INTERNATIONAL ORGANISATION OF PALAEOBOTANY

IOP NEWSLETTER 59

DECEMBER 1996

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PLEASE MAIL NEWS AND CORRESPONDENCE TO YOUR REGIONAL REPRESENTATIVE OR TO THE SECRETARY FOR THE NEXT NEWSLETTER 60.

The views expressed in the newsletter are those of its correspondents and do not necessarily reflect the policy of IOP.

IOP NEWS

DEVELOPMENTS ON THE INTERNET

To accomodate associated programs and databases the Plant Fossil Record facility on the internet is now best found at http://ibs.uel.ac.uk/ibs/

Our presentations on the internet have recently been publicised by registering appropriate keywords with search engines such as YaHoo, giving dramatic increases in the use of the facility. The table below lists the number of queries made through http://ibs.uel.ac.uk/ibs/ during November.

Country Code	Name	Number
edu	educational	4,875
uk	United Kingdom	4,690
net	networking	2,701
com	commercial	2,577
jp	Japan	1,071
org	noncommercial	959
au	Australia	884
de	Germany	727
ca	Canada	502
fr	France	400
gov	government	396
pt	Portugal	335
it	Italy	289
us	United States	284
es	Spain	234
dk	Denmark	223
se	Sweden	171
no	Norway	158
nl	Netherlands	134
ch	Switzerland	121
is	Iceland	109
at	Austria	109
tr	Turkey	90
mil	U.S. Military	74
fi	Finland	72
be	Belgium	68
mt	Malta	54
sg	Singapore	44
cz	Czech Republic	36
nz	New Zealand	32
pl	Poland	29
cr	Costa Rica	29
br	Brazil	26
gr	Greece	25
yu	Yugoslavia	24
il	Israel	23
ARPA	Arpanet	22
ve	Venezuela	22
eg	Egypt	15
pa	Panama	10
ie	Ireland	6
gt	Guatemala	2

NEWS OF IOPC-VI

The Palaeobotanical Committee of the Botanical Society of China and its counterpart at the Paleontological Society of China convened a meeting on November 4 - 5, 1996 in Beijing in order to work out the program of the next conference of IOP (IOPC-VI) in the year 2000 in China. It was agreed the the conference will take place at QIN-HUANG-DAO, a famous sea-side city in Hebei Province, about 2-3 hours from Beijing. It was unanimously agreed to be the ideal venue for IOPC-VI.

Luckily, the program has been approved by the Chinese Academy of Sciences. We are right in the process of a FORMAL reply to IOP.

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NEWS OF A RECENT MEETING

MEMORIAL CONFERENCE DEDICATED TO V.A. VAKHRAMEEV, November 1996, Moscow

This memorial conference, held on the tenth anniversary of Vsevolod Andreevich Vakhrameev's death, was attended by 65 scientists from Russia, Kazakhstan, the United Kingdom and Austria. Although tinged with sadness at the loss of a great friend and colleague, the meeting demonstrated that his legacy remains, reflected in the content of the 22 oral presentations, which covered aspects of Permian through Tertiary palaeobotany, phytogeography and palaeoclimatology, as well as other topics as diverse as shark teeth and dinosaur tracks. As such, the meeting was a fitting tribute to a highly perceptive and influential palaeobotanist; one of the true 'greats' of our subject. The accompanying memorial volume contains 72 abstracts and papers, including the oral presentations as well as contributions from his many friends and colleagues unable to attend the meeting. These additional contributions, by workers from Russia, Argentina, China, Czech Republic, India, UK and the USA further demonstrate the international warmth and respect for both the man and his work.

The proceedings volume (GEOS, 1996, 83p, editors in chief: M.A. Akhmetiev & M.P. Doludenko) is an appropriately high-quality published tribute. The incredible warmth and hospitality shown throughout by our hosts in the Geological Institute of the Russian Academy of Sciences is a memory I shall cherish. The post-conference dinner was one of the friendliest, laughter-filled and also most touching I have experienced, with toasts to a dear departed friend, as well as to a bright future for palaeobotany both in Russia and abroad. I am privileged to have met Vakhrameev's widow Elizabeth, and to have witnessed her honest, humorous and moving

recollections of her late husband and his work. Her dignity, generosity and warmth, at a time of great personal sadness, provided the most fitting of possible tributes.

Finally, I thank Professor Vakhrameev; a man I never knew personally, but a man from whom I have learned a great deal.

A. REES, Milton Keynes, UK.

NEWS OF A FORTHCOMING MEETING

ETTINGSHAUSEN COLLOQUIUM: Palaeobotanical Research 100 years after Freiherr Constantin v. Ettinghausen. July 7 - 9, 1997 Graz, Austria.

In commemoration of the 100th anniversary of his death. This will also be the annual meeting of the APP (Arbeitskreis für Palaeobotanik und Palynologie). Lectures and poster sessions will take place July 7th and 8th. A joint excursion is planned on July 9th together with the 2nd European Palaeontological Congress. An exhibition to commemorate ETTINGSHAUSEN's life-work is planned in the Landesmuseum Joanneum Graz.

The second circular will be available in December 1996.

J. EDER, Vienna, Austria.

AUSTRALASIAN NEWS

Australasian IOP membership remains in the 50-60 range, although a drop in the New Zealand component is disturbing. There is a trend towards payment of two or three years in advance and Greg Jordan of Hobart must have found the Santa Barbara Conference pretty inspiring because he has not only paid for 1997, but up to and including 2000!

Here in Melbourne there has been a reaction to the worldwide trend against palaeontology with the establishment of two new Chairs in the last 9 months, and the possibility of another. These are not specifically palaeobotany, I know, but a step in the right direction. Both appointees, Pat Vickers-Rich, personal Chair at Monash University, and Neil Archbold, Deakin University, keenly promote palaeobotany as an essential aspect of their responsibilities.

