Deutschland). *Palaeontographica, Abteilung B*, v.129, p.125–165, pl.26–35.

1973: Zur Validität der Gattung *Palynodinium* Gocht (Dinoflagellata). *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.8, p.455–457.

1975a: Neuuntersuchung von *Eodinia pachythea* Eisenack, 1936 (Dinoflagellata, Oberjura). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.148, p.12–32.

1975b: Morphologie und Wandstruktur von *Lithodinia jurassica* Eisenack 1935 (Dinoflagellata, Oberjura). Morphology and wall structure of the Upper Jurassic dinoflagellate *Lithodinia jurassica* Eisenack. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.6, p.343–359.

1976: *Hystrichosphaeropsis quasacribrata* (O. Wetzel), ein Dinoflagellat aus dem Maastricht Nordeuropas. Mit einem nomenklatorischen Nachtrag zur Gattung *Lithodinia* Eis. The dinoflagellate *Hystrichosphaeropsis quasacribrata* (O. Wetzel) from the north European Maestrichtian (with additional remarks to the genus *Lithodinia* Eis.). Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.6, p.321–336.

1979: *Eyachia prisca* n.g. n.sp. (Dinoflagellata) aus dem Lias-/Dogger-Grenzbereich. *Eyachia prisca* n.g. n.sp. (Dinoflagellata) from the upper Lias/lower Dogger sediments. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.5, p.305–319.

Gocht, H. and Netzel, H.

1976: Reliefstrukturen des Kreide-Dinoflagellaten *Palaeoperidinium pyrophorum* (Ehr.) im Vergleich mit Panzer-Merkmalen rezenter *Peridinium*-Arten. Relief structures of the Cretaceous dinoflagellate *Palaeoperidinium pyrophorum* (Ehr.) compared with thecal structures of Recent *Peridinium* species. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.152, no.3, p.380–413.

Gocht, H. and Wille, W.

1990: *Orobodinium* n.g., eine neue Dinoflagellatengattung aus dem mittleren Jura Sudwestdeutschlands. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.12, p.695–706.

Góczán, F.

1962: Mikroplankton a Bakonyi Krétából. A Magyar Allami Földtani Intézet Évi Jelentése, Az 1959, Évről, p.181–209, pl.1–4.

Goodman, D.K. and Evitt, W.R.

1981: The dinoflagellate *Angustidinium acribes* (Davey and Verdier) gen. et comb. nov. from the mid-Cretaceous of the northern California Coast Ranges. Grana, v.20, p.43–54.

Goodman, D.K. and Witmer, R.J.

1985: Archeopyle variation and paratabulation in the dinoflagellate *Diphyes colligerum* (Deflandre and Cookson, 1955) Cookson, 1965. Palynology, v.9, p.61–83, pl.1–6.

Górka, H.

1963: Coccolithophoridés, dinoflagellés, hystrichosphaeridés et microfossiles incertae sedis du Crétacé supérieur de Pologne. Acta Palaeontologica Polonica, v.8, no.1, p.1–83, pl.1–11.

1965: Les microfossiles du Jurassique supérieur de Magnuszew (Pologne). Acta Palaeontologica Polonica, v.10, no.3, p.291–334, pl.1–5.

1967: Quelques nouveaux acritarches des silexites du Trémadocien supérieur de la région de Kielce (Montagne de Ste. Croix, Pologne). Cahiers de micropaléontologie, Série 1, no.6 (Archives originales, Centre de documentation; Centre national de la recherche scientifique, no.441), p.1–8, pl.1–2.

1969: Mikroorganismen de l'Ordovicien de Pologne. Palaeontologia Polonica, no.22, p.1–102, pl.1–31.

1970: Dinoflagellate cysts from Callovian of Luków (Poland). Acta Palaeontologica Polonica, v.15, no.4, p.479–498, pl.1–6.

1974: Quelques informations sur une association d'acritarches du Famennien de Pologne. Review of Palaeobotany and Palynology, v.18, no.1–2, p.131–135, pl.1.

1982: *Cribooperidinium janinae*, nouvelle espèce de dinoflagellés de l'Hauterivien inférieur de Pologne. Revue de Micropaléontologie, v.25, p.105–110, pl.1–2.

Gottschling, M. and Soehner, S.

2013: An updated list of generic names in the Thoracosphaeraceae. *Microorganisms* 2013, p.122–136.

Gran, H.H.

1900: Hydrographic-biological studies of the North Atlantic Ocean and the coast of Nordland. Norwegian Fishery and Marine Investigations, Report, v.1, no.5, 89 p.

1902: Das Plankton des norwegischen Nordmeeres von biologischen und hydrographischen Gesichtspunkten behandelt. Norwegian Fishery and Marine Investigations, Report, v.2, no.5, part 2, p.1–222, pl.1.

Gran, H.H. and Braarud, T.

1935: A quantitative study of the phytoplankton in the Bay of Fundy and the Gulf of Maine (including observations on hydrography, chemistry and turbidity). *Biological Board of Canada, Journal*, v.1, no.5, p.279–467.

Greuter, W., Barrie, F.R., Burdet, H.M., Chaloner, W.G., Demoulin, V., Hawksworth, D.L., Jørgensen, P.M., Nicolson, D.H., Silva, P.C., Trehane, P. and McNeill, J.

1994: International Code of Botanical Nomenclature (Tokyo Code) 1994. *Regnum vegetabile*, v.131, 389+xviii p.

Greuter, W., McNeill, J., Barrie, F.R., Burdet, H.-M., Demoulin, V., Filgueiras, T.S., P.M., Nicolson, D.H., Silva, P.C., Skog, J.E., Trehane, P. Turland, N.J. and Hawksworth, D.L.

2000: International Code of Botanical Nomenclature (St. Louis Code). *Regnum Vegetabile*, v.138, 474 + xviii p.

Grigorovich, A.S.

1969a: Novyi rod *Carpatella* (Dinoflagellyata) iz dat-paleotsenovykh otlozhenii Karpat. *Paleontologicheskii Sbornik*, no.6, part 2, p.74–76.

1969b: Characteristics of some species of dinoflagellata from Cretaceous and Paleogene deposits of the Carpathians. *Paleontologicheskii Sbornik*, no.6, p.67–72, pl.1–2.

1971: Mikrofitoplankton melovykh i paleogenovykh otlozhenii severnogo sklona Ukrainiskikh Karpat. *Moskovskoe Obschestvo Ispytatelei Prirody, Biulleten, Otdel Geologicheskii*, v.46, no.2, p.83–98, pl.1–3.

1972: Peridinei iz pogranychnykh sloev Paleogena i Neogena prichernomorskoj vpadiny. *Paleontologicheskii Sbornik*, no.9, p.64–70, pl.1.

Grishina, T.S. and Klenina, L.N.

1981: Akritarkhi iz zony *Cyrtograptus lundgreni* zaisanskoi skladchatoi sistemy. *Khabarpary Izvestiya Akademii Nauk Kazakhskoi SSR, Seriya Geologicheskaya, Izdatelstvo Nauka, Kazakhskoi Alma-Ata*, no.1, p.26–34.

Grove, W.B.

1922: New or noteworthy fungi, VIII. *Journal of Botany, British and Foreign*, v.60, p.8–86.

Gruas-Cavagnetto, C.

1968: Étude palynologique des divers gisements du Sparnacien du bassin de Paris. *Mémoires de la Société géologique de France, Nouvelle série*, v.47, no.110, p.1–144, pl.1–18.

1976: Les marqueurs stratigraphiques (dinoflagellés) de l'Éocène du bassin de Paris et de la Manche orientale. *Revue de Micropaléontologie*, v.18, no.4, p.221–228, pl.1–2.

Gu Haifeng, Liu Tingting and Mertens, K.N.

2015: Cyst-theca relationship and phylogenetic positions of *Protoperidinium* (Peridinales, Dinophyceae) species of the sections *Conica* and *Tabulata*, with description of *Protoperidinium shanghaiense* sp. nov. *Phycologia*, v.54, no.1, p.49–66.

- Guédé, K.É., Slimani, H., Louwye, S., Asebriy, L., Toufiq, A., Ahmamou, M'F., El Amrani El Hassani, I-E. and Digbehi, Z.B.
2014: Organic-walled dinoflagellate cysts from the Upper Cretaceous-lower Paleocene succession in the western External Rif, Morocco: new species and new biostratigraphic results. *Geobios*, v.47, p.291–304.
- Guerstein, G.R., Fensome, R.A. and Williams, G.L.
1998: A new areoligeracean dinoflagellate from the Miocene of offshore eastern Canada and its evolutionary implications. *Palaeontology*, v.41, pt.1, p.23–34, pl.1.
- Guerstein, G.R., Williams, G.L. and Fensome, R.A.
2001: *Cannosphaeropsis quattrocchiaie*, a new species of dinoflagellate cyst from the mid Cenozoic of the Colorado Basin, Argentina. *Micropaleontology*, v.47, p.155–167, pl.1–2.
- Guerstein, G.R., Guler, M.V. and Casadio, S.
2004: Palynostratigraphy and palaeoenvironments across the Oligocene-Miocene boundary within the Centinela Formation, southwestern Argentina. In Beaudoin, A.B. and Head, M.J. (editors), *The palynology and micropaleontology of boundaries*; Geological Society, London, Special Publications, no.230, p.325–343.
- Guerstein, G.R., Junciel, G.L., Guler, M.V. and Daners, G.
2005: *Diconodinium lurensense* sp. nov., a late Maastrichtian to Danian dinoflagellate cyst from southwest Atlantic basins. *Ameghiniana*, v.42, no.2, p.329–338.
- Guerstein, G.R., Guler, M.V., Williams, G.L., Fensome, R.A. and Chiesa, J.O.
2008: Middle Palaeogene dinoflagellate cysts from Tierra del Fuego, Argentina: biostratigraphy and palaeoenvironments. *Journal of Micropaleontology*, v.27, p.75–94, pl.1–5.
- Guler, M.V., Guerstein, G.R. and Casadio, S.
2005: New dinoflagellate cyst species from the Calafate Formation (Maastrichtian), Austral Basin, Argentina. *Ameghiniana*, v.42, no.2, p.419–428.
- Habib, D.
1969: Middle Cretaceous palynomorphs in a deep-sea core from the seismic reflector Horizon A outcrop area. *Micropaleontology*, v.15, no.1, p.85–101, pl.1–4.
- 1970: Middle Cretaceous palynomorph assemblages from clays near the Horizon Beta deep-sea outcrop. *Micropaleontology*, v.16, no.3, p.345–379, pl.1–10.
- 1972: 10. Dinoflagellate stratigraphy Leg 11, Deep Sea Drilling Project. In: C.D. Hollister et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.11, p.367–425, pl.1–22.
- 1973: Taxonomy, morphology and suggested phylogeny of the dinoflagellate genus *Druggidium*. *Geoscience and Man*, v.7, p.47–55, pl.1–3.
- 1976: Neocomian dinoflagellate zonation in the western North Atlantic. *Micropaleontology*, v.21, no.4, p.373–392, pl.1–3. (Cover date 1975, issue date 1976)
- Habib, D. and Drugg, W.S.
1987: Palynology of Sites 603 and 605, Leg 93, Deep Sea Drilling Project. In: van Hinte, J.E. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.92, p.751–775, pl.1–9.
- Habib, D. and Knapp, S.D.
1982: Stratigraphic utility of Cretaceous small acritarchs. *Micropaleontology*, v.28, no.4, p.335–371, pl.1–11.
- Haeckel, E.
1894: *Systematische Phylogenie. Entwurf eines natürlichen Systems der Organismen auf Grund ihrer Stammesgeschichte, I. Systematische Phylogenie der Protisten und Pflanzen.* XV+400 p.; Reimer, Berlin, Germany.

Hannah, M.J., Wrenn, J.H. and Wilson, G.J.

1998: Early Miocene and Quaternary marine palynomorphs from Cape Roberts Project CRP-1, McMurdo Sound, Antarctica. *Terra Antarctica*, v.5, no.3, p.527–538.

Hansen, J.M.

1977: Dinoflagellate stratigraphy and echinoid distribution in Upper Maastrichtian and Danian deposits from Denmark. *Bulletin of the Geological Society of Denmark*, v.26, p.1–26.

Haq, B.U. and Lohmann, G.P.

1976: Early Cenozoic calcareous nannoplankton biogeography of the Atlantic Ocean. *Marine Micropaleontology*, v.1, no.2, p.119–194, pl.1–14.

Harding, I.C.

1986a: An early Cretaceous dinocyst assemblage from the Wealden of southern England. In: Batten, D.J. and Briggs, D.E.G. (editors), *Studies in Palaeobotany and Palynology in Honour of N.F. Hughes*, Special Papers in Palaeontology, no.35, p.95–109, pl.16–17.

1986b: Archaeopyle variability in Early Cretaceous dinocysts of the partiform gonyaulacoid genus *Druggidium* Habib. *Journal of Micropalaeontology*, v.5, pt.2, p.17–26, pl.1–3.

1990a: *Palaeoperidinium cretaceum*: a brackish-water peridiniinean dinoflagellate from the Early Cretaceous. *Palaeontology*, v.33, p.35–48, pl.1–3.

1990b: A dinocyst calibration of the European Boreal Barremian. *Palaeontographica, Abteilung B*, v.218, p.1–76, pl.1–31.

1996: Taxonomic stabilization of dinoflagellate cyst taxa, as exemplified by two morphologically complex Early Cretaceous species. *Review of Palaeobotany and Palynology*, v.92, p.351–366, pl.1–4.

1998: A minute new cladopyxiinean dinocyst from Barremian (Cretaceous) sediments and its bearing on the acritarch vs. dinoflagellate cyst question. *Review of Palaeobotany and Palynology*, v.100, p.89–98, pl.1–2.

Harding, I.C. and Hughes, N.F.

1990: Fossil ceratoids: a revision of *Endoceratium detmanniae* from the early Cenomanian Cambridge Greensand. *Review of Palaeobotany and Palynology*, v.65, p.311–318, pl.1.

Harding, I.C. and Lewis, J.

1994: Siliceous dinoflagellate thecal fossils from the Eocene of Barbados. *Palaeontology*, v.37, pt.4, p.825–840, pl.1–2.

Harker, S.D. and Sarjeant, W.A.S.

1975: The stratigraphic distribution of organic-walled dinoflagellate cysts in the Cretaceous and Tertiary. *Review of Palaeobotany and Palynology*, v.20, no.4, p.217–315, pl.1.

1991: Late Cretaceous (Campanian) organic-walled microplankton from the interior plains of Canada, Wyoming and Texas: validation of new taxa. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.12, p.707–710.

Harker, S.D., Sarjeant, W.A.S. and Caldwell, W.G.E.

1990: Late Cretaceous (Campanian) organic-walled microplankton from the interior plains of Canada, Wyoming and Texas: biostratigraphy, palaeontology and palaeoenvironmental interpretation. *Palaeontographica, Abteilung B*, v.219, 243 p., pl.1–13.

Harland, R.

1968: A microplankton assemblage from the post-Pleistocene of Wales. *Grana Palynologica*, v.8, p.536–554.

- 1973: Dinoflagellate cysts and acritarchs from the Bearpaw Formation (Upper Campanian) of southern Alberta, Canada. *Palaeontology*, v.16, p.665–706, pl.84–88.
- 1977a: Dinoflagellate cysts from the Bearpaw Formation (?Upper Campanian to Maastrichtian) of Montana. *Palaeontology*, v.20, p.179–193, pl.25.
- 1977b: Recent and Late Quaternary (Flandrian and Devensian) dinoflagellate cysts from marine continental shelf sediments around the British Isles. *Palaeontographica, Abteilung B*, v.164, p.87–126, pl.1–4.
- 1979a: *Agerasphaera* nov. gen., an '*Eisenackia*'-like dinoflagellate cyst from the Thanet Sands (Paleocene) of southeast England. *Review of Palaeobotany and Palynology*, v.28, p.27–35, pl.1–2.
- 1979b: Dinoflagellate biostratigraphy of Neogene and Quaternary sediments at holes 400/400A in the Bay of Biscay (Deep Sea Drilling Project Leg 48). In: Montadert, L. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.48, p.531–545, pl.1–3.
- 1979c: The *Wetziella (Apectodinium) homomorphum* plexus from the Palaeogene/earliest Eocene of north-west Europe. In: *Fourth International Palynology Conference, Lucknow, 1976–1977, Proceedings*, v.2, p.59–70, pl.1–2.
- 1981: Cysts of the colonial dinoflagellate *Polykrikos schwartzii* Bütschli 1873, (Gymnodiniales), from Recent sediments, Firth of Forth, Scotland. *Palynology*, v.5, p.65–79, pl.1–4.
- 1982: A review of Recent and Quaternary organic-walled dinoflagellate cysts of the genus *Protoperidinium*. *Palaeontology*, v.25, no.2, p.369–397, pl.38–42.
- 1983: Distribution maps of Recent dinoflagellate cysts in bottom sediments from the North Atlantic Ocean and adjacent seas. *Palaeontology*, v.26, p.321–387, pl.43–48.
- Harland, R. and Downie, C.
1969: The dinoflagellates of the interglacial deposits at Kirmington, Lincolnshire. *Proceedings of the Yorkshire Geological Society*, v.37, no.2, p.231–237.
- Harland, R. and Hill, J.
1979: A reappraisal of the Cainozoic dinoflagellate cyst "*Hystriosphæridium*" *choanophorum* Deflandre et Cookson 1955. *Review of Palaeobotany and Palynology*, v.28, p.37–45, pl.1–2.
- Harland, R. and Pudsey, C.J.
2002: Protoperidiniacean dinoflagellate cyst taxa from the Upper Miocene of ODP Leg 178, Antarctic Peninsula. *Review of Palaeobotany and Palynology*, v.120, p.263–284, pl.1–6.
- Harland, R. and Sarjeant, W.A.S.
1970: Fossil freshwater microplankton (dinoflagellates and acritarchs) from Flandrian (Holocene) sediments of Victoria and Western Australia. *Proceedings of the Royal Society of Victoria*, v.83, p.211–234, pl.21–22.
- Harland, R. and Sharp, J.
1980: *Phthanoperidinium obscurum* sp. nov. and a non-marine dinoflagellate cyst from the late Eocene of England. *Review of Palaeobotany and Palynology*, v.30, p.287–296, pl.1–2.
- Harland, R., Morbey, S.J. and Sarjeant, W.A.S.
1975: A revision of the Triassic to lowest Jurassic dinoflagellate *Rhaetogonyaulax*. *Palaeontology*, v.18, p.847–864, pl.100–104.
- Harland, R., Reid, P.C., Dobell, P. and Norris, G.
1980: Recent and sub-Recent dinoflagellate cysts from the Beaufort Sea, Canadian Arctic. *Grana*, v.19, p.211–225.
- Harland, R., Bonny, A.P., Hughes, M.J. and Morigi, A.N.

1991: The Lower Pleistocene stratigraphy of the Ormesby Borehole, Norfolk, England. *Geological Magazine*, v.128, no.6, p.647–660.

Harris, W.K.

1965: Basal Tertiary microfloras from the Princetown Area, Victoria, Australia. *Palaeontographica*, Abteilung B, v.115, p.75–106, pl.24–29.

1974: Tertiary nonmarine dinoflagellate cyst assemblages from Australia. *Geological Society of Australia, Special Publication*, no.4, p.159–166, pl.1–2.

Harris, W.K and Fensome, R.A.

2000: (1447) Proposal to conserve the name *Diphyes* Cookson (Dinophyceae) against *Diphyes* Blume (Orchidaceae). *Taxon*, v.49, p.281–282.

Haskell, T.R.

1970: Dinoflagellate species *Dingodinium cerviculum*, *Odontochitina operculata* and *Muderongia tetracantha* in Lower Cretaceous strata of the Great Artesian Basin, Australia. *Proceedings of the Royal Society of Queensland*, v.81, no.5, p.57–68, pl.1.

Hasskarl

1842: *Flora*, v.25, no.2. (Cited, but complete reference not given, in Farr et al., 1979, p. 1455.)

He Chengquan

1980: Some new genera of Oligocene dinoflagellates and acritarchs from the coastal region of Beibu Wan, China. In: Paper for the 5th International Palynological Conference, p.1–11, pl.1; Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, China.

1984a: Some new genera of Late Cretaceous to Eocene microphytoplankton from western Tarim Basin in southern Xinjiang. *Acta Palaeontologica Sinica*, v.23, no.6, p.768–774, pl.1. (In Chinese and English.)

1984b: Tertiary dinoflagellates and acritarchs from the coastal region of the Beibu Gulf. *Memoirs of the Nanjing Institute of Geology and Palaeontology*, no.19, p.143–192, pl.1–12. (In Chinese with English abstract.)

1991: Late Cretaceous-Early Tertiary microphytoplankton from the western Tarim Basin in southern Xinjiang, China. *Nanjing Institute of Geology and Palaeontology, Academia Sinica*, p.1–235, pl.1–65. (In Chinese with English summary.)

He Chengquan and Huang Guanjun

1997: Dinoflagellates from late Middle Jurassic Suibin Formation of Suibin area, eastern Heilongjiang, NE China. *Acta Micropalaeontologica Sinica*, v.14, no.1, p.21–40, pl.1–3.

He Chengquan and Li Peng

1981: Late Late Oligocene dinoflagellates and acritarchs from the North Continental Shelf of the South China Sea. In: *Tertiary Palaeontology of the North Continental Shelf of the South China Sea*, p.59–72, pl.31–35; Guangdong Science and Technology Press, Guangzhou, China. (In Chinese.)

He Chengquan and Qian Zeshu

1979: Early Tertiary dinoflagellates and acritarchs from the Bose Basin of Guangxi. *Acta Palaeontologica Sinica*, v.18, no.2, p.171–188, pl.1–2. (In Chinese with English abstract.)

He Chengquan and Sun Xuekun

1991: 7. Dinoflagellate cysts from Quaternary sediments of Nansha, the South China Sea. In: *The Multidisciplinary Oceanographic Expedition Team of Academia Sinica to the Nansha Islands (editors), Quaternary Biological Groups of the Nansha Islands and the Neighbouring Waters*, p.266–302, 520–525, pl.1–6; Science Press, Beijing, China.

1996: *Tianjinella*, a new dinoflagellate genus from the Eocene of southern Tianjin, China. *Review of Palaeobotany and Palynology*, v.92, p.383–388, pl.1–2.

2000: Late Hauterivian dinoflagellates from the lower part of the Chengzihe Formation in Jixi Basin, eastern Heilongjiang, NE China. *Acta Palaeontologica Sinica*, v.39, no.1, p.46–62, pl.1–3.

He Chengquan and Wang Kede

1990: Eocene dinoflagellates from the southwestern continental shelf basin of the East China Sea. *Acta Micropalaeontologica Sinica*, v.7, no.4, p.403–426, pl.1–4. (In Chinese with English summary.)

He Chengquan and Zhu Youhua

2003: Dinoflagellate assemblage from the uppermost part of the Dongrong Formation with a discussion on Jurassic-Cretaceous boundary in Suibin area, northeastern Heilongjiang Province, NE China. *Acta Palaeontologica Sinica*, v.42, no.3, p.328–345, pl.1–3. (In Chinese with English summary.)

He Chengquan, Zhu Shenzhao and Jin Guangxing

1989: Early Tertiary microphytoplankton from the Dongpu Region. *Series on Stratigraphy and Palaeontology of Oil and Gas Bearing Areas in China*, 99 p., 31 pl.; Research Institute of Exploration and Development, Zhongyuan Petroleum Exploration Bureau, Nanjing Institute of Geology and Palaeontology, Academia Sinica — The Petroleum Industry Press — Nanjing, China. (In Chinese with English summary.)

He Chengquan, Gao Ruiqi and Qiao Xiuyun

1992: New Albian microphytoplankton from the Songliao Basin, northeast China. *Acta Micropalaeontologica Sinica*, v.9, no.2, p.183–196, pl.1–2.

He Chengquan, Wan Chuanbiao and Yang Mingjie

1999: Hauterivian-Barremian dinoflagellates from the Longzhaogou Group of the H87-3 well in Hulin Basin, eastern Heilongjiang, NE China. *Acta Palaeontologica Sinica*, v.38, no.2, p.183–202, pl.1–4. (In Chinese with English summary.)

He Chengquan, Cheng Jinhui and Zhu Youhua

2005a: Section 4. Middle to Late Jurassic marine dinoflagellates from Haixi. In: Sha Jingeng, Wang Qifer, and Liu Huinan; *Micropalaeontology of Qiangtang Basin*; Science Press, Beijing, p.42–74, 245–250, pl.16–22. (In Chinese with English summary.)

He Chengquan, Zhu Youhua and Mai Wen

2005b: Neogene dinoflagellates from the southwestern Qiong Dongnan Basin in the north continental shelf of the South China Sea. *Acta Palaeontologica Sinica*, v.44, no.3, p.376–395. (In Chinese with English summary.)

He Chengquan, Song Zhichen and Zhu Youhua

2009: *Fossil dinoflagellates of China*. Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 2100089, 737p + 200 pl.

Head, M.J.

1992: Zygosporangia of the Zygnemataceae (Division Chlorophyta) and other freshwater algal spores from the uppermost Pliocene St. Erth Beds of Cornwall, southwestern England. *Micropaleontology*, v.38, no.3, p.237–260, pl.1–4.

1993: Dinoflagellates, sporomorphs and other palynomorphs from the Upper Pliocene St. Erth Beds of Cornwall, southwestern England. *Journal of Paleontology, Memoir*, no. 31, p.1–62.

1994a: Morphology and paleoenvironmental significance of the Cenozoic dinoflagellate genera *Tectatodinium* and *Habibacysta*. *Micropaleontology*, v.40, no.4, p.289–321, pl.1–11.

- 1994b: A forum on Neogene and Quaternary dinoflagellate cysts. The edited transcript of a round table discussion held at the Third Workshop on Neogene and Quaternary dinoflagellates, with taxonomic appendix. *Palynology*, v.17, p.201–239, pl.1–11. (Cover date 1993, issue date 1994 — 28th January.)
- 1996a: Late Cenozoic dinoflagellates from the Royal Society borehole at Ludham, Norfolk, eastern England. *Journal of Paleontology*, v.70, no.4, p.543–570.
- 1996b: Chapter 30. Modern dinoflagellate cysts and their biological affinities. In: Jansonius, J. and McGregor, D.C. (editors), *Palynology: Principles and Applications*, v.3, p.1197–1248; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.
- 1997: Thermophilic dinoflagellate assemblages from the mid Pliocene of eastern England. *Journal of Paleontology*, v.71, no.2, p.165–193.
- 1998a: Marine environmental change in the Pliocene and early Pleistocene of eastern England: the dinoflagellate evidence reviewed. *Mededelingen Nederlands Instituut voor Toegepaste Geowetenschappen TNO*, no.60, p.199–226, pl.1–4.
- 1998b: New goniodomean dinoflagellates with a compound hypotractal archeopyle from the late Cenozoic: *Capisocysta* Warny and Wrenn, emend. *Journal of Paleontology*, v.72, no.5, p.795–807.
- 2000: *Geonettia waltonensis*, a new goniodomean dinoflagellate from the Pliocene of the North Atlantic region, and its evolutionary implications. *Journal of Paleontology*, v.74, no.5, p.812–827.
- 2003a: *Echinidinium zonneveldiae* sp. nov., a dinoflagellate cyst from the late Pleistocene of the Baltic Sea, northern Europe. *Journal of Micropalaeontology*, v.21, pt.2, p.169–173. (Cover date 2002, issue date March 2003.)
- 2003b: Neogene occurrences of the marine acritarch genus *Nannobarbophora* Habib and Knapp, 1982 emend., and the new species *N. gedlii*. *Journal of Paleontology*, v.77, no.2, p.382–385.
- 2007: Last Interglacial (Eemian) hydrographic conditions in the southwestern Baltic Sea based on dinoflagellate cysts from Ristinge Klint, Denmark. *Geological Magazine*, v.144, no.6, p.987–1013.
- Head, M.J. and Nøhr-Hansen, H.
1999: The extant thermophilic dinoflagellate *Tectatodinium pellitum* (al. *Tectatodinium rugulatum*) from the Danian of Denmark. *Journal of Paleontology*, v.73, no.4, p.577–579.
- Head, M.J. and Norris, G.
1989: 28. Palynology and dinocyst stratigraphy of the Eocene and Oligocene in ODP Leg 105, Hole 647A, Labrador Sea. *Ocean Drilling Program, Proceedings, Scientific Results, Leg 105, College Station, Texas*, p.515–550, pl.1–13.
- 2003: New species of dinoflagellate cysts and other palynomorphs from the latest Miocene and Pliocene of DSDP Hole 603C, western North Atlantic. *Journal of Paleontology*, v.77, no.1, p.1–15.
- Head, M.J. and Westphal, H.
1999: Palynology and paleoenvironments of a Pliocene carbonate platform: the Clino core, Bhamas. *Journal of Paleontology*, v.73, no.1, p.1–25.
- Head, M.J. and Wrenn, J.H.
1992: A forum on Neogene and Quaternary dinoflagellate cysts. In Head, M.J. and Wrenn, J.H. (editors), *Neogene and Quaternary Dinoflagellate Cysts and Acritarchs*, p.1–31; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.
- Head, M.J., Norris, G. and Mudie, P.J.

1989a: 25. Palynology and dinocyst stratigraphy of the Upper Miocene and lowermost Pliocene, ODP Leg 105, Site 646, Labrador Sea. In: Srivastava, S.P. et al., Ocean Drilling Program, Proceedings, Scientific Results, Leg 105, College Station, Texas, p.423–451, pl.1–7.

1989b: 26. New species of dinocysts and a new species of acritarch from the upper Miocene and lowermost Pliocene, ODP Leg 105, Site 646, Labrador Sea. In: Srivastava, S.P. et al., Ocean Drilling Program, Proceedings, Scientific Results, Leg 105, p.453–466, pl.1–5.

1989c: 27. Palynology and dinocyst stratigraphy of the Miocene in ODP Leg 105, Hole 645E, Baffin Bay. In: Srivastava, S.P. et al., Ocean Drilling Program, Proceedings, Scientific Results, Leg 105, College Station, Texas, p.467–514, pl.1–12.

1992: Nomenclatural note on the Neogene marine acritarch *Cyclopsiella granosa* (Matsuoka 1983) Head et al. comb. nov. In: Head, M.J. and Wrenn, J.H. (editors), Neogene and Quaternary Dinoflagellate Cysts and Acritarchs, p.163–164; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

Head, M.J., Harland, R. and Matthiessen, J.

2001: Cold marine indicators of the late Quaternary: the new dinoflagellate cyst genus *Islandinium* and related morphotypes. *Journal of Quaternary Science*, v.16, no.7, p.621–636, pl.1–3.

Head, M.J., Borel, C.M., Guerstein, G.R. and Harland, R.

2003: The problematic aquatic palynomorph genus *Cobricosphaeridium* Harland and Sarjeant, 1970 emend., with new records from the Holocene of Argentina. *Journal of Paleontology*, v.77, no.6, p.1159–1181.

Head, M.J., Riding, J.B., Eidvin, T., Chadwick, R.A.

2004: Palynological and foraminiferal biostratigraphy of (Upper Pliocene) Nordland Group mudstones at Sleipner, northern North Sea. *Marine and Petroleum Geology*, v.21, p.277–297.

Head, M.J., Lewis, J. and de Vernal, A.

2006: The cyst of the calcareous dinoflagellate *Scrippsiella trifida*: resolving the fossil record of its organic wall with that of *Alexandrium tamarense*. *Journal of Paleontology*, v.80, no.1, p.1–18.

Head, M.J., Fensome, R.A., Herendeen, P.S. and Skog, J.E.

2016: (315-319) Proposals to amend Article 11.8 and its Examples to remove ambiguity in the sanctioning of dual nomenclature for dinoflagellates, and an emendation of Article 11.7, Example 29. *Taxon*, v.65, no.4, p.902–903.

Hedlund, R.W. and Norris, G.

1986: Dinoflagellates cyst assemblage from Middle Albian strata of Marshall County, Oklahoma, U.S.A. *Review of Palaeobotany and Palynology*, v.46, p.293–309, pl.1–3.

Heer, O.

1865: *Die Urwelt der Schweiz*. 622 p., 11 pl.; Friedrich Schulthess, Zürich, Switzerland. (First edition.)

Heilmann-Clausen, C.

1982: The Paleocene-Eocene boundary in Denmark. *Newsletters in Stratigraphy*, v.11, no.2, p.55–63.

1985: Dinoflagellate stratigraphy of the uppermost Danian to Ypresian in the Viborg I borehole, central Jylland, Denmark. *Danmarks Geologiske Undersøgelse, Serie A*, no.7, p.1–69, pl.1–15.

Heilmann-Clausen, C. and Costa, L.I.

1989: Dinoflagellate zonation of the uppermost Paleocene? to Lower Miocene in the Wursterheide Research Well, NW Germany. *Geologisches Jahrbuch*, v.111, p.431–521, pl.1–21.

Heilmann-Clausen, C. and Thomsen, E.

1995: Barremian-Aptian dinoflagellates and calcareous nannofossils in the Ahlum 1 Borehole and the Otto Gott Clay pit, Sarstedt, Lower Saxony Basin, Germany. *Geologisches Jahrbuch, Reihe A*, v.141, p.257–365, pl.1–20.

- Heilmann-Clausen, C. and Van Simaeys, S.
2005: Dinoflagellate cysts from the Middle Eocene to ?lowermost Oligocene succession in the Kysing Research Borehole, central Danish Basin. *Palynology*, v.29, p.143–204, pl.1–15.
- Heisecke, A.M.
1970: Microplankton de la Formación Roca de la Provincia de Neuquén. *Ameghiniana*, v.7, no.3, p.225–263, pl.1–12.
- Helby, R.
1987: *Muderongia* and related dinoflagellates of the latest Jurassic to Early Cretaceous of Australasia. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.297–336.
- Helby, R. and Partridge, A.D.
2001: *Bonbonadinium granulatum* gen. et sp. nov., a Late Jurassic (Tithonian) dinoflagellate cyst from the North-West Shelf, Australia. In Laurie, J.R and Foster, C.B. (editors), *Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists*, no.24, p.221–224.
- Helby, R. and Stover, L.E.
1987a: *Ternia balmei* gen. et sp. nov., a Jurassic dinoflagellate with possible dinophysalian affinity. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.135–141.
- 1987b: Paratabulation of the Early Cretaceous dinoflagellate *Dollidinium sinuosum* (Cookson and Eisenack) comb. nov. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.159–164.
- Helby, R. and Wilson, G.J.
1988: A new species of *Sverdrupiella* Bujak and Fisher (Dinophyceae) from the Late Triassic of New Zealand. *New Zealand Journal of Botany*, v.26, p.117–122.
- Helby, R., Morgan, R. and Partridge, A.D.
1987: A palynological zonation of the Australian Mesozoic. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.1–94.
- Helenes, J.
1983: Evaluation of Jurassic-Cretaceous dinoflagellates in the *Ascodinium-Ovoidinium* complex. *Micropaleontology*, v.29, no.3, p.255–266, pl.1.
- 1984: Morphological analysis of Mesozoic-Cenozoic *Cribroperidinium* (Dinophyceae), and taxonomic implications. *Palynology*, v.8, p.107–137, pl.1–5.
- 2000: *Exochosphaeridium alisitose* n. sp., a new gonyaulacoid dinoflagellate from the Albian of Baja California, Mexico. *Micropaleontology*, v.46, no.2, p.135–142, pl.1–2.
- Helenes, J. and Lucas-Clark, J.
1997: Morphological variations among species of the fossil dinoflagellate genus *Gonyaulacysta*. *Palynology*, v.21, p.173–196, pl.1–3.
- Henry, J.L.
1969: Microorganismes incertae sedis (acritarches et chitinozoaires) de l'Ordovicien de la presqu'île de Crozon (Finistère): gisements de Mort-Anglaise et de Kerglentin. *Bulletin de la Société géologique et minéralogique de Bretagne, Nouvelle série*, p.59–100, pl.1–13.
- Herngreen, G.F.W.

