

***Afrocymbella*** Krammer 2003Type species: *Afrocymbella reichardtii* Krammer

## SYNONYM:

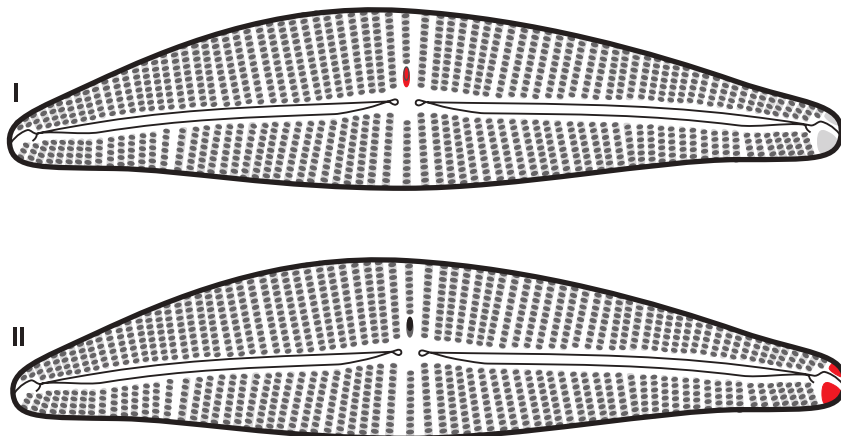
*Gomphocymbella* O. Müller 1905 pro parte

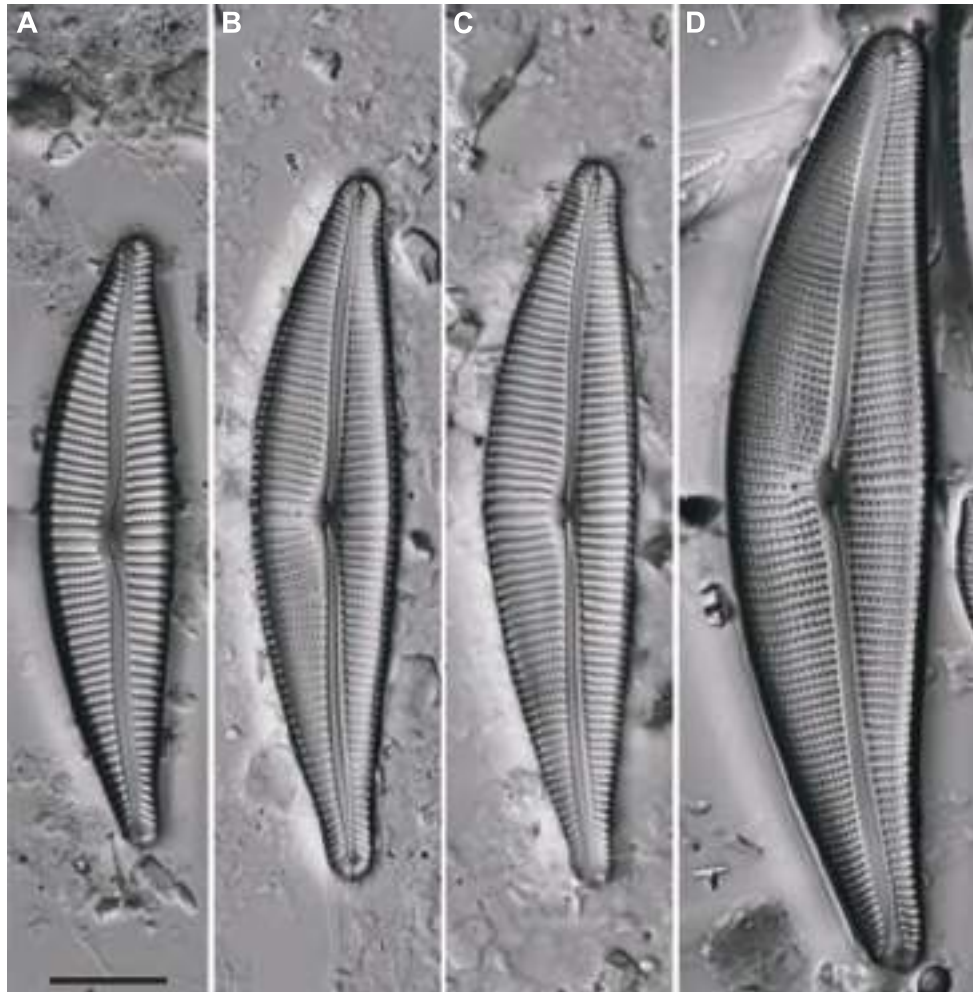
**Characteristics** – Cells **biraphid**, large and rather robust, valve shape **dorsiventral** and **heteropolar** (characteristics of both *Cymbella* and *Gomphonema*). Clearly visible elongate **stigma** on the dorsal side of the cell closely associated with the central striae (I, Fig. 72: B-C). Small apical pore field to the right and the left of the raphe on the foot pole (II, Fig. 71: B, Fig. 72: D).

**Plastid structure** – Single plastid with 2 lobes connected by a bridge (H-shape) (Fig. 72: A). Large pyrenoid against one margin in the central area (see *Cymbella*), several lipid droplets scattered through the cell.

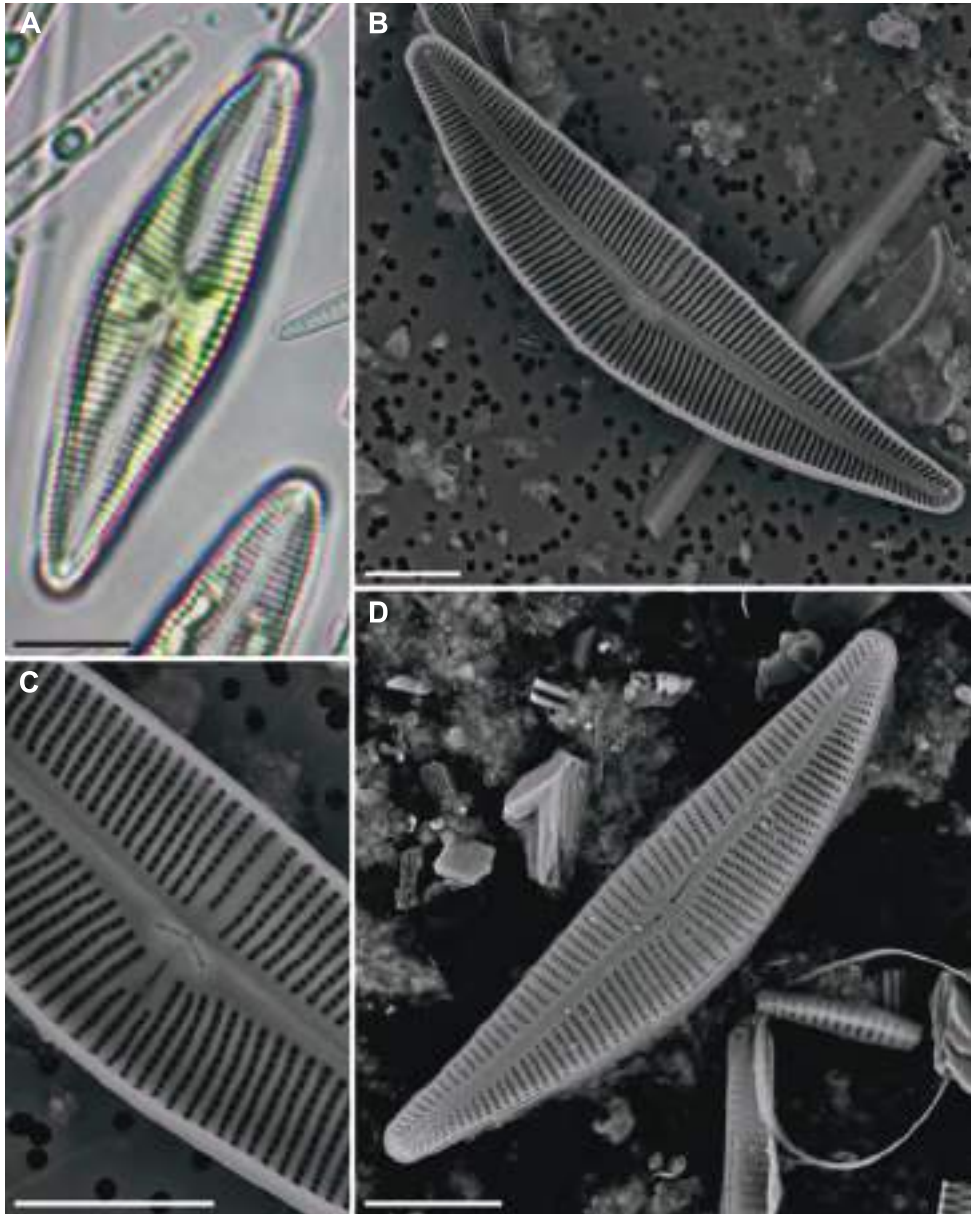
**Identification of species** – Species in this genus are distinguished based on cell size and shape and the shape of the apices. Striae density and angle relative to the **transapical axis** are also important characteristics to consider.

