

## A PRELIMINARY CHECK-LIST OF BRITISH MARINE DIATOMS

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The present list of diatoms may be considered an extension of the recent check-list of British marine algae by Parke (1953). It includes not only truly marine species, both sessile and planktonic, but also species inhabiting brackish waters with a few fresh-water species that manage to live, though somewhat precariously, in estuarine conditions.

It has been compiled for the following reasons: (1) to indicate the extent of the diatom flora around British coasts, so that comparisons may be made with that of the other countries; (2) to assist workers in the identification of material by indicating the size of any genus known to inhabit our shores; (3) to check the arrival of new entrants to the British flora; and (4) to provide a basis for a more detailed work, now in preparation. The check-list does not presume to lay down finalized decisions on the taxonomic rank ascribed to any organism or to consider the criteria upon which such ranks are based.

The vexed question of species, varieties and forms and the characters appertaining to them, as well as the degree to which such characters are possessed, is no part of the work at its present stage. Most of the varieties and forms cited are used in the accepted sense, and exceptions are explained in the notes.

As before, genera are listed alphabetically under the family, and species alphabetically under the genus. Synonyms are in brackets, and notes are appended at the end of each suborder: the number in brackets following a name in the list refers to these notes.

*Planktonic species are marked with an asterisk.*

Diatoms are considered as a Class of Algae, BACILLARIOPHYCEAE, comprising one order, BACILLARIALES, which is divided into ten suborders (Hendey, 1937, 1951), as follows:

- |                    |                    |
|--------------------|--------------------|
| 1. Discineae       | 6. Araphidineae    |
| 2. Aulacodiscineae | 7. Raphidioidineae |
| 3. Auliscineae     | 8. Monoraphidineae |
| 4. Biddulphiineae  | 9. Biraphidineae   |
| 5. Soleniineae     | 10. Surirellineae  |

The flora consists of 771 species arranged in 104 genera. The list includes all marine and brackish-water species that have been *recorded*, with the

omission of some that are doubtful or imperfectly described. It has not been possible to check all those listed.

The compiler will be grateful to hear of any errors or omissions, inevitable in a preliminary survey such as this, as well as to receive material or mounted slides that may help in advancing knowledge of our diatom flora.

Finally, it is hoped that this list will provide a stimulus for field-work of which a vast amount is yet necessary.

## BACILLARIOPHYCEAE

### BACILLARIALES

#### Suborder 1. DISCINEAE

#### Coscinodiscaceae

- ACTINOCYCLUS Ehrenberg, 1838. (1)  
*fulvus* (W. Sm.) Ralfs ex Pritch.\* (2)  
 (*Eupodiscus fulvus* W. Sm.)  
*octonarius* Ehrenb.\*  
 (*A. ehrenbergii* Ralfs ex Pritch.)  
 var. *octonarius*  
 var. *crassus* (W. Sm.)\*  
 (*A. crassus* (W. Sm.) Ralfs ex Pritch.)  
 (*A. ehrenbergii* var. *crassus* (W. Sm.)  
 Hust.)  
 (*Eupodiscus crassus* W. Sm.)  
 var. *ralfsii* (W. Sm.)\*  
 (*A. ehrenbergii* var. *ralfsii* (W. Sm.)  
 Hust.)  
 (*Eupodiscus ralfsii* W. Sm.)  
 (*Coscinodiscus fuscus* Norm.)  
 var. *sparsus* (Greg.)\*  
 (*A. sparsus* (Greg.) Rattray)  
 (*Eupodiscus sparsus* Greg.)  
 var. *tenella* (de Bréb.)\*  
 (*A. ehrenbergii* var. *tenella* (de Bréb.)  
 Hust.)  
 (*A. moniliformis* Ralfs ex Pritch.)  
 (*Eupodiscus tenellus* de Bréb.)  
*roperii* (de Bréb.) Grun. ex Van Heurck\*  
 (*ovalis* Grun.)  
 (*Eupodiscus roperii* de Bréb.)  
*subtilis* (Greg.) Ralfs ex Pritch.\*  
 (*falsus* W. Sm. ?)  
 (*subtilis* var. *disjuncta* Ratt.)  
 (*Eupodiscus subtilis* Greg.)  
 (*E. gregoryanus* de Bréb.)
- COSCINODISCUS Ehrenberg, 1838.  
*anguste-lineatus* A. Schm.\*  
*asteromphalus* Ehrenb.\*  
 var. *asteromphalus*  
 var. *hybrida* Grun.\*  
*centralis* Ehrenb.\* (3)  
*concinus* W. Sm.\*  
*curvatus* Grun. ex Schm.\*  
*divisus* Grun.  
*excentricus* Ehrenb.\*  
*fimbriatus* Ehrenb.\*  
*gigas* Ehrenb.\*  
*grani* Gough\*  
*joergenseii* Ostenf.\*
- jonesianus* (Grev.) Ostenf.\*  
 var. *jonesianus*  
 var. *commutatus* (Grun.) Hust.\*  
*kützingii* A. Schm.\*  
*leptopus* Grun. ex Van Heurck\*  
*lineatus* Ehrenb.\*  
*marginatus* Ehrenb.\*  
*nitidus* Greg.\*  
*nodulifera* Jan. ex Schm.\*  
*obscurus* A. Schm.\*  
*oculus-iridis* Ehrenb.\*  
*perforatus* Ehrenb.\*  
 var. *perforatus*  
 var. *pavillardii* (Forti) Hust.\*  
*radiatus* Ehrenb.\*  
*rothii* (Ehrenb.) Grun.\*  
 var. *rothii*  
 var. *normanii* (Greg.) Grun.\*  
 (*C. subtilis* var. *normanii* Van  
 Heurck)  
 (*C. normanii* (Greg.) Brockm.)  
*stellaris* Roper\*  
*sub-bulliens* Jörg.\* (3)  
*subtilis* Ehrenb.\*  
*woodwardii* Eulens.\* (4)
- COSCINOSIRA Grun, 1900. (5)  
*oestrupii* Ostenf.\*  
*polychorda* Grun.\*
- CYCLOTELLA (Kützing) de Brébisson, 1838.  
*kützingiana* Thwaites (6)  
*striata* (Kütz.) Grun.
- DRURIDGEA Donkin, 1861.  
*compressa* (West) Donk.\*  
 (*geminata* Donk.)  
 (*Podosira compressa* West)
- ENDICTYA Ehrenberg, 1845.  
*oceanica* Ehrenb.\*
- HYALODISCUS Ehrenberg, 1845. (7)  
*radiatus* (O'Meara) Grun.\*  
 (*Pyxidicula radiata* O'Meara)  
*scoticus* (Kütz.) Grun.\*  
 (*Cyclotella scotica* Kütz.)  
 (*Podosira smithiana* Grun.)  
*subtilis* Bail.\*  
 (*franklini* (Ehrenb.) Cleve)  
 (*Podosira subtilis* Mann)  
 (*Craspedodiscus franklini* Ehrenb.)

- MELOSIRA Agardh, 1824.  
*arctica* (Ehrenb.) Dick.  
 (*hyperborea* Schütt)  
*jurgensii* Agardh  
*moniliformis* (O. F. Müll.) Agardh  
 (*borreri* Grev. in Hook.)  
*nummuloides* (Dillw.) Agardh  
*westii* W. Sm.
- PARALIA Heiberg, 1863. (8)  
*sulcata* (Ehrenb.) Cleve  
 (*marina* Heib.)  
 (*Gaillionella sulcata* Ehrenb.)  
 (*Orthosira marina* W. Sm.)  
 var. *sulcata*  
 f. *coronata* (Ehrenb.) Grun.  
 f. *radiata* Grun.  
 var. *biseriata* Grun.
- PHACODISCUS Meunier, 1910.  
*punctulatus* (Grev.) Meun.\*  
 (*Coscinodiscus punctulatus* Greg.)
- PLANKTONIELLA Schütt, 1893.  
*sol* (Wall.) Schütt\*  
 (*wolterecki* Schimp.)  
 (*Coscinodiscus sol* Wall.)
- PODOSIRA Ehrenberg, 1840. (9)  
*montagnei* Kütz.\*  
*stelliger* (Bail.) Mann\*  
 (*maculata* W. Sm.)  
 (*Hyalodiscus stelliger* Bail.)  
 (*Melosira maculata* Lagerst.)
- POROSIRA Jörgensen in Nordgaard, 1905.  
*glacialis* (Gran) Jörg.\* (10)  
 (*Podosira glacialis* Cleve)  
 (*P. hormoides* var. *glacialis* Grun.)  
 (*Lauderia glacialis* (Grun.) Gran)
- PYXIDICULA Ehrenberg, 1833.  
*cruciata* Ehrenb.\* (11)
- ROPERIA Grunow ex VanHeurck, 1885. (12)  
*tessellata* (Roper) Grun.\*  
 (*Eupodiscus tessellatus* Roper)  
 (*Actinocyclus tessellatus* (Roper) Ralfs  
 ex Pritch.)
- SKELETONEMA Greville, 1865.  
*costatum* (Grev.) Cleve\*  
 (*Melosira costata* Grev.)  
*mirabile* Grun. ex Van Heurck\*
- STEPHANODISCUS Ehrenberg, 1845.  
*astraea* (Ehrenb.) Grun.\* (13)  
*dubius* (Fricke) Hust.\*  
*hantzschii* Grun.\*
- STEPHANOPYXIS Ehrenberg, 1844.  
*palmeriana* (Grev.) Grun.\*  
*turris* (Grev.) Ralfs ex Pritch.\*
- THALASSIOSIRA Cleve, 1873. (5)  
*baltica* (Grun.) Ostenf.\*  
*bioculata* (Grun.) Ostenf.\*  
*condensata* Cleve\*  
*decipiens* (Grun.) Jörg.\*  
*fallax* Meun.\*  
*fluviatilis* Hust.\*  
*gravida* Cleve\*  
*hyalina* (Grun.) Gran\*  
*nordenskioldii* Cleve\*  
*rotula* Meun.\*  
*subtilis* (Ostenf.) Gran\*

**Hemidiscaceae**

- HEMIDISCUS Wallich, 1860. (14)  
*cuneiformis* Wall.\*  
 (*Euodia inornata* Castr.)  
 (*E. cuneiformis* Schütt)

**Actinodiscaceae**

- ACTINOPTYCHUS Ehrenberg, 1843.  
*amblyoceros* (Ehrenb.) Schm.\*  
*senarius* Ehrenb.\*  
 (*undulatus* Bail.)  
*splendens* (Shad.) Ralfs ex Pritch.\*
- ARACHNOIDISCUS Deane ex Pritchard, 1852.  
 (15)  
*ehrenbergii* Bail. ex Ehrenb. (16)
- ASTEROMPHALUS Ehrenberg, 1844.  
*flabellatus* (de Bréb.) Grev.\*  
*heptactis* (de Bréb.) Ralfs ex Pritch.\*  
*hookerii* Ehrenb.\*

*Notes on Discineae*

- (1) *Actinocyclus* Ehrenb. is placed in the *Coscinodiscaceae* (Hendey, 1937) because the general valve structure resembles that of *Coscinodiscus* Ehrenb. and the presence of a marginal ocellus is regarded as of secondary importance. The genus is obviously related to *Roperia* Grun. and to the *Eupodiscaceae*, where it is placed by Hustedt and Cleve-Euler, but in that position it assumes affinities with *Auliscus* Ehrenb. which stretches relationships beyond reasonable bounds.
- (2) Probably a form of *Actinocyclus octonarius* or intermediate between it and *A. subtilis* (Grev.) Ralfs ex Pritch.
- (3) Cleve-Euler (1951) makes this a variety of *Coscinodiscus asteromphalus* Ehrenb.
- (4) Rattray makes this a synonym of *C. apiculatus* Ehrenb., but Mann (1907) points out that it is nearer to *C. radiatus* Ehrenb. Hustedt unites it with *C. perforatus* Ehrenb.
- (5) Cleve-Euler (1951) makes this a subgenus of *Coscinodiscus* Ehrenb. This is not in the least useful, as *Coscinosira* Gran and *Thalassiosira* Cleve have characteristic colony formation and are genera well recognized by plankton biologists, who make most of their determinations upon either living or formalin-preserved material.