- 1975: Palynology of Middle and Upper Cretaceous strata in Brazil. Mededelingen Rijks Geologische Dienst, Nieuwe Serie, v.26, p.39–91, pl.1–5.
- Herngreen, G.F.W., De Boer, K.F., Romein, B.J., Lissenberg, T. and Wijker, N.C.
1984: Middle Callovian beds in the Achterhoek, eastern Netherlands. Mededelingen Rijks Geologische Dienst, v.37, p.1–29, pl.1–6.
- Herngreen, G.F.W., Felder, W.M., Kedves, M. and Meessen, J.P.M.T.
1986: Micropaleontology of the Maastrichtian in borehole Bunde, The Netherlands. Review of Palaeobotany and Palynology, v.48, p.1–70, pl.1–13.
- Herngreen, G.F.W., Hartkopf-Fröder, C. and Ruegg, G.H.J.
1994: Age and depositional environment of the Kuhfeld Beds (Lower Cretaceous) in the Alstätte Embayment (w. Germany, e. Netherlands). Geologie en Mijnbouw, v.72, p.375–391.
- Herngreen, G.F.W., Kerstholt, S.J. and Munsterman, D.K.
2000: Callovian-Ryazanian ('Upper Jurassic') palynostratigraphy of the Central North Sea Graben and Vlieland Basin, The Netherlands. Mededelingen Nederlands Instituut voor Toegepaste Geowetenschappen TNO, no.63, 99p., 18pl.
- Hildebrand-Habel, T. and Streng, M.
2003: Calcareous dinoflagellate associations and Maastrichtian-Tertiary climatic change in a high-latitude core (ODP Hole 689B, Maud Rise, Weddell Sea). Palaeogeography, Palaeoclimatology, Palaeoecology, v.197, p.293–321, pl.1–3.
- Hildebrand-Habel, T. and Willems, H.
1997: Calcareous dinoflagellate cysts from the Middle Coniacian to Upper Santonian chalk facies of Lägerdorf (n Germany). Cour. Forsch.-Inst. Senckenberg, v.201, p.177–199, pl.1–3.
- 1999: New calcareous dinoflagellates from the Palaeogene of the South Atlantic Ocean (DSDP Site 357, Rio Grande Rise). Journal of Micropalaeontology, v.18, pt.1, p.89–95.
- 2003: New calcareous dinoflagellates from the Palaeogene of the South Atlantic Ocean (DSDP Site 357, Rio Grande Rise). Journal of Micropalaeontology, v.18, pt.1, p.89–95.
- 2004: New calcareous dinoflagellates (Calciodinelloideae) from the Middle Coniacian to Upper Santonian chalks of Lägerdorf (northern Germany). Journal of Micropalaeontology, v.23, p.181–190, pl.1–2.
- Hildebrand-Habel, T., Willems, H. and Versteegh, G.J.M.
1999: Variations in calcareous dinoflagellate associations from the Maastrichtian to Middle Eocene of the western South Atlantic Ocean (São Paulo Plateau, DSDP Leg 39, Site 356). Review of Palaeobotany and Palynology, v.106, p.57–87, pl.1–6.
- Hill, P.J.
1974: Stratigraphic palynology of acritarchs from the type area of the Llandovery and the Welsh Borderland. Review of Palaeobotany and Palynology, v.18, no.1–2, p.11–23, pl.1.
- Hoffstetter, R.
1967: Coup d'oeil sur les Sauriens (lacertiens) des couches de Purbeck (Jurassique supérieur d'Angleterre résumé d'un mémoire). Colloques internationaux du Centre national de la recherche scientifique, v.163, p.349–371.
- Hogg, N.M. and Bailey, D.A.
1997: *Prolixosphaeridiopsis spissus* gen. et comb. nov. for the dinoflagellate cyst *Cleistosphaeridium spissum* McIntyre and Brideaux 1980. Journal of Micropalaeontology, v.16, no.1, p.50.
- Hooker, J.D.

1872: The flora of British India. Part I Ranunculaceae to Polygaleae. L. Reeve & Co., 5, Henrietta Street, Covent Garden, London., 740 p.

Horowitz, A.

1970: Jurassic microflora from the northern Negev, Israel. *Israel Journal of Earth Sciences*, v.19, p.153–182, pl.1–5.

1975: Kystes de dinoflagellés du Trias du sud d'Israël. *Revue de micropaléontologie*, v.18, p.23–27, pl.1.

Houben, A.J.P., Bijl, P.K., Guerstein, G.R., Sluijs, A., Brinkhuis, H.

2011: *Malvinia escutiana*, a new biostratigraphically important Oligocene dinoflagellate cyst from the Southern Ocean. *Review of Palaeobotany and Palynology*, v.165, p.175–182, pl.1–2.

Hovasse, R.

1932a: Note préliminaire sur les ébriacées. *Bulletin de la Société zoologique de France*, v.57, no.2, p.118–131.

1932b: Troisième note sur les ébriacées. *Bulletin de la Société zoologique de France*, v.57, p.457–476.

1943: Nouvelles recherches sur les flagellés à squelette siliceux: ébriidés et silicoflagellés fossiles de la diatomite de Saint-Laurent-la-Vernède (Gard). *Bulletin biologique de la France et de la Belgique*, v.77, p.271–294.

Hu Yunxu

1986: Micropalaeoflora from the Early Ordovician in Gaoqiao Region of Shaanxi and its stratigraphic significance. *Xian Institute of Geology and Mineral Resources, Chinese Academy of Geological Sciences, Bulletin*, no.14, p.199–239, pl.1–20. (In Chinese with English summary.)

Huang Tsengchieng

1981: Miocene palynomorphs of Taiwan (VI) — miscellaneous spores and pollen grains. *Taiwania*, v.26, p.45–57, pl.1–3.

Hultberg, S.U.

1985a: *Pithonella organica* — a new calcareous dinoflagellate with an inner organic wall. In: Hultberg, S.U., *Dinoflagellate Studies of the Upper Maastrichtian and Danian in Southern Scandinavia*, p.24–32; Department of Geology, University of Stockholm, Stockholm, Sweden. (Published thesis.)

1985b: Danian dinoflagellate zonation, the C-T boundary, and the stratigraphical position of the Fish Clay in southern Scandinavia. In: Hultberg, S.U., *Dinoflagellate Studies of the Upper Maastrichtian and Danian in Southern Scandinavia*, p.56–82; Department of Geology, University of Stockholm, Stockholm, Sweden. (Published thesis.)

1985c: Systematic paleontology. In: Hultberg, S.U., *Dinoflagellate Studies of the Upper Maastrichtian and Danian in Southern Scandinavia*, p.104–189; Department of Geology, University of Stockholm, Stockholm, Sweden. (Published thesis.)

1985d: *Pithonella organica* — a new calcareous dinoflagellate with an inner organic wall. *Grana*, v.24, no.2, p.115–120.

Hultberg, S.U. and Malmgren, B.A.

1985: Quantitative biostratigraphy based on Upper Maastrichtian dinoflagellates and planktonic foraminifera from southern Scandinavia. In: Hultberg, S.U., *Dinoflagellate Studies of the Upper Maastrichtian and Danian in Southern Scandinavia*, p.33–55; Department of Geology, University of Stockholm, Stockholm, Sweden. (Published thesis.)

Hunt, C.O., Andrews, M.V. and Gilbertson, D.D.

1985: Late Quaternary freshwater dinoflagellate cysts from the British Isles. *Journal of Micropalaeontology*, v.4, no.2, p.101–109, pl.1–2.

Iakovleva, K.I.

- 2016: Did the PETM trigger the first radiation of wetzelielloideans? Evidence from France and northern Kazakhstan. *Palynology*, in press. (Published online in 2016.)
- Iakovleva, A.I. and Heilmann-Clausen, C.
2007: *Wilsonidium pechorium* new species — a new dinoflagellate species with unusual asymmetry from the Paleocene/Eocene transition. *Journal of Paleontology*, v.81, no.5, p.1023–1033.
- 2010: Eocene dinoflagellate cyst biostratigraphy of research borehole 011–B, Omsk Region, southwestern Siberia. *Palynology*, v.34, p.195–232, pl.1–14.
- Iakovleva, A.I. and Kulkova, I.A.
2001: Paleocene-Eocene dinoflagellate cysts and continental palynomorphs of the Pur Downstream Basin (northwestern Siberia): biostratigraphical and paleoenvironmental implications. *Revista Española de Micropaleontología*, v.33, p.1–33.
- 2002: Paleocene-Eocene dinoflagellate cysts and continental palynomorphs of the Pur Downstream Basin (northwestern Siberia): biostratigraphical and palaeoenvironmental implications. *Revista Española de Micropaleontología*, v.33, pt.1, p.1–31.
- Ichikawa, W., Fuji, N. and Bachmann, A.
1964: Fossil diatoms, pollen grains and spores, silicoflagellates and arachaeomonads in the Miocene Hojuji diatomaceous mudstone, Noto Peninsula, Central Japan. *Kanazawa Daigaku, Rigakubu (Science Reports of Kanazawa University)*, v.9, no.1, p.25–118, pl.1–13 and 1–7.
- Ilyina, V.I., Kulkova, I.A. and Lebedeva, N.K.
1994: Microphytofossils and detail stratigraphy of marine Mesozoic and Cenozoic of Siberia. *Mikrofitofossilii i detalnaya stratigrafiya morskogo i kainozoya Sibiri*. Russian Academy of Sciences, Siberian Branch, United Institute of Geology, Geophysics and Mineralogy, Transactions, Issue no.818, p.1–192, pl.1–56. (In Russian with English abstract.)
- Ioannides, N.S.
1986: Dinoflagellate cysts from Upper Cretaceous-Lower Tertiary sections, Bylot and Devon Islands, Arctic Archipelago. *Geological Survey of Canada, Bulletin*, no.371, p.1–99, pl.1–25.
- Ioannides, N.S., Stavrinou, G.N. and Downie, C.
1977: Kimmeridgian microplankton from Clavell's Hard, Dorset, England. *Micropaleontology*, v.22, no.4, p.443–478, pl.1–5. (Cover date 1976, issue date 1977, according to Ioannides, 1986, p.46.)
- Ionescu, A.
2003: New dinoflagellate cyst species from the Eocene of Moesian Platform, Romania. *Acta Palaeontologica Sinica*, v.42, no.1, p.39–44.
- Iosifova, E.K.
1992: Novye taxony dinotzyst iz Neokoma Moscovskoy Sineklizy. *Paleontologicheskii Zhurnal*, no.4, p.58–64, pl.9–10.
- 1996: Dinocysts from Tchernaya Retchka (Ryazanian-Aptian, Lower Cretaceous) of the Moscow Basin, Russia. *Review of Palaeobotany and Palynology*, v.19, p.187–240, pl.1–19.
- Isagulova, E.Z.
1963: Gistrikhosfery v yurskikh otlozheniyakh L'vovsko-Volynskogo kamennougolnogo basseyna. *Akademiya Nauk SSSR (Doklady Earth Science Sections)*, v.148, no.5, p.1156–1158.
- Islam, M.A.
1982: Archeopyle structure in the fossil dinoflagellate *Phthanoperidinium*. *Review of Palaeobotany and Palynology*, v.36, p.305–316, pl.1–2.

1983a: Dinoflagellate cysts from the Eocene cliff sections of the Isle of Sheppey, southeast England. *Revue de Micropaléontologie*, v.25, p.231–250, pl.1–4.

1983b: Dinoflagellate cyst taxonomy and biostratigraphy of the Eocene Bracklesham Group in southern England. *Micropaleontology*, v.29, p.328–353, pl.1–4.

1983c: Dinoflagellate cysts from the Eocene of the London and the Hampshire basins, southern England. *Palynology*, v.7, p.71–92, pl.1–4.

1993: Review of the fossil dinoflagellate *Cleistosphaeridium*. *Revista española de micropaleontología*, v.25, no.2, p.81–94, pl.1.

Jacobson, S.R.

1978: Acritarchs from the Upper Ordovician Clays Ferry Formation, Kentucky, U.S.A. *Palinología*, Número extraordinario 1, p.293–301, pl.1.

Jacobson, S.R. and Achab, A.

1985: Acritarch biostratigraphy of the *Dicellograptus complanatus* graptolite Zone from the Vaureal Formation (Ashgillian), Anticosti Island, Quebec, Canada. *Palynology*, v.9, p.165–198, pl.1–9.

Jafar, S.A.

1983: Significance of Late Triassic calcareous nannoplankton from Austria and southern Germany. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.166, p.218–259.

Jagielska, L.

1962a: Wstępne opracowanie mikrospor z Ordowiku Brzeziny i Zbrzy w górach świętokrzyskich. *Instytut Geologiczny Biuletyn*, no.174, p.51–62, pl.1–8.

1962b: Mikrospory starszego paleozoiku z otworu Uszkowce 1. *Kwartalnik Geologiczny*, v.6, no.3, p.330–344, 4 pl.

Jain, K.P.

1977a: Morphologic re-interpretation of some *Dinogymnium* species with remarks on palaeogeographic and stratigraphic distribution of the genus. *The Palaeobotanist*, v.24, no.2, p.132–139.

1977b: Additional dinoflagellates and acritarchs from Grey Shale Member of Dalmiapuram Formation, south India. *The Palaeobotanist*, v.24, p.170–194, pl.1–6.

1978: An Upper Cretaceous dinoflagellate assemblage from Vriddhachalam area, Cauvery Basin, south India. *The Palaeobotanist*, v.25, p.146–160, pl.1–3.

1980: Reallocation of some dinoflagellate cysts from the Kutch, western India. *Palaeontological Society of India, Journal*, v.23-24, p.140–143, pl.1.

1982: Cenozoic dinoflagellate cysts and acritarchs from sedimentary formations of India, a critical review. *Palaeontological Society of India, Special Publication*, no.1, p.50–56.

Jain, K.P. and Garg, R.

1982: Revision of some dinoflagellate cysts from Meghalaya, India. *Journal of the Palaeontological Society of India*, v.27, p.68–70.

1983: *Cleistosphaeridium mikiril* Mehrotra, a junior synonym of *Lingulodinium machaerophorum* (Deflandre and Cookson) Wall, 1967. *Journal of the Palaeontological Society of India*, v.28, p.61–62.

1986a: Upper Paleocene dinoflagellate cysts and acritarchs from Vriddhachalam, Cauvery Basin, southern India. *Palaeontographica*, Abteilung B, v.198, p.101–132, pl.1–6.

1986b: Revision and reassessment of a dinoflagellate cyst assemblage from Sangchamalla Formation (Upper Flysch), Malla Johar area, Kumaon Himalaya, India. *The Palaeobotanist*, v.35, p.61–68.

1990: *Membranilarnacia donaensis* Saxena and Rao 1984, a junior synonym of *Tuberculodinium vancampoae* (Rossignol 1962) Wall 1967. *Geophytology*, v.19, no.1, p.108, pl.1.

1991: "The fossil floras of Kachchh. IV — Tertiary palynostratigraphy" by Ranajit K. Kar (1985): a critique on dinoflagellate cysts. *The Palaeobotanist*, v.39, no.1, p.57–85, pl.1–4.

Jain, K.P. and Khowaja-Ateequzzaman

1984: Re-appraisal of the genus *Muderongia* Cookson and Eisenack, 1958. *Journal of the Palaeontological Society of India*, v.29, p.34–42, pl.1–3.

Jain, K.P. and Millepied, P.

1973: Cretaceous microplankton from Senegal Basin, NW Africa. 1. Some new genera, species and combinations of dinoflagellates. *The Palaeobotanist*, v.20, p.22–32, pl.1–3.

1975: Cretaceous microplankton from Senegal Basin, W. Africa, pt. II. Systematics and biostratigraphy. *Geophytology*, v.5, no.2, p.126–171, pl.1–6.

1977: Two new names: *Fromea senegalensis* and *Pterospermopsis kieseri*. *Geophytology*, v.7, p.284.

Jain, K.P. and Tandon, K.K.

1981: Dinoflagellate and acritarch biostratigraphy of the Middle Eocene rocks of a part of south-western Kachchh, India. *Journal of the Palaeontological Society of India*, v.26, p.6–21, pl.1–4.

Jain, K.P. and Taugourdeau-Lantz, J.

1973: Palynology of Dalmiapuram grey shale, Dalmiapuram Formation, District Trichinopoly, south India — 1. Taxonomy. *Geophytology*, v.3, p.52–68, pl.1–4.

Jain, K.P., Sah, S.C.D. and Singh, R.Y.

1975: Fossil dinoflagellates across Maestrichtian-Danian boundary in Lower Assam, India. *The Palaeobotanist*, v.22, p.1–18, pl.1–7.

Jain, K.P., Kumar, P. and Maheshwari, H.K.

1982: Dinoflagellate cysts from "non-marine" sediments of Jabalpur Group at Morghat, Madhya Pradesh. *The Palaeobotanist*, v.30, no.1, p.22–27, pl.1.

Jain, K.P., Garg, R., Kumar, S. and Singh, I.B.

1984: Upper Jurassic dinoflagellate biostratigraphy of Spiti Shale (Formation), Malla Johar area, Tethys Himalaya, India. *Journal of the Palaeontological Society of India*, v.29, p.67–83, pl.1–6.

Jain, K.P., Garg, R. and Khowaja-Ateequzzaman

1991: *Hystrichokolpoma indicum* Khanna and Singh, 1981: a junior homonym of *Hystrichokolpoma indicum* Salujha and Kindra, 1981. *Geophytology*, v.20, no.1, p.75.

Jan du Chêne, R.

1977: Étude palynologique du Miocène supérieur Andalou (Espagne). *Revista española de micropaleontología*, v.9, p.97–114, pl.1–2.

1988: Étude systématique des kystes de dinoflagellés de la Formation des Madeleines (Danien du Sénégal). *Cahiers de micropaléontologie*, Nouvelle série, v.2, p.147–174, pl.1–28.

Jan du Chêne, R. and Adediran, S.A.

1985: Late Paleocene to Early Eocene dinoflagellates from Nigeria. *Cahiers de micropaléontologie*, Centre nationale de la recherche scientifique, no.1984-3, p.5-38, pl.1-25. (Cover date 1984, issue date 1985, according to p.2 of publication.)

Jan du Chêne, R. and Châteauneuf, J.-J.

1975: Nouvelles espèces de *Wetzeliella* et *Deflandrea* (Pyrrhophyta, Dinophyceae) de l'Eocène des Alpes occidentales. *Revue de Micropaléontologie*, v.18, p.28-37, pl.1-3.

Jan du Chêne, R. and Fauconnier, D.

1986: "*Gonyaulacysta*" *gottisi* Dupin, 1968: un synonyme junior de *Rhynchodiniopsis cladophora* (Deflandre, 1938) Below, 1981 (kyste fossile de dinoflagellé). *Revue de Micropaléontologie*, v.29, p.55-60, pl.1-2.

Jan du Chêne, R. and Londeix, L.

1988: Données nouvelles sur *Achomospaera andalousiense* Jan du Chêne, 1977, kyste de dinoflagellé fossile. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.12, no.1, p.237-250, pl.1-3.

Jan du Chêne, R., Stover, L.E. and de Coninck, J.

1985a: New observations on the dinoflagellate cyst genus *Kallosphaeridium* de Coninck, 1969. *Cahiers de micropaléontologie*, v.4, p.1-18, pl.1-7. (Cited as **Jan du Chêne** et al., 1985a in text.)

Jan du Chêne, R., Fauconnier, D.C. and Fenton, J.P.G.

1985b: Problèmes taxonomiques liés à la révision de l'espèce "*Gonyaulax*" *cornigera* Valensi, 1953, kyste fossile de dinoflagellé. *Revue de Micropaléontologie*, v.28, p.109-124, pl.1-5. (Cited as **Jan du Chêne** et al., 1985b in text.)

Jan du Chêne, R., Masure, E., Becheler, I., Biffi, U., de Vains, G., Fauconnier, D., Ferrario, R., Foucher, J.-C., Gaillard, M., Hochuli, P., Lachkar, G., Michoux, D., Monteil, E., Moron, J.-M., Rauscher, R., Raynaud, J.-F., Taugourdeau, J. and Turon, J.-L.

1986a: Guide pratique pour la détermination de kystes de dinoflagellés fossiles. Le complexe *Gonyaulacysta*. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, Mémoire, no.12, 479 p., 152 pl. (Cited as **Jan du Chêne** et al., 1986a in text.)

Jan du Chêne, R., Becheler, I., Helenes, J. and Masure, E.

1986b: Les genres *Diacanthum*, *Exiguisphaera*, *Occisucysta* et *Tehamadinium* gen. nov. (kystes fossiles de dinoflagellés). *Cahiers de micropaléontologie*, Centre nationale de la recherche scientifique, Nouvelle série, v.1, no.3-4, p.5-37, pl.1-30. (Cited as **Jan du Chêne** et al., 1986b in text.)

Janofske, D.

1987: Kalkige Nannofossilien aus der Ober-Trias (Rhät) der nördlichen Kalkalpen. *Berliner Geowissenschaften Abhandlungen*, Reihe A: Geologie und Paläontologie, v.86, p.45-67, pl.1-4.

1992: Kalkiges Nannoplankton, insbesondere kalkige Dinoflagellaten-Zysten der alpinen Ober-Trias. Taxonomie, Biostratigraphie und Bedeutung für die Phylogenie der Peridinales. *Berliner Geowissenschaftliche Abhandlungen*, Reihe E, v.4, p.1-53, pl.1-20.

2000: *Scrippsiella trochoidea* and *Scrippsiella regalis*, nov. comb. (Peridinales, Dinophyceae): a comparison. *Journal of Phycology*, v.4, p.1-53, pl.1-20.

Janofske, D. and Karwath, B.

2000: Oceanic calcareous dinoflagellates of the equatorial Atlantic Ocean: cyst-theca relationship, taxonomy and aspects on ecology. In: Karwath, B. *Ecological studies on living and fossil calcareous dinoflagellates on the equatorial and tropical Atlantic Ocean*; *Berichte aus dem Fachbereich Geowissenschaften der Universität Bremen*, no.152, p.94-136, pl.1-4.

Jansonius, J.

- 1962: Palynology of Permian and Triassic sediments, Peace River area, western Canada. *Palaeontographica, Abteilung B*, v.110, no.1–4, p.35–98, pl.11–16.
- 1982: *Muderongia*. Canadian Association of Palynologists, Newsletter, Winter 1982, p.16–17.
- 1986: Re-examination of Mesozoic Canadian dinoflagellate cysts published by S.A.J. Pocock (1962, 1972). *Palynology*, v.10, p.201–223, pl.1–6.
- 1989: The species of *Fromea* (fossil dinoflagellates). *Review of Palaeobotany and Palynology*, v.61, p.63–68, pl.1.
- 1997a: *Capita nomenclaturae*. American Association of Stratigraphic Palynologists Newsletter, v.30, no.3, p.4–5.
- 1997b: *Capita nomenclaturae II*. American Association of Stratigraphic Palynologists Newsletter, v.30, no.4, p.4–6.
- Jaramillo, C. and Yepes, O.
1994: Palinoestratigrafía del Grupo Olini (Coniaciano-Campaniano), Valle Superior del Magdalena, Colombia. In: Etayo, F. (editor), *Estudios geológicos del Valle Superior del Magdalena*, Capítulo 17, p.1–17; Universidad Nacional, Bogotá, Colombia.
- Jardiné, S., Combaz, A., Magloire, L., Peniguel, G. and Vachey, G.
1972: Acritarches du Silurien terminal et du Dévonien du Sahara Algérien. *Comptes rendus, 7e Congrès international de stratigraphie et de géologie du Carbonifère*, Krefeld, August 1971, v.1, p.295–311, pl.1–3.
- 1974: Distribution stratigraphique des acritarches dans le Paléozoïque du Sahara Algérien. *Review of Palaeobotany and Palynology*, v.18, no.1–2, p.99–129, pl.1–3.
- Jeffrey, C.
1977: *Biological Nomenclature*. 72 p.; Edward Arnold, London, U.K.
- Jiabo
1978: On the Paleogene Dinoflagellates and Acritarchs from the Coastal Region of Bohai. 190 p., 49 pl.; Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, China. (In Chinese with English summary.)
- Jiang Qinghua, Mungai, M.W., Downie, C. and Neves, R.
1992: Late Jurassic dinoflagellate assemblages of the Mto Panga Quarry, Mombasa, Kenya. *Review of Palaeobotany and Palynology*, v.74, no.1/2, p.77–100, pl.1–5.
- Johnson, C.D. and Hills, L.V.
1973: Microplankton zones of the Savik Formation (Jurassic), Axel Heiberg and Ellesmere Islands, District of Franklin. *Bulletin of Canadian Petroleum Geology*, v.21, p.178–218, pl.1–3.
- Jolley, D.W.
1992: A new species of the dinoflagellate genus *Areoligera* Lejeune-Carpentier from the Late Palaeocene of the eastern British Isles. *Tertiary Research*, v.14, no.1, p.25–32, pl.1–2.
- Jolley, D.W. and Spinner, E.
1989: Some dinoflagellate cysts from the London Clay (Palaeocene-Eocene) near Ipswich, Suffolk, England. *Review of Palaeobotany and Palynology*, v.60, p.361–373, pl.1–2.
- Jørgensen, E.
1900: Protophyten und Protozoën im Plankton aus der norwegischen Westküste. *Bergens Museums Aarbok*, 1899, no.6, p.1–112, pl.1–5.
- 1912: Bericht über die von der schwedischen Hydrographisch-Biologischen Kommission in den schwedischen Gewässern in den Jahren 1909–1910 eingesammelten Planktonproben. *Svenska Hydrografisk-Biologiska Kommissionens Skrifter*, v.4, p.1–20.

Kälin, O. and Bernoulli, D.

1984: *Schizosphaerella* Deflandre and Dangeard in Jurassic deeper-water carbonate sediments, Mazagan continental margin (Hole 547B) and Mesozoic Tethys. In: Hinz, K. et al., Deep Sea Drilling Project, Washington, Initial Reports, v.79, p.411–435.

Kamptner, E.

1927: Beitrag zur Kenntnis adriatischer Coccolithophoriden. Archiv für Protistenkunde, v.58, p.173–184.

1937: Über Dauersporen bei marinen Coccolithineen. S.-B. Akad. Wiss. Wien, Math.-naturwiss. Kl., Abt.1, v.146, p.67–76.

1944: Coccolithineen-Studien in Golf von Neapel. Wiener Botanische Zeitschrift, v.93, p.138–147.

1955: Fossile Coccolithineen-Skelettreste aus Insulinde. Eine mikropaläontologische Untersuchung. Verhandelingen der Koninklijke Nederlandse Akademie van Wetenschappen, Afdeling Natuurkunde, Tweede Reeks, v.50, p.1–106.

1956: *Thoracosphaera deflandrei* nov. spec., ein bemerkenswertes Kalkflagellaten-Gehäuse aus dem Eocän von Donzacq (Dep. Landes, Frankreich). Österreichische Botanische Zeitschrift, v.103, p.448–456.

1958: Betrachtungen zur Systematik der Kalkflagellaten, nebst Versuch einer neuen Gruppierung der Chrysomonadales. Archiv für Protistenkunde, v.103, p.54–116.

1963: Coccolithineen-Skelettreste aus Tiefseeablagerungen des Pazifischen Ozeans. Annalen des Naturhistorischen Museums, Wien, v.66, p.139–204.

1967: Kalkflagellaten-Skelettreste aus dem Tiefseeschlamm des Südatlantischen Ozeans. Annalen des Naturhistorischen Museums, Wien, v.71, p.117–198.

Kanmacher, F.

1798: Adam's Essays on the Microscope; the Second Edition, with Considerable Additions and Improvements. Dillon and Keating, London, U.K.

Kar, R.K.

1979: Palynological fossils from the Oligocene sediments and their biostratigraphy in the District of Kutch, western India. The Palaeobotanist, v.26, p.16–49, pl.1–4. (Cover date 1977, issue date 1979.)

1985: The fossil floras of Kachchh-IV. Tertiary palynostratigraphy. The Palaeobotanist, v.34, p.1–280, pl.1–50.

1992: Stratigraphical implications of Tertiary palynological succession in northeastern and western India. The Palaeobotanist, v.40, p.336–344.

Kar, R.K., Singh, R.Y. and Sah, S.C.D.

1972: On some algal and fungal remains from Tura Formation of Garo Hills, Assam. The Palaeobotanist, v.19, p.146–154, pl.1–2.

Kawami, M., van Wetzel, R., Koeman, R.P.T. and Matsuoka, K.

2009: *Protoperidinium tricingulatum* sp. nov. (Dinophyceae), a new motile form of a round brown, and spiny dinoflagellate cyst. Phycological Research, v.57, p.259–267.

Kedves, M.

1992: Dél-Bakonyi növényi eredetű mikrofossziliák vizsgálata. Öslénytani Viták (Discussiones Palaeontologicae), v.38, p.47–57.

Keller, B.M.

1946: The foraminifera of the Upper Cretaceous deposits, in the Sochi region. Soc. Nat. Moscou, Bull., n, ser., v.51, no.3, p.83–108, pl.1–3.

Kennedy, W.J., Gale, A.S., Bown, P.R., Caron, M., Davey, R.J., Gröcke, D. and Wray, D.S.

2000: Integrated stratigraphy across the Aptian-Albian boundary in the Marnes Bleues, at the Col de Pré-Guittard, Arnayon (Drôme), and at Tartonne (Alpes-de-Haute-Provence), France: a candidate global boundary stratotype section and boundary point for the base of the Albian Stage. *Cretaceous Research*, v.21, p.591–720.

Keupp, H.

1977: Ultrafazies und Genese der Solnhofener Plattenkalke (Oberer Malm, Südliche Frankenalb). *Abhandlungen der Naturhistorischen Gesellschaft Nürnberg*, v.37, p.1–128, pl.1–30.

1978: Calcisphaeren des Untertithon der Südlichen Frankenalb und die systematische Stellung von *Pithonella* Lorenz 1901. Calcisphaerulidae from the lower Tithonian (southern Franken-Alb, W-Germany) and the taxonomic position of *Pithonella* Lorenz 1901. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.2, p.87–98.

1979a: Die Blätterton-Fazies der nordwestdeutschen Unterkreide — Teil 1. Calciodinelloidea aus der Blätterton-Fazies des nordwestdeutschen Unter-Barremium. *Bericht, Naturhistorische Gesellschaft zu Hannover*, v.122, p.7–69, pl.1–11.

1979b: *Alasphaera caudata* n.g. n.sp., eine neue Calciodinelloidee aus der Unterkreide (Hauterivium) Nordwestdeutschlands. *Alasphaera caudata* n.g. n.sp., a new Calciodinelloidea from the Lower Cretaceous (Hauterivian) of northwest Germany. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.5, p.284–290.

1979c: Lower Cretaceous Calcisphaerulidae and their relationship to calcareous dinoflagellate cysts. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.3, no.2, p.651–663, pl.1–6.

1980a: *Calcigonellum* Deflandre 1948 und *Echinodinella* n. gen. (kalkige Dinoflagellaten-Zysten) aus der nordwestdeutschen Unter-Kreide. *Calcigonellum* Deflandre 1948 and *Echinodinella* n. gen. (calcareous dinoflagellate cysts) from the Lower Cretaceous of northwest Germany. *Facies*, no.2, p.123–148, pl.14–17.

1980b: *Pithonella paratabulata* n.sp., eine unterkretazische Calcisphaere mit äusserer Paratabulation. *Facies*, v.3, p.239–249, pl.30–31.

1980c: *Pithonella patriciagreeleyae* Bolli 1974, eine kalkige Dinoflagellaten-Zyste mit interner Paratabulation (Unter-Kreide, Speeton/SE-England). *Pithonella patriciagreeleyae* Bolli 1974, a calcareous dinoflagellate cyst with an inside paratabulation (Lower Cretaceous, Speeton/se England). *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.9, p.513–524.

1981: Die kalkigen Dinoflagellaten-Zysten der borealen Unter-Kreide (Unter-Hauterivium bis Unter-Albium). Calcareous dinoflagellate cysts of the Boreal Lower Cretaceous (Lower Hauterivian to Lower Albian). *Facies*, no.5, p.1–190, pl.1–53.

1982: Die Kalkigen Dinoflagellaten-Zysten des späten Apt und frühen Alb in Nordwestdeutschland. *Geologische Jahresberichte, Hannover*, v.A65, p.307–363, pl.1–9.

1984: Revision der kalkigen Dinoflagellaten-Zysten G. Deflandre, 1948. A restudy of the calcareous dinoflagellate cysts established by G. Deflandre, 1948. *Paläontologische Zeitschrift*, v.58, no.1–2, p.9–31.

1987: Die kalkigen Dinoflagellatenzysten des Mittelalb bis Untercenoman von Escalles/Boulonnais (N-Frankreich). Dinoflagellate cysts from the Middle Albian to Early Cenomanian of Escalles/Boulonnais (northern France). *Facies*, no.16, p.37–88, pl.6–21.

1990: Eine neue pithonelloide Dinoflagellaten-Kalkzyste aus der Oberkreide von South Dakota/U.S.A. A new pithonellid calcareous dinoflagellate cyst from the Upper Cretaceous of South Dakota/U.S.A. *Facies*, v.22, p.47–58, pl.14–15.

1991a: Fossil calcareous dinoflagellate cysts. In: Riding, R. (editor), *Calcareous Algae and Stromatolites*, p.267–286; Springer-Verlag, Berlin, Germany.

1991b: Kalkige Dinoflagellaten-Zysten aus dem Eibranner Mergel (Cenoman-Turon-Grenzbereich) bei Bad Abbach/Süddeutschland. Calcareous dinoflagellate cysts of the Eibrunn Marls (Cenomanian-Turonian boundary) from Bad Abbach/southern Germany. *Berliner Geowissenschaftliche Abhandlungen, Reihe A, Geologie und Paläontologie*, v.134, p.127–145, pl.1–4.

1992a: Calcareous dinoflagellate cysts from the Lower Cretaceous of Hole 761C, Wombat Plateau, eastern Indian Ocean. In: von Rad, U. et al., *Ocean Drilling Program, Scientific Results, Proceedings*, v.122, p.497–509, pl.1–7.

1992b: Die Flora kalkiger Dinoflagellaten-Zysten im mittleren Apt (Gargas) der Kernbohrung Himstedt 3 bei Hoheneggelsen/Niedersachsen. *Berliner Geowissenschaftliche Abhandlungen, Reihe E, Paläobiologie* v.3, p.121–169, pl.1–12.

1993: Kalkige Dinoflagellaten-Zysten in Hell-Dunkel-Rhythmen des Ober-Hauterive/Unter-Barrême NW-Deutschlands. *Zitteliana*, v.20, p.25–39, pl.1–3.

1995: Die kalkigen Dinoflagellaten-Zysten aus dem Ober-Alb der Bohrung Kirchrode 1/91 (zentrales niedersächsisches Becken, NW-Deutschlands). *Berliner Geowissenschaftliche Abhandlungen*, v.16, p.155–199, pl.1–11.

Keupp, H. and Ilg, A.

1989: Die kalkigen Dinoflagellaten im Ober-Callovium und Oxfordium der Normandie/Frankreich. *Berliner Geowissenschaftliche Abhandlungen, Reihe A, Geologie und Paläontologie*, v.106, p.165–205, pl.1–12.

Keupp, H. and Kienel, U.

1994: Wandstrukturen bei Pithonelloideae (kalkige Dinoflagellaten-Zysten); Biomineralisation und systematische Konsequenzen. *Abhandlungen der Geologischen Bundesanstalt*, v.50, p.197–217, pl.1–5.

Keupp, H. and Kohring, R.

1993: Kalkige Dinoflagellatenzysten aus dem Obermiozän von El Medhi (Algerien). *Berliner Geowissenschaftliche Abhandlungen, Reihe E, Paläobiologie*, v.9, p.25–43, pl.1–4.

Keupp, H. and Kowalski, F.-U.

1992: Die kalkigen Dinoflagellaten-Zysten aus dem Alb von Folkestone/SE-England. *Berliner Geowissenschaftliche Abhandlungen, Reihe E, Paläobiologie*, v.3, p.211–251, pl.1–9.

Keupp, H. and Mutterlose, J.

1984: Organismenverteilung in den D-Beds von Speeton (Unterkreide, England) unter besonderer Berücksichtigung der kalkigen Dinoflagellaten-Zysten. Vertical distribution of organisms in the D-Beds of Speeton (Lower Cretaceous, England) considering the calcareous dinoflagellate cysts. *Facies*, no.10, p.153–178, pl.20–23.

1994: Calcareous phytoplankton from the Barremian/Aptian boundary interval in NW Germany. *Cretaceous Research*, v.15, p.739–763.

Keupp, H. and Versteegh, G.

1989: Ein neues systematisches Konzept für kalkige Dinoflagellaten-Zysten der Subfamilie Orthopithonelloideae Keupp 1987. *Berliner Geowissenschaftliche Abhandlungen, Reihe A, Geologie und Paläontologie*, v.106, p.207–219, pl.1–2.

Keupp, H., Monnet, B. and Kohring, R.

1991: Morphotaxa bei kalkigen Dinoflagellaten-Zysten und ihre problematische Systematisierung. Problems with the systematics of calcareous dinoflagellate cysts based on morphologically defined taxa. Berliner Geowissenschaftliche Abhandlungen, Reihe A, Geologie und Paläontologie, v.134, p.161–185, pl.1–5.

Keupp, H., Kohring, R. and Kowalski, F.-U.

1992: Neue Arten der Gattung *Ruegenia* Willems 1992 (kalkige Dinoflagellaten-Zysten) aus Kreide und Tertiär. Berliner Geowissenschaftliche Abhandlungen, Reihe E, Paläobiologie, v.3, p.191–209; pl.1–3.

Khanna, A.K.

1979: Subathus — stratigraphic status and nomenclature. Himalayan Geology, v.8, 1, p.209–223. (Cover date 1978, issue date 1979.)

Khanna, A.K. and Singh, H.P.

1980: *Subathua* — a new dinoflagellate genus and its palaeoecological significance in the Subathu Formation, Simla Hills. The Palaeobotanist, v.26, no.3, p.307–313, pl.1.

1981a: Palynological evidences in determination of age and environment of deposition of the Subathu Formation, Simla Hills. Himalayan Geology, v.9, no.1, p.293–303.

1981b: Some new dinoflagellates, spores and pollen grains from the Subathu Formation (Upper Palaeocene-Eocene) of Simla Hills, India. Himalayan Geology, v.9, no.1, p.385–419. (Cover date 1979, issue date 1981.)

Khanna, A.K., Singh, H.P. and Sah, S.C.D.

1981: Palynostratigraphic correlation of the Subathu Formation, Simla Hills. Himalayan Geology, v.9, no.1, p.255–272.

Khowaja-Ateequzzaman

1993: Some new dinoflagellate cyst taxa from Dalmiapuram Formation, Cauvery Basin, southern India. Geophytology, v.23, no.1, p.131–135, pl.1.

Khowaja-Ateequzzaman and Garg, R.

1995: *Jainiella* — a new dinoflagellate cyst genus from the Upper Cretaceous of Cauvery Basin, India. The Palaeobotanist, v.42, no.3, p.245–248, pl.1.

2004a: *Callaiosphaeridium scabratum* sp. nov. — a new dinoflagellate cyst species from Early Turonian of the Cauvery Basin, India. Palaeobotanist, v.53, p.97–103.

2004b: Re-interpretation of the archaeopyle type in the dinoflagellate cyst *Leberidocysta? scabrata* (Jain & Taugourdeau-Lantz, 1973) Stover & Evitt, 1978 and its taxonomic reallocation. Journal of Micropalaeontology, v.23, p.11–14, pl.1,

Khowaja-Ateequzzaman and Jain, K.P.