The Executive of PPAA (Palynological and Palaeobotanical Association of Australia) which has a large overlapping membership with IOP has transferred from Hobart to Adelaide. PPAA publishes a Newsletter called "Palaeoaustral", and also a biannual bibliography of Australasian palynology and palaeobotany. The new President is Neville Alley, S A Dept. Mines and Energy, PO Box 151, Eastwood, South Australia 5063.

By and large the media are interested in "topical" earth science news, and the public are aware as never before of our natural heritage. This unfortunately does not transfer into ready jobs for our eager and competent graduates!

Among the local work published recently has been Late Cretaceous macrofloras of eastern Otago, New Zealand: Gymnosperms, by Mike Pole - Aust. Systematic Bot. 8, 1995; Pollen of proteaceous type from latest Cretaceous sediments southeastern Australia, by Mary Dettmann & David Jarzen - Alcheringa, 20 1996; and Early Cretaceous macrofloras of Western Australia by, by Steve McLoughlin - Rec. West Aust. Museum 18 1996.

Bob Hill is involved in Australian participation at the SOUTHERN CONNECTION Conference at Valdivia, Chile, early in 1997. Anne and I had hoped to go also, but..... after deciding we could not afford to attend IOP at Santa Barbara because of our youngest daughter's wedding, our eldest now announces her engagement, and wedding plans for February.

For any further Australian news or information my e-mail address is douglas@melbpc.org.au

J. DOUGLAS, Melbourne, Australia.

A BRIEF INTRODUCTION TO THE NATIONAL MUSEUM OF PLANT HISTORY IN CHINA

The National Museum of Plant History of China has been set up in Beijing this year. The museum is located in the Beijing Botanical Garden, Institute of Botany, CAS. It has a two-storey building with some indispensable facilities available. About 60,000 accessions of fossil plant specimens will be housed in the museum. It serves as an important base for palaeobotanical research pertaining to collection, storage, exhibition, education, etc. The museum is believed to be active in the exchange of fossil plants, academic communication and international corroborative projects.

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CALL FOR PRELIMINARY SUBSCRIPTION

This is an urgent call for a preliminary subscription to a catalogue that has been recently prepared for print: a catalogue of type specimens and other fossils published in Sternberg's "Versuch einer geognostisch - botanischen Darstellung der Flora der Vorwelt". For the reasons mentioned below we need an idea of how many copies are needed. The price will not exceed $40. Will those interested to have a copy please contact J. Kvacek & M. Strakova:
e-mail: ais@nm.anet.cz. (Libor Koudela)

It is a catalogue of type specimens and other fossils published in the Sternberg's "Versuch einer geognostisch - botanischen Darstellung der Flora der Vorwelt" by Jiri Kvacek and Marketa Strakova.

Kaspar Count of Sternberg is one of the most famous Czech palaeobotanists of the nineteenth century. Having an experience as a botanist, he started collecting fossil plants in the Carboniferous at Radnice (east of Prague, Czech Republic). As an owner of mines in this area he obtained a lot of specimens from the mine engineer, but he was collecting also by himself. The collection of fossil plants was housed in the Kaspar Sternberg's court in Radnice. Later on when Sternberg cooperated in establishing the National Museum, the collection was moved to Prague.

K. Sternberg, partly in collaboration with K.B. Presl and C.A. Corda, described in the period 1820-1838 more than 80 genera and 500 species. Many of them are still used (e.g. *Lepidodendron*) others are rejected or suggested to be conserved. The date December 31, 1820, when the first part of Sternberg's "Versuch einer geognostisch-botanischen Darstellung der Flora der Vorwelt" was issued, became (in 1957) the starting point of the palaeobotanical nomenclature.

The catalogue contains a complete list of specimens described and figured by Sternberg, Presl and Corda (1820-1838), with attached photographs and a survey of the most important synonymy and nomenclature of every taxon, a revised stratigraphy, and the new names of localities etc. The main part is focused on the specimens housed in the National Museum, Prague, and the other part lists specimens housed in others European Museums; finally there is a list and of missing specimens.

Our financial sources are restricted, so we would be very grateful to obtain preliminary subscriptions for estimating the number of copies. If you are interested to receive the catalogue, please write to: Dr. Marketa Strakova, National Museum, Dept. of Palaeontology, Vaclavske, n m. 68, 15 79 Prague, Czech Republic.

IS IT GOOD FORM TO HAVE FORM-GENERA?

The history of naming fossil plants has been long and varied, but one of the first concepts that emerged was the need to indicate the place of fragmentary specimens in a taxonomic system. The assignment of distinct names to different plant organs began in the 1820s and has been used with more or less formality ever since. From the formal incorporation of paleobotanical rules into the ICBN in 1959 until 1975, there were two categories of genera that were available for fragmentary remains of fossil plants: organ-genera and form-genera. These were recognized under Article 3, which describes the hierarchical system of ranks of taxa. Article 3, Note 1 read as follows:

"Since the names of species, and consequently of many higher taxa, of fossil plants are usually based on fragmentary specimens, and since the connection between these specimens can only rarely be proved, organ-genera (organo-genera) and form-genera (forma-genera) are distinguished as taxa within which species may be recognized and given names according to this Code."

"An organ-genus is assignable to a family. A form-genus is a genus unassignable to a family, but it may be referable to a taxon of higher rank (see Art. 59). Form-genera are artificial in varying degree."