- (6) Cleve-Euler (1951) credits this combination to Chauvin.
- (7) Hustedt's classification is followed here in that *Hyalodiscus* is reserved for those species that possess an umbilical line at about half the valve radius. More work is required on British material.
- (8) *Paralia* Heiberg is separated from *Melosira* on account of the punctate-areolate structure of the valve margin and mantle. Lebour (1930), Gran (1905), and Cleve-Euler (1951) accept *Paralia*; Hustedt gives it subgeneric rank. Often found in the plankton, particularly after winter storms.
- (9) Cleve-Euler (1951) makes *Podosira* Ehrenb. a subgenus of *Melosira* Agardh.
- (10) Gran (1905) and Lebour (1930) place this species in *Lauderia*. Hustedt separates them on account of the spinulae, which cover the valve in *Porosira* but are marginal only in *Lauderia*.
- (11) A very doubtful species. Three species only are known from European waters, and more work is required on this group.
- (12) *Roperia* Grunow connects *Actinocyclus* Ehrenb. with the Eupodiscaceae. Some authorities place it there, but it has closer affinities with *Coscinodiscus* Ehrenb.
- (13) Normally considered as a fresh-water species, but is often found living in marine conditions.
- (14) Very variable in outline and size, with a world-wide distribution.
- (15) The generic name *Arachnoidiscus* Deane was accepted for conservation against *Hemiptrychus* Ehrenb., *Ber. Akad. Wiss., Berl.*, 1848, p. 7, and *Arachnoidiscus* J. W. Bailey ex Ehrenb., *Ber. Akad. Wiss., Berl.*, 1849, p. 63, by the Special Committee for Diatomaceae at the 7th International Botanical Congress, Stockholm, July 1950 (*Int. Code bot. nomencl.*, 1952, p. 70, Utrecht).
- (16) This record is doubtful. Two records are given in the literature of the nineteenth century, both for the west coast. The species has been recorded (unpublished) from the Thames Estuary; but it would be unwise to consider the species as other than an alien in the British flora. With such a characteristic species there can be no case for misidentification, so it can be assumed only that the species was carried to our shores mechanically. The species is common on the Californian coast and around Cape Town.

## Suborder 2. AULACODISCINEAE

**Eupodiscaceae**

AULACODISCUS Ehrenberg, 1844. (1)

*argus* (Ehrenb.) Schm.\*  
 (*Eupodiscus argus* (Ehrenb.) W. Sm.)  
*sollitianus* Norman\*

EUPODISCUS Rattray, 1888. (2)

*radiatus* Bail.\*  
 (*Aulacodiscus radiatus* (Bail.) Brightw.)

*Notes on Aulacodiscineae*

- (1) *Aulacodiscus* Ehrenb. (*Ber. Akad. Wiss., Berl.*, 1844, p. 73) based on *A. crux* Ehrenb. was accepted for conservation by the Special Committee for Diatomaceae at the 7th International Botanical Congress, Stockholm, July 1950 (*Int. Code bot. nomencl.*, 1952, p. 70, Utrecht) against *Tripodiscus* Ehrenb., *Tetrapodiscus* Ehrenb., *Pentapodiscus* Ehrenb. and *Eupodiscus* Ehrenb.
- (2) The name *Eupodiscus* was accepted for conservation in the sense that Rattray used it (*J.R. micr. Soc.*, 1888, p. 909), i.e. for *E. radiatus* Bail. (*Int. Code bot. nomencl.*, 1952, p. 71)—see note (1).

## Suborder 3. AULISCINEAE

**Auliscaceae**

AULISCUS Ehrenberg, 1843.

*sculptus* (W. Sm.) Ralfs ex Pritch. (1)*Note on Auliscineae*

- (1) This species occurs but infrequently around British coasts, and it is thought that a more intensive search, particularly along the south and west coasts, would reveal a more general distribution of it, also that *Auliscus caelatus* Bail., a species favouring warmer water, might be encountered. *A. caelatus* is considered by some authorities to be identical with *A. sculptus*. Further researches on this species are required.

## Suborder 4. BIDDULPHIINEAE

**Biddulphiaceae** (1)

- BELLEROCHEA Van Heurck, 1885.  
*malleus* (Brightw.) Van Heurck\*  
 (*Triceratium malleus* Brightw.)
- BIDDULPHIA Gray, 1821. (2)  
*alternans* (Bail.) Van Heurck  
 (*Triceratium alternans* Bail.)  
*antediluviana* (Ehrenb.) Van Heurck  
 (*vesiculosa* (Agardh) Boyer)  
 (*Amphitetras antediluviana* Ehrenb.)  
*aurita* (Lyngb.) de Bréb.\* (3)  
 var. *aurita*  
 var. *obtusa* (Kütz.) Hust.\*  
 (*B. obtusa* (Kütz.) Ralfs ex Pritch.)  
 (*B. roperiana* Grev.)  
 (*Odontella obtusa* Kütz.)  
*granulata* Roper\*  
*laevis* Ehrenb.\*  
*mobilienis* (Bail.) Grun. ex Van Heurck\*  
 (*baileyi* W. Sm.)  
 (*Zygoceros mobilienis* Bail.)  
*pulchella* Gray  
 (*biddulphiana* (Smith) Boyer)  
*regia* (Schultze) Ostenf.\*  
*rhombus* (Ehrenb.) W. Sm.\*  
 f. *rhombus*  
 (*Zygoceros rhombus* Ehrenb.)  
 f. *trigona* Hust.\*  
*sinensis* Grev.\* (4)  
*spinosa* (Bail.) Boyer\* (5)  
 (*Triceratium spinosum* Bail.)  
 (*T. armatum* Roper)  
 (*T. serratum* Wall.)  
 (*T. setigerum* Bail.)  
*striolata* (Ehrenb.)\* (6)  
 (*Triceratium striolatum* Ehrenb.)  
 (*Trigonium striolatum* (Ehrenb.)  
 Mann)
- CERATAULINA Peragallo & Schütt, 1896.  
*pelagica* (Cleve) Hendey\*  
 (*bergonii* (Perag.) Schütt)
- CERATAULUS Ehrenberg, 1843 (1844). (7)  
*smithii* Ralfs ex Pritch.\*  
 (*Biddulphia smithii* Van Heurck)  
*turgidus* Ehrenb.
- DITYLUM L. W. Bailey, 1862.  
*brightwellii* (West) Grun. ex Van  
 Heurck\*  
 (*trigonum* Bail.)  
 (*undulatum* (Brightw.) Mann)  
 (*Triceratium brightwellii* West)  
 (*T. undulatum* Brightw. e.p.)
- EUCAMPIA Ehrenberg, 1840.  
*zodiacus* Ehrenb.\*  
 (*groenlandica* Cleve) (8)  
 (*britannica* W. Sm.)  
 (*nodosa* Schm.)
- HEMIAULUS Ehrenberg, 1844.  
*hauckii* Grun. ex Van Heurck\*  
 (*delicatulus* Lemm.)
- ISTHMIA Agardh, 1832.  
*enervis* Ehrenb.

- (*obliquata* Agardh e.p.)  
 (*Isthmiella enervis* Cleve) (9)  
 var. *enervis*  
 var. *subcylindrica* Taylor  
*nervosa* Kütz.  
 (*obliquata* Ehrenb.)  
 (*obliquata* Agardh e.p.)
- LITHODESMIUM Ehrenberg, 1840.  
*undulatum* Ehrenb.\*  
 (*victoriae* Karsten)  
 (*Triceratium undulatum* Brightw.)  
 (*T. intricatum* West)  
 (*Ditylum intricatum* Grun.)  
 (*D. undulatum* Mann.)
- STREPTOTHECA Shrubsole, 1890.  
*thamesis* Shrub.\*
- TRICERATIUM Ehrenberg, 1840.  
*favus* Ehrenb.\* (10)  
 (*muricatum* Brightw.)  
 (*fimbriatum* Wall.)  
 (*ferox* Castr.)  
 (*sarcophagos* Castr.)  
 (*Biddulphia favus* (Ehrenb.) Van  
 Heurck)
- TRIGONIUM Cleve, 1868.  
*arcticum* (Brightw.) Cleve (11)  
 (*Triceratium arcticum* Brightw.)

**Chaetoceraceae**

- CHAETOCEROS Ehrenberg, 1844. (12)  
*adhaerans* Mangin\*  
*affine* Laud.\*  
 (*schuttii* Cleve in Gran)  
 var. *affine*  
 var. *willei* (Grun.) Hust.\*  
*armatum* West\*  
*atlanticum* Cleve\*  
*boreale* Bail.\*  
*breve* Schütt\*  
*ceratosporum* Ostenf.\*  
 (*gracilis* Apstein)  
*cinctus* Gran\*  
*coarctatum* Laud.\*  
*compressum* Laud.\*  
 (*contortum* Schütt)  
*concavicornis* Mangin\*  
 (*criophilus* Gran)  
*constrictum* Gran\*  
*convexicornis* Mangin\*  
 (*peruvianus* Gran)  
*convolutum* Castr.\*  
*coronatum* Gran\*  
*crinitus* Schütt\*  
*curvisetum* Cleve\*  
*danicum* Cleve\*  
*debile* Cleve\*  
*decipiens* Cleve\*  
*densum* Cleve\*  
*didymum* Ehrenb.\*  
*difficile* Cleve\*  
*diversum* Cleve\*  
*eibenii* (Grun.) Meun.\*

## CHAETOCEROS (cont.)

*exospermum* Meun.\*  
*externum* Gran\*  
*furca* Cleve\*  
*glandazi* Mangin\*  
*gracile* Schütt\*  
*holsaticum* Schütt\*  
 (balticus Cleve)  
*imbricatum* Mangin\*  
*ingolfianum* Ostenf. in Gran\*  
*janischianum* Castr.\*  
 (dichaeta Ehrenb.)  
*lacinosum* Schütt\*  
*lauder* Ralfs in Laud.\*  
 (weissflogii Schütt)  
*lorenzianum* Grun.\*  
*mitra* (Bail.) Cleve\*  
 (Dieladia mitra Bail.)  
*neapolitanum* Schroder\*  
*perpusillum* Cleve\*  
*polygonum* Schütt\*  
*pseudocrinium* Ostenf.\*  
*pseudocurvisetum* Mangin\*  
*radians* Schütt\*  
*scolopendra* Cleve\*  
*seriacanthus* Gran\*  
*septentrionale* Oestrup\*

*simile* Cleve\*  
*simplex* Ostenf.\*  
*skeleton* Cleve\*  
*sociale* Laud.\*  
*subsecundum* (Grun.) Hust.\*  
 (distans var. *subsecunda* Grun.)  
 (paradoxus Schütt)  
 (paradoxus var. *ludersii* Engler)  
 (paradoxus var. *subsecunda* Van  
 Heurck)  
 (ralfsii Schütt)  
 (groenlandicus Cleve)  
 (diadema Grun.)  
 (Syndendrium *diadema* Ehrenb.)  
*subtile* Cleve\*  
*teres* Cleve\*  
*tetrastichon* Cleve\*  
*tortissimum* Gran\*  
*wighami* Brightw.\*

## BACTERIASTRACEAE

BACTERIASTRUM Shadbolt, 1854.