1990: *Cauveridinium*, a new Gv-type dinoflagellate cyst from Trichinopoly Formation, Cauvery Basin, India. The Palaeobotanist, v.38, p.171–179, pl.1–3.

1992: Hauterivian-Barremian dinoflagellate cyst assemblage from subsurface of Palar Basin, southern India. Geophytology, v.22, p.133–180.

Khowaja-Ateequzzaman, Jain, K.P. and Manum, S.B.

1985: Dinocyst genus *Discorsia*: a reinterpretation. Palynology, v.9, p.95–103, pl.1–4.

Khowaja-Ateequzzaman, Garg, R. and Jain, K.P.

1990: Observations on archaeopyle type in fossil dinoflagellate cyst species *Dingodinium cerviculum* Cookson and Eisenack 1958. The Palaeobotanist, v.37, no.6, p.267–277, pl.1–2.

1991: Some observations on dinoflagellate cyst genus *Alterbidinium* Lentin and Williams 1985. *The Palaeobotanist*, v.39, no.1, p.37–45, pl.1–2.

Kienel, U.

1994: Die Entwicklung der kalkigen Nannofossilien und der kalkigen Dinoflagellaten-Zysten an der Kreide/Tertiär-Grenze in Westbrandenburg im Vergleich mit Profilen in Nordjütland und Seeland (Dänemark). *Berliner Geowissenschaftliche Abhandlungen, Reihe E*, v.12, p.1–87, pl.1–15.

Kimyai, A.

1966: New plant microfossils from the Raritan Formation (Cretaceous) in New Jersey. *Micropaleontology*, v.12, p.461–476, pl.1–2.

Kirsch, K.-H.

1991: Dinoflagellatenzysten aus der Oberkreide des Helvetikums und Nordultrahelvetikums von Oberbayern. *Münchener Geowissenschaftliche Abhandlungen, Reihe A, Geologie und Paläontologie*, v.22, p.1–306, pl.1–43.

1993: Dinoflagellatenzysten aus der helvetischen Unterkreide (Barrême) des Waxenstein-Grabens Oberbayern. *Zitteliana*, v.20, p.41–58, pl.1–3.

2000: Dinoflagellatenzysten aus der höheren Oberkreide des rhenodanubischen Flysches. 1. Kalkgrabenschichten vom Schliersee/Oberbayern. *Mitteilung der Bayerischen Staatssammlung für Paläontologie und Historische Geologie*, v.40, p.3–79, pl. 1–5.

Kiryanov, V.V.

1974: Novye akritarkhi iz kembriyskikh otlozheniy Volyni. *Paleontologicheskii Zhurnal*, no.2, p.117–129, pl.7–8. (Published English translation: New acritarchs from the Volynian Cambrian. *Paleontological Journal*, v.8, p.225–236; 1974.)

1978: Akritarkhi silura Volyno-Podolii. 116 p., 20 pl.; Akademiya Nauk Ukrainskoi SSR, Institut Geologicheskikh Nauk, "Naukova Dumka", Kiev, U.S.S.R.

Kjellström, G.

1971a: Ordovician microplankton (baltisphaerids) from the Grötlingbo Borehole No.1 in Gotland, Sweden. *Sveriges Geologiska Undersökning, Serie C*, no.655, v.65, no.1, p.1–75, pl.1–4.

1971b: Middle Ordovician microplankton from the Grötlingbo Borehole No.1 in Gotland, Sweden. *Sveriges Geologiska Undersökning, Serie C*, no.669, v.65, no.15, p.1–35.

1972: Archaeopyle formation in the genus *Lejeunia* Gerlach, 1961 emend. *Geologiska Föreningens i Stockholm Förhandlingar*, v.94, p.467–469.

1973: Maastrichtian microplankton from the Höllviken Borehole No.1 in Scania, southern Sweden. *Sveriges Geologiska Undersökning, Serie C*, no.688, v.67, no.8, p.1–59.

1976: Lower Viruan (Middle Ordovician) microplankton from the Ekön Borehole No.1 in Östergötland, Sweden. *Sveriges Geologiska Undersökning, Serie C*, no.724, v.70, no.6, p.1–44.

Klement, K.W.

1957: Revision der Gattungszugehörigkeit einiger in die Gattung *Gymnodinium* Stein eingestufte Arten jurassischer Dinoflagellaten. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.9, p.408–410.

1960: Dinoflagellaten und Hystrichosphaerideen aus dem unteren und mittleren Malm Südwestdeutschlands. *Palaeontographica, Abteilung A*, v.114, no.1–4, p.1–104, pl.1–10.

1961: Kritische Stellungnahme zur Gattung *Bulbodinium* O. Wetzel 1960 (Dinoflagellaten). *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.9, p.489–492.

- Klumpp, B.
1953: Beitrag zur Kenntnis der Mikrofossilien des mittleren und oberen Eozän. *Palaeontographica*, Abteilung A, v.103, p.377–406, pl.16–20.
- Knauer, J.
1970: *Calcisphaerula*, *Pithonella* and *Stomiosphaera* from middle Cretaceous beds of the Rakony Mountains. *Földtani Közlöny*, v.100, no.1, p.88–90, pl.1.
- Kofoed, C.A.
1907a: New species of dinoflagellates. *Museum of Comparative Zoology at Harvard College, Bulletin*, v.50, p.163–207, pl.1–18.
1907b: Dinoflagellata of the San Diego region. III. Descriptions of new species. *University of California Publications in Zoology*, v.3, no.13, p.299–340, pl.22–33.
1911: Dinoflagellata of the San Diego region, IV. The genus *Gonyaulax*, with notes on its skeletal morphology and a discussion of its generic and specific characters. *University of California Publications in Zoology*, v.8, no.4, p.187–286, pl.9–17.
- Kofoed, C.A. and Michener, J.R.
1911: New genera and species of dinoflagellates. *Museum of Comparative Zoology at Harvard College, Bulletin*, v.54, no.7, p.267–302.
- Köhler, J. and Clausing, A.
2000: Taxonomy and palaeoecology of dinoflagellate cysts from Upper Oligocene freshwater sediments of Lake Enspel, Westerwald area, Germany. *Review of Palaeobotany and Palynology*, v.112, p.39–49, pl.1.
- Kohring, R.
1993a: Kalkdinoflagellaten aus dem Mittel- und Obereozän von Jütland (Dänemark) und dem Pariser Becken (Frankreich) im Vergleich mit anderen Tertiär-Vorkommen. *Berliner Geowissenschaftliche Abhandlungen, Reihe E, Paläobiologie*, v.6, p.1–164, pl.1–8,8b,9–43.
1993b: Kalkdinoflagellaten-Zysten aus dem unteren Pliozän von E-Sizilien. *Berliner Geowissenschaftliche Abhandlungen, Reihe E, Paläobiologie*, v.9, p.15–23, pl.1–2.
1997: Calcareous dinoflagellate cysts from the Blue Clay formation (Serravallian, Late Miocene) of the Maltese Islands. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.3, p.151–164.
- Kokinos, J.P. and Anderson, D.M.
1995: Morphological development of resting cysts in cultures of the marine dinoflagellate *Lingulodinium polyedrum* (= *L. machaerophorum*). *Palynology*, v.19, p.143–166, pl.1–3.
- Koppelhus, E.B. and Nielsen, L.H.
1994: Palynostratigraphy and palaeoenvironments of the Lower to Middle Jurassic Bagå Formation of Bornholm, Denmark. *Palynology*, v.18, p.139–194, pl.1–5.
- Köthe, A.
1990: Paleogene dinoflagellates from northwest Germany — biostratigraphy and paleoenvironment. *Geologisches Jahrbuch, Reihe A*, no.118, p.3–111, pl.1–33.
- Kozur, H.
1984: Muellerisphaerida. Eine neue Ordnung von Mikrofossilien unbekannter systematischer Stellung aus dem Silur und Unterdevon von Ungarn. *Geologisch-Paläontologische Mitteilung, Innsbruck*, v.13, no.6, p.125–148, pl.1–5.
- Krasheninnikov, V.A. and Basov, I.A.

1983: Cretaceous calasphaerulids of the Falkland Plateau, D.S.D.P. Leg 71. In: Ludwig, W.J. et al., Deep Sea Drilling Project, Washington, Initial Reports, v.71, p.977–997.

Kremp, G.

1949: Pollenanalytische Untersuchungen des miozänen Braunkohlenlagers von Konin an der Warthe. *Palaeontographica*, Abteilung B, v.90, p.53–93; pls.3–9.

Kretschmann, J., Zinssmeister, C. and Gottschling, M.

2014: Taxonomic clarification of the dinophyte *Rhabdosphaera erinaceus* Kamptner, ≡ *Scrippsiella erinaceus* comb. nov. (Thoracosphaeraceae, Peridinales). *Systematics and Biodiversity*, v.12, no.4, p.393–404.

Kristan, E.

1957: Ophthalmidiidae und Tetrataxinae (Foraminifera) aus dem Rhät der Hohen Wand in Nieder-Österreich. *Jahrbuch der Geologischen Bundesanstalt*, Wien, v.100, p.269–298, pl.22–27.

Kriván-Hutter, E.

1963: Microplankton from the Palaeogene of the Dorog Basin 1. *Annales Universitatis Scientiarum Budapestinensis de Rolando Eotvos Nominatae, Sectio Geologica*, v.6, p.71–91, pl.1–6.

Krutzsch, W.

1959: Mikropaläontologische (sporenpaläontologische) Untersuchungen in der Braunkohle des Geiseltales. *Geologie*, v.8, no.21–22, p.1–245, pl.1–49.

1962: Die Mikroflora der Geiseltalbraunkohle. Teil III. Süßwasserdinoflagellaten aus subaquatisch gebildeten Blätterkohlenlagen des mittleren Geiseltales. *Hallesches Jahrbuch für Mitteldeutsche Erdgeschichte*, v.4, p.40–45, pl.10–11.

1970: Atlas der mittel- und jungtertiären dispersen Sporen- und Pollen- sowie der Mikroplanktonformen des nördlichen Mitteleuropas. Lieferung VII: monoporate, monocolpate, longicolpate, dicolpate und ephedrioide (polylicate) Pollenformen. 175 p. VEB Gustav Fischer Verlag, Jena, Germany.

Krutzsch, W. and Vanhoorne, R.

1977: Die Pollenflora von Epinois und Loksbergen in Belgien. *Palaeontographica*, Abteilung B, v.163, no.1–4, p.1–110, pl.1–44.

Krutzsch, W., Pchalek, J. and Spiegler, D.

1960: Tieferes Paläozän (?Montien) in Westbrandenburg. *Proceedings of the International Geological Congress, XXI Session, Copenhagen, 1960, Part VI, Pre-Quaternary Micropaleontology*, p.135–143, pl.1–2.

Kufferath, H.

1950: Recherches sur le plancton de la Mer Flamande (Mer du Nord méridionale). 1. Quelques flagellés, protistes et "caetera". *Bulletin de l'Institut royal des sciences naturelles de Belgique*, v.26, no.29, 43 p.

Kumar, A.

1984: Indodiniaceae — a new dinoflagellate cyst family from the uppermost Jurassic (Tithonian) of India. 27th International Geological Congress, Moscow, Abstracts, v.9, 2, p.26.

1986a: A sequence of dinocysts from the subsurface sediments (Valanginian-Hauterivian) of the Krishna-Godavari Basin, India. *Journal of the Palaeontological Society of India*, v.31, p.26–38, pl.1–2.

1986b: A dinocyst assemblage from the Middle Member (Lower Kimmeridgian-Tithonian) of the Jhuran Formation, Kachchh, India. *Review of Palaeobotany and Palynology*, v.48, p.377–407, pl.1–6.

1987a: Additional dinocysts and acritarchs from the Middle Member (Lower Kimmeridgian-Tithonian) of the Jhuran Formation, Kachchh, India. *Revista española de micropaleontología*, v.19, p.239–249, pl.1–2.

1987b: Distribution of dinocysts in the Jurassic rocks of Kachchh, India. *Journal of the Geological Society of India*, v.29, p.594–602, pl.1–3.

Kumar, A., Sharma, J. and Kapoor, P.N.

1993: *Selenopemphix maastrichta* sp. nov.: the first pre-Tertiary record of the genus *Selenopemphix* (Benedek) Bujak in Bujak et al., 1980. *Oil and Natural Gas Commission, Bulletin*, v.30, no.2, p.139–146, pl.1.

Kunz, R.

1990: Phytoplankton und Palynofazies im Malm NW-Deutschlands (Hannoversches Bergland). *Phytoplankton and palynofacies in the Malm of NW Germany (Hannoversches Bergland)*. *Palaeontographica, Abteilung B*, v.216, 1–105 p., pl.1–10.

Kurita, H.

2004: Paleogene dinoflagellate cyst biostratigraphy of northern Japan. *Micropaleontology*, v.50, suppl. 2, p.3–50, pl.1–7.

Kurita, H. and Matsuoka, K.

1995: *Trinovantedinium boreale* Bujak — dominated dinoflagellate assemblages in Eocene-Oligocene stratified water in northern Japan. *Review of Palaeobotany and Palynology*, v.84, p.129–153, pl.1–2.

Kützing, F.T.

1844: *Die Kieselschaligen Bacillarien oder Diatomeen*. 152 p., 30 pl., W. Köhne, Nordhausen.

Lamarck, J.B.P.A. de M. de

1816: *Histoire Naturelle des Animaux sans Vertèbres*. 2. 568 p.; Verdière, Paris, France.

Lang Yan, He Chengquan, Wu Chunguang and Yang Guoqi

1999: Early Cretaceous microphytoplankton from the Eren Basin, Nei Mongol, north China. *Acta Micropalaeontologica Sinica*, v.16, no.4, p.369–392, pl.1–6.

Lange, D.

1969: Mikroplankton aus dem Fischton von Stevns-Klint auf Seeland. *Beiträge zur Meereskunde*, no.24–25, p.110–121, pl.1–3.

Lantz, J.

1958: Étude palynologique de quelques échantillons Mésozoïque du Dorset (Grande Bretagne). *Revue de l'Institut français du pétrole et Annales des combustibles liquides*, v.13, no.6, p.917–943.

Lardeux, H. (editor)

1976: Les schistes et calcaires éodévoniens de Saint-Cénére (Massif armoricain, France). *Sédimentologie, paléontologie, stratigraphie*. *Mémoire de la Société géologique et minéralogique de Bretagne*, v.19, p.1–329.

Le Hérisse, A.

1989: Acritarches et kystes d'algues prasinophycées du Silurien de Gotland, Suède. *Palaeontographia italica*, v.76, p.57–302, pl.1–30.

Le Herissé, A., Masure, E. and Massa, D.

1995: Revision de *Arpylorus antiquus* du Silurien: la fin d'un mythe. In: *Evolution & environnement des organismes microscopiques; Colloque du GDR 88 du CNRS (biologistes et micropaléontologistes, Paris 18–19 Septembre 1995 [abstracts]*.

Lebedeva, N.K.

1988: Novye vidy *Chatangiella* iz Santonskikh otlozhenii Ust-Eniseiskogo raiona. In: Chlonova, A.F. (editor), *Palinologiya b SSSR, Stat'i Sovetskikh Palinologov k VII Mezhdunarodnomu Palinologicheskomu Kongressu, Brisben, Australiya, 1988*, p.73–77, pl.18–19; *Akademiya Nauk SSSR, Sibirskoe Otdelenie, Institut Geologi i Geofiziki, Novosibirsk, Russia*.

2000: Rod *Chatangiella* Vozzhennikova 1967 (tsisty dinoflagellat): morfologiya i sistematika. *Novosti Paleontologii i Stratigrafii*, v.2-3 (Prilozhenie k Zhurnalu Geologiya i Geofizika, v.41), p.111–125, pl.1–2. (In Russian with English summary and species diagnosis.)

Lebedeva, N.K. and Nikitenko, B.L.

1998: Mikrofitoplankton i mikroforaminifery opornogo razreza nizhnego mela pripolyarnogo zaural'ya (zapadnaya Sibir'). *Geologiya i Geofizika*, v.39, p.799–820, pl.1–3. (In Russian with English abstract.)

Lebour, M.V.

1922: Plymouth Peridinians. I. *Diplopsalis lenticula* and its relatives. *Marine Biological Association of the United Kingdom, Journal*, v.12, no.4, p.795–812.

Lecal, J.

1952: Sur un protiste pélagique rattachable aux discoastéridés. *Archives de zoologie, expérimentale et générale*, v.89, p.51–55.

Leereveld, H.

1997: Upper Tithonian-Valanginian (Upper Jurassic-Lower Cretaceous) dinoflagellate cyst stratigraphy of the western Mediterranean. *Cretaceous Research*, v.18, p.385–420.

Lefèvre, M.

1933a: Recherches sur les péridiniens fossiles des Barbades. *Muséum d'histoire naturelle, Paris, Bulletin, Série 2*, v.5, p.415–418.

1933b: Les *Peridinites* des Barbades. *Annales de cryptogamie exotique*, v.6, p.215–229.

Leffingwell, H.A. and Morgan, R.P.

1977: Restudy and comparison of the dinoflagellate cyst genus *Carpodinium* to that of *Prionodinium* n. gen. *Journal of Paleontology*, v.51, p.288–302, pl.1–4.

Leischner, W.

1959: Zur Mikrofacies kalkalpiner Gesteine. *Österreichische Akademie der Wissenschaften Mathematisch-Naturwissenschaftliche Klasse, Sitzungsberichte*, v.168, p.838–882.

Lejeune-Carpentier, M.

1938a: L'étude microscopique des silex. *Areoligera*: nouveau genre d'Hystrichosphaeridée. (Sixième note.) *Annales de la Société géologique de Belgique*, v.62, p.B163–B174.

1938b: *Peridinium pyrophorum* Ehrenberg. *Bulletin du Musée royal d'histoire naturelle de Belgique*, v.14, no. 44, p.1–13.

1939: L'étude microscopique des silex. Un nouveau péridinien crétacique: *Gonyaulax wetzeli*. (Septième note.) *Annales de la Société géologique de Belgique*, v.62, p.B525–B529.

1940: L'étude microscopique des silex. Systématique et morphologie des "tubifères". (Huitième note.) *Annales de la Société géologique de Belgique*, v.63, p.B216–B236.

1941: L'étude microscopique des silex. Sur *Hystrichosphaeridium hirsutum* (Ehrenberg) et quelques formes voisines. (Neuvième note.) *Annales de la Société géologique de Belgique*, v.63, no.3, p.B71–B92.

1942: L'étude microscopique des silex. Péridiniens nouveaux ou peu connus. (Dixième note.) *Annales de la Société géologique de Belgique*, v.65, p.B181–B192.

1943: L'étude microscopique des silex. Une hystrichosphaeridée à classer parmi les péridiniens. (Onzième note.) *La Société géologique de Belgique, Annales*, v.67, no.1, p.B22–28.

1946: L'étude microscopique des silex. Espèces nouvelles ou douteuses de *Gonyaulax*. (Douzième note). Annales de la Société géologique de Belgique, v.69, p.B187–B197.

1951: L'étude microscopique des silex. *Gymnodinium* et *Phanerodinium* (Dinoflagellates) de Belgique. (Treizième note.) Annales de la Société géologique de Belgique, v.74, p.B307–B315.

Lejeune-Carpentier, M. and Sarjeant, W.A.S.

1981: Restudy of some larger dinoflagellate cysts and an acritarch from the Upper Cretaceous of Belgium and Germany. Annales de la Société géologique de Belgique, v.104, p.1–39, pl.1–6.

1983: Restudy of some smaller dinoflagellate cysts from the Upper Cretaceous of Belgium. Annales de la Société géologique de Belgique, v.106, p.1–17, pl.1–2.

Lemmermann, E.

1899: Ergebnisse einer Reise nach dem Pacific. (H. Schauinsland 1896/97.). Abhandlungen des Naturwissenschaftlichen Vereins in Bremen, v.16, no.2, p.313–398, pl.1–3.

Lentin, J.K.

1983: *Williamsidinium banksianum* gen. et sp. nov., a new peridinioid dinoflagellate cyst from the Maastrichtian of Banks Island, N.W.T., Canada. Palynology, v.7, p.147–151, pl.1.

Lentin, J.K. and Manum, S.B.

1986: A new peridinioid dinoflagellate from Campanian sediments recovered from DSDP Leg 22, Site 217, Indian Ocean. Palynology, v.10, p.111–116, pl.1.

Lentin, J.K. and Vozzhennikova, T.F.

1989: The fossil dinoflagellate cysts *Kisselovia* emend. and *Charlesdowniea* gen. nov. Review of Palaeobotany and Palynology, v.58, p.215–229, pl.1–3.

1990: Fossil dinoflagellates from the Jurassic, Cretaceous and Paleogene deposits of the USSR — a re-study. American Association of Stratigraphic Palynologists, Contributions Series, no.23, 221 p., pl.1–16.

Lentin, J.K. and Williams, G.L.

1973: Fossil dinoflagellates: index to genera and species. Geological Survey of Canada, Paper, no.73–42, 176 p.

1975: Fossil dinoflagellates: index to genera and species. Supplement 1. Canadian Journal of Botany, v.53, p.2147–2157.

1976: A monograph of fossil peridinioid dinoflagellate cysts. Bedford Institute of Oceanography, Report Series, no.BI–R-75–16, 237 p. [Cover date 1975, issue date 1976]

1977a: Fossil dinoflagellate genus *Isabelidinium* nom. nov. Palynology, v.1, p.167–168.

1977b: Fossil dinoflagellates: index to genera and species, 1977 edition. Bedford Institute of Oceanography, Report Series, no.BI–R-77–8, 209 p.

1980: Dinoflagellate provincialism with emphasis on Campanian peridiniaceans. American Association of Stratigraphic Palynologists, Contributions Series, no.7, p.1–47, pl.1.

1981: Fossil dinoflagellates: index to genera and species, 1981 edition. Bedford Institute of Oceanography, Report Series, no.BI–R-81–12, 345 p.

1985: Fossil dinoflagellates: index to genera and species, 1985 edition. Canadian Technical Report of Hydrography and Ocean Sciences, no.60, 451 p.

- 1987: Status of the fossil dinoflagellate genera *Ceratiopsis* Vozzhennikova 1963 and *Cerodinium* Vozzhennikova 1963 emend. *Palynology*, v.11, p.113–116.
- 1989: Fossil dinoflagellates: index to genera and species, 1989 edition. American Association of Stratigraphic Palynologists, Contributions Series, no.20, 473 p.
- 1993: Fossil dinoflagellates: index to genera and species. 1993 edition. American Association of Stratigraphic Palynologists, Contributions Series, no.28, 856 + viii p.
- Lentin, J.K., Fensome, R.A. and Williams, G.L.
 1994: The stratigraphic importance of species of *Sumatradinium*, *Barssidinium* and *Erymmodinium*, Neogene dinoflagellate genera from offshore eastern Canada. *Canadian Journal of Earth Sciences*, v.31, p.567–582.
- Lenz, O.K., Wilde, V., Riegel, W. and Heinrichs, T.
 2007: Distribution and paleoecologic significance of the freshwater dinoflagellate cyst *Messelodinium thielepfeifferae* gen. et. sp. nov. from the Middle Miocene of Lake Messel, Germany. *Palynology*, v.31, p.119–134, pl.1–4.
- Leschik, G.
 1956: Die Entstehung der Braunkohle der Wetterau und ihre Mikro- und Makroflora. *Palaeontographica, Abteilung B*, v.100, p.26–64, pl.15–19.
- Levy, R.H. and Harwood, D.M.
 2000: Tertiary marine palynomorphs from the McMurdo Sound erratics, Antarctica. *Paleobiology and paleoenvironments of Eocene rocks*. *Antarctic Research Series*, v.76, p.183–242, pl.1–14.
- Lewis, J., Dodge, J.D. and Tett, P.
 1984: Cyst-theca relationships in some *Protoperidinium* species (Peridiniales) from Scottish sea lochs. *Journal of Micropalaeontology*, v.3, no.2, p.25–34, pl.1.
- Lewis, J., Rochon, A., Ellegaard, M., Mudie, P.J. and Harding, I.
 2001: The cyst-theca relationship of *Bitectatodinium tepikiense* (Dinophyceae). *European Journal of Phycology*, v.36, p.137–146.
- Li Wenben
 1974: Triassic and Early Jurassic spores and pollen. *Handbook of Stratigraphy and Palaeontology in South-West China*, p.362–379, pl.195–202; *Academica Sinica, Institute of Geology and Palaeontology, Science Press, Beijing, China*. (In Chinese.)
- Libert, M.A.
 1820: Sur un genre nouveau d'hépatiques, *Lejeunea*. *Annales générales des sciences physiques*, v.6, no.96, p.372–374.
- Liengjarern, M., Costa, L. and Downie, C.
 1980: Dinoflagellate cysts from the Upper Eocene-Lower Oligocene of the Isle of Wight. *Palaeontology*, v.23, p.475–499, pl.53–54.
- Lindgren, S.
 1984: Acid resistant peridinioid dinoflagellates from the Maastrichtian of Trelleborg, southern Sweden. *Acta Universitatis Stockholmiensis, Stockholm Contributions in Geology*, v.39, no.6, p.145–201.
- 1985: Nomenclatural notes on fossil peridinioid dinoflagellates. *Taxon*, v.34, p.670–671.
- Lindström, S.
 2002: *Lunnomidinium scaniense* Lindström, gen. et sp. nov., a new suessiacean dinoflagellate cyst from the Rhaetian of Scania, southern Sweden. *Review of Palaeobotany and Palynology*, v.120, p.247–261; pl.1–4.

- Lister, T.R.
1970: The acritarchs and chitinozoa from the Wenlock and Ludlow Series of the Ludlow and Millichope areas, Shropshire. *Palaeontographical Society Monographs*, v.124, no.1 (publication 528), p.1–100, pl.1–13.
- Lister, J.K. and Batten, D.J.
1988a: *Hurlandsia*, a new non-marine Early Cretaceous dinocyst genus. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.8, p.505–516.
1988b: Stratigraphic and palaeoenvironmental distribution of Early Cretaceous dinoflagellate cysts in the Hurlands Farm Borehole, West Sussex, England. *Palaeontographica, Abteilung B*, v.210, p.9–89, pl.1–13.
- Liu Zhili, Liu Xuexian and Zheng Yuefang
1992: Early Tertiary dinoflagellates and other algae from the Xialiaohe Depression. 133 p., 31 pl.; Nanjing University Press, Nanjing, China. (In Chinese with English abstract.)
- Locker, S.
1967: Die Sphaeren der Oberkreide und die sogenannte Orbulinaritfazies. *Geologie, Berlin*, v.16, no.7, p.761–864, pl.1–2.
- Loeblich, A.R. III
1965: Dinoflagellate nomenclature. *Taxon*, v.14, p.15–18.
1970: The amphiesma or dinoflagellate cell covering. North American Paleontological Convention, Chicago, September, 1969, Proceedings, part G, p.867–929.
1976: Dinoflagellate evolution: speculation and evidence. *Journal of Protozoology*, v.23, p.13–28.
- Loeblich, A.R. Jr.
1970: Morphology, ultrastructure and distribution of Paleozoic acritarchs. North American Paleontological Convention, Chicago, 1969, Proceedings, part G, v.2, p.705–788.
- Loeblich, A.R. Jr. and Loeblich, A.R. III
1966: Index to the genera, subgenera, and sections of the Pyrrhophyta. *Studies in Tropical Oceanography*, no.3, x+94 p.
1968: Index to the genera, subgenera, and sections of the Pyrrhophyta, II. *Journal of Paleontology*, v.42, p.210–213.
1969: Index to the genera, subgenera, and sections of the Pyrrhophyta, III. *Journal of Paleontology*, v.43, p.193–198.
1970a: Index to the genera, subgenera and sections of the Pyrrhophyta, IV. *Journal of Paleontology*, v.44, p.536–543.
1970b: Index to genera, subgenera and sections of the Pyrrhophyta. *Phycologia*, v.9, p.199–203.
1971: Index to the genera, subgenera, and sections of the Pyrrhophyta, VI. *Phycologia*, v.10, p.309–314.
- Loeblich, A.R. Jr. and Tappan, H.
1976: Some new and revised organic-walled phytoplankton microfossil genera. *Journal of Paleontology*, v.50, no.2, p.301–308.
1977: *Senegalinium* Jain and Millepieid, 1973, correct name for *Alterbia* Lentin and Williams, 1975, a dinoflagellate. *Micropaleontology*, v.23, p.368.
- Loeblich, A.R. Jr. and Wicander, E.R.

1976: Organic-walled microplankton from the Lower Devonian Late Gedinnian Haragan and Bois d'Arc Formations of Oklahoma, U.S.A., Part 1. *Palaeontographica*, Abteilung B, v.159, no.1–3, p.1–39, pl.1–12.

Lohmann, H.

1904: Eier und sogenannte Cysten der Plankton-Expedition. Anhang: Cyphonautes. Ergebnisse der Plankton-Expedition der Humboldt-Stiftung, Band IV. N., 61 p., 7 pl.; Lipsius und Tischer, Kiel, Germany.

1920: Die Bevölkerung des Ozeans mit Plankton nach den Ergebnissen der Zentrifugenfänge während der Ausreise der Deutschland 1911, zugleich ein Beitrag zur Biologie des Atlantischen Ozeans. *Archiv für Biontologie*, v.4, p.1–617.

Londeix, L. and Jan du Chêne, R.

1988: *Ectosphaeropsis*, nouveau genre de dinoflagellé de la région stratotypique du Burdigalien Bordelais (France). *Ectosphaeropsis* a new genus of dinoflagellate cyst from the Burdigalian type area near Bordeaux (France). *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.12, no.1, p.251–265, pl.1–3.

Londeix, L., Benzakour, M. and de Vernal, A.

1992: *Impagidinium bacatum*, a new dinoflagellate cyst species from the Mediterranean Pliocene: systematics, biostratigraphy and paleoecology. *Geobios*, v.25, no.6, p.695–702.

Londeix, L., Pourtoy, D. and Fenton, J.P.G.

1996: The presence of *Dinogymnium* (Dinophyceae) in Lower Cretaceous sediments from the northwest Tethys (southeast France and western Switzerland) and Gulf of Mexico areas: stratigraphic and systematic consequences. *Review of Palaeobotany and Palynology*, v.92, p.367–382, pl.1.

Londeix, L., Benzakour, M., de Vernal, A., Turon, J.-L. and Suc, J.-P.

1999: Late Neogene dinoflagellate cyst assemblages from the Strait of Sicily, central Mediterranean Sea: paleoecological and biostratigraphical implications. In: Wrenn, J.H., Suc, J.-P. and Leroy, S.A.G. (editors), *The Pliocene: Time of Change*, p.65–91; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

Londeix, L., Herreyre, Y., Turon, J.-L. and Fletcher, W.

2009: Last glacial to Holocene hydrology of the Marmara Sea inferred from a dinoflagellate cyst record. *Review of Palaeobotany and Palynology*, v.158, p.52–71, pl.1–5.

2010: Erratum to "Last glacial to Holocene hydrology of the Marmara Sea inferred from a dinoflagellate cyst record." *Review of Palaeobotany and Palynology*, v.158, p.52–71.

Lorenz, T.

1902: Geologische Studien im Grenzgebiete zwischen helvetischer und ostalpiner Fazies. *Berichte, Naturforschende Gesellschaft (Freiburg)*, v.12, p.34–95, pl.1–9.

Louwye, S.

1997: New dinoflagellate cyst species from the Upper Cretaceous subsurface deposits of western Belgium. *Annales de la Société géologique de Belgique*, v.118, no.2, p.147–159, pl.1–2.

1999: New species of organic-walled dinoflagellates and acritarchs from the Upper Miocene Diest Formation, northern Belgium (southern North Sea Basin). *Review of Palaeobotany and Palynology*, v.107, p.109–123, 5 pl.

2001: New species of dinoflagellate cysts from the Berchem Formation, Miocene, northern Belgium (southern North Sea Basin). *Geobios*, v.34, no.2, p.121–130.

Louwye, S. and De Schepper, S.

2010: The Miocene-Pliocene hiatus in the southern North Sea Basin (northern Belgium) revealed by dinoflagellate cysts. *Geological Magazine*, v.147, no.05, p.760–776.

- Louwye, S., Head, M.J. and De Schepper, S.
2004: Dinoflagellate cyst stratigraphy and palaeoecology of the Pliocene in northern Belgium, southern North Sea Basin. *Geological Magazine*, v.141, no.3, p.353–378.
- Louwye, S., Mertens, K.N. and Vercauteren, D.
2008: New dinoflagellate cysts from the Miocene of the Porcupine Basin, offshore southwest Ireland. *Palynology*, v.32, p 131–142.
- Lu Mengning and Wang Ruoshan
1980: The discovery of microflora from the Maantang Formation in the north-west Sichuan Basin and its significance. *Acta Botanica Sinica*, v.22, no.4, p.370–378, pl.1–3. (In Chinese with English summary.)
- Lucas-Clark, J.
1984: Morphology of species of *Litosphaeridium* (Cretaceous, Dinophyceae). *Palynology*, v.8, p.165–193, pl.1–5.
1987: *Wigginsella* n. gen., *Spongodinium*, and *Apteodinium* as members of the Aptiana-Ventriosum complex (fossil Dinophyceae). *Palynology*, v.11, p.155–184, pl.1–5.
2006: Small peridinioid dinoflagellate cysts from the Paleocene of South Carolina, U.S.A. *Palynology*, v.30, p.183–210, pl.1–5.
2007: *Litosphaeridium* too: the new dinoflagellate cyst species from the Cretaceous of California. *Palynology*, v.31, p.205–217, pl.1–2.
- Lucas-Clark, J. and Helenes, J.
2000: *Ynezidinium*, a new genus within the Gonyaulacaceae (fossil Dinophyceae). *Journal of Micropalaeontology*, v.19, pt.2, p.113–121, pl.1–2.
- Lund, J.J.
1996: Jurassic and Cretaceous microfloras used to determine the stratigraphical succession of steeply dipping strata along the Pfahl Fault, Bodenwöhr Halfgraben, ne Bavaria. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.200, p.133–147.
2002: A Lower Oligocene Norwegian Sea dinoflagellate cyst found in the North Sea and in the Rupelian type area in Belgium. In: North European Cenozoic Stratigraphy; Proceedings of the 8th Biannual Meeting of the Regional Committee on Northern Neogene Stratigraphy/Regional Committee on Northern Paleogene Stratigraphy (RCNNS/RCNPS), Flintbek, p.83–89, 1 pl.
- Lund, J.J. and Ecke, H.-H.
1988: Dinoflagellate cyst stratigraphy applied to the Middle to Late Jurassic of the Regensburg-Passau area, Bavaria. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.12, no.1, p.345–359, pl.1–3.
- Lund, J.J., Lund-Christensen, J. and Strauss, C.
1993: Dinoflagellate cyst biostratigraphy and palaeoenvironmental analysis in the Miocene of the Regional Committee on Northern Neogene Stratigraphy (RCNNS) research well Nieder Ochtenhausen, NW Germany. *Festschrift für Prof. W. Krutzsch, Museum für Naturkunde der Humboldt-Universität der Berlin*, p. 27–37.
- Luo Zhaohe, Yang Weidong, Xu Bin and Gu Haifeng
2013: First record of *Biecheleria cincta* (Dinophyceae) from Chinese coasts, with morphological and molecular characterization of the strains. *Chinese Journal of Oceanology and Limnology*, v.31 no.4, p.835–845.
- Macko, S.
1957: Lower Miocene pollen flora from the valley of Keodnicka near Gliwice (Upper Silesia). *Prace Wrocławskiego Towarzystwa Naukowego*, ser.13, no.88, p.1–313, pl.1–80.
- MacRae, R.A., Hills, L.V. and McIntyre, D.J.

1996: The paleoecological significance of new species of *Limbicysta* (Acritarcha) from the upper Albian of the Canadian Arctic Islands. *Canadian Journal of Earth Sciences*, v 33, p.1475–1486, pl.1–2.

Mädler, K.A.

1963: III. Die figurierten organischen Bestandteile der Posidonienschiefer. *Geologisches Jahrbuch, Beihefte*, v.58, p.287–406, pl.15–30.

Mahmoud, M.S.

1998: Palynology of middle Cretaceous-Tertiary sequence of Mersa Matruh-1 well, northern Western Desert, Egypt. *Neues Jahrbuch für Geologie und Paläontologie Abhandlungen*, v.209, no.1, p.79–104.

Maier, D.

1959: Planktonuntersuchungen in tertiären und quartären marinen Sedimenten. Ein Beitrag zur Systematik, Stratigraphie und Ökologie der Coccolithophorideen, Dinoflagellaten und Hystrichosphaerideen vom Oligozän bis zum Pleistozän. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.107, no.3, p.278–340, pl.27–33.

Malinowskiej, L. and Piwockiego, M.

1996: Budowa Geologiczna Polski. Tom III. Atlas Skamieniałości Przewodnych i Charakterystycznych. Część 3a. Kenozoik. Trzeciorzęd. Paleogen. 1074 p.; Polska Agencja Ekologiczna, Warsaw, Poland.

Malloy, R.E.

1972: An Upper Cretaceous dinoflagellate cyst lineage from Gabon, west Africa. *Geoscience and Man*, v.4, p.57–65, pl.1.

Mangin, L.

1911: Sur l'existence d'individus dextres et senestres chez certains peridiniens. *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, v.153, p.27–32.

1913: Sur la flore planctonique de la rade de Saint-Vaast-La Hougue 1908–1912. *Muséum national d'histoire naturelle (France), Nouvelles archives, Série 5*, v.5, p.147–241.

Mantell, G.A.

1844: *The Medals of Creation: or, First Lessons in Geology and the Study of Organic Remains*. 1016 p., 108 pl. (in two volumes); Henry G. Bohn, London, U.K.

