



Fig. 114. *Frustulia* spp. **A-D.** LM, living cells. **A, D.** Cells inhabiting mucilage (arrow) tubes. **B.** Valve view, not large lipid droplets. **C.** Girdle view. Scale bars = 10 μ m (A-D).

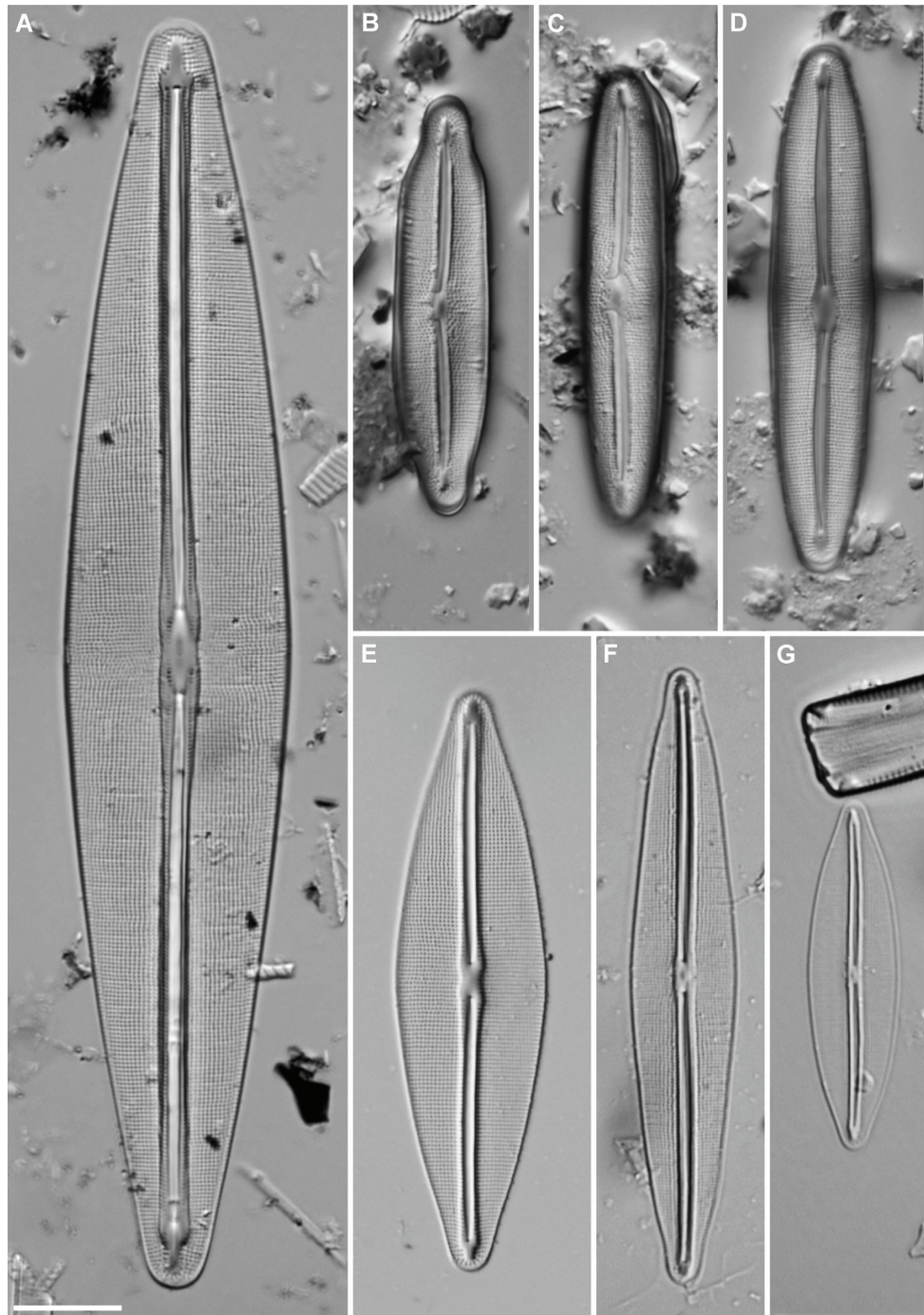


Fig. 115. *Frustulia* spp. **A-G.** LM, cleaned valves.
Scale bar = 10 μ m (A-G).

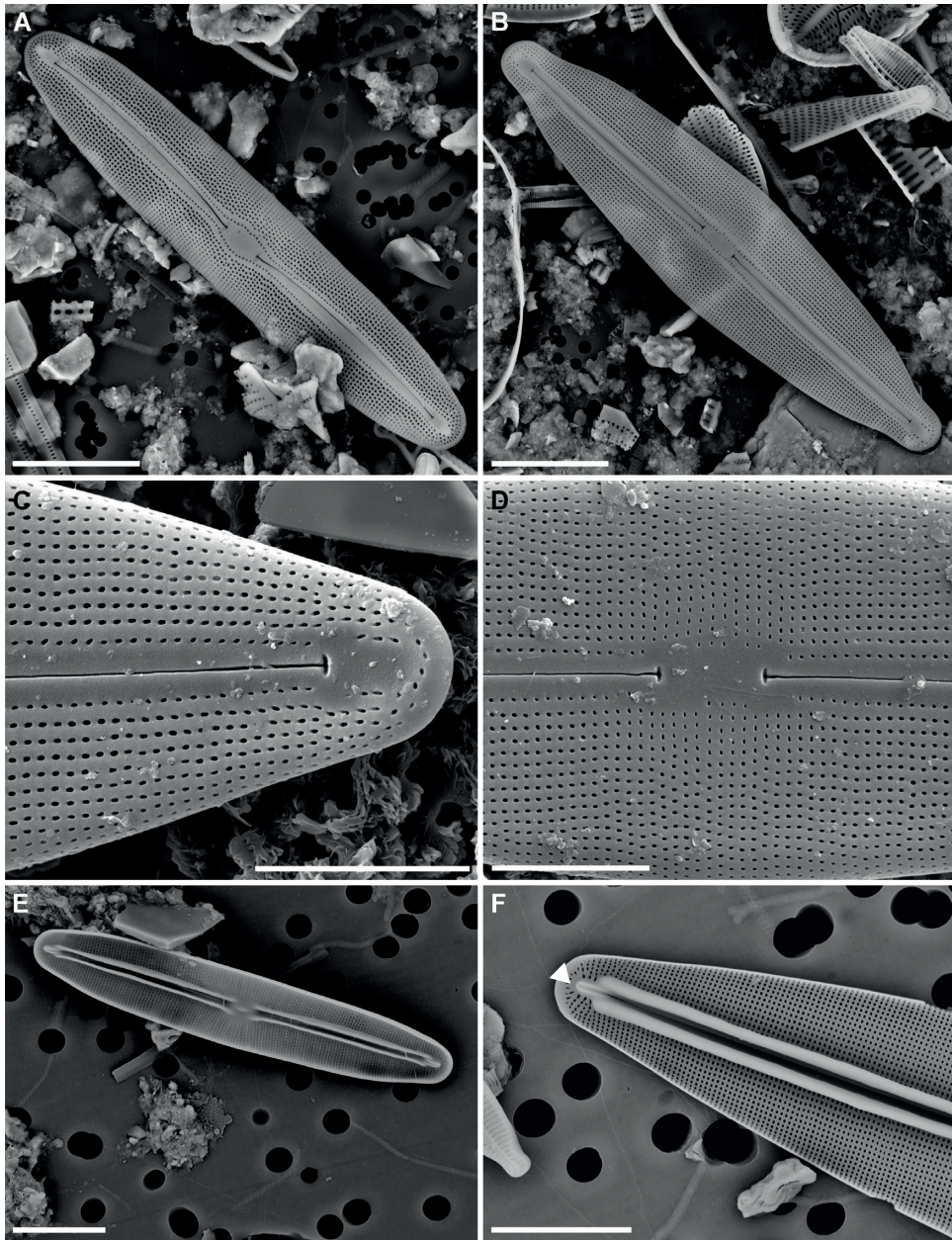


Fig. 116. *Frustulia* spp. **A-F.** SEM. **A.** *F. vulgaris* (Thwaites) De Toni, external view of valve. **B.** External view of valve of *Frustulia* sp. **C.** External view of valve, detail of apex. **D.** External view of valve, detail of central area, note T-shaped raphe endings. **E.** *F. vulgaris*, internal view of valve. **F.** *F. vulgaris*, internal view of valve, detail of apex, note helictoglossa (arrow).
 Scale bars = 10 μm (A-B, E-F), 5 μm (C-D).