**Ecology** – Cells solitary, mostly observed free living occasionally attached. Found in tropical African alkaline oligotrophic waters in both planktonic and benthic habitats.





**Fig. 71.** *Afrocybella* spp. **A-D.** LM. **A-C.** Valve view of *Afrocybella beccarii* (Grunow) Krammer. **D.** Valve view of *A. reichardtii* var. *procera* Krammer. Scale bar = 10  $\mu$ m.



**Fig. 72.** *Afrocybella* spp. **A.** LM. Living cell of *Afrocybella barkeri* Cocquyt & Ryken, valve view . **B-D.** SEM. **B-C.** Internal view of valve of *A. beccarii*. **D.** External view of valve of *A. beccarii*.  
 Scale bars = 10  $\mu$ m (A-C), 8  $\mu$ m (D).

## ***Cymbella*** C. Agardh 1830

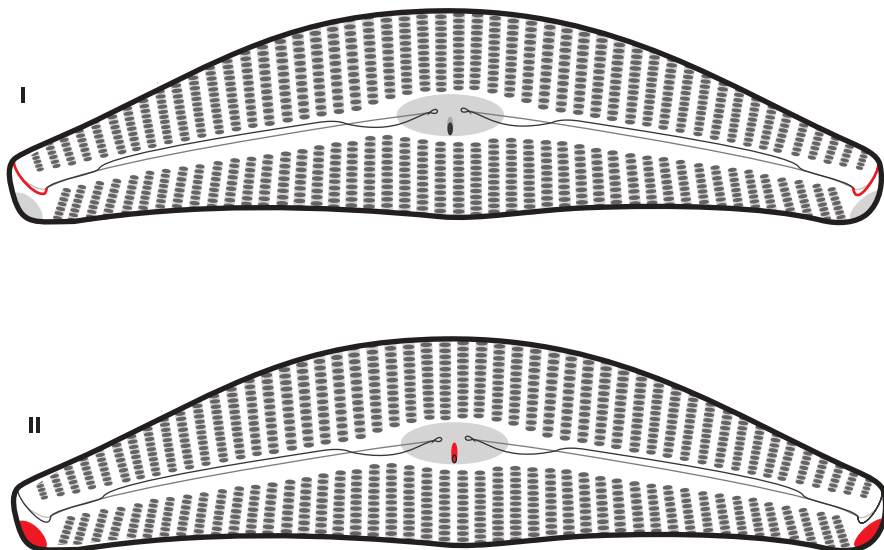
Type species: *Cymbella cymbiformis* C. Agardh

**Characteristics** – Cells **biraphid**, slightly to strongly **dorsiventral**, raphe complex, terminal raphe endings bent towards the dorsal side (I, Fig. 75: A-C). **Stigma(ta)** (II) in general present in the **central area** on the ventral side. Apical pore field found at the apices (II); may be difficult to discern under LM.

**Plastid structure** – Cells with one H-shaped plastid and a large pyrenoid (Fig. 74: D) in the centre against one girdle. Several small lipid droplets scattered throughout the cell (Fig. 73:A-B; Fig. 74: B).

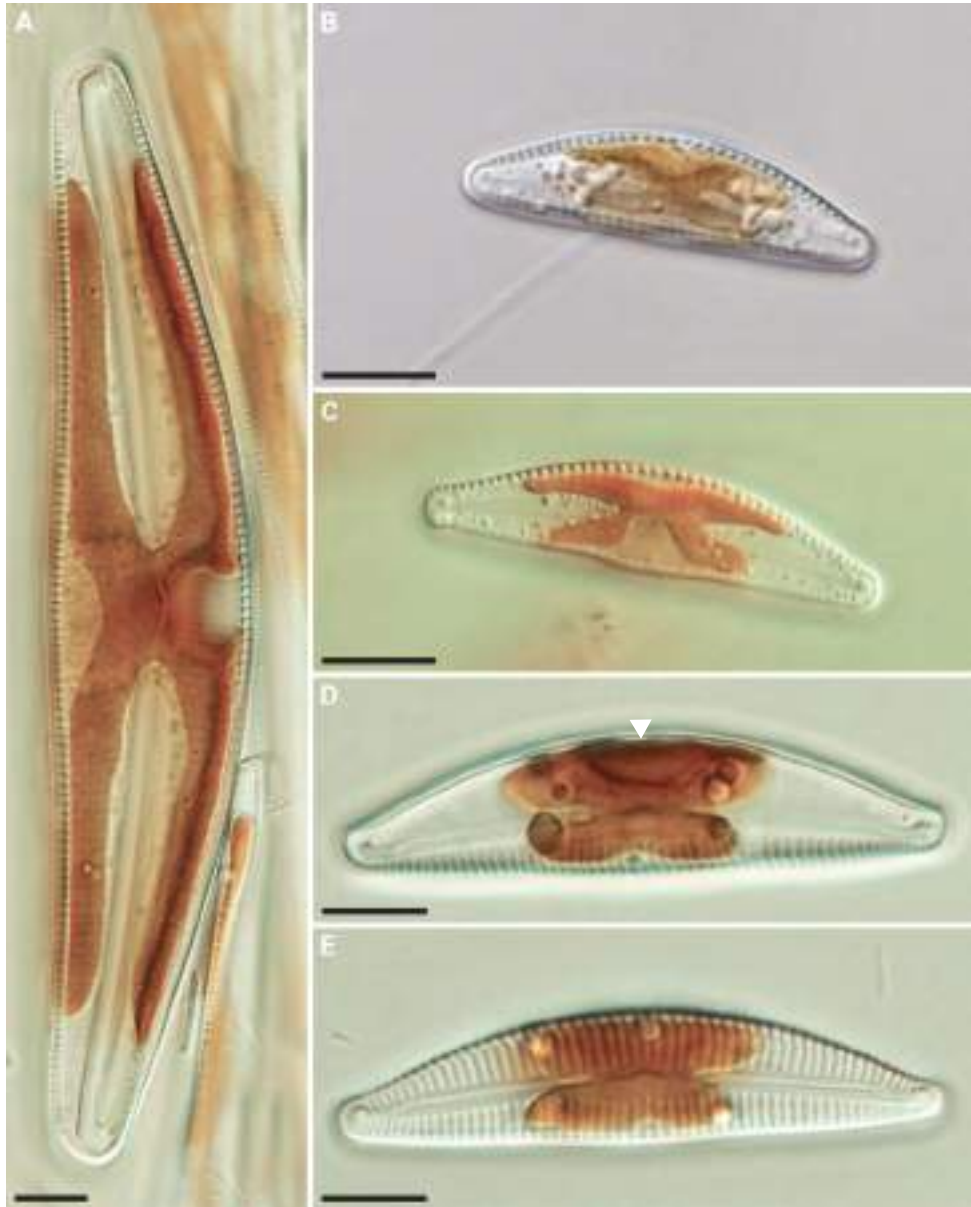
**Identification of species** – Species can be identified by cell size, cell shape, shape of the apices, structure and density of the striae and the size, number and position of the stigmata in relation to the striae. Shape and extent of the central area as well as the curvature of the raphe are important.