*delicatulum* Cleve\*  
*elongatum* Cleve\*  
*hyalinum* Laud.\*  
*solitarium* Mangin\*  
*varians* Lauder\*

## Notes on Biddulphiineae

- (1) This family is very ill defined and, despite the lengthy monograph by Boyer (1927), contains a wide range of forms whose only connexion is that they fail to fit reasonably into any other group of diatoms. In outline the cells may be circular, biangular or polygonal, and the valve surface is usually furnished with spines or processes. In such a family the synonymy is necessarily chaotic. The treatment adopted here is that of most modern taxonomists, and set out in Hendey (1937).
- (2) Van Heurck (1896) and Mann (1907) include *Odontella* Agardh, *Lampriscus* Bail., *Zygoceros* Ehrenb., *Denticella* Ehrenb., *Pseudo-stictodiscus* Grun., *Amphitetras* Ehrenb., *Amphipentas* Ehrenb., *Cerataulus* Ehrenb., and *Triceratium* Ehrenb. The last two are recognized here (in part) as separate genera.
- (3) Usually considered as a plankton species but frequently found in dense masses attached to a substratum.
- (4) This species made its first appearance in the North Sea sometime between 1903 and 1907, and by 1909 had spread to the English Channel and the Irish Sea. It is now firmly established in British coastal waters.
- (5) Not *Biddulphia spinosa* Grev.
- (6) Placed here tentatively. The valve is without horn-like processes, and is not a true member of *Biddulphia* Gray. Mann (1907) placed it in *Trigonium* Cleve, but that is giving *Trigonium* a meaning not intended by its author; neither is it a *Triceratium* as I interpret that genus. This species is different from *T. striolatum* Roper.
- (7) Included in *Biddulphia* by Van Heurck, but Hustedt separates it on account of the torsion of that cell in girdle view.
- (8) *Eucampia groenlandica* Cleve is considered to be distinct from *E. zoodiacus* by Lebour (1930) and Boyer (1927). I follow Hustedt here in considering them synonymous. It has been suggested that they are seasonal variations of the same organism.
- (9) Cleve (1873) created a new genus for this species on account of the absence of costae, a distinction not generally accepted.
- (10) Hendey (1937) interprets the genus *Triceratium* Ehrenb. strictly in terms of *T. favus* the type of the genus, and excludes all species that do not possess cornutate processes and hexagonal areolation. This treatment reduces a very unwieldy genus to less than thirty species.
- (11) *Trigonium* Cleve is reserved for species that have an areolate surface but whose angles are furnished with rounded bosses of fine pores.
- (12) *Chaetoceros* is here considered as a neuter noun, and all specific epithets have been treated accordingly. All members of the genus are planktonic.

## Suborder 5. SOLENIINEAE

**Corethronaceae**

- CORETHRON Castracane, 1886. (1)  
*criophilum* Castr.\*  
 (*hystrix* Hensen)

**Leptocylindraceae**

- BACTERIOSIRA Gran, 1900. (2)  
*fragilis* Gran\*  
 DACTYLIOSOLEN Castracane, 1886.  
*antarcticus* Castr.\*  
*mediterraneus* Perag.\*  
 DETONULA Schütt, 1893. (2)  
*confervacea* (Cleve) Gran\*  
 (*cystifera* Gran)  
 (*Lauderia confervacea* Cleve)  
 LAUDERIA Cleve, 1837. (2)  
*borealis* Gran\*  
 (*annulata* Cleve)  
 LEPTOCYLINDRUS Cleve, 1889.  
*danicus* Cleve\*  
*minimus* Gran\*  
 (*belgicus* Meun.)  
 SCHROEDERELLA Pavillard, 1913. (2)  
*delicatula* (Perag.) Pav.\*  
 (*Detomula delicatula* Gran)  
 (*Lauderia delicatula* Perag.)  
*schroderi* (Berg.) Pav.\* (3)

**Rhizosoleniaceae**

- GUINARDIA Peragallo, 1892.  
*flaccida* (Castr.) Perag.\*

- (*baltica* Schütt)  
 (*Rhizosolenia* ? *flaccida* Castr.)  
 (*R. castracanei* Cleve)  
 (*Hensemella baltica* Schütt)  
 RHIZOSOLENIA Brightwell, 1858. (4)  
*acuminata* (Perag.) Gran  
*alata* Brightw.\*  
 var. *alata*  
 var. *indica* Ostenf.\*  
 var. *inermis* (Castr.) Hust.\*  
*bergonii* Perag.\*  
 (*amputata* Ostenf.)  
*calcar-avis* Schultze\*  
*castracanei* Perag.\*  
*cylindrus* Cleve\*  
*delicatula* Cleve\*  
*fragilissima* Berg.\*  
 (*faeroeensis* Ostenf.)  
*hebetata* Bail.\*  
*imbricata* Brightw.\*  
 (*striata* Grev.)  
*robusta* Norm. ex Pritch.\*  
 (*sigma* Schütt)  
*setigera* Brightw.\*  
 (*japonica* Castr.)  
 (*hensemii* Schütt)  
*shrubsolei* Cleve\*  
*stolterfothii* Perag.\*  
 (*Eucampia striata* Stolt.)  
 (*Pyxilla stephanos* Hensen)  
*styliformis* Brightw.\*

## Notes on Soleniineae

- (1) Hendeby (1937) was able to show that all the published species of this genus should be considered as phases of one species. *Corethron hystrix* Hensen is therefore given as a synonym of *C. criophilum* Castr. The variation of this organism depends upon environmental factors of which probably salinity is the chief.
- (2) Hendeby (1937) placed this genus in Discineae; its transference to its present position is on account of its peculiar girdle formation, and follows Hustedt (1927-30) and Cleve-Euler (1951).
- (3) Hustedt (1927-30) unites with *Schroderella delicatula* (Perag.) Pav. More information is required on British material.
- (4) The genus *Rhizosolenia* Brightwell was accepted for conservation against *Rhizosolenia* Ehrenb., 1843, and *Monoceros* van Goor, 1824, by the Special Committee for Diatomaceae (*Int. Code bot. nomencl.*, 1952, p. 72).

## Suborder 6. ARAPHIDINEAE

**Fragilariaceae**

- ASTERIONELLA Hassall ex W. Smith, 1856.  
 (1)  
*bleakeleyii* W. Sm.  
*formosa* Hass.\* (2)  
*japonica* Cleve & Müller ex Gran\* (3)  
*kariana* Grun. in Cleve & Grun.\* (4)  
*notata* Grun. ex Van Heurck\*  
 CAMPYLOSIRA Grunow, 1882.  
*cymbelliformis* (Schm.) Grun. ex Van  
 Heurck  
 (*Synedra cymbelliformis* Schm.)

- CYMATOSIRA Grunow, 1862.  
*belgica* Grun.  
 DIMEREGRAMMA Ralfs ex Pritchard, 1861.  
*fulvum* (Greg.) Ralfs ex Pritch.  
*marinum* (Greg.) Ralfs ex Pritch.  
 var. *marinum*  
 var. *lanceolatum* (Perag.) Hust.  
*minor* (Greg.) Ralfs ex Pritch.  
 var. *minor*  
 var. *nana* (Greg.) Van Heurck  
 FRAGILARIA Lyngbye, 1819.  
*bicipitata* Mayer

## FRAGILARIA (cont.)

- capucina* Desmaz. (2)  
*construens* var. *pusilla* Grun.  
 var. *venter* (Ehrenb.) Grun.  
*cylindrus* Grun.  
*hyalina* (Kütz.) Grun.  
*islandica* Grun. ex Van Heurck  
*leptostauron* (Ehrenb.) Hust.  
*oceanica* Cleve  
*pinnata* Ehrenb.  
 var. *pinnata*  
 var. *trigona* (Brun. & Hérib.) Hust.  
*striatula* Lyngb. (3)  
*virescens* var. *oblongella* Grun.  
 GLYPHODESMIS Greville, 1862.  
*distans* (Greg.) Grun.  
 OPEPHORA Petit, 1888.  
*marina* (Greg.) Petit  
 (*Meridion marinum* Greg.)  
*martyi* Hérib.  
*pacifica* (Grun.) Petit  
 (*Fragilaria pacifica* Grun.)  
*parva* (Grun.) Krasske  
 PLAGIOGRAMMA Greville, 1859.  
*brockmanni* Hust.  
*gregoryanum* Grev.  
*interruptum* (Greg.) Ralfs ex Pritch.  
*laeve* (Greg.) Ralfs ex Pritch.  
*stauraphorum* (Greg.) Heib.  
*vanheurckii* Grun.  
 RHAPHONEIS Ehrenberg, 1844.  
*amphiceros* Ehrenb. (5)  
 (*rhombus* Ehrenb.)  
 (*lanceolata* Ehrenb.)  
 (*amphiceros* var. *rhombica* Grun.)  
*belgica* Grun.  
 var. *belgica*  
 var. *intermedia* Grun.  
*minutissima* Hust.  
*nitida* (Greg.) Grun.  
*surirella* (Ehrenb.) Grun.  
 (*Zygoceros surirella* Ehrenb.)  
 SCEPTRONEIS Ehrenberg, 1844. (6)  
*caduceus* Ehrenb.  
 TRACHYSPHENIA Petit, 1857.  
*australis* Petit  
*communis* (Heib.) Grun.  
*dalmatica* (Kütz.) Grun.  
*debilis* (Kütz.) Grun. ex Van Heurck  
*ehrenbergii* (Kütz.) Grun.  
*flabellata* (Carm.) Agardh (7)  
*gracilis* (Ehrenb.) Grun. (7)  
 var. *gracilis*  
 var. *elongata* (Kütz.) de Toni  
*hyalina* (Kütz.) Grun.  
*juergensii* Agardh  
*lyngbyei* (Kütz.) Grun. ex Van Heurck  
 (7)  
*ovata* (W. Sm.) Grun.  
*paradoxa* (Lyngb.) Agardh  
 RHABDONEMA Kützing, 1844.  
*adriaticum* Kütz. (7)  
*arcuatum* (Lyngb.) Kütz. (7)  
*minutum* Kütz.  
 STRIATELLA Agardh, 1832.  
*delicatula* (Kütz.) Grun. ex Van Heurck  
*interrupta* (Ehrenb.) Heib.  
 (*Tessella interrupta* Ehrenb.)  
*unipunctata* (Lyngb.) Agardh  
 SYNEDRA Ehrenberg, 1830.  
*affinis* Kütz.  
 var. *affinis*  
 var. *fasciculata* Van Heurck  
 var. *gracilis* Grun.  
 var. *hybrida* Van Heurck  
 var. *parva* Kütz.  
*barbatula* Kütz.  
*crystallina* (Agardh) Kütz.  
*formosa* Hantzsch  
*fulgens* (Grev.) W. Sm. (7)  
*gaillonii* (Bory) Ehrenb.  
 var. *gaillonii*  
 var. *macilenta* (Grun.) Perag.  
*gracilis* Kütz.  
*hennedeyana* Greg.\* (8)  
*hyperborea* Grun.  
*investiens* W. Sm.  
*pulchella* Kütz.  
*robusta* Ralfs ex Pritch.  
 (*superba* Kütz.)  
*tabulata* (Agardh) Kütz. (9)  
 (*fasciculata* Kütz.)  
 (*affinis* var. *tabulata* (Kütz.) Grun.)  
 var. *tabulata*  
 var. *acuminata* (Kütz.) Grun.  
*ulna* (Nitzsch) Ehrenb.  
*undulata* Bail.  
 THALASSIONEMA Grunow ex Hustedt, 1932.  
*nitzschioides* Hust.\*  
 (*Thalassiothrix nitzschioides* Grun.)  
 THALASSIOTHRIX Cleve & Grunow, 1880.  
*frauenfeldii* Grun. in Cleve & Grun.\*  
*longissima* Cleve & Grun.\*

## Tabellariaceae

GRAMMATOPHORA Ehrenberg, 1840.

- angulosa* Ehrenb.  
*marina* (Lyng.) Kütz.  
*oceanica* Ehrenb. (7)  
 var. *oceanica*  
 var. *macilenta* (W. Sm.) Grun.  
 var. *subtilissima* (Bail.) De Toni  
*serpentina* Ehrenb.  
 LICMOPHORA Agardh, 1827.  
*anglica* (Kütz.) Grun.

## Notes on Araphidineae

- (1) Hassall (1850) first used the name *Asterionella* for what he described as a 'stelliform Diatoma'. A figure labelled *Asterionella formosa* was given but, as no generic description was provided, Hassall's name must be regarded as illegitimate. The authority for the genus is therefore given to Wm. Smith.



- (2) Usually considered as a freshwater species, but frequently found in estuarine conditions.
- (3) This species enjoys almost world-wide distribution, but usually favours warmer waters than those around our coasts.
- (4) An arctic form. Further details are required about the southern limits of its distribution.
- (5) The outline of this species is very variable.
- (6) A doubtful record.
- (7) Commonly epiphytic upon red algae, e.g. *Polysiphonia* and *Ceramium* spp.
- (8) Usually favours warm water and a high salinity.
- (9) Given by some authorities as a synonym of *Synedra affinis* Kütz. A more detailed examination of British material is required.

## Suborder 7. RAPHIDIOIDINAE

Not represented.