1850: *A Pictorial Atlas of Fossil Remains Consisting of Coloured Illustrations Selected from Parkinson's "Organic Remains of a Former World", and Artis's "Antediluvian Phytology"*. xii+207 p., 74 pl.; Henry G. Bohn, London, U.K.

1854: *The Medals of Creation; or, First Lessons in Geology and the Study of Organic Remains; Second Edition*. 930 p., 6 pl. (in two volumes); Henry G. Bohn, London, U.K.

Mantle, D.J.

2005: New dinoflagellate cyst species from the upper Callovian-lower Oxfordian *Rigaudella aemula* Zone, Timor Sea, northwestern Australia. *Review of Palaeobotany and Palynology*, v.135, p.245–264, pl.1–4.

2009a: Palynology, sequence stratigraphy, and palaeoenvironments of Middle to Upper Jurassic strata, Bayu-Undan Field, Timor Sea region. Part one. *Palaeontographica Abteilung B*, v.280, nos.1–3, p.1–86, pl.1–15.

2009b: Palynology, sequence stratigraphy, and palaeoenvironments of Middle to Upper Jurassic strata, Bayu-Undan Field, Timor Sea region. Part two. *Palaeontographica Abteilung B*, v.280, nos.4–6, p.87–212, pl.1–17.

Mantle, D.J. and Riding, J.B.

2012: Palynology of the Middle Jurassic (Bajocian-Bathonian) *Wanaea verrucosa* dinoflagellate cyst zone of the North West Shelf of Australia. *Review of Palaeobotany and Palynology*, v.180, p.41–78, pl.1–10.

Manum, S.B.

1960: Some dinoflagellates and hystrichosphaerids from the Lower Tertiary of Spitsbergen. *Nytt Magasin for Botanikk*, v.8, p.17–26, pl.1.

1963: Some new species of *Deflandrea* and their probable affinity with *Peridinium*. *Norsk Polarinstitutt, Årbok* 1962, p.55–67, pl.1–3.

1979: Two new Tertiary dinocyst genera from the Norwegian Sea: *Lophocysta* and *Evittosphaerula*. *Review of Palaeobotany and Palynology*, v.28, p.237–248, pl.1–2.

Manum, S.B. and Cookson, I.C.

1964: Cretaceous microplankton in a sample from Graham Island, arctic Canada, collected during the second "Fram" expedition (1898-1902). With notes on microplankton from the Hassel Formation, Ellef Ringnes Island. *Norske Videnskaps-Akademi i Oslo, I. Matematisk-Naturvidenskapelig Klasse, Skrifter, Ny Serie*, no.17, p.1–36, pl.1–7.

Manum, S.B. and Williams, G.L.

1995: Hypocystal archeopyles in the dinoflagellate cyst genus *Caligodinium* Drugg. *Palynology*, v.19, p.183–190.

Manum, S.B., Boulter, M.C., Gunnarsdottir, H., Rangnes, K. and Scholze, A.

1989: 32. Eocene to Miocene palynology of the Norwegian Sea (ODP Leg 104). In: Eldholm, O. et al., *Ocean Drilling Program, Proceedings, Scientific Results, Leg 104*, College Station, Texas, v.104, p.611–639, pl.1–23.

Mao Shaozhi

1988: Palaeogene dinoflagellates from Antarctica. *Acta Micropalaeontologica Sinica*, v.5, p.237–252, pl.1–2. (In Chinese with English summary.)

1989: V. Dinoflagellata. In: Hao Yichun, Mao Shaozhi, Ruan Peihua, Su Xin, Sun Sheping, Wang Zhenru, Yin Jiayun and Zheng Hong, *Quaternary microbiotas and their geological significance from northern Xisha Trench of South China Sea*, p.132–147, pl.26–31; China University of Geosciences Press, Wuhan, China.

Mao Shaozhi and Mohr, B.

1992: 20. Late Cretaceous dinoflagellate cysts (?Santonian-Maestrichtian) from the southern Indian Ocean (Hole 748C). In: Wise, S.W. Jr. et al., *Proceedings of the Ocean Drilling Program, Scientific Results*, v.120, p.307–341, pl.1–11.

1995: Middle Eocene dinocysts from Bruce Bank (Scotia Sea, Antarctica) and their paleoenvironmental and paleogeographic implications. *Review of Palaeobotany and Palynology*, v.86, p.235–263, pl.1–7.

Mao Shaozhi and Norris, G.

1988: Late Cretaceous — Early Tertiary dinoflagellates and acritarchs from the Kashi area, Tarim Basin, Xinjiang Province, China. *Royal Ontario Museum, Life Sciences Division, Contributions*, no.150, p.1–93, pl.1–16.

Mao Shaozhi, Zhu Shenzhao, Mao Guoxing, Wang Congfeng, Tong Linfen, Xiong Yuwen, Qu Xinguo, Lin Guifang and Ma Xinxiang

1995: Early Tertiary Terrigenous Dinoflagellates and Other Planktonic Algae from Henan Province and their Significance in Oil/Gas Prospecting. 107 p., 13 pl.; Press of China University of Geosciences, Beijing, China. (In Chinese with English abstract.)

Mao Shaozhi, Wan Chunbiao and Qiao Xiayun

1999: Cretaceous nonmarine dinoflagellates from northeast China. *Grana*, v.38, nos.2–3, p.144–161, pl.1–7.

Marheinecke, U.

1986: Dinoflagellaten des Maastrichtium der Grube Hemmoor (Niedersachsen). *Geologisches Jahrbuch, Hannover, Reihe A*, v.93, p.3–93, pl.1–22.

1992: Monographie der Dinozysten, Acritarcha und Chlorophyta des Maastrichtium von Hemmoor (Niedersachsen). *Palaeontographica*, Abteilung B, v.227, no.1–6, p.1–173, pl.1–30.

Marret, F. and de Vernal, A.

1997: Dinoflagellate cyst distribution in surface sediments of the southern Indian Ocean. *Marine Micropaleontology*, v.29, p.367–392, pl.1–5.

Marret, F. and Kim, S.-Y.

2009: *Operculodinium aguinauwense* sp. nov., a dinoflagellate cyst from the Late Pleistocene and recent sediments of the east equatorial Atlantic Ocean. *Palynology*, v.33, p.125–139, pl.1–5.

Marret, F., de Vernal, A., Pedersen, T.F. and McDonald, D.

2001: Middle Pleistocene to Holocene palynostratigraphy of Ocean Drilling Program Site 887 in the Gulf of Alaska, northeastern North Pacific. *Canadian Journal of Earth Sciences*, v.38, no.3, p.373–386.

Marret, F., Leroy, S. and Chalié, F.

2004: New organic-walled dinoflagellate cysts from recent sediments of central Asian seas. Review of Palaeobotany and Palynology, v.129, p.1–20, pl.1–5.

Marshall, N.G.

1988: A Santonian dinoflagellate assemblage from the Gippsland Basin, southeastern Australia. In: Jell, P.A. and Playford, G. (editors), *Palynological and Palaeobotanical Studies in Honour of Basil E. Balme; Memoir of the Association of Australasian Palaeontologists*, no.5, p.195–215.

1989: An unusual assemblage of algal cysts from the Late Cretaceous of the Gippsland Basin, southeastern Australia. *Palynology*, v.13, p.21–56, pl.1–9.

1990a: Campanian dinoflagellates from southeastern Australia. *Alcheringa*, v.14, p.1–38.

1990b: The dinoflagellate *Canninginopsis* Cookson and Eisenack 1962 from the Cretaceous of the Perth and Gippsland Basins, Australia. *Alcheringa*, v.14, p.77–87.

Marshall, K.L. and Batten, D.J.

1988: Dinoflagellate cyst associations in Cenomanian-Turonian "black shale" sequences of northern Europe. Review of Palaeobotany and Palynology, v.54, p.85–103, pl.1–3.

Marszalek, D.S.

1975: Calcispheres ultrastructure and skeletal aragonite from the alga *Acetabularia antillana*. *Journal of Sedimentary Petrology*, v.45, p.266–271.

Martin, F.

1966a: Les acritarches du sondage de la brasserie Lust, à Kortrijk (Courtrai) (Silurien belge). *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie*, v.74, no.2, p.354–400, pl.1. (The pages of the reprint of this publication are numbered 1–47.)

1966b: Les acritarches de Sart-Bernard (Ordovicien belge). *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie*, v.74, no.2, p.423–444. (The pages of the reprint of this publication are numbered 1–21.)

1969: Les acritarches de l'Ordovicien et du Silurien belges. Détermination et valeur stratigraphique. *Mémoire de l'Institut royal des sciences naturelles de Belgique*, no.160, p.1–175, pl.1–8. (Cover date 1968, issue date 1969.)

1972: Les acritarches de l'Ordovicien inférieur de la Montagne Noire (Hérault, France). *Bulletin de l'Institut royal des sciences naturelles de Belgique, sciences de la terre*, v.48, no.10, p.1–61, pl.1–11.

- 1973: Ordovicien supérieur et Silurien inférieur à Deerlijk (Belgique). Mémoire de l'Institut royal des sciences naturelles de Belgique, no.174, p.1–71, pl.1–8.
- 1981: Acritarches du Famennien inférieur à Villers-sur-Lesse (Belgique). Bulletin de l'Institut royal des sciences naturelles de Belgique, Sciences de la terre, v.52, no.2, p.1–55, pl.1–6.
- 1984: Acritarches du Frasnien supérieur et du Famennien inférieur du bord meridional du Bassin de Dinant (Ardenne belge). Bulletin de l'Institut royal des sciences naturelles de Belgique, Sciences de la terre, v.55, no.7, p.1–57, pl.1–13.
- Martin, F. and Dean, W.T.
1988: Middle and Upper Cambrian acritarch and trilobite zonation at Manuels River and Random Island, eastern Newfoundland. Geological Survey of Canada, Bulletin, no. 381, 91 p., 18 pl.
- Martínez, M.A., Quattrocchio, M. and Sarjeant, W.A.S.
1999: *Jansonia psilata* n. sp., a Middle Jurassic dinoflagellate from the Neuquén Basin, Argentina. Revista Española de Micropaleontología, v.31, no.2, p.255–263.
- Maslov, V.P.
1956: 3. Hystrichosphaera-spory, tsisty ili rastitelnye organizmy? In: Iskopaemye Izvestkovye Vodorosli SSSR; Akademiya Nauk SSSR, Institut Geologicheskikh Nauk, Moscow, Trudy, no.160, p.258–264, pl.86.
- Masters, B.A. and Scott, R.W.
1978: Microstructure, affinities and systematics of Cretaceous calcispheres. Micropaleontology, v.24, p.210–221, pl.1–2.
- Masure, E.
1984: L'indice de diversité et les dominances des "communautés" de kystes de dinoflagellés: marqueurs bathymétriques; forage 398 D, croisière 47 B. Bulletin de la Société géologique de France, 7e série, v.26, no.1, p.93–111, pl.1.
1985: Les kystes de dinoflagellés de l'autoroute A10. Cretaceous Research, v.6, p.199–206.
1986: *Corradinisphaeridium*, nouveau genre de dinoflagellés du Sénonien d'Italie et de France. Revue de micropaléontologie, v.29, p.109–119, pl.1–2.
1988a: Le genre *Maghrebinia* Below, 1981, nouvelle interprétation et amendement. The genus *Maghrebinia* Below, 1981, a new interpretation and amendment. Bulletin des Centres de recherches exploration-production Elf-Aquitaine, v.12, no.1, p.361–381, pl.1–6.
1988b: 7. Albian-Cenomanian dinoflagellate cysts from Sites 627 and 635, Leg 101, Bahamas. In: Austin, J.A. Jr. et al., Ocean Drilling Program, Scientific Results, Proceedings, v.101, p.121–138, pl.1–5.
1988c: 25. Berriasian to Aptian dinoflagellate cysts from the Galicia Margin, offshore Spain, Sites 638 and 639, ODP Leg 103. Ocean Drilling Program, Scientific Results, Proceedings, v.103, p.433–444, pl.1–3.
1991: Morphology of the dinoflagellate genus *Atopodinium* Drugg emend., senior synonym of *Maghrebinia* Below and *Bejuia* Stover and Williams. Palynology, v.15, p.63–80, pl.1–4.
- Masure, E. and Arai, M.
2003: Les kystes de dinoflagellés du Crétacé moyen de la marge atlantique brésilienne, le bassin de Santos. Dinoflagellate cysts from the middle Cretaceous of the Brazilian Atlantic margin, the Santos Basin. Revue de micropaléontologie, v.46, p.47–64, pl.1–2.
- Masure, E., Tea, J. and Yao, R.

- 1996: The dinoflagellate *Andalusiella*: emendation of the genus, revision of species, *A. ivoirensis* Masure, Tea and Yao, sp. nov. Review of Palaeobotany and Palynology, v.91, p.171–186, pl.1–3.
- Masure, E., Rauscher, R., Dejax, J., Schuler, M. and Ferré, B.
1998: 24. Cretaceous-Paleocene palynology from the Côte d'Ivoire-Ghana transform margin, sites 959, 960, 961, and 962. Proceedings of the Ocean Drilling Program, Scientific Results, v. 159, p.253–276, pl.1–5.
- Masure, E., Dejax, J. and De Ploëg, G.
2013: Blowin' in the wind ... 100 Ma old multi-staged dinoflagellate with sexual fusion trapped in amber: marine-freshwater transition. Palaeogeography, Palaeoclimatology, Palaeoecology, v.388, p.128–144, pl.1–7.
- Matsuoka, K.
1974: Some plant microfossils from the Miocene Fujiwara Group, Nara, central Japan. Palaeontological Society of Japan, Transactions and Proceedings, New Series, no.94, p.319–340, pl.44–46.
- 1976: Paleoenvironmental study of the Saho and the Saidaiji Formations from a view point of palynology. Mizunami Fossil Museum, Bulletin 3, p.99–117, pl.25–30.
- 1979: *Hystriocholpoma* from Pleistocene sediments in Okinawa-Jima, Japan. Review of Palaeobotany and Palynology, v.28, p.47–60, pl.1–2.
- 1983a: List of synonyms of late Pleistocene to Holocene dinoflagellate cysts. I. *Gonyaulax* group. News of Osaka Micropaleontologists, no.11, p.1–32.
- 1983b: Late Cenozoic dinoflagellates and acritarchs in the Niigata district, central Japan. Palaeontographica, Abteilung B, v.187, p.89–154, pl.1–15.
- 1983c: A new dinoflagellate cyst (*Danea heterospinosa*) from the Eocene of central Java, Indonesia. Review of Palaeobotany and Palynology, v.40, p.115–126, pl.1–2.
- 1984a: Some dinoflagellate cysts from the Nanggulan Formation in central Java, Indonesia. Palaeontology Society of Japan, Transactions and Proceedings, New Series, no.134, p.374–387, pl.71–74.
- 1984b: List of synonyms of late Pleistocene-to-Holocene dinoflagellate cysts II. *Peridinium* and *Gymnodinium* groups. News of Osaka Micropaleontologists, no.12, p.1–15.
- 1985a: Organic-walled dinoflagellate cysts from surface sediments of Nagasaki Bay and Senzaki Bay, west Japan. Faculty of Liberal Arts, Nagasaki University, Natural Science, Bulletin, v.25, no.2, p.21–115, pl.1–17.
- 1985b: Distribution of the dinoflagellate cyst in surface sediments of the Tsushima Warm Current. The Quaternary Research, v.24, no.1, p.1–12, pl.1. (In Japanese with English abstract.)
- 1987: Organic-walled dinoflagellate cysts from surface sediments of Akkeshi Bay and Lake Saroma, north Japan. Faculty of Liberal Arts, Nagasaki University, Natural Science, Bulletin, v.28, no.1, p.35–123, pl.1–19.
- 1989: Morphological features of the cyst of *Pyrodinium bahamense* var. *compressum*. In: Hallegraeff, G.M. and Maclean, J.L. (editors), Biology, epidemiology and management of *Pyrodinium* red tides; International Center for Living Aquatic Resources Management (Manila, Philippines) Conference Proceedings, v.21, p.219–229.
- 1991: Marine palynomorphs in Holocene sediments of the Isahaya Plain, west Kyushu, Japan. Japanese Journal of Palynology, v.37, p.1–10, 1 pl. (In Japanese, with English abstract.)
- 1992: Peridiniacean cyst genus *Xandarodinium* in the Miocene Kaminoyama Formation in the western part of Zao Volcano, Yamagata, north Japan. In: Ishizaki, K. and Saito, T. (editors), Centenary of Japanese Micropaleontology, p.449–455; Terra Scientific Publishing Company, Tokyo, Japan.

- Matsuoka, K. and Bujak, J.P.
1988: Cenozoic dinoflagellate cysts from the Navarin Basin, Norton Sound and St. George Basin, Bering Sea. Nagasaki University, Faculty of Liberal Arts, Natural Science, Bulletin, v.29, no.1, p.1–147, pl.1–19.
- Matsuoka, K. and Head, M.J.
1992: Taxonomic revision of the Neogene marine palynomorphs *Cyclopsiella granosa* (Matsuoka) and *Batiacasphaera minuta* (Matsuoka) and a new species of *Pyxidinopsis* Habib (Dinophyceae) from the Miocene of the Labrador Sea. In: Head, M.J. and Wrenn, J.H. (editors), Neogene and Quaternary Dinoflagellate Cysts and Acritarchs, p.165–180, pl.1–3; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.
- 2013: Clarifying cyst-motile stage relationships in dinoflagellates. In Lewis, J.M, Marret, F. and Bradley, L. (eds); Biological and geological perspectives of dinoflagellates. The Micropalaeontological Society, Special Publications, Geological Society, London, p.325–350.
- Matsuoka, K., Bujak, J.P. and Shimazaki, T.
1987: Late Cenozoic dinoflagellate cyst biostratigraphy from the west coast of northern Japan. Micropaleontology, v.33, p.214–229, pl.1–2.
- Matsuoka, K., Fukuyo, Y., Jaafar, M.H. and de Silva, M.W.R.N.
1989: Occurrence of the cyst of *Pyrodinium bahamense* var. *compressum* in surface sediments of Brunei Bay. In: Hallegraeff, G.M. and Maclean, J.L. (editors), Biology, epidemiology and management of *Pyrodinium* red tides; International Center for Living Aquatic Resources Management (Manila, Philippines) Conference Proceedings, v.21, p.89–95.
- Matsuoka, K., McMinn, A. and Wrenn, J.H.
1997: Restudy of the holotype of *Operculodinium centrocarpum* (Deflandre & Cookson) Wall (Dinophyceae) from the Miocene of Australia, and the taxonomy of related species. Palynology, v.21, p.19–33, pl.1–4.
- Matsuoka, K., Kawami, H., Nagai, S., Iwataki, M. and Takayama, H.
2009: Re-examination of cyst-motile relationships of *Polykrikos kofoidii* Chatton and *Polykrikos schwartzii* Bütschli (Gymnodiniales, Dinophyceae). Review of Palaeobotany and Palynology, v.154, p.74–90.
- May, F.E.
1977: Functional morphology, paleoecology, and systematics of *Dinogymnium* tests. Palynology, v.1, p.103–121, pl.1–3.
- 1980: Dinoflagellate cysts of the Gymnodiniaceae, Peridiniaceae, and Gonyaulacaceae from the Upper Cretaceous Monmouth Group, Atlantic Highlands, New Jersey. Palaeontographica, Abteilung B, v.172, p.10–116, pl.1–23.
- May, F.E., Stevens, J. and Partridge, A.D.
1987: The Early Cretaceous dinoflagellate, *Dissimulidinium lobispinosum* gen. et sp. nov. from Western Australia. In: Jell, P.A. (editor), Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists, no.4, p.199–204.
- McIntyre, D.J.
1975: Morphologic changes in *Deflandrea* from a Campanian section, District of Mackenzie, N.W.T., Canada. Geoscience and Man, v.11, p.61–76, pl.1–4.
- McIntyre, D.J. and Brideaux, W.W.
1980: Valanginian miospore and microplankton assemblages from the northern Richardson Mountains, District of Mackenzie, Canada. Geological Survey of Canada, Bulletin, no.320, 57 p., 12 pl.
- McLean, D.M.
1971: Transfer of *Baltisphaeridium septatum* Cookson and Eisenack, 1967, from the Acritarcha to the Dinophyceae. Journal of Paleontology, v.45, p.729–730, pl.88.

- 1972: *Cladopyxidium septatum*, n. gen., n. sp., possible Tertiary ancestor of the modern dinoflagellate *Cladopyxis hemibrachiata* Balech, 1964. *Journal of Paleontology*, v.46, p.861–863, pl.1.
- 1973a: Emendation and transfer of *Eisenackia* (Pyrrhophyta) from the Microdiniaceae to the Gonyaulacaceae. *Geologiska Föreningens i Stockholm Förhandlingar*, v.95, p.261–265.
- 1973b: A problematical dinoflagellate from the Tertiary of Virginia and Maryland. *Palaeontology*, v.16, p.729–732, pl.90.
- 1974: Two new Paleocene dinoflagellates from Virginia and Maryland. *Palaeontology*, v.17, p.65–70, pl.8.
- 1976: *Eocladopyxis peniculatum* Morgenroth, 1966, Early Tertiary ancestor of the modern dinoflagellate *Pyrodinium bahamense* Plate, 1906. *Micropaleontology*, v.22, p.347–351, pl.1.
- McMinn, A.
1988: Outline of a Late Cretaceous dinoflagellate zonation of northwestern Australia. *Alcheringa*, v.12, p.137–156.
- 1991: Recent dinoflagellate cysts from estuaries on the central coast of New South Wales, Australia. *Micropaleontology*, v.37, no.3, p.269–287, pl.1–5.
- 1992: 21. Neogene dinoflagellate distribution in the eastern Indian Ocean from Leg 123, Site 765. In: Gradstein, F.M. et al., *Ocean Drilling Program, Scientific Results, Proceedings*, v.123, p.429–441, pl.1–4.
- McMinn, A. and Sun Xuekun
1994: Recent dinoflagellate cysts from the Chatham Rise, Southern Ocean, east of New Zealand. *Palynology*, v.18, p.41–53, pl.1–3.
- McMinn, A., Bolch, C. and Hallegraeff, G.
1992: *Cobricosphaeridium* Harland and Sarjeant: dinoflagellate cyst or copepod egg? *Micropaleontology*, v.38, no.3, p.315–316, pl.1.
- McNeill, J., Barrie, F.R., Buck, W.R., Demoulin, V., Greuter, W., Hawksworth, D.L., Herendeen, P.S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W.F., Smith, G.F., Wiersema, J.H. and Turland, N.J.
2012: *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code)*. *Regnum Vegetabile* 154. Koeltz Scientific Books.
- Mehrotra, N.C.
1981: Fossil dinoflagellates from subcrop Garampani Limestone sediments of Garampani area in North Cachar Hills, Assam. *Geoscience Journal*, v.2, p.13–22, pl.1.
- 1983: Palynology of Mikir Formation in the type area. *Geoscience Journal*, v.4, no.1, p.1–34, pl.1–5.
- Mehrotra, N.C. and Aswal, H.S.
2003: Atlas of dinoflagellate cysts from Mesozoic-Tertiary sediments of Krishna-Godavari Basin. Volume 1: Late Jurassic-Cretaceous dinoflagellate cysts. *Paleontographica Indica*, no. 7, 146 p, 36 pl.
- Mehrotra, N.C. and Sah, S.C.D.
1982: Palynostratigraphy of Mikir Formation in the type area. *Geoscience Journal*, v.3, no.2, p.113–133, pl.1–3.
- Mehrotra, N.C. and Sarjeant, W.A.S.
1984a: Archeopyle type in the dinoflagellate cyst genus *Imbatodinium*: some new observations. *Micropaleontology*, v.30, no.2, p.213–222, pl.1–2.
- 1984b: *Dingodinium*, a dinoflagellate cyst genus exhibiting variation in archeopyle character. *Micropaleontology*, v.30, no.3, p.292–305, pl.1–4.

- 1984c: The dinoflagellate cyst genus *Polygonifera*; emendation and taxonomic stabilization. *Journal of Micropalaeontology*, v.3, no.1, p.43–53, pl.1–2.
- 1986: Early to middle Cretaceous dinoflagellate cysts from the Periyavadavadi Shallow Well-1, Cauvery Basin, India. *Geobios*, v.19, no.6, p.705–753, pl.1–11.
- 1987: Late Cretaceous to Early Tertiary dinoflagellate cysts from Narasapur Well-1, Godavari-Krishna Basin, south India. *Geobios*, v.20, no.2, p.149–191, pl.1–9.
- Mehrotra, N.C. and Singh, K.
2003: Atlas of dinoflagellate cysts from Mesozoic-Tertiary sediments of Krishna-Godavari Basin. Volume 2: Tertiary dinoflagellate cysts. *Paleontographica Indica*, no. 8, 135 p, 36 pl.
- Mehrotra, N.C. and Sinha, A.K.
1981: Further studies on microplankton from the Sangchamalla Formation (Upper Flysch) of Malla Johar area in the Tethyan zone of higher Kumaun Himalaya. In: Sinha, A.K. (editor), *Contemporary Geoscientific Researches in Himalaya*, v.1, p.151–160; Bishen Singh Mahendra Pal Singh, Dehra Dun, India.
- Meier, K.J.S., Janofske, D. and Willems, H.
2002: New calcareous dinoflagellates (Calciodinelloideae) from the Mediterranean Sea. *Journal of Phycology*, v.48, p.321–354.
- Menéndez, C.A.
1965: Microplankton fósil de sedimentos Terciarios y Cretácicos del norte de Tierra del Fuego (Argentina). *Ameghiniana*, v.4, no.1, p.7–15, pl.1–3.
- Merrill, J.A.
1895: Fossil sponges of the flint nodules in the Lower Cretaceous of Texas. *Museum of Comparative Zoology, Harvard College, Bulletin (Geology Series III)*, v.28, no.1, p.1–26, pl.1.
- Mertens, K.N., Takano, Y., Head, M.J. and Matsuoka, K.
2014: Living fossils in the Indo-Pacific warm pool: a refuge for thermophilic dinoflagellates during glaciations. *Geology*, v.42, p.531–534.
- Mertens, K.N., Aydin, H., Uzar, S., Takano, Y., Yamaguchi, A. and Matsuoka, K.
2015: Relationship between the dinoflagellate cyst *Spiniferites pachydermus* and *Gonyaulax ellegaardiae* sp. nov. from Izmir Bay, Turkey, and molecular characterization. *Journal of Phycology*, v.51, p.560–573.
- Meunier, A.
1909: Microplankton des mers de Barents et de Kara. In: Duc d'Orléans, *Campagne Arctique de 1907*, 355 p., 37 pl.; C. Bulens, Brussels, Belgium.
- 1919: Microplankton de la mer Flamande. Partie 3. Les péridiniens. *Mémoires du Musée royal d'histoire naturelle de Belgique*, v.8, no.1, p.3–116, pl.15–21.
- Meuschen
1787: (Cited by Gerlach, 1961, p.198 but full reference not given.)
- Meyen
1833: (Cited by Gerlach, 1961, p.198, but full reference not given.)
- Michael, E.
1964: Mikroplankton und Sporomorphe aus dem nordwestdeutschen Barrême. *Hannover, Technische Universität, Mitteilungen Geologisches Institut*, v.2, p.22–48.
- Michoux, D.

1985: Palynostratigraphie de l'Éocène de Montfort-en-Chalosse (Landes, France). *Revue de Micropaléontologie*, v.28, p.138–153, pl.1–3.

1988: Dinoflagellate cysts of the *Wetzeliella*-complex from Eocene sediments of the Aquitaine Basin, southwestern France. *Palynology*, v.12, p.11–41, pl.1–11.

Miles, N.H.

1990: Three new dinoflagellate cysts from the Albian of the South Atlantic Ocean. *Palynology*, v.14, p.81–90, pl.1–3.

Millioud, M.E.

1969: Dinoflagellates and acritarchs from some western European Lower Cretaceous type localities. In: Brönnimann, P. and Renz, H.H. (editors), 1st International Conference on Planktonic Microfossils, Geneva, 1967, *Proceedings*, v.2, p.420–434, pl.1–3; E.J. Brill, Leiden, The Netherlands.

Moczyłowska, M.

1998: Cambrian acritarchs from Upper Silesia, Poland — biochronology, and tectonic implications. *Fossils and Strata*, no.46, 121 p.

Moerch

1852: (Cited by Gerlach, 1961, p.198, but full reference not given.)

Mohr, B.A.R. and Mao Shaozhi

1997: Maastrichtian dinocyst floras from Maud Rise and Georgia Basin (Southern Ocean): their stratigraphic and paleoenvironmental implications. *Palynology*, v.21, p.41–65, pl.1–2.

Molyneux, S.G.

1987: II. Appendix. Acritarchs and chitinozoa from the Arenig Series of south-west Wales. The Arenig Series in south Wales: stratigraphy and palaeontology; *Bulletin of the British Museum (Natural History), Geology*, v.41, no.3, p.309–364.

Monnet, B.

1993: Wechselseitige Beziehungen organischer und kalzitischer Komponenten beim Wandungsaufbau orthopithonelloider und obliquipithonelloider Calciodinellaceae Deflandre 1947. *Berliner Geowissenschaftliche Abhandlungen, Reihe E*, v.7, p.1–75, pl.1–16.

Monteil, E.

1990: Revision and emendation of dinocyst genus *Amphorula* Dodekova 1969. The concept of morphostratigraphy. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.14, no.2, p.597–609, pl.1–2.

1991a: Revision of the dinoflagellate cyst genus *Cometodinium* Deflandre & Courteville, 1939, emend.

Enantiomorphy in a fossil dinoflagellate cyst population. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.15, no.2, p.439–459, pl.1–6.

1991b: Morphology and systematics of the ceratioid group: a new morphographic approach. Revision and

emendation of the genus *Muderongia* Cookson and Eisenack 1958. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.15, no.2, p.461–505, pl.1–12.

1992a: Quelques nouvelles espèces-index de kystes de dinoflagellés (Tithonique-Valanginien) du sud-est de la France et de l'ouest de la Suisse. *Revue de Paléobiologie*, v.11, no.1, p.273–297, pl.1–8.

1992b: Kystes de dinoflagellés index (Tithonique-Valanginien) du sud-est de la France: proposition d'une nouvelle zonation palynologique. *Revue de Paléobiologie*, v.11, no.1, p.299–306.

- 1996: *Daveya boresphaera* gen. et sp. nov.: a valid name for the dinoflagellate cysts *Gonyaulacysta* sp.A Davey 1979 and sp.B Davey 1982, and some remarks regarding the formal status of *Muderongia "brevispinosa"* Iosifova 1996. Bulletin des Centres de recherche exploration-production Elf-Aquitaine, v.20, no.1, p.37–59, pl.1–8.
- 1997: *Nidarocysta jubilaea* gen. et sp. nov., a new gonyaulacacean dinoflagellate cyst marker for the Oxfordian-Kimmeridgian boundary in the European Boreal Province. *Nidarocysta jubilaea* gen. et sp. nov., un nouveau kyste de dinoflagellé gonyaulacoïde marqueur de la limite oxfordien-kimméridgien dans la province boréale européenne. Bulletin des Centres de recherche exploration-production Elf-Aquitaine, v.20, no.2, p.389–413, pl.1–8.
- Montresor, M., Zingone, A. and Marino, D.
1993: The calcareous resting cyst of *Pentapharsodinium tyrrhenicum* comb. nov. (Dinophyceae). Journal of Phycology, v.29, p.223–230.
- Montresor, M., Montesarchio, E., Marino, D. and Zingone, A.
1995: Calcareous dinoflagellate cysts in marine sediments of the Gulf of Naples (Mediterranean Sea). Review of Palaeobotany and Palynology, v.84, p.45–56, pl.1–3. (Cover date 1994, issue date 1995, according to G. Versteegh, personal communication)
- Montresor, M., Janofske, D. and Willems, H.
1997: The cyst-theca relationship in *Calciodinellum operosum* emend. (Peridinales, Dinophyceae) and a new approach for the study of calcareous cysts. Journal of Phycology, v.33, p.122–131.
- Moquin-Tandon, C.H.B.A.
1849: Salsolaceae. In de Candolle, A.L.P.P. (ed.); Prodrum systematis naturalis regni vegetabilis, v.13, no.2. p.47–219
- Morbey, S.J.
1975: The palynostratigraphy of the Rhaetian Stage, Upper Triassic in the Kendelbachgraben, Austria. Palaeontographica, Abteilung B, v.152, p.1–75, pl.1–19.
- Moreau-Benoit, A.
1974: Recherches de palynologie et de planctologie. Sur le Dévonien et quelques formations siluriennes dans le sud-est du Massif Armoricain. Mémoires de la Société géologique et minéralogique de Bretagne, no.18, p.1–248, pl.1–15.
- Morgan, R.
1975: Some Early Cretaceous organic-walled microplankton from the Great Australian Basin, Australia. Journal and Proceedings of the Royal Society of New South Wales, v.108, p.157–167, pl.1–3.
- 1977: Elucidation of the Cretaceous dinoflagellate *Diconodinium* Eisenack and Cookson, 1960, and related peridinioid species from Australia. Palynology, v.1, p.123–138, pl.1–2.
- 1980: Palynostratigraphy of the Australian early and middle Cretaceous. Geological Survey of New South Wales, Palaeontology Memoir, no.18, p.1–153, pl.1–38.
- Morgenroth, P.
1966a: Mikrofossilien und Konkretionen des nordwesteuropäischen Untereozäns. Palaeontographica, Abteilung B, v.119, no.1–3, p.1–53, pl.1–11.
- 1966b: Neue in organischer Substanz erhaltene Mikrofossilien des Oligozäns. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.127, p.1–12, pl.1–2.
- 1968: Zur Kenntnis der Dinoflagellaten und Hystrichosphaeridien des Danien. Geologisches Jahrbuch, Hannover, v.86, p.533–578, pl.41–48.

- 1970: Dinoflagellate cysts from the Lias Delta of Lühnde/Germany. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.136, no.3, p.345–359, pl.9–13.
- Morzadec-Kerfourn, M.-T.
1966: Étude des acritarches et dinoflagellés des sédiments vaseux de la Vallée de la Vilaine aux environs de Redon (Ille-et-Vilaine). *Bulletin de la Société géologique et minéralogique de Bretagne, Nouvelle série*, p.137–146, pl.1–4.
- Morzadec-Kerfourn, M.T.
1979: Étude des organismes, D — Les kystes de dinoflagellés. In: Burolet, P.F., Clairefond, P. and Winnock, E. (eds), *La mer pélagienne, Géologie Méditerranéenne*, v.6, no.1, p.221–246, pl.31–34.
- Moshkovitz, S.
1979: On the distribution of *Schizosphaerella punctulata* Deflandre and Dangeard and *Schizosphaerella astraea* n. sp. in the Liassic section of Stowell Park Borehole (Gloucestershire) and in some other Jurassic localities in England. *Eclogae Geologicae Helvetiae*, v.72, no.2, p.455–465.
- Moshkovitz, S. and Habib, D.
1993: Calcareous nannofossil and dinoflagellate stratigraphy of the Cretaceous-Tertiary boundary, Alabama and Georgia. *Micropaleontology*, v.39, no.2, p.167–191, pl.1–5.
- Mudie, P.J.
1987: Palynology and dinoflagellate biostratigraphy of Deep Sea Drilling Project Leg 94, Sites 607 and 611, North Atlantic Ocean. In: Ruddiman, W.F. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.94, p.785–812, pl.1–5. (Cover date 1986, issue date 1987.)
- Muir, M.D. and Sarjeant, W.A.S.
1978: The palynology of the Langdale Beds (Middle Jurassic) of Yorkshire and its stratigraphical implications. *Review of Palaeobotany and Palynology*, v.25, p.193–239, pl.1–7.
- Müller, C.
1976: Nannoplankton-Gemeinschaften aus dem Jung-Quartär des Golfes von Aden und des Roten Meeres. *Geologisches Jahrbuch, Reihe D*, v.17, p.33–77, pl.1–8.
- Murray, G. and Whitting, F.
1899: New Peridiniaceae from the Atlantic. *Linnean Society of London, Transactions, Botany, Series 2*, v.5, no.9, p.321–342, pl.27–33.
- Nagy, E.
1965: The microplankton occurring in the Neogene of the Mecsek Mountains. *Acta Botanica, Academiae Scientiarum Hungaricae*, v.11, p.197–216, pl.1–6.
1966: Investigations into the Neogenic microplankton of Hungary. *The Palaeobotanist*, v.15, no.1, p.38–46, pl.1–2.
1969: Palynological elaborations on the Miocene layers of the Mecsek Mountains. *A Magyar Állami Földtani Intézet Évkönyve*, v.52, no.2, p.233–652, pl.1–56.
- Nagy, I.
1966: A *Stomiosphaera* és a *Cadosina* nemzetség rétegtani szerepe a Mecseki felsőjuraban. *Földtani Közlöny*, v.96, no.1, p.86–104.
- Naumova, S.N.
1939: Spores and pollen of the coals of the U.S.S.R. Report of the XVII International Geological Congress, Moscow, 1937, v.1, p.353–364.
1950: Spory nizhnego silura. *Trudy Konferentsii po Sporovo-Pyltsevomu Analizu, 1948 Goda*, p. 165–190; *Geograficheskii Facultet, Izdatelstvo Moskovskogo Universiteta, Moscow, Russia*.

1968: Zonalnye kompleksy rastitelnykh mikrofosilii Dokembriya i nizhnego Kembriya Evrazii i ikh stratigraficheskoe znachenie. Stratigrafia nizhnego Paleozoya tsentralnoi Evropy; Akademiya Nauk SSSR, Mezhdunarodnyi Geologicheskii Kongres, XXIII Serriya, Doklady Sovetskikh Geologob, Problema 9, p.30–39, pl.1–2.

Neale, J.W. and Sarjeant, W.A.S.

