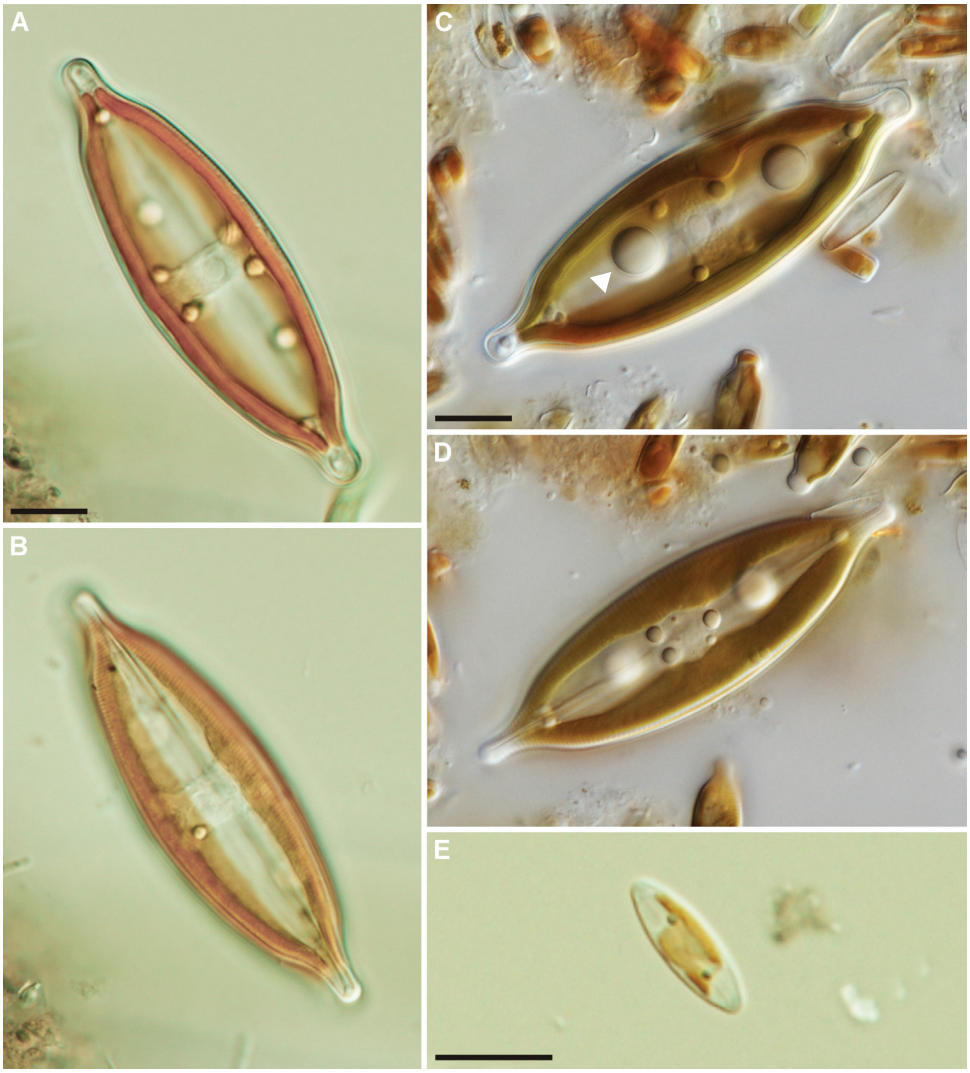


Fig. 153. *Craticula* spp. **A-E.** LM. **A-B.** Living cell of *Craticula ambigua* (Ehrenberg) D.G. Mann, valve view, different foci of same cell. **C-D.** Living cell of *Craticula ambigua*, valve view, different foci of same cell, note large lipid droplets (arrow). **E.** *Craticula molestiformis* (Hustedt) Mayama valve view. Scale bars = 10 µm.

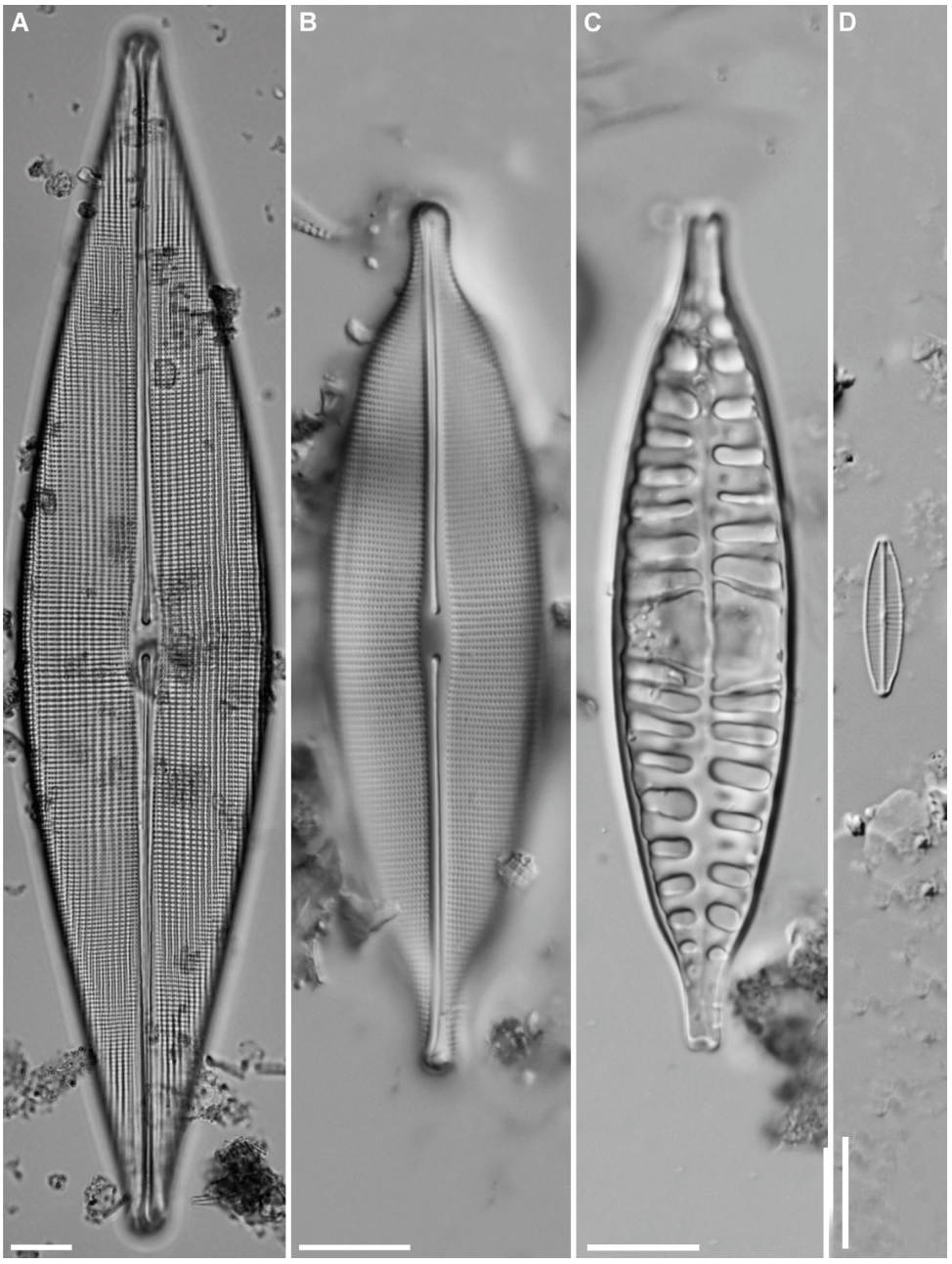


Fig. 154. *Craticula* spp. **A-D.** LM. **A.** Valve view of *Craticula perrotettii.* **B.** Valve view of *C. ambigua*. **C.** *Craticula* sp., a craticula. **D.** Valve view of *Craticula submolesta* (Hustedt) Lange-Bertalot.
Scale bars = 10 µm.