In 1975 the Committee for Fossil Plants proposed the elimination of the category organ-genus from the ICBN, mainly because this category involved taxonomic and not nomenclatural decisions (Meyen & Traverse, 1979). The form-genus was retained; however, also retained was the stipulation that a form-genus was not assignable to a family (also a taxonomic decision). The wording of the proposal approved by the Fossil Plant Committee in 1975 (Traverse, 1975) stated that a form-genus may be unassignable to a family, but may be referable to a taxon of higher rank . However, when the actual ICBN was published the wording had been changed to: Because of the fragmentary nature of the specimens on which the species of some fossil plants are based, the genera to which they are assigned are not assignable to a family, although they may be referable to a taxon of higher rank. Such genera are known as form-genera. At the same time, the Note was raised to the status of an Article (3.3), which, according to the Code must be followed. While the article that was actually approved allowed potential assignment of a form-genus to a family, the outcome of the published ICBN was quite different and does not allow it at all. This has resulted in numerous difficulties for paleobotanical nomenclature.

Several suggestions have been proposed, including 1) elimination of form-genus also and treatment of all genera as equal, 2) use of a term such as fossil genus to identify the fragmentary remains of plants regardless of their affinities, and 3) reinstatement of organ-genus.

None of these solutions successfully clarifies the situation which needs to be resolved with nomenclatural and taxonomic issues kept separate.

The interpretation of Article 3.3 has been varied. Arguably the most literal interpretation is that if one names a fragmentary fossil, then it must be called a form-genus and therefore cannot be assigned to a family. Other workers have used form-genera to include species that can be assigned not to a single family, but to more than one. In other cases the form-genus has been used only for plant fragments that cannot be assigned to a family, with other designations for plant fragments that can be assigned to families.

Fossils representing part of a plant constitute only one of several situations for which the designation of form-genera is appropriate. In some cases, fossils may represent a particular stage of a life cycle. For example, dinoflagellates are represented in the fossil record almost exclusively by a cyst stage. For nomenclatural purposes dinoflagellates are ambiregnal

organisms and include both phyto- and zooplankton. Up until the early 1960's some dinoflagellate paleontologists applied the ICZN to their taxa and some used the ICBN. Recognizing this to be an undesirable state of affairs, agreement was reached at that time to treat fossil dinoflagellates under the ICBN. That organ-genera were permitted under the ICBN at the time, but no equivalent device was incorporated within ICZN, was the decisive factor in the choice of Code for fossil dinoflagellates.

It is entirely feasible to assign many fossil dinoflagellate genera to extant families; moreover, it is clear from the morphology of other fossils that they represent extinct groups of dinoflagellates that are assignable to fossil families. Such families were permissible for organ-genera, but not for form-genera. Hence, dinoflagellates are currently classified into "regular" genera, not as form-genera. This makes sense in that fossil dinoflagellates must be included with living forms in a comprehensive suprageneric scheme, but it produces a confusing situation for dinoflagellate taxa in which both the fossil cyst and motile equivalent are known.

Because they are based on different stages in the life-cycle, fossil dinoflagellates and living dinoflagellates have largely received two sets of names, the equivalencies of which are becoming increasingly well known. For example, *Gonyaulax spinifera* (the "type species" of *Gonyaulax*) and related species are known to produce cysts assignable to the genus *Spiniferites*. Indeed, it is generally informally acknowledged that *Spiniferites* and *Gonyaulax* are taxonomic synonyms. For several reasons this synonymy has not been formally proposed: 1) the fossil generic name *Spiniferites* is senior to the extant name *Gonyaulax* and acceptance of the synonymy would bring considerable changes to the nomenclature of this major extant genus (and conservation of *Gonyaulax* would cause a reciprocal chaos among fossil names); 2) the exact correspondence of *Spiniferites* species with *Gonyaulax* species is not clear; and 3) it is impossible to establish whether earlier representatives of the genus *Spiniferites* were cysts with a thecate stage identical to living *Gonyaulax*. In other words, to many researchers, it is useful and desirable to retain both *Gonyaulax* and *Spiniferites* while acknowledging that they may represent the same biological taxon. Even if some authors disagree that that there is merit in retaining quasi-equivalent names for fossil and living dinoflagellates, the ICBN is a nomenclatural tool and should have no part in or influence over this taxonomic debate.

According to Meyen and Traverse (1979) the problems of naming fossils are as follows. 1. Living plants are assignable to a single taxon at any rank whereas fossil plants with dispersed parts and no observable original connections may be referred to several taxa of the same rank and have different names (*Stigmaria, Lepidodendron, Lepidostrobus*) 2. In living plants, all individuals belonging to a species belong to the same genus, etc. whereas in fossil plants various specimens of a species may or may not belong to the same genus and the genus may belong to different families when the complete plant is considered (*Stigmaria* may belong to genera assigned to Lepidodendraceae, Sigillariaceae, or Lepidocarpaceae). 3. Living plants are assigned to a complete hierarchy of taxa whereas fossil plants may be assigned only to genera with higher rankings unknown (some leaf genera might belong to pteridosperms, ferns, or cycads). 4. Living plants cannot be assigned to different genera based upon different types of preservation whereas fossil plants may be. 5. Different ontogenetic phases of the living plant do not normally serve as a distinction for a taxon whereas in fossil plants this is possible (seeds, microspores, megaspores, cysts). They concluded that fossil plant nomenclature requires only two special circumstances be reflected in the ICBN: 1) the possibility to keep genera of fossil plants outside the hierarchy of formally named higher taxa; and 2) the possibility to retain names of taxa established for various parts. Each of these issues are addressed below.