Brachysira Kützing 1836

Type species: *Brachysira aponina* Kützing

SYNONYM:

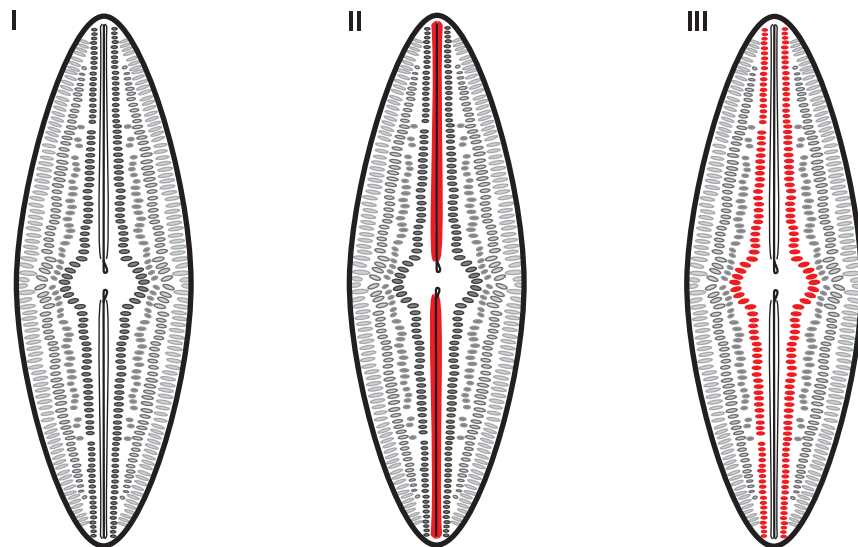
Anomoeoneis Pfitzer 1871 pro parte

Characteristics – Cells **biraphid**, size and shape variable, linear or linear-lanceolate sometimes cruciform, **biraphid** with raphe located between 2 distinct transapical ribs (II, Fig. 117: K, Fig. 118: B). Axial area very narrow. Areolae distinct and irregular in distribution creating undulating longitudinal lines (III).

Plastid structure – Single plastid with lobes extending under each valve face (Fig. 117: A-D). Large lipid droplets visible (Fig. 117: B).

Identification of species – Species in this genus are distinguished based on cell size and shape and the shape of the apices. Size of the areolae is an important characteristic to consider as well as the presence or absence of a distinct swelling in the central area.

Ecology – Cells solitary and motile. Found in acidic oligotrophic waters.



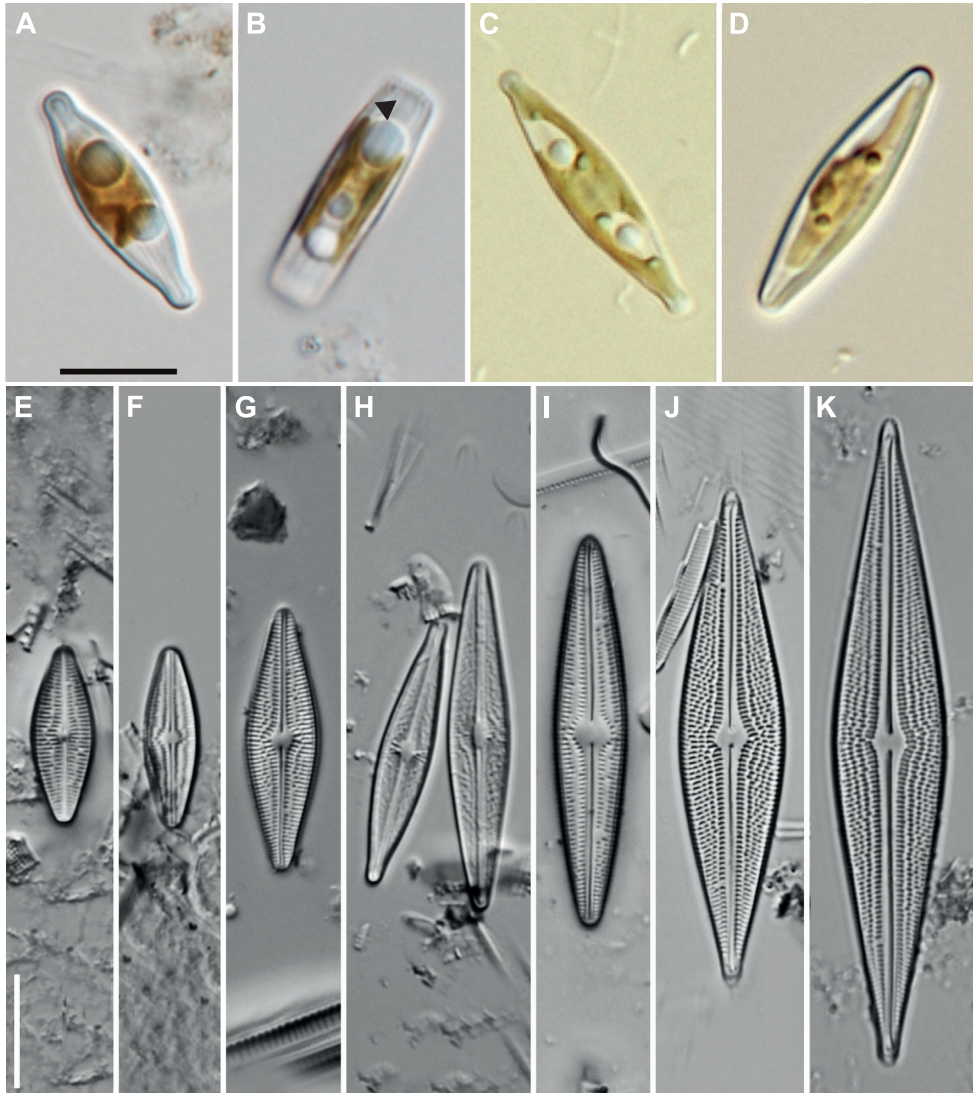


Fig. 117. *Brachysira* spp. **A-K.** LM. **A-D.** Living cells. **A, C-D.** Valve view. **B.** Girdle view, note large lipid droplets (arrow). **E-K.** Cleaned material showing valve views. Scale bars = 10 μ m (A-K).