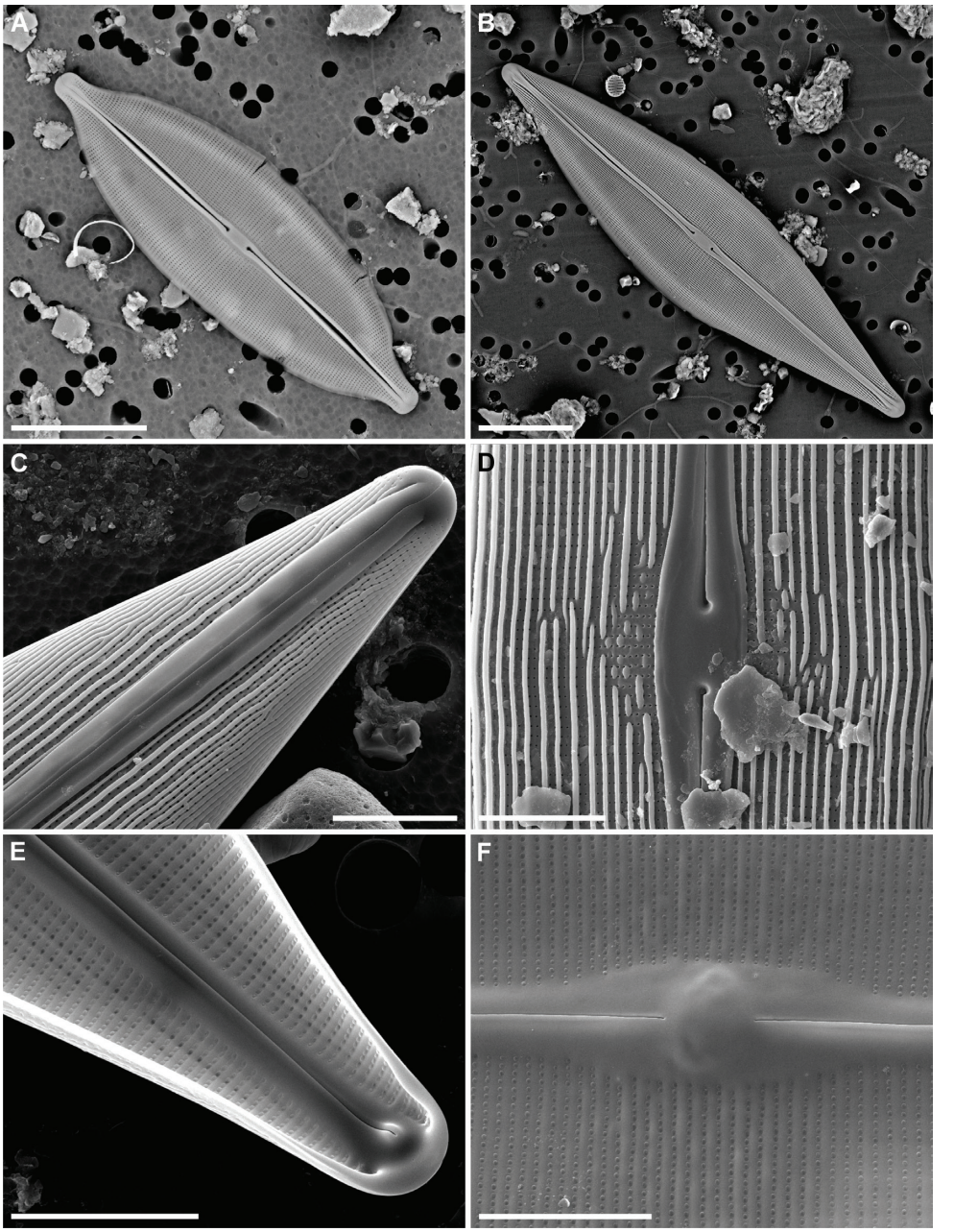


Fig. 155. *Craticula* spp. **A-F.** SEM. **A.** Valve view of *Craticula ambigua*. **B.** Valve view of *C. cuspidata* (Kützing) D.G. Mann . **C-F.** *C. perrotettii,* external view of terminal raphe ending (**C**), external view of central raphe endings (**D**), internal view of terminal raphe ending (**E**), internal view of central raphe endings (**F**). Scale bars = 20 µm (A-B), 10 µm (C-F).

Stauroneis Ehrenberg 1843

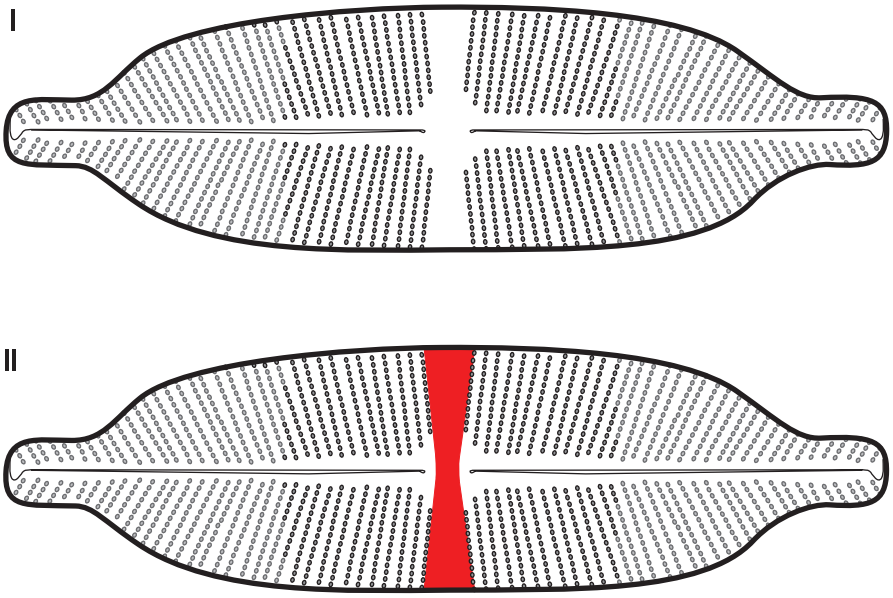
Type species: *Stauroneis phoenicenteron* (Nitzsch) Ehrenberg

Characteristics – Cells **biraphid**, cell may be large, elliptical to linear-elliptical and sub-capitate to capitate apices. Striae easily discernable under LM (Fig. 157) composed of a single row of round or elongate areolae (Fig. 158: A). Raphe carried in a sternum. **Stauros** present (II; Fig. 157; Fig. 158: D-E). **Pseudosepta** may be present at the apices (Fig. 158: C).

Plastid structure – 2 plate-like plastids extending under each valve (Fig. 156).

Identification of species – Species can be identified by cell size, cell shape, shape of the apices, structure and density of the striae, structure of the central raphe endings as well as structure of the central stauros and the presence/absence of pseudosepta.

Ecology – Cells solitary, free living and motile. Found mostly in the benthos of oligotrophic standing waters with low conductivities and also found in streams and sub-aerial habitats.



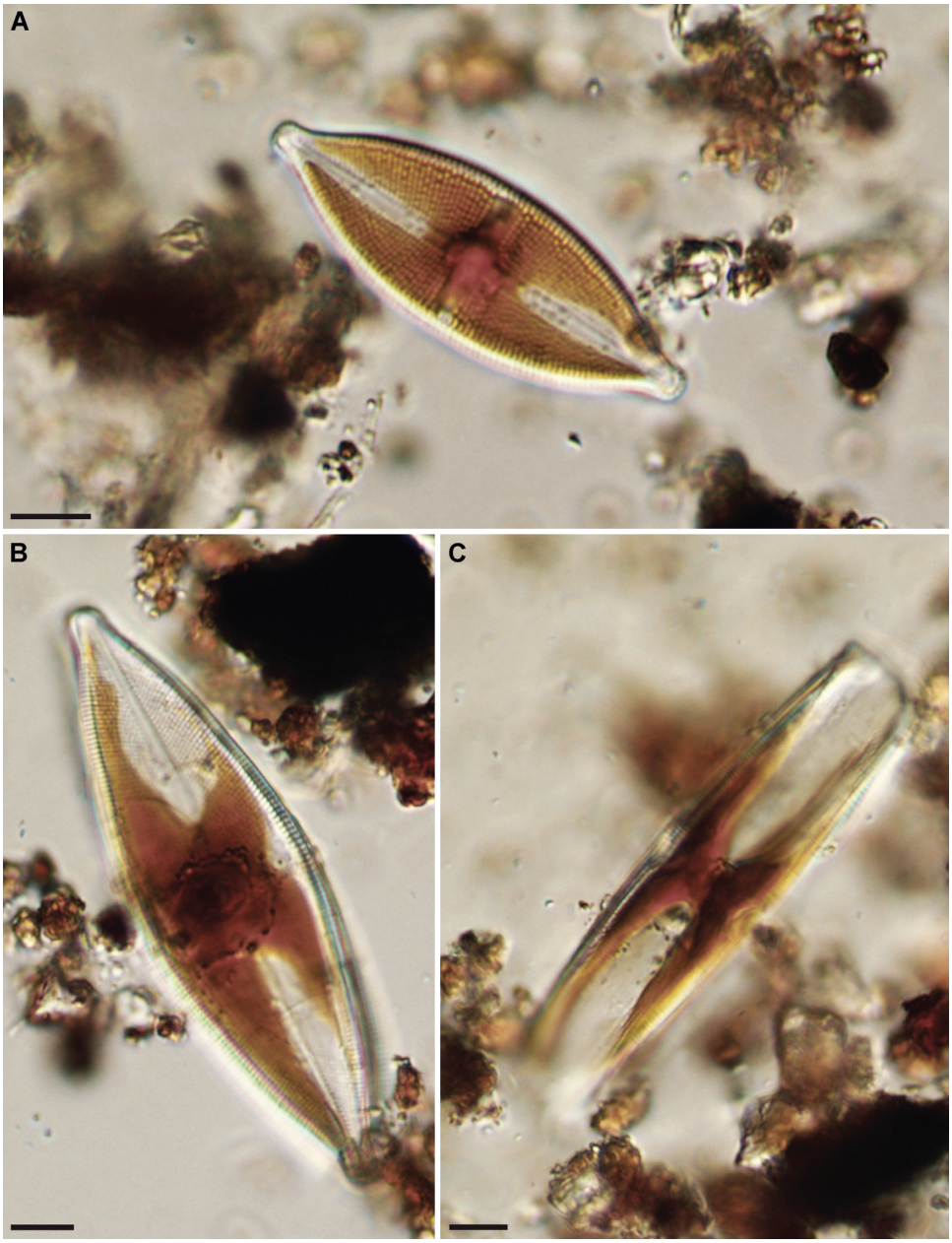


Fig. 156. *Stauroneis* spp. **A-C.** LM, living cells. **A-B.** Valve views. **C.** Girdle view. Scale bars = 10 µm.

