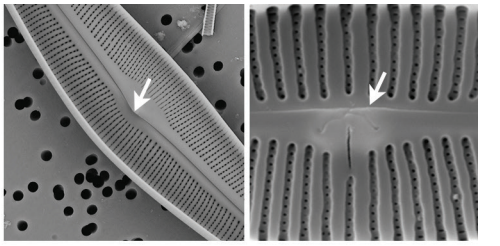
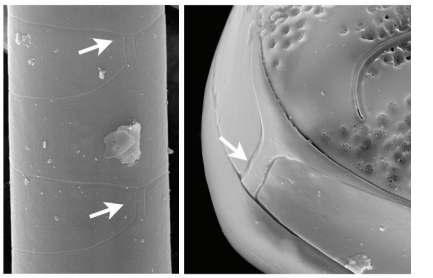
Intermission: fissure interne qui lie les fissures centrales chez quelques taxons cymbelloides.

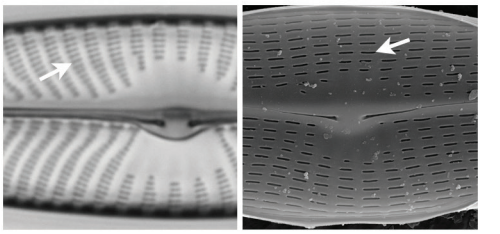


Isopolaire: valve qui a une forme identique de chaque côté de l'axe transapical; les deux extrémités ont la même forme et taille.

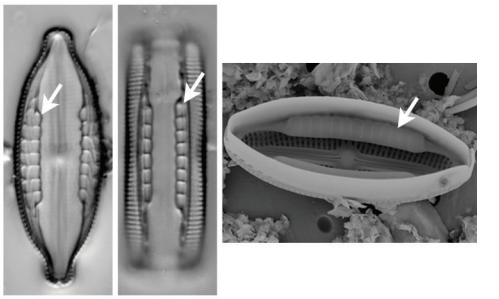
Ligule: expansion siliceuse d'une bande connective qui remplit le sillon, causée par une faille dans la bande, de la bande connective suivante.



Linéole: aréole allongée en direction apicale.

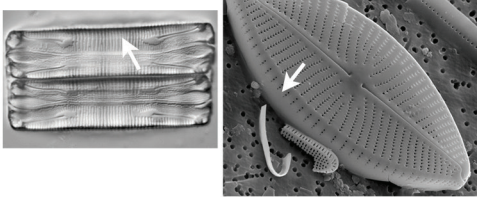


Locule ou partectum: chambre globulaire à l'intérieur de la valvocopula, présente uniquement dans le genre Mastogloia. Les chambres sont rangées sur une ligne le long de chaque côté de la valvocopula en formant un anneau partectal.



Luniforme: en forme de lune, de croissant.

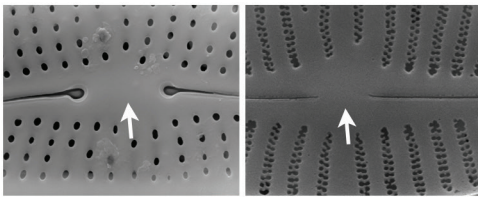
Manteau: hauteur d'une valve, partie dressée de valve qui entoure la face de la valve.



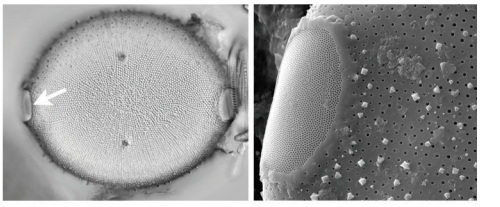
Monoraphide: diatomée pennée qui porte un raphé sur une des deux valves.

Nodule apical, polaire ou terminal: partie de la valve plus épaisse, située près d'un pôle où la fente raphéenne se termine.

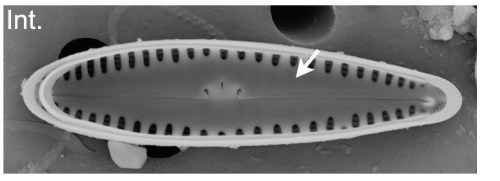
Nodule central: partie de la valve plus épaisse entre les fissures centrales du raphé.



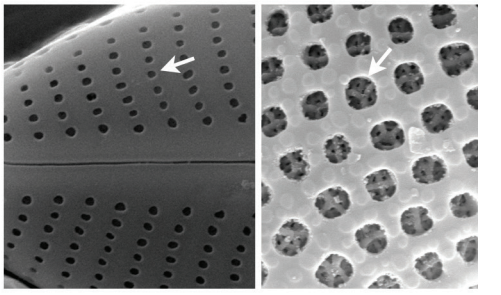
Ocellus: structure en forme d'œil, composée de petits pores entourés d'une côte siliceuse peu profonde. Présente à la transition de la surface de la valve et le manteau dans le genre *Pleurosira*. Responsable de la sécrétion de polysaccharides qui unissent les cellules.



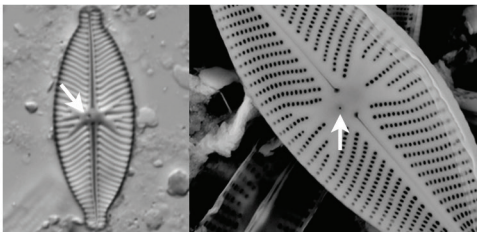
Plaque axiale: plaque siliceuse qui se trouve dans la partie interne d'une valve et qui couvre les ouvertures internes des aréoles. La plaque existe chez quelques représentants du genre *Gomphoneis* où le bord est visible au microscope optique comme une ligne longitudinale.



Point: ou aréole, perforation ronde ou ovale de la paroi en silice.



Point isolé: perforation ronde de la paroi en silice à hauteur de l'aire centrale, nettement séparé des aréoles des stries.

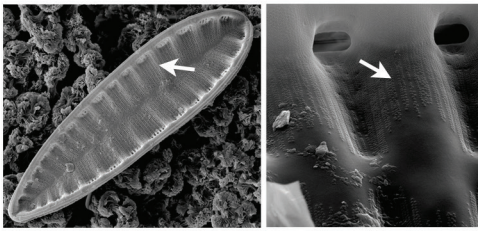


Pôle: chez les diatomées pennées, extrémité de la valve, aussi appelée apex.

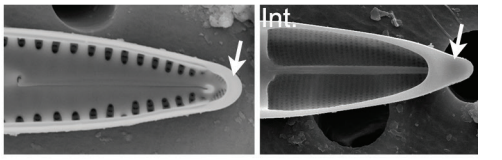
Pôle apical: chez les diatomées pennées hétéropolaires, extrémité de la valve la plus large.

Pôle basal ou pôle podal: chez les diatomées pennées hétéropolaires, extrémité de la valve la plus fine, aussi appelée apex podal.

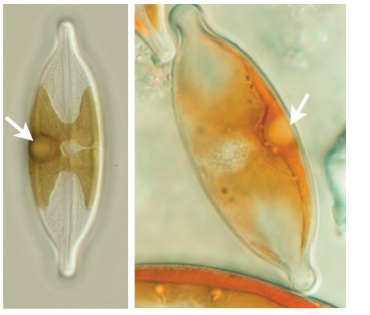
Porca: ondulation transapicale de la surface de la valve dans le genre *Surirella*.



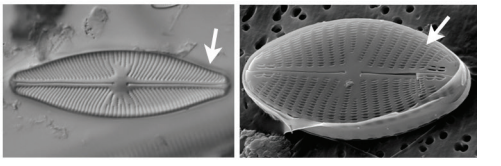
Pseudoseptum: plaque de silice avancée à l'intérieur de la cellule étendue de la valve.



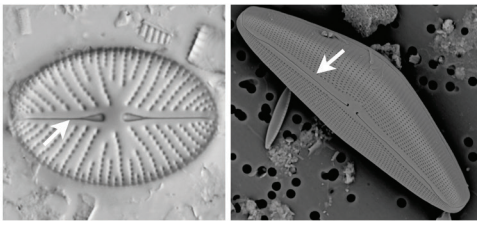
Pyrénoïde: structure chez les algues dans le chloroplaste qui est responsable de la fixation de CO2, et pas de la production de l'amidon comme supposé autrefois; elle est souvent enveloppée des grains ou d'une gaine d'amidon.



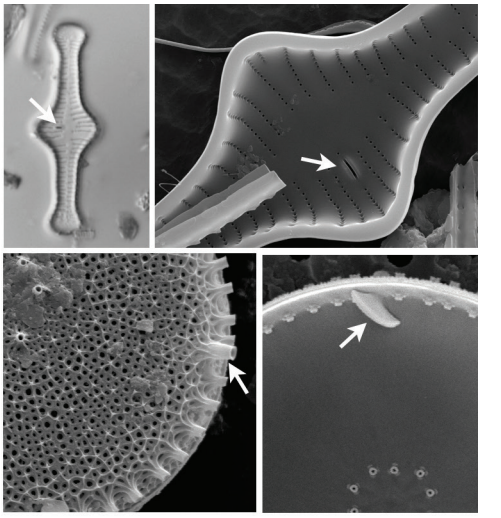
Radiaire: les stries sont radiaires quand elles sont rayonnantes à partir du nodule central.



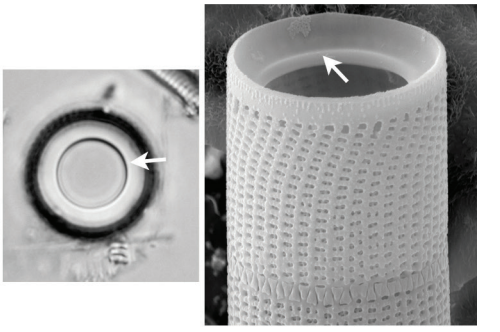
Raphé: fente dans la surface de la valve chez les mono- et biraphides, souvent localisée le long de l'axe apical.



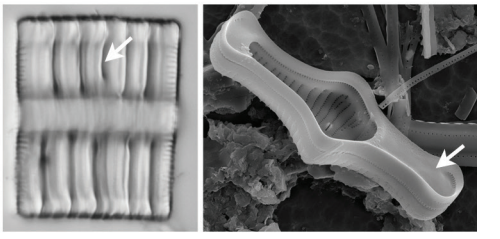
Rimoportule ou processus labié: processus tubulaire de quelques diatomées centriques et pennées, associé à la sécrétion de polysaccharides et d'autres substances contenant du carbone. En vue intérieure de la valve le processus se voit comme une ouverture en forme de lèvres; en vue extérieure un tube



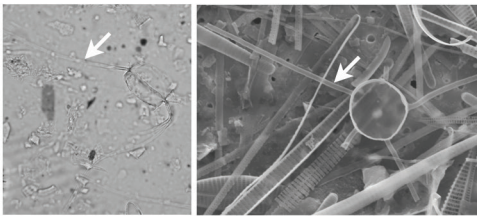
Ringleiste: petit rebord qui sépare le collet de la partie du manteau à aréoles chez le genre Aulacoseira.



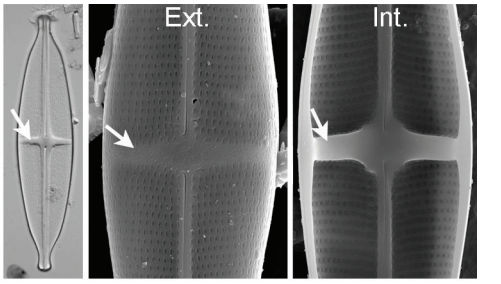
Septum: plaque de silice avancée à l'intérieur de la cellule étendue d'une bande connective.



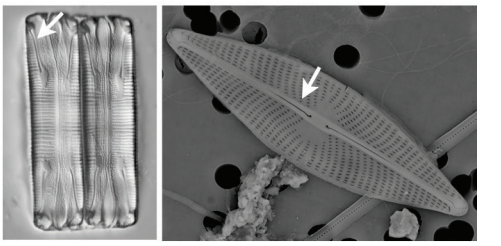
Seta: prolongement simple ou robuste de la valve, plus allongé qu'une épine. Présent dans le genre *Chaetoceros*. Les setae connectent les cellules pour former des chaînes.



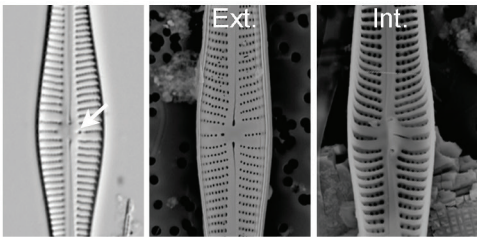
Stauros: partie hyaline épaisse présente dans l'aire centrale, formée différemment d'un fascia dans l'ontogénie de la cellule. Uniquement présent dans le genre *Stauroneis*.



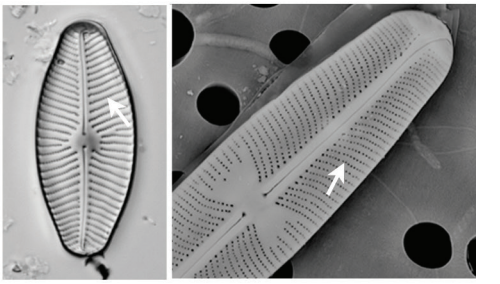
Sternum: structure épaisse siliceuse allongée le long de l'axe apical chez les diatomées pennées; c'est le centre ontogénique des pennées. Le sternum contient souvent le raphé, et peut se trouver au centre, comme chez *Navicula*, ou marginal comme chez *Eunotia*.



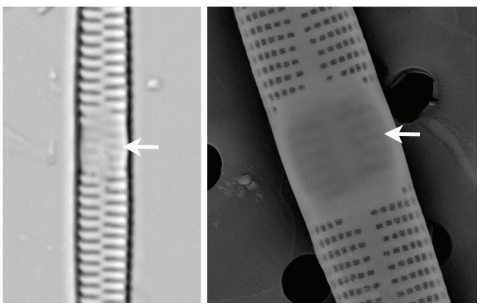
Stigma: perforation de la paroi en silice à hauteur de l'aire centrale, différente d'une aréole; ouverture ronde à l'extérieur et une fente à l'intérieur, ou structure très complexe.



Strie: rangée de pores, d'aréoles sur la valve.



Stries fantômes: stries floues, composées d'aréoles ne perforant pas la paroi de la valve.

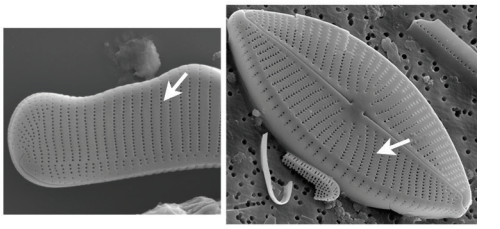


Strie lineolée: strie composée de linéoles (aréoles allongées en direction apicale)

Thèque: partie d'une frustule composée de la valve est des bandes intercalaires associées à cette valve.