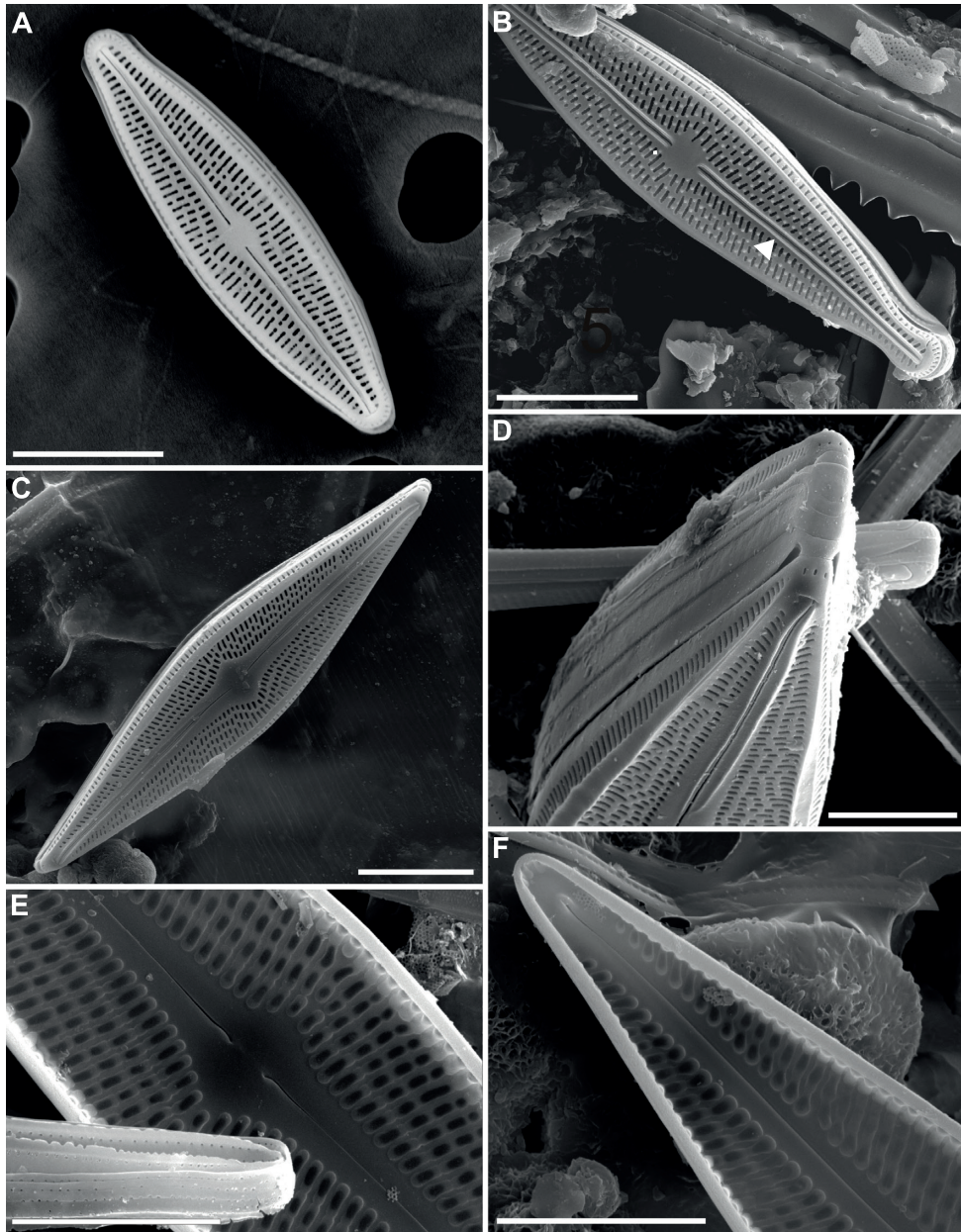


Fig. 118. *Brachysira* spp. **A-F.** SEM. **A-C.** External view of valve, note transapical rib (arrow - **B**). **D.** External view of valve, cell apex showing structure of terminal raphe ending. **E.** Internal view of valve showing central raphe endings. **F.** Internal view of valve showing terminal raphe ending and helictoglossa. Scale bars = 5 μm (A-B, D-F), 10 μm (C).

***Neidium* Pfitzer 1871**

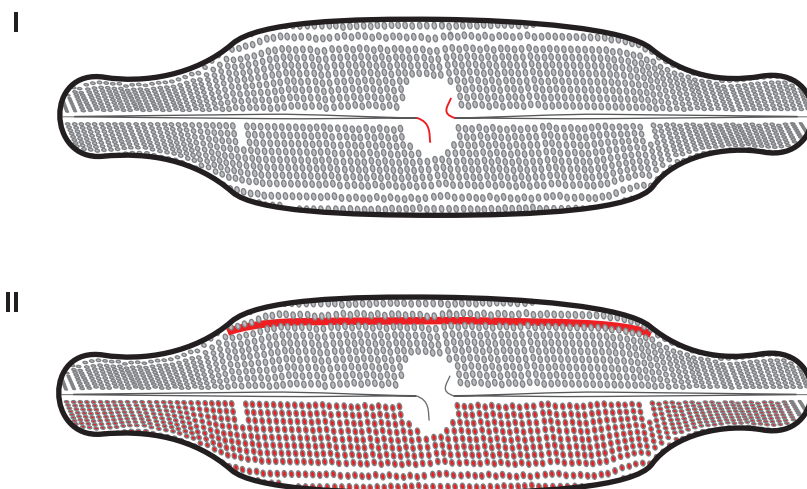
Type species: *Neidium affine* (Ehrenberg) Pfitzer

Characteristics – Cells **biraphid**, variable in size and outline, usually linear to linear elliptic with strongly protracted capitate or rostrate apices. Some taxa have undulate (Fig. 119: E) or tri-undulate valve margins and acutely rounded apices (Fig. 119: D). Striae are coarse, composed of single rows of easily discernable areolae. Striae may be convergent on the upper half of the valve and radiate on the lower half (II). Raphe has distinctive central endings, deflected in opposite directions, which can be hooked or curved or have one hooked and one curved ending (I; Fig. 120: A-C; Fig. 121: A, C). Striae interrupted near the margin by one or several longitudinal hyaline lines (II; Fig. 119: B-E, G-I; Fig. 120: A-C). Voight discordance is clearly discernable (II; Fig. 120: B; Fig. 121: B).

Plastid structure – Cells with 4 plastids each containing a pyrenoid and extending under the valve faces (Fig. 119: A).

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

Ecology – Cells solitary, free living and motile. Found in the benthos of acidic and alkaline oligotrophic waters with moderate conductivities.



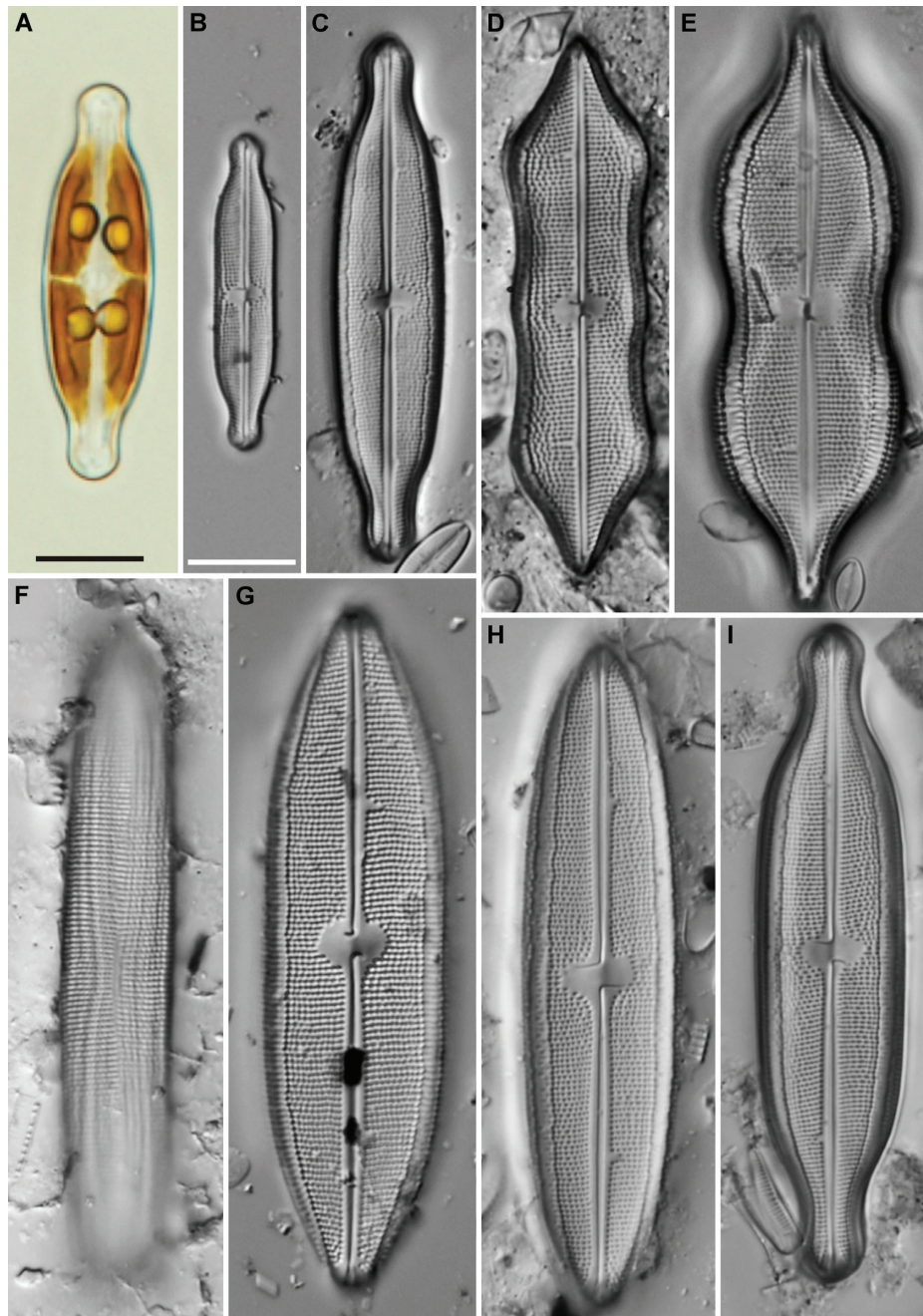


Fig. 119. *Neidium* spp. **A-I.** LM. **A.** Living cell, note the 4 plastids each bearing a pyrenoid. **B-I.** Cleaned valves. **B-E, G-I.** Valve views, note longitudinal hyaline lines near the valve margin. **F.** Girdle view. Scale bars = 10 μm (A-I).