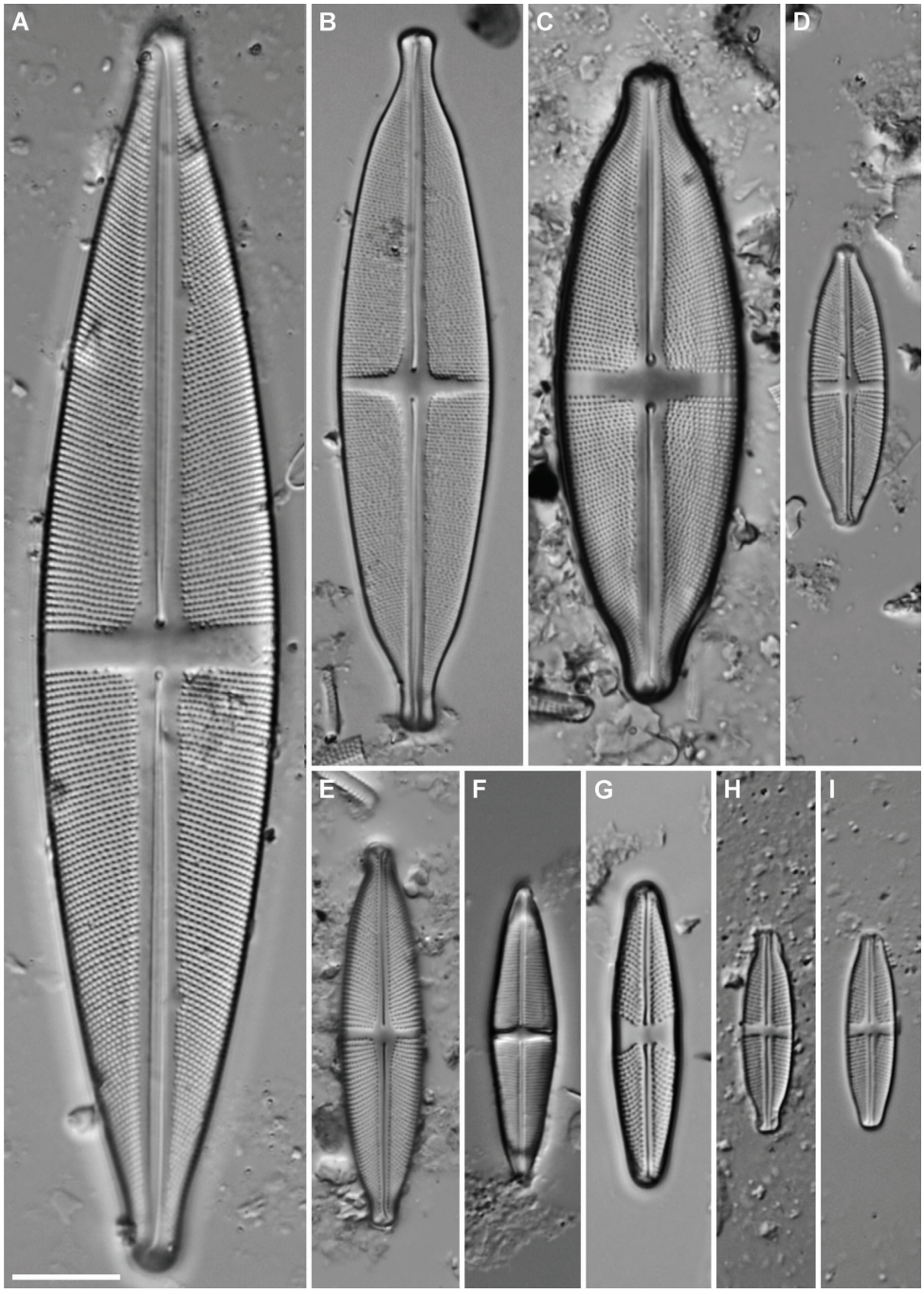


Fig. 157. *Stauroneis* spp. **A-I.** LM, cleaned valves. **B.** *Stauroneis gracilior* E. Reichardt. **H-I.** *Stauroneis kriegeri* R.M. Patrick.
Scale bar = 10 µm (A-I).

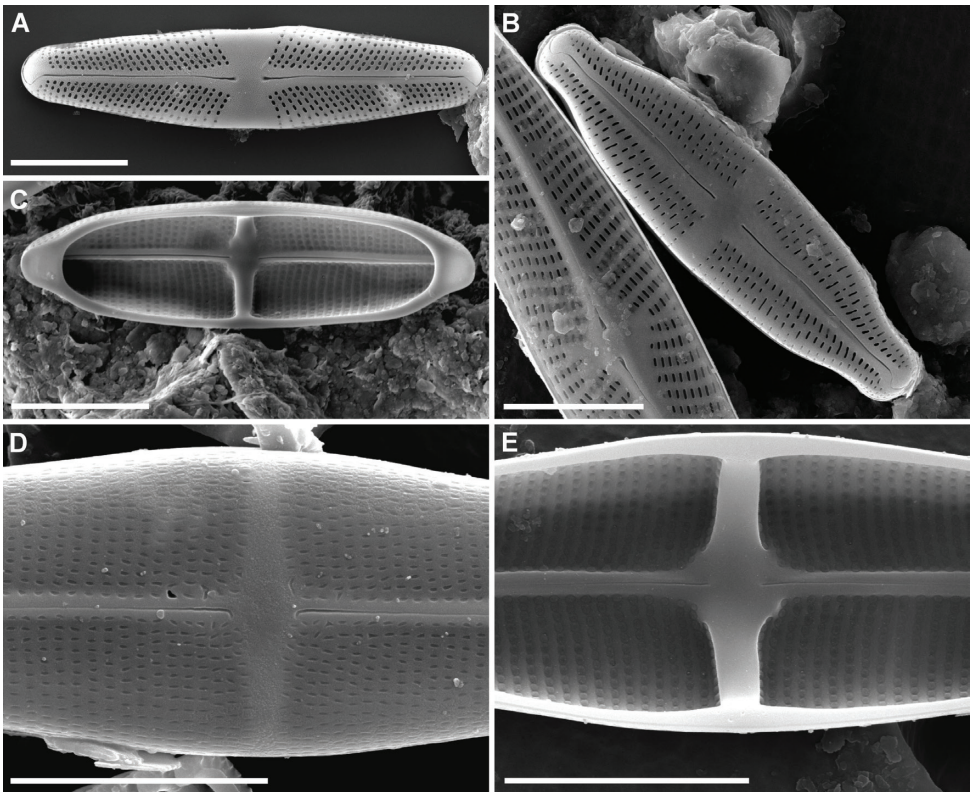


Fig. 158. *Stauroneis* spp. **A-E.** SEM. **A-B, D.** External view of valves. **B.** *Stauroneis kriegeri*. **C.** Internal view of valve, note the pseudosepta at both apices. **E.** Internal view of valve, detail of stauros. Scale bars = 5 µm (A-E).

Envekadea Van de Vijver, Gligora, F. Hinz, Kralj & Cocquyt 2009

Type species: *Envekadea hedinii* (Hustedt) Van de Vijver, Gligora, F. Hinz, Kralj & Cocquyt

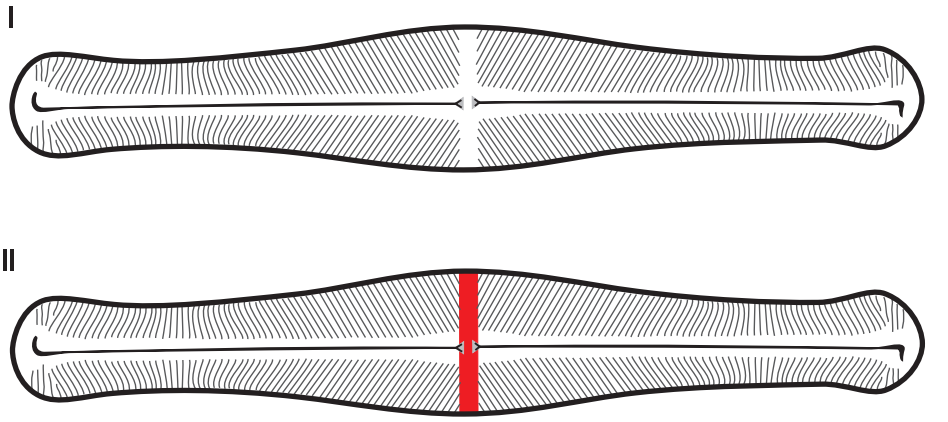
SYNONYM:
Navicula Bory 1822 pro parte
Stauroneis Ehrenberg 1843 pro parte

Characteristics – Cells **biraphid**, usually with expanded apices and expanded central region. Striae fine, strongly radiate in the mid-valve becoming strongly convergent near the apices. Raphe sigmoid, terminal raphe endings curved in opposite direction, golf club shaped under SEM, central raphe endings delta-shaped. Stauros may be present (II; Fig. 159).

Plastid structure – Cells with one H-shaped plastid.

Identification of species – Species can be identified by cell size, cell shape, shape of the apices, structure and density of the striae as well as structure of the central area.

Ecology – Cells solitary, free living and motile. Found in the benthos of oligotrophic to mesotrophic waters in both low and moderate conductivities.