**Ecology** – Cells solitary, mostly attached but occurs also free living and motile. Found in the benthos of oligotrophic to mesotrophic waters preferring alkaline habitats.

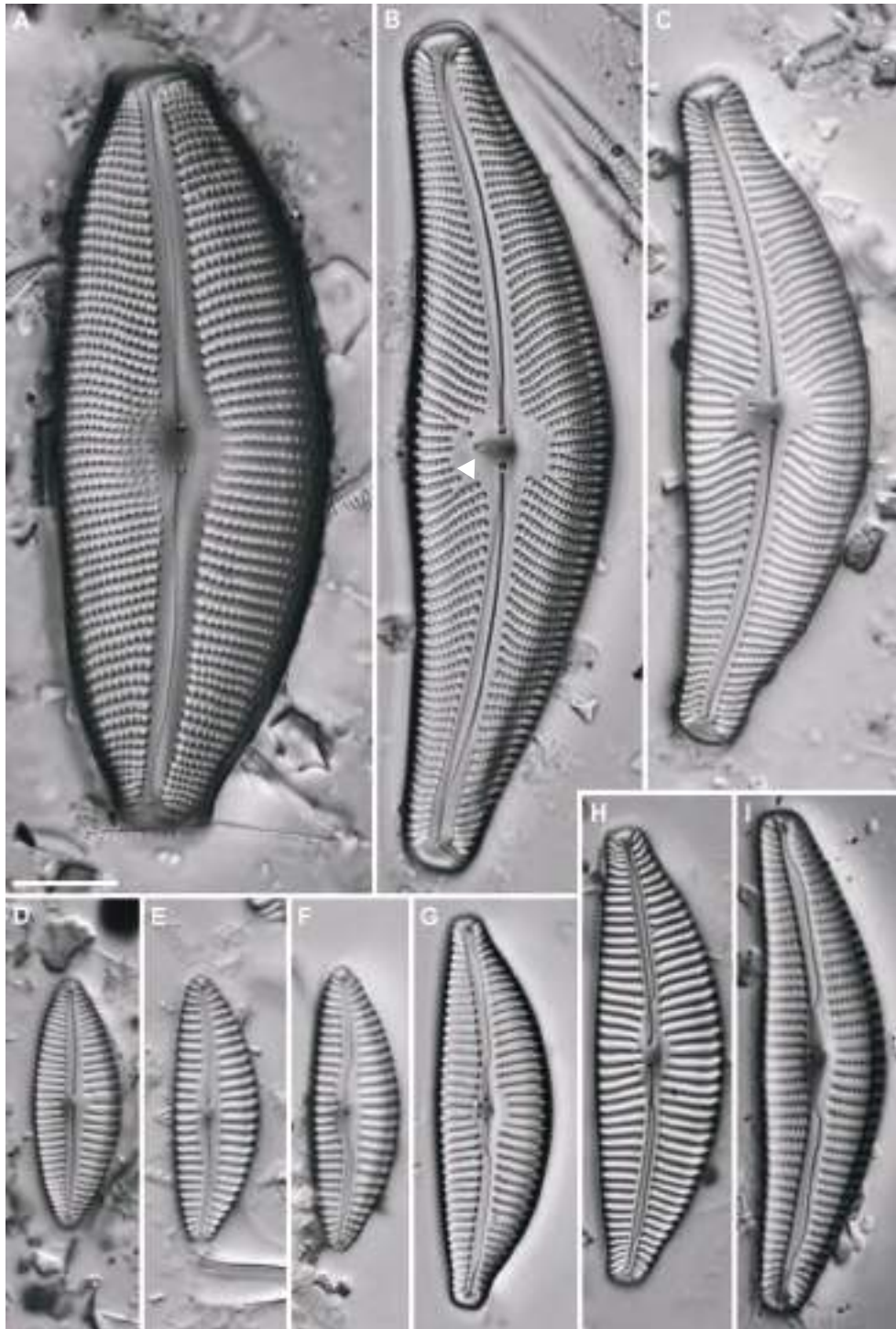


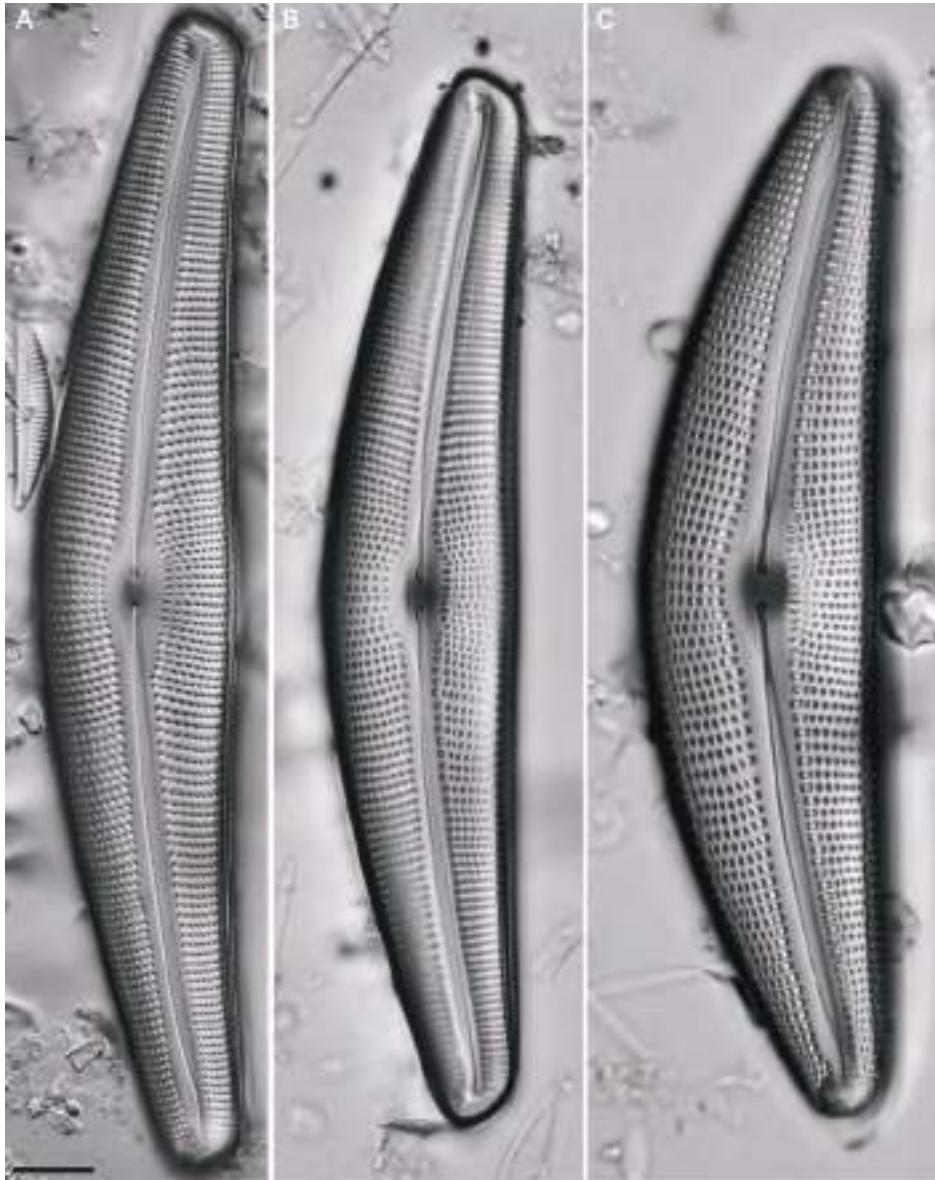


**Fig. 73.** *Cymbella* spp. **A-B.** LM. **A.** Living cell, girdle view. **B.** Living cells with mucilage stalks (arrow).  
Scale bar = 10  $\mu$ m.