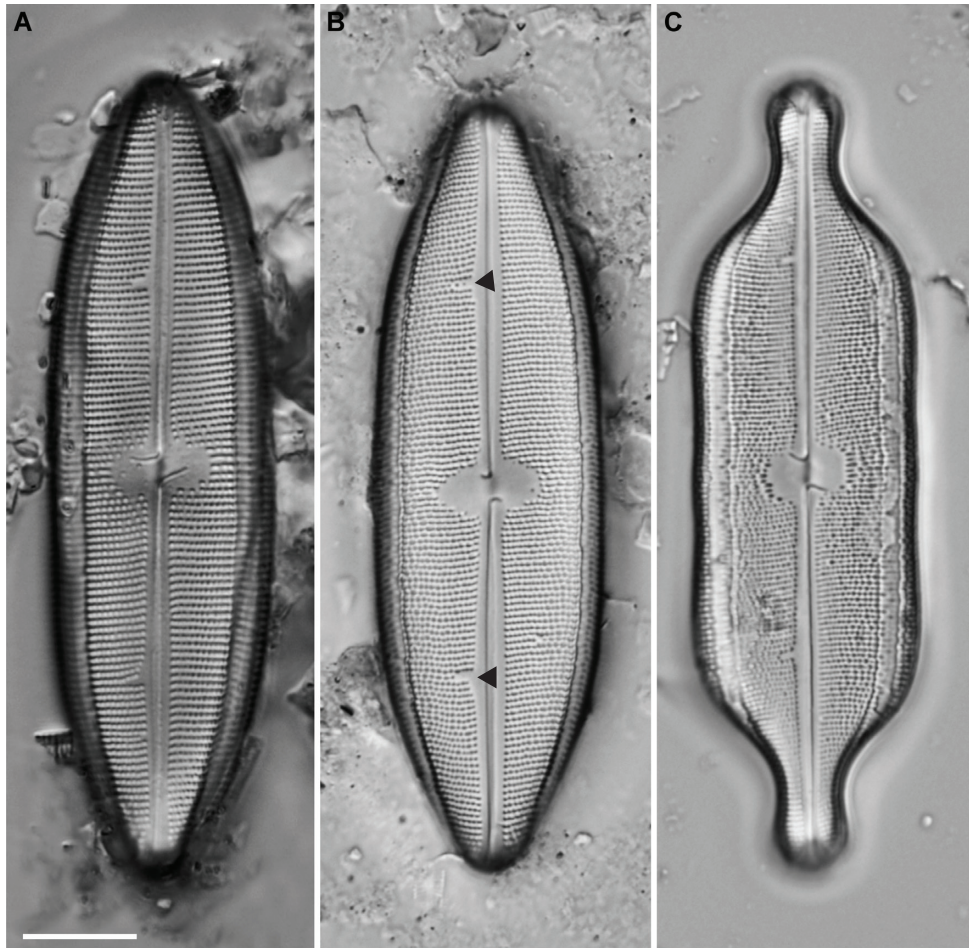


Fig. 120. *Neidium* spp. **A-C.** LM, valve views, note longitudinal hyaline lines near the valve margin and the Voigt discordance (arrows - **B**).
Scale bar = 10 μ m (A-C).

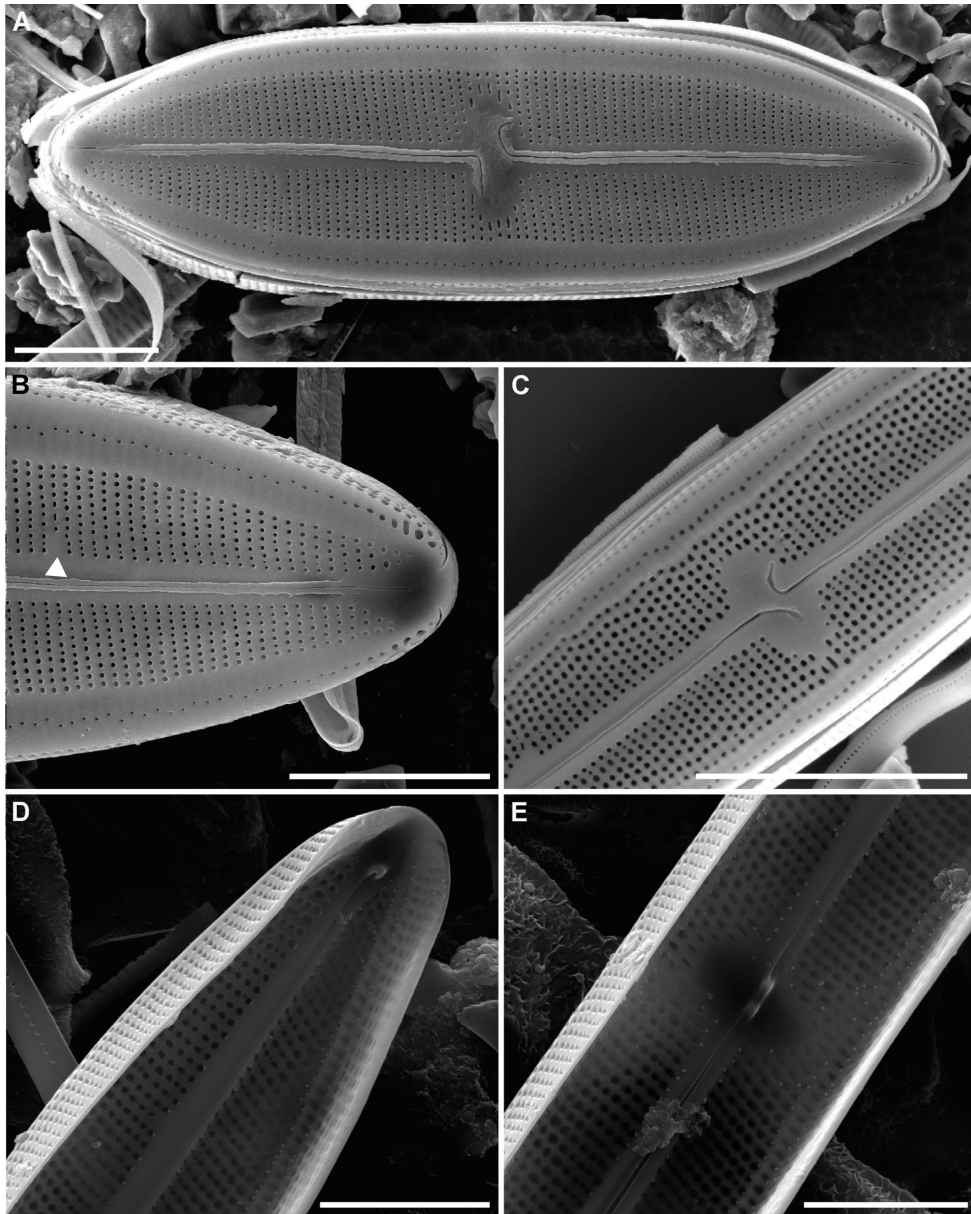


Fig. 121. *Neidium* spp. **A-E.** SEM. **A.** External view of entire valve. **B.** Detail of apex, note Voight discordance (arrow). **C.** Detail of central raphe endings, deflected in opposite directions, **D-E.** Internal view of valve. Scale bars = 10 μm (A-C), 5 μm (D-E).

Fallacia Stickle 1990

Type species: *Fallacia pygmaea* (Kützing) Stickle & D.G. Mann

SYNONYM:

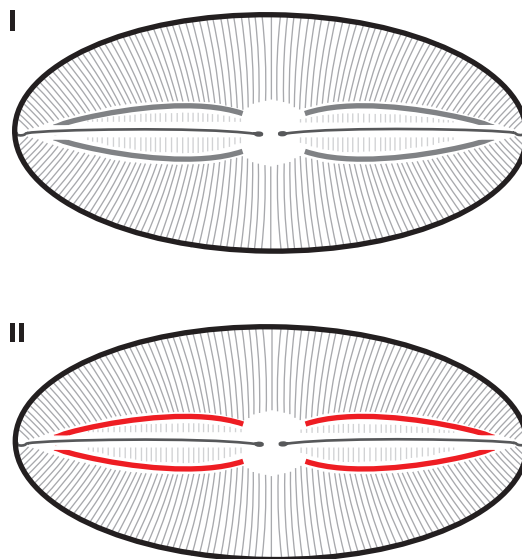
Navicula Bory 1822 pro parte

Characteristics – Cells **biraphid**, elliptical with broadly rounded apices. Striae fine, radiate throughout composed of single rows of areolae which may not be discernable under LM (Fig. 122: B-D). Raphe straight and complex, striae interrupted by H-shaped (lyre-shaped) hyaline area parallel to the raphe (II, Fig. 122: B-E).

Plastid structure – Cells with H-shaped plastid with 2 plates connected by a narrow isthmus (Fig. 122: A).

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

Ecology – Cells solitary, free living and motile. Found in the benthos of eutrophic waters with moderate to high conductivities.