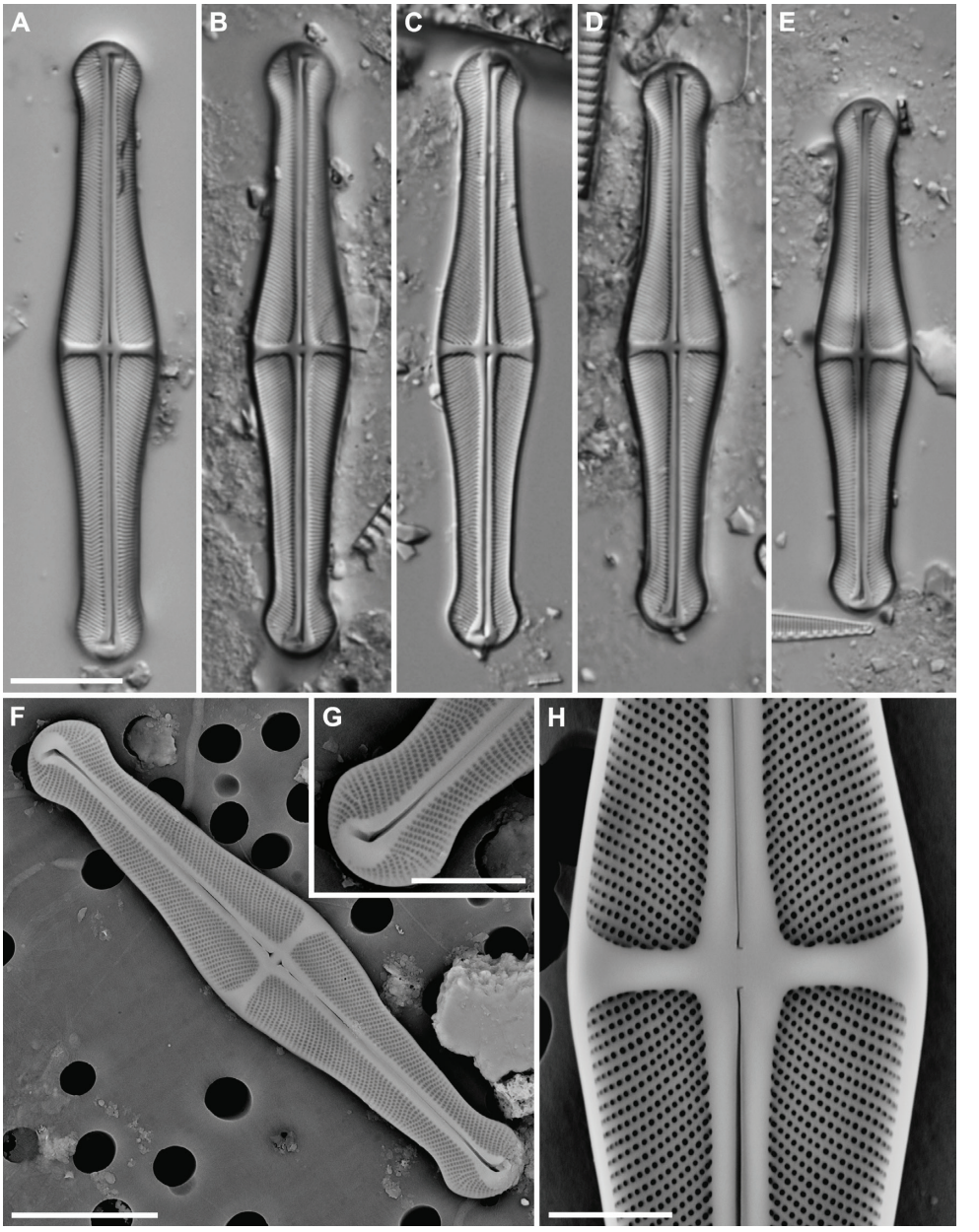


Fig. 159. *Envekadea* sp. **A-E.** LM, valve views. **F-H.** SEM, internal view of valve. **G.** Detail of apex, note golf club shaped terminal raphe ending. **H.** Detail of stauros, note delta-shaped central raphe endings.
Scale bars = 10 µm (A-F), 5 µm (G), 3 µm (H).

Amphora Ehrenberg ex Kützing 1844

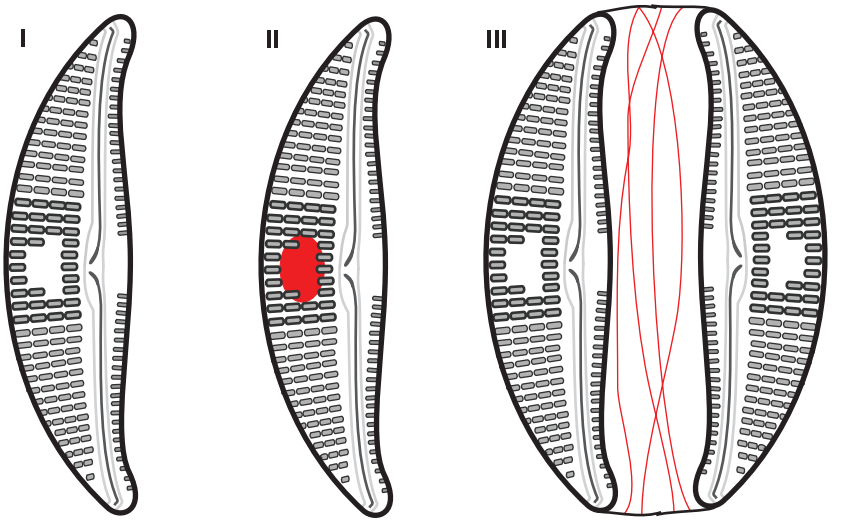
Type species: *Amphora ovalis* (Ehrenberg) Kützing

Characteristics – Cells **biraphid**, variable in terms of size and shape. Intact cells (i.e. both valves still joined by the girdle) are similar in shape to an orange segment, with the diatom valve faces being comparable to the faces of the orange segment, this is because cells have many more girdle bands on the dorsal side than on the ventral side (III; Fig. 161: A). The dorsal central striae are often separated by a thickened area of the valve known as a **semi-stauros** (II; Fig. 160: G-H; Fig. 161: D) absent in *Halamphora* Levkov. The striae on the ventral side of the valve are very short, composed of only a few areolae. In some species the areolae are clearly discernable under LM. Differentiated from *Halamphora* by the structure of the areolae (only visible under SEM).

Plastid structure – Single H-shaped plastid (Fig. 160: A). Lipid droplets (2-4) found towards the apex of each lobe of the plastid.

Identification of species – Species in this genus are distinguished based on cell size and shape and the shape of the apices. Striae density and angle relative to the **transapical axis** are also important characteristics to consider along with the size of individual areolae. The number of areolae on the ventral side of the valve is also important (IV) as well as the distance between the raphe and the ventral margin.

Ecology – Cells solitary, free living in the benthos of alkaline waters and occurring in a range of conductivities and trophic levels.



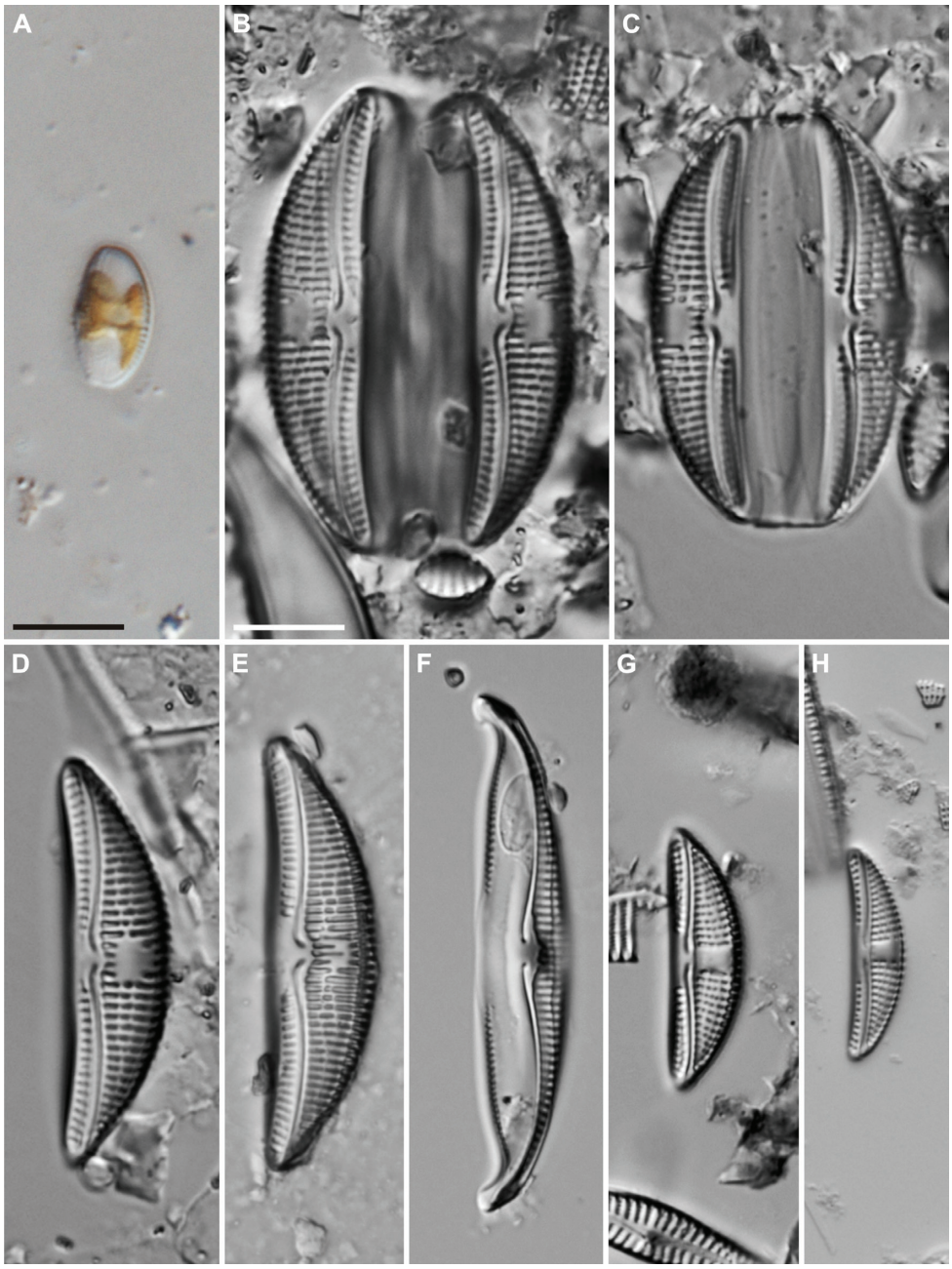


Fig. 160. *Amphora* spp. **A-H.** LM. **A.** Living cell. **B-H.** Cleaned valves. **B-D.** *Amphora copulata* (Kützing) Schoeman & R.E.M. Archibald. **E.** *Amphora ovalis*. Scale bars = 10 µm (A-H).