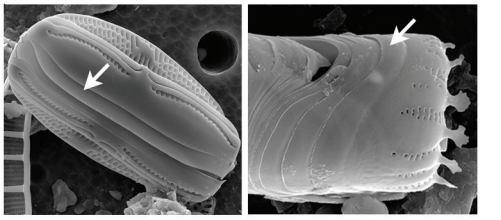
Ubiquiste: présent partout dans le monde.

Unisérié: les stries unisériées portent une seul ligne d'aréoles



Valve: partie d'une frustule, composée d'une partie aplatie, la surface de la valve, et d'une partie dressée, le manteau.

Valvocopula: bande connective en contact avec la valve; c'est la première bande de la ceinture.



Vélum: type de couverture d'un pore.

Vue valvaire: vue de la frustule quand la face de la valve est visible.

Vola: type de couverture d'un pore.

11. Classification of the diatoms

In the present work ninety-one diatom genera are illustrated, covering most of the genera which can be observed in tropical Africa. The classification used is after Round *et al.* (1990) with some modifications when it concerns genera described after 1990. This classification is more complex than the before used “centrics” and “pennates”. We will cite here only the genera discussed in the taxonomic part of the present book.

The divisions given are: class (-phyceae), subclass (-phycidae), order (-ales), family (-aceae) and genus. Note that the names are written in italics from genus level on. Taxa lower than genus most often used in diatom taxonomy are: species, variety and forma.

Division Bacillariophyta

Class: Coscinodiscophyceae Round & R.M. Crawford
- Subclass: Thalassiosirophycidae Round & R.M. Crawford
  - Order: Thassiosirales Glezer & Makarova
    - Family: Thalassiosiraceae Lebour
      - Genus: *Thalassiosira* Cleve
    - Family: Stephanodiscaceae Glezer & Makarova
      - Genus: *Cycostephanos* Round
      - *Cyclotella* Kützing ex Brébisson
      - *Discostella* Houk & Klee
      - *Pantocsekiella* Kiss & Ács
      - *Stephanodiscus* Ehrenberg
- Subclass: Coscinodiscohycidae Round & R.M. Crawford
  - Order: Melosirales R.M. Crawford
    - Family: Melosiraceae Kützing
      - Genus: *Melosira* C. Agardh
  - Order: Aulacoseirales R. M. Crawford
    - Family: Aulacoseiraceae R.M. Crawford
      - Genus: *Aulacoseira* Thwaites
  - Order: Orthoseirales R. M. Crawford
    - Family: Orthoseiraceae R.M. Crawford
      - Genus: *Orthoseira* Thwaites
- Subclass: Biddulphiophycidae Round & R.M. Crawford
  - Order: Triceratiales Round & R.M. Crawford
    - Family: Triceratiaceae (Schütt) Lemmermann

Genus: *Pleurosira* (Meneghini) Trevisan

Subclass: Rhizosoleniophycidae Round & R.M. Crawford

Order: Rhizosoleniales Silva

Family: Rhizosoleniaceae De Toni

Genus: *Urosolenia* Round & R.M. Crawford

Class: Fragilariophyceae Round

Subclass: Fragilariophycidae Round

Order: Fragilariales Silva

Family: Fragilariaceae Greville

Genus: *Asterionella* Hassall

Ctenophora Grunow ex D.M. Williams & Round

Diatoma Bory

Fragilaria Lyngbye

Fragilariforma D. M. Williams & Round

Meridion C. Agardh

Pseudostaurosira D.M. Williams & Round

Staurosira Ehrenberg

Staurosirella D.M. Williams & Round

Tabularia Kützing ex D.M. Williams & Round

Ulnaria (Kützing) Compère

Order: Tabellariales Round

Family: Tabellariaceae Kützing

Genus: *Tabellaria* (Ehrenberg) Kütizng

Class: Bacillariophyceae Haeckel

Subclass: Eunotiophycidae D.G. Mann

Order: Eunotiales Silva

Family: Eunotiaceae Kützing

Genus: *Actinella* F.W. Lewis

Actinellopsis J.C. Taylor, B. Karthick & Kociolek

Desmogonium Ehrenberg

Eunotia Ehrenberg

Subclass: Bacillariophycidae D.G. Mann
Order: Mastogloiales D.G. Mann
Family: Mastogloiaceae Mereschkowsky
Genus: *Mastogloia* Thwaites ex W. Smith
Order: Cymbellales D.G. Mann
Family: Rhoicospheniaceae Chen & Zhu
Genus: *Rhoicosphenia* Grunow
Family: Anomoeoneidaceae D.G. Mann
Genus: *Anomoeoneis* Pfitzer
Family: Cymbellaceae Greville
Genus: *Afrocymbella* Krammer
Cymbella C. Agardh
Cymbopleura (Krammer) Krammer
Encyonema Kützing
Encyonopsis Krammer
Placoneis Mereschkowsky
Family: Gomphonemataceae Kützing
Genus: *Gomphonema* Ehrenberg
Gomphosphenia Lange-Bertalot
Order: Achnanthales Silva
Family: Achnanthaceae Kützing
Genus: *Achnanthes* Bory
Lemnicola Round and Basson
Psammothidium Bukhtiyarova & Round
Family: Cocconeidaceae Kützing
Genus: *Anorthoneis* Grunow
Cocconeis Ehrenberg
Family: Achnanthidiaceae D.G. Mann
Genus: *Achnanthidium* Kützing
Planothidium Round & Bukhtiyarova
Order: Naviculales Bessey
Family: Cavinulaceae D.G. Mann
Genus: *Cavinula* D.G. Mann & Stickle
Family: Diadesmidaceae D.G. Mann
Genus: *Diadesmis* Kützing
Humidophila R.L. Lowe, Kociolek, J.R. Johansen, Van de Vijver, Lange-

Bertalot & Kopalová
Luticola D.G. Mann
Family: Amphipleuraceae Grunow
Genus: *Amphipleura* Kützing
Frustulia Rabenhorst
Family: Brachysiraceae D.G. Mann
Genus: *Brachysira* Kützing
Family: Neidiaceae Mereschkowsky
Genus: *Neidium* Pfitzer
Family: Sellaphoraceae Mereschkowsky
Genus: *Fallacia* Stickle
Pseudofallacia Y. Liu, Kociolek & Q.X. Wang
Sellaphora Mereschkowsky
Family: Pinnulariaceae D. G. Mann
Genus: *Caloneis* Cleve
Pinnularia Ehrenberg
Family: Diploneidaceae D.G. Mann
Genus: *Diploneis* (Ehrenberg) Cleve
Family: Naviculaceae Kützing
Genus: *Adlafia* Gerd Moser, Lange-Bertalot & Metzeltin
Capartogramma Kufferath
Eolimna Lange-Bertalot & W. Schiller
Fistulifera Lange-Bertalot
Geissleria Lange-Bertalot & Metzeltin
Hippodonta Lange-Bertalot, Metzeltin & Witkowski
Kobayasiella Lange-Bertalot
Mayamaea Lange-Bertalot
Navicula Bory
Nupela Vyverman & Compère
Seminavis D.G. Mann
Family: Pleurosigmataceae Mereschkowsky
Genus: *Gyrosigma* Hassall
Pleurosigma W. Smith

Family: Stauroneidaceae D.G. Mann
Genus: *Craticula* Grunow
Stauroneis Ehrenberg
Family: incertae sedis
Genus: *Envekadea* Van de Vijver, Gligora, Hinz, Kralj & Cocquyt
Order: Thalassiophysales D.G. Mann
Family: Catenulaceae Mereschkowsky
Genus: *Amphora* Ehrenberg ex Kützing
Halamphora (Cleve) Levkov
Order: Bacillariales Hendey
Family: Bacillariaceae Ehrenberg
Genus: *Bacillaria* J. F. Gmelin
Denticula Kützing
Gomphonitzschia Grunow
Hantzschia Grunow
Nitzschia Hassall
Simonsenia Lange-Bertalot
Tryblionella W. Smith
Order: Rhopalodiales D. G. Mann
Family: Rhopalodiaceae (Karsten) Topachevs'kyj & Oksiyuk
Genus: *Epithemia* Kützing
Rhopalodia O. Müller
Order: Surirellales D. G. Mann
Family: Entomoneidaceae D.G. Mann
Genus: *Crucicostulifera* J.C. Taylor & Lange-Bertalot
Family: Surirellaceae Kützing
Genus: *Campylodiscus* Ehrenberg ex Kützing
Cymatopleura W. Smith
Stenopterobia (Brébisson) Van Heurck
Surirella Turpin

12. Diatom genera

Thalassiosira Cleve 1873

Type species: *Thalassiosira nordenskioeldii* Cleve

SYNONYM:

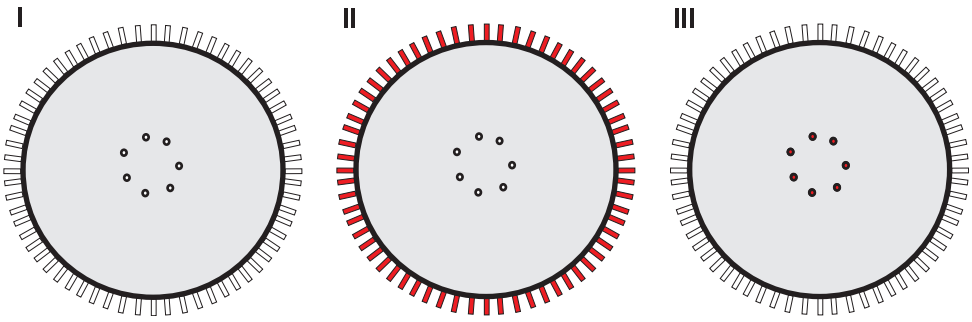
Coscinodiscus Ehrenberg 1839 pro parte

Characteristics – Cells **centric**, striae radiate, not arranged in **fascicles**, areolae may be difficult to discern under LM. A row of prominent **fultoportulae** (strutted processes) present at junction of valve face and mantle (II, Fig. 18: F) which at first glance may resemble spines. Valve face **fultoportulae** (strutted processes) present and usually arranged in a ring in the centre of the valve face (III, Fig. 18: D, G, H). One **rimoportula** present (Fig. 18: I).

Plastid structure – Cells with small discoid plastids (Fig. 18: A-B) and a number of scattered lipid bodies (Fig. 18: A-B).

Identification of species – Cell diameter, size and number of the areolae, placement and structure of the marginal and valve face **fultoportulae**.
Note: Many important cell characteristics can only be observed using SEM.

Ecology – Cells planktonic may become entrained in the benthos. Found in waters with medium to high conductivity and higher trophic levels.



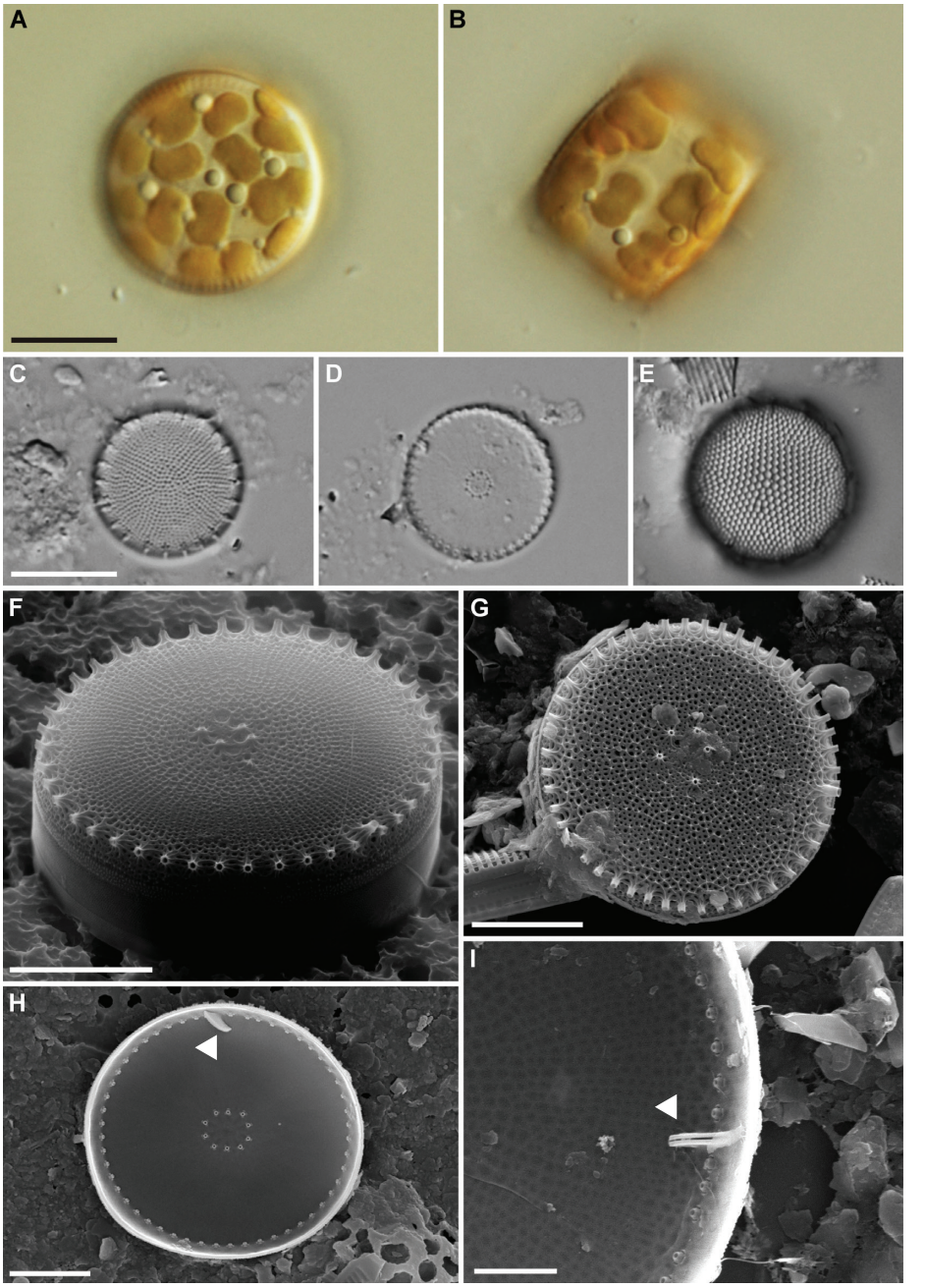


Fig. 18. *Thalassiosira* spp. **A-E**. LM. **A-B.** Living cells of *T. weissflogii*. **A.** Valve view. **B.** Girdle view. **F-I**. SEM, *T. weissflogii*. **F-G.** External view of valve, note central valve face fultoportulae and marginal ring of marginal fultoportula. **H-I.** Internal view of valve, note internal opening of valve face and marginal fultoportula and one rimoportula (arrow).
Scale bars = 10 µm (A-E), 5 µm (F-H), 1µm (I).