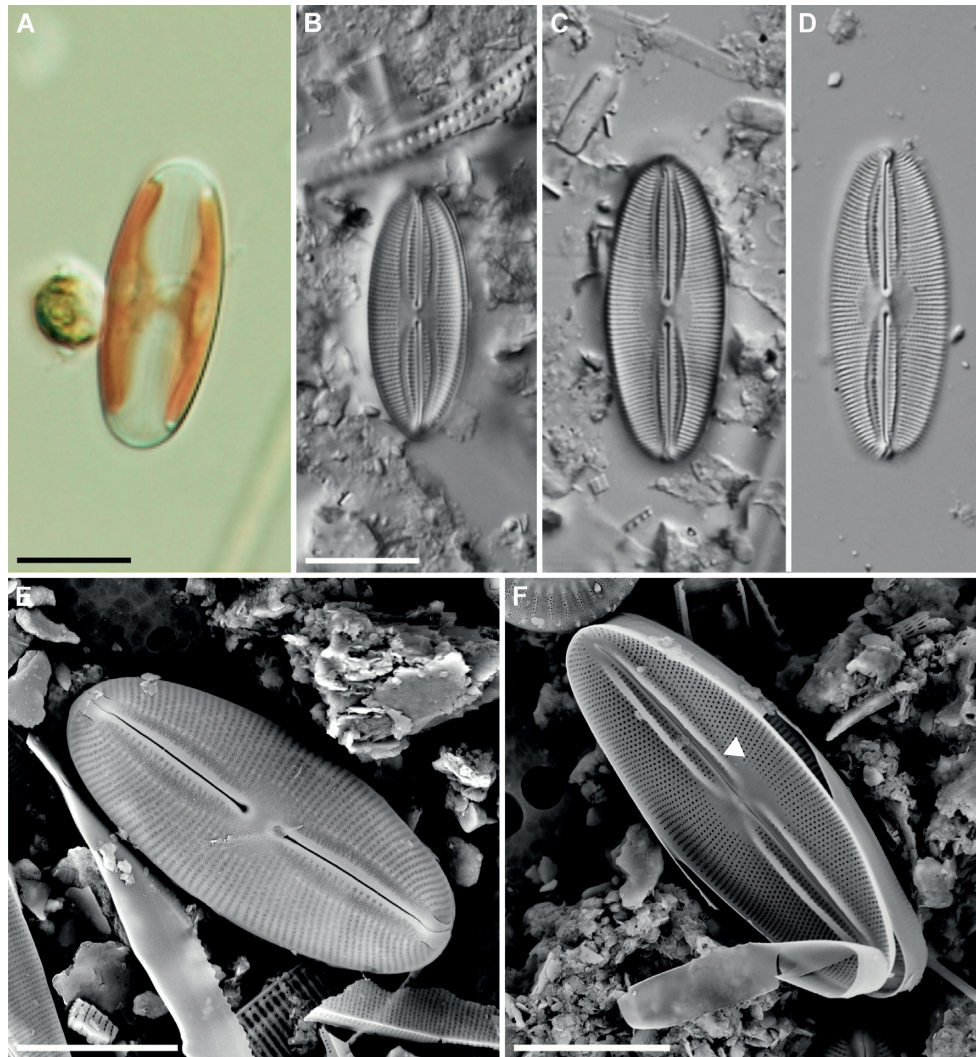


Fig. 122. *Fallacia pygmaea*. **A-D.** LM. **A.** Living cell, valve view. **B-D.** Valve views of cleaned material. **E-F.** SEM. **E.** External view of valve. **F.** Internal view of valve, note thickened silica ribs (arrow) in axial area which appear as hyaline lines in LM. Scale bars = 10 μm (A-D, F), 8 μm (E).

Pseudofallacia Y. Liu, Kociolek & Q.X. Wang 2012Type species: *Pseudofallacia occulata* Y. Liu, Kociolek & Q.X. Wang

SYNONYM:

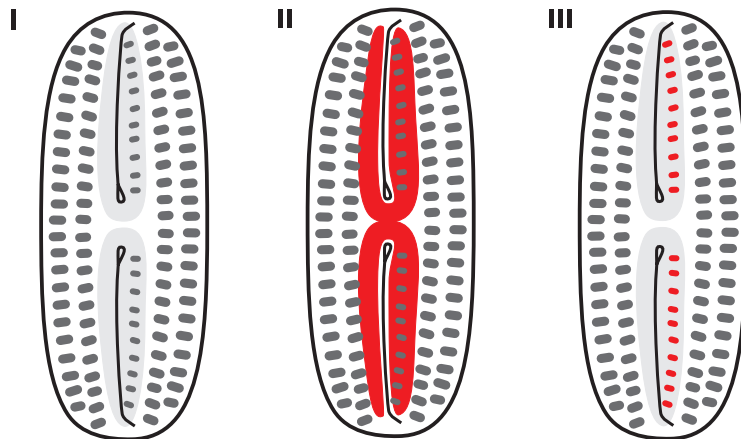
Fallacia Stickle & D.G. Mann 1990 pro parte*Navicula* Bory 1822 pro parte

Characteristics – Cells **biraphid**, small in size, elliptical to linear elliptical with broadly rounded apices. Striae fine, radiate or parallel composed of single rows of areolae which may not be discernable under LM (Fig. 123) or more robust (Fig. 123). Raphe straight and simple (Fig. 123) with H-shaped hyaline area parallel to the raphe (II). Longitudinal lines of isolated areolae are present adjacent to the raphe. Under SEM the conopeum has fine perforations (Fig. 123).

Plastid structure – Cells with one H-shaped plastid (Fig. 123).

Identification of species – Species can be identified by cell size, cell shape, structure and density of the striae as well as structure and extent of the H-shaped hyaline area.

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



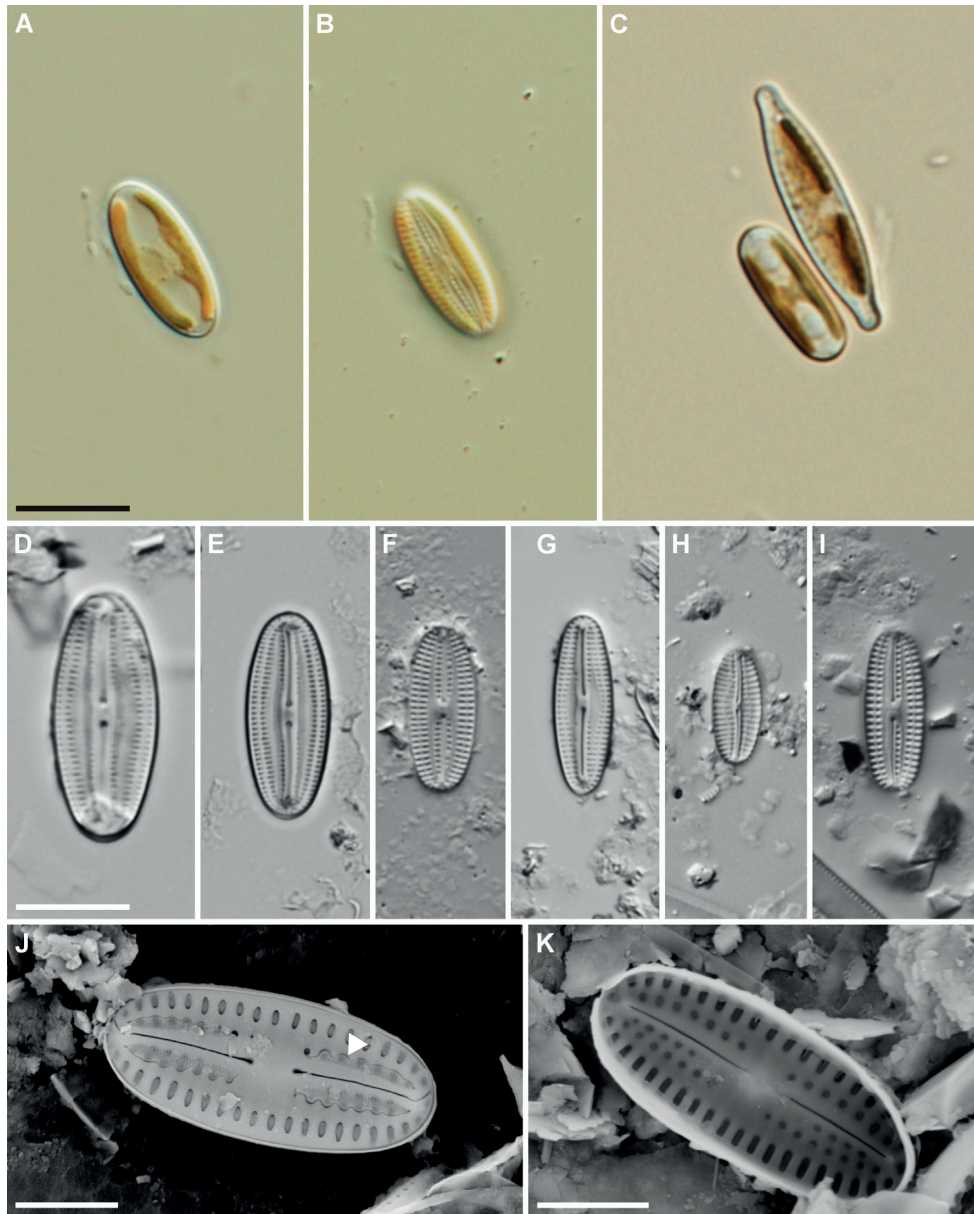


Fig. 123. *Pseudofallacia* spp. **A-I.** LM. **A-B.** Living cell, single cell, different foci. **C.** Living cell with typical H-shaped chloroplast. **D-I.** Valve views of *Pseudofallacia* species. **J-K.** SEM. **J.** External view of valve of *Fallacia [Pseudofallacia] umpatica* (Cholnoky) D.G. Mann, note conopeum covering external openings of areolae close to the axial area (arrow). **K.** Internal view of valve of *Fallacia [Pseudofallacia] umpatica*.
Scale bars = 10 μ m (A-I), 3 μ m (J-K).