1962: Microplankton from the Speeton Clay of Yorkshire. Geological Magazine, v.99, p.439–458, pl.19–20.

Nejad, E.G., Sarjeant, W.A.S. and Gygi, R.

1999: Palynology and paleoenvironment of the uppermost Bathonian and Oxfordian (Jurassic) of the northern Switzerland sedimentary basin. Schweizerische Paläontologische Abhandlungen, v.119, 69 p., 29 pl.

Neumann, F.A.

1990: The taxonomic status of *Wetzeliella samlandica* Eisenack, 1954. Review of Palaeobotany and Palynology, v.66, p.163.

Newton, E.T.

1875: On "tasmanite" and Australian "white coal". Geological Magazine, v.2, no.8, p.337–342, pl.10.

Nicolson, D.H.

1986: Species epithets and gender information. Taxon, v.35, no.2, p.323–328.

Nøhr-Hansen, H.

1986: Dinocyst stratigraphy of the Lower Kimmeridge Clay, Westbury, England. Geological Society of Denmark, Bulletin, v.35, p.31–51, pl.1–5.

1993: Dinoflagellate cyst stratigraphy of the Barremian to Albian, Lower Cretaceous, north-east Greenland. Grønlands Geologiske Undersøgelse, Bulletin, no.166, p.1–171, pl.1–30.

1996: Upper Cretaceous dinoflagellate cyst stratigraphy, onshore west Greenland. Grønlands Geologiske Undersøgelse, Bulletin, no.170, p.1–104, pl.1–19.

Nøhr-Hansen, H. and Dam, G

1999: *Trithyrodinium evittii* Drugg 1967 and *T. fragile* Davey 1969 an artificial split of one dinoflagellate cyst species — stratigraphic and palaeoenvironmental importance. Grana, v.38, nos.2–3, p.125–133.

Nøhr-Hansen, H. and Heilmann-Clausen, C.

2001: *Cerodinium kangiliense* and *Senegalinium iterlaaense* n. sp. — two new stratigraphically important Paleocene species from west Greenland and Denmark. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.219, nos.1–2, p.153–170.

Norris, G.

1965: Archeopyle structures in Upper Jurassic dinoflagellates from southern England. New Zealand Journal of Geology and Geophysics, v.8, p.792–806.

1978: Phylogeny and a revised supra-generic classification for Triassic-Quaternary organic-walled dinoflagellate cysts (Pyrrhophyta). Part II. Families and sub-orders of fossil dinoflagellates. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.156, no.1, p.1–30.

1986: Systematic and stratigraphic palynology of Eocene to Pliocene strata in the Imperial Nuktak C-22 well, Mackenzie Delta region, District of Mackenzie, N.W.T. Geological Survey of Canada, Bulletin 340, p.1–89, pl.1–14.

Norris, G. and Jux, U.

1984: Fine wall structure of selected Upper Jurassic gonyaulacystinean dinoflagellate cysts from southern England. *Palaeontographica*, Abteilung B, v.190, p.158–168, pl.1–6.

Norris, G. and Sarjeant, W.A.S.

1965: A descriptive index of genera of fossil Dinophyceae and Acritarcha. New Zealand Geological Survey, Paleontological Bulletin, no.40, 72 p.

Norvick, M.S.

1973: The microplankton genus *Disphaeria* Cookson and Eisenack emend. Bureau of Mineral Resources, Geology and Geophysics, Bulletin, v.140, p.45–46.

1976: Mid-Cretaceous microplankton from Bathurst Island. In: Norvick, M.S. and Burger, D., Palynology of the Cenomanian of Bathurst Island, Northern Territory, Australia; Bureau of Mineral Resources, Geology and Geophysics, Bulletin, v.151, p.21–113, pl.1–17.

Nowak, W.

1968: Stomiosferidy warstw cieszynskich (kimeryd-hoteryw) polskiego slaska Cieszynskiego i ich znaczenie stratygraficzne. *Rocznik Polskie Towarzystwo Geologiczne*, v.38, no.2–3, p.275–327, pl.25–31.

1974: *Stomiosphaerina* nov. gen. (incertae sedis) of the Upper Cretaceous in the Polish Flysch Carpathians. *Stomiosphaerina* nov. gen. (incertae sedis) z górnej kredy polskich Karpat Fliszowych. *Rocznik Polskiego Towarzystwa Geologicznego*, v.44, no.1, p.51–63, pl.1–4.

Núñez-Betelu, K. and Hills, L.V.

1998: A late Coniacian ceratioid dinoflagellate cyst, *Odontochitina octopus* sp. nov., from the Kanguk Formation, Canadian Arctic. *Canadian Journal of Earth Sciences*, v.35, p.923–930.

O'Connor, S.J. and Walker, D.

1993: Paleocene reservoirs of the Everest trend. In: J.R. Parker (editor), *Petroleum Geology of Northwest Europe: Proceedings of the 4th Conference*; p.145–160; Geological Society, London, England.

Odin, G.S.

2008: Description and illustration of forty-four gilianelles (microproblematica) and ten other microproblematica of the Cretaceous of the stratotype section at Tercis (Campanian-Maastrichtian boundary), south-west France. *Carnets de Géologie/notebooks on Geology Memoir*, CG2006, p.1–82.

2009: Description de nouvelles gilianelles (microproblematica) et de leurs expansions; identité, classification, évolution, distribution, biologie au Crétacé Supérieur. *Revue de Paléobiologie*, v.28, no.1, p.175–209.

Olaru, L.V.

1978a: Cercetări asupra distribuției stratigrafice a microflorei în flișul paleogen dintre văile Bistrița și Trotuș. *Institut de géologie et de géophysique, Bucharest, Mémoires*, v.27, p.5–158, pl.1–24.

1978b: Forme noi de microfloră din depozitele senoniene dintre Bistrița și Trotuș (Carpații Orientali). *Analele Științifice ale Universității, "Al. I. Cuza" din Iași (Serie Nouă), Secțiunea IIB, Geologie-Geografie*, v.24, p.35–40, pl.1.

Oleinik, E.S.

1975: Nekotorye novye i kharakternye vidy peridinei iz isfarinsko-khanabadskikh sloev (verkhonii eotsen) Tadzhikistana. In: *Voprosy Paleontologii Tadzhikistana*, p.224–243; Donish, Dushanbe, Tadzhikistan.

1976: Nekotorye novye i maloizychennye vidy peridinei i zelenykh vodoroslei iz paleogenovykh otlozhenii Tadzhikistana. *Paleontologicheskii Sbornik*, no.13, p.84–90.

Olsson, R.K. and Youssefina, I.

1979: Cretaceous Calcisphaerulidae from New Jersey. *Journal of Paleontology*, v.53, p.1085–1093, pl.1–2.

- Oreshkina, T.V., Iakovleva, A.I. and Shcherbinina, E.A.
2015: Micropaleontological analysis of Eocene sediments from eastern pre-Caspian region (Bore-hole no, 57, Shubarsay Mould, Kazakhstan. Bulletin of the Moscow Society of Naturalists. Geological Series, v.90, no.1, p.42–80. [in Russian].
- Ostenfeld, C.H.
1899: *Pachysphaera*. In: Knudsen, M. and Ostenfeld, C.H., Iagttagelser over Overfladevandets Temperatur, Saltholdighed og Plankton paa Islandske og Grønlandske Skibsrouter i 1898, p.52; Bianco Lunos Hof-Bogtrykkeri (F. Dreyer), Copenhagen, Denmark.
1903: Phytoplankton from the sea around the Faeröes. Botany of the Faeröes Based Upon Danish Investigations, Part II, p.558–612; Det Nordiske Forlag, Copenhagen, Denmark.
- Ostenfeld, C.H. and Schmidt, J.
1901: Plankton fra det Røde Hav og, Adenbugten. Dansk Naturhistorisk Forening, Copenhagen, Videnskabelige Meddelelser 1901, p.141–182.
- Ottone, E.G. and Pérez-Loinaze, V.S.
2002: A new dinoflagellate from the Lower Cretaceous of Argentina. *Ameghiniana*, v.39, no.1, p.117–120.
- Ouyang Shu
1979: Notes on some new miospore genera from Permo-Carboniferous strata of China. (Papers for the) 9th International Congress of Carboniferous Stratigraphy and Geology, Urbana, U.S.A., 1979, p.1–13, pl.1–2; Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, China.
- Özdikmen, H.
2009: Substitute names for some unicellular animal taxa (Protozoa). *Munis Entomology and Zoology Journal*, v.4, no.1, p.233–256.
- Paez-Reyes, M and Head, M.J.
2013: The Cenozoic gonyaulacacean dinoflagellate genera *Operculodinium* Wall, 1967 and *Protoceratium* Bergh, 1881 and their phylogenetic relationships. *Journal of Paleontology*, v.87, no.5, p.786–803.
- Pallas
1773: *Reise Russ. Reichs*, v.2. (Cited, but complete reference not given, in Farr et al., 1979, p.1455.)
- Paris, F. and Deunff, J.
1970: Le paléoplancton Llanvirnien de la Roche-au-Merle (commune de Vieux-Vy-sur-Couesnon, Ille-et-Vilaine). *Bulletin de la Société géologique et minéralogique de Bretagne, Série C*, v.2, no.1, p.25–43, pl.1–3.
- Parke, D.L.
1974: Une nouvelle espèce de dinoflagellé siliceux. *Revue de Micropaléontologie*, v.17, p.81–85, pl.1.
- Parke, M. and Dodge, J.D.
1976: Dinophyta-Dinophyceae. In: Parke, M. and Dixon, P.S. (editors), Check-list of British marine algae, third revision; Marine Biological Association of the United Kingdom, *Journal*, v.56, p.542–551.
- Parker, F.M.
1988: *Carnarvonodinium*, a new dinocyst genus from the Late Jurassic of northwestern Australia. In: Jell, P.A. and Playford, G. (editors), Palynological and palaeobotanical studies in honour of Basil E. Balme; *Memoir of the Association of Australasian Palaeontologists*, no.5, p.167–171.
- Partington, M.A., Copestake, P., Mitchener, B.C. and Underhill, J.R.

1993: Biostratigraphic calibration of genetic stratigraphic sequences in the Jurassic-lowermost Cretaceous (Hettangian to Ryazanian) of the North Sea and adjacent areas. In: J.R. Parker (editor), *Petroleum Geology of Northwest Europe: Proceedings of the 4th Conference*; p.371–386; Geological Society, London, England.

Paschenyi, G.V., Bogdanovich, V.V., Kulish, L.I. and Orlovskii, G.N.
1992: Stratigrafiya i litologiya rudonosnoi i podstilayushchiknee tolshch Oligotsena nikopolskogo Margantsevorudnogo Basseina. *Geologicheskii Zhurnal*, no.6, p.66–76.

Pastiels, A.
1948: Contribution à l'étude des microfossiles de l'Éocène belge. *Mémoires du Musée royal d'histoire naturelle de Belgique*, no.109, p.1–77, pl.1–6.

Paul, C.R.C., Mitchell, S.F., Marshall, J.D., Leary, P.N., Gale, A.S., Duane, A.M. and Ditchfield, P.W.
1994: Palaeoceanographic events in the Middle Cenomanian of northwest Europe. *Cretaceous Research*, v.15, p.707–738.

Paulsen, O.
1904: Plankton-investigations in the waters around Iceland in 1903. *Meddelelser fra Kommissionen for Havundersøgelser, Serie Plankton*, v.1, no.1, p.1–40.

1905: On some Peridinia and plankton diatoms. *Meddelelser fra Kommissionen for Havundersøgelser, Serie Plankton*, v.1, no.3, p.1–7.

1907: The Peridinales of the Danish waters. *Meddelelser fra Kommissionen for Havundersøgelser, Serie Plankton*, v.1, no.5, 26 p.

Pavillard, J.
1912: À propos du *Diplopsalis lenticula* Bergh. *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, v.155, p.173–175.

1913: Le genre *Diplopsalis* Bergh et les genres voisins. 12 p.; published by the author, Montpellier, France.

1916: Recherches sur les péridiniens du Golfe du Lion. *Institut de Botanique de l'Université de Montpellier et de la Station Zoologique de Cette, Travail, Série mixte, Mémoire*, no.4, p.1–73.

Pavlishina, P.
1990: Early Cenomanian palynomorphs near the village of Sanadinovo, central north Bulgaria. *Review of the Bulgarian Geological Society*, v.51, pt.3, p.89–101, pl.1–3.

1995: Maastrichtian dinoflagellate cysts from north Bulgaria — taxonomy, biostratigraphy and palaeoenvironmental interpretations. *Geologica Balcanica*, v.25, nos.3–4, p.125–143, pl.1–4.

Pearce, M.A.
2010: New organic-walled dinoflagellate cysts from the Cenomanian to Maastrichtian of the Trunch borehole, UK. *Marine Micropalaeontology*, v.29, p.51–72, pl.1–8.

Pearce, M.A., Jarvis, I., Swan, A.R.H., Murphy, A.M., Tocher, B.A. and Edmunds, M.
2003: Integrating palynological and geochemical data in a new approach to palaeoecological studies: Upper Cretaceous of Banterwick Barn Chalk borehole, Berkshire, UK. *Marine Micropalaeontology*, v.47, p.271–306.

Pearce, M.A., Lignum, J.S. and Jarvis, I.
2011: *Senoniasphaera turonica* (Prössl, 1990 ex Prössl, 1992) comb. nov., senior synonym of *Senoniasphaera rotundata alveolata* Pearce et al., 2003: an important dinocyst marker for the Lower Turonian chalk of NW Europe. *Journal of Micropalaeontology*, v.30, p.91–93, pl.1.

Penard

1912: (Cited, but complete reference not given, in Loeblich Jr. and Loeblich III, 1966, p.59.)

Pestchevitskaya, E.B.

2001: New dinoflagellate species of the genus *Horologinella* from Lower Valanginian deposits of Anabar Bay region [Novyj vid dinoflagellate rode *Horologinella* iz nizhnevalanzhinskikh otlozhenij Anabarskogo rajona]. News of palaeontology and stratigraphy [Novosti paleontologii i stratigraphii], Supplement to Russian Geology and Geophysics, v.42, Issue 4, p.95–108. (In Russian with English summary)

2003: Taxonomy and morphology of dinoflagellate cyst genus *Horologinella* Cookson and Eisenack 1962. Acta Palaeontologica Sinica, v.42, no.1, p.45–55.

2006: Early Cretaceous dinocysts of northern Siberia and their stratigraphic significance. Paleontological Journal, v.40, Suppl.5, p.s629–s647, pl.7–8.

2009: Dinocysts of the family Gonyaulacaceae from the Lower Cretaceous of northern regions of western and middle Siberia [Dinotzisty semejstva Gonyaulacaceae iz nizhnego mela severnykh rajonov Zapadnoj i Srednej Sibiri]. News of palaeontology and stratigraphy [Novosti paleontologii i stratigraphii], Supplement to Russian Geology and Geophysics, 2009, v.50, Issue 12, p.105–117, 1 pl. (In Russian with English summary)

Peyrot, D.

2011: Late Cretaceous (Late Cenomanian–Early Turonian) dinoflagellate cysts from the Castilian Platform, northern Spain. Palynology, v.35, no.2, p.267–300, pl.1–7.

Pflaumann, U. and Krasheninnikov, V.A.

1978: Cretaceous calcisphaerulids from D.S.D.P. Leg 41, eastern North Atlantic. In: Lancelot, Y. et al., Deep Sea Drilling Project, Washington, Initial Reports, v.41, p.817–839, pl.1–8.

Philippot, A.

1949: Contributions à la paléontologie des silex crétacés. Trois nouveaux microfossiles. Bulletin de la Société scientifique de Bretagne, v.24, p.55–58.

Piasecki, S.

1980: Dinoflagellate cyst stratigraphy of the Miocene Hodde and Gram Formations, Denmark. Geological Society of Denmark, Bulletin, v.29, p.53–76, pl.1–6.

1984: Dinoflagellate cyst stratigraphy of the Lower Cretaceous Jydegård Formation, Bornholm, Denmark. Geological Society of Denmark, Bulletin, v.32, p.145–161, pl.1–4.

2001: Three new Middle Jurassic dinoflagellate cysts from east Greenland. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.219, nos.1–2, p.15–31.

Pic, M.

1900: Description d'un nouveau genre d'Elmides de Tunisie. Bulletin de la Société entomologique de France, 1900, p.266–267.

Piel, K.M.

1985: *Lagenadinium*, a new dinocyst from British Middle-Late Callovian rocks, a possible evolutionary intermediate between *Stephanelytron* and *Gardodinium*. Review of Palaeobotany and Palynology, v.45, p.107–119, pl.1–3.

Piel, K.M. and Evitt, W.R.

1980: Paratabulation in the Jurassic dinoflagellate genus *Nannoceratopsis* and a comparison with modern taxa. Palynology, v.4, p.79–104, pl.1–5.

Pierce, S.T.

1976: Morphology of *Schizosporis reticulatus* Cookson and Dettmann 1959. Geoscience and Man, v.15, p.25–33, pl.1–2.

Piskun, L.V.

1974a: *Veryhachium* iz Ordovika i Silura Brestskoy Vpadiny. In: Mikrofitofossilii Proterozoya i Rannego Paleozoya SSSR, p.15–20, pl.1–9; Akademiya Nauk SSSR, Leningrad, Russia.

1974b: Paleontologicheskaya kharakteristika siluriiskikh otlozhenii Brestskoi vpadiny. In: Vozzhennikova, T.F., Timofeev, B.V., and Sheshegova, L.I. (editors), Microfossilii SSSR; Akademiya Nauk SSSR, Sibirkoe Otdelenie, Trudy Insituta Geologii i Geofiziki, Novosibirsk, v.81, p.30–36.

Plate, L.H.

1906: *Pyrodinium bahamense* n. g., n. sp. Die Leucht-Peridinee des "Feuersees" von Nassau, Bahamas. Archiv für Protistenkunde, v.7, p.411–429, pl.19.

Playford, G.

1963: Lower Carboniferous microfloras of Spitsbergen — part two. Palaeontology, v.5, no.4, p.619–678, pl.88–95.

1977: Lower to Middle Devonian acritarchs of the Moose River Basin, Ontario. Geological Survey of Canada, Bulletin 279, 87 p., 20 pl.

Playford, G. and Dettmann, M.E.

1965: Rhaeto-Liassic plant microfossils from the Leigh Creek Coal Measures, South Australia. Senckenbergiana Lethaea, v.46, no.2/3, p.127–181, pl.12–17.

Playford, G. and Dring, R.S.

1981: Late Devonian acritarchs from the Carnarvon Basin, Western Australia. Special Papers in Palaeontology, no.27, p.1–78, pl.1–19.

Pocock, S.A.J.

1962: Microfloral analysis and age determination of strata at the Jurassic-Cretaceous boundary in the western Canada plains. Palaeontographica, Abteilung B, v.111, p.1–95, pl.1–15.

1972: Palynology of the Jurassic sediments of western Canada. Part 2. Marine species. Palaeontographica, Abteilung B, v.137, no.4–6, p.85–153, pl.22–29.

Pocock, S.A.J. and Sarjeant, W.A.S.

1972: Partitomorphae, a new subgroup of Triassic and Jurassic acritarchs. Geological Society of Denmark, Bulletin, v.21, p.346–357, pl.1–3.

Pokrovskaya, I.M.

1966: Paleopalynologiya. Tom III. Tablitsy risunkov i mikrofotoğrafii spor, pyltysy i drugikh rastitelnykh mikrofosilii iz otlozhenii verkhnego dokembriya-pleistotsena SSSR. Vsesoyuznyi Nauchno-Issledovatel'skii Geologicheskii Institut, Leningrad (VSEGEI), Trudy, Novaya Seryia, no.141, 367 p., pl.1–110 and III-LV.

Popovsky

1912: (Cited, but complete reference not given, in Loeblich Jr. and Loeblich III, 1966, p. 93.)

Pospelova, V. and Head, M.J.

2002: *Islandinium brevispinosum* sp. nov. (Dinoflagellata), a new organic-walled dinoflagellate cyst from modern estuarine sediments of New England (USA). Journal of Phycology, v.38, p.593–601.

Pöthe de Baldis, E.D.

1966: Microplankton del Terciario de Tierra del Fuego. Ameghiniana, v.4, no.7, p.219–228, pl.1–2.

1981: Paleomicroplankton y miosporas del Ludloviano Inferior de la Formacion Los Espejos en el perfillos azulejitos, en la Provincia de San Juan, Republica Argentina. Revista española de micropaleontología, v.13, no.2, p.231–265, pl.1–8.

1986: Dinoflagelados de la facies de mar abierto del Santoniano-Campaniano del sur de Lago Viedma, Provincia de Santa Cruz, Argentina. *Ameghiniana*, v.23, no.3-4, p.167-183, pl.1-3.

Pöthe de Baldis, E.D. and Ramos, V.

1983: Dinoflagelados del Aptiano inferior de Río Fósiles, Lago San Martín, Provincia de Santa Cruz, Argentina. *Revista española de micropaleontología*, v.15, no.3, p.427-446, pl.1-4.

1988: Microplankton adicional del Aptiano de Río Fósiles Lago San Martín, Provincia de Santa Cruz, Argentina y su correlación con Australia. IV Congreso Argentino de Paleontología y Bioestratigrafía, November, 1986, Mendoza, Acta 3, p.23-40; pl.1-4.

Potonié, R.

1934: Zur Mikrobotanik des eocänen Humodils des Geiseltals. *Arbeiten aus dem Institut für Paläobotanik und Petrographie der Brennsteine*, v.4, p.25-125, pl.1-6.

1951: Revision stratigraphisch wichtiger Sporomorphen des mitteleuropäischen Tertiärs. *Palaeontographica*, Abteilung B, v.91, p.131-151, pl.20-21.

1958: Synopsis der Gattungen der Sporae dispersae. II. Teil: Sporites (Nachträge), Saccites, Aletes, Praecolpates, Polyplicates, Monocolpates. *Geologisches Jahrbuch, Beihefte*, no.31, p.1-113, pl.1-11.

Potvin, É., Rochon, A. and Lovejoy, C.

2013: Cyst-theca relationship of the Arctic dinoflagellate cyst *Islandinium minutum* (Dinophyceae) and phylogenetic position based on SSU rDNA and LSU rDNA. *Journal of Phycology*, v.49, no.5, p.848-866.

Pouchet, G.

1883: Contribution à l'étude des cilioflagellés. *Journal of Anatomy and Physiology*, v.19, no.4, p.399-455, pl.18-21.

1893: Chapter X. Histoire naturelle. In: *Voyage de "La Manche": l'Île Jan-Mayen et au Spitzberg (juillet-août 1892); Les Missions scientifique et littéraires*, Nouvelles archives, v.5, p.155-220, pl.22.

Poulsen, N.E.

1991: *Gonyaulacysta jurassica desmos*, a new subspecies of dinoflagellate cyst from the Early Oxfordian (Late Jurassic) of northwestern Europe and east Greenland. *Palynology*, v.15, p.211-217, pl.1.

1992a: The dinoflagellate cyst genus *Epiplosphaera* Klement 1960 — a reappraisal. *Journal of Micropalaeontology*, v.11, no.1, p.65-72, pl.1-3.

1992b: Jurassic dinoflagellate cyst biostratigraphy of the Danish Subbasin in relation to sequences in England and Poland: a preliminary view. *Review of Palaeobotany and Palynology*, v.75, p.33-52, pl.1-4.

1993: Dinoflagellate cyst biostratigraphy of the Oxfordian and Kimmeridgian of Poland. *Acta Geologica Polonica*, v.43, nos.3-4, p.251-272, pl.1-2.

1996: Dinoflagellate cysts from marine Jurassic deposits of Denmark and Poland. *American Association of Stratigraphic Palynologists, Contributions Series*, no.31, i-vi, p.1-227, pl.1-46.

Poulsen, N.E. and Riding, J.B.

1992: A revision of the Late Jurassic dinoflagellate cysts *Ambonosphaera? staffinensis* (Gitmez 1970) comb. nov. and *Senoniasphaera jurassica* (Gitmez and Sarjeant 1972) Lentin and Williams, 1976. *Palynology*, v.16, p.25-34, pl.1.

Poulton, T.P., Tittlemore, J. and Dolby, G.

1990: Jurassic strata of northwestern (and west-central) Alberta and northeastern British Columbia. *Bulletin of Canadian Petroleum Geology*, v.38A, p.159–175.

Pourtoy, D.

1988: Le genre *Aprobolocysta* Duxbury, 1977, emend.: révision et comparaison avec le genre *Batioladinium* Brideaux, 1975, emend. The genus *Aprobolocysta* Duxbury, 1977, emend.: revision and comparison with the genus *Batioladinium* Brideaux, 1975, emend. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.12, no.1, p.383–403, pl.1–5.

Prauss, M.

1987: *Nannoceratopsis triangulata* n. sp. — eine neue Dinozysten-Spezies aus dem Obertoarcium von NW-Deutschlands. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.176, p.129–136.

1989: Dinozysten-Stratigraphie und Palynofazies im oberen Lias und Dogger von NW-Deutschland. *Palaeontographica, Abteilung B*, v.214, no.1–4, p.1–124, pl.1–15.

1990: Palynofazielle Untersuchungen in der *hodsoni*-Zone (Ober-Bathonium, Dogger) von Lechstedt bei Hildesheim. *Geologisches Jahrbuch, Reihe A*, v.121, p.275–291, pl.1.

Prauss, M.L.

2012: Potential freshwater dinocysts from marine upper Cenomanian to upper Coniacian strata of Tarfaya, northwest Africa: three new species of *Bosedinia*. *Cretaceous Research*, v.37, p.285–290.

Price, A.M. and Pospelova, V.

2014: *Spiniferites multisphaerus*, a new dinoflagellate cyst from the Late Quaternary of the Guaymas Basin, Gulf of California, Mexico. *Palynology*, v.38, p.101–116, pl.1–5.

Priewalder, H.

1987: Acritarchen aus dem Silur des Cellon-Profiles (karnische Alpen, Österreich). *Abhandlungen der Geologischen Bundesanstalt*, v.40, p.1–121, pl.1–24.

Prince, I.M., Jarvis, I., and Tocher, B.A.

1999: High-resolution dinoflagellate cyst biostratigraphy of the Santonian-basal Campanian (Upper Cretaceous): new data from Whitecliff, Isle of Wight, England. *Review of Palaeobotany and Palynology*, v.105, p.143–169, pl.1–2.

Prince, I.M., Jarvis, I., Pearce, M.A. and Tocher, B.A.

2008: Dinoflagellate cyst biostratigraphy of the Coniacian-Santonian (Upper Cretaceous): New data from the English Chalk. *Review of Palaeobotany and Palynology*, v.150, p.59–96, pl.1–2.

Pross, J.

1997: Aquatische Palynomorphe im Rupel des Mainzer Beckens (Oligozän, Südwest deutschland): Paläoökologie, Biostratigraphie und Taxonomie. *Tübinger Mikropaläontologische Mitteilung*, no.15, 182 p., 15 pl.

Pross, J., Houben, A.J.P., van Simaey, S., Williams, G.L., Kotthoff, U. and Coccioni, R.

2010: Umbria-Marche revisited: a refined magnetostratigraphic calibration of dinoflagellate cyst events for the Oligocene of the western Tethys. *Review of Palaeobotany and Palynology*, v.58, p.213–235, pl.1–4.

Prössl, K.F.

1990: Dinoflagellaten der Kreide — Unter-Hauterive bis Ober-Turon — im niedersächsischen Becken. *Stratigraphie und Fazies in der Kernbohrung Konrad 101 sowie einiger anderer Bohrungen in Nordwestdeutschland*. *Palaeontographica, Abteilung B*, v.218, p.93–191, pl.1–19.

1992a: Preliminary results of palynological investigations on the Cretaceous of Colombia, South America. *Review of Palaeobotany and Palynology*, v.71, p.255–268, pl.1–3.

- 1992b: Eine Dinoflagellatenpopulation aus dem Eozän von Garoe (Somalia, Ost-Afrika). *Giessener Geologische Schriften*, no.48, p.101–123, pl.1–3.
- 1994: *Paucilobimorpha* de Coninck 1986 and *Tritonites* Marshall & Partridge 1988: two synonymous Eocene acritarch-genera. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.7, p.399–406.
- Qian Lijun, Bai Qingzhao, Xiong Cunwei, Wu Jingyun, He Dechang, Zhang Xinmin and Xu Maoyu
1987: Jurassic coal-bearing strata and the characteristics of coal accumulation from northern Shaanxi. Northwest University Press, 202p. [In Chinese]
- Qian Zeshu, Chen Yongxiang and He Chengquan
1986: Palaeocene-Eocene non-marine microphytoplankton from Dongtai Depression, northern Jiangsu. *Acta Palaeontologica Sinica*, v.25, no.1, p.17–29, pl.1–3. (In Chinese.)
- Qiao Xiuyun, He Chengquan and Gao Ruiqi
1992: Early Cretaceous freshwater dinoflagellates from Songliao Basin, NE China. *Acta Palaeontologica Sinica*, v.31, no.1, p.30–38, pl.1–3. (In Chinese with English summary.)
- Quaijtaal, W. and Brinkhuis, H.
2012: *Pentadinium alabamensis*: A new, unusual dinoflagellate from the Oligocene of the Gulf Coast, Alabama, USA. *Review of Palaeobotany and Palynology*, v.175, p.47–54, pl.1–2.
- Quattrocchio, M.E. and Sarjeant, W.A.S.
1992: Dinoflagellate cysts and acritarchs from the Middle and Upper Jurassic of the Neuquén Basin, Argentina. *Revista española de micropaleontología*, v.24, no.2, p.67–118 [al. 2–219 — 2–270], pl.1–8.
- 1996: Early Palaeogene (Danian) dinoflagellates from the Colorado Basin, Argentina. *Revista española de micropaleontología*, v.28, no.3, p.111–138 [al. 3–411 — 3–438], pl.1–5.
- 2003: Dinoflagellates from the Chorrillo Chico Formation (Paleocene) of southern Chile. *Ameghiniana*, v.40, no.2, p.129–153.
- Quattrocchio, M.E. and Volkheimer, W.
1983: Datos palinológicos de la Formación Picún Leufú (Jurásico Superior) en su localidad tipo, Provincia de Neuquén. *Asociación Geológica Argentina, Revista*, v.38, p.34–48.
- 1985: Estudio palinológico del Berriasiano en la localidad Mallín Quemado, Provincia de Neuquén, Argentina. *Ameghiniana*, v.21, p.187–204.
- Radmacher, W., Tyszka, J. and Mangerud, G.
2014: Distribution and biostratigraphical significance of *Heterosphaeridium bellii* sp. nov. and other Late Cretaceous dinoflagellate cysts from the southwestern Barents Sea. *Review of Palaeobotany and Palynology*, v.214, p.29–40, pl.1.
- Rasul, S.M.
1974: The Lower Palaeozoic acritarchs *Priscogalea* and *Cymatiogalea*. *Palaeontology*, v.17, p.41–63, pl.3–7.
- 1976: New species of the genus *Vulcanisphaera* (Acritarcha) from the Tremadocian of England. *Micropaleontology*, v.22, no.4, p.479–484, pl.1.
- 1979: Acritarch zonation of the Tremadoc Series of the Shineton Shales, Wrekin, Shropshire, England. *Palynology*, v.3, p.53–72, pl.1–3.
- Rauscher, R.

1973: Recherches micropaléontologiques et stratigraphiques dans l'Ordovicien et le Silurien en France. Étude des acritarches, des chitinozoaires et des spores. Sciences Géologiques, Université Louis Pasteur de Strasbourg, Institut de géologie, p.1–224, pl.1–12.

Rauscher, R. and Doubinger, J.

1982: Les dinokystes du Maestrichtien phosphaté au Maroc. Sciences Géologiques, v.35, no.3, p.97–116, pl.1–2.

Raynaud, J.F.

1978: Principaux dinoflagellés caractéristiques du Jurassique supérieur d'Europe du nord. Palinología, número extraordinario, no.1, p.387–405, pl.1–2.

Reade, J.B.

1839: On some new organic remains in the flint of Chalk. Annals of Natural History, v.2, p.191–198, pl.8–9.

Regali, M.S.P., Uesugui, N. and Santos, A.S.

1974: Palinologia dos sedimentos meso-cenozoicos do Brasil (II). Boletim Técnico da Petrobras, v.17, no.4, p.263–301, pl.1–25.

Reháková, D. and Michalík, J.

1996: *Stomiosphaera* or *Orthopithonella*? *Cadosina* or *Obliquipithonella*? Notes to ultrastructure and systematic position of some Jurassic-Cretaceous calcareous dinoflagellates from western Carpathians. Mineralia Slovaca, v.28, p.92–98, pl.1.

Řehánek, J.

1982: New species of the genus *Colomisphaera* Nowak from the Tithonian and Upper Cretaceous. Geologický Sborník — Geologica Carpathica, v.33, no.2, p.219–228, pl.1–2.

1984: *Colomisphaera modica* n. sp. and *Stomiosphaera leporis* n. sp. From sandy-glaucinite autochthonous Mesozoic series on se slopes of Bohemian Massif (Turonian-Lower Senonian, South Moravia, ČSSR. Západné Karpaty, Séria Paleontológia, v.9, p.179–186.

1985a: *Cadosinidae* Wanner and *Stomiosphaeridae* Wanner (incertae sedis) from the Mesozoic limestones of southern Moravia. Časopis pro Mineralogii a Geologii, v.30, no.4, p.367–380.

1985b: *Colomisphaera conferta* n.sp. (*Stomiosphaeridae* Wanner, 1940) from the Lower Cretaceous of the west Carpathians. Věstník Ústředního Ústavu Geologického, v.60, no.3, p.171–174, pl.1–2.

1987a: Biostratigraphy and facies development of the Carbonate Malm on the southeast slopes of the Bohemian Massif. Miscell. Micropal. v.6, no.1, p.251–282.

1987b: Berriasian *Stomiosphaerina proxima* n. sp. (*Stomiosphaeridae*) from the central west Carpathian Paleogene basal breccias. Geologický Sborník — Geologica Carpathica, v.38, no.6, p.695–703, pl.1–2.

Řehánek, J. and Cecca, F.

1993: Calcareous dinoflagellate cysts biostratigraphy in Upper Kimmeridgian-Lower Tithonian pelagic limestones of Marches Apennines (central Italy) (Biostratigraphie des calcaires pélagiques des Marches (Apennins, Italie centrale), d'âge Kimméridgien supérieur-Tithonique inférieur, à l'aide des kystes de dinoflagellés calcaires). Revue de micropaléontologie, v.36, no.2, p.143–163, pl.1.

Řehánek, J. and Heliasz, H.

1993: Microfacies and microbiostratigraphy of the Oxfordian-Lower Kimmeridgian on the basis of cadosinids and stomiosphaerids in the Czestochowa region of Poland. Geologica Carpathica, v.44, no.2, p.81–93, pl.1–2.

Řehánek, J. and Mišík, M.

1991: New Upper Cretaceous cyst *Pithonella siniformis* n. sp. (Calciadinellaceae) from eastern Algeria. Geologica Carpathica, v.42, no.2, p.111–116, pl.1–2.

Reid, P.C.

1974: Gonyaulacacean dinoflagellate cysts from the British Isles. *Nova Hedwigia*, v.25, p.579–637, pl.1–4.

1977: Peridiniacean and glenodiniacean dinoflagellate cysts from the British Isles. *Nova Hedwigia*, v.29, p.429–463, pl.1–4.

Reinecke, P.

1967: *Gonyaulax grindleyi* sp. nov.: a dinoflagellate causing a red tide at Elands Bay, Cape Province, in December 1966. *Journal of South African Botany*, v.33, no.3, p.157–160.

Reinsch, P.F.

1905: Die Palinosphären, ein mikroskopischer vegetabiler Organismus in der Mucronatenkreide. *Centralblatt für Mineralogie, Geologie und Paläontologie*, 1905, p.402–407.

Reissinger, A.

1950: Die "Pollenanalyse" ausgedehnt auf alle Sedimentgesteine der geologischen Vergangenheit. *Palaeontographica, Abteilung B*, v.90, p.99–126, pl.11–19.

Ribecai, C. and Tongiorgi, M.

1999: The Ordovician acritarch genus *Pachyshaeridium* Burmann 1970: new, revised and reassigned species. *Palaeontographia Italica*, v.86 (1999), p.113–153.

Richardson, J.B. and Rasul, S.M.

1978: Palynomorphs in Lower Devonian sediments from the Apley Barn Borehole, southern England. *Pollen et Spores*, v.20, no.3, p.423–462.

Ride, W.D.L., Sabosky, C.W., Bernardi, G., Melville, R.V., Corliss, J.O., Forest, J., Key, K.H.L. and Wright, C.W. 1985: Code International de Nomenclature Zoologique. Troisième édition adopté par la XXe Assemblée Générale de l'Union Internationale des Sciences Biologiques. International Code of Zoological Nomenclature. Third edition adopted by the XX General Assembly of the International Union of Biological Sciences. 321 p.; University of California Press, Berkeley, U.S.A.

Ride, W.D.L., Cogger, H.G., Dupuis, C., Kraus, O., Minelli, A., Thompson, F.C. and Tubbs, P.K.

2012: International Code of Zoological Nomenclature Fourth Edition. The International Trust for Zoological Nomenclature: online <http://iczn.org/iczn/index.jsp>. (dated 1999 but incorporating 2012 amendments).

Riding, J.B.

1983: *Gonyaulacysta centriconnata* sp. nov. and a dinoflagellate cyst from Late Callovian and Early Oxfordian of eastern England. *Palynology*, v.7, p.197–204, pl.1–2.

1984a: Observations on the Jurassic dinoflagellate cyst *Nannoceratopsis ambonis* Drugg, 1978. *Journal of Micropalaeontology*, v.3, no.1, p.75–79, pl.1.