**Fig. 74.** *Cymbella* spp. **A-E.** LM. **A-B.** Valve views of living cells. **A.** *Cymbella aspera* (Ehrenberg) H. Peragallo. **B.** Cell with a large number of lipid droplets. **C.** *Cymbella kappii* (Cholnoky) Cholnoky. **D-E.** *Cymbella turgidula* Grunow, same cell different foci, note large pyrenoid (arrow - **D**).  
Scale bars = 10  $\mu$ m (A-E).



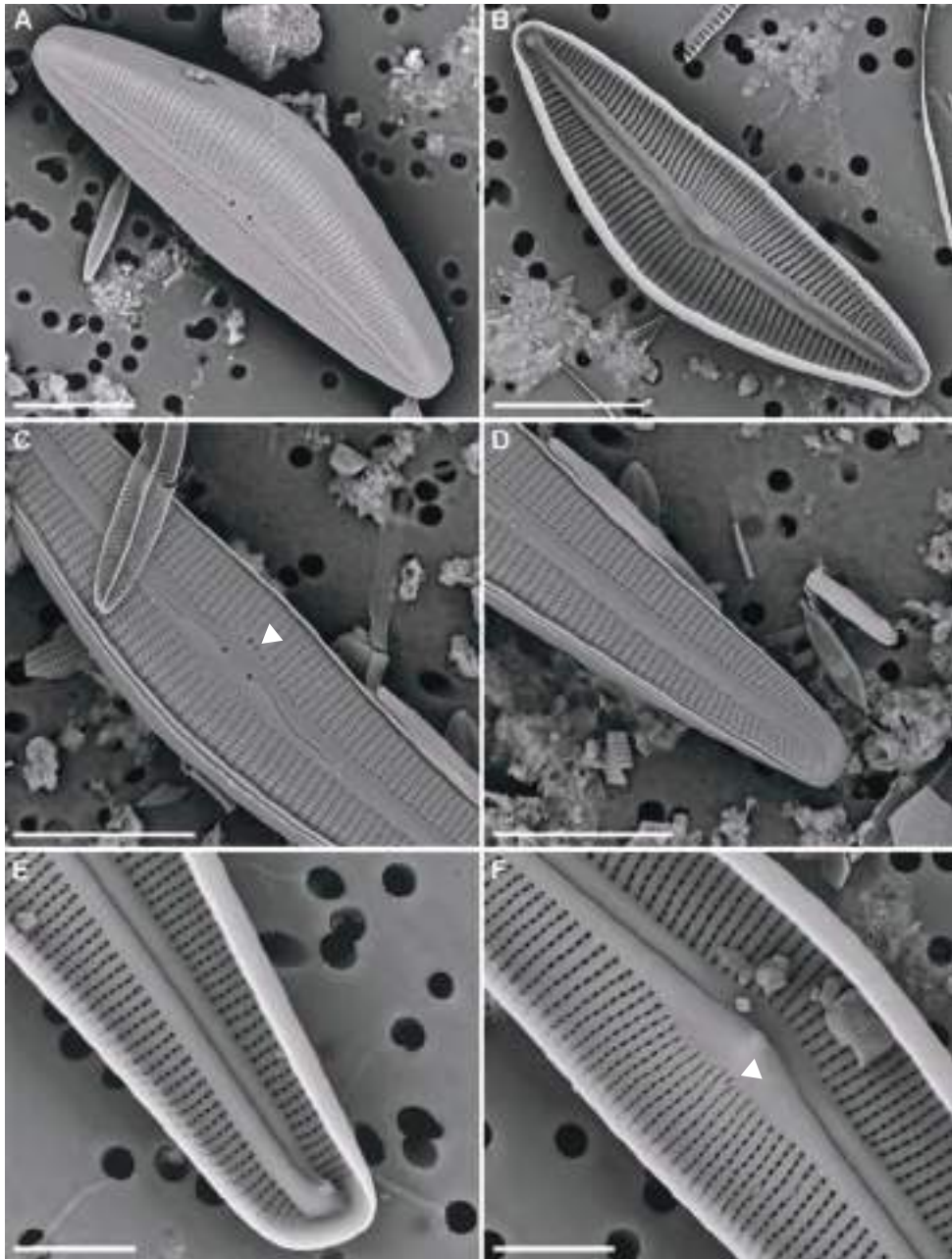


**Fig. 76.** *Cymbella* spp. **A-C.** LM, valve views. **A-B.** *Cymbella aspera*.  
**C.** *Cymbella* sp.  
Scale bar = 10  $\mu$ m.

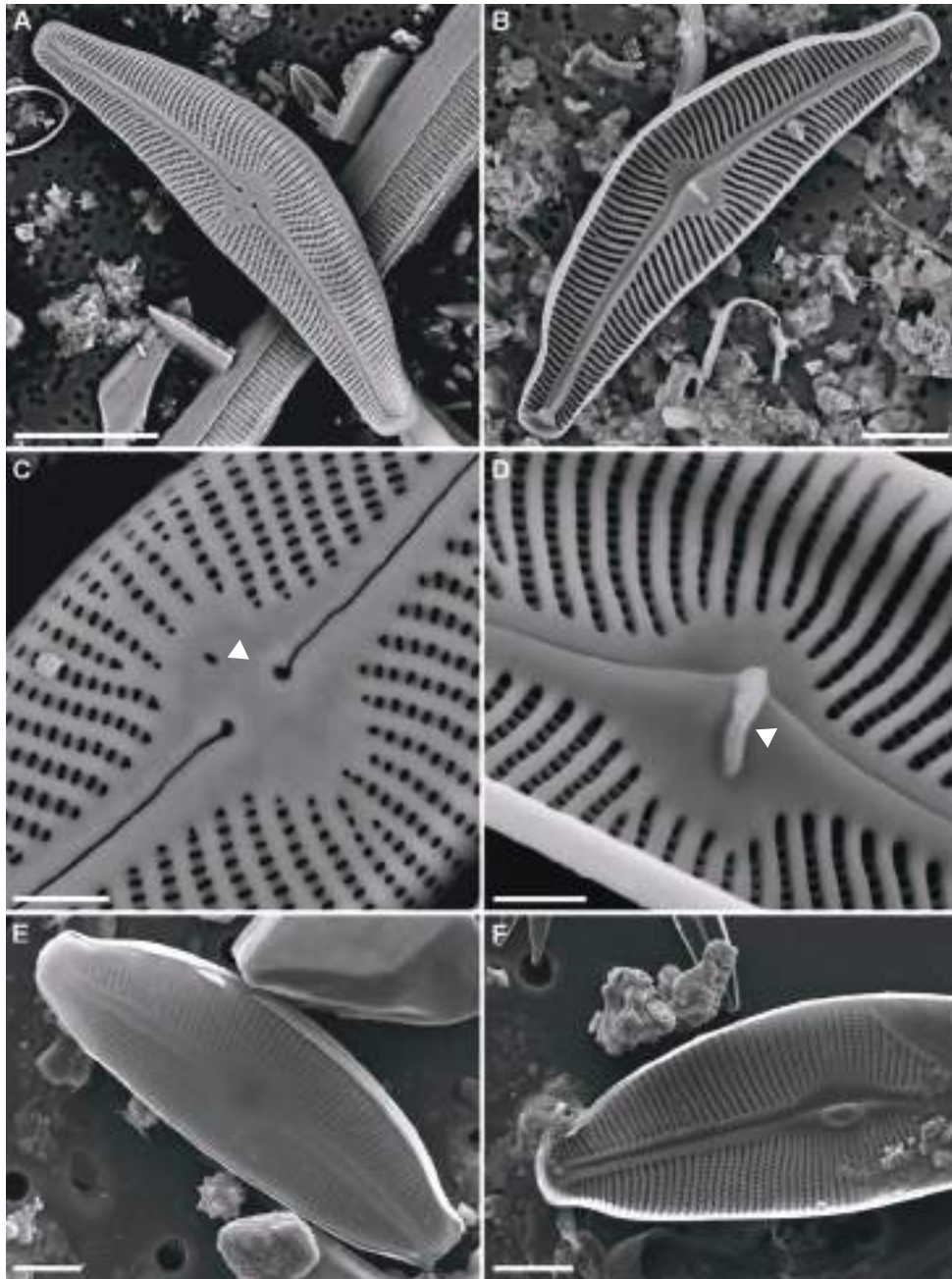
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**Fig. 75.** *Cymbella* spp. **A-I.** LM, valve views. **A.** *Cymbella cucumis* A.W.F. Schmidt. **B-C.** *C. tumida* (Brébisson) Van Heurk, note stigma (arrow - **B**). **D.** *C. kolbei* Hustedt. **E-F.** *C. zambesiana* Krammer. **G.** *Cymbella* sp. **H.** *C. turgidula*.  
**I.** *Cymbella* sp.  
Scale bar = 10  $\mu$ m.