Sellaphora Mereschkowsky 1902Type species: *Sellaphora pupula* (Kützinger) Mereschkowsky

SYNONYM:

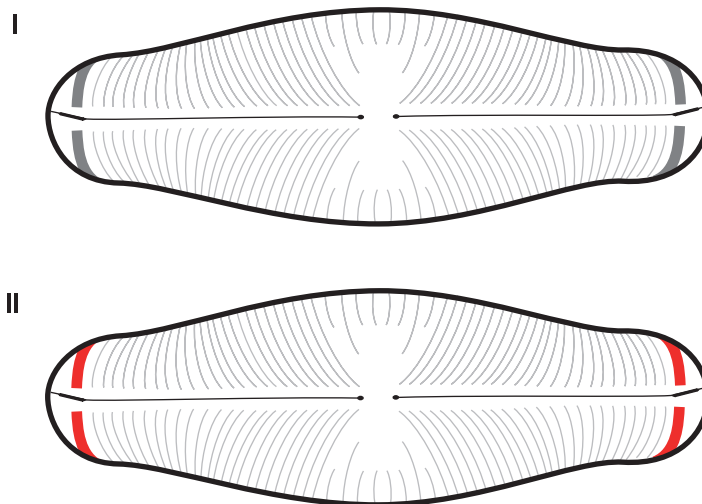
Navicula Bory 1822 pro parte

Characteristics – Cells **biraphid**, with broadly rounded to sub-capitate apices. Striae fine but discernable under LM (Fig. 125), composed of single rows of small round areolae. Raphe straight and simple (Fig. 125) carried in a sternum, terminal raphe endings extend onto the valve mantle. Thickened bars of silica present at the poles (II; Fig. 126: F) on the valve interior in most taxa, which appear as hyaline areas on the valve exterior (Fig. 125: I-J; Fig. 126: A). Central area is usually rectangular and well delimited.

Plastid structure – Cells with 2 plate-like plastids, one along each side of the girdle with central bridge (Fig. 124). Large lipid bodies present.

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 and the shape and curvature of the terminal raphe endings.

Ecology – Cells solitary, free living and motile, occasionally planktonic. Found in the benthos of eutrophic to hypereutrophic waters with moderate to high conductivities.



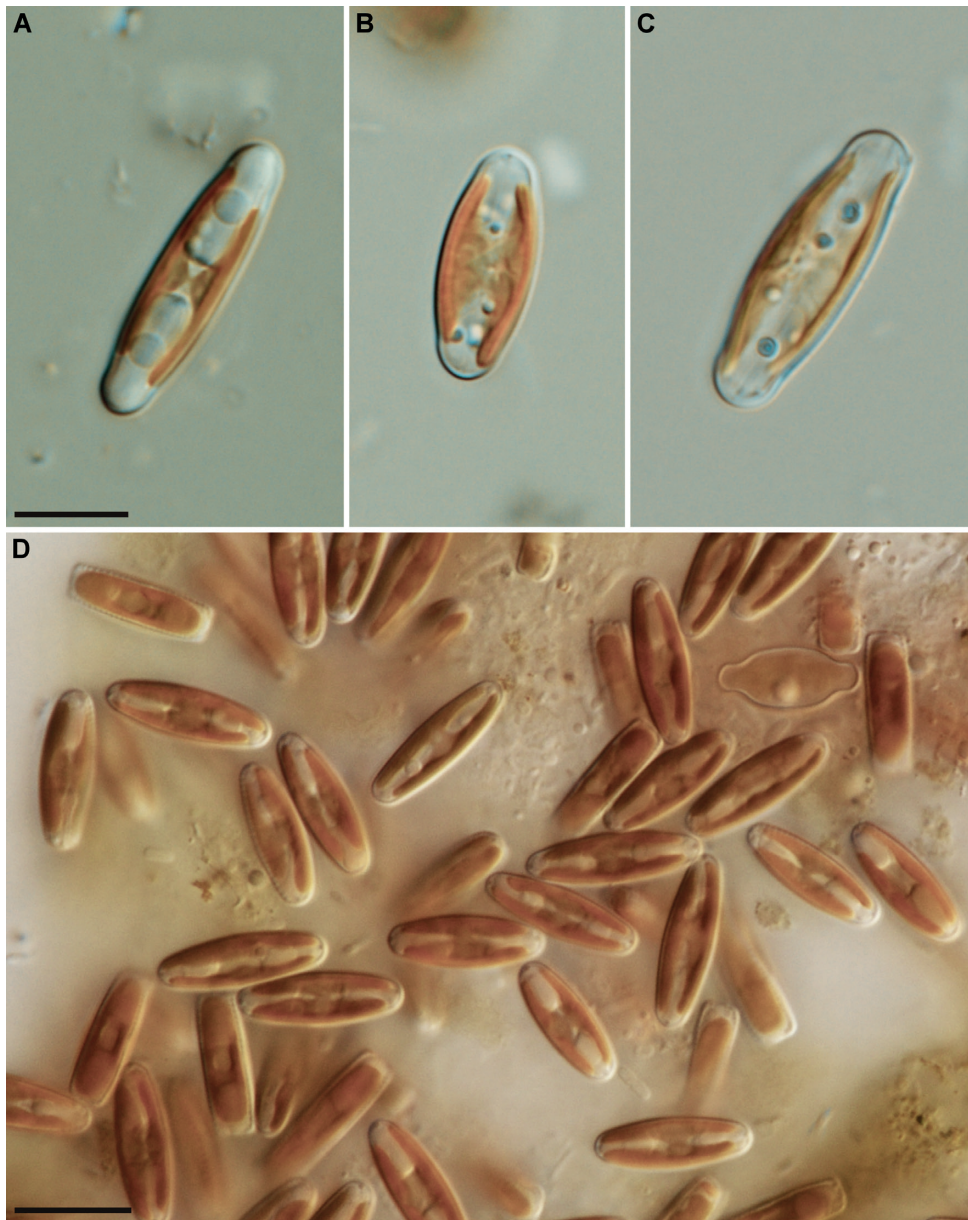


Fig. 124. *Sellaphora* spp. **A-D.** LM, living cells. **A-C.** *Sellaphora pupula* sensu lato, note lipid bodies. **D.** *Sellaphora seminulum* (Grunow) D.G. Mann. Scale bars = 10 μ m (A-D).