Cyclostephanos Round 1988

Type species: *Cyclostephanos novaezeelandiae* (Cleve) Round

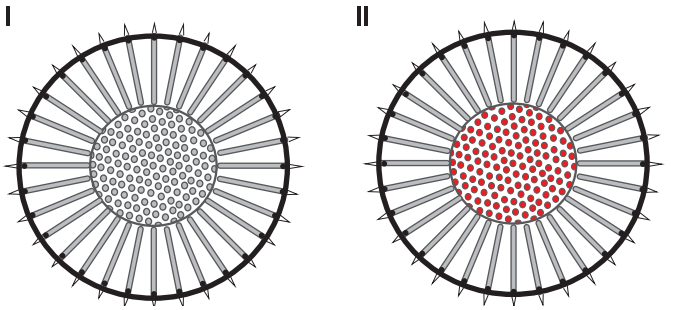
SYNONYM:
Stephanodiscus Ehrenberg 1845 pro parte

Characteristics – Cells **centric** with radiate striae. Striae near the valve margins arranged in bundles (**fasicles**) separated by **interfascicular costae** which extend from the valve margin approximately half way across the valve face where they fuse together. Central area composed of irregularly spaced areolae (II). Spines present at junction of valve face and valve margin at the end of each **costa**. Valve face **fultoportulae** (strutted processes) present on valve face and below the spines on the valve margin. Several **rimoportulae** present near the spines.

Plastid structure – Cells with small discoid plastids.

Identification of species – Cell diameter, number of striae, **fasicles** and **costae** as well as structure of costae. Note: Many important cell characteristics, such as the branching of the striae on the valve mantle, can only be observed using SEM.

Ecology – Cells solitary not forming chains, planktonic may become entrained in the benthos. Found in waters with medium conductivity and ranging from oligotrophic to eutrophic conditions.



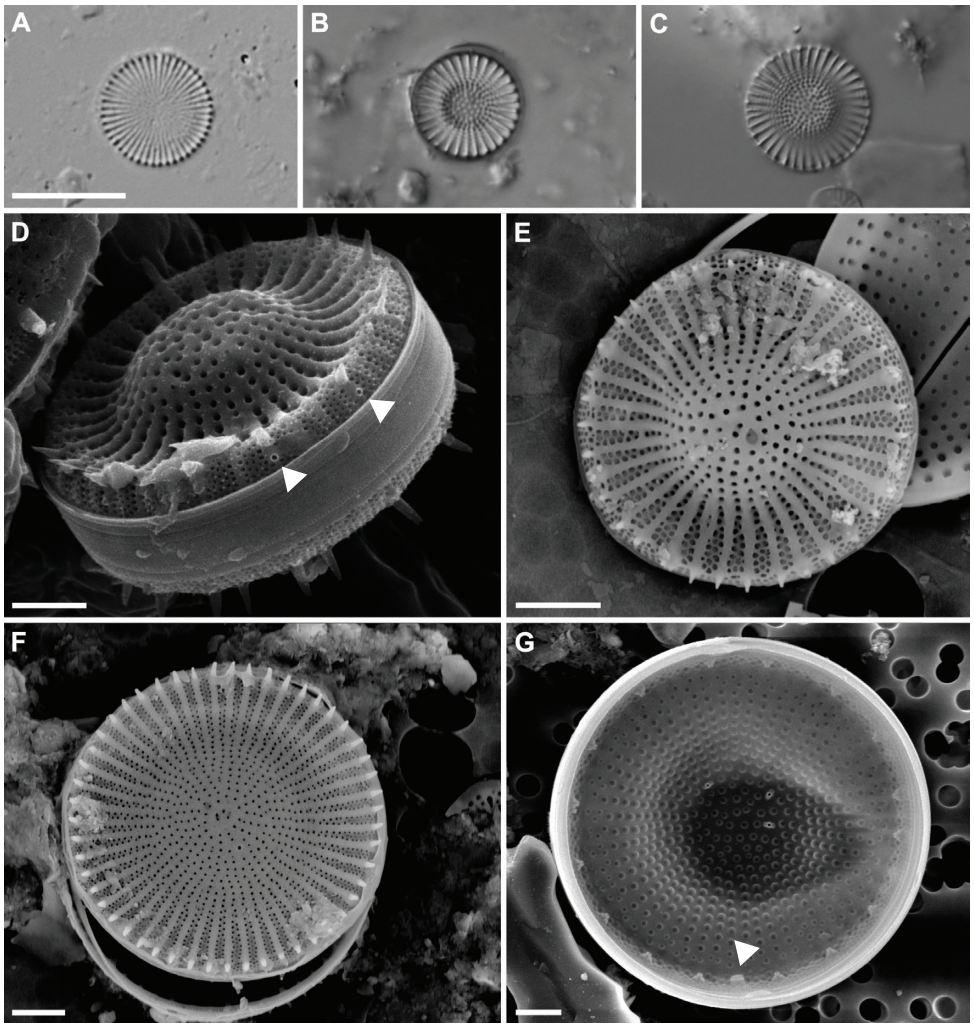


Fig. 19. *Cyclostephanos* spp. **A-C**. LM. **A-C**. Valve views. **D-G**. SEM. **D.** Oblique view showing a ring of spines at the junction of the valve face and mantle, and some fultoportulae on the mantle (arrows). **E-F**. External view of valve. **G.** Internal view of valve showing the internal openings of the valve and marginal fultoportulae and the rimoportula (arrow).
Scale bars = 10 µm (A-C), 2 µm (D-E), 1 µm (F-G).

Cyclotella Kützing ex Brébisson 1838

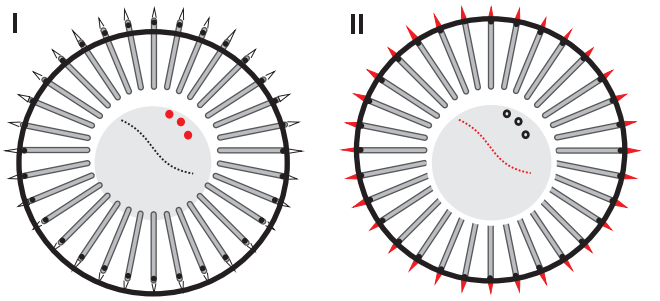
Cyclotella tecta Håkansson & R. Ross

Characteristics – Cells **centric** with radiate striae. Striae separated by robust **interfascicular costae** which extend from approximately half way across the valve face to the valve margin, leaving an open central area which may undulate slightly (II). Spines can be present at junction of valve face and valve mantle at the end of each **costa** (II). Valve face **fultoportulae** (strutted processes) are often present on valve face towards the center (I, Fig. 21: G, H) and below the spines on the valve margin. One **rimoportula** present on the valve mantle.

Plastid structure – Cells with small discoid plastids, scattered lipid bodies (Fig. 20: A).

Identification of species – Cell diameter, number of striae and costae as well as structure of the costae. Presence or absence of valve face **fultoportulae**, number and distribution of marginal **fultoportulae**. Presence or absence of an undulation in the central area. Presence or absence of spines. Note: Many important cell characteristics can only be observed using SEM.

Ecology – Cells, solitary or in pairs but not forming chains, planktonic may become entrained in the benthos. Cells exude chitin threads (Fig. 20: A) from **fultoportulae** allowing them to remain suspended for a longer time in the water column. Found in waters with medium to high conductivity and higher trophic levels.



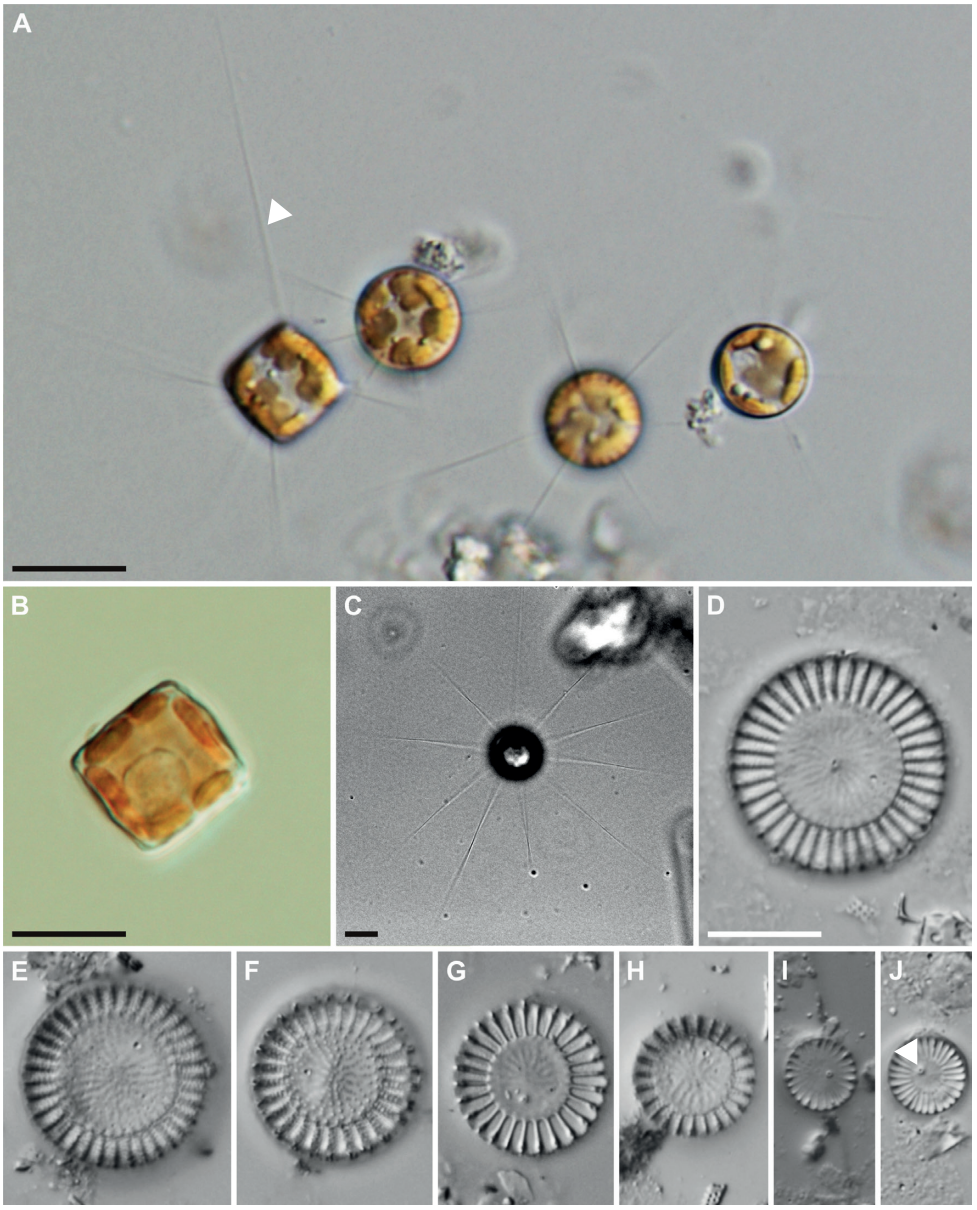


Fig. 20. *Cyclotella* spp. **A-J**. LM. **A**. Living cells, valve and girdle views of *Cyclotella meneghiniana* Kützing, note chitin threads (arrow). **B.** Living cell, girdle view. **C.** Cleaned cell, showing the chitin threads. **D-H**. *C. meneghiniana*, valve views of cleaned cells. **I-J**. *C. atomus* Hustedt, valve views, note rimoportula (arrow).
Scale bars = 10 µm.

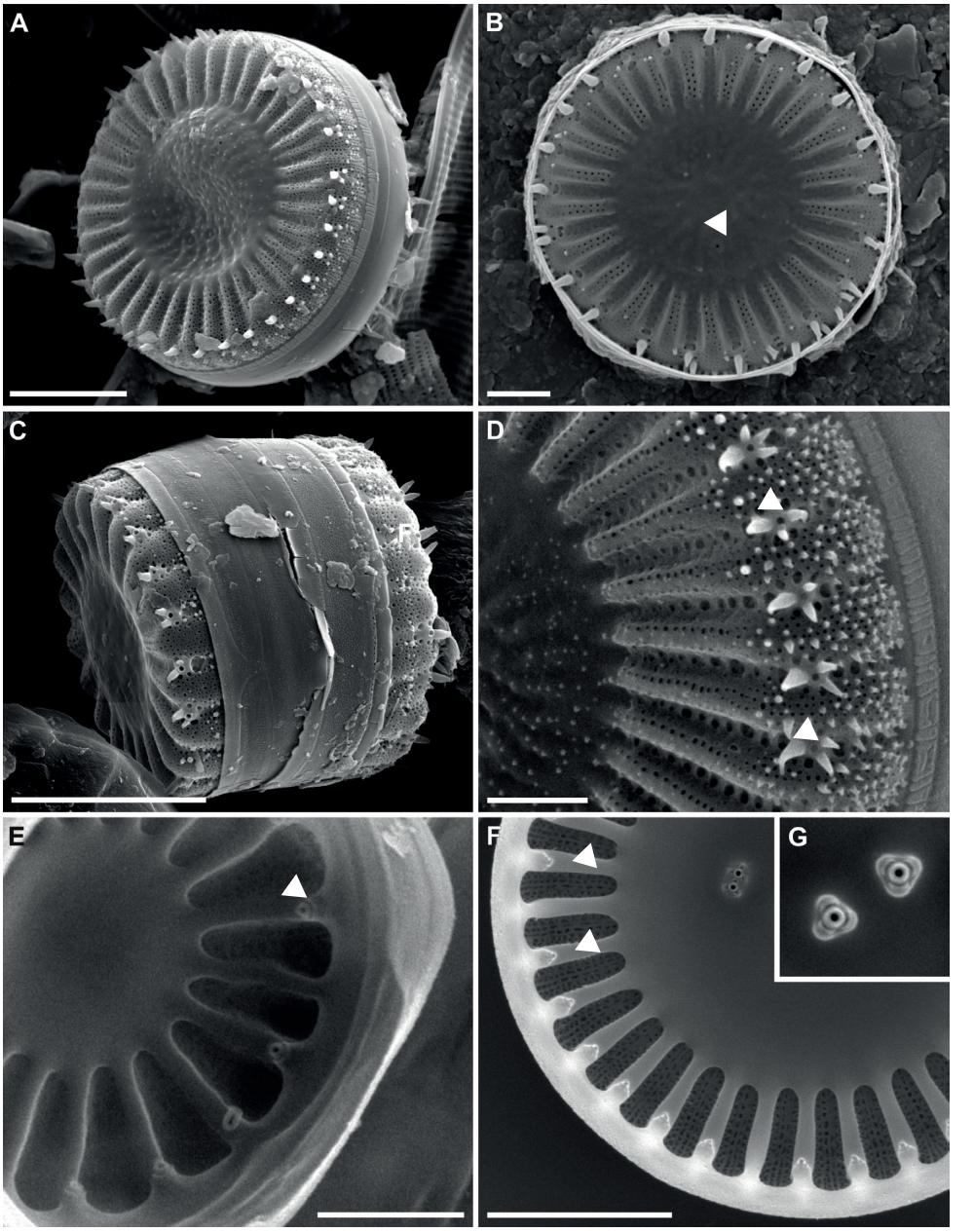


Fig. 21. *Cyclotella* spp. A-F. SEM. **A-D**. *C. meneghiniana*. **A**. Oblique view, note central undulation. **B**. Valve view, note external opening of rimoportula (arrow). **C**. Girdle view. **D**. Detail of the mantle, note the marginal fultoportulae (arrows). **E-G.** Internal view of valve, note internal opening of valve face and marginal fultoportulae (arrows). **G.** Detail of valve face fultoportulae with 3 satellite pores. Scale bars = 5 µm (A-F).