## Suborder 8. MONORAPHIDINEAE

**Achnanthaceae**

ACHNANTHES Bory, 1822.

*affinis* Grun. in Cleve & Grun.*angustata* Grev. (1)*brevipes* Agardh (2)var. *brevipes*var. *intermedia* Kütz.var. *parvula* (Kütz.) Cleve(A. *parvula* Kütz.)*clevei* var. *rostrata* Hust.*coarctata* var. *sinoensis* Hust.*delicatula* (Kütz.) Grun. in Cleve & Grun.*hauckiana* Grun. (2)var. *hauckiana*var. *rostrata* Schulz*lanceolata* (Bréb.) Grun.var. *lanceolata*f. *ventricosa* Hust.var. *elliptica* Clevevar. *rostrata* (Ostenf.) Hust.*latissima* Cleve*lemmermanni* Hust.var. *lemmermanni*var. *lineata* Salahvar. *obtusata* Hust.*lilljeborgei* Grun.*linkei* Hust.*longipes* Agardh*microcephala* (Kütz.) Cleve (3)*pseudobrevipes* Aleem*saxonica* Krasske*similis* McCall*subsessilis* Kütz. (2)*taeniata* Grun. in Cleve & Grun.

CAMPYLONEIS Grunow, 1862. (4)

*grevillei* (W. Sm.) Grun.(Cocconeis *grevillei* W. Sm.)

COCONEIS Ehrenberg, 1838.

*clandestina* Schm.*costata* Greg.*diaphana* W. Sm.*dirupta* Greg.*distans* Greg.*excentrica* Donk.*fluminensis* (Grun.) Perag.*grata* Schm.*guttata* Hust. & Aleem*molesta* var. *crucifera* Grun. ex Van

Heurck

*norvegica* Grun.*notata* Petit*pelta* Schm.*peltoidea* Hust.*placentula* Ehrenb.*pseudomarginata* Greg.*scutellum* Ehrenb.var. *scutellum*var. *ampliata* Grun.var. *distans* (Greg.) Schm.var. *ornata* Grun.var. *parva* Grun. in Clevevar. *stauroneiformis* W. Sm. in Cleve*sublittoralis* Hendey (5)*tenuis* Hust.

RHOICOSPHENIA Grunow, 1860. (6)

*curvata* (Kütz.) Grun.*marina* (W. Sm.) Schm.*pullus* Schm. M.*Notes on Monoraphidineae*

- (1) Considered by some authorities as a variety of *Achnanthes brevipes* Agardh.
- (2) This species and its varieties is seldom found in waters of full salinity, and in common with most brackish diatoms is liable to much variation in outline and size.
- (3) Usually considered as a fresh-water species, but has been found in marine waters having a salinity of 33‰.
- (4) Considered by some authorities to belong to *Cocconeis* Ehrenberg, but separated from that genus on account of a peculiar internal plate which is attached to the raphe-bearing valve.
- (5) More information concerning the distribution of this species is required.
- (6) Species of this genus were originally described as geniculate forms of *Gomphonema*. Further research, however, showed that the similarity with *Gomphonema* was superficial, and that the genus is correctly placed in the Monoraphidineae.

## Suborder 9. BIRAPHIDINEAE

## Naviculaceae (1)

- AMPHIPLEURA Kützing, 1844. (2)  
*micans* Lyngb.  
   var. *micans*  
   var. *fragilis* (Grev.) Grun.  
   *rutilans* (Trent.) Cleve  
     (*Schizonema rutilans* Trent.)  
 AMPHIPRORA Ehrenberg, 1843.  
   *alata* (Ehrenb.) Kütz.  
     (*Navicula alata* Ehrenb.)  
     (*Amphicampa alata* Rab.)  
   *constricta* Ehrenb.  
   *didyma* W. Sm.  
   *gigantea* var. *sulcata* (O'Meara) Cleve  
   *hyalina* Eulen. ex Van Heurck  
     (*paludosa* var. *hyalina* Eulen. ex Van  
       Heurck)  
   *hyperborea* Grun. in Cleve & Grun.\*  
   *lata* Grev.  
     var. *lata*  
     var. *angustior* McCall  
   *ornata* Bail.  
   *paludosa* W. Sm.  
     var. *paludosa*  
     var. *duplex* Donk.  
   *pulchra* var. *pulchella* Perag.  
   *robusta* McCall  
   *sulcata* Perag.  
   *surirelloides* Hendey  
   *vitrea* W. Sm.  
 ANOMOEONEIS Pfitzer, 1871. (3)  
   *exellii* Salah  
   *sculpta* (Ehrenb.) Cleve  
     (*Navicula sculpta* Ehrenb.)  
     (*N. tunens* W. Sm.)  
     (*N. rostrata* Kütz.)  
 AURICULA Castracane, 1873. (4)  
   *complexa* (Greg.) Cleve  
     (*Amphiprora complexa* Greg.)  
   *decepiens* Grun.  
   *dubia* Perag.  
   *ostrea* Brun & Temp. (5)  
 BREISSONIA Grunow, 1860. (2), (6)  
   *boeckii* W. Sm.  
 CALONEIS Cleve, 1894. (3)  
   *amphisboena* (Bory) Cleve  
     (*Navicula amphisboena* Bory)  
     var. *amphisboena*  
     var. *fenzlii* (Grun.) Cleve  
     var. *liburnica* (Grun.) Cleve  
     var. *subsalina* (Donk.) Cleve  
       (*N. subsalina* Donk.)  
   *bicuneata* (Grun.) Boyer  
     (*N. bicuneata* Grun.)  
   *brevis* (Greg.) Cleve  
     (*N. brevis* Greg.)  
   *formosa* (Greg.) Cleve  
     (*N. formosa* Greg.)  
     var. *formosa*  
     var. *holmiensis* Cleve  
   *fusioides* (Grun.) Heid. & Kolbe  
     (*N. fusioides* Grun.)  
     (*N. inornata* Grun.)  
     (*N. subula* Grun.)  
   *hustedtii* Aleem in Aleem & Hust.  
   *lepidula* (Grun.) Cleve  
     (*N. lepidula* Grun.)  
   *liber* (W. Sm.) Cleve  
     (*N. liber* W. Sm.)  
   var. *liber*  
   var. *linearis* (Grun.) Cleve  
   var. *umbilicata* (Grun.) Cleve  
 DIPLONEIS Ehrenberg, 1840. (3), (7)  
   *advena* (Schm.) Cleve  
     var. *advena*  
     var. *sanssegana* (Grun.) Cleve  
   *aestiva* (Donk.) Cleve  
     (*N. aestiva* Donk.)  
   *aestuari* Hust.  
   *bomboides* (Schm.) Cleve  
     (*N. bomboides* Schm.)  
     (*N. williamsonii* Van Heurck)  
   *bombus* Ehrenb.  
     (*N. bombus* Greg.)  
     (*N. abnormis* Castr.)  
     var. *bombus*  
     var. *egena* (Schm.) Cleve  
   *chersonensis* Grun.  
     (*N. apis* Ehrenb.)  
   *coffaeiformis* (Schm.) Cleve  
   *constricta* (Grun.) Cleve  
     (*N. constricta* Grun.)  
     (*N. donkimii* Schm.)  
   *contigua* var. *eudoxia* (Schm.) Cleve  
     (*N. mediterranea* Schm.)  
     (*N. eudoxia* Schm.)  
     var. *eugenia* (Schm.) Cleve  
       (*D. sejuncta* Jörg.)  
       (*N. eugenia* Schm.)  
   *crabro* Ehrenb.  
     (*N. crabro* Kütz.)  
     var. *crabro*  
     var. *expleta* (Schm.) Cleve  
     var. *pandura* (de Bréb.) Cleve  
       (*N. pandura* de Bréb.)  
   *cynthia* (Schm.) Cleve  
     (*N. cynthia* Schm.)  
   *didyma* (Ehrenb.) Cleve  
     (*Pinnularia didyma* Ehrenb.)  
   *divergens* (Schm.) Cleve  
     (*N. divergens* Schm.)  
     (*N. pfitzeriana* O'Meara)  
   *elliptica* (Kütz.) Cleve  
     (*N. elliptica* Kütz.)  
   *entomon* (Ehrenb.) Cleve  
   *fusca* (Greg.) Cleve  
     var. *fusca*  
     var. *delicata* Schm.  
     var. *gregorii* Cleve  
     var. *norvegica* Cleve  
   *hyalina* (Donk.) Cleve  
     (*N. hyalina* Donk.)  
   *incurvata* (Greg.) Cleve  
     (*N. incurvata* Greg.)

- DIPLONEIS (cont.)  
*incurvata* (cont.)  
 f. *incurvata*  
 f. *stricta* Hust.  
*interrupta* (Kütz.) Cleve  
 (N. *interrupta* Kütz.)  
*lineata* (Donk.) Cleve  
 (N. *lineata* Donk.)  
 (N. *adriatica* Grun.)  
*littoralis* (Donk.) Cleve  
 (N. *littoralis* Donk.)  
 (N. *ovulum* Grun.)  
*marginestriata* Hust.  
*nitescens* (Greg.) Cleve  
 (N. *nitescens* Greg.)  
 var. *nitescens*  
 var. *candida* McCall  
*notabilis* (Grev.) Cleve  
*oamaruensis* (Cleve) Mills  
 (adonis var. *oamaruensis* Cleve)  
 (N. *oamaruensis* (Cleve) Mann)  
*papula* (Schm.) Cleve  
 (N. *papula* Schm.)  
 var. *papula*  
 var. *constricta* Hust.  
*parca* (Schm.) Boyer  
*pseudovalis* Hust.  
*puella* (Schum.) Cleve  
*smithii* (de Bréb.) Cleve  
 (N. *smithii* de Bréb. in W. Sm.)  
*splendida* (Greg.) Cleve  
 (N. *splendida* Greg.)  
 (N. *entomon* Donk.)  
*stroemi* Hust.  
*subcincta* (Schm.) Cleve  
 (N. *subcincta* Schm.)  
*suborbicularis* (Greg.) Cleve  
 (N. *smithii* var. *suborbicularis* Greg.)  
 var. *suborbicularis*  
 var. *constricta* Hust.  
*subovalis* Cleve  
*vacillans* (Schm.) Cleve  
 var. *vacillans*  
 var. *delicatula* Cleve  
 var. *minuta* Grun.  
*weissflogii* (Schm.) Cleve  
DONKINIA Ralfs, 1860. (8)  
*angusta* (Donk.) Ralfs ex Pritch.  
 (Pleurosigma *angustum* Donk.)  
*carinata* (Donk.) Ralfs ex Pritch.  
 (P. *carinatum* Donk.)  
*recta* (Donk.) Grun. ex Van Heurck  
FRUSTULIA Agardh, 1824.  
*rhomboides* var. *amphipleuroides* (Grun.)  
 De Toni (9)  
MASTOGLIOIA Thwaites in W. Smith, 1856.  
*apiculata* W. Sm. (10)  
*binotata* (Grun.) Cleve  
 (Cocconeis *binotata* Grun.)  
*danseii* (Thwaites) W. Sm.  
*elliptica* (Agardh) Cleve  
 (*danseii* var. *elliptica* Van Heurck)  
 (Frustulia *elliptica* Agardh)  
*exigua* Lewis  
*lanceolata* Thwaites in W. Sm.  
*ovata* Grun.  
*ovulum* Hust.  
*portierana* Grun.  
*pumila* (Grun.) Cleve  
*smithii* Thwaites in W. Sm.  
 var. *smithii*  
 var. *lacustris* Grun.  
NAVICULA Bory, 1822.  
*abrupta* (Greg.) Cleve (11)  
 (Lyra var. *abrupta* Greg.)  
 var. *abrupta*  
 var. *rattrayi* Pant.  
*abstrusa* Hust.  
*aequorea* Hust.  
*aleemi* Hust.  
*algida* Grun.  
*ammophila* var. *flanatica* Grun.  
*approximata* var. *niceaensis* (12)  
 (*hennedyii* var. *niceaensis* Perag.)  
*arenicola* Grun.  
*avenacea* de Bréb. (13)  
 (*viridula* var. *avenacea* (de Bréb.) Van  
 Heurck)  
*bacillum* Ehrenb.  
*bahusiensis* Grun.  
 var. *bahusiensis*  
 var. *istriana* Grun. ex Van Heurck  
*biskanteri* Hust.  
*bottnica* Grun.  
*bremeyeri* Hust.  
 var. *bremeyeri*  
 var. *rostrata* Hust.  
*britannica* Aleem  
*bulnheimii* var. *belgica* Grun.  
*cancellata* Donk.  
 var. *cancellata*  
 var. *gregorii* Ralfs  
 var. *retusa* (de Bréb.) Cleve  
 (N. *retusa* de Bréb.)  
 var. *subretusa* (Ehrenb.) Van Heurck  
*carinifera* Grun.  
*cincta* Ehrenb.  
 var. *cincta*  
 var. *heufleri* Grun.  
 var. *leptocephala* (de Bréb.) Grun. ex  
 Van Heurck  
 (N. *leptocephala* de Bréb.)  
*clamans* Hust.  
*clavata* Greg.  
 var. *clavata*  
 var. *indica* (Grev.) Cleve  
 var. *wrightii* (O'Meara) Perag. (14)  
*clavicus* Greg.  
*clementis* Grun.  
*cluthensis* Greg. (15)  
*complanata* Grun. in Cleve & Grun.  
 var. *complanata*  
 var. *subinflata* Grun.  
*consentanea* Hust.  
*corymbosa* (Agardh) Cleve  
 (*Schizonema corymbosum* Agardh)  
*crucicula* (W. Sm.) Donk.  
 (*Stauroneis crucicula* W. Sm.)