Article 3 sets forth a sequence of names, i.e. orders are subdivided into families and not vice versa. Also, species are assignable to genera and genera to families, when placed in a hierarchy. It does not say that this sequence must occur as a requirement for valid publication, and, in fact, placement of genera within a family is not a requirement for a generic name to be valid, whether or not it is a fossil. Many genera of extant plants have been validly published and accepted with no familial assignment (i.e. *Panda*). Since there is no requirement for any plant to be placed in a family, we do not need to separate out fossil plants in this regard and Article 3.3 is unnecessary. It is a taxonomic decision whether to place any genus into a family. Article 3.4 adequately allows for the use of form-genera.

The second point raised by Meyen and Traverse is critical for generic names of dispersed fossil parts. Allowing more than one generic name for the same biological taxon is most appropriately placed under Article 11, which deals with priority of names.

In light of the above discussion, we are making proposals to change the Code. These proposals are currently in the form of a manuscript to be submitted to Taxon. They include the deletion of Article 3.3, thus removing the confusion as to whether or not fragmentary fossils should be assigned to families; regardless of one s philosophical stance on this matter and the definitions of form- and organ-genera, these are taxonomic issues and should not be addressed in a nomenclatural code. Article 3 is about the ranks of taxa and insofar as form-genera need to be mentioned in this context, they are alluded to in Article 3.4.

We are proposing a new article under Article 11 prescribing the circumstances under which form-genera should be applied and how they relate to the principal of priority. In the sense of our proposal, form-genera equate with both form-genera and organ-genera of previous usage in that they may or may not be assignable to families. In a proposed new recommendation, we discourage the use of form-genera in typifying families if names based on whole organisms are available. However this is a taxonomic issue and under no circumstances should this recommendation be incorporated into an existing or new article.

We believe that these proposals formally allow taxonomists the freedom of deciding whether or not to assign a form-genus (incorporating the former concepts of organ-genus and form-genus) to a family and to permit the use of alternative names for fossil genera (the old organ-genus concept of naming dispersed parts of the taxon separately). The proposals do not change existing practice in the nomenclature of fossil plants, but serve to clarify the situation and to place the rules more appropriately within the ICBN.

As always, we welcome your input, especially on the form-genus topic and also the new BioCode draft (Greuter *et al*, 1996). We feel that the draft is unacceptable in its present state in respect to form- and organ-genera. (The Committee for Fossil Plant's suggestions on the first draft of the BioCode have not yet been incorporated into the draft BioCode.)

References:

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EXTRACTS FROM THE DRAFT BIOCODE

The quotes that follow are the paragraphs concerning fossil plants in the "prospective international rules for the scientific names of organisms" referred to by Skog and Fensome in the item above. The draft is prepared and edited by W. Greuter, D.L. Hawksworth, J. McNeill, M. A. Mayo, A. Minelli, P.H.A. Sneath, B.J. Tindall, P. Trehane & P. Tubbs (the IUBS/IUMS International Committee for Bionomenclature). It is the third draft, revised at a meeting of the Committee at Egham, U.K., 8-10 March 1996, by W. Greuter, D.L. Hawksworth, J. McNeill, M.A. Mayo, B.J. Tindall, P. Trehane and P. Tubbs.

PREAMBLE

2. The provisions of this Code shall apply to names of all kinds of non-viral organisms, whether fossil or non-fossil1, and of some fossil traces of organisms, that are published and established on or after 1 January 2000, and shall govern the choice of name when these names compete among themselves or with earlier names. They shall also, and without limitation of date, provide, in the interest of nomenclatural stability and security, for the protection, conservation, or suppression of all such names, as well as for their correct form and spelling. - ICBN, Pre. 7; ICZN, Pre.

1 In this Code, the term "fossil" is applied to a taxon when its name is based on a fossil type and the term "non-fossil" is applied to a taxon when its name is based on a non-fossil type.

DIVISION II. RULES
CHAPTER I. TAXA AND RANKS

Article 3

3.1. The principal ranks of taxa in descending sequence are: kingdom, phylum, class, order, family, genus, and species. - BC, Rule 5b; ICBN, Art. 3.1.

3.2. Taxa that do not consist of whole organisms but of particular parts of organisms, or part of their life history, or their fossil traces, may receive names under special regulations at only some of these ranks, e.g. fossil organ-genera, the anamorphs of pleomorphic fungi, or ichnotaxa (see Art. 36). Names of such form taxa do not compete for precedence with names applying to the whole organisms and to all stages of their life history. - ICBN, Art. 3.3-4; ICZN, Art. 1d, 10d, 23g & 42b(i).

[Art. 3.2 and 36 provide for a special category of names that apply exclusively to parts of organisms, parts of their life histories, or their fossil traces. These provisions are referred for discussion and advice to the groups of specialists concerned.]

CHAPTER III. NAMES (GENERAL PROVISIONS)

Section 2. Establishment

Article 11

11.1. In order to be established, a name of a new taxon of fossil plants and non-fossil algae of specific or lower rank must be accompanied by an illustration or figure showing the essential characters, in addition to the description or diagnosis, or by a reference to an illustration or figure previously published in accordance with Art. 5-6. - ICBN, Art. 38.1.

Section 6. Precedence

Article 19

19.7. Names of organisms (animals and algae excepted) based on a non-fossil type are treated as having precedence over names of the same rank based on a fossil (or subfossil) type. - ICBN, Art. 11.7.

CHAPTER V. PROVISIONS FOR SPECIAL GROUPS

Section 2. Parts of Organisms, Portions of Life Histories, and Trace Fossils

36.2. Names referring to specific organs of fossil botanical taxa (organ-taxa), or to mitotic asexual morphs (anamorphs) of ascomycetous and basidiomycetous fungi (excluding those forming lichens) with a pleomorphic life history, are names of form-taxa. These names are applicable only to the organ or morph represented by their type, not to the whole fossil, or to the fungus in all its morphs (holomorph), which is considered to be represented by its meiotic sexual morph (the teleomorph, characterized by the production of asci/ascospores, basidia/basidiospores, teliospores, or other basidium-bearing organs). - ICBN, Art. 59.1.