Discostella Houk & Klee 2004

Type species: *Discostella stelligera* (Cleve & Grunow) Houk & Klee

SYNONYM:

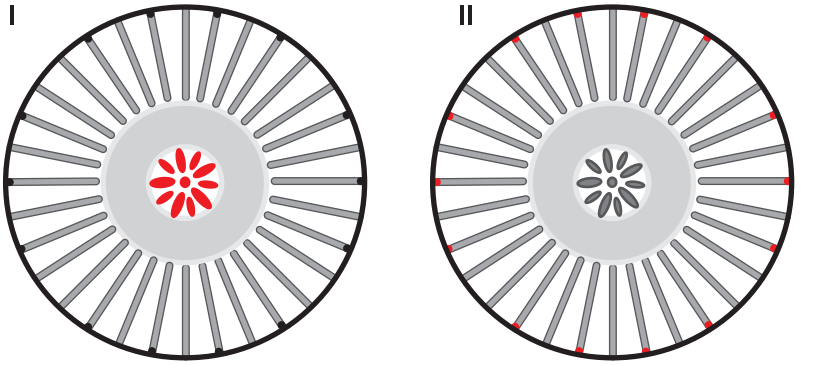
Cyclotella Kützing ex Brébisson 1838 pro parte

Characteristics – Cells **centric,** short striae, separated by robust **costae**, extending from the margin approximately half way across the valve face. Central area thickened silica with large perforations in a more or less stellate pattern (I). Cells lack marginal spines. Marginal **fultoportulae**, only visible with SEM, present at the margin on every second or third costa (II, Fig. 22: J, L, M).

Plastid structure – Cells with small granular plastids.

Identification of species – Species can be identified by cell size and density and structure of the striae. The shape, structure and configuration of the ornamentation of the central area are important.

Ecology – Cells planktonic may become entrained in the benthos. Found in oligotrophic to mesotrophic waters with moderate conductivity.



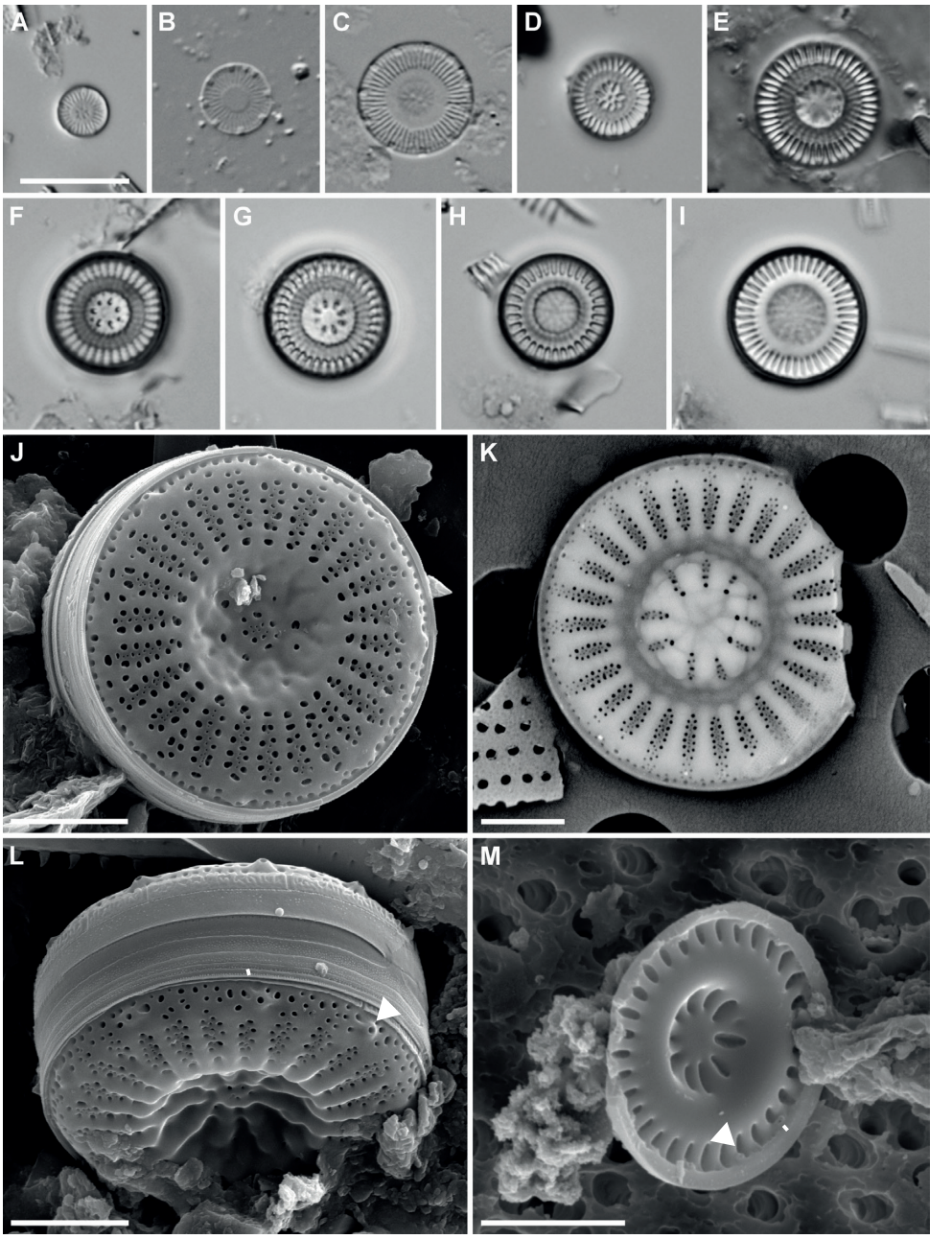


Fig. 22. *Discostella* spp. **A-I**. LM, cleaned material. **A-C**. Valve views of *Discostella woltereckii* (Hustedt) Houk & Klee. **D-I**. Valve views of *D. stelligera*. **J-M**. SEM. **J-K**. External view of valve of *D. stelligera*. **L**. Oblique external view of valve of *D. stelligera*, note external openings of marginal fultoportulae (arrow). **M**. Oblique internal view of valve of *D. stelligera*, note internal openings of marginal fultoportulae (arrow)
Scale bars = 10 µm (A-I), 2 µm (J-L), 5 µm (M).

Pantocsekiella K.T. Kiss & Ács 2016

Pantocsekiella ocellata (Pantocsek) K.T. Kiss & Ács

SYNONYM:

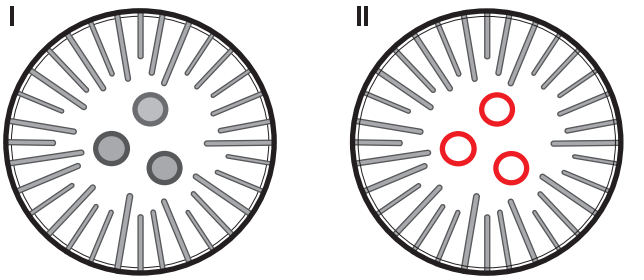
Cyclotella Kützing ex Brébisson 1838 pro parte

Characteristics – Cells **centric** with radiate striae. Striae separated by robust **interfascicular costae** which can differ in length and extend from approximately half way across the valve face to the valve margin, leaving an open central area which has large circular depressions (lacunae) (II, Fig. 23: E, F). Weakly developed spines can be present at junction of valve face and valve mantle at the end of each **costa**. Valve face **fultoportulae** (strutted processes) are often present on valve face towards the center (Fig. 23: E, F) and below the spines on the valve margin. One **rimoportula** present on the valve mantle.

Plastid structure – Cells with small discoid plastids, scattered lipid bodies (see *Cyclotella*).

Identification of species – Cell diameter, number of striae and costae as well as structure of the costae. Number and distribution of circular depressions. Note: Many important cell characteristics can only be observed using SEM.

Ecology – Cells, solitary or in pairs but not forming chains, planktonic may become entrained in the benthos. Found in waters with medium conductivity and higher trophic levels.



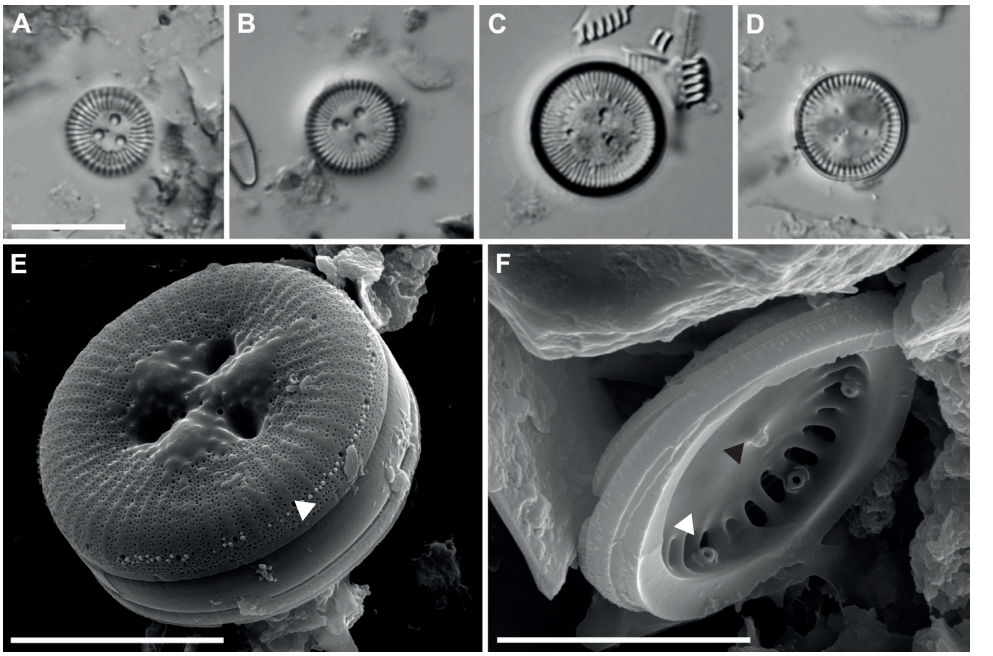


Fig. 23. *Pantocsekiella* **spp. A-D. LM. A-C.** *Pantocsekiella ocellata*, valve views of cleaned cells. **D.** *Pantocsekiella* sp., valve view. **E-F.** SEM. *P. ocellata.* **E.** External oblique view of valve, note external openings of fultoportulae (arrow). **F**. Internal view of valve, note internal opening of valve face (black arrow) and marginal fultoportulae (white arrow). Scale bars = 10 µm (A-D), 5 µm (E), 3 µm (F).

Stephanodiscus Ehrenberg 1845

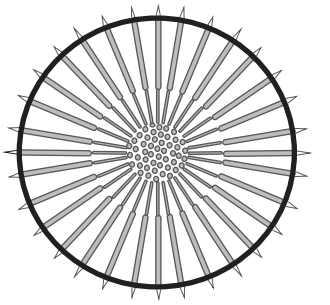
Type species: *Stephanodiscus niagarae Ehrenberg*

Characteristics – Cells **centric** with radiate striae. Valve face flat or concentrically undulate. Striae composed of 2-3 rows of areolae and are combined in **fascicles** (rows of 2-3 areolae) by **interfascicular costae** which extend from the margin of the valve face to the centre of valve face where they fuse together. Spines present at junction of valve face and mantle at the end of each **costa**. Valve face **fultoportulae** (strutted processes) present on valve face and below the spines on the valve mantle. One **rimoportula** present on the valve mantle.

Plastid structure – Cells with small discoid plastids (Fig. 24: A-C).

Identification of species – Cell diameter, number of striae and costae as well as structure of costae. Note: Many important cell characteristics can only be observed using SEM.

Ecology – Cells planktonic may become entrained in the benthos. Chitin threads (Fig. 24: A) exuded from marginal fultoportulae increase surface area, slowing sinking through the water column. Found in waters with medium conductivity and higher trophic levels.