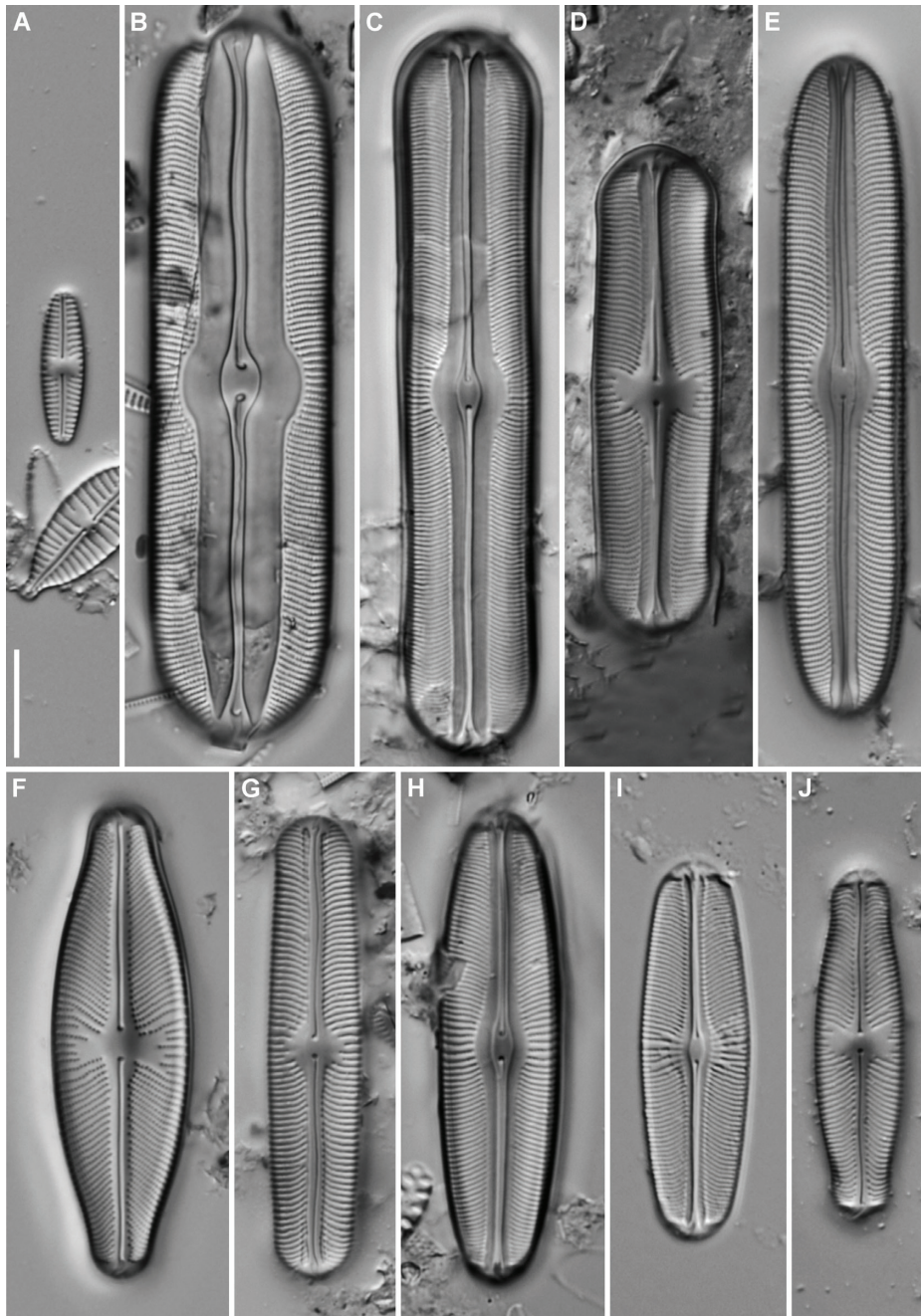


Fig. 125. *Sellaphora* spp. **A-J.** LM, cleaned valves. **A.** *Sellaphora seminulum*. **B.** *Sellaphora americana* (Ehrenberg) D.G. Mann. **F.** *Sellaphora nyassensis* (O. Müller) D.G. Mann. **J.** *Sellaphora pupula* sensu lato. Scale bar = 10 μ m (A-J).

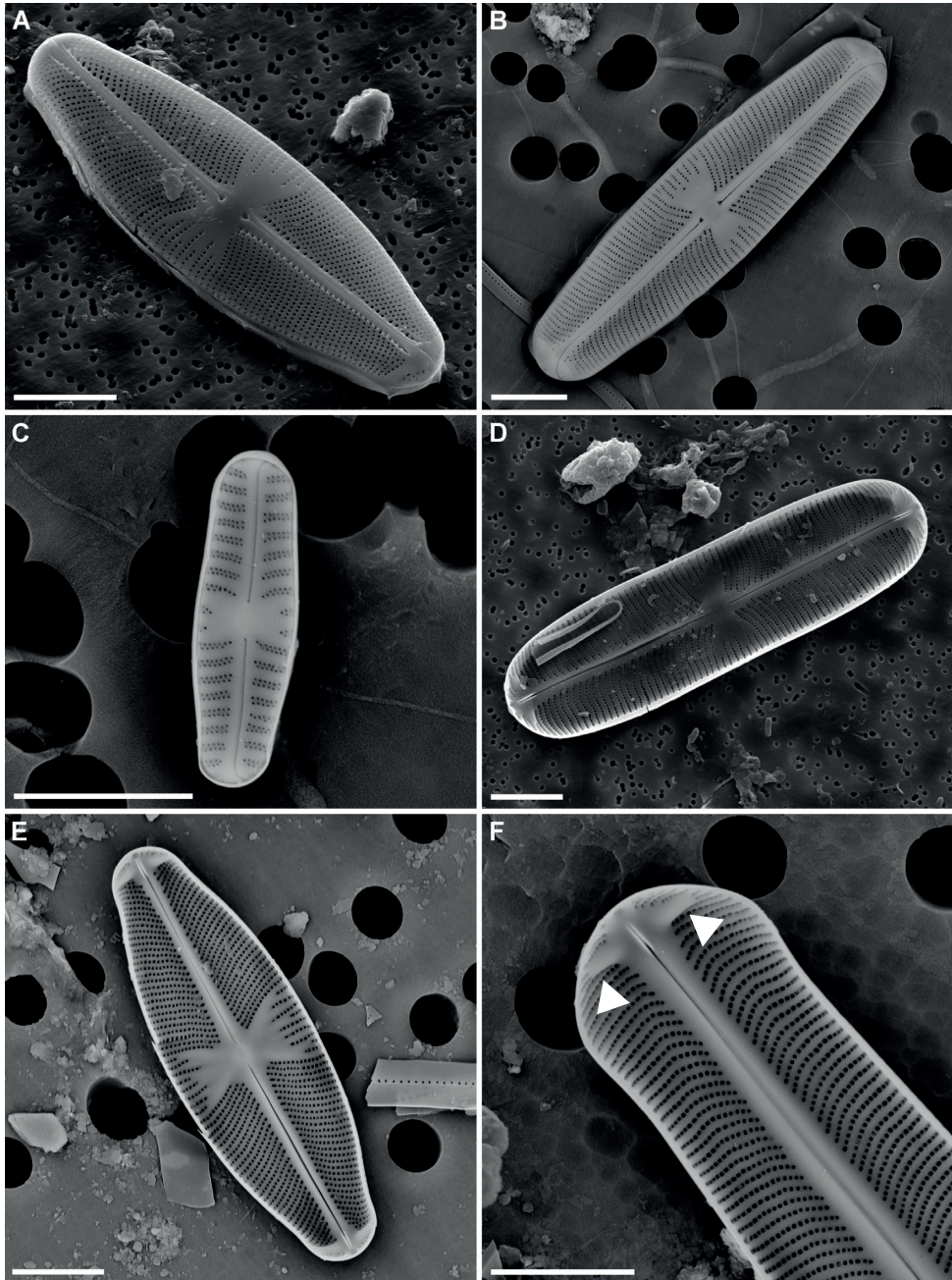


Fig. 126. *Sellaphora* spp. **A-F.** SEM. **A-B.** *Sellaphora* spp., external view of valves. **C.** *Sellaphora seminulum*, external view of valve. **D-F.** *Sellaphora* spp., internal view of valves, note silica bars (arrows - **F**).
Scale bars = 5 μ m (A-F).

Caloneis Cleve 1894

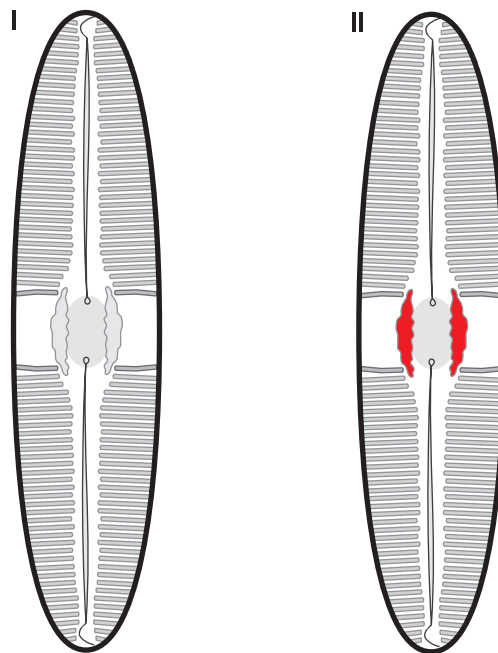
Type species: *Caloneis amphisbaena* (Bory) Cleve

Characteristics – Cells size and shape variable and may be strongly triundulate (Fig. 127: I), **biraphid**. Tube striae are present, individual areolae cannot be observed under LM. Central area broad usually reaching the valve margins and often bearing irregular depressions in the valve face (II).

Plastid structure – Cells with one plastid with a narrow bridge across the centre of the cell (Fig. 127: A) or two plastids along the girdle sides. Large lipid droplets visible.