1984b: A palynological investigation of Toarcian to early Aalenian strata from the Blea Wyke area, Ravenscar, North Yorkshire. *Yorkshire Geological Society, Proceedings*, v.45, pts.1-2, p.109–122.

1987a: Dinoflagellate cyst stratigraphy of the Nettleton Bottom Borehole (Jurassic: Hettangian to Kimmeridgian), Lincolnshire, England. *Proceedings of the Yorkshire Geological Society*, v.46, pt.3, p.231–266.

1987b: *Limbodinium*, a new dinoflagellate genus from the Jurassic of western Europe. *Palynology*, v.11, p.55–65, pl.1–3.

1990: On *Chytroesphaeridia hyalina* (Raynaud) Lentin and Williams (Pyrrhophyta, Dinophyceae). *Taxon*, v.39, p.311–312.

1994: A taxonomic study of the Mesozoic dinoflagellate cysts *Phallocysta elongata* (Beju 1971) comb. nov., emend. nov. and *Walloodinium cylindricum* (Habib 1970) Duxbury 1983 emend. nov. *Palynology*, v.18, p.11–22, pl.1.

2002: *Microdinium avocetianum* sp. nov., a dinoflagellate cyst from the latest Jurassic (Tithonian) of Australia. *Palynology*, v.25, p.3–10, pl.1. (Cover date 2001, issue date 2002.)

2004: *Frigatadinium frigatense* gen. et sp. nov., a dinoflagellate cyst from the Late Jurassic–Early Cretaceous (Oxfordian–Berriasian) of Australasia. *Memoir of the Association of Australasian Palaeontologists*, v.29, p.237–244.

2005a: The Late Jurassic dinoflagellate cyst *Gonyaulacysta ceratophora* (Cookson & Eisenack 1960) comb. nov., emend. nov. *Palynology*, v.29, p.13–22, pl.1.

2005b: *Fostericysta* Riding nom. nov. (division Dinoflagellata). *Taxon*, v.54, no.4. p.1091.

2012: The Jurassic dinoflagellate cyst *Gonyaulacysta dentata* (Raynaud 1978) Lentin & Vozzhennikova 1990 emend. nov.: an index species for the Late Callovian to earliest Oxfordian of the northern hemisphere. *Review of Palaeobotany and Palynology*, v.176–177, p.68–81, pl.1–2.

Riding, J.B. and Bailey, D.A.

1991: *Durotrigia filapicata*, comb. nov. for *Gonyaulacysta filapicata* (fossil Pyrrophyta: Dinophyceae). *Taxon*, v.40, p.100–102.

Riding, J.B. and Davey, R.J.

1989: *Rotosphaeropsis thula* (Davey 1982) comb. nov. and emend.: a dinoflagellate cyst from the Upper Jurassic–Lower Cretaceous of England. *Journal of Micropalaeontology*, v.8, no.1, p.109–112, pl.1.

Riding, J.B. and Duxbury, S.

1993: A new non-marine acritarch from the Middle Jurassic of Britain. *Special Papers in Palaeontology*, no.48, p.57–66, pl.1.

Riding, J.B. and Fensome, R.A.

2003: A review of *Scriniodinium* Klement 1957, *Endoscrinium* (Klement 1960) Vozzhennikova 1967 and related dinoflagellate cyst taxa. *Palynology*, v.26, p.5–33, pl.1–3. (Cover date 2002, issue date 2003.)

Riding, J.B. and Helby, R.

2001a: Early Jurassic (Toarcian) dinoflagellate cysts from the Timor Sea, Australia. In Laurie, J.R and Foster, C.B. (editors), *Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists*, no.24, p.1–32.

2001b: A selective reappraisal of *Wanaea* Cookson & Eisenack 1958 (Dinophyceae). In Laurie, J.R and Foster, C.B. (editors), *Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists*, no.24, p.33–58.

2001c: *Phallocysta granosa* sp. nov., a Mid Jurassic (Bathonian) dinoflagellate cyst from the Timor Sea, Australia. In Laurie, J.R and Foster, C.B. (editors), *Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists*, no.24, p.59–63.

2001d: Microplankton from the Mid Jurassic (late Callovian) *Rigaudella aemula* Zone in the Timor Sea, north-western Australia. In Laurie, J.R and Foster, C.B. (editors), *Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists*, no.24, p.65–109.

2001e: Dinoflagellate cysts from the Late Jurassic (Oxfordian) *Wanaea spectabilis* Zone in the Timor Sea region. In Laurie, J.R and Foster, C.B. (editors), *Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists*, no.24, p.111–140.

2001f: Dinoflagellate cysts from the Late Jurassic (Kimmeridgian) *Dingodinium swanense* Zone in the North-West Shelf and Timor Sea, Australia. In Laurie, J.R and Foster, C.B. (editors), Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists, no.24, p.141–176.

2001g: Marine microplankton from the Late Jurassic (Tithonian) of the north-west Australian region. In Laurie, J.R and Foster, C.B. (editors), Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists, no.24, p.177–220.

2001h: Some stratigraphically significant dinoflagellate cysts from the Early Cretaceous (Aptian and Albian) of Australia. In Laurie, J.R and Foster, C.B. (editors), Studies in Australian Mesozoic palynology II; Memoir of the Association of Australasian Palaeontologists, no.24, p.225–235.

Riding, J.B. and Ilyina, V.I.

1996: *Protobatioladinium elatmaensis* sp. nov., a dinoflagellate cyst from the Bathonian of Russia. Journal of Micropalaeontology, v.15, pt.2, p.150.

1998: A new dinoflagellate cyst from the Upper Bathonian (Middle Jurassic) strata of the Russian Platform. Journal of Micropalaeontology, v.17, pt.1, p.86.

Riding, J.B. and Michoux, D.

2013: Further observations on the Jurassic dinoflagellate cyst *Gonyaulacysta dentata* (Raynaud 1978) Lentin & Vozzhennikova 1990 emended Riding 2012. Review of Palaeobotany and Palynology, v.196, p.51–56, pl.1.

Riding, J.B. and Schmidt, F.G.

2009: Deflandre (1938) — a palynological classic. AASP--The Palynology Society Newsletter, v.42 (4), p.16–18.

Riding, J.B. and Thomas, J.E.

1988: Dinoflagellate cyst stratigraphy of the Kimmeridge Clay (Upper Jurassic) from the Dorset coast, southern England. Palynology, v.12, p.65–88, pl.1–3.

Riding, J.B. and Zijlstra, G.

2006: *Belowicysta* nom. nov., a new name for the Jurassic dinoflagellate cyst *Belowia* Riding & Helby, 2001. Alcheringa, v.30, p.313–314.

Riding, J.B., Walton, W. and Shaw, D.

1991: Toarcian to Bathonian (Jurassic) palynology of the Inner Hebrides, northwest Scotland. Palynology, v.15, p.115–179, pl.1–9.

Riding, J.B., Poulsen, N.E. and Bailey, D.A.

2001: A taxonomic study of the dinoflagellate cyst *Muderongia simplex* Alberti 1961 and related species. Palynology, v.24, p.21–35, pl.1. (Cover date 2000, issue date 2001.)

Riegel, W.

1974: New forms of organic-walled microplankton from an Upper Cretaceous assemblage in southern Spain. Revista española de micropaleontología, v.6, no.3, p.347–366, pl.1–3.

Riegel, W. and Sarjeant, W.A.S.

1982: Dinoflagellate cysts from the Upper Cretaceous of southern Spain: new morphological and taxonomic observations. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.162, p.286–303.

Riley, L.A.

1979: Dinocysts from the Upper Kimmeridgian (*pectinatus* Zone) of Marton, Yorkshire. Mercian Geologist, v.7, p.219–222.

Riley, L.A. and Fenton, J.P.G.

- 1980: A dinocyst zonation for the Callovian-Oxfordian succession of north-west Europe. 5th International Palynological Conference, Cambridge, England, 1980, Abstracts, p.340.
- 1982: A dinocyst zonation for the Callovian to Middle Oxfordian succession (Jurassic) of northwest Europe. *Palynology*, v.6, p.193–202.
- Riley, L.A. and Sarjeant, W.A.S.
1972: Survey of the stratigraphic distribution of dinoflagellates, acritarchs and tasmanitids in the Jurassic. *Geophytology*, v.2, no.1, p.1–40.
- Robaszynski, F., Bless, M.J.M., Felder, P.J., Foucher, J.-C., Legoux, O., Manivit, H., Meesen, J.P.M.T. and van der Tuuk, L.A.
1985: The Campanian-Maastrichtian boundary in the chalky facies close to the type-Maastrichtian area. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.9, no.1, p.1–113, pl.1–22.
- Rochon, A., de Vernal, A., Turon, J.-L., Matthiessen, J. and Head, M.J.
1999: Distribution of Recent dinoflagellate cysts in surface sediments from the North Atlantic Ocean and adjacent areas in relation to sea-surface parameters. *American Association of Stratigraphic Palynologists, Contributions Series*, no.35, 146 p.
- Rochon, A., Mudie, P.J., Aksu, A.E. and Gillespie, H.
2003: *Pterocysta* gen. nov.: a new dinoflagellate cyst from Pleistocene glacial-stage sediments of the Black and Marmara seas. *Palynology*, v.26, p.95–105, pl.1–3. (Cover date 2002, issue date 2003.)
- Rögl, F.
1976: Danian Calcisphaerulidae of D.S.D.P. Leg 35, Site 323, south-east Pacific Ocean. In: Hollister, C.D. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.35, p.701–711, pl.1–4.
- Rögl, F. and Franz, H.E.
1979: *Bachmayerella* -- ein neues problematisches Mikrofossil aus dem marinen Mittelmiozän von Walbersdorf, Burgenland. *Annalen des Naturhistorischen Museums in Wien*, v.82, p.83–98, pl.1–5.
- Roncaglia, L.
2000: A new dinoflagellate species from the Upper Cretaceous of New Zealand — a morphological intermediate between three genera. *Alcheringa*, v.24, p.135–146.
- Roncaglia, L. and Corradini, D.
1997: Correlation of key dinoflagellate events with calcareous nannoplankton and planktonic foraminiferal zones in the Solignano Formation (Maastrichtian, Late Cretaceous) northern Apennines, Italy. *Review of Palaeobotany and Palynology*, v.97, p.177–196, pl.1–5.
- Roncaglia, L. and Schiøler, P.
1999: *Alterbidinium austrinum* Roncaglia et Schiøler, sp. nov., a new dinoflagellate from the Conway Siltstone (Upper Cretaceous), southern Marlborough, New Zealand. *Review of Palaeobotany and Palynology*, v.106, p.121–129, pl.1–2.
- Roncaglia, L., Field, B.D., Raine, J.I., Schiøler, P. and Wilson, G.J.
1999: Dinoflagellate biostratigraphy of Piripauan-Haumurian (Upper Cretaceous) sections from the northeast South Island, New Zealand. *Cretaceous Research*, v.20, p.271–314.
- Rosignol, M.
1961: Analyse pollinique de sédiments marins quaternaires en Israël. I: sédiments récents. *Pollen et Spores*, v.3, p.303–324, pl.1–2.
- 1962: Analyse pollinique de sédiments marins quaternaires en Israël II. — Sédiments pleistocènes. *Pollen et Spores*, v.4, no.1, p.121–148, pl.1–2.

1963: Aperçus sur le développement des hystrichosphères. Muséum national d'histoire naturelle, Paris, Bulletin, Série 2, v.35, p.207–212, pl.1–2.

1964: Hystrichosphères du Quaternaire en Méditerranée orientale, dans les sédiments Pléistocènes et les boues marines actuelles. Revue de micropaléontologie, v.7, no.2, p.83–99, pl.1–3.

Rozen, B.

1965: Contribution à l'étude des hystrichosphères et dinoflagellés du Bartonien belge. Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie, v.73, p.287–318, pl.1–4.

Rusbült, J. and Strauss, C.

1992: Mikrofossilien des Unter- und Mittelmiozäns in der Braunkohlenbohrung Lübtheen 46/84 (Südwest-Mecklenburg). Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.3, p.150–170.

Rzedowski, J.

1957: Notas sobre la flora y la vegetación del estado de San Luis Potosí. IV. Un género nuevo y dos especies poco conocidas de la parte sur del estado. Ciencia (México), v.16, p.139–142. (Cover date 1956)

Sah, S.C.D., Kar, R.K. and Singh, R.Y.

1970: Fossil microplankton from the Langpar Formation of Therriaghat, south Shillong Plateau, Assam, India. The Palaeobotanist, v.18, p.143–150, pl.1–2.

Salujha, S.K. and Kindra, G.S.

1981: Palynological fossils from the Langpar Formation exposed along South Shillong Front, Meghalaya, India. Geoscience Journal, v.2, p.43–62, pl.1–3.

Salujha, S.K., Srivastava, N.C. and Rawat, M.S.

1969: Microforal assemblages from Subathu sediments of Simla Hills. Journal of the Palaeontological Society of India, v.12, p.25–40, pl.3–4.

Salujha, S.K., Rehman, K. and Kindra, G.S.

1973: Distinction between the Bhuban and Bokabil sediments on the southern edge of Shillong Plateau based on palynofossil assemblages. Oil and Natural Gas Commission, Dehradun, Bulletin, v.10, no.1–2, p.109–117.

Samoilovitch, S.R. and Mtchedlishvili, N.D.(editors)

1961: Pyltsa i spory zapadnoi Sibiri, yura-paleotsen. Vsesoyuznyi Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad (VNIGRI), Trudy, no.177, 352 p., 84+LXV pl.

Sancay, R.H., Bati, Z., Edwards, L.E. and Ertug, K.I.

2007: A new species of *Pentadinium* from eastern Anatolia, Turkey, *Pentadinium galileoi*. Micropaleontology, v.52, no.6, p.537–543, pl.1.

Sangiorgi, F., Brinkhuis, H. and Damassa, S.P.

2009: *Arcticacysta*: a new organic-walled dinoflagellate cyst genus from the early Miocene? of the central Arctic Ocean. Micropaleontology, v.55, no.2–3, p.249–258, pl.1–4.

Sannemann, D.

1955: Hystrichosphaerideen aus dem Gotlandium und Mittel-Devon des Frankenwaldes und ihr Feinbau. Senckenbergiana Lethaea, v.36, no.5–6, p.321–346, pl.1–6.

Sarai, C., Yamaguchi, A., Kawami, H. and Matsuoka, K.

2013: Two new species formally attributed to *Protoperidinium oblongum* (Aurivillius) Park et Dodge (Peridinales, Dinophyceae): evidence from cyst incubation experiments. Review of Palaeobotany and Palynology, v.192 p.103–118, pl.1–5.

Sarjeant, W.A.S.

1959: Microplankton from the Cornbrash of Yorkshire. *Geological Magazine*, v.96, no.5, p.329–346, pl.13.

1960a: New hystrichospheres from the Upper Jurassic of Dorset. *Geological Magazine*, v.97, no.2, p.137–144, pl.6.

1960b: Microplankton from the Corallian Rocks of Yorkshire. *Proceedings of the Yorkshire Geological Society*, v.32, pt.4, p.389–408, pl.12–14.

1961a: Microplankton from the Kellaways Rock and Oxford Clay of Yorkshire. *Palaeontology*, v.4, no.1, p.90–118, pl.13–15.

1961b: *Systematophora* Klement and *Polystephanosphaera* Sarjeant. *Journal of Paleontology*, v.35, no.5, p.1095–1096.

1962a: Microplankton from the Ampthill Clay of Melton, south Yorkshire. *Palaeontology*, v.5, no.3, p.478–497, pl.69–70.

1962b: Upper Jurassic microplankton from Dorset, England. *Micropaleontology*, v.8, no.2, p.255–268, pl.1–2.

1963a: *Favilarnax*, new genus of Mesozoic hystrichospheres. *Journal of Paleontology*, v.37, no.3, p.719–721.

1963b: Fossil dinoflagellates from Upper Triassic sediments. *Nature*, v.199, p.353–354.

1963c: Two new Jurassic species of *Gonyaulax* (Dinophyceae). *Revue de micropaléontologie*, v.6, p.85–88, pl.1.

1964a: Taxonomic notes on hystrichospheres and acritarchs. *Journal of Paleontology*, v.38, no.1, p.173–177.

1964b: New name and diagnosis for an Upper Jurassic species of *Gonyaulacysta* (Dinophyceae). *Palaeontology*, v.7, p.472–473.

1965: Microplankton from the Callovian (*S. calloviense* Zone) of Normandy. *Revue de micropaléontologie*, v.8, p.175–184, pl.1.

1966a: The supposed "sponge spicules" of Merrill, 1895, from the Lower Cretaceous (Albian) of Texas. *Breviora*, no.242, p.1–15, pl.1.

1966b: Dinoflagellate cysts with *Gonyaulax*-type tabulation. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., *Studies on Mesozoic and Cainozoic dinoflagellate cysts; British Museum (Natural History) Geology, Bulletin, Supplement 3*, p.107–156.

1966c: Further dinoflagellate cysts from the Speeton Clay. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., *Studies on Mesozoic and Cainozoic dinoflagellate cysts; British Museum (Natural History) Geology, Bulletin, Supplement 3*, p.199–214.

1967a: The stratigraphical distribution of fossil dinoflagellates. *Review of Palaeobotany and Palynology*, v.1, no.1–4, p.323–343.

1967b: The genus *Palaeoperidinium* Deflandre (Dinophyceae). *Grana Palynologica*, v.7, p.243–258.

1967c: The rediscovery of a lost species of dinoflagellate cyst *Hystrichosphaera* (ex *Spiniferites*) *reginaldi* (Mantell 1844) comb.nov. *Microscopy: the Journal of the Quekett Microscopical Club*, v.30, p.241–250.

1968: Microplankton from the Upper Callovian and Lower Oxfordian of Normandy. *Revue de micropaléontologie*, v.10, no.4, p.221–242, pl.1–3.

- 1969: Taxonomic changes. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., Appendix to "Studies on Mesozoic and Cainozoic Dinoflagellate Cysts"; British Museum (Natural History) Geology, Bulletin, Appendix to Supplement 3, p.7–15.
- 1970: The genus *Spiniferites* Mantell, 1850 (Dinophyceae). *Grana*, v.10, p.74–78.
- 1972: Dinoflagellate cysts and acritarchs from the Upper Vardekløft Formation (Jurassic) of Jameson Land, East Greenland. *Meddelelser om Grønland*, v.195, p.1–69, pl.1–9.
- 1975a: Jurassic dinoflagellate cysts with epittractal archaeopyles: a reconsideration. *Grana*, v.14, no.1–2, p.49–56, pl.1–3.
- 1975b: *Hapsidaulax*, new genus of dinoflagellate cysts from the Jurassic (Bathonian) of the Isle of Skye. *Scottish Journal of Geology*, v.11, p.143–149, pl.1–2.
- 1976a: Dinoflagellate cysts and acritarchs from the Great Oolite Limestone (Jurassic: Bathonian) of Lincolnshire, England. *Geobios*, no.9, p.5–46, pl.1–6.
- 1976b: *Energlynia*, new genus of dinoflagellate cysts from the Great Oolite Limestone (Middle Jurassic: Bathonian) of Lincolnshire, England. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.3, p.163–173.
- 1976c: English Jurassic dinoflagellate cysts and acritarchs: a re-examination of some type and figured specimens. *Geoscience and Man*, v.15, p.1–24, pl.1–7.
- 1978a: A guide to the identification of Jurassic dinoflagellate cysts. School of Geoscience, Louisiana State University, Miscellaneous Publication 78–1, 107 p.
- 1978b: *Arpylorus antiquus* Calandra, emend., a dinoflagellate cyst from the Upper Silurian. *Palynology*, v.2, p.167–179, pl.1–4.
- 1980a: Restudy of a 19th–Century dinoflagellate cyst holotype from the Polish Upper Jurassic. *Acta Palaeontologica Polonica*, v.25, p.279–285, pl.37.
- 1980b: A restudy of some dinoflagellate cyst holotypes in the University of Kiel collections. I. The Jurassic holotypes of Walter Wetzel (1966a,b). *Meyniana*, v.32, p.113–128, pl.1–3.
- 1981: A restudy of some dinoflagellate cyst holotypes in the University of Kiel Collections. II. The Eocene holotypes of Barbara Klumpp (1953); with a revision of the genus *Cordosphaeridium* Eisenack, 1963. *Meyniana*, v.33, p.97–132, pl.1–6.
- 1982a: A restudy of some dinoflagellate cyst holotypes in the University of Kiel Collections. III. The taxonomic proposals of J.P.G. Fenton (1981) concerning Walter Wetzel's Jurassic holotypes. *Meyniana*, v.34, p.125–129.
- 1982b: The dinoflagellate cysts of the *Gonyaulacysta* group: a morphological and taxonomic restudy. *American Association of Stratigraphic Palynologists, Contributions Series*, no.9, p.1–81, pl.1–12.
- 1983: A restudy of some dinoflagellate cyst holotypes in the University of Kiel collections. IV. The Oligocene and Miocene holotypes of Dorothea Maier (1959). *Meyniana*, v.35, p.85–137, pl.1–7.
- 1984a: A restudy of some dinoflagellate cysts and an acritarch from the Malm (Upper Jurassic) of southwest Germany. *Palaeontographica, Abteilung B*, v.191, no.5–6, p.154–177, pl.1–4.
- 1984b: Re-study of some dinoflagellate cysts from the Oligocene and Miocene of Germany. *Journal of Micropalaeontology*, v.3, no.2, p.73–94, pl.1–4.

- 1984c: A restudy of some dinoflagellate cyst holotypes in the University of Kiel collections. V. The Danian (Palaeocene) holotypes of Walter Wetzel (1952, 1955). *Meyniana*, v.36, p.121–171, pl.1–8.
- 1985a: The German Aptian dinoflagellate cysts of Eisenack (1958): a restudy. *Review of Palaeobotany and Palynology*, v.45, p.47–106, pl.1–10.
- 1985b: A restudy of some dinoflagellate cyst holotypes in the University of Kiel collections: VI. Late Cretaceous dinoflagellate cysts and other palynomorphs in the Otto Wetzel collection. *Meyniana*, v.37, p.129–185, pl.1–7.
- 1986: A restudy of Pastiels' (1948) dinoflagellate cysts from the Early Eocene of Belgium. *Bulletin de l'Institut royal des sciences naturelles de Belgique*, no.56, p.5–43, pl.1–5.
- 1988: The genus *Sarjeantia* Horowitz: dinoflagellate cyst or spore? *Grana*, v.27, p.177–181.
- 1989: Review: L.E. Stover and G.L. Williams. Analyses of Mesozoic and Cenozoic organic-walled dinoflagellates 1977–1985. American Association of Stratigraphic Palynologists, Contributions Series no.18, 1987. *Micropaleontology*, v.35, no.1, p.93–96.
- 1991: Henry Hopley White (1790-1877) and the early researches on Chalk "xanthidia" (marine palynomorphs) by Clapham microscopists. *Journal of Micropalaeontology*, v.10, no.1, p.83–93.
- 1992a: Gideon Mantell and the 'Xanthidia' Archives of Natural History, v.19, p.91–100.
- 1992b: *Tenua* Eisenack and *Cerbia* Below: Cretaceous dinoflagellate synonyms. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.11, p.675–682.
- Sarjeant, W.A.S. and Anderson, R.Y.
1969: A re-examination of some dinoflagellate cysts from the uppermost Lewis Shale (Late Cretaceous) New Mexico (U.S.A.). *Review of Palaeobotany and Palynology*, v.9, p.229–237, pl.1.
- Sarjeant, W.A.S. and Downie, C.
1982: The Upper Cretaceous dinoflagellate cyst *Raphidodinium* Deflandre: a restudy. *Grana*, v.21, p.115–120.
- Sarjeant, W.A.S. and Stancliffe, R.P.W.
1994: The *Micrhystridium* and *Veryhachium* complexes (Acritarcha: Acanthomorphytae and Polygonomorphytae): a taxonomic reconsideration. *Micropaleontology*, v.40, no.1, p.1–77, pl.1.
- 1996: The acritarch genus *Polygonium*, Vavrdová emend Sarjeant and Stancliffe 1994: a reassessment of its constituent species. *Annales de la Société géologique de Belgique*, v.117, no.2, p.355–369.
- Sarjeant, W.A.S. and Stover, L.E.
1978: *Cyclonephelium* and *Tenua*: a problem in dinoflagellate cyst taxonomy. *Grana*, v.17, p.47–54.
- Sarjeant, W.A.S. and Vavrdova, M.
1997: Taxonomic reconsideration of *Multiplicisphaeridium* Staplin, 1961 and other acritarch genera with branching processes. *GeoLines*, v.5, p.1–52, pl.1–4.
- Sarjeant, W.A.S., Lacalli, T. and Gaines, G.
1987: The cysts and skeletal elements of dinoflagellates: speculations on the ecological causes for their morphology and development. *Micropaleontology*, v.33, no.1, p.1–36, pl.1–3.
- Sarkar, S.
2012: A new species of *Muratodinium* (Cookson & Eisenack) Drugg from the Subathu Formation (Lutetian) of Lesser Himalaya, India and its biostratigraphic significance. *Himalayan Geology*, v.33, no.2, p.173–179.
- Sarkar, S. and Singh, H.P.

1988: Palynological investigation of the Subathu Formation (Eocene) in the Banethi-Bagthan area of Himachal Pradesh, India. *Palaeontographica, Abteilung B*, v.209, p.29–109, pl.1–8.

Saxena, R.K. and Rao, M.R.

1984: Palynology of the Barail (Oligocene) and Surma (Lower Miocene) sediments exposed along Sonapur-Badarpur road section, Jainkia Hills (Meghalaya) and Cachar (Assam), part I. Dinoflagellate cysts. *Journal of the Palaeontological Society of India*, v.29, p.52–62, pl.1–2.

Saxena, R.K. and Sarkar, S.

2000: Palynological investigation of the Siju Formation (Middle Eocene) in the type area, South Garo Hills, Meghalaya, India. *The Palaeobotanist*, v.49, p.253–267, pl.1–2.

Schaarschmidt, F.

1963: Sporen und Hystrichosphaerideen aus dem Zechstein von Büdingen in der Wetterau. *Palaeontographica, Abteilung B*, v.113, no.1–4, p.38–91, pl.11–20.

Schauer, J.C.

1843: *Nov. Actorum Acad. Caes. Leop.–Carol. Nat. Cur. (Suppl.1)*, p.364. (Cited, but complete reference not given, in Farr et al., 1979, p.1283.)

Schiller, J.

1935: Dinoflagellatae (Peridineae) in monographischer Behandlung. 2. Teil, Lieferung 1. In: Kolkwitz, R., Zehnter Band. Flagellatae. In: Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Österreich und der Schweiz, p.1–160; Akademische Verlagsgesellschaft, Leipzig, Germany. (Reprinted, as part of a larger work, by Strauss and Cramer, Leutershaysen, Germany, 1971 and by Johnson Reprint Company, New York, U.S.A., date unspecified.)

Schimper

1837: (Cited by Lentin and Williams, 1976, p.47, but full reference not given.)

Schindler, K.

1992: Taxonomie der Gattung *Chiropteridium* Gocht (Dinophyceae) im Rupelium des Mainzer Beckens (Mitteloligozän, SW-Deutschland). *Paläontologische Zeitschrift*, v.66, no.3–4, p.199–211.

Schiøler, P.

1992: Dinoflagellate cysts from the Arnager Limestone Formation (Coniacian, Late Cretaceous), Bornholm, Denmark. *Review of Palaeobotany and Palynology*, v.72, p.1–25, pl.1–10.

1993: New species of dinoflagellate cysts from Maastrichtian-Danian chalks of the Danish North Sea. *Journal of Micropalaeontology*, v.12, no.1, p.99–112, pl.1–5.

2005: Dinoflagellate cysts and acritarchs from the Oligocene-Lower Miocene interval of the Alma-1X well, Danish North Sea. *Journal of Micropalaeontology*, v.24, p.1–37, pl.1–19.

2015: *Bianchina hieroglyphica* gen. et sp. nov., a new dinoflagellate cyst with a unique archaeopyle type and ornament from the mid-Cretaceous of the East Coast Basin, New Zealand. *Palynology*, v.40, no.3, p.406–412, pl.1. [Published online in 2015 with pagination 1–7; to be published in journal with final pagination in 2016.]

Schiøler, P. and Crampton, J.S.

2014: Dinoflagellate biostratigraphy of the Arowhanan Stage (upper Cenomanian-lower Turonian) in the East Coast Basin, New Zealand. *Cretaceous Research*, v.48, p.205–224.

Schiøler, P. and Wilson, G.J.

1993: Maastrichtian dinoflagellate zonation in the Dan Field, Danish North Sea. *Review of Palaeobotany and Palynology*, v.78, p.321–351, pl.1–5.

1994: *Glaphyrosphaera*, a new dinoflagellate genus from the Maastrichtian of Denmark. *Grana*, v.33, p.139–145.

1995: *Glaphyrosphaera*, a new synonym of *Wilsonisphaera* (Dinophyceae, Gonyaulacales). *Taxon*, v.44, p.511–512.

1998: Dinoflagellate biostratigraphy of the middle Coniacian-lower Campanian (Upper Cretaceous) in south Marlborough, New Zealand. *Micropaleontology*, v.44, no.4, p.313–349, pl.1–11.

Schiøler, P., Brinkhuis, H., Roncaglia, L. and Wilson, G.J.

1997: Dinoflagellate biostratigraphy and sequence stratigraphy of the type Maastrichtian (Upper Cretaceous), ENCI Quarry, The Netherlands. *Marine Micropaleontology*, v.31, p.65–95, pl.1–4.

Schiøler, P., Roncaglia, L. and Wilson, G.J.

2001: *Alterbidinium? novozealandicum*, a new dinoflagellate from the Herring Formation (Upper Cretaceous), southern Marlborough, New Zealand. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.219, nos.1–2, p.139–152.

Schopf, J.M., Wilson, L.R. and Bentall, R.

1944: An annotated synopsis of Paleozoic fossil spores and the definition of generic groups. Illinois State Geological Survey, Report of Investigations, no.91, p.1–66, pl.1–3.

Schrank, F. von P.

1793: Mikroskopische Wahrnehmungen. *Naturforscher (Halle)*, v.27, p.26–37, pl.3.

Schrank, E.

1987: Palaeozoic and Mesozoic palynomorphs from northeast Africa (Egypt and Sudan) with special reference to Late Cretaceous pollen and dinoflagellates. *Berliner Geowissenschaftliche Abhandlungen (A)*, v.75, p.249–310, pl.1–12.

1988: Effects of chemical processing on the preservation of peridinioid dinoflagellates: a case from the Late Cretaceous of NE Africa. *Review of Palaeobotany and Palynology*, v.56, p.123–140, pl.1–4.

2001: Paleoeological aspects of *Afropollis/elaterates* peaks (Albian-Cenomanian pollen) in the Cretaceous of northern Sudan and Egypt. In Goodman, D.K. and Clarke, R.T. (editors), *Proceedings of the IX International Palynological Congress*, Houston, Texas, U.S.A., 1996, p.201–210; American Association of Stratigraphic Palynologists Foundation, Dallas, U.S.A.

Schrank, E.

2004: A gymnosperm pollen not a dinoflagellate: a new combination for *Mendicodinium? quadratum* and description of a new pollen species from the Jurassic of Tanzania. *Review of Palaeobotany and Palynology*, v.131, p.301–309, pl.1–2.

Schrank, E.

2005: Dinoflagellate cysts and associated aquatic palynomorphs from the Tendaguru Beds (Upper Jurassic-Lower Cretaceous) of southeast Tanzania. *Palynology*, v.29, p.49–85, pl.1–11.

Schreck, M. and Matthiessen, J.

2013: *Batiacasphaera micropapillata*: palaeobiogeographic distribution and palaeoecological implications of a critical Neogene species complex. In Lewis, J.M., Marret, F. and Bradley, L. (eds.), *Biological and geological perspectives of dinoflagellates*; The Micropalaeontological Society, Special Publications, Geological Society, London, p.293–306.

2014: *Batiacasphaera bergenensis* and *Lavradosphaera elongata* — new dinoflagellate cyst and acritarch species from the Miocene of the Iceland Sea (ODP Hole 907A). *Review of Palaeobotany and Palynology*, v.211, p.97–106, pl.1–2.

Schreck, M., Matthiessen, J. and Head, M.J.

2012: A magnetostratigraphic calibration of Middle Miocene through Pliocene dinoflagellate cyst and acritarch events in the Iceland Sea (Ocean Drilling Program Hole 907A). *Review of Palaeobotany and Palynology*, v.187, p.66–94, pl.1–4.

Schultz, G.

1967: Mikrofossilien des oberen Llandovery von Dalarna (Schweden). *Kölner Geologische Hefte*, v.13, p.175–187, pl.1.

Schulz, E.

1965: Sporae dispersae aus der Trias von Thüringen. *Abhandlungen des Zentralen Geologischen Instituts*, no.1, p.257–287, pl.20–23.

Schumacker-Lambry, J.

1978: Palynologie du Landenien inférieur (Paléocène) à Gelinden-Overbroek/Belgique. Relations entre les microfossiles et le sédiment. 157 p., 18 pl.; Université de Liège, Laboratoire de Paléobotanique et de Paléopalynologie, Liège, Belgium.

Schütt, F.

1891: Sulla formazione scheletrica intracellulare di un dinoflagellato. *Neptunia*, no.10, p.1–20.

1895: Die Peridineen der Plankton-Expedition. *Ergebnisse der Plankton-Expedition der Humboldt-Stiftung*, v.IV, M.a.A., p.1–170, pl.1–27; Lipsius and Teicher, Kiel. (Reprinted by J. Cramer, Lehre, 1977.)

Scott, D.B., Mudie, P.J., Vilks, G. and Younger, D.C.

1984: Latest Pleistocene-Holocene paleoceanographic trends on the continental margin of eastern Canada: foraminiferal, dinoflagellate and pollen evidence. *Marine Micropaleontology*, v.9, p.181–218, pl.1.

Shakhmundes, V.A.

1971: O nakhodkakh *Acanthodiacrodium* Timofeev, 1958 v Nizhnemelovykh otlozheniyakh severnogo Prikaspiya. *Akademiya Nauk SSSR (Doklady Earth Science Sections)*, v.196, no.12, p.437–439. (Published English translation in *Doklady Earth Science Sections, American Geological Institute*, v.196, p.224–226.)

Sharafutdinova, N.G.

1992: Dinotsisty na granitse Maastrichta i Daniya v razreze Koshak (Mangyshlak). *Byulleten Moskovskogo Obshchestva Ispytatelei Prirody, Otdel Geologicheskii*, v.67, no.2, p.92–98.

Shaw Chenglong

1999a: Eocene wetzeliellaceous dinoflagellate cysts of Taiwan. *Taiwania*, v.44, no.1, p.32–48.

1999b: Eocene dinoflagellate cysts of Taiwan. *Taiwania*, v.44, no.2, p.155–201.

Shaw Chenglong and Huang Tsengchieng

1994: Cretaceous palynomorphs of Taiwan (2) — taxonomic treatment. *Taiwania*, v.39, no.3–4, p.81–198, 54 pl.

Sheshegova, L.I.

1973: Mikrofossilii silura Podolii. In: Vozzhennikova, T.F. and Timofeev, V.B. (editors), *Mikrofossilii drevneishikh otlozhenii*; 3rd International Palynological Conference, Proceedings, p.40–41; Nauka, Moscow, Russia.

Siegl-Farkas, A.

1997: Dinoflagellate stratigraphy of the Senonian formations of the Transdanubian Range. *Acta Geologica Hungarica*, v.41, no.1, p.73–100, pl.1–8.

Silva, P.C.

1970: Remarks on algal nomenclature. IV. *Taxon*, v.19, p.941–945.

Singh, C.

1964: Microflora of the Lower Cretaceous Mannville Group, east-central Alberta. Research Council of Alberta, Bulletin, no. 15, 239 p., 29 pl.

1971: Lower Cretaceous microfloras of the Peace River area, northwestern Alberta. Research Council of Alberta, Bulletin, no.28, p.301–542, pl.39–80.

1983: Cenomanian microfloras of the Peace River area, northwestern Alberta. Research Council of Alberta, Bulletin, no.44, 322 p., 62 pl.

Singh, H.P., Khanna, A.K. and Sah, S.C.D.

1979: Palynological zonation of the Subathu Formation in the Kalka-Simla area of Himachal Pradesh. Himalayan Geology, v.8, no.1, p.33–46.

Skog, J.E. and Fensome, R.A.

1995: Nomenclatural notes no. 3. What's in a date? Palynos, v.18, no.1, p.8–9.

Slimani, H.

1994: Les dinokystes des craies du Campanien au Danien à Hallembaye, Turnhout (Belgique) et à Beutenaken (Pays-Bas). Mémoires pour servir à l'explication des cartes géologiques et minières de la Belgique, no.37, p.1–173, pl.1–18.

1996: Les dinokystes des craies du Campanien-Danien à Hallembaye et Turnhout (Belgique) et à Beutenaken (Pays-Bas): supplément de systematique. Annales de la Société géologique de Belgique, v.117, pt.2, p.371–391, pl.1–4.

2001a: Les kystes de dinoflagellés du Campanien au Danien dans la région de Maastricht (Belgique, Pays-Bas) et de Turnhout (Belgique): biozonation et corrélation avec d'autres régions en Europe occidentale. Geologica et Palaeontologica, v.35, p.161–201, pl.1–3.

2001b: New species of dinoflagellate cysts from the Campanian-Danian chalks at Hallembaye and Turnhout (Belgium) and at Beutenaken (The Netherlands). Journal of Micropalaeontology, v.20, pt.1, p.1–11, pl.1–3.

2003: A new genus and two new species of dinoflagellate cysts from the Upper Cretaceous of the Maastrichtian type area and Turnhout (northern Belgium). Review of Palaeobotany and Palynology, v.126, p.267–277, pl.1.