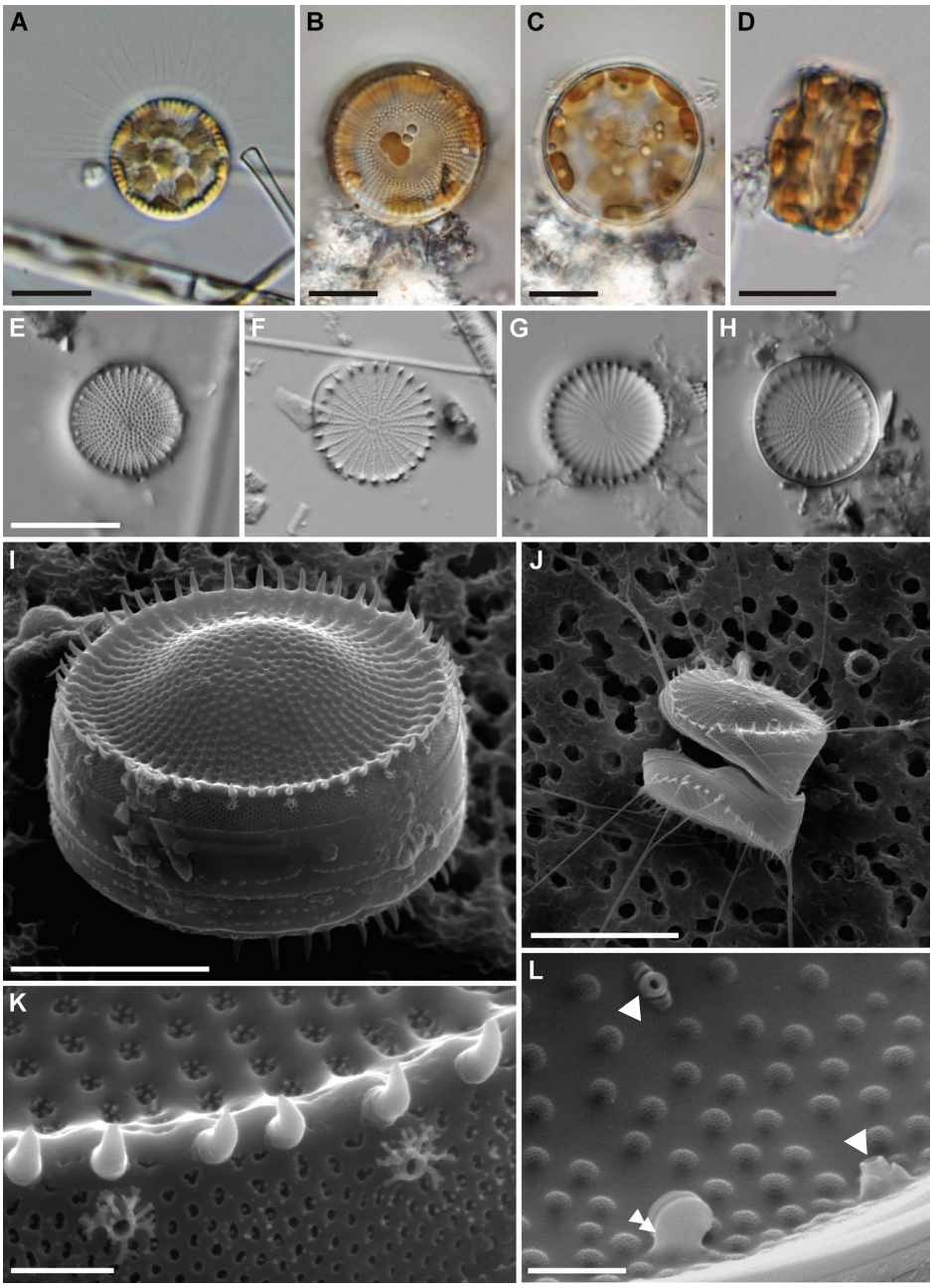


Fig. 24. *Stephanodiscus* spp. **A-H.** LM. **A-D**. Living cells. **E-H**. Cleaned cells. **I-L**. SEM. **I.** Oblique view. **J.** External view of valve, note chitin threads. **K.** External view of valve margine, note marginal spines and marginal fultoportulae. **L.** Internal view of valve, note valve and marginal fultoportulae (arrows) and rimoportula (double arrow).
Scale bars = 10 µm (A-J), 1 µm (K-L).

Melosira C. Agardh 1824

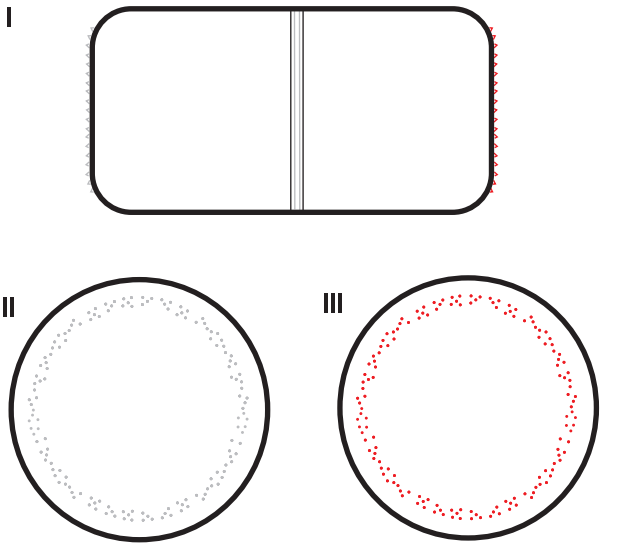
Type species: *Melosira nummuloides* C. Agardh

Characteristics – Cells **centric**, valve mantle is rather deep, cells often observed in girdle view (I). Areolae very small, scattered over the valve face only visible with SEM. **Rimoportulae** small (Fig. 26: C-D, F), scattered over valve face, usually not possible to resolve using LM. Valve face bears a large number of scattered silica granules which can be seen both under LM and SEM (Fig. 25: E-F; Fig. 26:A-B). When seen in valve view under LM a ring of very small spines can be observed around the periphery of the cell close to the valve margin (III; Fig. 25: E-F; Fig. 26: A-B).

Plastid structure – Cells with small plate-like plastids that may be lobed or circular, found around the periphery of the cell (Fig. 25: A-B).

Identification of species – Up till now only one species known from tropical African freshwaters: *Melosira varians* C. Agardh.

Ecology – Cells joined face-to-face by mucilage pads forming long chain like-colonies with the terminal cell attached to the substrate by the same means. Found in the benthos, and may be re-suspended in the plankton, of eutrophic waters with moderate to high conductivities.



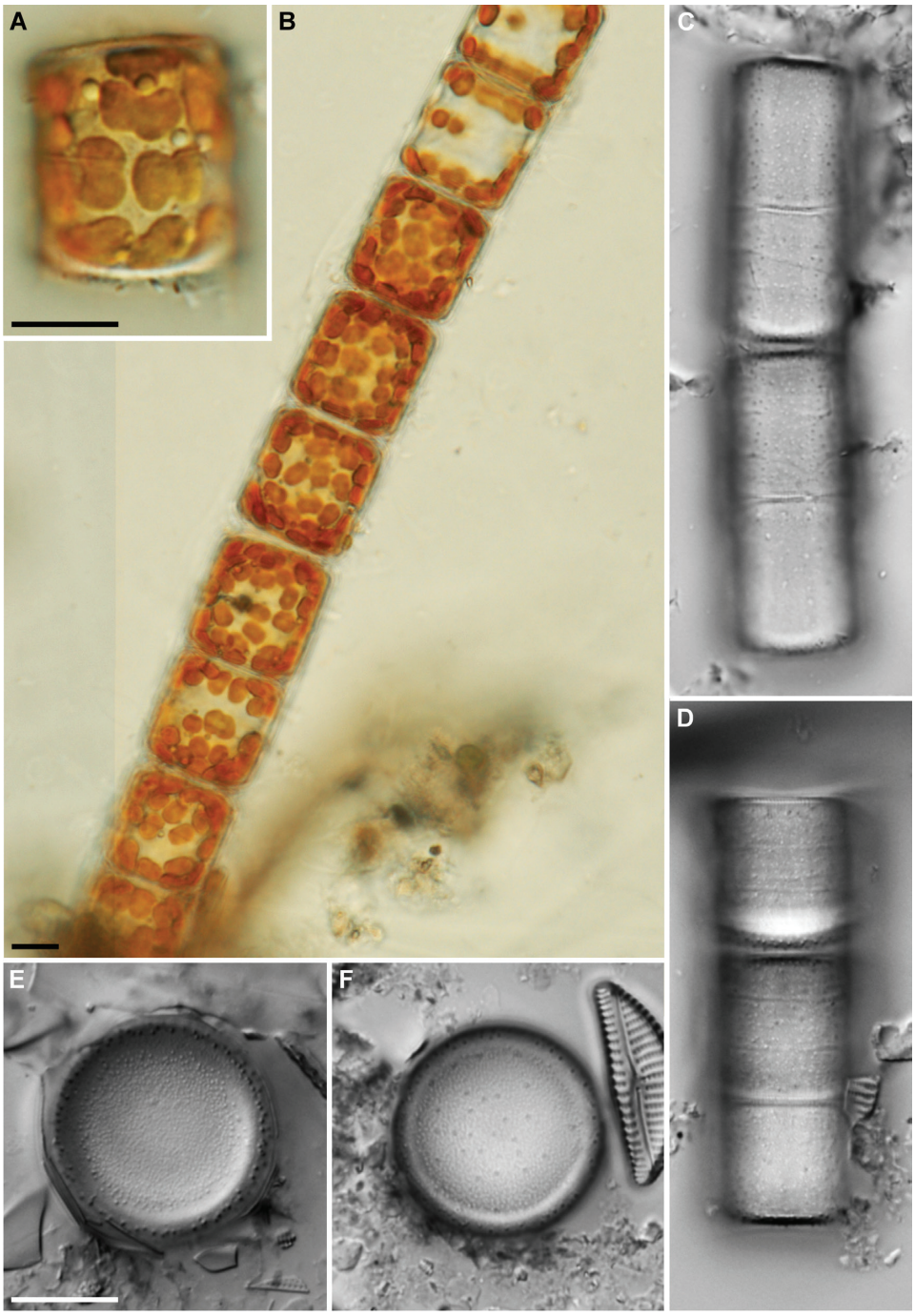


Fig. 25. *Melosira varians*. **A-F.** LM. **A-B.** Living cells, firdle view. **C-F.** Cleaned cells. **C-D.** girdle view. **E-F.** Valve view.
Scale bars = 10 µm.

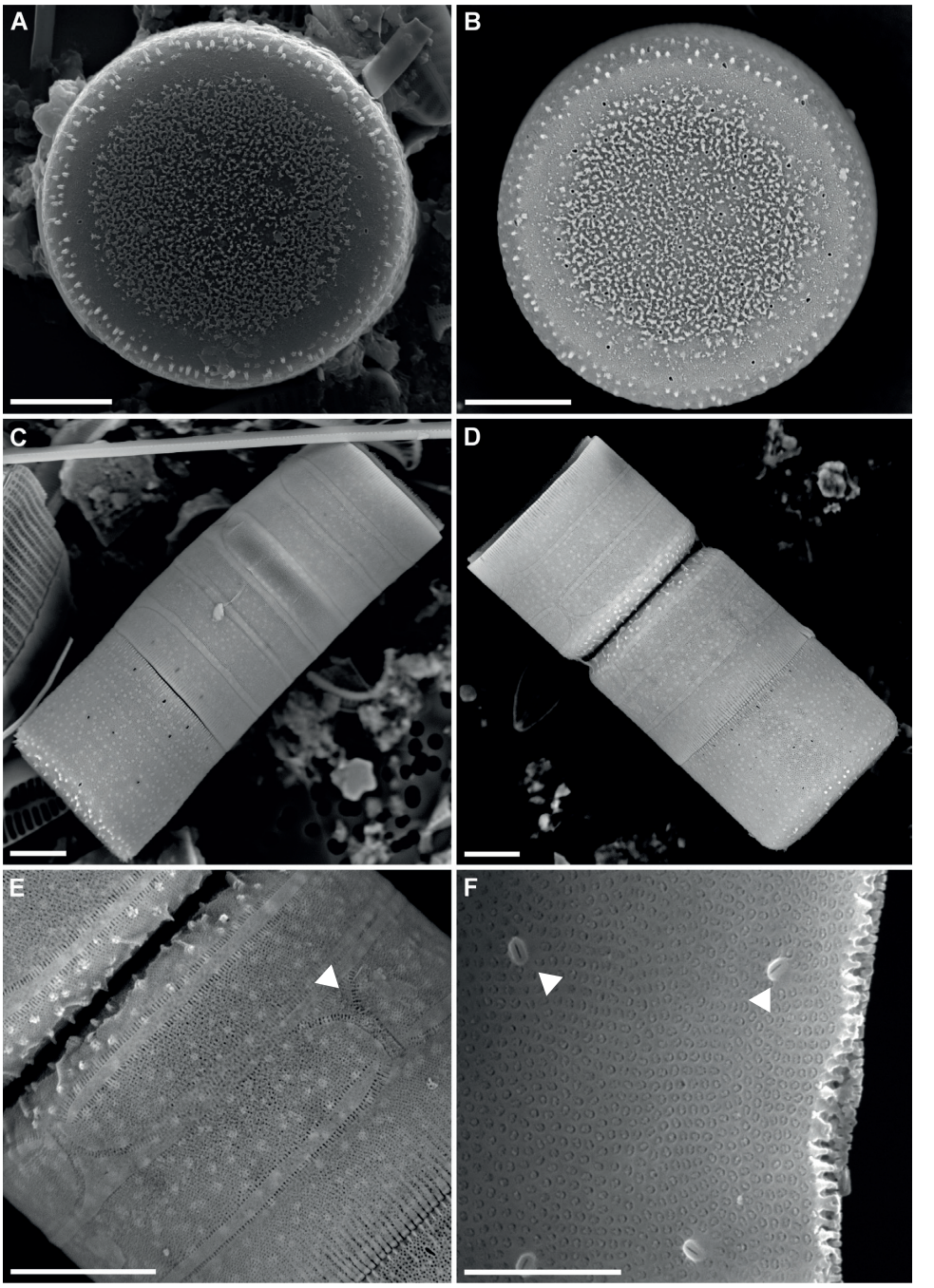


Fig. 26. *Melosira varians*. **A-F.** SEM. **A-B.** External view of valves. **C-D.** Girdle views. **E.** Detail of girdle bands, note ligula (arrow). **F.** Internal view of valve, note rimoportulae (arrows).
Scale bars = 10 µm (A-D), 5 µm (E), 2 µm (F).

Aulacoseira Thwaites 1848

Type species: *Aulacoseira crenulata* (Ehrenberg) Thwaites

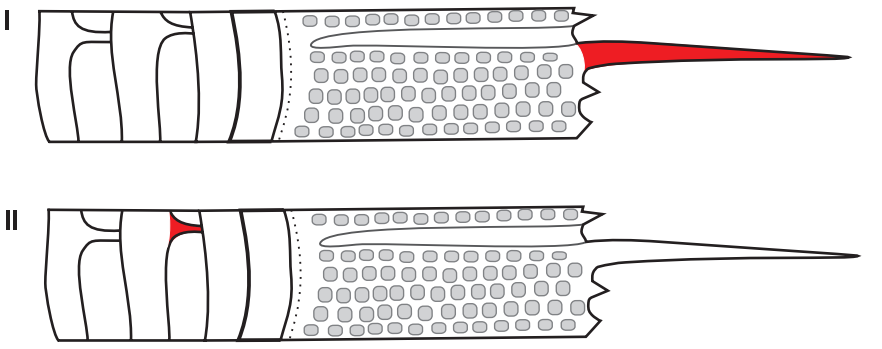
SYNONYM:
Melosira C. Agardh 1824 pro parte

Characteristics – A **centric** diatom genus with the **valve mantle** most often deeper than the diameter of the **valve face**, for this reason cells are mostly seen in girdle view. Areolae usually large and easily discernable in LM but may be rather small in some cases (e.g. *Aulacoseira herzogii* (Lemmermann) Simonsen; Fig. 27: I). Spines are present including long linking spines (I). Girdle composed of both open and closed bands, a **ligula** or tongue-like structure is present (II, Fig. 28: E).

Plastid structure – Many small disc-like plastids (Fig. 27: B-C).

Identification of species – Depth of the valve mantle is very important together with the orientation and dimensions of the striae and type and length of spines present (e.g. *Aulacoseira granulata* (Ehrenberg) Simonsen has long and short linking spines while *Aulacoseira ambigua* (Grunow) Simonsen only has short linking spines and *Aulacoseira herzogii* only has long spines).