Identification of species – Species in this genus are distinguished based on cell size and shape (especially valve outline), striae density, the shape of the apices, the shape of the central area and structure of the depressions found in the central area (II).

Ecology – Cells solitary and motile. Found in acidic and alkaline waters across all trophic levels.



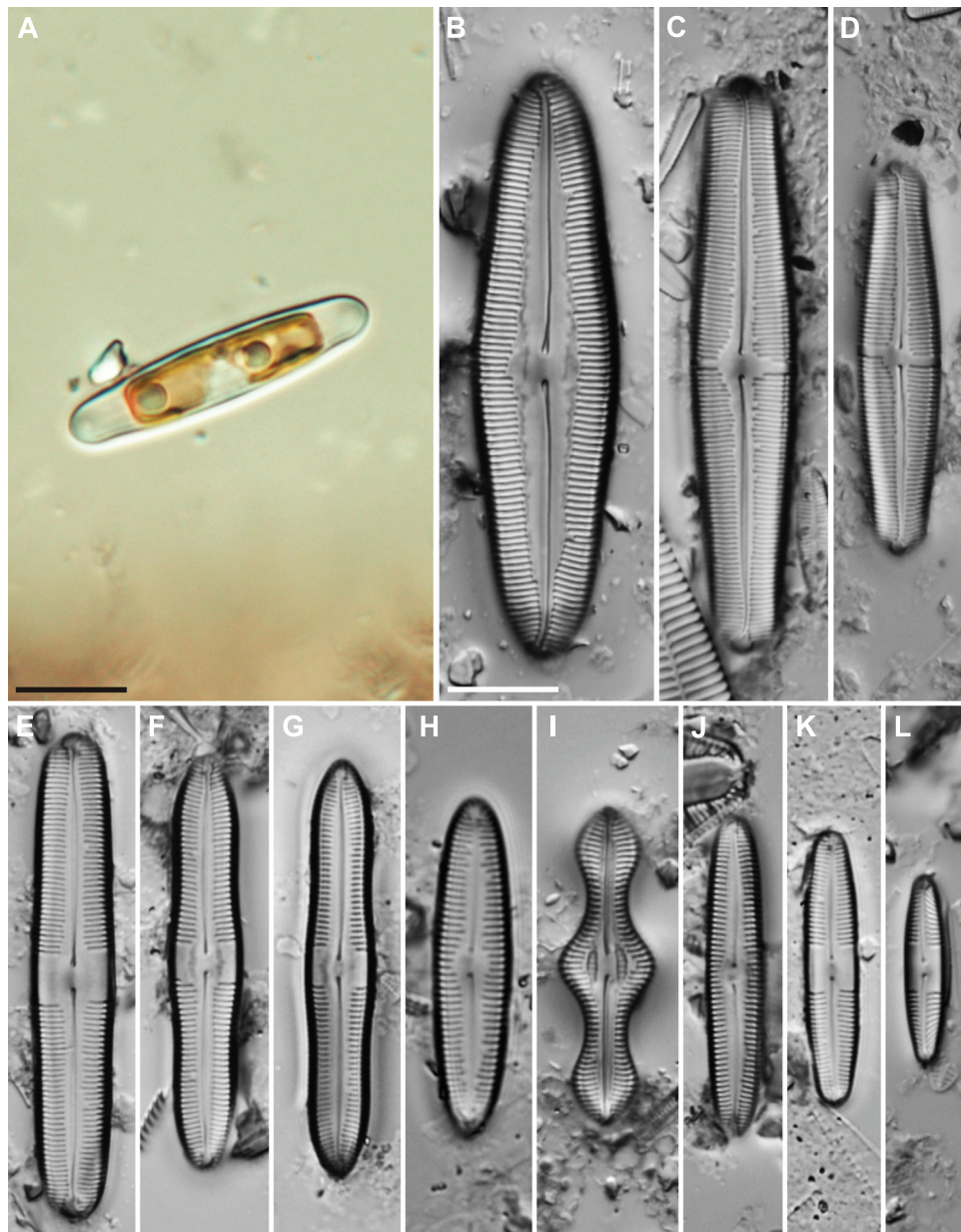


Fig. 127. *Caloneis* spp. **A-L.** LM. **A.** Living cell, valve view. **B-L.** Cleaned material, illustrating various taxa. Scale bars = 10 μ m (A-L).

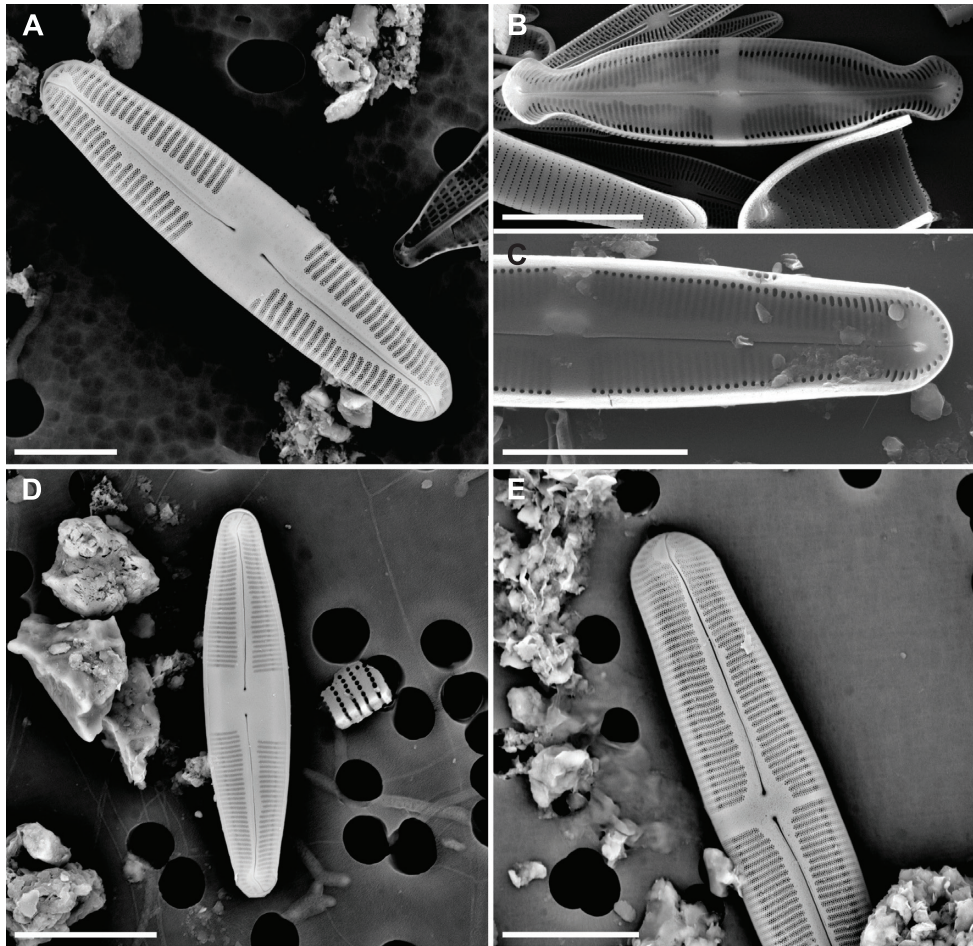


Fig. 128. *Caloneis* spp. **A-E.** SEM. **A, E.** External view of valve showing structure of tube striae. **B-C.** Internal view of valve showing internal occlusion of the striae, these occlusions appear as longitudinal lines in LM. **D.** External view of valve of *Caloneis hyalina* Hustedt.

Scale bars = 5 μm (A), 10 μm (B-C), 8 μm (D-E).

Pinnularia Ehrenberg 1843

Type species: *Pinnularia viridis* (Nitzsch) Ehrenberg

Characteristics – Cells **biraphid**, can be very large in size, valve shape generally linear to linear-elliptical with broadly rounded, capitate or sub-capitate apices. Striae **alveolate**, easily discernable under LM (Fig. 130; Fig. 131) and composed of numerous small round areolae (Fig. 132: C). Raphe system complex or simple. Central area may be expanded and reach both valve margins. Sometimes longitudinal lines are present (II).

Plastid structure – A range of chloroplast types, usually 2 plate-like plastids, and one along each side of the girdle (Fig. 129). Plastids may be undulate (Fig. 129: C). Many scattered lipid bodies present.

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 extent of the central and axial areas and the structure and curvature of the central and terminal raphe endings.

Ecology – Cells solitary, free living and motile. Abundant in slightly acidic, oligotrophic waters with low conductivity. Some taxa are found in eutrophic conditions and others are considered typical of sub-aerial habitats.