36.3. The provisions of this article shall not be construed as preventing the publication and use of binomina for form-taxa when it is thought necessary or desirable to refer to fungal anamorphs alone, or to specific organs of botanical fossils, even though the holomorph or whole fossil organism may be known and have been named. For the name of a fossil botanical genus, the author's intent (as apparent from the original description, the material he used, and often from the name itself) is essential in establishing whether it applies to an organ-genus only. Names of fossil botanical taxa in ranks lower than genus are considered to apply to an organ-taxon if they are subordinate to the name of an organ-genus. When their epithet is later transferred to a genus of whole-organism fossils, the new combination is deemed to be the name of a whole-organism taxon and as such takes the date of the transfer, without change of type. - ICBN, Art. 59.5.

FUNGINITE - THE OFFICIAL NEW NAME FOR FUNGAL REMAINS IN COAL

At the 48th Meeting of the International Committee for Coal and Organic Petrology (ICCP) in Heerlen, The Netherlands (September 9-14, 1996) - the historic meeting place of the first four Carboniferous congresses (1927, 1935, 1951, 1958) that were held under the leadership of the legendary paleobotanist W.J. Jongmans - it was decided by the ICCP to officially introduce the name funginite for fungal masses preserved in coal. At the suggestion of Paul C. Lyons (U.S. Geological Survey), it was decided to abandon the maceral name sclerotinite (Stach, 1952) and replace it with funginite (Benes, 1956) and secretinite (Lyons, 1986) - a new maceral of the inertinite maceral group that had been mixed with fungal remains. Secretinite is non-cellular and associated with the secretory ducts of medullosan seed ferns This relationship was clearly established in a pioneering paper (Lyons et al., 1982).

Over the last seven decades, mycologists and coal petrologists have confused fungal and non-fungal bodies in coal. The confusion has been compounded by the introduction of new taxonomic names for non-fungal bodies in coal, which belong to the new maceral secretinite - non-cellular masses probably of humic origin. Such fungal names as *Crenasclerotes stachii* Pickhardt 1957, *Crenasclerotes duras* Pickhardt 1957, *Globosasclerotes ägiranus* Pickhardt 1957, *Cellularasclerotes abnormis* Pickhardt 1957, *Cellulasclerotes giganteous* Pickhardt 1957, and *Coronasclerotes australis* Pickhardt 1957 - which belong to the new maceral secretinite and are illustrated in Stach and Pickhardt (1957) and Benes and Kraussová (1964) - are nomina nuda. Other non-fungal remains that belong to the new maceral secretinite are illustrated as "Palaeozoic secretion sclerotinite" by Stach et al. (1982, Fig. 49).

Sclerotinite has been officially laid to rest by the ICCP; official cryers were hired for the wake!

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A PROVISIONAL WORLD LIST OF GEOSITES FOR PALAEOZOIC PALAEOBOTANY

GEOSITES is a new project initiated by the IUGS to develop an inventory of globally important geological sites. As part of this project, we have been asked to provide a provisional list of candidate Palaeozoic palaeobotany sites. The results are summarized below. The 40 sites are intended to show the broad pattern of evolution in land floras from the middle Silurian to the end of the Permian, constructed around the standard palaeophytogeographies and biostratigraphies. The network consists of two parts. At its core is a succession of sites showing the broad trends of geographical and temporal diversification of land plants. These core sites yield mainly adpressions, usually representing several stratigraphical levels revealing the temporal changes in the floras. Against this background are the sites yielding anatomically preserved fossils. This second category contains sites that are usually much smaller and represent a much narrower stratigraphical range, but the quality of the preservation of the fossils allows the adpression sites to be viewed in a more botanical context. The two types of site are thus mutually supportive in providing an overall picture of land plant evolution during the Palaeozoic.

We invite comments on this list from all our colleagues. Are any globally-important sites omitted, are there better alternatives to those sites listed, or are some of the listed sites simply not up to scratch? As will be evident from the list, a site can be anything from a small quarry to a whole complex of sites in an area representing a palaeobotanical theme. When a consensus has been obtained, the revised list will be presented to the IUGS Global Geosites Working Group.

A longer comparative analysis of the importance of the sites can be found on the IOP home page (http://ibs.uel.ac.uk/ibs/palaeo/pfr2/geosites.htm).

SILURIAN

Tipperary, Ireland: Wenlock strata yielding the oldest known examples of *Cooksonia*.

Walhalla, Victoria, Australia: Ludlow deposits yielding rhyniophytes and the oldest known examples of lycophytes (*Baragwanathia*).

DEVONIAN

Clee Hills, Great Britain: Lower Old Red Sandstone yielding important rhyniophyte assemblages of the *Zosterophyllum* Zone, including sites with anatomically preserved *Cooksonia*.

Craig-y-Fro and Llanover quarries, Great Britain: Two sites showing different preservational aspects of the so-called 'Senni Beds Flora', the best known example of a *Psilophyton* Zone flora. The fossils can yield anatomical detail and has included many types, such as of *Gosslingia* and *Uskiella*.

Rhynie, Great Britain: A unique Early Devonian biota, including early vascular and non-vascular land plants such as *Rhynia*, *Asteroxylon* and *Aglaophyton*.

Gaspé, Canada: Emsian beds yielding extensive suites of upper *Psilophyton* Zone plant fossils. The fossils often occur in monospecific stands, which facilitates whole-plant reconstructions. It is also of historical interest as the type area for the trimerophyte *Psilophyton*.