Ecology – Cells colonial forming chains, planktonic in a wide range or water qualities. The increased surface area of these chain-like colonies helps to prevent sinking through the water column.



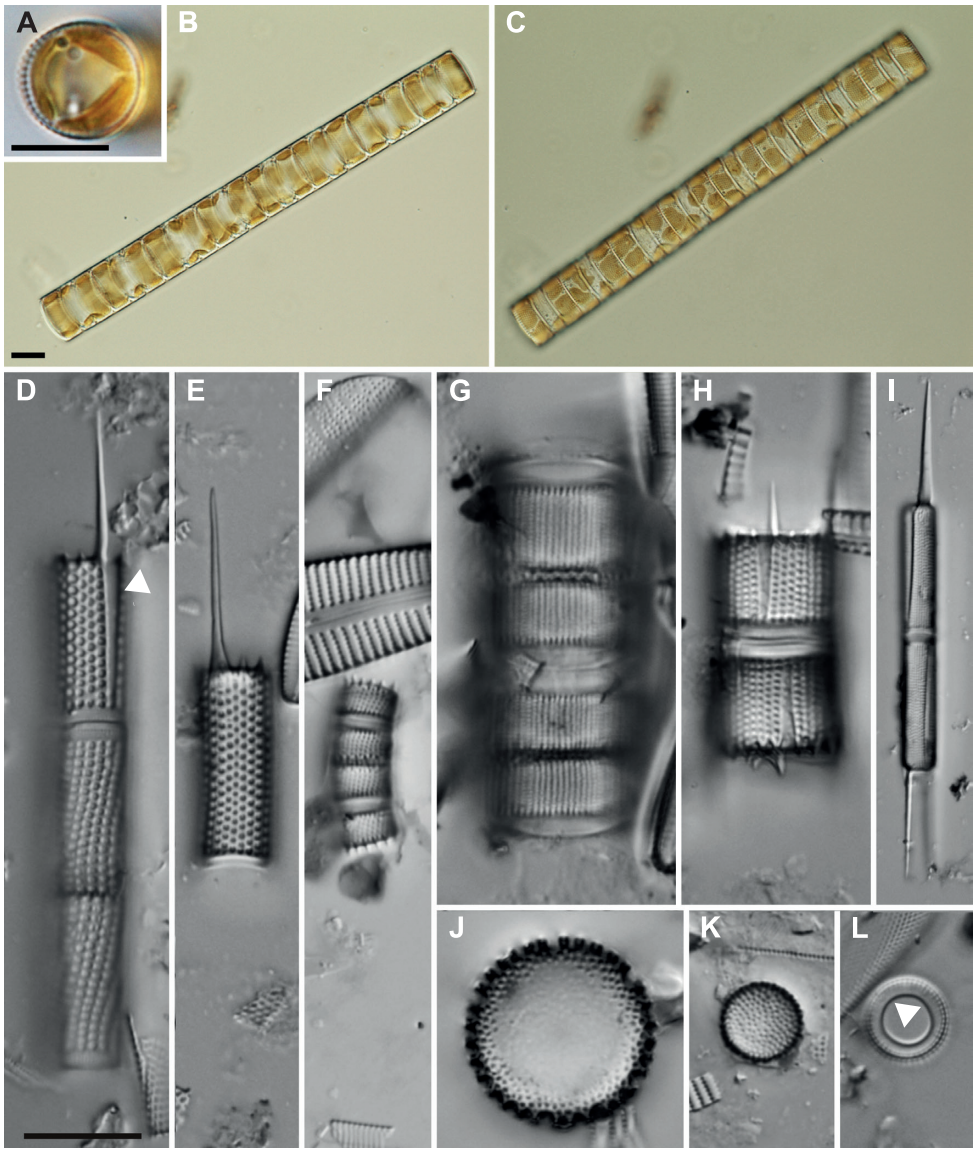


Fig. 27. *Aulacoseira* spp. **A-L**. LM. **A**. Living cell of *Aulacoseira ambigua*, valve view, note position of plastids - appressed to valve mantle. **B-C**. Living cells of *A. ambigua* forming a filamentous colony or chain, different foci of the same filament. **D-E**. Girdle view of *A. granulata*, note long linking spines and associated groove in the mantle (arrow). **F**. Girdle view of *A. subarctica* (O. Müller) E.Y. Haworth. **G.** Girdle view of *Aulacoseira* sp. **H.** Girdle view of *A. muzzanensis* (F. Meister) Krammer, note relatively shorter linking spines as compared with *A. granulata*. **I.** Girdle view of *A. herzogii*. **J-L.** Valve views of various *Aulacoseira* species showing distribution of areolae on valve face and position of the ringleiste (arrow). Scale bars = 10 µm (A-H).

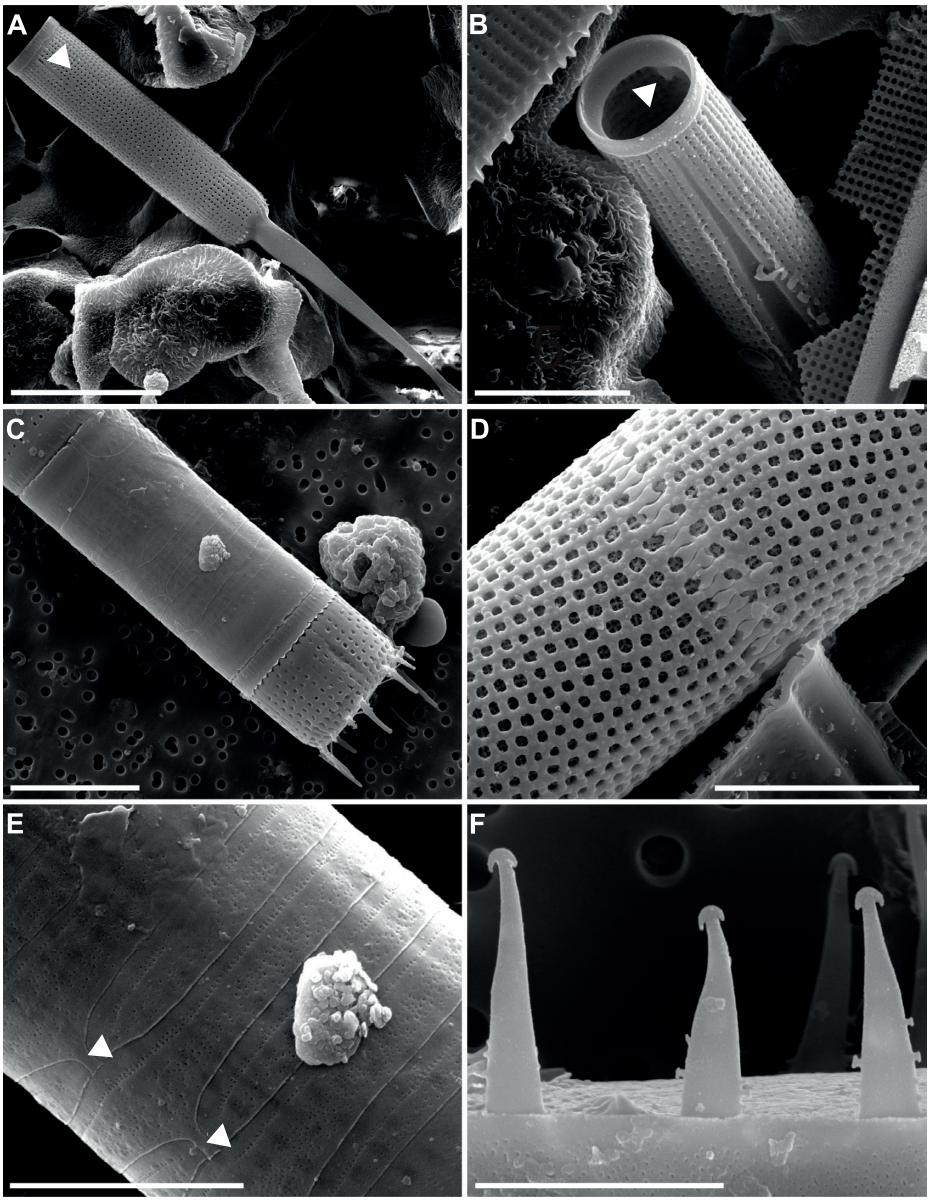


Fig. 28. *Aulacoseira* spp. **A-F**. SEM. **A**. Girdle view of *Aulacoseira herzogii,* note external opening of the rimoportula (arrow). **B**. Oblique view of *A. herzogii* showing groove in the valve mantle occupied by the linking spine, note internal opening of the rimoportula (arrow). **C**. Girdle view of *Aulacoseira* sp. showing valve mantle and associated copulae. **D**. Girdle view of *A. ambigua* showing the structure of the areolae and the short linking spines. **E**. Detail of the structure of the copulae of *Aulacoseira* sp., note the ligulae (arrows). **F**. Detail of the complex structure of the linking spines of *Aulacoseira* sp.
Scale bars = 10 µm (A), 5 µm (B-D), 3 µm (E), 2 µm (F).

Orthoseira Thwaites 1848

Type species: *Orthoseira americana* (Kützing) S.A. Spaulding & Kociolek

SYNONYM:

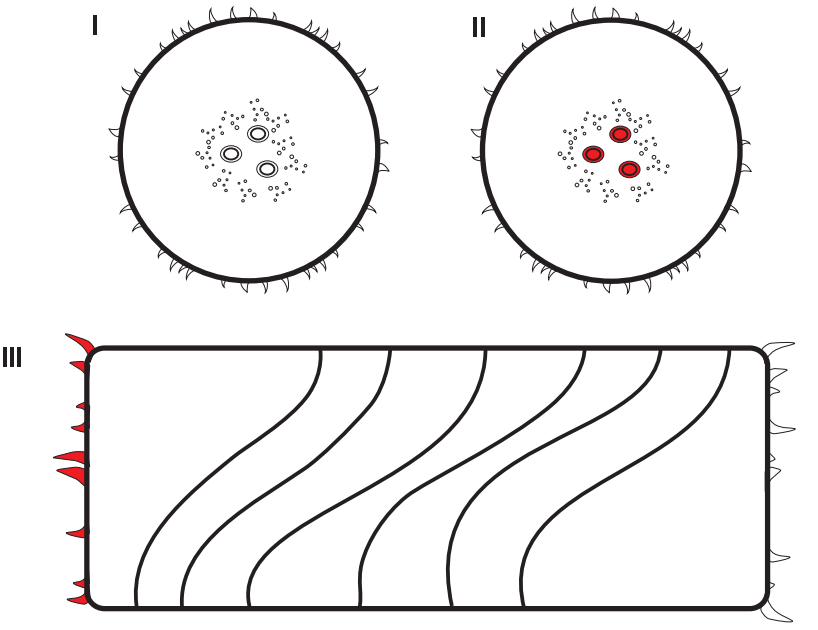
Melosira C. Agardh 1824 pro parte

Characteristics – Cells **centric**, valve mantle is rather deep, cells often observed in girdle view. Girdle composed of multiple bands (**copulae**) (Fig. 30: C, H; Fig. 31: D). Valve face bears unique structures in the centre (II; **carinoportulae**). A ring of spines is found around the periphery of the cell close to the junction of the valve face and mantle (III; Fig. 30: A; Fig. 31: B-C) but may be difficult to observe using LM (Fig. 30 B-F).

Plastid structure – Cells with many small discoid plastids (Fig. 29), found in the peripheral cytoplasm (Fig. 29: A, C) as well as clustered in the cytoplasm surrounding the nucleus (Fig. 29: B).

Identification of species – Based on SEM.

Ecology – Cells linked by spines to form short chains. Generally found in sub-aerial habitats, sometimes washed into rivers, streams and lakes.



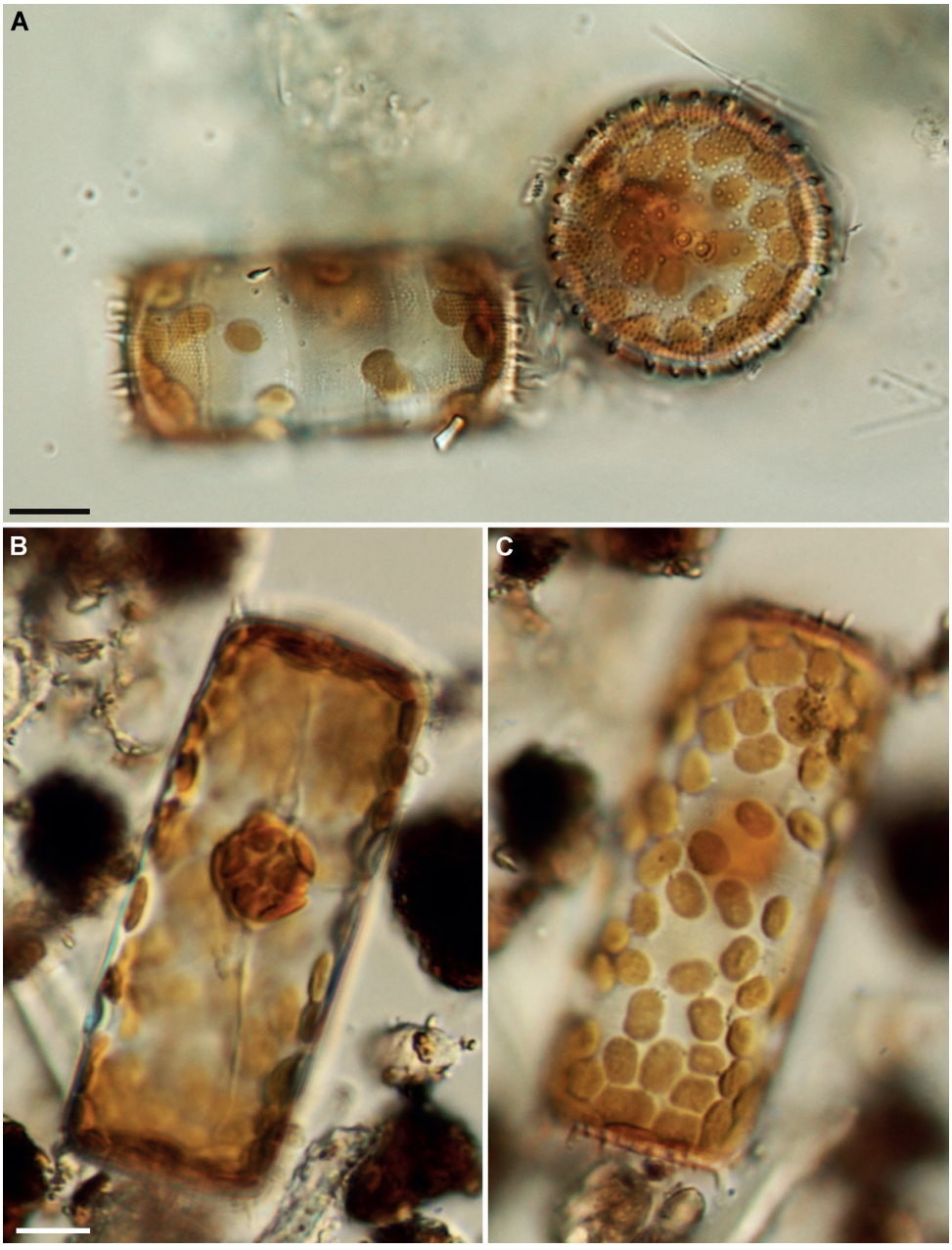


Fig. 29. *Orthoseira* sp. **A-C**. LM, Living cells. **A.** Valve view and girdle view. **B-C.** Girdle view of the same cell at different foci. Scale bars = 10 µm.