## NAVICULA (cont.)

*crucicula* (cont.)var. *crucicula*var. *obtusata* Grun.*crucifera* Grun.(N. *rostellata* Schm.)*crucigera* (W. Sm.) Cleve(Schizonema *cruciger* W. Sm.)(Stauroneis *crucigera* (W. Sm.) Heib.)*cryptocephala* Kütz.var. *cryptocephala*var. *veneta* (Kütz.) Cleve*cryptostriata* Salah*cuspidata* Kütz.*cuspis* O'Meara (16)*cyprinus* (W. Sm.) Boyer (17)

(digito-radiata (Greg.) Ralfs)

(digito-radiata var. *cyprinus* (Ehrenb.)

Van Heurck)

(Pinnularia *digito-radiata* Greg.)var. *cyprinus*var. *linearis* (Hust.)var. *rostrata* (Hust.)(N. *digito-radiata* var. *rostrata* Hust.)*debilissima* Grun.*detersa* Grun.*dilucida* Hust.*diploneoides* Hust.*directa* (W. Sm.) Cleve (18)(Pinnularia *directa* W. Sm.)var. *directa*var. *subtilis* Cleve(N. *acutiuscula* Greg.)(Pinnularia *subtilis* Greg.)*diserta* Hust.*distans* (W. Sm.) Cleve (19)(Pinnularia *distans* W. Sm.)*dunstonii* Salah*elegans* W. Sm.var. *elegans*var. *cuspidata* Cleve (20)*favus* Salah*flagellifera* Hust.*flanatica* Grun.*forcipata* Grev.var. *forcipata*var. *densistriata* Schm. (21)var. *punctata* Cleve*formenterae* Cleve*fortis* (Greg.) Ralfs ex Pritch.(Pinnularia *fortis* Greg.)(P. *constricta* O'Meara)*fraudulenta* Schm.*fuchsii* Pant. (22)*gastrum* Ehrenb.var. *gastrum*var. *exigua* Greg.*gelida* Grun.(kariana var. *curta* Cleve)*gotlandica* Grun.*gracilis* var. *schizonemoides* Van Heurck*granii* Jörg.\*(Stauropsis *granii* (Jörg.) Meun.)*granulata* Bail. (23)*gregaria* Donk.*gregorii* Ralfs ex Pritch.*grevillei* (Agardh) Cleve (24)(Schizonema *grevillei* Agardh)var. *grevillei*var. *comoides* Aleem*groschopfi* Hust.*halophila* (Grun.) Cleve(cuspidata var. *halophila* Grun.)*hamulifera* Grun.*henmedyii* W. Sm. (25)var. *henmedyii*var. *manca* Schm.var. *nebulosa* (Greg.) Cleve (26)(N. *nebulosa* Greg.)*humerosa* de Bréb. in W. Sm.var. *humerosa*var. *arabica* Perag.var. *constricta* Clevevar. *minor* Heid.*hungarica* var. *linearis* Östrup*hyalosira* Cleve*incerta* Grun. ex Van Heurck*inflexa* (Greg.) Ralfs ex Pritch.(Pinnularia *inflexa* Greg.)*integra* (Smith) Ralfs(P. *integra* Smith)*jamaicensis* Cleve*kryophila* Cleve*lanceolata* (Agardh) Kütz.var. *lanceolata*var. *arenaria* (Donk.) Cleve(N. *arenaria* Donk.)var. *phyllepta* (Kütz.) Cleve(N. *phyllepta* Kütz.)*latissima* Greg.*libellus* Greg.*litoris* Salah*longa* (Greg.) Ralfs ex Pritch.(P. *longa* Greg.)*lucens* Hust. ex Salah*lunatapicalis* Salah*lyra* Ehrenb. (27)var. *lyra*var. *atlantica* Schm.var. *constricta* Perag.var. *elliptica* Schm.var. *granulata* Perag.var. *subcarinata* Grun.*maculosa* Donk.*margino-nodularis* Salah*marina* Ralfs ex Pritch. (28)

(punctulata W. Sm.)

*mediterranea* Cleve & Brun*membranacea* Cleve\*(Stauropsis *membranacea* (Cleve)

Meun.)

*mollis* (W. Sm.) Cleve (24)(Schizonema *molle* W. Sm.)*monilifera* Cleve (29)

(granulata de Bréb.)

var. *monilifera*var. *heterosticha* Cleve*moniliformis* Cleve

## NAVICULA (cont.)

- mutica* Kütz.  
*northumbrica* Donk.  
*obsidialis* Hust.  
*octavosignata* Salah  
*ostrearia* Turp. (30)  
 (fusiformis Grun.)  
*palpebralis* de Bréb. in W. Sm. (31)  
 var. *palpebralis*  
 var. *angulosa* (Greg.) Cleve  
 var. *barclayana* (Greg.) Cleve  
 var. *minor* (Greg.) Grun.  
 var. *obtusata* Van Heurck  
 var. *protracta* Perag.  
 var. *robusta* Heid.  
 var. *semiplena* (Greg.) Cleve  
 f. *vahliana* (Grun.) Hust.  
*pavillardii* Hust.  
*pelagica* Cleve\*  
 (*Stauropsis pelagica* (Cleve) Meun.)  
*pennata* Schm.  
*peregrina* (Ehrenb.) Kütz.  
 (*Pinnularia peregrina* Ehrenb.)  
 var. *peregrina*  
 var. *kefvingensis* (Ehrenb.) Cleve  
 var. *meniscus* (Schum.) Cleve  
*plicata* Donk.  
*praetexta* Ehrenb.  
*producta* McCall  
*protracta* Grun.  
*pseudo-bacillum* Grun.  
*pusilla* W. Sm.  
 var. *pusilla*  
 var. *lanceolata* Grun.  
*pygmaea* Kütz.  
*ramosissima* (Agardh) Cleve (24)  
 (*Schizonema ramosissimum* Agardh)  
 var. *ramosissima*  
 var. *amplia* Grun.  
 var. *mucosa* Aleem  
*retusa* de Bréb.  
*rhombica* Greg. (32)  
*rhyncocephala* Kütz.  
 var. *rhyncocephala*  
 var. *amphicerus* (Kütz.) Cleve  
 (*N. amphicerus* Kütz.)  
*salinarum* Grun.  
*salinicola* Hust.  
*scandinavica* Lagerst.  
*scopulorum* de Bréb. ex Kütz.  
 (*Pinnularia johnsonii* W. Sm.)  
 var. *scopulorum*  
 var. *belgica* (Van Heurck) Cleve  
 var. *perlonga* Brun  
*septentrionalis* (Östrup) Cleve\*  
 (*Libellus septentrionalis* Östrup)  
 (*Stauropsis septentrionalis* Meun.)  
*solaris* Greg.  
*spectabilis* Greg.  
*spicula* (Hick.) Cleve  
 (*Stauroneis spicula* Hick.)  
*spuria* Cleve  
*subinflata* Grun.  
*supralittoralis* Aleem & Hust.

- ulvacea* (Berk.) Cleve  
 (*Dickieia ulvacea* Berk.)  
*unilaterarea* Salah  
*vanhöffeni* Gran\*  
 (*Stauropsis vanhöffeni* (Gran) Meun.)  
*viridula* Kütz.  
 var. *viridula*  
 var. *rostellata* Kütz.  
 (*N. rostellata* Kütz.)  
*weissflogi* Schm.  
*zohdyi* Salah  
*zostereti* Grun.  
 OESTRUPA Heiden, 1906. (33)  
*musca* (Greg.) Hust.  
 (*Navicula musca* Greg.)  
 (*Caloneis musca* (Greg.) Cleve)  
 PINNULARIA Ehrenberg, 1843. (3)  
*ambigua* Cleve  
*clavicularis* (Greg.) Cleve  
 (*Navicula clavicularis* Greg.)  
*cruciformis* (Donk.) Cleve  
 (*N. cruciformis* Donk.)  
*ergadensis* Greg.  
 (*Navicula blanda* Schm.)  
 (*Caloneis blanda* (Schm.) Cleve)  
 var. *ergadensis*  
 var. *minor* (Perag.)  
 (*N. blanda* var. *minor* Perag.)  
*fritschii* Salah  
 var. *fritschii*  
 var. *lata* Salah  
*quadratarea* (Schm.) Cleve  
 (*Navicula quadratarea* Schm.)  
 (*N. pinnularia* Cleve)  
 var. *quadratarea*  
 var. *subproducta* (Grun.) Cleve  
 (*N. pinnularia* var. *subproducta*  
 Grun.)  
*rectagulata* (Greg.) Cleve  
 var. *rectangulata*  
 var. *subundulata* Grun.  
*stauntonii* (Grun.) Cleve  
 (*Alloioneis stauntonii* Grun.)  
*trevelyana* (Donk.) Rab.  
 (*Navicula trevelyana* Donk.)  
 PLEUROSIGMA W. Smith, 1852. (34)  
*acuminatum* var. *brebissonii* (Grun.)  
 Mills  
*aestuarii* (de Bréb. ex Kütz.) W. Sm.  
 (*Navicula aestuarii* de Bréb. ex Kütz.)  
*affine* Grun.  
 (*normanii* Ralfs ex Pritch.)  
 var. *affine*  
 var. *fossile* Grun.  
*angulatum* (Quekett) W. Sm. (35)  
 (*Navicula angulata* Quekett)  
 var. *angulatum*  
 var. *finmarchica* Cleve  
 var. *quadratum* (W. Sm.) Cleve  
 (*P. quadratum* W. Sm.)  
 var. *robustum* McCall  
*attenuatum* (Kütz.) W. Sm.  
 (*Frustulia attenuata* Kütz.)  
 var. *attenuatum*

## PLEUROSIGMA (cont.)

- attenuatum* (cont.)  
 var. *scalprum* (Gaill. & Turp.) Cleve  
 (*Navicula scalprum* Gaill. & Turp.)  
*balticum* (Ehrenb.) W. Sm.  
 (*Navicula baltica* Ehrenb.)  
 (*Gyrosigma balticum* (Ehrenb.) Rab.)  
*cuspidatum* Cleve  
*decorum* W. Sm.  
*delicatulum* W. Sm.  
 var. *delicatulum*  
 var. *gracile* McCall  
*diminutum* Grun.  
 (*Gyrosigma diminutum* (Grun.) Cleve)  
 var. *diminutum*  
 var. *constrictum* Grun.  
 (*P. reversum* Greg.)  
*distortum* W. Sm.  
 (*Gyrosigma distortum* (W. Sm.) Cleve)  
 var. *distortum*  
 var. *undulatum* McCall  
*elongatum* W. Sm.  
*eximium* (Thwaites) Cleve  
 (*Colletonema eximia* Thwaites)  
 (*Gyrosigma eximium* (Thwaites) Boyer)  
*fasciola* (Ehrenb.) W. Sm.  
 (*Ceratonis fasciola* Ehrenb.)  
 var. *fasciola*  
 var. *closterioides* (Grun.) Perag.  
 var. *prolongatum* (W. Sm.) Grun. ex  
 Van Heurck  
 var. *sulcatum* Grun.  
*formosum* W. Sm.  
 (*australicum* Witt)  
 (*tahitense* Witt)  
*hippocampus* (Ehrenb.) W. Sm.  
 (*Navicula hippocampus* Ehrenb.)  
 (*Gyrosigma hippocampus* Hass.)  
*intermedium* W. Sm.  
 var. *intermedium*  
 var. *nubecula* (W. Sm.) Grun. ex Van  
 Heurck  
 (*P. nubecula* W. Sm.)  
*lanceolatum* Donk.  
 (*transversale* Roper)  
*litorale* W. Sm.  
*longum* var. *subrigidum* (Grun.) Perag.  
*macrum* W. Sm.  
 (*Gyrosigma macrum* (W. Sm.) Cleve)  
*marinum* Donk.  
*maroccanum* Cleve (36)  
 (*Rhoicosigma maroccanum* Perag.)  
*naviculaceum* de Bréb.  
 (*japonicum* Castr.)  
 (*transversale* W. Sm.)  
*normani* Ralfs (37)  
*obliquum* Grun. in Cleve & Grun.  
 (*Gyrosigma obliquum* (Grun.) Boyer)  
*obscurum* W. Sm.  
 (*macilentum* Perag.)  
*parkerii* Har.  
 (*Gyrosigma parkerii* (Har.) Cleve)  
*rectum* Donk.  
*rigidum* W. Sm.