**Fig. 77.** *Cymbella* sp. **A-F.** SEM. **A.** *Cymbella aspera*, external view of valve. **B.** *C. aspera* internal view of valve. **C-F.** *C. cymbiformis*. **C.** External view of valve, central area, note external openings of stigmata (arrow). **D.** External view of valve, cell apex. **E.** Internal view of valve, cell apex. **F.** Internal view of valve, central area, note structure of stigma (arrow).  
Scale bars = 20  $\mu\text{m}$  (A-D), 10  $\mu\text{m}$  (E-F).



**Fig. 78.** *Cymbella* sp. **A-F.** SEM. **A-D.** *Cymbella tumida*. **A.** External view of valve. **B.** Internal view of valve. **C.** Central area, external view, note opening of stigma (arrow). **D.** Internal view of stigma (arrow). **E.** *C. cucumis*, external view of valve. **F.** *C. cucumis*, internal view of valve.  
Scale bars = 20  $\mu\text{m}$  (A-B), 3  $\mu\text{m}$  (C-D), 10  $\mu\text{m}$  (E-F).

***Cymbopleura*** (Krammer) Krammer 1999

Type species: *Cymbopleura subaequalis* (Grunow) Krammer

SYNONYM:

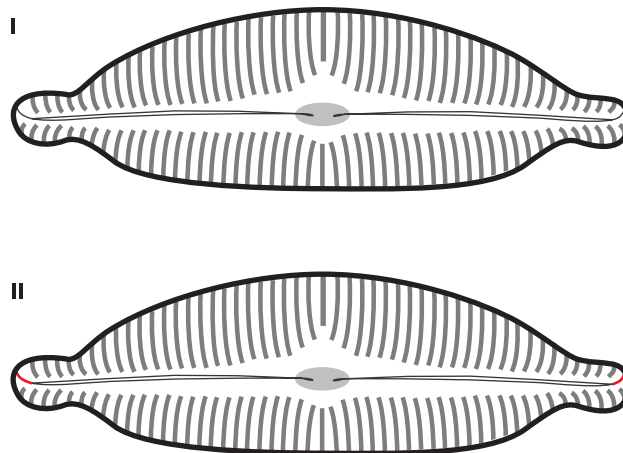
*Cymbella* C. Agardh 1830 pro parte

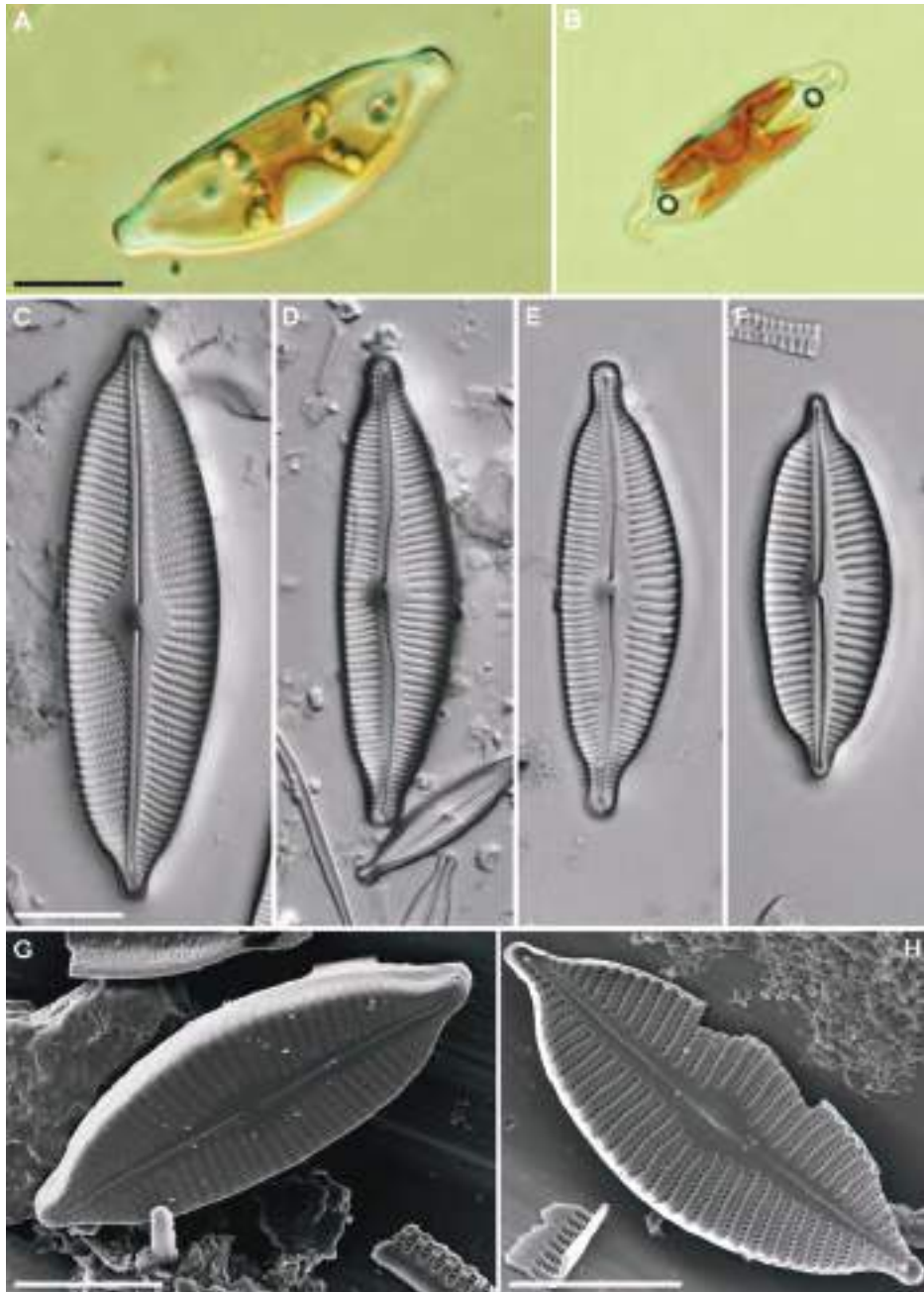
**Characteristics** – Cells **biraphid**, weakly **dorsiventral**, dorsal margin more curved than the ventral margin. Striae slightly radiate throughout the valve. Raphe complex and terminal raphe endings bent towards the dorsal side (II). (Fig. 79: G). **Stigma** absent. **Apical pore fields** absent although SEM may be needed to determine this.