2004: A reappraisal of the dinoflagellate cyst genus *Montanarocysta*. Review of Palaeobotany and Palynology, v.129, p.175–185.

Slimani, H. and Louwye, S.

2011: New dinoflagellate cysts of the *Microdinium* and *Phanerodinium* complexes (Evitt) from the Upper Cretaceous-Lower Paleogene Chalk Group in the Meer borehole, northern Belgium. Review of Palaeobotany and Palynology, v.168, p.41–50.

2012: New junior synonyms of the Late Cretaceous dinoflagellate cysts *Membranigonyaulax wilsonii* Slimani 1994 and *Turnhosphaera hypoflata* (Yun 1981) Slimani 1994. Palynology, v.36, no.1, p.110–115.

2013: New organic-walled dinoflagellate cysts from the Upper Cretaceous-Lower Palaeocene Chalk Group in the Meer and Turnhout boreholes, Campine Basin, northern Belgium. Review of Palaeobotany and Palynology, v.192, p.10–21, pl.1–4.

Slimani, H., Louwye, S., Toufiq, A., Verniers, J. and de Coninck, J.

2008: New dinoflagellate cyst species from Cretaceous-Palaeogene boundary deposits at Ouled Haddou, south-eastern Rif, Morocco. Cretaceous Research, v.29, p.329–344.

Slimani, H., Louwye, S. and Toufiq, A.

2010: Dinoflagellate cysts from the Cretaceous-Paleogene boundary at Ouled Haddou, southeastern Rif, Morocco: biostratigraphy, paleoenvironments and paleobiogeography. *Palynology*, v.34, no.1, p.90–124, pl.1–10.

2012: New species of organic-walled dinoflagellate cysts from the Maastrichtian-Danian boundary interval at Ouled Haddou, northern Morocco. *Alcheringa*, v.36, p.337–353.

Słodkowska, B.

1994: Próba rekonstrukcji zbiorowisk roślinnych trzeciorzędu nw Polski na podstawie badań palinologicznych. *Przegląd Geologiczny*, v.42, no.1, p.15–19.

Sluijs, A. and Brinkhuis, H.

2009: A dynamic climate and ecosystem state during the Paleocene-Eocene Thermal Maximum; inferences from dinoflagellate cyst assemblages on the New Jersey Shelf. *Biogeosciences*, v.6, p.1755–1781, pl.1–11.

Sluijs, A., Brinkhuis, H., Williams, G.L. and Fensome, R.A.

2009: Taxonomic revision of some Cretaceous-Cenozoic spiny organic-walled peridiniacean dinoflagellate cysts. *Review of Palaeobotany and Palynology*, v.154, p.34–53, pl.1–6.

Smelror, M.

1987: Bathonian and Callovian (Middle Jurassic) dinoflagellate cysts and acritarchs from Franz Josef Land, Arctic Soviet. *Polar Research, New Series*, v.5, no.2, p.221–238.

1988a: Bathonian to Early Oxfordian dinoflagellate cysts and acritarchs from Kong Karls Land, Svalbard. *Review of Palaeobotany and Palynology*, v.56, p.275–304.

1988b: Late Bathonian to Early Oxfordian dinoflagellate cyst stratigraphy of Jameson Land and Milne Land, East Greenland. *Grønlands Geologiske Undersøgelse, Rapport*, v.137, p.135–159.

1989: *Chlamydothorella ectotabulata* sp. nov. and a gonyaulacoid dinoflagellate cyst from the Late Bathonian to the Oxfordian of the Arctic. *Review of Palaeobotany and Palynology*, v.61, p.139–145, pl.1–3.

1991: Two new dinoflagellate cysts from the Middle Jurassic of the Barents Sea region. *Journal of Micropalaeontology*, v.10, pt.2, p.175–180, pl.1.

Smelror, M. and Århus, N.

1989: Emendation of the dinoflagellate cyst genus *Crussolia* Wolfard & Van Erve 1981, and description of *C. dalei* n. sp. from the Callovian of Svalbard. *Neues Jahrbuch für Geologie und Paläontologie, Monatshefte*, no.1, p.37–46.

Smelror, M. and Lominadze, T.A.

1989: Callovian dinoflagellate cysts from the Caucasus, U.S.S.R. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.178, no.2, p.147–166.

Smith, J.E.

1793: *Mém. Acad. Roy. Sci. (Turin)*, v.5, t.9, 11. (Cited, but complete reference not given, in Farr et al., 1979, p.492.)

Smith

1817: (Cited by Gerlach, 1961, p.198, but full reference not given.)

Smith, S.W.

1992: Microplankton from the Cape Lamb Member, López de Bertodano Formation (Upper Cretaceous), Cape Lamb, Vega Island. *Antarctic Science*, v.4, no.3, p.337–353.

Smith, G.A. and Harding, I.C.

2004: New dinoflagellate cyst species from Upper Jurassic to Lower Cretaceous sediments of the Volgian tectostratotype sections at Gorodische and Kashpir, Volga Basin, Russia. *Review of Palaeobotany and Palynology*, v.128, p.355–379, pl.1–6.

Snape, M.G.

1992: Dinoflagellate cysts from an allochthonous block of Nordenskjöld Formation (Upper Jurassic), northwest James Ross Island. *Antarctic Science*, v.4, no.3, p.267–278.

Snopková, P. and Samuel, O.

1982: *Pentagonium obidum* nov. gen. et nov. sp. (incertae sedis) from the Upper Eocene of the west Carpathians (the Podunajská Nížina Lowland). *Zapadne Karpaty, Seria Paleontologia*, v.8, p.131–133, pl.48–50.

Soliman, A., Head, M.J. and Louwye, S.

2009: Morphology and distribution of the Miocene dinoflagellate cyst *Operculodinium? borgerholtense* Louwye 2001, emend. *Palynology*, v.33, no.2, p.73–84, pl.1–3.

Soliman, A., Feist-Burkhardt, S., Harzhauser, M., Kern, A.K. and Piller, W.E.

2013: *Mendicodinium mataschenensis*: a new endemic dinoflagellate cyst from the Late Miocene (Tortonian) of Lake Pannon (Austria). *Palynology*, v.37, p.35–47, pl.1–3.

Sommerfelt, S.C.

1824: Om den röde Sneec, eller *Sphaerella nivalis* Sommerf., uredo nivalis auct. *Magazin for Naturvidenskaberne* 4: 249–253.

Soncini, M.J.

1992: Three new dinoflagellate cysts from the Moroccan Paleocene-Eocene phosphates. *Review of Palaeobotany and Palynology*, v.70, no.4, p.325–338, pl.1–3.

Soncini, M.J. and Rauscher, R.

1988: Associations de Dinokystes du Maastrichtien-Paléocène phosphaté au Maroc. Dinocyst assemblages in the phosphatic Maastrichtian-Paleocene of Morocco. *Bulletin des Centres de recherches exploration-production Elf-Aquitaine*, v.12, no.1, p.427–450, pl.1–4.

Song Zhichen and He Chengquan

1982: Reassignment of several *Deflandrea* species from the coastal region of Bohai. *Acta Palaeontologica Sinica*, v.21, no.6, p.735–736.

Song Zhichen, Guan Xueting, Li Zengrui, Zheng Yahui, Wang Weiming and Hu Zhongheng

1985: A research on Cenozoic palynology of the Longjing structural area in the Shelf Basin of the East China Sea (Donghai) region. *Cenozoic-Mesozoic Palaeontology and Stratigraphy of East China, Series 1*, p.1–209, pl.1–55; Anhui Science and Technology Publishing House, China. (In Chinese with English summary.)

Srivastava, N.S.

1975: A new microsporangiata fructification from the Triassic of Nidin, India. *The Palaeobotanist*, v.22, p.19–24.

Srivastava, S.K.

1984: Barremian dinoflagellate cysts from southeastern France. *Cahiers de micropaléontologie*, no.1984–2, p.1–90, pl.1–39.

1995: Dinocyst biostratigraphy of Santonian-Maastrichtian formations of the western Gulf Coastal Plain, southern United States. *The Palaeobotanist*, v.42, no.3, p.249–362, pl.1–51.

Srivastava, N.C. and Banerjee, D.

1969: Hystrichosphaerids from Tertiary subcrops of Assam, India. *J. Sen Memorial Volume*, p.101–108, pl.1; J. Sen Memorial Volume Committee and Botanical Society of Bengal, Calcutta, India.

Stafleu, F.A., Bonner, C.E.B., McVaugh, R., Meikle, R.D., Rollins, R.C., Ross, R., Schopf, J.M., Schulze, G.M., de Vilmorin, R. and Voss, E.G.

1972: International Code of Botanical Nomenclature. *Regnum Vegetabile*, v.82, 426 p.

Stancliffe, R.P.W.

1991: Dinoflagellate cysts from the Oxfordian (Upper Jurassic) of Skye, Scotland and southern Dorset, England.

Journal of Micropalaeontology, v.10, no.2, p.185–201, pl.1–4.

Stancliffe, R.P.W. and Sarjeant, W.A.S.

1990: The complex chorate dinoflagellate cysts of the Bathonian to Oxfordian (Jurassic): their taxonomy and stratigraphic significance. *Micropaleontology*, v.36, no.3, p.197–228, pl.1–5.

1994: The acritarch genus *Veryhachium* Deunff 1954, emend. Sarjeant and Stancliffe 1994: a taxonomic restudy and a reassessment of its constituent species. *Micropaleontology*, v.40, no.3, p.223–241.

1996: The acritarch genus *Dorsennidium* Wicander 1974, emend. Sarjeant and Stancliffe 1994: a reassessment of its constituent species. *Micropaleontology*, v.42, no.2, p.151–166.

Stanley, E.A.

1965: Upper Cretaceous and Paleocene plant microfossils and Paleocene dinoflagellates and hystrichosphaerids from northwestern South Dakota. *Bulletin of American Paleontology*, v.49, no.222, p.179–384, pl.19–49.

Staplin, F.L.

1960: Upper Mississippian plant spores from the Golata Formation, Alberta, Canada. *Palaeontographica, Abteilung B*, v.107, no.1–3, p.1–40, pl.1–8.

1961: Reef-controlled distribution of Devonian microplankton in Alberta. *Palaeontology*, v.4, no.3, p.392–424, pl.48–51.

Staplin, F.L., Jansonius, J. and Pocock, S.A.J.

1965: Evaluation of some acritarchous hystrichosphere genera. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.123, no.2, p.167–201, pl.18–20.

Steidinger, K.A., Tester, L.S. and Taylor, F.J.R.

1980: A redescription of *Pyrodinium bahamense* var. *compressa* (Böhm) stat. nov. from Pacific red tides. *Phycologia*, v.19, no.4, p.329–337.

Stein, F.R. von

1878: Der Organismus der Infusionsthier nach eigenen Forschungen in systematischer Reihenfolge bearbeitet. III. Abteilung. Die Naturgeschichte der Flagellaten oder Geisselinfusorien. I. Hälfte. Den noch nicht abgeschlossenen allgemeinen Teil nebst Erklärung der sämtlichen Abbildungen enthaltend. x+154 p., 24 pl.; Wilhelm Engelmann, Leipzig, Germany.

1883: Der Organismus der Infusionsthier nach eigenen Forschungen in systematischer Reihenfolge bearbeitet. II. Hälfte. Einleitung und Erklärung der Abbildungen. 30 p., 25 pl.; Wilhelm Engelmann, Leipzig, Germany.

Stevens, J.

1987: Some Early Cretaceous dinoflagellates from the *Cassiculosphaeridia delicata* Zone on the Exmouth Plateau, Western Australia. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.185–197.

Stevens, J. and Helby, R.

1987: Some Early Cretaceous dinoflagellates encountered in the Australian *Kalyptea wisemaniae* Zone. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.165–184.

Stockmans, F. and Willière, Y.

1960: Hystrichosphères du Dévonien belge (Sondage de l'Asile d'aliénés à Tournai). *Senckenbergiana Lethaea*, v.41, no.1–6, p.1–11, pl.1–2.

1962a: Hystrichosphères du Dévonien belge (Sondage de l'Asile d'aliénés à Tournai). *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie*, v.71, p.41–77, pl.1–2.

1962b: Hystrichosphères du Dévonien belge (Sondage de Wépion). *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie*, v.71, no.1, p.83–99, pl.1–2.

1963: Les hystrichosphères ou mieux les acritarches du Silurien belge. Sondage de la brasserie Lust à Courtrai (Kortrijk). *Bulletin de la Société belge de géologie, de paléontologie et d'hydrologie*, v.71, no.3, p.450–481, pl.1–3.

1969: Acritarches du Famannien Inférieur. *Mémoires de l'Académie royale des sciences, des lettres et des beaux arts de Belgique, Classe des sciences*, v.38, no.6, p.1–63, pl.1–3.

Stöhr, E.

1880: Die Radiolarien fauna der Tripoli von Grotte Provinz Girgenti in Sicilien. *Palaeontographica*, v.26, p.69–124, 7 pl.

Stokes, A.C.

1887: Notices of new fresh-water infusoria. *Proceedings of the American Philosophical Society*, v.24, no.126, p.244–255.

Stone, J.F.

1973: Palynology of the Almond Formation (Upper Cretaceous), Rock Springs Uplift, Wyoming. *Bulletin of American Paleontology*, v.64, no.278, p.1–135, pl.1–20.

Stover, L.E.

1966: *Nannoceratopsis spiculata*, a new dinoflagellate species from the Middle Jurassic of France. *Journal of Paleontology*, v.40, p.41–45, pl.8.

1974: Palaeocene and Eocene species of *Deflandrea* (Dinophyceae) in Victorian coastal and offshore basins, Australia. *Geological Society of Australia, Special Publication*, no.4, p.167–188, pl.1–5. (Cover date 1973, issue date 1974.)

1975: Observations on some Australian Eocene dinoflagellates. *Geoscience and Man*, v.11, p.35–45, pl.1–3.

1977: Oligocene and Early Miocene dinoflagellates from Atlantic Corehole 5/5B, Blake Plateau. *American Association of Stratigraphic Palynologists, Contributions Series*, no.5A, p.66–89, pl.1–3.

Stover, L.E. and Evitt, W.R.

1978: Analyses of pre-Pleistocene organic-walled dinoflagellates. *Stanford University Publications, Geological Sciences*, v.15, 300 p.

Stover, L.E. and Hardenbol, J.

1994: Dinoflagellates and depositional sequences in the Lower Oligocene (Rupelian) Boom Clay Formation, Belgium. *Bulletin de la Société belge de géologie*, v.102, no.1–2, p.5–77, pl.1–13. (Cover date 1993, issue date 1994.)

Stover, L.E. and Helby, R.

1987a: Some Australian Mesozoic microplankton index species. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.101–134.

1987b: The Jurassic dinoflagellate *Omatia* and allied genera. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.143–157.

- 1987c: Early Cretaceous dinoflagellates from the Vinck-1 well, offshore Western Australia. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.227–260.
- 1987d: Some Early Cretaceous dinoflagellates from the Houtman-1 well, Western Australia. In: Jell, P.A. (editor), *Studies in Australian Mesozoic palynology; Memoir of the Association of Australasian Palaeontologists*, no.4, p.261–295.
- Stover, L.E. and Williams, G.L.
1987: Analyses of Mesozoic and Cenozoic organic-walled dinoflagellates 1977–1985. *American Association of Stratigraphic Palynologists, Contributions Series*, no.18, 243 p.
- 1995: A revision of the Paleogene dinoflagellate genera *Areosphaeridium* Eaton 1971 and *Eatonicysta* Stover and Evitt 1978. *Micropaleontology*, v.41, no.2, p.97–141, pl.1–7.
- Stover, L.E., Sarjeant, W.A.S. and Drugg, W.S.
1977: The Jurassic dinoflagellate genus *Stephanellytron*: emendation and discussion. *Micropaleontology*, v.23, p.330–338, pl.1.
- Stradner, H.
1961: Vorkommen von Nannofossilien im Mesozoikum und Alttertiär. *Erdöl-Zeitung*, v.77, p.77–88.
- Strauss, C.
1991a: *Krutzschidinium*, a new dinoflagellate cyst-genus from the Middle Eocene of the Egel-Brown Coal Basin (central Germany). *Acta Palaeobotanica*, v.31, no.1–2, p.49–61, pl.1–2.
- 1991b: Dinozysten-Biostratigraphie im Unter- und Mittelmiozän von Ostdeutschland. *Tagungsmaterial 38, Jahresstagung Gesellschaft für Geowissenschaften*, p.66–67.
- Strauss, C. and Lund, J.J.
1992: A Middle Miocene dinoflagellate cyst microflora from Papendorf near Hamburg, Germany. *Mitteilungen Geologisch-Paläontologischen Institut der Universität Hamburg*, v.73, p.159–189, pl.1–5.
- Strauss, C., Lund, J.J. and Lund-Christensen, J.
2001: Miocene dinoflagellate cyst biostratigraphy of the Nieder Ochtenhausen research borehole (NW Germany). *Geologisches Jahrbuch, Serie A*, v.152, p.395–447, pl.1–6.
- Streel, M., Fairon-Demaret, M., Bick, H., Schumacker-Lambry, J. and Vanguetaine, M.
1977: Macro and microplant fossils in litho and biostrat of the Senonian-Paleocene Left Bank of the Meuse, north Belgium. *Guidebook of excursion, "Recent Techniques in Palynology"*, Université de Liège, 87 p., 12 pl.
- Streng, M., Hildebrand-Habel, T. and Willems, H.
2002: Revision of the genera *Sphaerodinella* Keupp and Versteegh, 1989 and *Orthopithonella* Keupp in Keupp and Mutterlose, 1984 (Calciodinelloideae, calcareous dinoflagellate cysts). *Journal of Paleontology*, v.76, p.397–407.
- 2004: A proposed classification of archeopyle types in calcareous dinoflagellate cysts. *Journal of Paleontology*, v.78, no.3, p.456–483.
- Streng, M., Hildebrand-Habel, T., Meier, K.J. and Fensome, R.A.
2006: Clarification of the systematic position of two calcareous dinoflagellate taxa belonging to the genus *Calciodinellum* (Dinophyceae, Peridinales). *Micropaleontology*, v.52, no.2, p.189–192, pl.1.
- Streng, M., Basanova, M., Rehakova, S. and Willems, H.
2009: An exceptional flora of calcareous dinoflagellates from the middle Miocene of the Vienna Basin, SW Slovakia. *Review of Palaeobotany and Palynology*, v.153, p.225–244, pl.1–12.

Streng, M., Esper, O. and Wollenburg, J.

2011: Calcareous dinoflagellate cysts from the Pleistocene (Marine Isotope Stage 31) of the Ross Sea, Antarctica. *Antarctic Science*, v.23, no.6, p.597–604.

Sumner, P.W.

1992: Dinoflagellate cysts from the Rabot Member (Santa Marta Formation) of eastern James Ross Island. *Antarctic Science*, v.4, no.3, p.305–310.

Sun Xuekun

1994: Paleogene dinoflagellate cysts from the Liaohe Depression, northeast China. *Palynology*, v.18, p.67–86, pl.1–6.

Sun Xuekun and He Chengquan

1992: Dinoflagellates from Upper Jurassic Dongrong Formation of Suibin, Heilongjiang. *Acta Palaeontologica*, v.31, no.2, p.190–205, pl.1–4.

Sun Xuekun and Song Zhichen

1992: Quaternary dinoflagellates from arenaceous dolomite in Hainan Island. *Acta Micropalaeontologica Sinica*, v.9, no.1, p.45–52, pl.1–2.

Sung Tzechen and Lee Manying

1976: Mesozoic and early Paleogene spore-pollen assemblages from Yunnan, China. Part II. Early Upper Cretaceous assemblages from Lufeng and Mouding and late Upper Cretaceous-early Paleogene assemblage from Mengla, Yunnan. In: *Mesozoic Fossils from Yunnan, Volume 1*, p.9–64, pl.1–12; Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, China.

Sütő, Z.

1994: Microplankton associations of organic skeleton in the surroundings of Villány Mts. Szerves vázú mikroplankton a Villányi-hegység környezetében. *Földtani Közlemény*, v.124, no.4, p.451–478, pl.1–8.

Sütő-Szentai, M.

1982a: A Tengelic 2. sz. fúrás pannóniai kezödményeinek szerves vázú mikroplankton és sporomorpha maradványai. *Annales Instituti Geologici Publici Hungarici, a Magyar Allami Földtani Intézet*, v.65, p.205–233, pl.1–6.

1982b: Szerves vázú mikroplankton biozónák a közép-dunántúl pannóniai rétegösszletében. *Magyar Allami Földtani Intézet Evi Jel., Institutum Geologicum Publicum Hungaricum, 1980–Ról*, p.309–344, pl.1–9.

1983: A Pannóniai dinoflagellata együttesek vizsgálatának újabb a-datai. *Öslénytani Viták Discussiones Palaeontologicae*, Budapest, v.29, p.11–23.

1984: Szervesvázú mikroplankton vizsgálatok a Mecsek hegység környékének pannóniai rétegeiből. *Folia Comloensis*, v.1, p.55–77, pl.1–4.

1985: Die Verbreitung organischer Mikroplankton-Vergesellschaftungen in dem pannonischen Schichten Ungarns. In: Papp, A., Jambor, A. and Steininger, F.F., *Pannonien (Slavonien und Serbien) Chronostratigraphie und Neostatotypen, Miozän der Zentralen Paratethys*, p.517–533, pl.79–82; Akadémiai Kiadó, Budapest, Hungary.

1986: A magyarországi Pannóniai (s.l.) rétegösszlet mikroplankton vizsgálata. *Folia Comloensis*, v.2, p.25–45, pl.1–3.

1988: Microplankton zones of organic skeleton in the Pannonian s.l. stratum complex and in the upper part of the Sarmatian strata. *Acta Botanica Hungarica*, v.34, nos.3–4, p.339–356, pl.1–4.

- 1989: A Szentlőrinc-XII. sz. szerkezetkutató fúrás pannóniai rétegsorának szervesvázú mikroplankton flórája. *Földtani Közlöny*, v.119, p.31–43, pl.1–7.
- 1990: 4.6.3. Mikroplanktonflora der pontischen (oberpannonischen) Bildungen Ungarns. Pliozän Pl, Pontien; Chronostratigraphie und Neostatotypen, p.842–869.; Jazu and Sanu, Zagreb and Belgrade, Yugoslavia.
- 1991: Szervesvázú mikroplankton zónák magyarország pannóniai rétegösszletében. Újabb adatok a zónációról és a dinoflagellaták evolúciójáról. *Óslénytani Viták/Discussiones Palaeontologicae*, v.36-37, p.157–200.
- 1995: Délkelet-dunántúl ösföldrajzi képe a Pannóniai emelet idején. *Folia Comloensis*, v.6, p.35–55.
- 2000: Organic walled microplankton zonation of the Pannonian s.l. in the surroundings of Kaskantyú, Paks and Tengelic (Hungary). *Annual Report of the Geological Institute of Hungary, 1994–1995*, no.2, p.153–175, pl.1–9.
- Sverdløve, M.S. and Habib, D.
1974: Stratigraphy and suggested phylogeny of *Deflandrea vestita* (Brideaux) comb. nov. and *Deflandrea echinoidea* Cookson and Eisenack. *Geoscience and Man*, v.9, p.53–62, pl.1.
- Takahashi, K.
1979: Phytoplankton from the Upper Cretaceous Quiriquina Formation, central Chile. *Bulletin of Faculty of Liberal Arts, Nagasaki University, Natural Science*, v.19, p.31–37, pl.1.
- Tangen, K., Brand, L.E., Blackwelder, P.L. and Guillard, R.R.L.
1982: *Thoracosphaera heimii* (Lohmann) Kamptner is a dinophyte: observations on its morphology and life cycle. *Marine Micropaleontology*, v.7, p.193–212.
- Tappan, H. and Loeblich, A.R. Jr.
1967: [Review of] *Katalog der fossilen Dinoflagellaten Hystrichosphären und verwandten Mikrofossilien. Band I Dinoflagellaten*, by Alfred Eisenack and K.W. Klement, 1964 *Journal of Paleontology*, v.41, no.2, p.525–526.
- Tasch, P.
1963: Hystrichosphaerids and dinoflagellates from the Permian of Kansas. *Micropaleontology*, v.9, p.332–336, pl.1.
- Tasch, P., McClure, K. and Oftedahl, O.
1964: Biostratigraphy and taxonomy of a hystrichosphere — dinoflagellate assemblage from the Cretaceous of Kansas. *Micropaleontology*, v.10, no.2, p.189–206, pl.1–3.
- Taugourdeau-Lantz, J. and Rosset, C.
1966: Sur un nouveau microfossile incertae sedis de l'Oligocène du bassin de Narbonne. *Revue de Micropaléontologie*, v.9, p.186–191.
- Teteryuk, V.K.
1958: O nakhodke pyltsy paleozoiskikh pokrytozemennykh s otkrytymi porami. *Akademiya Nauk SSSR (Doklady Earth Science Sections)*, v.118, no.5, p.1034–1035.
- Thomas, J.E. and Cox, B.M.
1988: The Oxfordian-Kimmeridgian Stage boundary (Upper Jurassic): dinoflagellate cyst assemblages from the Harome Borehole, north Yorkshire, England. *Review of Palaeobotany and Palynology*, v.56, p.313–326, pl.1–2.
- Thomsen, E. and Heilmann-Clausen, C.
1985: The Danian-Selandian boundary at Svejstrup with remarks on the biostratigraphy of the boundary in western Denmark. *Bulletin of the Geological Society of Denmark*, v.33, p.341–362, pl.1–7.
- Thorn, V., Riding, J. and Francis, J.
2009: The Late Cretaceous dinoflagellate cyst *Manumiella* — biostratigraphy, systematics and paleoecological signals in Antarctica. *Review of Palaeobotany and Palynology*, v.156, p.436–448, pl.1–2.

- Thurrow, J., Moullade, M., Brumsack, H.-J., Masure, E., Taugourdeau-Lantz, J. and Dunham, K.
1988: 35. The Cenomanian/Turonian boundary event (CTBE) at Hole 641A, ODP Leg 103 (compared with the CTBE interval at site 398). In: Boillot, G. et al., Ocean Drilling Program, Scientific Results, Proceedings, Leg 103, p.587–634, pl.1–8.
- Thusu, B.
1973: Acritarchs of the Middle Silurian Rochester Formation of southern Ontario. *Palaeontology*, v.16, no.4, p.799–826, pl.104–106.
- Timbrell, G.
1993: Sandstone architecture of the Balder Formation depositional system, U.K. quadrant 9 and adjacent areas. In: J.R. Parker (editor), *Petroleum Geology of Northwest Europe: Proceedings of the 4th Conference*; p.107–121; Geological Society, London, England.
- Timofeev, B.V.
1958: Über das Alter sächsischer Grauwacken. Mikropaläophytologische Untersuchungen von Proben aus der Weesensteiner und Lausitzer Grauwacke. *Geologie*, v.7, no.3–6, p.826–845, pl.1–3.
1959: Drevneishaya flora Pribaltiki i ee stratigraficheskoe znachenie. Vsesoyuznyi Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad (VNIGRI), Trudy, no.129, p.1–136, pl.1–24.
1960: Spory i fitoplankton proterozoya i rannego paleozoya Evrazii. Mezhdunarodnyi Geologicheskii Kongress, XXI Sessia, 1960, Doklady Sovetskikh Geologov, p.172–188, pl.1–2; Nauka, Moscow, Russia.
1962: Teodolitnyi paleontologicheskii stolik (novyi metod issledovaniya iskopaemogo mikroplanktona) obshchie zamechaniya. Vsesoyuznyi Neftyanoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad (VNIGRI), Trudy, no.196 (Paleontologicheskii Sbornik, no.3), p.601–647, pl.1–20.
1963: Fitoplankton ordovika i silura Sibirskoy Platformy. Akademiya Nauk SSSR (Doklady Earth Science Sections), v.149, no.2, p.399–402. (Published English translation dated 1965 in *Doklady Earth Science Sections*, American Geological Institute, v.149, p.45–48. Russian original not available to present authors.)
1966: Mikropaleofitologicheskoe issledovanie drevnikh svit. Akademiya Nauk SSSR, Izdatel'skvo Nauka, Moskva, p.1–147, pl.1–89. (Published English translation dated 1974 by British Library — Lending Division, Yorkshire, England, 214 p.)
1969: Sferomorfidy Proterozoya. 145 p., 39 pl.; Academiya Nauk SSSR, Leningradskoe Otdelenie, Izdatel'skva Nauka, Leningrad, U.S.S.R.
- Tocher, B.A. and Jarvis, I.
1987: Dinoflagellate cysts and stratigraphy of the Turonian (Upper Cretaceous) chalk near Beer, southeast Devon, England. In: Hart, M.B. (editor), *Micropalaeontology of Carbonate Environments*, p.138–175, pl.9.1–9.3; Ellis Horwood, Chichester, U.K.
- Torricelli, S.
1997: Two new Early Cretaceous dinoflagellate cyst species from the Monte Soro Flysch (Sicily, Italy). *Review of Palaeobotany and Palynology*, v.96, p.339–345, pl.1–2.
2000: Lower Cretaceous dinoflagellate cyst and acritarch stratigraphy of the Cismon APTICORE (southern Alps, Italy). *Review of Palaeobotany and Palynology*, v.108, p.213–266, pl.1–13.
2001: Dinoflagellate cyst stratigraphy of the Lower Cretaceous Monte Soro Flysch in Sicily (S Italy). *Revista Italiana di Paleontologia e Stratigrafia*, v.107, no.1, p.79–105, pl.1–13.
- Traverse, A.

1955: Pollen analysis of the Brandon lignite of Vermont. United States Bureau of Mines, Report of Investigations, no.5151, p.1–107.

1994: Palynofloral geochronology of the Brandon Lignite of Vermont, USA. Review of Palaeobotany and Palynology, v.82, p.265–297, pl.1–3.

1998: (48-49) Two proposals to amend Art. 8 to provide for the typification of plant microfossil names by illustrations. Taxon, v.47, p.757–759.

Trejo, M.

1983: Paleobiología y taxonomía de algunos fósiles mesozoicos de México. Boletín de la Sociedad Geológica Mexicana, v.19, p.1–22.

Tripathi, S.K.M.

1989: Algal and fungal remains from Jowai-Sonapur road section (Palaeocene-Eocene), Meghalaya. The Palaeobotanist, v.37, no.1, p.63–76, pl.1–3. (Cover date 1988, issue date 1989.)

Troncoso, A. and Doubinger, J.

1980: Dinoquistes (Dinophyceae) del límite Cretácico-Terciario del Pozo El Ganso No 1 (Magallanes, Chile). Actas del Segundo Congreso Argentino de Paleontología y Bioestratigrafía y Primer Congreso Latinoamericano de Paleontología, v.2, p.93–125, pl.1–3.

Truswell, E.M., Sluiter, E.I.R. and Harris, W.K.

1985: Palynology of the Oligocene-Miocene sequence in the Oakvale-1 corehole, western Murray Basin, South Australia. Bureau of Mineral Resources, Journal of Australian Geology and Geophysics, v.9, p.267–295.

Turner, R.E.

1984: Acritarchs from the type area of the Ordovician Caradoc Series, Shropshire, England. Palaeontographica, Abteilung B, v.190, no.4–6, p.87–157, pl.1–14.

1985: Acritarchs from the type area of the Ordovician Llandeilo Series, south Wales. Palynology, v.9, p.211–234, pl.1–7.

Turon, J.-L. and Londeix, L.

1988: Les assemblages de kystes de Dinoflagellés en Méditerranée occidentale (Mer d'Alboran). Mise en évidence de l'évolution des paléoenvironnements depuis le dernier maximum glaciaire. Dinoflagellate assemblages in the western Mediterranean (Alboran Sea). Evidence of the evolution of palaeoenvironments since the last glacial maximum. Bulletin des Centres de recherches exploration-production Elf-Aquitaine, v.12, no.1, p.314–344, pl.1–7.

Tykozeinski, H.R.G., Smith, S.W., Hogg, N.M. and Bailey, D.A.

2001: Three new dinoflagellate cyst species from the Bathonian and Callovian of England. Palynology, v.24, p.79–93, pl.1–4.

Tynni, R.

1976: Ordovician hystrichospheres and chitinozoans in limestone from the Bothnian Sea. Geological Survey of Finland, Bulletin, no.279, p.1–59, pl.1–4. (Cover date 1975, issue date 1976)

1982: On Paleozoic microfossils in clastic dykes on the Åland Islands and in the core samples of Lumparn. In: Bergman, L., Tynni, R. and Winterhalter, B., Paleozoic sediments in the Rapakivi area of the Åland Islands; Geological Survey of Finland, Bulletin, no.317, p.35–94, pl.1–20.

Valensi, L.

1947: Note préliminaire à une étude des microfossiles des silex jurassiques de la région de Poitiers. Comptes rendus hebdomadaires des séances de l'Académie des sciences, v.225, p.816–818.

- 1949: Sur quelques microorganismes planctoniques des silex du Jurassique moyen du Poitou et de Normandie. Bulletin de la Société géologique de France, 5e série, v.18, p.537–550.
- 1953: Microfossiles des silex du Jurassique moyen. Remarques pétrographiques. Mémoires de la Société géologique de France, Nouvelle série, v.32, part 4, no.68, p.1–100, pl.1–16.
- 1955a: Sur quelques microorganismes des silex crétacés du Magdalénien de Saint-Amand (Cher). Bulletin de la Société géologique de France, 6e série, v.5, no.1–3, p.35–40.
- 1955b: Étude micropaléontologique des silex du Magdalénien de Saint-Amand (Cher). Bulletin de la Société préhistorique française, v.52, no.9, p.584–596, pl.1–5.
- van Helden, B.G.T.
1977: Correlation of microplankton assemblages with ammonite faunas from the Jurassic Wilkie Point Formation, Prince Patrick Island, District of Franklin. Geological Survey of Canada, Paper, no.77–1B, p.163–171, pl.33.1–33.2.
- 1986: Dinoflagellate cysts at the Jurassic-Cretaceous boundary, offshore Newfoundland, Canada. Palynology, v.10, p.181–199, pl.1–6.
- van Mourik, C.A., Brinkhuis, H. and Williams, G.L.
2001: Mid- to Late Eocene organic-walled dinoflagellate cysts from ODP Leg 171B, offshore Florida. In: Kroon, D., Norris, R.D. and Klaus, A. (editors), Western North Atlantic Palaeogene and Cretaceous palaeoceanography; Geological Society of London Special Publications, no.183, p.225–251.
- Van Simaëys, S., Munstermann, D. and Brinkhuis, H.
2005: Oligocene dinoflagellate cyst biostratigraphy of the southern North Sea. Review of Palaeobotany and Palynology, v.134, p.105–128, pl.1–3.
- Varma, C.P. and Dangwal, A.K.
1964: Tertiary hystrichosphaerids from India. Micropaleontology, v.10, no.1, p.63–71, pl.1–2.
- Vasilyeva, O.N.
2013: Paleogene dinocysts of eastern Caspian Depression (the Uspenskaya SP-1 borehole, Kazakhstan). Lithosphaera, v.1, p.102–127, pl.1–3. [In Russian with English Summary]
- Vasilyeva, O.N., Zhelezko, V.A. and Kozlov, V.A.
2001: Tavdinskaya (cheganskaya) svita Zauralya, ee vozrast po microfytoplanktonu i elasmobranchiyam, korrelyaciya s odnovozrastnimi otlozheniyami Zapadnoy Sibiri, Turgayskogo progiba. Materialy po stratigrafii i paleontologii Urala, Ekaterinburg, Issue 6, p.61–73, pl.1–3.
- Vavrdová, M.
1966: Palaeozoic microplankton from central Bohemia. Časopis pro Mineralogii a Geologii, v.11, no.4, p.409–414, pl.1–3.
- Verdier, J.-P.
1970: Addendum au mémoire de G. Deflandre et I.C. Cookson. Microplancton fossile de sédiments du Mésozoïque supérieur et du Tertiaire d'Australie. Cahiers de micropaléontologie, Série 2, no.4, p.1–54.
- Verhoeven, K. and Louwye, S.
2012: *Selenopemphix islandensis* sp. nov.: a new organic-walled dinoflagellate cyst from the Lower Pliocene Tjörnes beds, northern Iceland. Palynology, v.36, no.1, p.10–25, pl.1–3.
- Verleye, T., Pospelova, V., Mertens, K.N. and Louwye, S.
2011: The geographical distribution and (palaeo)ecology of *Selenopemphix undulata* sp. nov., a new late Quaternary dinoflagellate cyst from the Pacific Ocean. Marine Micropaleontology, v.78, no.3–4, p.65–83, pl.1–2.

Versteegh, G.J.M.

1993: New Pliocene and Pleistocene calcareous dinoflagellate cysts from southern Italy and Crete. Review of Palaeobotany and Palynology, v.78, p.353–380, pl.1–9.

1995: Palaeoenvironmental changes in the Mediterranean and North Atlantic in relation to the onset of Northern Hemisphere glaciations (2.5 Ma B.P.) — a palynological approach. Ph.D. Thesis, University of Utrecht, 134 p., 6 pl.; Cip-Gegevens Koninklijke Bibliotheek, Den Haag, The Netherlands. (Published thesis dated February, 1995.)

Versteegh, G.J.M. and Zevenboom, D.

1995: New genera and species of dinoflagellate cysts from the Mediterranean Neogene. Review of Palaeobotany and Palynology, v.85, p.213–229, pl.1–5. (Publication dated April, 1995.)

Versteegh, G.J.M., Servais, T., Streng, M., Munnecke, A. and Vachard, D.

2009: A discussion and proposal concerning the use of the term calcispheres. Palaeontology, v.52, p.343–348.

Villain, J.-M.

1975: "Calcisphaerulidae" (incertae sedis) du Cretacé supérieur du Limbourg (Pays-Bas), et d'autres régions. Studies on "Calcisphaerulidae" (incertae sedis) from Upper Cretaceous of Limburg (Netherlands), and other regions. Palaeontographica, Abteilung A, v.149, p.193–242, pl.33–41.