- var. *rigidum*  
 var. *giganteum* (Grun.) Cleve  
 (*P. giganteum* Grun.)  
*rhombeum* Grun. in Cleve & Grun.  
*speciosum* W. Sm.  
*spencerii* W. Sm.  
 (*Gyrosigma spencerii* (W. Sm.) Cleve)  
 var. *spencerii*  
 var. *exile* Grun.  
 var. *smithii* Grun. in Cleve & Grun.  
*strigilis* W. Sm.  
 (*Gyrosigma strigilis* (W. Sm.) Cleve)  
*strigosum* W. Sm. (38)  
 (*angulatum* var. *strigosum* Cleve)  
*subhyalinum* Hust. & Aleem  
*sulcatum* Grun.  
*tenuissimum* W. Sm.  
 (*Gyrosigma tenuissimum* (W. Sm.)  
 Cleve)  
*wansbeckii* Donk.  
 (*balticum* var. *wansbeckii* (Donk.) Van  
 Heurck)  
 SCOLIOPLEURA Grunow, 1860.  
*tumida* (de Bréb. ex Kütz.) Rab.  
 (*Navicula jemmerii* W. Sm.)  
 (*N. tumida* (de Bréb.) Cleve)  
 var. *tumida*  
 var. *adriatica* (Grun.) Cleve  
*westii* (W. Sm.) Grun.  
 (*N. westii* W. Sm.)  
 SCOLIOTROPIS Cleve, 1894.  
*latestriata* (de Bréb. ex Kütz.) Cleve  
 (39)  
 (*Amphipora latestriata* de Bréb. ex  
 Kütz.)  
 (*Navicula convexa* W. Sm.)  
 STAURONEIS Ehrenberg, 1843. (40)  
*acuta* W. Sm.  
 (*kochii* Pant.)  
*africana* var. *acuminata* Grun.  
*amphioxys* Greg. (41)  
 (*gregorii* Ralfs ex Pritch.)  
*amphorooides* Grun.  
*salina* W. Sm.  
*septentrionalis* Grun.  
 STENONEIS Cleve, 1894. (42)  
*inconspicua* (Greg.) Cleve  
 (*Navicula inconspicua* Greg.)  
 (*N. fistula* Schm.)  
 TOXONIDEA Donkin, 1858. (43)  
*gregoryana* Donk.  
*insignis* Donk.  
 var. *insignis*  
 var. *undulata* Norm.  
 TRACHYNEIS Cleve, 1894. (3)  
*aspera* (Ehrenb.) Cleve  
 (*Navicula aspera* (Ehrenb.) Donk.)  
 (*Stauroptera aspera* Ehrenb.)  
 var. *aspera*  
 var. *intermedia* (Grun.) Cleve  
 var. *pulchella* (W. Sm.) Cleve  
 (*Stauroptera pulchella* W. Sm.)  
 (*S. pygmaea* Castr.)  
*clepsydra* (Donk.) Cleve

## TRACHYNEIS (cont.)

*clepsydra* (cont.)*(Navicula clepsydra* Donk.)var. *clepsydra*var. *scotica* Schm.

## TROPIDONEIS Cleve, 1891.

*elegans* (W. Sm.) Cleve*(Amphiprora elegans* W. Sm.)*gibberula* Grun.*lepidoptera* (Greg.) Cleve*(A. lepidoptera* Greg.)*maxima* (Greg.) Cleve*(A. maxima* Greg.)var. *maxima*var. *dubia* (Cleve & Grun.) Cleve*(A. maxima* var. *dubia* Cleve & Grun.)*pusilla* (Greg.) Cleve*(A. pusilla* Greg.)*recta* (Greg.) Cleve*(A. recta* Greg.)*vanheurckii* (Grun.) Cleve*(Plagiotropis vanheurckii* Grun.)*vitrea* (W. Sm.) Cleve*(Amphiprora vitrea* W. Sm.)*(Plagiotropis vitrea* Grun.)

## Cymbellaceae

AMPHORA Ehrenberg, 1831.

*acuta* Greg.*acutiscula* Kütz.*(lineata* Greg.)*angularis* Greg.*angusta* Greg.*arcus* Greg. (44)*arenaria* Donk.var. *arenaria*var. *donkii* Rab.var. *rattrayi* Cleve*arenicola* Grun.var. *arenicola*var. *minor* McCall*bacillaris* Greg. (45)*binodis* Greg.*coffeaeformis* (Agardh) Kütz.*(aponina* Kütz.)*(Frustulia coffeaeformis* Agardh)var. *coffeaeformis*var. *borealis* (Kütz.) Cleve*(A. borealis* Kütz.)var. *perpusilla* (Grun.) Cleve*costata* W. Sm. (46)*crassa* Greg. (47)*cymbifera* Greg. (48)*decussata* Grun.*dubia* Greg. (49)*elliptica* (Agardh) Kütz.*ergadensis* Greg. (50)*eunotia* Cleve*(cymbifera* Cleve)*excisa* Greg. (51)*exigua* Greg. (52)*fluminensis* Grun. (53)*graeffi* (Grun.) Cleve (54)var. *graeffi*var. *minor* Perag.*granulata* Greg.*grevilleana* Greg.*(fasciata* Greg.)*(complexa* Greg.)*(sulcata* Greg.) ?*hyalina* Kütz.*(hemisphaerica* Grun.)*laevis* Greg.*(nobilis* Flögel)*laevissima* Greg. (55)*lineolata* Ehrenb. (56)*lyrata* Greg. (57)*macilenta* Greg.*marina* W. Sm. (58)*membranacea* W. Sm. (59)*milesiana* Greg. (60)*monilifera* Greg. (61)*nobilis* Greg. (62)*oblonga* Greg. (63)*obtusa* Greg. (64)var. *obtusa*var. *rectangularis* Perag.*ocellata* Donk.var. *ocellata*var. *singulata* Cleve*ostrearia* de Bréb. (65)*(littoralis* Donk.)var. *ostrearia*var. *lineata* Clevevar. *vitrea* Cleve*ovalis* Kütz.*(affinis* Kütz.)*(lybica* (Ehrenb.)*(ovalis* var. *lybica* (Ehrenb.) Cleve)*(Navicula amphora* Ehrenb.)*proboscidea* Greg. (66)*proteus* Greg.*(hexagonalis* Witt) ?*(speciosa* Castr.) ?var. *proteus*var. *oculata* Perag.*pusilla* Greg. (67)*pusio* Cleve*quadrata* Greg. (68)*rhombica* Kitt.*robusta* Greg. (69)*salina* W. Sm. (70)*spectabilis* Greg.*sulcata* de Bréb. (71)*tenera* W. Sm. (72)*tenerrima* Aleem & Hust.*turgida* Greg. (53)*valida* Perag.*veneta* Kütz.*ventricosa* Greg.

OKEDENIA Eulenstein ex De Toni, 1891.

(73)

*inflexa* (de Bréb.) De Toni*(Amphipleura inflexa* de Bréb. ex

Kütz.)

*(Amphora inflexa* (de Bréb.) Cleve)

## Gomphonemaceae

GOMPHONEMA Husted in Pascher, 1930.

*exiguum* Kütz.

**Epithemiaceae**

- EPITHEMIA de Brébisson, 1844.  
*adnata* var. *proboscidea* (Grun.)  
 (*zebra* var. *proboscidea* Kütz.)  
*sorex* Kütz.  
*turgida* var. *westermanii* (Ehrenb.) Grun.  
 RHOPALODIA O. Müller, 1895.  
*gibba* (Ehrenb.) Müll.  
 (*Navicula gibba* Ehrenb.)  
 (*Epithemia gibba* Kütz.)  
 var. *gibba*  
 var. *ventricosa* (Kütz.) Grun.  
*gibberula* var. *producta* (Grun.) Müll.  
*musculus* (Kütz.) Müll.  
 (*Epithemia musculus* Kütz.)  
 var. *musculus*  
 var. *constricta* (de Bréb.) Müll.

**Bacillariaceae**

- BACILLARIA Gmelin, 1778. (74)  
*paxillifer* (Müll.) Hendey  
 (*paradoxa* Gmelin)  
 (*Nitzschia paxillifer* (Müll.) Heib.)  
 (*Vibrio paxillifer* Müll.)  
*socialis* Ralfs  
 (*Nitzschia socialis* Greg.)  
 var. *socialis*  
 var. *baltica* Grun.  
 CYLINDROTHECA Rabenhorst, 1859. (75)  
*gracilis* (de Bréb.) Grun.  
 HANTZSCHIA Grunow in Cleve &  
 Grunow, 1880. (76)  
*amphioxys* var. *minor* Perag.  
*hyalina* Grun.  
*marina* (Donk.) Grun. in Cleve & Grun.  
*rigida* McCall  
*virgata* (Roper) Grun.  
 var. *virgata*  
 var. *gracilis* Hust.  
 NITZSCHIA Hassall, 1845. (77)  
*acicularis* (Kütz.) W. Sm.  
 (*Synedra acicularis* Kütz.)  
*acuminata* (W. Sm.) Cleve in Cleve &  
 Grun.  
 (*Tryblionella acuminata* W. Sm.)  
 var. *acuminata*  
 var. *subconstricta* Grun.  
*aequorea* Hust.  
*affinis* Grun.  
*amphibia* Grun.  
*angularis* W. Sm.  
*apiculata* (Greg.) Grun. in Cleve &  
 Grun.  
 (*Tryblionella apiculata* Greg.)  
*bilobata* W. Sm.  
 var. *bilobata*  
 var. *minor* Grun.  
*calcicola* Aleem & Hust.  
*calida* var. *salinarum* (Grun.) Freng.  
 (*N. tryblionella* var. *salinarum*  
 Grun.)  
*capitellata* Hust.  
*circumsuta* (Bail.) Grun. in Cleve &  
 Grun.