**Plastid structure** – Cells with one H-shaped plastid and a large pyrenoid in the centre of the cell against one girdle. Several small lipid droplets scattered throughout the cell (Fig. 79: A-B).

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

**Ecology** – Cells solitary and motile. Found in the benthos of oligotrophic slightly acidic waters.





**Fig. 79.** *Cymbopleura* spp. **A-F.** LM, valve views. **A-B.** Living cells. **C-F.** Cleaned valves. **C.** *Cymbopleura* sp. **D-E.** *Cymbopleura amphicephala* (Nägeli) Krammer. **G-H.** SEM. **G.** *Cymbopleura* sp., external view of valve. **H.** *Cymbopleura* sp., internal view of valve. Scale bars = 10  $\mu\text{m}$  (A-H).

***Encyonema* Kützing 1833**Type species: *Encyonema paradoxum* Kützing

SYNONYM:

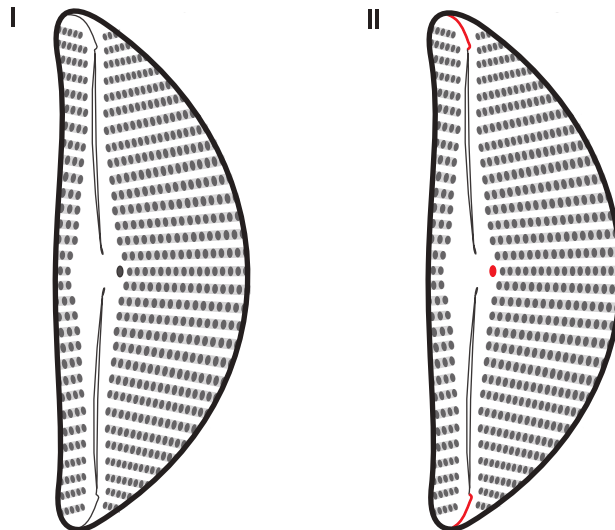
*Cymbella* C. Agardh 1830 pro parte

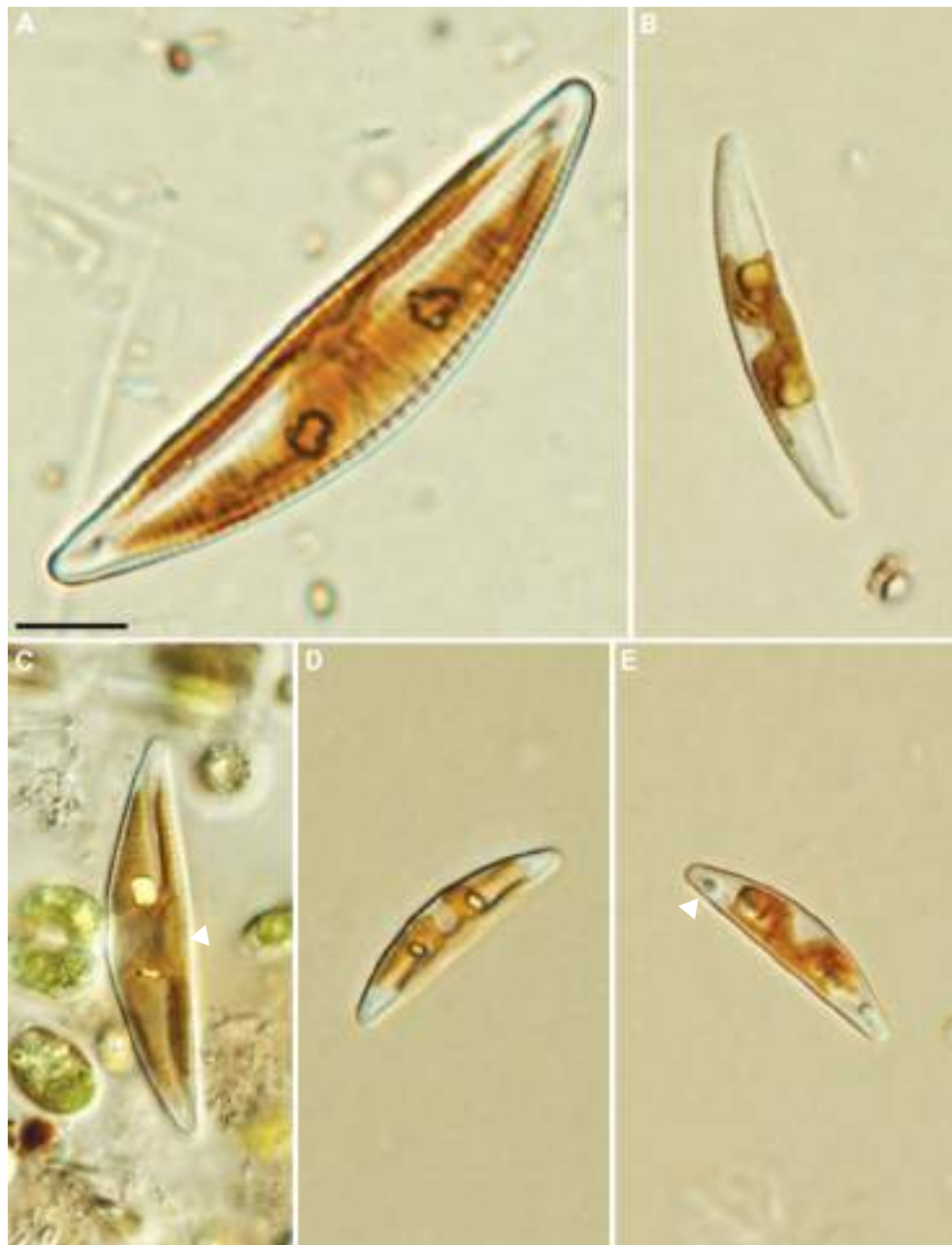
**Characteristics** – Cells **biraphid**, **dorsiventral**, dorsal margin strongly curved, ventral margin more or less straight or slightly curved. Raphe complex and terminal raphe endings bent towards the ventral side (II, Fig. 81: A-F). **Stigma(ta)** usually absent but if present located in the central area on the dorsal side (II, Fig. 81: C-E). **Apical pore fields** absent.

**Plastid structure** – Cells with one H-shaped plastid and a large pyrenoid in the central region against the ventral side (Fig. 80: C). Several small lipid droplets scattered throughout the cell (Fig. 80: E).