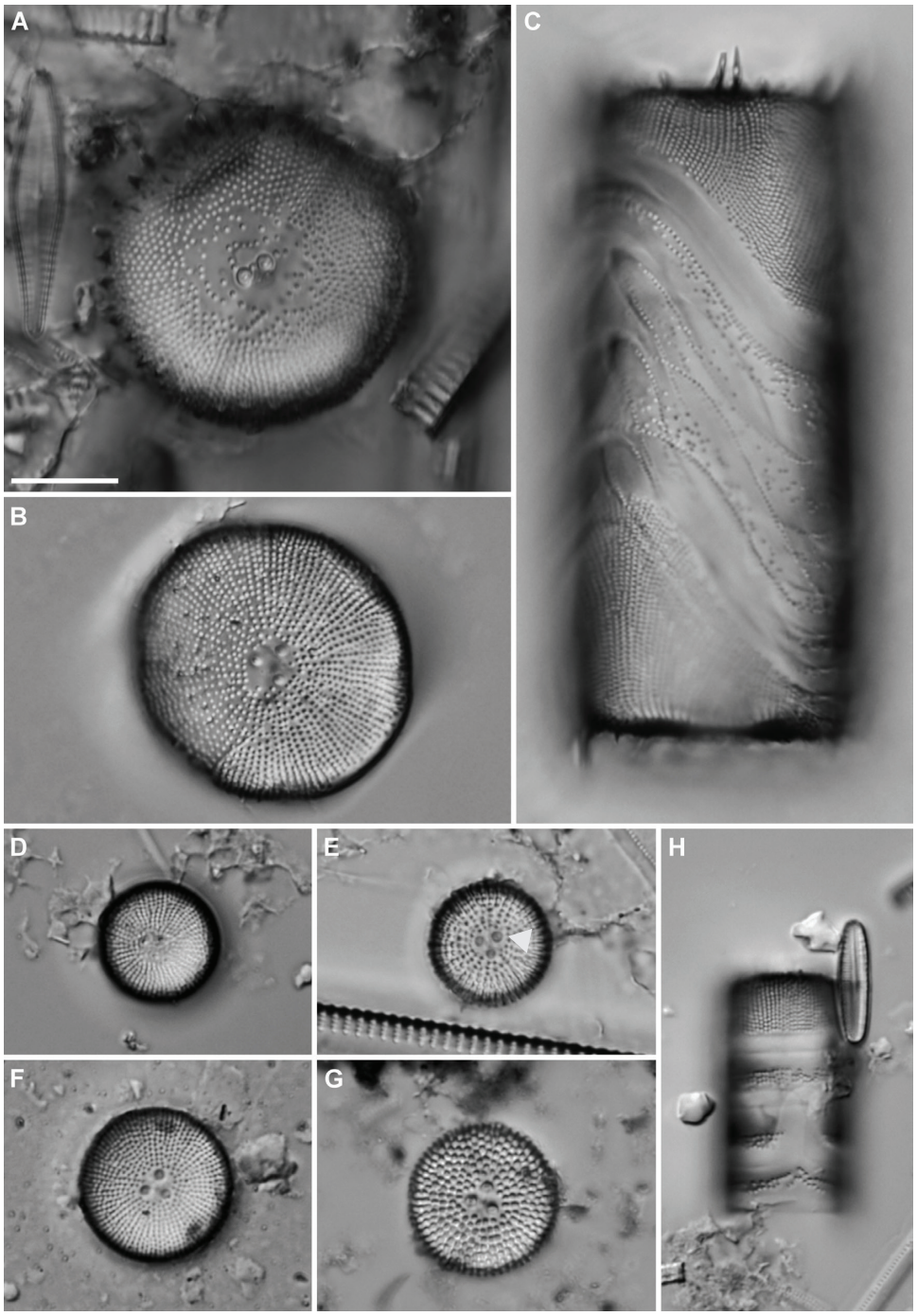


Fig. 30. *Orthoseira* spp. **A-H.** LM, cleaned material. **A-B, D-G.** Valve views, note the carinoportulae (arrow - **E**). **C, H.** Girdle views.
Scale bar = 10 µm.

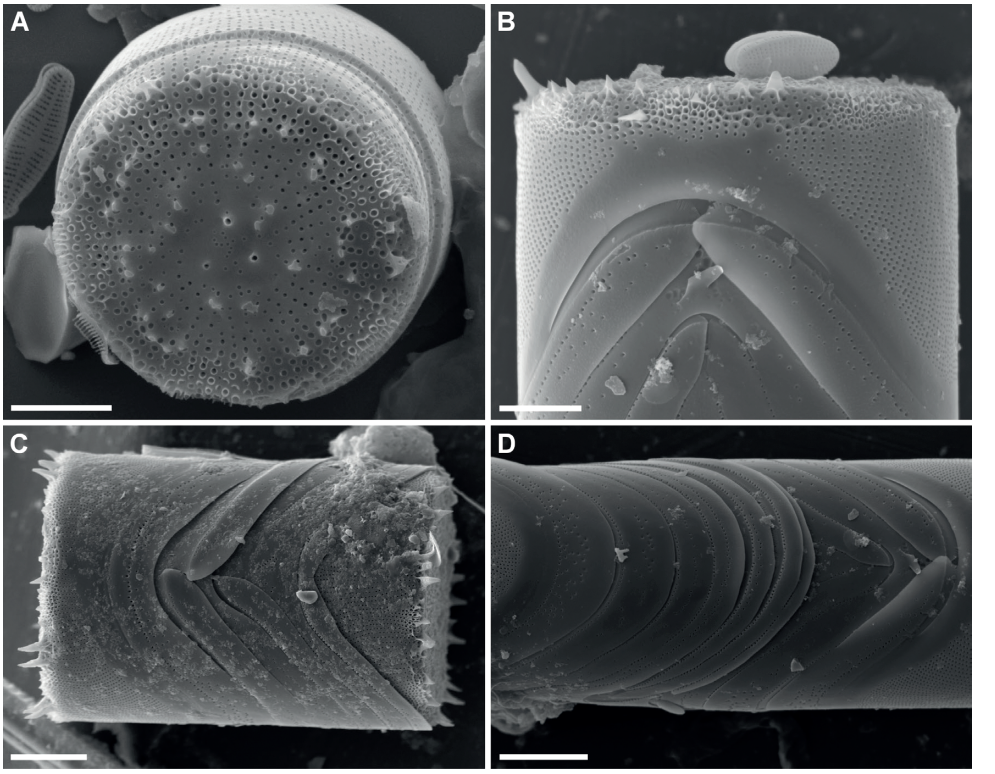


Fig. 31. *Orthoseira* spp. **A-D.** SEM. **A.** External view of valve. **B-C.** Girdle views, note the spines at the junction of the valve face and mantle. **D.** Detail of the girdle bands.
Scale bars = 10 µm (A, C-D), 5 µm (B).

Pleurosira (Meneghini) Trevisan 1848

Type species: *Pleurosira thermalis* Meneghini

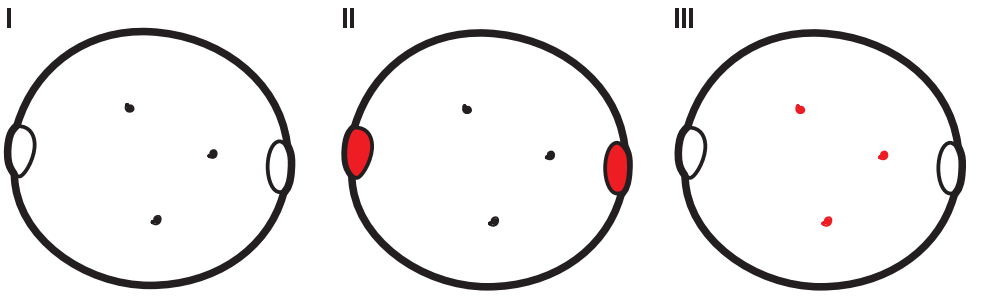
SYNONYM:
Melosira C. Agardh 1824 pro parte
Biddulphia Gray 1821 pro parte

Characteristics – Cells **centric**, oval (**orbicular**) in shape. Valve bears a number of **ocelli** (usually 2) on the valve margin (II). Areolae round, discernable under LM. Short spines and silica granules scattered over the valve face and the valve mantle (III) but may be difficult to observe using LM (Fig. 32: E). A number (1-5) of **rimoportulae** are scattered across the valve face (III; Fig. 32: A-D, E).

Plastid structure – Many small discoid plastids.

Identification of species – Up till now only one species known from tropical Africa: *Pleurosira laevis* (Ehrenberg) Compère.

Ecology – Cells exude mucilage from **ocelli** forming zig-zag chains. Typical of tropical waters with high conductivity and anthropogenically impacted habitats.



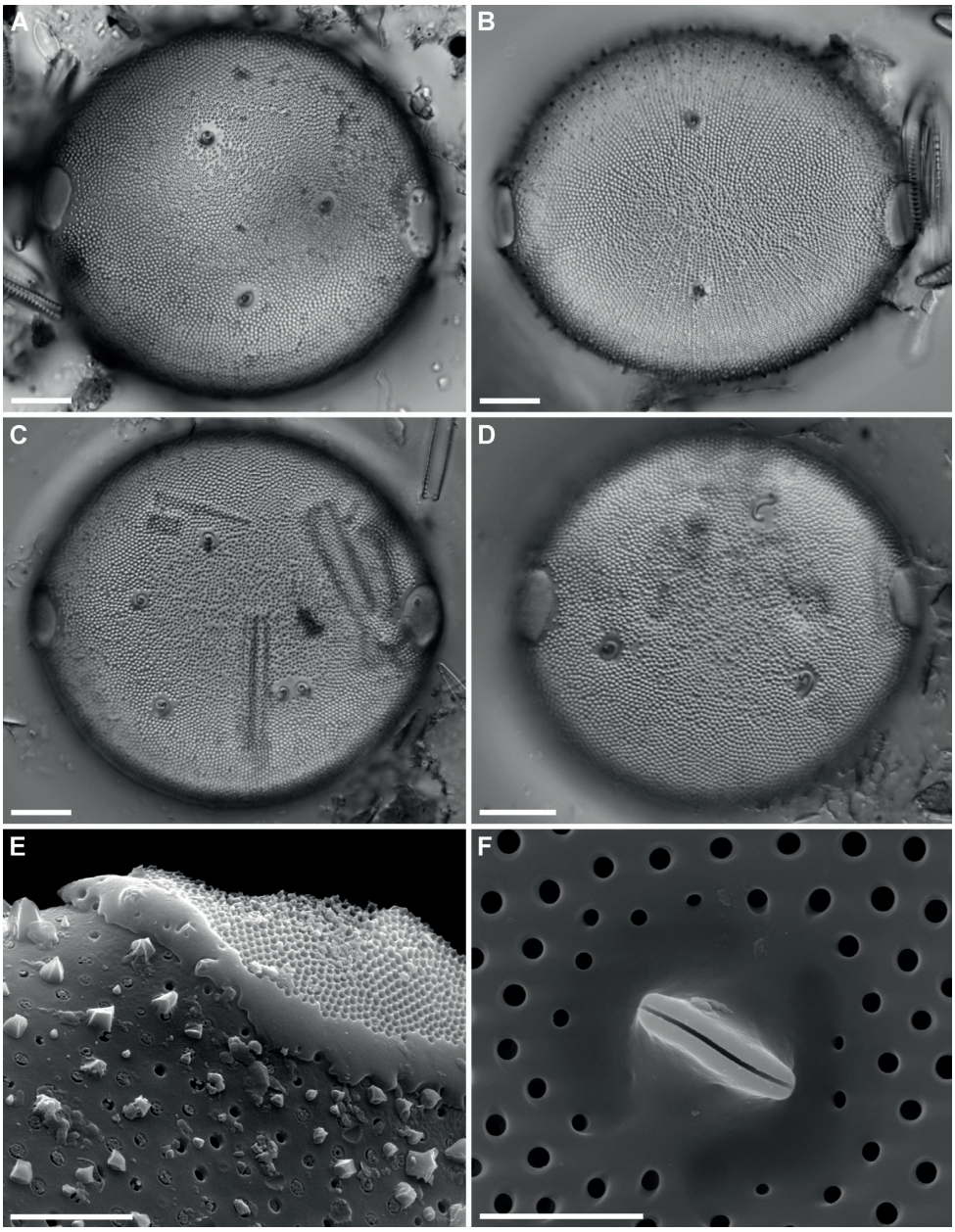


Fig. 32. *Pleurosira* laevis. **A-D.** LM, valve views, note the ocelli. **E-F.** SEM. **E.** External view of valve, detail of an ocellus. **F.** Internal view of valve, detail of a rimoportula.
Scale bars = 10 µm (A-D), 2 µm (E-F).

Urosolenia Round & R.M. Crawford 1990

Type species: *Urosolenia eriensis* (H.L. Smith) Round & R.M. Crawford

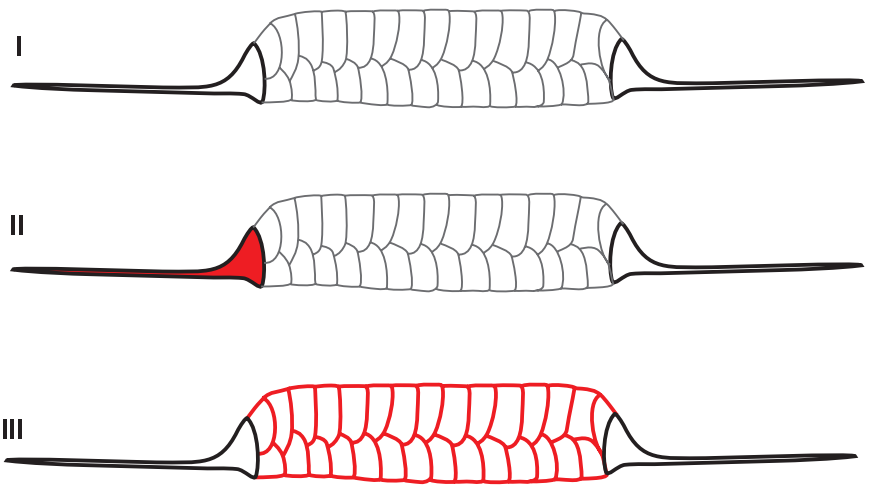
SYNONYM:
Rhizosolenia Brightwell 1858 pro parte

Characteristics – A **centric** diatom genus. Cells **cylindrical** with a small valve and elongate spine (II) on each valve. Frustule very lightly silicified, and the spines may be the only structure remaining after treatment and cleaning of the sample. The valves are joined by scale-like girdle bands (III, Fig. 33: E) (**copulae**), these copulae are rarely discernable under LM.