- (*Surirella circumsuta* Bail.)  
*clausii* Hantzsch  
*closterium* (Ehrenb.) W. Sm.\* (78)  
 (*Ceratoneis closterium* Ehrenb.)  
*commutata* Grun.  
*constricta* Ralfs ex Pritch.  
 var. *constricta*  
 var. *subconstricta* Grun.  
*debilis* (Arnott) Grun.  
 (*Tryblionella debilis* Arnott)  
*delicatissima* Cleve\*  
 (*Pseudonitzschia delicatissima* (Cleve)  
 Heiden)  
*denticula* var. *delognei* Grun. ex Van  
 Heurck  
*distans* Greg.  
*dubia* W. Sm.  
*dubiformis* Hust.  
*epithemioides* Grun. in Cleve & Grun.  
*filiformis* (W. Sm.) Schütt  
 (*Homoeocladia filiformis* W. Sm.)  
*fonticola* Grun.  
*frigida* Grun. in Cleve & Grun.  
*frustulum* (Kütz.) Grun. in Cleve & Grun.  
 (*Synedra frustulum* Kütz.)  
*gotlandica* A. Cleve-Euler  
*granulata* Grun. in Cleve & Grun.  
*habirshawii* Feb.  
*hungarica* Grun.  
*hustedtiana* Salah  
*hybrida* Grun.  
*incurva* Grun. in Schneider  
*insignis* Greg.  
 var. *insignis*  
 var. *smithii* (Ralfs) Pell.  
 (*N. spectabilis* W. Sm.)  
*irregularis* Ross & Abidin  
*laevis* Hust.  
*lanceolata* W. Sm.  
 var. *lanceolata*  
 var. *incrustans* Grun.  
*linkei* Hust.  
*littoralis* Grun. in Cleve & Grun.  
 var. *littoralis*  
 var. *slesvicensis* Grun.  
*longissima* (de Bréb.) Ralfs ex Pritch.  
 (*birostrata* W. Sm.)  
 (*Ceratoneis longissima* de Bréb.)  
*lorenziana* Grun.  
 var. *lorenziana*  
 var. *subtilis* Grun.  
*macilenta* Greg.  
*marginulata* var. *didyma* Grun. in Cleve  
 & Grun.  
*marina* Grun. in Cleve & Grun.  
*martiana* (Agardh) Schütt  
 (*Homoeocladia martiana* Agardh)  
*microcephala* Grun. in Cleve & Grun.  
*navicularis* Grun. in Cleve & Grun.  
 (*Surirella navicularis* de Bréb.)  
 (*Tryblionella marginata* W. Sm.)  
*obtusa* W. Sm.  
 var. *obtusa* [Grun.  
 var. *scabelliformis* Grun. in Cleve &



## NITZSCHIA (cont.)

- panduriformis* Greg.  
 var. *panduriformis*  
 var. *minor* Grun.  
*paravasa* Grun.  
*parvula* W. Sm.  
*petitiana* Grun. ex Van Heurck  
*plana* W. Sm.  
*polaris* Grun.  
*punctata* (W. Sm.) Grun.  
 var. *punctata*  
 var. *coarctata* Grun.  
*pungens* Grun.  
*reversa* W. Sm. (78)  
*salinicola* Aleem & Hust.  
*seriata* Cleve\*  
 (*Pseudonitzschia seriata* (Cleve) Perag.)  
*sigma* (Kütz.) W. Sm.  
 (*Synedra sigma* Kütz.)  
 var. *sigma*  
 var. *intercedens* Grun.  
 var. *rigida* Grun.  
 var. *rigidula* Grun.
- var. *sigmatella* Grun.  
*sigmoidea* (Nitzsch) W. Sm.  
 (*Bacillaria sigmoidea* Nitzsch)  
 (*Navicula sigmoidea* Ehrenb.)  
*spathulata* de Bréb. ex W. Sm.  
 var. *spathulata*  
 var. *hyalina* (Greg.) Grun. in Van  
 Heurck  
*spectabilis* (Ehrenb.) Ralfs  
 (*brebissonii* W. Sm.)  
*subcapitellata* Hust.  
*subfrustum* Hust.  
*tenuissima* Perag.  
*thermalis* var. *littoralis* Grun.  
 var. *minor* Hilde  
*tryblionella* Hantz.  
 var. *tryblionella*  
 var. *levidensis* (W. Sm.) Grun.  
 var. *maxima* Grun.  
 var. *recta* McCall  
*valdestriata* Aleem & Hust.  
*vasta* Hust.  
*vivax* W. Sm.

## Notes on Biraphidineae

- (1) The Naviculaceae is the largest family of diatoms and the genera recognized here follow the review of the naviculoid diatoms by Cleve (1894-5). Cleve instituted several new genera and recognized older genera created by Ehrenberg in order to reduce a very large genus to a more manageable size. In the following year Van Heurck (1896) ignored Cleve's work, and absorbed Cleve's genera into the genus *Navicula* Bory, which he divided into twenty-two groups. De Toni (1891-4) and Mann (1907) to a large degree followed Van Heurck, but most modern taxonomists follow Cleve.
- (2) Mann (1907) includes in *Frustulia* Agardh. Van Heurck and De Toni consider it a separate genus.
- (3) Included in *Navicula* by Van Heurck, see (1) above. The generic name *Pinnularia* Ehrenb., 1843, was accepted for conservation against *Pinnularia* Lindl. & Hutt., 1833, and *Stauroptera* Ehrenb., *Ber. Akad. Wiss., Berl.*, 1843, p. 45, by the Special Committee for Diatomaceae (*Int. Code bot. nomencl.*, 1952, p. 71).
- (4) Seldom found in large quantities. A critical review of the genus is required to define specific differences and geographical ranges. The generic name *Auricula* Castracane, 1873, was accepted for conservation against *Auricula* Spach, 1840, by the Special Committee for Diatomaceae (*Int. Code bot. nomencl.*, 1952, p. 70).
- (5) Recently observed in Chichester Harbour (Hendey, 1951), but originally described from a fossil deposit in Japan.
- (6) Appears to be more common along the north and west than other coasts of Great Britain. The name *Brebissonia* Grunow was accepted for conservation against *Brebissonia* Spach, 1835, by the Special Committee for Diatomaceae (*Int. Code bot. nomencl.*, 1952, p. 70).
- (7) It is accepted to-day by all diatomists that *Diploneis* Ehrenb. is sufficiently distinct to be recognized as a separate genus, despite the fact that Van Heurck and Mann included it in *Navicula* Ehrenb. However, a certain amount of confusion exists in the genus, largely because so many of the species were described in early literature and, by modern standards, poorly illustrated. Many of Ehrenberg's species are unidentifiable and the synonymy is complicated. Most of the species vary greatly in size and appearance, and this has led to an unwarranted multiplicity of names. The genus requires a critical review and the distribution of each species defined.
- (8) The sigmoid diatoms are dealt with here after the manner of Peragallo in 'Monographie du Genre *Pleurosigma*' published in *Le Diatomiste* (1890-1). In *Donkinia* the raphe is keeled above the valve surface and usually strongly sigmoid, while the valve outline is seldom sigmoid or only weakly so.
- (9) Usually recognized as a fresh-water species, but this variety is found not infrequently in fully saline waters.

- (10) The genus *Mastogloia* is recognized by most diatomists to-day, although Mann (1907) grouped it under *Navicula*. It is distinguished from the latter by the presence of a loculiferous rim which is attached to the inside of the girdle. This internal system often becomes detached during cleaning operations and the valves without it differ in no way from those of *Navicula*. The genus is not well represented in British waters, and further research is needed on the distribution of the species.
- (11) Common around the west coasts of Britain, and usually considered distinct from *N. lyra*.
- (12) *N. approximata* Greville is sharply separated from other members of the Naviculaceae Lyratae by the foreshortening of the median striae around the raphe at the central nodule. This character is clearly shown in Peragallo's figure of *N. hennedyii* var. *niceaensis* (*Diat. Mar. France*, 1897-1908, pl. 24, fig. 19, 15).
- (13) Connected by intermediate forms to *N. viridula* Kütz.
- (14) Connected by intermediate forms to *N. lyra* Ehrenb.
- (15) Cleve makes this a variety of *N. punctulata* W. Sm.
- (16) Doubtful species.
- (17) The shape of the valve apex and the gibbous sides of this organism are very variable characters, and much confusion in the synonymy has arisen by creating varietal names to accommodate the differences seen. Most of these are here included under the earliest valid name of *N. cyprinus* (*Pinnularia cyprinus* Ehrenb., 1842).
- (18) A very variable species, the exact limits of which should be more accurately defined.
- (19) This species is a cold-water form, and the southerly limits of its distribution require defining.
- (20) A large gathering of *N. elegans* shows much variation of the valve apices, and var. *cuspidata* with rostrate apices is often linked to the type by a series of intermediate forms.
- (21) Usually more finely striate than the type, but the var. is of doubtful value.
- (22) A small form of this species (about half the size of specimens found on American coasts) was found at Anglesey. This is the first record for the British Isles. It is closely allied to *N. humerosa* de Bréb.
- (23) Owing to Bailey's poor illustration, this species frequently has been confused with *N. brasiliensis* Grun. and other allied species. *N. granulata* Bail. has rounded apices and interrupted striation. It is probably a cold-water form.
- (24) This species lives in large frondose colonies of mucous tubes in conditions of reduced salinity.
- (25) A very variable species, under which has been gathered a host of forms in which the marginal striae vary greatly in width. Smith did not publish a figure, but in his type specimen the marginal striate portion is less wide than the lateral area. Specimens from British coasts usually conform very well to the type.
- (26) It is possible that this should be regarded as a distinct species.
- (27) The type specimen was described from washings of seaweeds from the Falkland Islands in 1843, and since that time over thirty varietal names have been published. Some authors refuse to accept these names and refer all varieties to the type. The species is very variable, and a competent monograph on it is badly needed. It is not numerous around British coasts and, although the varieties listed are fairly readily recognized, their inclusion here is tentative.
- (28) First described by Wm. Smith in 1853 as *N. punctulata*, a name previously used by Ehrenberg in 1842 to describe another species.
- (29) First described by de Brébisson as *N. granulata*, a name previously used by Bailey in 1854 to describe another species.
- (30) This species is commonly found where oysters are cultured. The cytoplasm towards the apices of the cell frequently assumes a blue colour.
- (31) A widely distributed species, showing many varieties of somewhat doubtful value. More information required on distribution and ecology.
- (32) Should be compared with *N. grevillei* (Agardh) Cleve.
- (33) The genus *Oestrupia* Heiden, based upon *Caloneis powelli* (Lewis) Cleve, is connected to *Pinnularia* Ehrenberg and *Caloneis* Cleve. Hustedt (1935) compares and contrasts the valve structure of these genera, and shows that the transverse costae of *Oestrupia* are interrupted by a longitudinal siliceous band upon either side of the raphe.
- (34) The genus *Pleurosigma* W. Sm. here includes species whose valves have striae crossing at right angles as well as those crossing obliquely. Some authorities refer the former to *Gyrosigma* Hassall; no useful purpose is however served by this. The generic name *Pleurosigma* W. Sm. was accepted for conservation against *Scalprum* Corda, 1835, *Gyrosigma* Hassall, 1845, and *Endosigma* de Bréb. ex D'Orb., 1849, by the Special Committee for Diatomaceae (*Int. Code bot. nomencl.*, 1952, p. 72).