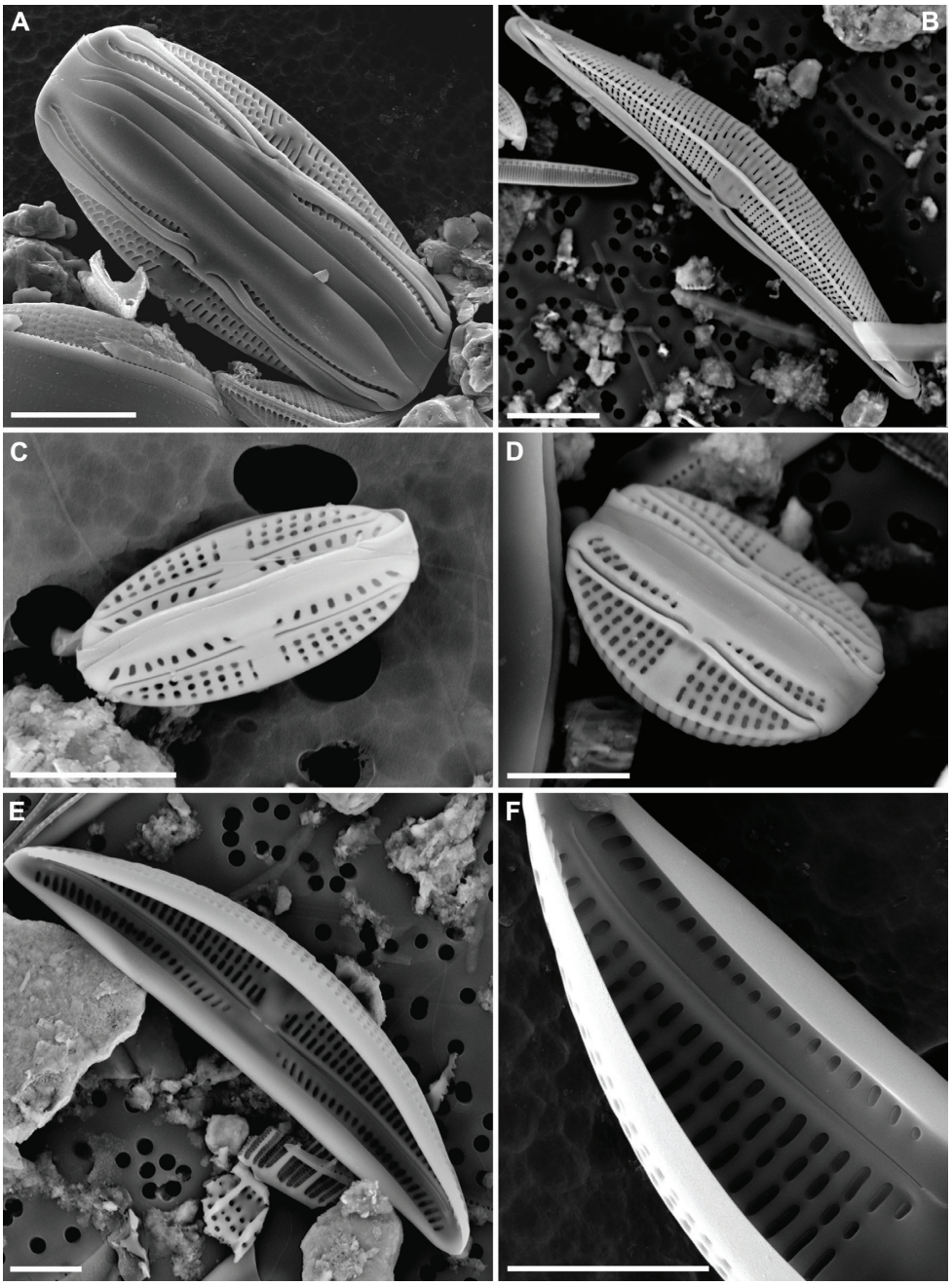


Fig. 161. *Amphora* spp. **A-F.** SEM. **A-D.** External view of valves. **C-D.** *Amphora pediculus* (Kützing) Grunow**. E-F.** Internal view of valve.
Scale bar = 10 µm (A-B), 5 µm (C-F).

Halamphora (Cleve) Levkov 2009

Type species: *Halamphora coffeaeformis* (C. Agardh) Levkov

SYNONYM:

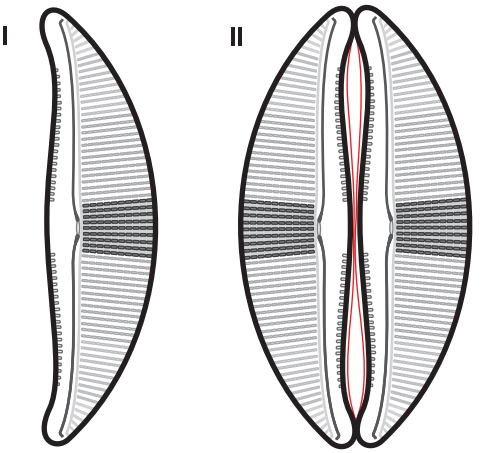
Amphora Ehrenberg ex Kützing 1844 pro parte

Characteristics – Cells **biraphid**, variable in terms of size and shape. Intact cells (i.e. both valves still joined by the girdle) are similar in shape to an orange segment, with the diatom valve faces being comparable to the faces of the orange segment, this is because cells have many more girdle bands on the dorsal side than on the ventral side (II; Fig. 163: A). Dorsal **semi-stauros** is absent. The striae on the ventral side of the valve are very short, composed of only a few areolae (Fig. 162: D, F-H; Fig. 163: C, E). In some species the areolae are clearly discernable under LM. Differentiated from *Amphora* by the structure of the areolae (only visible under SEM).

Plastid structure – Single H-shaped plastid (Fig. 162: A-B). Lipid droplets (2-4) found towards the apex of each lobe of the plastid (Fig. 162: A).

Identification of species – Species in this genus are distinguished based on cell size and shape and the shape of the apices. Striae density and angle relative to the **transapical axis** are also important characteristics to consider along with the size of individual areolae. The number of areolae on the ventral side of the valve is also important as well as the distance between the raphe and the ventral margin.

Ecology – Cells solitary, free living in the benthos. Occurs in a range of water quality with most species found at moderate conductivity and some species being specifically associated with high conductivity.



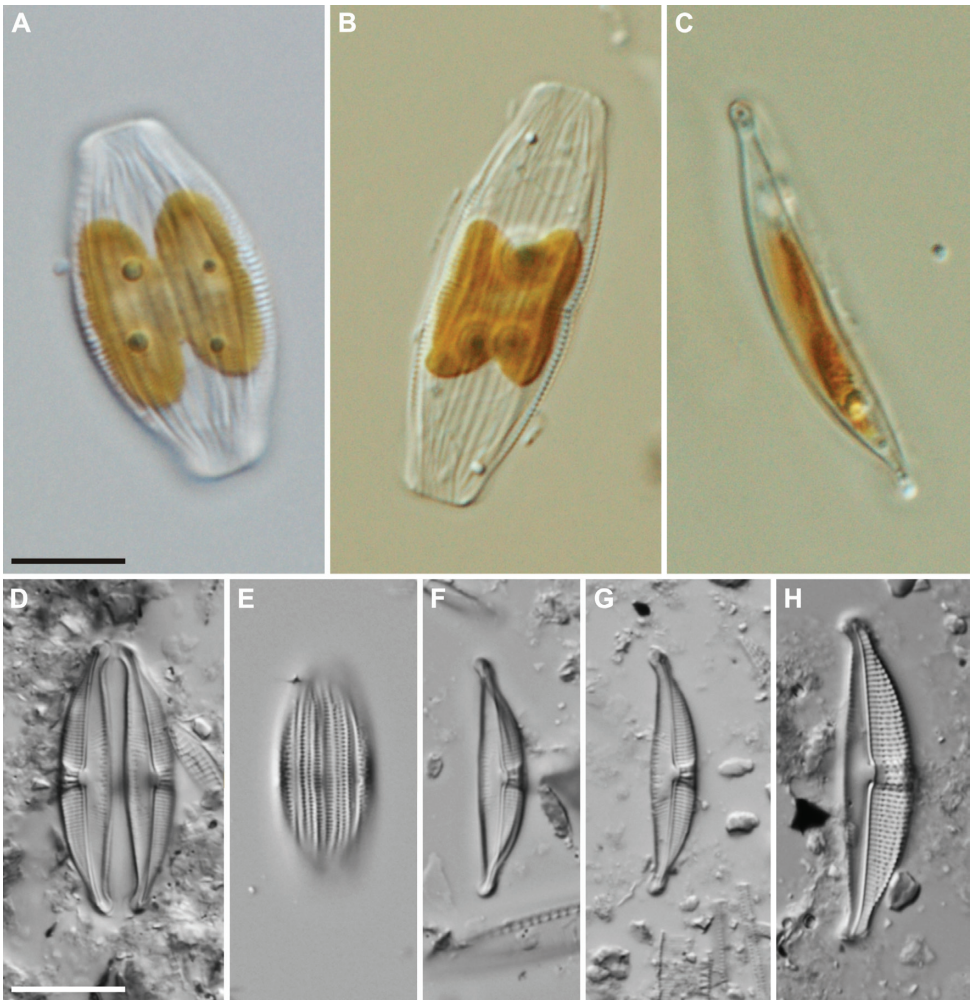


Fig. 162. *Halamphora* spp. **A-H.** LM. **A-B.** Living cells, girdle view. **C.** Living cell, valve view. **D-H.** Cleaned valves. **D, F, G.** *Halamphora submontana* Hustedt, valve view. **E.** *H. submontana*, girdle view.
Scale bars = 10 µm (A-H).