1977: Les Calcisphaerulidae: architectures, calcification de la paroi et phylogénèse. The Calcisphaerulidae: architectures, wall calcification and phylogenesis. Palaeontographica, Abteilung A, v.159, p.139–177, pl.42–47.

Visser, A.M.

1951: Monograph on the foraminifera of the type locality of the Maestrichtian (south Limburg), Netherland. Leidse Geologische Mededelingen, v.16, p.202–233, pl.1–16.

Vogler, J.

1941: Ober-Jura und Kreide von Misol (Niederländisch-Ostindien). Palaeontographica, Supplement-Band, v.4, no.4, p.243–293, pl.19–24.

Voigt, E. and Häntzschel, Z.

1964: Gradierte Schichtung in der Oberkreide Westfalens. Fortschritte in der Geologie von Rheinland und Westfalen, v7, p.495–548.

Volkheimer, W.

2010: Early Cretaceous dinoflagellate cysts from the southern border of the Neuquén Basin, Estancia Santa Elena locality, Argentina. Revista del Museo Argentino de Ciencias Naturales, n.s., v.12, no.2, p.233–253.

Volkheimer, W. and Salas, A.

1976: Estudio palinológico de la Formación Huitrín Cretácico de la Cuenca Nuequina, en su localidad tipo. Actos del Sexto Congreso Geológico Argentina, v.1, p.433–456, pl.1–2.

Volkheimer, W. and Sarjeant, W.A.S.

1993: *Systematophora rosenfeldii* n. sp., a Lower Cretaceous dinoflagellate from the Neuquén Basin, central western Argentina. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.4, p.246–256.

Volkova, N.A.

1974: Akritarkhi iz pogranichnykh sloev Nizhnego-Srednego Kembriya zapadnoi Latvii. Biostratigrafiya i Paleontologiya Nizhnego Kembriya Evropy i Severnoi Azii, p.194–197, pl.27–28; Akademiya Nauk SSSR, Sibirskoe Otdelenie, Institut Geologii i Geofiziki, Novosibirsk, Izdatelstvo Nauka, Moskow, U.S.S.R.

Volkova, N.A. and Golub, I.N.

1985: Novye akritarkhi verkhnego kembriya Leningradskoy Oblasti (Ladozhskaya Svita). *Paleontologicheskii Zhurnal*, v.19, no.4, p.90–98, pl.7–8. (Published English translation dated 1986 in *Paleontological Journal, Scripta Technica Inc.* v.19, no.4, p.99–109, pl.7–8.)

von Höhnel, F.

1915: Fragmente zur Mykologie (XVII. Mitteilung, Nr. 876 bis 943). *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften Math.-naturw. Klasse Abt. I*, v.124, p.49–159

Voss, E.G., Burdet, H.M., Chaloner, W.G., Demoulin, V., Hiepkö, P., McNeill, J., Meikle, R.D., Nicolson, D.H., Rollins, R.C., Silva, P.C. and Greuter, W.

1983: International Code of Botanical Nomenclature adopted by the Thirteenth International Botanical Congress, Sydney, August 1981. *Regnum Vegetabile*, v.111, xvi + 472 p.

Vozzhennikova, T.F.

1960: Paleoalgologicheskaya kharakteristika mezokaynozoykskikh otlozheniy Zapadno — Sibirskoy Nizmennosti. *Akademiya Nauk SSSR, Sibirskoe Otdelenie, Institut Geologii i Geofiziki, Trudy*, v.1, p.7–64, pl.1–3.

1961: K voprosu o sistematike iskopayemykh Peridiney. *Akademiya Nauk SSSR (Doklady Earth Science Sections)*, v.139, no.6, p.1461–1462. (Published English translation dated 1963 in *Doklady of the Academy of Sciences of the U.S.S.R., Earth Science Sections by the American Geological Institute*, v.139, nos. 1–6, p.852–853.)

1963: Klass Peridineae (Dinoflagellateae). Peridinei, ili dinoflagellaty. In: Kiselev, A. (editor), *Tip Pyrrophyta. Pirrofitovye Vodorosli*; in: Vakhrameeva, V.A., Radchenko, G.P. and Tachmadzhana, A.L. (editors), *Tip Pyrrophyta. Pirrofitovye Vodorosli. Vodorosli, Mochoobraznie, Psilofitovie, Plaonovidnie, Chlenistostebelnie, Paporotniki*; in Orlov, A. (editor), *Osnovy Paleontologii*, v.14, p.171–186.

1965: Vvedenie v izuchenie iskopaemykh peridineevykh vodorosli. 156 p.; *Izdatel Nauka, Moscow, U.S.S.R.* (Translation: Syers and Sarjeant, 1967.)

1967: Iskopaemye peridinei Yurskikh, Melovykh i Paleogenovykh otlozheniy SSSR. 347 p., 121 pl.; *Izdatelstvo Nauka, Moscow, U.S.S.R.* (Translation: Lees and Sarjeant, 1971.)

Vozzhennikova, T.F. and Sheshegova, L.I.

1989: *Palaeodinophysis* gen. et sp. n. iz devona Rudnogo Altaya (unikal'naya nakhodka iskopayemykh dinoflagellyat). *Doklady Akademii Nauk SSSR*, v.307, no.2, p.442–445. [Published English translation dated 1991: *Palaeodinophysis* gen. et sp. n. from the Devonian of the Rudnyy Altay (a unique find of dinoflagellate fossils); *Transactions (Doklady) of the USSR Academy of Sciences, Earth Science Sections*, p.227–230; Wiley — Scripta Technica, Inc., New York, U.S.A.]

Waagstein, R. and Heilmann-Clausen, C.

1995: Petrography and biostratigraphy of Palaeogene volcanoclastic sediments dredged from the Faeroes shelf. In: Scrutton, R.A., Stoker, M.S., Shimmield, G.B. and Tudhope, A.W. (editors), *The Tectonics, Sedimentation and Palaeoceanography of the North Atlantic Region*, p.179–197; Geological Society, London, England.

Walcott, C.D.

1908: Cambrian geology and paleontology. *Smithsonian Miscellaneous Collection*, v.53, no.1, 296 p.

Wall, D.

1965a: Microplankton, pollen, and spores from the Lower Jurassic in Britain. *Micropaleontology*, v.11, no.2, p.151–190, pl.1–9.

1965b: Modern hystrichospheres and dinoflagellate cysts from the Woods Hole region. *Grana Palynologica*, v.6, p.297–314.

1967: Fossil microplankton in deep-sea cores from the Caribbean Sea. *Palaeontology*, v.10, no.1, p.95–123, pl.14–16.

Wall, D. and Dale, B.

1966: "Living fossils" in western Atlantic plankton. *Nature*, v.211, no.5053, p.1025–1026.

1967: The resting cysts of modern marine dinoflagellates and their palaeontological significance. *Review of Palaeobotany and Palynology*, v.2, p.349–354, pl.1.

1968a: Early Pleistocene dinoflagellates from the Royal Society Borehole at Ludham, Norfolk. *New Phytologist*, v.67, p.315–326, pl.1.

1968b: Quaternary calcareous dinoflagellates (Calciodinellidae) and their natural affinities. *Journal of Paleontology*, v.42, no.6, p.1395–1408, pl.172.

1968c: Modern dinoflagellate cysts and evolution of the Peridinales. *Micropaleontology*, v.14, p.265–304, pl.1–4.

1969: The "hystrichosphaerid" resting spore of the dinoflagellate *Pyrodictinium bahamense*, Plate, 1906. *Journal of Phycology*, v.5, no.2, p.140–149.

1970: Living hystrichosphaerid dinoflagellate spores from Bermuda and Puerto Rico. *Micropaleontology*, v.16, p.47–58, pl.1.

1971: A reconsideration of living and fossil *Pyrophacus* Stein, 1883 (Dinophyceae). *Journal of Phycology*, v.7, p.221–235.

Wall, D., Guillard, R.R.L., Dale, B., Swift, E. and Watabe, N.

1970: Calcitic resting cysts in *Peridinium trochoideum* (Stein) Limmermann, an autotrophic marine dinoflagellate. *Phycologica*, v.9, no.2, p.151–156.

Wall, D., Dale, B. and Harada, K.

1973: Descriptions of new fossil dinoflagellates from the Late Quaternary of the Black Sea. *Micropaleontology*, v.19, p.18–31, pl.1–3.

Wall, D., Dale, B., Lohmann, G.P. and Smith, W.K.

1977: The environmental and climatic distribution of dinoflagellate cysts in modern marine sediments from regions in the North and South Atlantic Oceans and adjacent areas. *Marine Micropaleontology*, v.2, p.121–200.

Wan Chuanbiao and Qiao Xiuyun

1994: Early Cretaceous nonmarine dinoflagellate assemblages of Well 206 in Sanjiang Basin from Heilongjiang. *Acta Palaeontologica Sinica*, v.33, no.4, p.499–508, pl.1–2. (In Chinese with English summary.)

Wan Chuanbiao and Zhang Ying

1990: Discovery and significance of Hailaer Basin Early Cretaceous dinoflagellates and acritarchs. *Petroleum Geology and Oilfield Development in Daqing*, v.9, no.3, p.1–14, pl.1–3. (In Chinese with English summary.)

Wan Chuanbiao, Yan Fengyun and Yin Nan

1995: Early Cretaceous dinoflagellates and other algae from Jixian, Heilongjiang. *Acta Micropalaeontologica Sinica*, v.12, no.1, p.51–62, pl.1–3. (In Chinese with English summary.)

Wan Chuanbiao, Qiao Xiuyun, Wang Renhou and He Chengquan

1997: Cretaceous nonmarine microphytoplankton from the Hongqi Depression in the Hailar Basin, NE China. *Acta Micropalaeontologica Sinica*, v.14, no.4, p.405–418, pl.1. (In Chinese with English summary.)

Wanner, J.

1940: Gesteinbildende Foraminiferen aus Malm und Unterkreide des östlichen ostindischen Archipels nebst Bemerkungen über *Orbulinaria* Rumbler und andere verwandte Foraminiferen. *Paläontologische Zeitschrift*, v.22, no.2, p.75–99, pl.1–2.

- Warny, S.A. and Wrenn, J.H.
1997: New species of dinoflagellate cysts from the Bou Regreg core: a Miocene-Pliocene boundary section on the Atlantic coast of Morocco. *Review of Palaeobotany and Palynology*, v.96, p.281–304, pl.1–10.
- Warren, J.S.
1973: Form and variation of the dinoflagellate *Sirmiodinium grossi* Alberti, from the Upper Jurassic and Lower Cretaceous of California. *Journal of Paleontology*, v.47, p.101–114, pl.1–3.
- Weiler, H.
1956: Über einen Fund von Dinoflagellaten, Coccolithophoriden und Hystrichosphaerideen im Tertiär des Rheintales. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.104, no.2, p.129–147, pl.11–13.
- Weinkauf, M.F.G., Keupp, H. and Mutterlose, J.
2013: Calcareous dinoflagellates from the Late Hauterivian (Early Cretaceous) of Frielingen, Germany. *Documenta naturae*, v.192, no.3, p.241–271.
- Welsch, M.
1986: Die Acritarchen der höheren Digermulgruppe, Mittelkambrium bis Tremadoc Ost-Finnmark, Nord-Norwegen. *Palaeontographica, Abteilung B*, v.201, no.1–4, p.1–109, pl.1–9.
- Wendler, J.E., Wendler, I. and Haber, B.T.
2013: Revision and evaluation of the systematic affinity of the calcitarch genus *Pithonella* based on exquisitely preserved Turonian material from Tanzania. *Journal of Paleontology*, v.87, no.6, p.1077–1106.
- West, R.G.
1961: Vegetational history of the Early Pleistocene of the Royal Society Borehole at Ludham, Norfolk. *Proceedings of the Royal Society of London, Series B*, v.155, p.437–453.
- Wetzel, O.
1932: Die Typen der baltischen Geschiebefeuersteine, beurteilt nach ihrem Gehalt an Mikrofossilien. *Zeitschrift für Geschiebeforschung*, v.8, p.129–146, pl.1–3.
- 1933a: Die in organischer Substanz erhaltenen Mikrofossilien des baltischen Kreide-Feuersteins mit einem sediment-petrographischen und stratigraphischen Anhang. *Palaeontographica, Abteilung A*, v.77, p.141–186.
- 1933b: Die in organischer Substanz erhaltenen Mikrofossilien des baltischen Kreide-Feuersteins mit einem sediment-petrographischen und stratigraphischen Anhang. *Palaeontographica, Abteilung A*, v.78, p.1–110, pl.1–7.
- 1940: Mikropaläontologische Untersuchungen an der obersenenen Kreide von Stevns Klint-Kridtbrud auf der dänischen Insel Seeland und an ihrem Feuerstein in geschiebekundlicher Hinsicht. *Zeitschrift für Geschiebeforschung*, v.16, pt.2, p.118–156, pl.1–5.
- Wetzel, W.
1942: Über die oberste Kreide von Barsbek bei Hemmoor. *Zeitschrift der Deutschen Geologischen Gesellschaft*, v.94, no.1–2, p.41–43, pl.2.
- Wetzel, O.
1948: Mikropaläontologische Funde in Gesteinsproben einer holsteinischen Bohrung, besonders in Kreide- und Keuperschichten. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen B*, v.89, no.3, p.315–343, pl.33–38.
- Wetzel, W.
1952: Beitrag zur Kenntnis des dan-zeitlichen Meeresplanktons. *Geologisches Jahrbuch, Hannover*, v.66, p.391–419, 1 pl.

1955: Die Dan-Scholle vom Katharinenhof (Fehmarn) und ihr Gehalt an Planktonen. Neues Jahrbuch für Geologie und Paläontologie, Monatshefte, no.1, p.30–46.

Wetzel, O.

1960: Eine neue Dinoflagellaten-Gruppe aus dem baltischen Geschiebefeuerstein. Schriften des Naturwissenschaftlichen Vereins für Schleswig-Holstein, v.31, p.81–86, pl.1.

1961: New microfossils from Baltic Cretaceous flintstones. Micropaleontology, v.7, no.3, p.337–350, pl.1–3.

Wetzel, W.

1966: Charakteristik des marinen Planktons und Pseudo-planktons der Amaltheen-Schichten Deutschlands und Lotharingens. Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen, v.124, no.3, p.313–326, pl.30–31.

1967a: Mikroorganismen aus jurassischen und kretazischen Saurier-Gewöllen. Zeitschrift der Deutschen Geologische Gesellschaft, v.116, p.867–874, pl.15–17.

1967b: Charakteristik des marinen Planktons im untersten Ordovizium (B3). Der Geschiebesammler, v.2, no.2, p.35–50, pl.1–4.

1971: Organogene Inhalte der Flintsteinkerne oberkretazischer Seeigel aus dem baltisch-norddeutschen Raum. Meyniana, v.21, p.87–94, pl.1–2.

Wheeler, J.W. and Sarjeant, W.A.S.

1990: Jurassic and Cretaceous palynomorphs from the central Alborz Mountains, Iran: their significance in biostratigraphy and palaeogeography. Modern Geology, v.14, no.4, p.267–374, pl.1–22.

1992: Jurassic and Cretaceous palynomorphs from the central Alborz Mountains, Iran: validation of new taxa. Modern Geology, v.16, p.381–382.

White, H.H.

1842: On fossil *Xanthidia*. Microscopical Journal, London, v.11, p.35–40, pl.4.

1844: On a new species of fossil *Xanthidium*. Transactions of the Microscopical Society of London, v.1, p.87, pl.9.

Whitney, B.L.

1979: A population study of *Alterbia acutula* (Wilson) Lentin and Williams from the Maestrichtian (Upper Cretaceous) of Maryland. Palynology, v.3, p.123–128, pl.1.

Wicander, E.R.

1974: Upper Devonian-Lower Mississippian acritarchs and prasinophycean algae from Ohio, U.S.A. Palaeontographica, Abteilung B, v.148, no.1–3, p.9–43, pl.5–19.

Wicander, E.R. and Wood, G.D.

1981: Systematics and biostratigraphy of the organic-walled microphytoplankton from the Middle Devonian (Givetian) Silica Formation, Ohio, U.S.A. American Association of Stratigraphic Palynologists, Contributions Series, no.8, p.1–137, pl.1–17.

Wiesner, H.

1936: Sur la découverte de diatomées et autres microfossiles peu connus dans le Crétacé supérieur de la Bohême. Annales de Protistologie, v.5, p.151–155, pl.6–7.

Wiggins, V.D.

1969: Two Lower Cretaceous dinoflagellate species from Alaska. Micropaleontology, v.15, p.145–150, pl.1–2.

1972: Two new Lower Cretaceous dinoflagellate genera from southern Alaska (U.S.A.). Review of Palaeobotany and Palynology, v.14, p.297–308, pl.1–3.

- 1973: Upper Triassic dinoflagellates from arctic Alaska. *Micropaleontology*, v.19, p.1–17, pl.1–5.
- 1975: The dinoflagellate family Pareodiniaceae: a discussion. *Geoscience and Man*, v.11, p.95–115, pl.1–5.
- Wilkinson, S.J.
1849: Observations on *Xanthidium*, both fossil and recent. *Transactions of the Microscopical Society of London*, v.2, p.89–92, pl.13.
- Wille, W. and Gocht, H.
1979: Dinoflagellaten aus dem Lias Südwestdeutschlands. Dinoflagellates from the Lias of SW Germany. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.158, p.221–258.
- 1985: Solitäre und kettenbildende Dinoflagellaten-Zysten aus dem Jura Südwestdeutschlands. *Review of Palaeobotany and Palynology*, v.45, p.121–147, pl.1–5.
- Willems, H.
1985: *Tetramerosphaera lacrimula*, eine intern gefächerte Calcisphaere aus der Ober-Kreide. *Senckenbergiana Lethaea*, v.66, p.177–201, pl.1–4.
- 1988: Kalkige Dinoflagellaten-Zysten aus der oberkretazischen Schreiekreide-Fazies N-Deutschlands (Coniac bis Maastricht). *Senckenbergiana Lethaea*, v.68, p.433–477, pl.1–6.
- 1990: *Tetratropis*, eine neue Kalkdinoflagellaten-Gattung (Pithonelloideae) aus der Ober-Kreide von Lägerdorf (N-Deutschland). *Senckenbergiana Lethaea*, v.70, no.1/3, p.239–257, pl.1–2.
- 1992: Kalk-Dinoflagellaten aus dem Unter-Maastricht der Insel Rügen. *Zeitschrift für Geologische Wissenschaften*, v.20, no.2, p.155–178, pl.1–6.
- 1995a: New calcareous dinoflagellates from the Upper Cretaceous white chalk of northern Germany. *Review of Palaeobotany and Palynology*, v.84, p.57–72, pl.1–4. (Cover date 1994, issue date 1995, according to G. Versteegh, pers. comm.)
- 1995b: *Praecalcionellum duopylum* n. sp., a new calcareous dinoflagellate cyst from the lowermost Danian (*Biantholithus sparsus* Zone) of the Geulhemmerberg Section (South Limburg, The Netherlands). *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.198, p.141–152, pl.1–3.
- 1996: Calcareous dinocysts from the Geulhemmerberg K/T boundary section (Limburg, se Netherlands). *Geologie en Mijnbouw*, v.75, p.215–231, pl.1–2.
- Williams, G.L.
1978: Palynological biostratigraphy, Deep Sea Drilling Project Sites 367 and 370. In: Lancelot, Y. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.41, p.783–815, pl.1–8.
- Williams, G.L. and Brideaux, W.W.
1975: Palynologic analyses of upper Mesozoic and Cenozoic rocks of the Grand Banks, Atlantic continental margin. *Geological Survey of Canada, Bulletin*, no.236, 163 p., 47 pl.
- Williams, G.L. and Downie, C.
1966a: The genus *Hystrichokolpoma*. In: Davey, R.J. and Downie, C. and Sarjeant, W.A.S. and Williams, G.L., *Studies on Mesozoic and Cainozoic dinoflagellate cysts; Bulletin of the British Museum (Natural History) Geology, Supplement 3*, p.176–181.
- 1966b: *Wetziella* from the London Clay. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., *Studies on Mesozoic and Cainozoic dinoflagellate cysts; British Museum (Natural History) Geology, Bulletin, Supplement 3*, p.182–198.

1966c: Further dinoflagellate cysts from the London Clay. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., Studies on Mesozoic and Cainozoic dinoflagellate cysts; British Museum (Natural History) Geology, Bulletin, Supplement 3, p.215–236.

1969: Generic re-allocations proposed by G.L. Williams and C. Downie. In: Davey, R.J., Downie, C., Sarjeant, W.A.S. and Williams, G.L., Appendix to "Studies on Mesozoic and Cainozoic dinoflagellate cysts"; British Museum (Natural History) Geology, Bulletin, Appendix to Supplement 3, p.17.

Williams, G.L. and Fensome, R.A.

2016: Fossil dinoflagellates: nomenclatural proposals in anticipation of a revised DINOFLAJ database. *Palynology*, v. 40, p.137–143.

Williams, G.L., Stover, L.E. and Kidson, E.J.

1993: Morphology and stratigraphic ranges of selected Mesozoic-Cenozoic dinoflagellate taxa in the Northern Hemisphere. Geological Survey of Canada, Paper, no.92–10, 137 p.

Williams, G.L., Lentin, J.K. and Fensome, R.A.

1998: The Lentin and Williams Index of fossil dinoflagellates 1998 edition. American Association of Stratigraphic Palynologists, Contributions Series, no.34, 817 p.

Williams, G.L., Damassa, S.P., Fensome, R.A. and Guerin, G.R.

2015: *Wetzelialla* and its allies — the 'hole' story; a taxonomic revision of the Paleogene subfamily Wetzelialloideae. *Palynology*, v.39, p.289–344, pl.1–5. (Published online 2015, hard copy 2016)

Willumsen, P.S.

2004: Two new species of the dinoflagellate cyst genus *Carpatella* Grigorovich, 1969 from the Cretaceous-Tertiary transition in New Zealand. *Journal of Micropalaeontology*, v.23, p.119–125, pl.1–2.

2006: *Palynodinium minus* sp. nov.: a new dinoflagellate from the Cretaceous-Paleogene boundary in New Zealand. *Cretaceous Research*, v.27, p.954–963.

2011: Maastrichtian to Paleocene dinocysts from the Clarence Valley, South Island, New Zealand. *Alcheringa*, v.35, p.199–240.

2012: Three new species of dinoflagellate cyst from Cretaceous-Paleogene (K-Pg) boundary sections at mid-Waipara River and Fairfield Quarry, South Island, New Zealand. *Palynology*, v.36, p.48–62, pl.1–2.

Willumsen, P.S. and Vajda, V.

2010: A new early Paleocene dinoflagellate cyst species, *Trithyrodinium partridgei*: its biostratigraphic significance and paleoecology. *Alcheringa*, v.34, p.523–538.

Willumsen, P.S., Dale, B., Jolley, D.W. and Laursen, G.V.

2014: Palynostratigraphy and palaeoenvironmental shifts in Oligocene and Miocene strata from offshore Angola, west-central Africa. *Palynology*, v.38, p.259–279, pl.1–3.

Wilson, G.J.

1967a: Some new species of Lower Tertiary dinoflagellates from McMurdo Sound, Antarctica. *New Zealand Journal of Botany*, v.5, p.57–83.

1967b: Microplankton from the Garden Cove Formation, Campbell Island. *New Zealand Journal of Botany*, v.5, p.223–240.

1967c: Some species of *Wetzelialla* Eisenack (Dinophyceae) from New Zealand Eocene and Paleocene strata. *New Zealand Journal of Botany*, v.5, p.469–497.

- 1968: Palynology of some Lower Tertiary coal measures in the Waihao District, south Canterbury, New Zealand. *New Zealand Journal of Botany*, v.6, p.56–62.
- 1972: Age of the Garden Cove Formation, Campbell Island. *New Zealand Journal of Geology and Geophysics*, v.15, p.184–185.
- 1973: Palynology of the Middle Pleistocene Te Piki bed, Cape Runaway, New Zealand. *New Zealand Journal of Geology and Geophysics*, v.16, p.345–354.
- 1977: A new species of *Svalbardella* Manum (Dinophyceae) from the Eocene of New Zealand. *New Zealand Journal of Geology and Geophysics*, v.20, p.563–566.
- 1978: *Kaiwaradinium*, a new dinoflagellate genus from the Late Jurassic of North Canterbury, New Zealand. *New Zealand Journal of Geology and Geophysics*, v.21, p.81–84.
- 1984a: Two new dinoflagellates from the Late Jurassic of North Canterbury, New Zealand. *Journal of the Royal Society of New Zealand*, v.14, no.3, p.215–221.
- 1984b: A new Paleocene dinoflagellate cyst from the Chatham Islands, New Zealand. *New Zealand Journal of Botany*, v.22, p.545–547.
- 1984c: Some new dinoflagellate species from the New Zealand Haumurian and Piripauan stages (Santonian-Maastrichtian, Late Cretaceous). *New Zealand Journal of Botany*, v.22, p.549–556.
- 1985: Dinoflagellate biostratigraphy of the Eocene Hampden Section, North Otago, New Zealand (2). *New Zealand Geological Survey, Research Notes 1985, Record 8*, p.93–101.
- 1988: Paleocene and Eocene dinoflagellate cysts from Waipawa, Hawkes Bay, New Zealand. *New Zealand Geological Survey Paleontological Bulletin*, no.57, 96 p., 26 pl.
- Wilson, G.J. and Clowes, C.D.
1980: A concise catalogue of organic-walled fossil dinoflagellate genera. *New Zealand Geological Survey, Report*, no.92, p.1–199.
- 1982: *Arachnodinium*, a new dinoflagellate genus from the Lower Tertiary of Antarctica. *Palynology*, v.6, p.97–103, pl.1–2.
- Wilson, G.J. and Helby, R.
1988: Early Cretaceous dinoflagellate assemblages from Torlesse rocks near Ethelton, North Canterbury. *New Zealand Geological Survey Record*, v.35, p.38–43, pl.1–2.
- Winslow, M.R.
1962: Plant spores and other microfossils from Upper Devonian and Lower Mississippian rocks of Ohio. *United States Geological Survey*, p.1–93, pl.1–22.
- Wise, S.W. Jr. and Wind, F.H.
1977: Mesozoic and Cenozoic calcareous nannofossils recovered by DSDP Leg 36 drilling on the Falkland Plateau, southwest Atlantic sector of the southern ocean. In: Barker, P.F. et al., *Deep Sea Drilling Project, Washington, Initial Reports*, v.36, p.269–492, pl.1–89.
- Wolf, R.
1980: The lower and upper boundary of the Ordovician System of some selected regions (Celtiberia, eastern Sierra Morena) in Spain. Part I: the Lower Ordovician sequence of Celtiberia. *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, v.160, no.1, p.118–137.
- Wolfard, A. and Van Erve, A.W.

1981: *Crussolia deflandrei* nov. gen. et nov. sp., a dinoflagellate cyst from the Jurassic (Callovian-Lower Oxfordian) of Montagne Crussol, Rhône Valley, France. *Review of Palaeobotany and Palynology*, v.34, p.321–329, pl.1–2.

Woollam, R.

1980: Jurassic dinocysts from shallow marine deposits of the East Midlands, England. *Journal, University of Sheffield Geological Society*, v.7, p.243–261.

1982: Observations on the Jurassic dinocyst genera *Energlynia* and *Wanaea*. *Journal of Micropalaeontology*, v.1, p.45–52, pl.1–2.

1983: A review of the Jurassic dinocyst genera *Ctenidodinium* Deflandre 1938 and *Dichadogonyaulax* Sarjeant 1966. *Palynology*, v.7, p.183–196, pl.1.

Woollam, R. and Riding, J.B.

1983: Dinoflagellate cyst zonation of the English Jurassic. *Institute of Geological Sciences, Report 83/2*, p.1–42, pl.1–8.

Wrenn, J.H.

1988: Differentiating species of the dinoflagellate cyst genus *Nematosphaeropsis* Deflandre & Cookson 1955. *Palynology*, v.12, p.129–150, pl.1–7.

1996: *Pseudorhombodinium lisbonense* gen. et sp. nov., a new dinoflagellate fossil from the Lisbon Formation (Middle Eocene), Little Stave Creek, Alabama. *Palynology*, v.20, p.209–219, pl.1–3.

Wrenn, J.H. and Hart, G.F.

1988: Paleogene dinoflagellate cyst biostratigraphy of Seymour Island, Antarctica. *Geological Society of America, Memoir*, no.169, p.321–447.

Wright, R.P. and Meyers, W.C.

1981: Organic-walled microplankton in the subsurface Ordovician of northeastern Kansas. *Kansas Geological Survey, Subsurface Geology Series*, no.4, p.1–53, pl.1–8.

Xing Yusheng

1982: Microflora of the Sinian System and Lower Cambrian near Kunming, Yunnan and its stratigraphical significance. *Acta Geologica Sinica*, v.56, no.1, p.42–49, pl.1–2. (In Chinese with English summary.)

Xu Jinli

1987: New materials of dinoflagellates from the 4th member of Shahejie Formation in Dongying Basin, Shandong Province. *Proceedings on Stratigraphy and Paleontology of Oil and Gas Bearing Areas in China*, no.1, p.144–155, pl.1–4; *The Petroleum Industry Press, Beijing, China*. (In Chinese with English summary.)

Xu Jinli and Mao Shaozhi

1989: A new understanding of the bohaidinioid dinoflagellates. *Acta Botanica Sinica*, v.31, no.3, p.215–222 and no.4, p.300–306, pl.1–3. (This paper was published in two parts.)

Xu Jinli, Pan Zhaoren, Yang Yumei, Zhu Youhua and Fan Naimin

1997: On the Paleogene microphytoplankton from the Shenli oil-bearing region, Shandong, China. 241 p., 59 pl.; *Petroleum University Press, Dongying, China*. (In Chinese with English summary.)

Xu Zhaoran and Nicolson, D.H.

1992: Don't abbreviate Chinese names. *Taxon*, v.41, p.499–504.

Yankauskas, T.V. and Posti, E.

1976: Novye vidy akritarkh kembriya Pribaltiki. *Eesti NSV Teaduste, Akadeemia Toimetised*, v.25, *Keemia, Geologia*, no.2, p.145–151, 1 pl.

Yankauskas, T.V. and Vaitekunene, G.K.

1972: Akritarkhi iz silura Pribaltiki (Silurian acritarchs from the Baltic area). *Paleontologicheskii Zhurnal*, no.2, p.113–121, pl.7.

Ye Xiaorong

1984: Microfossil assemblage from Silurian of Kumyezek at Toli NW Xinjiang and their stratigraphic significance. *Bulletin of the Xian Institute of Geology and Mineral Resources, Chinese Academy of Geological Sciences*, no.7, p.38–49, pl.1–2. (In Chinese with English summary.)

Yi Sangheon

1997: Zygnematacean zygospores and other freshwater algae from the Upper Cretaceous of the Yellow Sea Basin, southwest coast of Korea. *Cretaceous Research*, v.18, p.515–544.

Yin Leiming

1986: Acritarchs. In: Chen Junyuan, *Aspects of Cambrian-Ordovician Boundary in Dayangcha, China*, p.314–373, pl.83–98; China Prospect Publishing House, Beijing, China.

Yu Jingxian

1982: Late Jurassic to Early Cretaceous dinoflagellate assemblages of eastern Heilongjiang Province, China. *Chinese Academy of Geological Sciences, Shenyang Institute of Geology and Mineral Resources, Bulletin*, no.5, p.227–267, pl.1–8. (In Chinese with English abstract.)

1989: Dinoflagellates. *Cenozoic Paleobiota of the Continental Shelf of the East China Sea (Donghai)*, Micropaleobotanical Volume, p.112–160, 260–262, 298–307, pl.38–59; Geological Publishing House, Beijing, China.

Yu Jingxian and Zhang Wangping

1980: Upper Cretaceous dinoflagellate cysts and acritarchs of western Xinjiang. *Chinese Academy of Geological Sciences, Bulletin, Series 1*, v.2, no.1, p.93–119, pl.1–6. (In Chinese with English abstract.)

Yu Jingxian, Sun Mongrong, Sun Suying and Mao Shaozhi

1981: Dinoflagellates and acritarchs from Dalanshan Formation and their significance in explain the depositional environment. *Oil and Gas Geology*, v.2, no.3, p.254–264, pl.1. (In Chinese with English abstract.)

Yu Jingxian, Guo Zhengying and Mao Shaozhi

1983: Cretaceous palynological assemblages from the district south of the Songhua River. *Chinese Academy of Geological Sciences, Professional Papers of Stratigraphy and Palaeontology*, Geological Publishing House, Beijing, no.10, p.1–86, pl.1–30. (In Chinese with English abstract.)

Yuan Deyan and He Chengquan

1999: Two new species of dinoflagellate cysts from the Upper Cretaceous Nenjiang Formation, southern Songliao Basin, NE China. *Acta Micropalaeontologica Sinica*, v.16, no.1, p.89–94, pl.1. (In Chinese with English summary.)

Yun Hyesu

1981: Dinoflagellaten aus der Oberkreide (Santon) von Westfalen. *Palaeontographica, Abteilung B*, v.177, p.1–89, pl.1–16.

Zahiri, A.

1981: Phytoplankton of Barremian type section from Angles, south east France. *The Iranian Petroleum Institute, Bulletin*, no.83, p.1–34, pl.1–7.

Zatonskaya, S.G.

1975: Opisaniye novykh vidov peridinei iz otlozhenii verkhnei yury i nizhnego mela Shaimskogo neftenosnogo raiona. *Zapadno-Sibirskii Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Trudy*, v.101, p.31–35.

Zevenboom, D.

1995: Dinoflagellate cysts from the Mediterranean Late Oligocene and Miocene. Ph.D. Thesis, University of Utrecht, 221 p., 9 pl.; Cip-Gegevens Koninklijke Bibliotheek, Den Haag, The Netherlands.

Zhang Lujin

1984: Late Triassic spores and pollen from central Sichuan. *Palaeontologica Sinica*, "whole" no.167, New Series A, no.8, p.14–100, pl.1–27; Science Press, Beijing, China. (In Chinese with English summary.)

Zhao Chuanben and Qiao Xiuyun

1993: Discovery of the Muling Formation and its palynomorph assemblages in Ning'an Basin. *Acta Micropalaeontologica Sinica*, v.10, no.4, p.447–458. (In Chinese with English summary.)

Zhao Yunyun and Morzadec-Kerfourn, M.-T.

1994: Nouveaux kystes de dinoflagellés: *Spiniferites pacificus* nov. sp. et *Pentadinium netangei* nov. sp. de Pléistocène du nord-ouest Pacifique. *Geobios*, v.27, no.3, p.261–269, pl.1–2.

Zheng Yahui and He Chengquan

1984: Palynology of the Upper Cretaceous Taizhou Formation in Well Qin-30, northern Jiangsu. *Nanjing Institute of Geology and Palaeontology, Academia Sinica, Bulletin*, v.8, p.55–117, pl.1–11. (In Chinese with English abstract.)

Zhou Heyi

1985: Middle Oligocene dinoflagellates and acritarchs from the first member of the Shahejie Formation in the Dongying depression of northern Shandong and their paleogeographical significance. *Proceedings of the First National Conference on Fossil Algae*, p.1–11; pl.1; Geological Publishing House, Beijing, China. (In Chinese with English summary.)

Zhu Zunghao, Wu Liyu, Xi Ping, Song Zhichen and Zhang Yiyong

1985: A research on Tertiary palynology from the Qaidam Basin, Qinghai Province. p.1–297, pl.1–62; Research Institute of Exploration and Development, Qinghai Petroleum Administration, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Nanjing, China. (In Chinese with English summary.)

Ziaja, J.

1989: Dinoflagellate cysts from Grodziszczce Beds (Hauterivian-Lower Barremian?) of Lipnik near Bielsko, western Carpathians. *Cysty bruzdnic z warstw grodziskich (hoteryw-dolny barrem?) z Lipnika kolo Bielska w zachodnich Karpatach. Acta Palaeobotanica*, v.29, no.1, p.213–218, pl.1.

Zippi, P.

1998: Freshwater algae from the Mattagami Formation (Albian), Ontario: paleoecology, botanical affinities, and systematic taxonomy. *Micropaleontology*, v.44, supplement 1, 78 p., 31 pl.

Žitt, J., Nekvasilová, O., Bosák, P., Svobodová, M., Stembroková-Jírová, D. and Šastný, M.

1997: Rocky coast facies of the Cenomanian-Turonian Boundary interval at Velim (Bohemian Cretaceous Basin, Czech Republic). Second part. *Věstník Českého Geologického Ústavu*, v.72, no.2, p.141–155, pl.1–5.

Zonneveld, K.A.F.

1997: New species of organic-walled dinoflagellate cysts from modern sediments of the Arabian Sea (Indian Ocean). *Review of Palaeobotany and Palynology*, v.97, p.319–337; pl.1–4.

Zonneveld, K.A.F. and Jurkschat, T.

1999: *Bitectatodinium spongium* (Zonneveld, 1997) Zonneveld et Jurkschat, comb. nov. from modern sediments and sediment trap samples of the Arabian Sea (northwestern Indian Ocean): taxonomy and ecological affinity. *Review of Palaeobotany and Palynology*, v.106, p.153–169.

Zotto, M., Drugg, W.S. and Habib, D.

1987: Kimmeridgian dinoflagellate stratigraphy in the southwestern North Atlantic. *Micropaleontology*, v.33, p.193–213, pl.1–6.

Zügel, P.

1994: Verbreitung kalkiger Dinoflagellaten-Zysten im Cenoman/Turon von Westfrankreich und Norddeutschland. *Courier Forschungsinstitut Senckenberg*, v.176, p.1–161, pl.1–20.