Elberfeld, Germany: Extensively studied Middle Devonian *Hyenia* Zone floras, that have included the types of the important taxa such as *Aneurophyton* and *Calamophyton*.

Catskill Mountains, USA: Numerous localities yielding well preserved examples of *Svalbardia* and *Archaeopteris* Zone floras. They include the Gilboa Fossil Forest site, which yielded some of the first known Devonian tree stumps. Other sites have yielded permineralized specimens including *Leclercqia*, *Ibyka*, *Haskinsia*, *Triloboxylon*, *Actinoxylon*, *Colpodexylon* and *Sawdonia*. Also present are important localities for the progymnosperm *Archaeopteris* and one of the earliest known seed plants, *Elkinsia*.

Bear Island, Arctic: The best example of a Famennian *Rhacophyton* Zone flora, including early sphenophytes, progymnosperms, pteridosperms and sub-arborescent lycophytes.

LOWER CARBONIFEROUS

Southern Allegehny Mountains, Virginia, USA: The Price and Pocono Formations yielding the most diverse known *Adiantites* and *Triphyllopteris* Zone floras (Tournaisian - lower Visean).

Horton Bluffs, Canada: Upper Visean Horton Group yielding the best available adpressions of the upper *Triphyllopteris* and *Neuropteris antecedens* Zones.

Berwickshire and East Lothian, Great Britain: The Cementstone Group yields late Tournaisian anatomically preserved fossils, especially important for gymnosperms. The site-complex also includes coeval sites yielding permineralizations in volcangenic rocks, e.g. Oxroad Bay and Weak Law.

Montagne Noire, France: Phosphatic nodules from the Lydienne Formation yielding exceptionally preserved, late Tournaisian plant permineralizations, especially important for lycophytes and early 'ferns'.

Pettycur, Great Britain: The classic site for Visean plant permineralizations, that has yielded the types of four genera and twenty species. The flora is exceptionally diverse for this age, including ferns, lycophytes, sphenophytes and pteridosperms.

Kilpatrick Hills, Great Britain: Sites yielding both petrifactions and adpressions, at several levels between the upper Tournaisian and lower Visean. They are especially important for lycophytes, sphenophytes, progymnosperms and early seed plants. They also yield adpressions of the *Triphyllopteris* Zone.

Huadong, China: Tseishui Formation yielding typical Visean floras for the far eastern part of the palaeoequatorial belt. They are of especial interest for yielding exceptionally well preserved examples of parispermacean pteridosperms, including fertile structures.

Minusa Basin, Russia: Classic examples of Lower Carboniferous Angaran floras, dominated by lycophytes and progymnosperms, with very few seed-plants.

UPPER CARBONIFEROUS

Washington County, Arkansas, USA: Basal Namurian Fayetteville Shales yielding anatomically preserved fossils of trigonocarpaleans, lycophytes, coeonopterids and calamites. They are easily the best preserved fossils of these groups reported so far from these relatively low stratigraphical levels.

Meuse Valley, Belgium: Chokier and Andenne Formations (Arnsbergian to Yeadonian) in central Belgium yield the most complete sequence of Namurian floras in Europe.

Glynneath-Ammanford, UK: Numerous exposures yielding the best available sequence of Westphalian floras in Europe.

Guardo Coalfield, Spain: The best area for transitional Westphalian-Stephanian floras.

Sabero Coalfield, Spain: The best area upper Barruelian to Stephanian B floras, including assemblages reflecting both wet and drier habitats.

Grand'Croix, France: The remains of a unique, Barruelian-aged petrified peat, in which anatomical details of the plants are preserved. Ferns, cordaites, sphenophytes and pteridosperms are well represented, the former including exceptionally well-preserved sporangial structures.

New River Gorge, West Virginia, USA: The stratotype section for the Pennsylvanian 'System' in North America yields a diverse set of floras ranging from near the top of the Lower Carboniferous and through most of the Upper Carboniferous.

Joggins Cliffs, Canada: The best site for *in situ* stumps from the Late Carboniferous palaeoequatorial coal-forests, including remains of lycophytes, sphenophytes and cordaites.

Point Aconi, Canada: The best site for late Westphalian D and early Cantabrian floras, with fossils yielding well preserved cuticles and pollen/spores.

Mazon Creek, Illinois, USA: Classic lower Cantabrian nodule flora, different in composition from most contemporary floras of the palaeoequatorial belt. The fossils are preserved as authigenic mineralizations, showing many fine details of structures such as fern sporangia.

Rock Island, Illinois, USA: The best example of a so-called 'upland' or extra-basinal flora preserved in local palaeovalley-fills.

Steubenville road cutting, Ohio, USA: This is the best available site for (Stephanian) Upper Pennsylvanian coal balls.

Hamilton Limestone Quarries, Kansas, USA: Upper Stephanian (Virgilian) Shawnee Group yielding anatomically preserved fragments of extra-basinal vegetation. They included the oldest known anatomically preserved conifers, as well as a range of other gymnosperms (peltasperms, trigonocarpaleans), lycophytes and sphenophytes.

Northern Utah, USA: Manning Canyon Shale yielding the best preserved flora (probably late Namurian or possibly early Westphalian in age) from the Carboniferous of western North America. It confirms that this part of North America represents a distinct floristic region from the rest of the palaeoequatorial belt.

Southern Kuznetsk Basin, Russia: The classic area for Carboniferous and Permian Angaran floras, representing northern-temperate vegetation.

Rio Blanco, Argentina: The best preserved pre-glossopterid floras from western Gondwana, including a range of endemic forms (e.g. *Archaeosigillaria*, *Furquea*) and dwarf lycophytes. The latter have been interpreted as part of a tundra vegetation that developed as the Gondwanan ice-cap retreated.