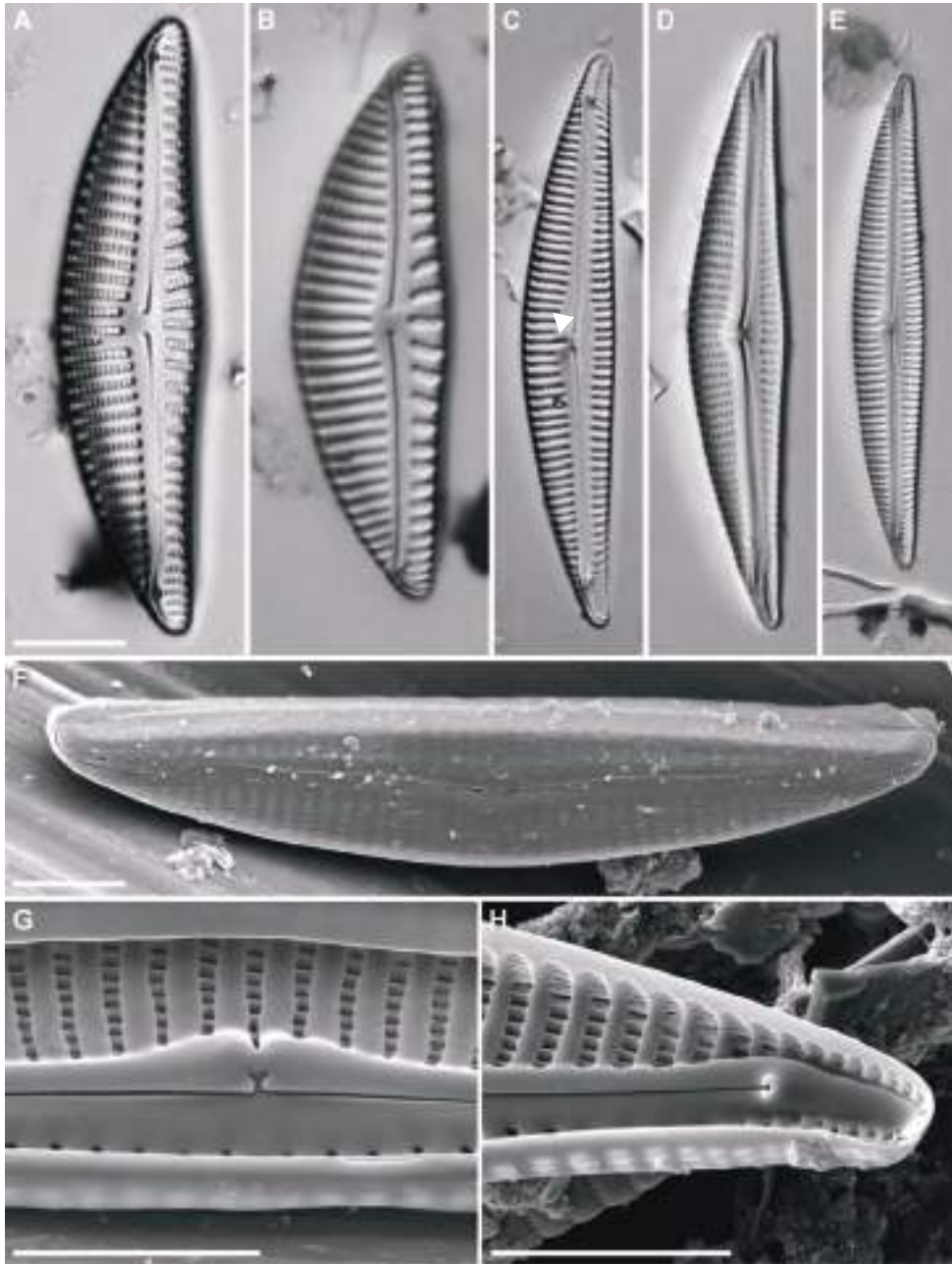
**Identification of species** – Species can be identified by cell size, cell shape, shape and curvature of the apices, structure and density of the striae.

**Ecology** – Cells solitary, in mucilage tubes or free living and motile. Found in the benthos of oligotrophic to mesotrophic waters in both acidic and alkaline habitats at various trophic levels.





**Fig. 80.** *Encyonema* spp. **A-E.** LM. Living cells, valve views, note pyrenoid (arrow - **C**) and lipid droplets (arrow - **E**).  
Scale bar = 10  $\mu$ m.



**Fig. 81.** *Encyonema* spp. **A-E.** LM. Valve views, note stigma on dorsal side (arrow - **C**). **F-H.** SEM. **F.** Valve view of complete valve. **G.** Internal view of valve, detail of central area and central raphe endings. **H.** Internal view of valve, detail of cell apex showing helictoglossa.  
 Scale bars = 10  $\mu$ m (**A-E**), 5  $\mu$ m (**F-H**).

***Encyonopsis*** Krammer 1997

Type species: *Encyonopsis cesatii* (Rabenhorst) Krammer

SYNONYM:

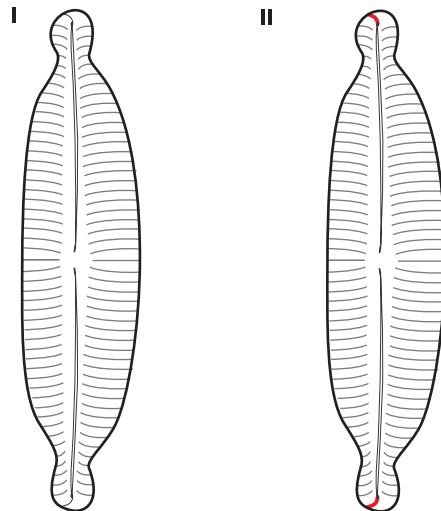
*Cymbella* C. Agardh 1830 pro parte

**Characteristics** – Cells **biraphid**, of variable size, slightly to moderately **dorsiventral**, raphe complex and terminal raphe endings bent towards the ventral side (II, Fig. 83: B). **Apical pore fields** absent.

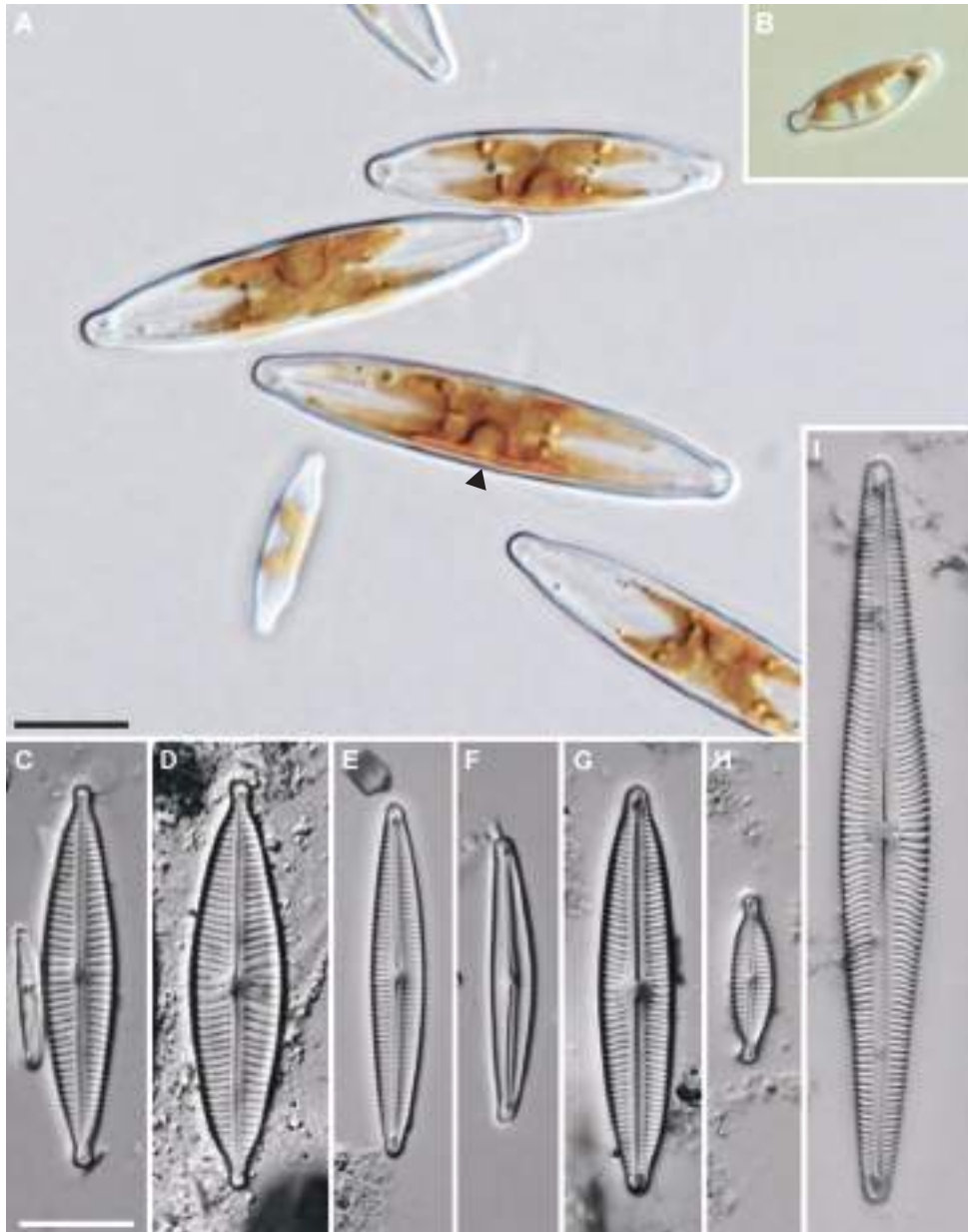
**Plastid structure** – Cells with one H-shaped plastid and a large pyrenoid in the central region against the ventral side. Several small lipid droplets scattered throughout the cell (Fig. 82: A).