- (35) All varieties of this species are of doubtful value, as intermediate forms connect them, producing a continuous series.
- (36) A doubtful species.
- (37) Probably *P. affine* Grun.
- (38) Electron micrographs of this species show that its ultimate structure is entirely different from that of *P. angulatum*, and that Cleve was in error in relating them.
- (39) More information is required about the distribution of this species.
- (40) *Stauroneis* Ehrenberg was included in *Navicula* Ehrenberg by Van Heurck and Mann but most modern taxonomists separate them.
- (41) Gregory's epithet must replace the later one of Ralfs which has been normally used for this species.
- (42) In *Stenoneis* Cleve the raphe is enclosed between two stout ribs. One species is represented in the British flora. More information is required concerning its distribution.
- (43) Included by some authorities in *Pleurosigma* but separated here on account of its bow-shaped raphe.
- (44) Several varieties of this species have been described but intermediate forms appear to connect them. The published figures are of poor quality and more information is required concerning the whole group.
- (45) The description provided by Gregory is not precise and the species requires a more accurate examination.
- (46) This may be identical with *A. monilifera* Greg.
- (47) Several varieties of this species are known but intermediate forms connect them. More information is required.
- (48) Cleve (1895) makes this a synonym of *A. terroris* Ehrenberg.
- (49) Doubtful species.
- (50) Cleve (1895) makes this species a variety of *A. macilenta*, but the identification from the figures provided is doubtful. This species is akin to *A. acutiuscula* but its striae are coarser.
- (51) This may be the same as, or related to, *A. laevis*.
- (52) Gregory's figure does not admit of trustworthy identification. This species is related to *A. acutiuscula*.
- (53) According to Cleve (1895) *A. fluminensis* Grun. agrees with *A. turgida* Greg.
- (54) This species is probably the same as *A. grevilleana* but the striae are closer and not distinctly punctate.
- (55) Considered by some authorities to be a variety of *A. laevis*.
- (56) There seems to be some doubt as to the identity of this species. The figures provided by Ehrenberg and Kützting are not very satisfactory. *A. lineolata* in Donkin represents another species.
- (57) This may be identical with *A. cuneata* Cleve.
- (58) A doubtful species, probably a form of *A. proteus*.
- (59) Probably the same as *A. ostrearia* de Bréb.
- (60) This species is closely allied to *A. exsecta* Grun.
- (61) Probably identical with *A. costata*.
- (62) This may be the same as *A. acuta*.
- (63) Seems to be a form of *A. robusta*. More work is required on this.
- (64) Very variable species. More work is required on the distribution of this species and its variety.
- (65) The varieties at first sight appear very dissimilar, but intermediate forms connect them to the type to such a degree that some authorities think they should be united.
- (66) Cleve (1895) considers this nearly akin to *A. graeffi*.
- (67) A doubtful species, very similar to *A. bacillaris* Greg.
- (68) Doubtful species, allied to *A. truncata* Greg.
- (69) Related to *A. proteus* but differs from it principally by coarser striae and larger size.
- (70) May be the same as *A. coffaeiformis*.
- (71) A doubtful species, probably connected to *A. elongata* Greg.
- (72) Cleve (1895) considers this may be a small form of *A. lineolata*. More information is required on this.
- (73) The generic name was originally attached to specimens by Eulenstein, and did not receive valid publication until 1891 when it appeared in De Toni's *Sylloge Algarum*. Cleve included *Okedenia inflexa* in *Amphora* but the organism bears no relation to that genus. More information is required on its distribution.
- (74) The genus *Bacillaria* has been accepted by most taxonomists because of the characteristic mode of colony formation adopted by the type species *B. paxillifer*. The cells join together by their valve faces to form packets and move by sliding one on the other

somewhat like a slide rule. As colony formation and methods of movement are no longer considered as valid characters on which to base genera, *Bacillaria* is retained here on account of the symmetry of the frustule. It is distinguished from the genus *Nitzschia* Hassall in that the raphe is central and in the apical axis of the valve, whereas in *Nitzschia* it is marginal and the two raphes are placed diagonally upon the frustule.

- (75) Not commonly found in marine waters. A spindle-shaped nitzschoid diatom in which the frustule is twisted about the apical axis so that the raphes appear helical.
- (76) The genus *Hantzschia* is separated from *Nitzschia* because the raphe-bearing keels occupy adjacent margins of the frustule (see note 74).
- (77) *Nitzschia* Hassall (1845) is an absolute synonym of *Sigmatella* Kützing (1833), as both genera were based on *Bacillaria sigmoidea* Nitzsch. The genus *Nitzschia* is accepted here in the sense that most modern taxonomists have used it, that is, in the sense that Wm. Smith (1853) used it taking *N. sigmoidea* Wm. Smith based on *Sigmatella nitzschii* Kützing, which was *Bacillaria sigmoidea* Nitzsch, as the type of the genus. Grunow in Cleve & Grunow (1880) divided the genus into twenty-four groups, most of which are generally accepted. British material requires much more detailed examination and revision. The generic name *Nitzschia* was accepted for conservation at the 7th Int. bot. Congr., Stockholm (*Int. Code bot. nomencl.*, 1952, p. 71).
- (78) Some authorities make this a variety of *Nitzschia longissima*. The group is a difficult one as the diatoms are not strongly siliceous. More information is required on the British material.

#### Suborder 10. SURIRELLINEAE

##### Surirellaceae (1)

CAMPYLODISCUS Ehrenberg, 1841.

*bicostatus* W. Sm.

*clypeus* Ehrenb. (2)

(*ovatus* Ralfs)

(*Cocconeis clypeus* Ehrenb.)

(*Surirella clypeus* Ehrenb.)

*decorus* de Bréb.

*echineis* Ehrenb. (2)

(*argus* Bail.)

(*cribrosus* W. Sm.)

(*Coronia echineis* Ehrenb.)

*fastuosus* Ehrenb.

(*parvulus* W. Sm.)

(*thuretii* de Bréb.)

*hodgsonii* W. Sm.

(*eximius* Greg.)

*hypodromus* Brun & Temp.

(*gregoryii* Perag.)

*innominatus* Ross & Abdin

*ralfsii* W. Sm.

PODOCYSTIS Bailey ex Wm. Smith, 1856. (3)

*adriatica* (Kütz.) Boyer

(*americana* Bail.)

(*Surirella adriatica* Kütz.)

(*Euphyllodium spathalatum* Shad.)

SURIRELLA Turpin 1828. (4)

*caspia* Brun

(*cardaria* Brockm.)

*constricta* Ehrenb.

*crumena* de Bréb. ex Kütz.

(*brightwellii* W. Sm.)

*fastuosa* Ehrenb.

(*hohenackerii* Rab.)

(*cuneata* Schm.)

var. *fastuosa*

var. *cuneata* Witt.

*gemma* (Ehrenb.) Kütz.

*hispida* Ross & Abdin

*lata* W. Sm. (5)

(*hybrida* Grun.)

*minima* Ross & Abdin

*ovalis* de Bréb.

*ovata* Kütz.

var. *ovata*

var. *salina* (W. Sm.) Hust.

*pyriformis* Kitt.

*striatula* Turp. (6)

(*Navicula striatula* (Turp.) Ehrenb.)

*strigosa* Hust.

*subsalsa* W. Sm.

#### Notes on Surirellineae

- (1) Some authorities regard the genera described here as belonging to the Biraphidineae, but the type of raphe and its peripheral position on the valve separate them most definitely from those genera that possess a single raphe in the axial area of each valve.
- (2) Not abundant in British waters, more information is required concerning distribution and ecology.
- (3) This genus is sometimes ascribed to Kützing (Kützing, 1844, p. 62), but the name was not validly published there. The generic name *Podocystis* Bailey ex W. Smith was accepted for conservation against *Euphyllodium* Shadbolt, 1854, by the Special Committee for Diatomaceae (*Int. Code bot. nomencl.*, 1952, p. 72).
- (4) The smaller species of this genus lack precise descriptions, and it is likely that a thorough review of the group would considerably reduce the number of names now in use.
- (5) Some authorities consider this to be identical with *Surirella fastuosa*.
- (6) This species is very variable and several worthless varieties have been made.

## NEW COMBINATIONS

During the course of this work it became necessary to make a number of new combinations. In order to validate them they are set out below together with synonyms and references.

*Actinocyclus octonarius* var. *crassus* (W. Smith) Hendey, *comb.nov.*

*Eupodiscus crassus* W. Smith, *Syn. Brit. Diat.*, 1, 24 (1853).

*Actinocyclus crassus* (W. Smith) Ralfs, in Pritchard, *Hist. Infus.*, ed. 4, 835 (1861).

*Actinocyclus ehrenbergii* var. *crassus* (W. Smith) Hustedt, in Rabenhorst, *Krypt.-Flora*, 7 (1), 529 (1929).

*Actinocyclus octonarius* var. *ralfsii* (W. Smith) Hendey, *comb.nov.*

*Eupodiscus ralfsii* W. Smith, *Syn. Brit. Diat.*, 2, 86 (1856).

*Actinocyclus ralfsii* (W. Smith) Ralfs, in Pritchard, *Hist. Infus.*, ed. 4, 835 (1861).

*Actinocyclus ehrenbergii* var. *ralfsii* (W. Smith) Hustedt, in Rabenhorst, *Krypt.-Flora*, 7 (1), 528 (1929).

*Actinocyclus octonarius* var. *sparsus* (Gregory) Hendey, *comb.nov.*

*Eupodiscus sparsus* Gregory, in *Trans. micr. Soc. Lond.*, N.S. 5, 81 (1857).

*Actinocyclus ralfsii* var. *sparsus* (Gregory) Ralfs, in Pritchard, *l.c.*: 835 (1861).

*Actinocyclus sparsus* (Gregory) Rattray, in *J. Quekett micr. Cl.*, ser. 2, 4, 170 (1890).

*Actinocyclus ehrenbergii* var. *sparsus* (Gregory) Hustedt, in Rabenhorst, *Krypt.-Flora*, 7 (1), 528 (1929).

*Actinocyclus octonarius* var. *tenellus* (Brébisson) Hendey, *comb.nov.*

*Eupodiscus tenellus* Brébisson, in *Mém. Soc. Sci. nat. Cherbourg*, 2, 257 (1854).

*Actinocyclus tenellus* (Brébisson) Grunow, in *Hedwigia*, 6, 31 (1867).

*Actinocyclus ehrenbergii* var. *tenellus* (Brébisson) Hustedt, in Rabenhorst, *Krypt.-Flora*, 7 (1), 530 (1929).

*Navicula cyprinus* var. *linearis* (Hustedt) Hendey, *var.nov.*

*Navicula digito-radiata* f. *linearis* Hustedt, in *Abh. naturw. Ver. Bremen*, 31, 626 (1939).

*Navicula cyprinus* var. *rostrata* (Hustedt) Hendey, *comb.nov.*

*Navicula digito-radiata* var. *rostrata* Hustedt, in *Abh. naturw. Ver. Bremen*, 31, 627 (1939).

*Epithemia adnata* var. *proboscidea* (Kützing) Hendey, *comb.nov.*

*Epithemia proboscidea* Kützing, *Die kies. Bacill.*, 35 (1844).

*Epithemia zebra* var. *proboscidea* (Kützing) Grunow, in *Verh. zool.-bot. Ges. Wien*, 12, 329 (1862), 'proboscoidea'.

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records to the flora, and for undertaking the onerous task of checking the proofs. I am indebted also to Dr Mary Parke, without whose encouragement this list never would have been completed.

#### ABBREVIATIONS OF AUTHORS' NAMES

Bail.	J. W. Bailey	Jörg.	E. G. Jörgensen
Bail. L. W.	L. W. Bailey	Kitt.	F. Kitton
Berg.	P. Bergon	Kütz.	F. T. Kützing
Berk.	M. J. Berkeley	Lagerst.	N. G. W. Lagerstedt
de Bréb.	A. de Brébisson	Laud.	H. S. Lauder
Brightw.	T. Brightwell	Lemm.	E. Lemmermann
Brockm.	C. Brockmann	Lindl.	J. Lindley
Carm.	D. Carmichael	Lyngb.	H. C. Lyngbye
Castr.	A. F. Castracane	Meun.	A. Meunier
Desmaz.	J. H. B. J. Desmazières	Müll.	O. Müller
Dick.	G. Dickie	Norm.	G. Norman
Dill.	L. W. Dillwyn	Ostenf.	C. H. Ostensfeld
Donk.	A. S. Donkin	Pant.	J. Pantocsek
D'Orb.	A. D'Orbigny	Pav.	J. Pavillard
Ehrenb.	C. G. Ehrenberg	Pell.	J. Pelletan
Eulen.	T. Eulenstein	Perag.	H. Peragallo
Feb.	H. Febiger	Pritch.	A. Pritchard
Freng.	J. Frenguelli	Rab.	L. Rabenhorst
Gaill.	M. Gaillon	Ratt.	J. Rattray
Greg.	W. Gregory	Schimp.	A. J. W. Schimper
Grev.	R. K. Greville	Schm.	A. Schmidt
Grun.	A. Grunow	Schm. M.	M. Schmidt
Har.	R. Harrison	Schum.	J. Schumann
Hass.	A. H. Hassall	Shadb.	G. Shadbolt
Heib.	P. A. C. Heiberg	Shrubs.	W. H. Shrubsole
Heid.	H. Heiden	Smith	J. E. Smith
Hérib.	J. Héribaud	Stolt.	H. Stolterfoth
Hick.	W. J. Hickie	Temp.	J. Tempère
Hook.	J. Hooker	Trent.	J. F. Trentepohl
Hust.	F. Hustedt	Turp.	P. Turpin
Hutt.	W. Hutton	W. Sm.	William Smith
Jan.	C. Janisch	Wall.	G. C. Wallich

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