PERMIAN

Saar-Nahe Rotliegend, Germany: The most diverse and well preserved Early Permian floras in Europe, including ferns, peltasperms, trigonocarpaleans, conifers and a possible early cycad.

Kupferschiefer, central Germany: The best documented Late Permian fossil flora from Europe, dominated by conifers (especially Voltziaceae), but also with sphenophytes, peltasperms, and ginkgophytes.

Taiyuan, China: The classic area for Cathaysian floras, which represent the remnants of the tropical swamp forests that disappeared from most of the rest of the palaeoequatorial belt in the Late Carboniferous. It is also one of the few areas where the Permian-Triassic extinction event can be recognized in the plant fossil record in a well-dated succession.

North-central Texas, USA: Classic Lower Permian floras of North America, including ferns, conifers, peltasperms and sphenophytes. There are also abundant remains of gigantopterid-like leaves, resembling closely those found in similar-aged deposits in China.

Hermit Trail, Arizona, USA: The best example of the *Supaia* Flora of North America. It is of similar age to the Texas *Gigantopteris* flora, but lacks ferns and lycophytes, and is thought to have represented the vegetation of a much drier habitat.

Pechora, Russia: The Upper Permian Pechora flora is of undoubted Angaran affinity, but differs from the 'type' Angaran of the Kuznetsk in having more ferns and fewer sphenophytes and cordaites. It is regarded as intermediate in character flora between the typical Angaran vegetation and that of Kazakhstan.

Northern Karoo Basin, South Africa: Middle and Upper Ecca Group (Lower Permian) and Lower Beaufort Group (Upper Permian) yielding the classic floras from western Gondwana.

Skaar Ridge, Antarctica: Upper Permian Buckley Formation with a silicified peat containing anatomically preserved plants, especially important for glossopterids.

C.J. CLEAL, Cardiff, UK
B.A. THOMAS, Lampeter, UK

NEWS OF AN INDIVIDUAL

Richard Bateman has been appointed Head of Science at the Royal Botanic Garden Edinburgh as of December 1st 1996. He will retain a link with his former employers at the Royal Museum of Scotland as a Research Associate. If he is *very* skilled at managing his time he may even be able to retain a link with the palaeobotanical research community.

BIBLIOGRAPHY

Bibliography of European Palaeobotany and Palynology 1994-5

The Bibliography of European Palaeobotany and Palynology 1994-1995, compiled by B.A. Thomas, C.J. Cleal, H.S. Pardoe and H.F. Fraser, is now available. The report consists of a list of publications produced by palaeobotanists and palynologists throughout Europe in 1994 and 1995, together with a list of publications in press and current research interests. The 163 page Bibliography is divided into sections according to geological periods.

If you would like to purchase a copy of the Bibliography please send a sterling cheque or Eurocheque for £5 (inc. p & p) to Miss H.E. Fraser, Department of Botany, National Museums and Galleries of Wales, Cathays Park, Cardiff, CF1 3NP, U.K., making your cheque payable to the National Museum of Wales. Europeans in countries outside the British Isles can obtain a copy of the Bibliography from their regional representative.

If you wish to pay by credit card please use the form available on the IOP home page (http://ibs.uel.ac.uk/ibs/palaeo/pfr2/cleal.htm) or write to us at the address above. The cost of the Bibliography, if purchased using a credit card, is £6.75 or $12

The following three titles are also still available:
- Report on British Palaeobotany and Palynology 1988-1989
- Bibliography of European Palaeobotany and Palynology 1990-1991
- Bibliography of European Palaeobotany and Palynology 1992-1993

Each can be purchased individually at the same price as the latest Bibliography, or a complete set can be purchased for £18 (or £25/$45 by credit card).

RECENT PUBLICATIONS

TEMPO AND MODE IN EVOLUTION. W.M. Fitch & F.J. Ayala (Editors). 1995. National Academy of Sciences. 325pp.

This is North America's celebration of George Gaylord Simpson's ideas about evolution fifty years on, by contemporary establishment figures. From palaeobotany J.W. Schopf, A.H. Knoll and K.J. Niklas talk about their interests, while S.J. Gould and D.M. Raup give equally stimulating reviews of macroevolution. It is an unrefereed review of a National Academy of Sciences symposium discussing tempo (rate of evolution) and mode (the manner or pattern of evolution). Read it for good stimulation on modern ideas

of process but don't expect anything new. The spirit of GGS lives.

TERTIARE VEGETATIONSGESCHICHTE EUROPAS D.H. Mai. 1996. G. Fischer Verlag, Jena. 691pp. 257 figs. DM248. ISBN 3-334-60456-X

This huge tome accounts for the author's life work up until the time of the collapse of the Berlin wall. It is both descriptive (covering most localities with megafossil plants in a geographical sequence) and interpretative (discussing the major theories and applications of the subject). The drawings, maps, pictures and charts are both numerous and superb. The three indices (genera, place names, subjects) and 37 page bibliography are very helpful and must be the best aid to searching for facts and ideas of European Tertiary palaeobotany. These features also mean that the book is useful to those not fluent in the German language. Everyone interested in plant evolution must have access to a copy of this book.

PALAEOECOLOGY OF THE FLORA IN BUNTSANDSTEIN AND KEUPER IN THE TRIASSIC OF MIDDLE EUROPE (Volume 1: Buntsandstein, Volume 2: Keuper & Index) D. Mader. 1990. G.Fischer Verlag, Jena. 1582pp. ISBN 3-437-30650-2.

PALYNOLOGY: PRINCIPLES AND APPLICATIONS (3 volumes)
J. Jansonius & D.C. McGregor (Editors) 1996. American Association of Stratigraphic Palynologists. 1330pp. ISBN 0-931871-03-4.