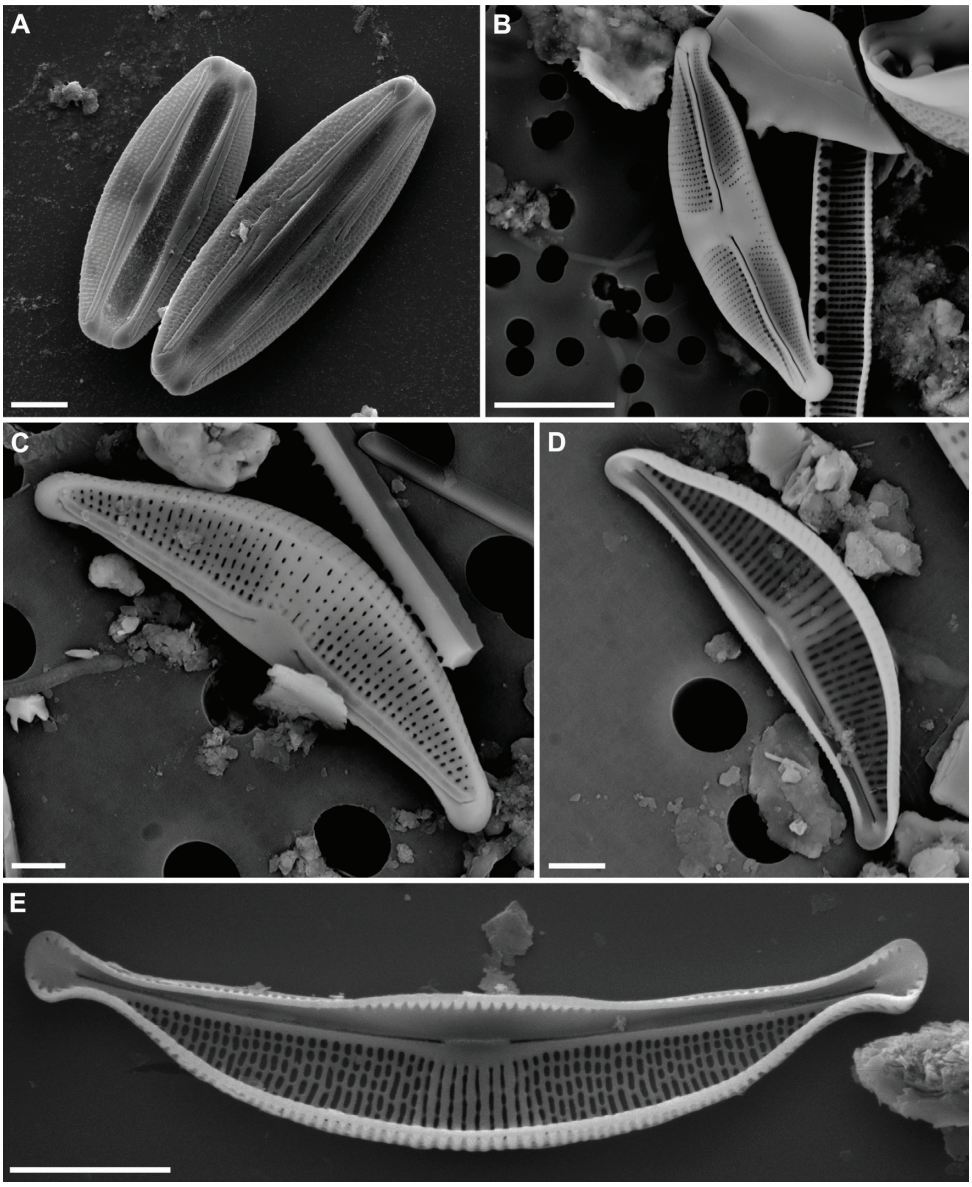


Fig. 163. *Halamphora* spp. **A-E**. SEM. **A-C.** External view of valves. **B.** *Halamphora submontana*. **D-E.** Internal view of valves. Scale bar = 5 µm (A-B, E), 2 µm (C-D).

Bacillaria J.F. Gmelin 1791

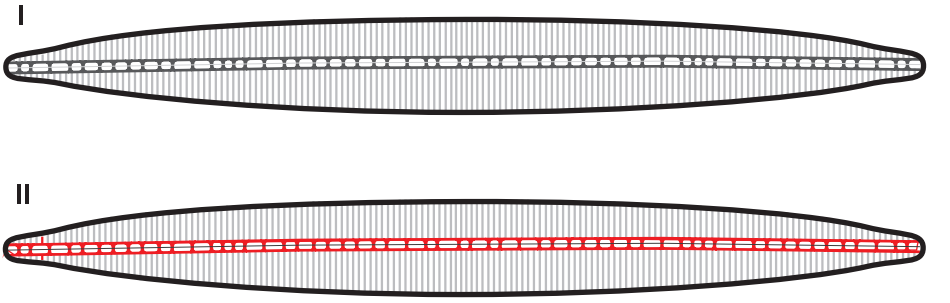
Type species: *Bacillaria paradoxa* J.F. Gmelin

Characteristics – Cells **biraphid**, large and rather robust, valve shape **linear**. Raphe located close to the center of the valve supported by robust **fibulae** (II; Fig. 164: A-B, E-F). Striae are coarse and easily discernable in LM but the areolae are indistinct.

Plastid structure – Two plate-like plastids on either side of the nucleus.

Identification of species – Up till now only one species occurs commonly in the inland waters of the tropics: *Bacillaria paradoxa.*

Ecology – Cells colonial, benthic. Found in tropical waters with high conductivity, usually in brackish to marine waters.



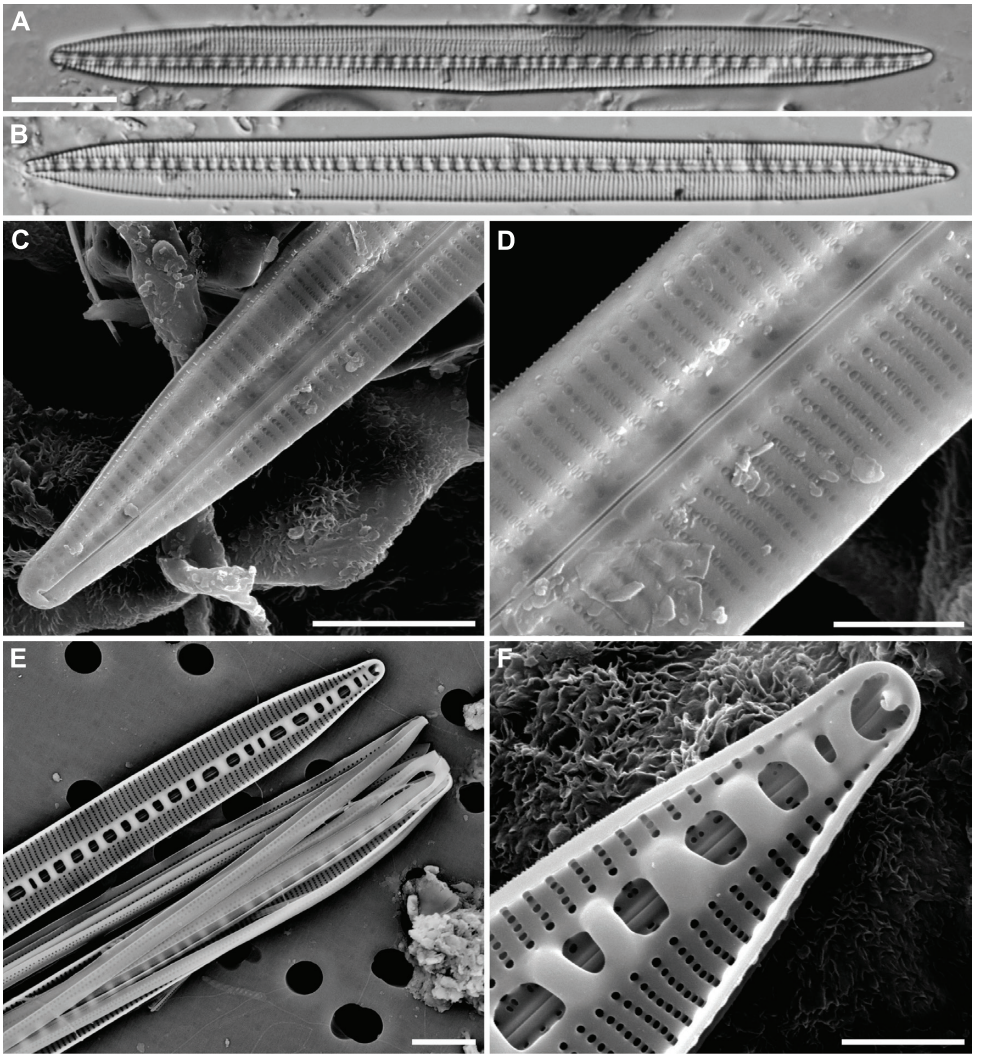


Fig. 164. *Bacillaria paradoxa*. **A-B.** LM, cleaned material, valve view. **C-F.** SEM. **C**. External view of valve showing detail of the terminal raphe ending. **D**. External view of valve showing detail of raphe slit. **E-F.** Internal view of valve showing structure of the fibulae and the copulae (**E**).
Scale bars = 10 µm (A-B), 5 µm (C, E), 2 µm (D, F).