Plastid structure – Cells with numerous discoid plastids.

Identification of species – Species can be identified by cell size, cell shape and width and the structure of the valve.
Note: Many important cell characteristics can only be observed using SEM.

Ecology –- Cells solitary, planktonic. Found in oligotrophic waters with low to moderate conductivities.



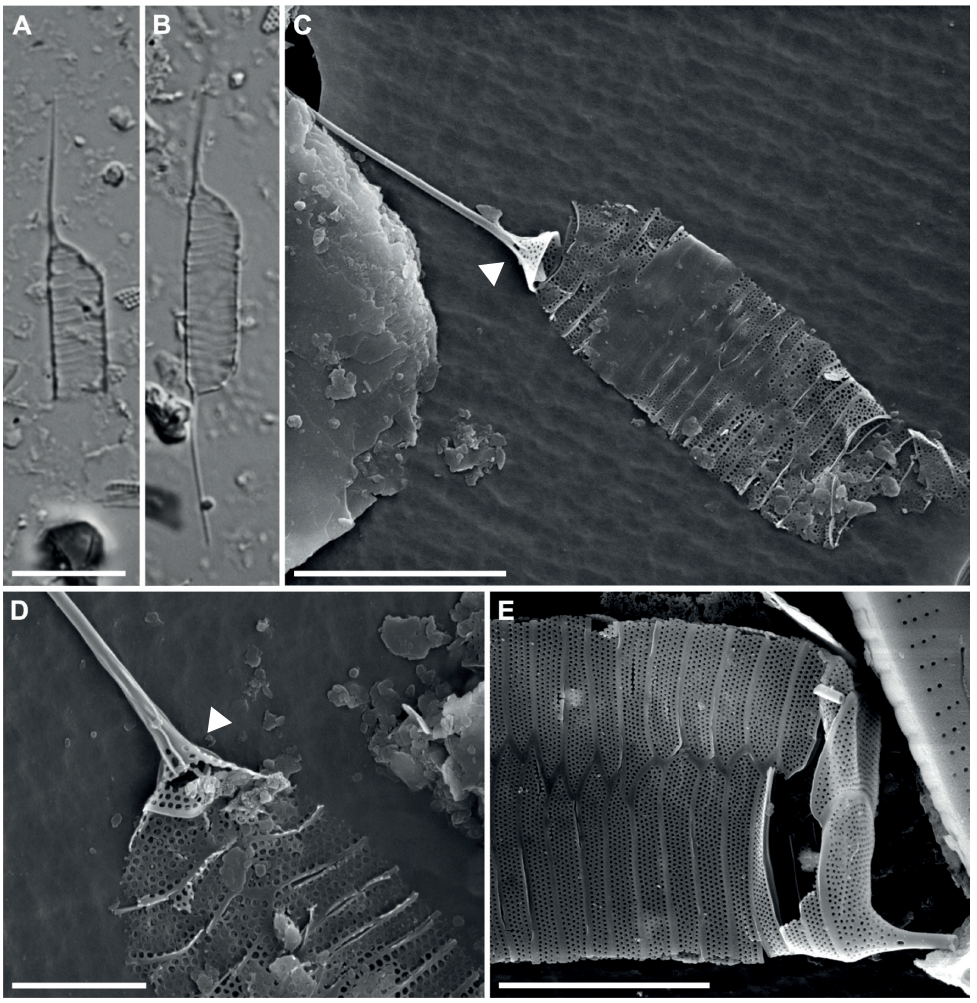


Fig. 33. *Urosolenia* spp. **A-B.** LM, girdle view. **C-E.** SEM. **C-D.** Girdle bands and valve with elongated spine (arrows). **E.** Detail of the scale like girdle bands. Scale bars = 10 µm (A-B), 5 µm (C,E), 2 µm (D).

Asterionella Hassall 1850

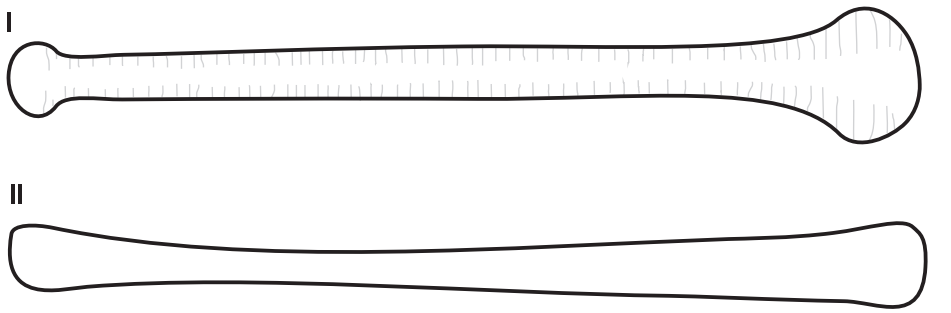
Type species: *Asterionella formosa* Hassall

Characteristics – Cells **araphid**, typically 'bone-shaped' (**heteropolar**) in valve view (I; Fig. 35: A-D) with a larger and smaller pole. Often observed in girdle view (II; Fig. 35: E-G) where one pole is also expanded. Striae are difficult to observe under LM. Spines are present at the junction of the valve face and valve mantle (Fig. 35: F, I). Rimoportulae only visible in SEM (Fig. 35: H).

Plastid structure – Many small plate-like plastids (Fig. 34: A-B).

Identification of species – Up till now only one species occurs commonly in the freshwaters of the tropics: *Asterionella formosa.*

Ecology – Cells colonial, planktonic, suspended in the water column of meso-to eutrophic lakes and impoundments and large rivers. Cells of *Asterionella formosa* secrete mucilage from the pore field of the larger pole and join to form star-like or stellate colonies (Fig. 34: A, C). The increased surface area of these colonies helps to prevent sinking through the water column.



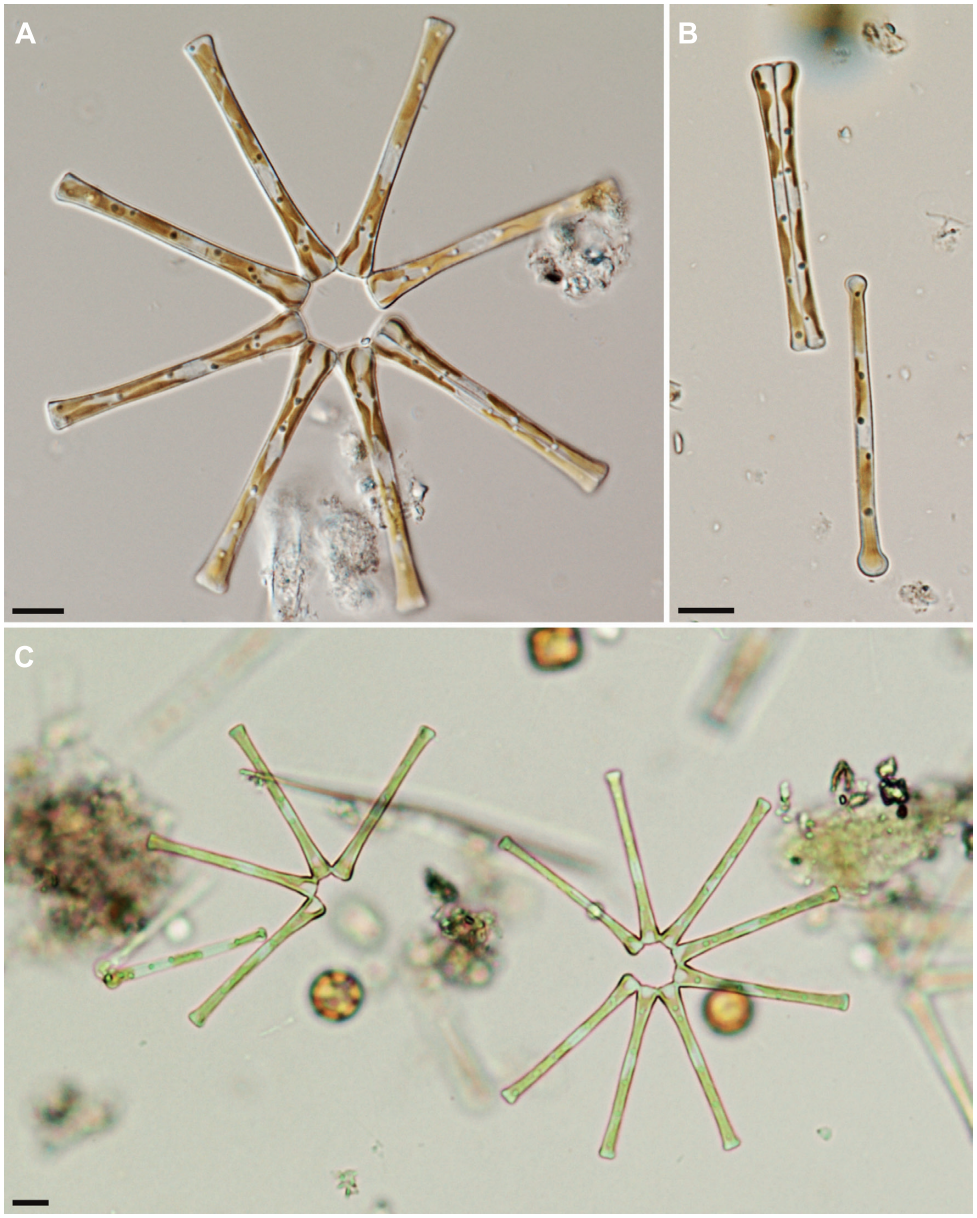


Fig. 34. *Asterionella formosa*. **A-C**. LM. **A**. Living cells, forming typical stellate colony. **B**. Living cells, girdle view, immediately post cell division (left), valve view, note typical 'bone-shape' (right). **C**. Partially formed stellate colonies. Scale bars = 10 µm (A-C).

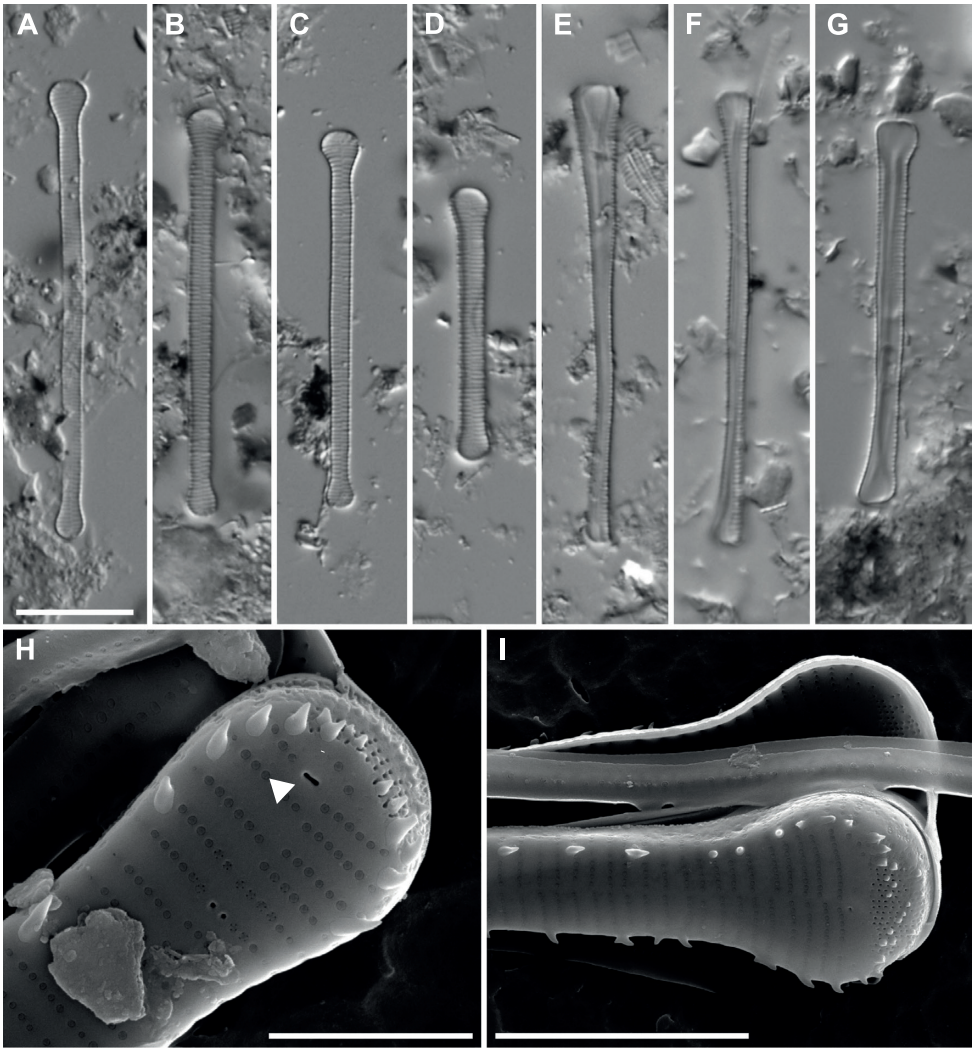


Fig. 35. *Asterionella formosa*. **A-G**. LM. **A-D**. Valve view, note very fient striae and barely visible marginal spines. **H-I**. SEM, cell apices, note apical pore fields, marginal spines and external opening of the rimoportula (arrow).
Scale bars = 10 µm (A-G), 2 µm (H), 5 µm (I).

Ctenophora Grunow ex D.M. Williams & Round 1986

Type species: *Ctenophora pulchella* (Ralfs ex Kützing) D.M. Williams & Round

SYNONYM:

Synedra Ehrenberg 1830 pro parte

Characteristics – Cells **araphid** with parallel striae through the length of the valve, areolae regularly arranged, large and easily observed under LM (Fig. 36: C,D). Areolae with complex structure (Fig. 36: E, F). **Axial area** broad. Central area large (a thickened **fascia**) with **ghost striae** (II, Fig. 36: F, H). **Rimoportula** (labiate or lipped process) present at both apices (I, Fig. 36: E, G).

Plastid structure – Cells with plate-like plastids one lying under each valve face (Fig. 36: A, B).

Identification of species – Up till now only one species known from tropical Africa: *Ctenophora pulchella.*

Ecology – Cells solitary and attached. Found in the benthos of waters with moderate to high conductivity.