BOOK REVIEWS

PALAEOZOIC PALAEOBOTANY OF GREAT BRITAIN. C.J. Cleal and B.A. Thomas. 1995 Chapman Hall, London. ISBN 0 41261090 6. £ 75.00

This is one of a series of books produced under the auspices of the Joint Nature Conservation Committee of Great Britain, a body which took over the responsibilities of the erstwhile Nature Conservancy Council. It is the outcome of a twelve year review of British Palaeozoic sites of palaeobotanical significance. It takes each of the relevant periods, from Silurian through Permian, giving a world map to set the British Isles in palaeogeographic perspective, reviews our knowledge of the plants of each, and then documents the major British sites for plant fossils of those periods. There are many larger scale maps showing the location of exposures and the relevant aspects of the geological structure and stratigraphy for the principal localities.

As the authors point out, the book is "not intended to be a field guide to the sites..... its remit is to put on record the scientific justification for conserving the sites, (and) ...discussing the interest of the fossils found there". This commitment to assessing conservation potential gives an odd imbalance to the treatment of these periods. Where coastal exposures or quarries are still available, these are all well documented. But for the Upper Carboniferous, most of the main sources of fossil plants which have given such a detailed picture of Coal Measure vegetation were of course deep mines. Naturally, these cannot figure in this review of potential sites for conservation. As a result, while the Devonian gets some 50 pages and the Lower Carboniferous 84, the Upper Carboniferous gets only 26, and only six Upper Carboniferous sites are recorded.

Despite the modest disclaimer of the authors, this work is in fact a most useful and readable review of the sources of British Palaeozoic plants, and of the state of contemporary research on the fossil record from each of the major periods. The review of the Rhynie locality and flora in particular offers a range of information unavailable in any other single work. It covers the geology of the site, the environment of deposition and process of fossilization and a brief account of the progress of research on the plants themselves since their discovery some eighty years ago. The explosion of interest in the Scottish Lower Carboniferous is similarly well documented, and many of the plant fossils and localities are illustrated. All in all, the book lives up to its title, rather than to the limitations imposed on the authors by the objectives of the series..

But it is a reviewers prerogative to look for faults as well as to give fair assessment and praise. One of the weakest features of the book are the photos of the field sites, which seem universally to have been taken in the rain, or at best on days of heavy overcast. All but a very small number are of coastal or quarry exposures without any indication of scale (neither a human being nor even the traditional hammer!); it is a pity that no-one was available to add a sense of proportion and life to those rather dead-pan photographs. The systematic treatment is also disappointing. Although the book is not a taxonomic treatise, it is disconcerting to find that its authors have reverted to lumping all spore-bearing vascular plants under the "Pteridophyta". This treatment was first rejected some fifty years ago by Eames, and his view has been accepted by most systematists. This is all the more surprising in a work which records the basis of our understanding of Devonian plants, which so clearly vindicates the thesis that the free-sporing character which defines the "Pteridophyta" is manifestly an evolutionary grade rather than a clade.

Such quibbles aside, this book is a valuable addition to the literature of Palaeozoic palaeobotany. It is much more than a parochial report on British field sites, and deserves a place in libraries worldwide, where they can afford it !

W.G. CHALONER, Egham, UK.

HITHERTO A.G. Long. The Pentland Press. 1996. 278 pp. £ 15.50 (cloth).

An autobiography of an eminent paleobotanist is rather unusual, therefore it is a rare pleasure to read Albert Long's story, full of observations about the countryside, people, fossils and life. As stated by Barry Thomas in the Foreword, Albert's life has been clearly sustained by a mixture of family, religion and natural history.

The book may be divided into three chronological parts. The first refers to his earliest paleobotanical experience when he was a student of Dr.Lang at Manchester University where he took a B Sc degree in Botany. Through extracts of his journal, the reader will follow Albert's increasing interest for coal ball floras that he intensively collected in the surrounding Lancashire coal field. Young paleobotanists may ignore that Albert Long published as early as 1943 and 1944 two most important papers on coal ball plants, one on the gametophyte of *Lagenostoma ovoides*, and the other on *Botryopteris hirsuta* which was the first correct interpretation of buds borne on the rachis of this fern. At this time - difficult - of the second world war, Albert had to go into school teaching and to abandon a scientific career in paleobotany.

The central part of the book (chapters 3 & 4) provides a sample of activities that he developed when he was a school teacher; this reveals that Albert Long has written widely on botany, ornithology and entomology with a particular interest for the later. Fortunately for our science, he received in 1957 a letter from P.D.W. Barnard which, he says, changed the tenor of his life in a most unexpected way and urged him to make a search for fossil plants in the Langton Burn near his home at Gavington! Amusingly he then "re-discovered" some blocks first seen in 1951 when fishing; they gave him the best specimens of *Genomosperma kidstonii* and *G.latens* and he immediately realized their great interest and significance: "the sudden revelation of these fossils now gave the moths and bees some respite".

The last part (chapters 5 & 6) includes writing on general botany (e.g. on the origin of seed and flower) which are of interest for all paleobotanists and 'articles on fossil plants'. These comprise a review of research on Lower Carboniferous plants of Berwickshire with an emphasis on his most famous results on early seeds.

Some chapters of the book have been already published in separate issues of the History of the Berwickshire Naturalists' Club and it is rather fortunate that they are now assembled in a book more easily available.

During the seventies I had the privilege to be the guest of Albert Long and his wife Gladys in their home of Ponteland; while reading this book I have found again the spirit of their home and memories of the delightful long evening discussions full of anecdotes and of Albert Long's humour.

J. GALTIER, Montpellier, France