Denticula Kützing 1844

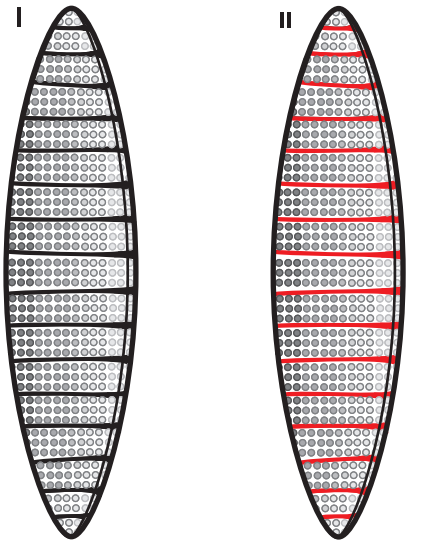
Type species: *Denticula elegans* Kützing

Characteristics – Cells **biraphid**, of variable size with prominent ribs or **transapical costae** (II) stretching across the valve face; these costae are extensions of the **fibulae**. Striae may be coarse and easily discernable or rather fine and in this case only the costae are readily discernable (Fig. 165: C-D). Costae are also clearly visible under LM in girdle view (Fig. 165: B). Raphe, not visible under LM, located at the junction of the valve face and valve mantle above the fibulae.

Plastid structure – Cells with 2 lobed plastids, each one extending from mid-valve to each apex (Fig. 165: A-B). Several small lipid droplets scattered throughout the cell (Fig. 165: B).

Identification of species – Species can be identified by cell size, cell shape, shape of the apices and structure and density of the **costae** and striae as well as the structure and density of the areolae.

Ecology – Cells solitary and motile. Found in the benthos of hard waters with medium conductivity.



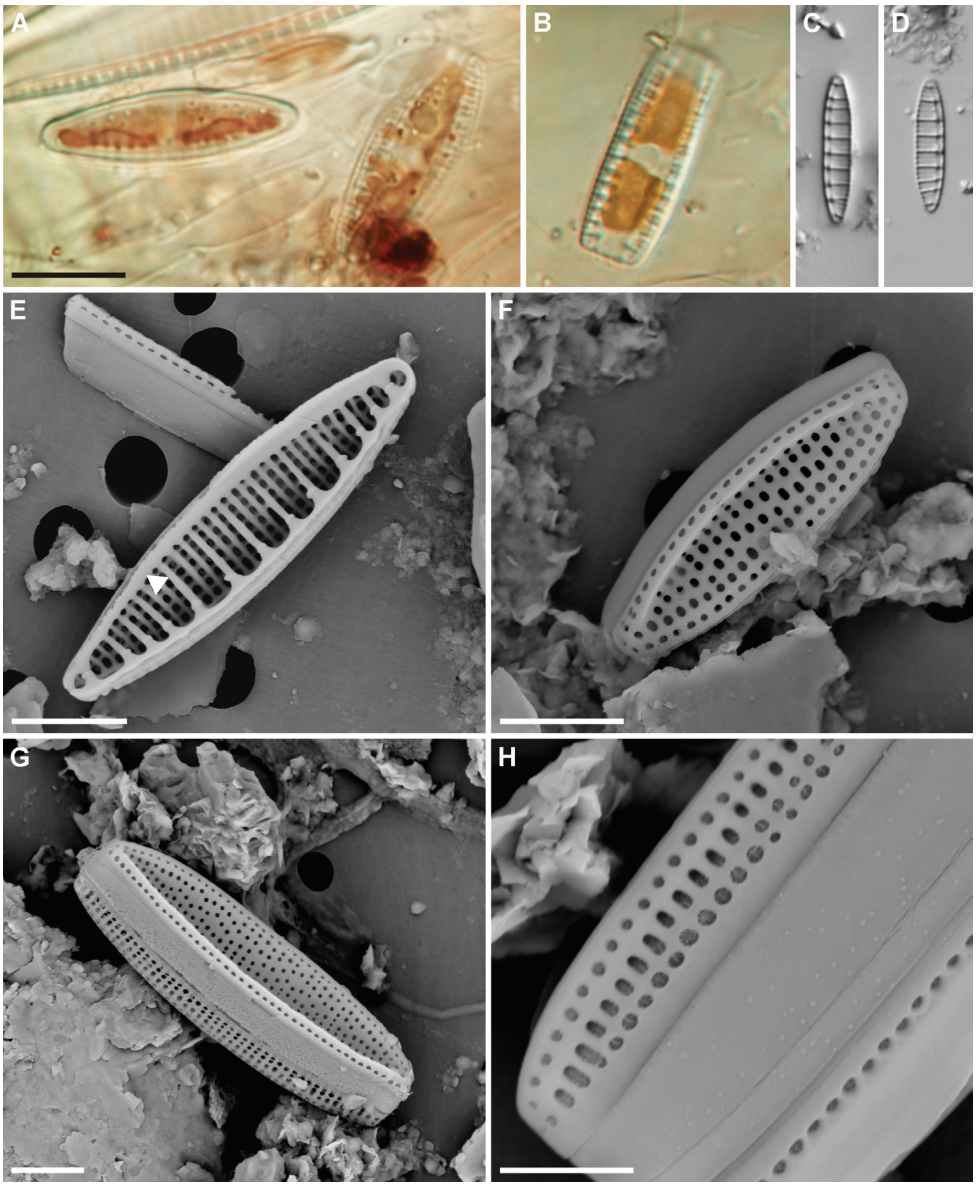


Fig. 165. *Denticula* spp. **A-D.** LM. **A-B**. Living cells of *Denticula kuetzingii* Grunow. **A**. Valve view (left), girdle view (right). **B**. Girdle view. **C-D.** *D. elegans*, valve views. **E-H**. SEM, *D. kuetzingii*. **E**. Internal view of valve, note costae (arrow). **F-G**. External view of valves. **H**. External view of girdle. Scale bars = 10 µm (A-D), 5 µm (E-G), 3 µm (H).

Gomphonitzschia Grunow 1868

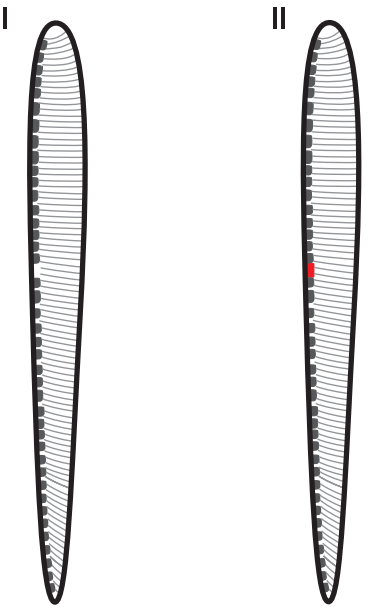
Type species: *Gomphonitzschia ungeriana* Grunow

Characteristics – Cells **biraphid**, **heteropolar**, head pole broadly rounded with a narrow foot pole. Marginal raphe supported by fibulae, central gap (II; Fig. 166: A-I, L) between the fibulae present. Striae fine, radiate, slightly curved near the head pole, composed of single rows of areolae which are discernable under LM.

Plastid structure – Cells with 2 plastids, each one extending from mid-valve to each apex.

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

Ecology – Cells solitary, free living and motile. Found in the plankton and benthos of alkaline waters with moderate conductivity.



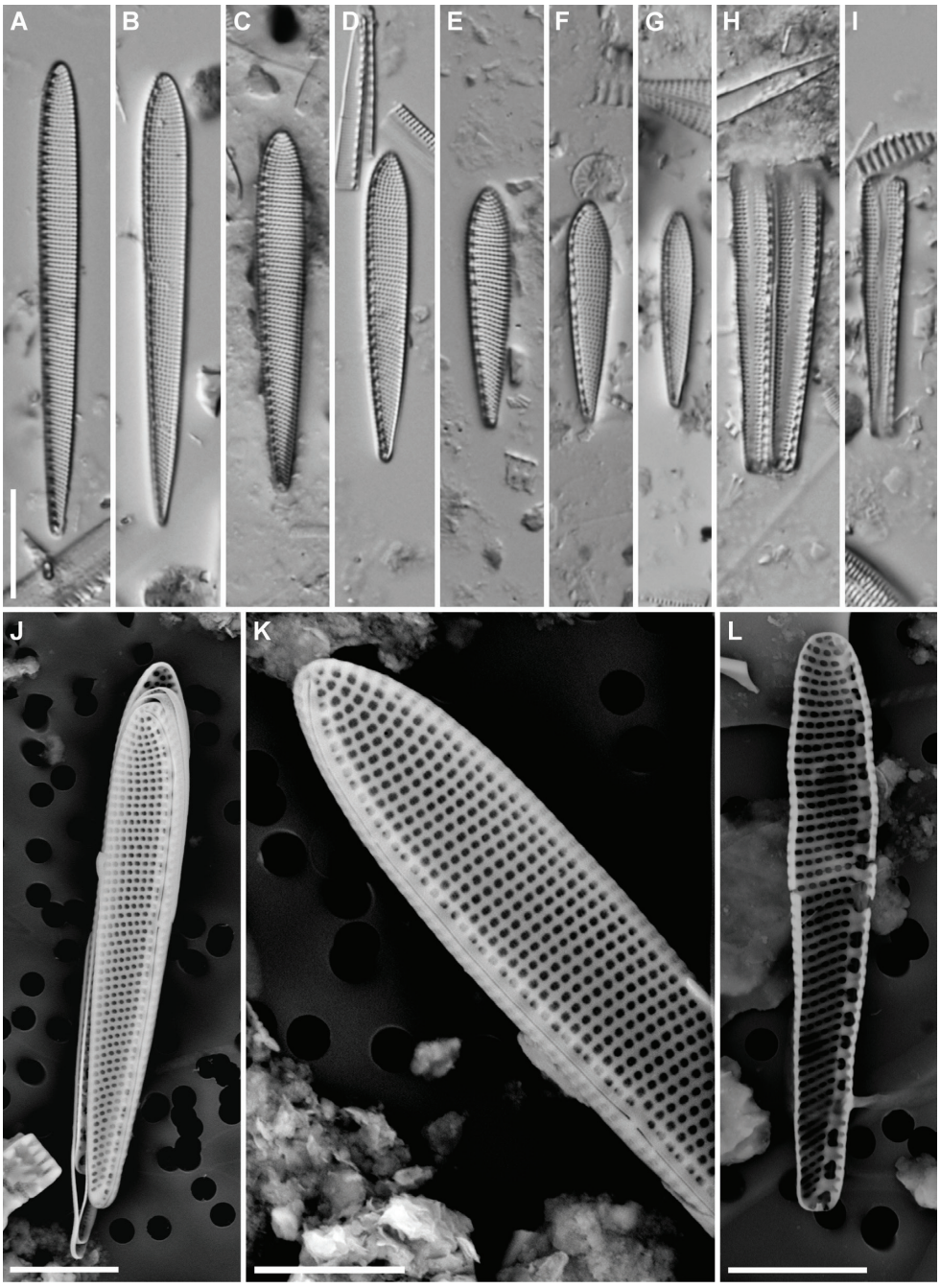


Fig. 166. *Gomphonitzschia ungeriana*. **A-I.** LM. **A-G.** Valve views. **H-I.** Girdle views. **J-L.** SEM. **J-K.** External view of valve. **L.** Internal view of valve. Scale bars = 10 µm (A-D), 5 µm (J-L).

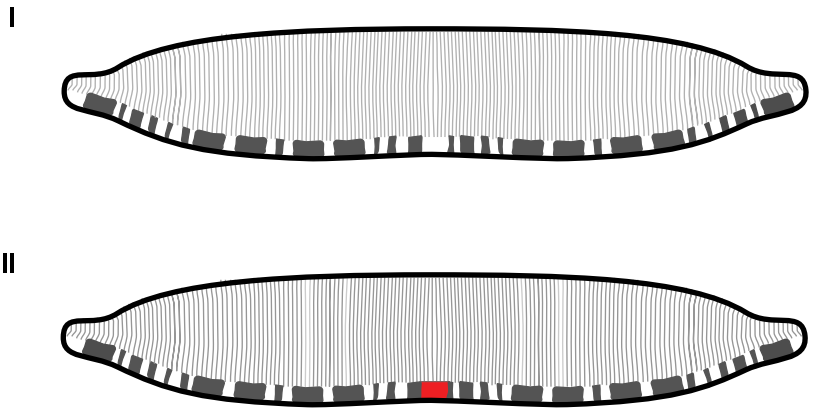
Hantzschia Grunow 1877

Type species: *Hantzschia amphioxys* (Ehrenberg) Grunow

Characteristics – Cells **biraphid**, weakly **dorsiventral**, ventral valve margin slightly concave and dorsal margin slightly convex. Rostrate apices. Raphe on the junction of valve face and mantle. Striae vary from fine to coarse, composed of single rows of areolae which may or may not be discernable under LM. Fibulae robust, easily discernable, with a central gap (I; Fig. 167: A-G) and carried on the ventral margins of both valves (**hantzschioid symmetry**).

Plastid structure – Two simple or complexly lobed plastids (Fig. 167: A-B) on either side of the central nucleus against the ventral side of the cell, or two girdle-appressed plates connected by a central pyrenoid (Fig. 167: A).

Identification of species – Species can be identified by cell size, cell shape, shape of the apices, structure and density of the striae, density and structure of the fibulae as well as structure of the areolae.



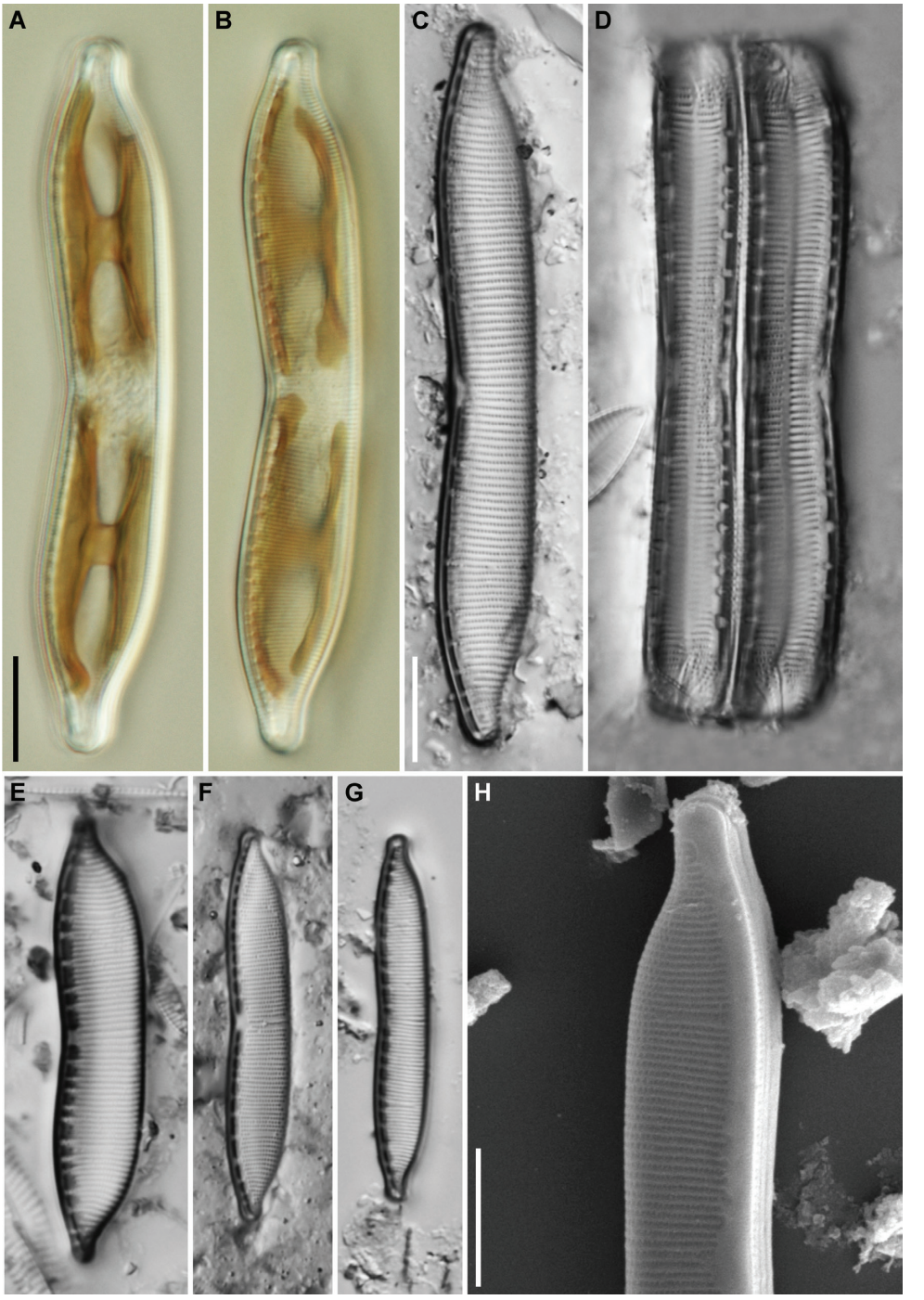


Fig. 167. *Hantzschia* spp. **A-G.** LM. **A-B.** Living cells. **C, E-G.** Cleaned valves. **D.** Girdle views. **H.** SEM, detail of external view of valve. Scale bars = 10 µm (A-G), 5 µm (H).

Nitzschia Hassall 1845

Type species: *Nitzschia elongata* Hassall

Characteristics – Cells **biraphid**, raphe eccentric, usually found at the junction of the valve face and mantle. Raphe keel is supported internally by **fibulae** (Fig. 170: H). Raphe may be continuous through the length of the valve or interrupted mid-valve (Fig. 170: D). The raphe is not discernable under LM but the presence of central raphe endings is indicated by a central gap in the fibulae (Fig. 169: A). The fibulae are variable in terms of shape (II), size (width) (III), extent across the valve face (IV) as well as the spacing between them (V). *Nitzschia dissipata* (Kützing) Rabenhorst and allied taxa are characterised by a raphe which is eccentric but not located at the junction of the valve face and mantle but more toward the valve centre (VI). This group also has an external conopeum covering the raphe (Fig. 170: G). Striae composed of single rows of round areolae which may or may not be discernable under LM, individual areolae may be discernable under LM.

Plastid structure – Cells with 2 plastids, each one extending from mid-valve to each apex (Fig. 168: F). Several small lipid droplets scattered throughout the cell (Fig. 168: A-C).

Identification of species – Species can be identified by cell size, cell shape, shape of the apices, structure and density of the striae as well as structure and arrangement of the fibulae and the presence or absence of a central gap.

Ecology – Cells usually solitary, usually free living and motile but do form colonies within mucilage tubes. Found in the plankton and benthos of acidic to alkaline, oligotrophic to hypereutrophic waters in low to high conductivities.