**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 axial area.

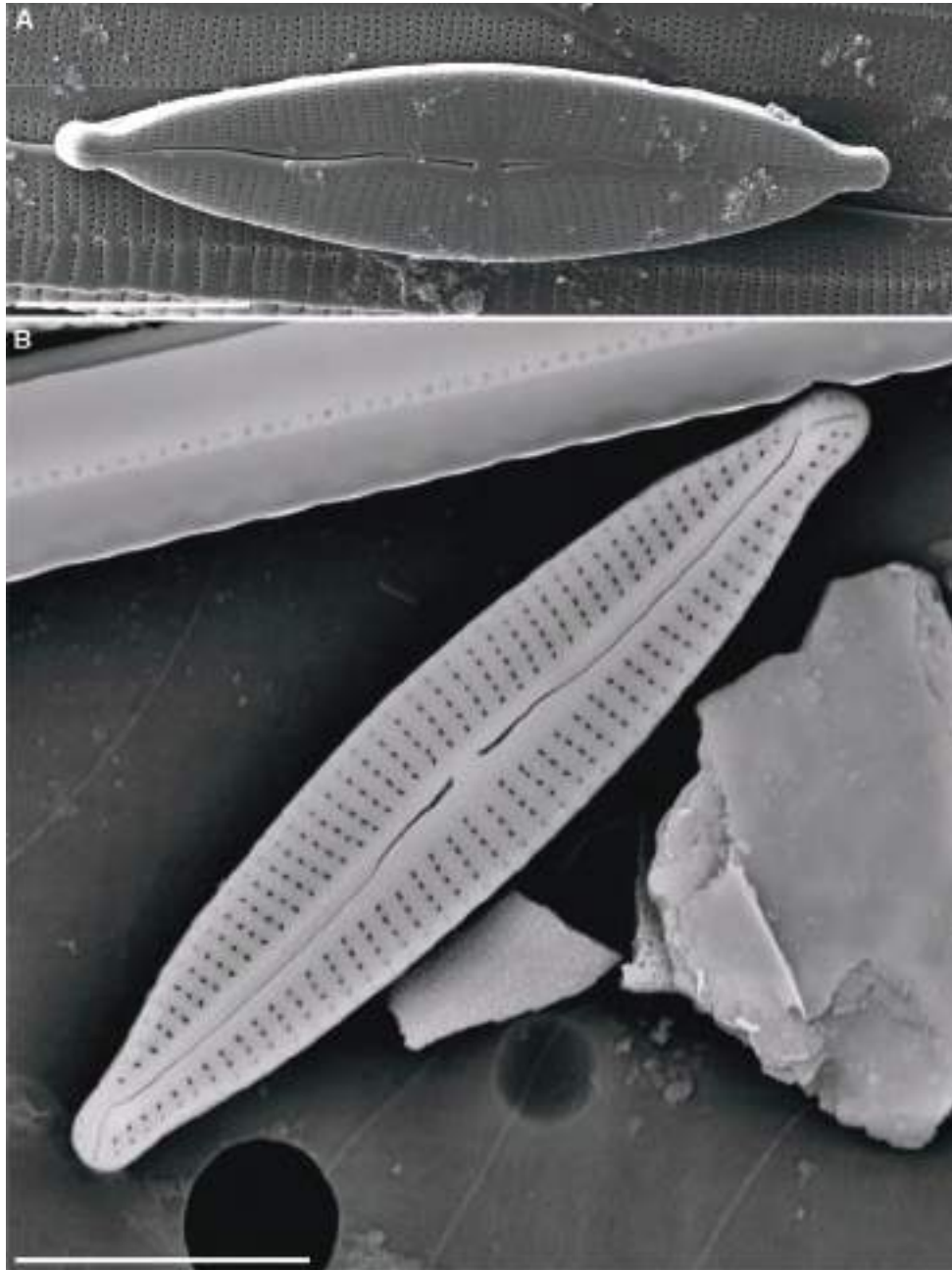
**Ecology** – Cells solitary, free living and motile. Found in the benthos of oligotrophic to mesotrophic waters in both acidic and alkaline habitats at various trophic levels.







**Fig. 82.** *Encyonopsis* spp. **A-I.** LM. **A.** Living cells, valve views, note pyrenoid (arrow). **B.** Living cell, valve view of *Encyonopsis microcephala* (Grunow) Krammer. **C-D.** Valve views of *Encyonopsis frequentis* Krammer. **E-F.** Valve views of *E. neerlandica* Van de Vijver, Verweij, Van der Wal & Mertens. **G.** *E. falaisensis* (Grunow) Krammer, valve view. **H.** *E. microcephala*, valve view. **I.** *E. treinishii* Bahls, valve view. Scale bars = 10 µm.



**Fig. 83.** *Encyonopsis* spp. **A-B.** SEM. **A.** *Encyonopsis frequentis*, external view of valve. **B.** External view of valve of *E. neerlandica*.  
Scale bars = 10  $\mu$ m (A), 5  $\mu$ m (B).

***Placoneis*** Mereschkowsky 1903Type species: *Placoneis gastrum* (Ehrenberg) Mereschkowsky

SYNONYM:

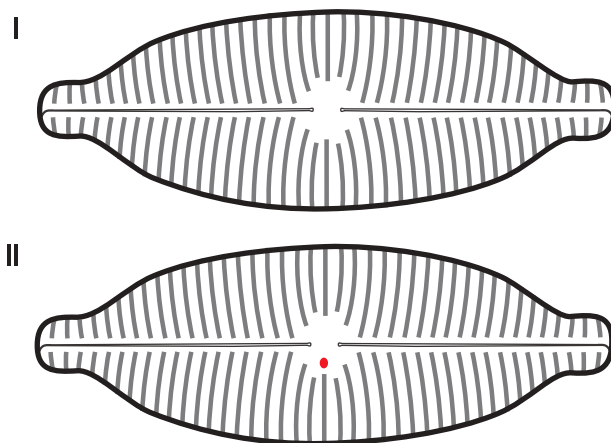
*Navicula* Bory 1822 pro parte

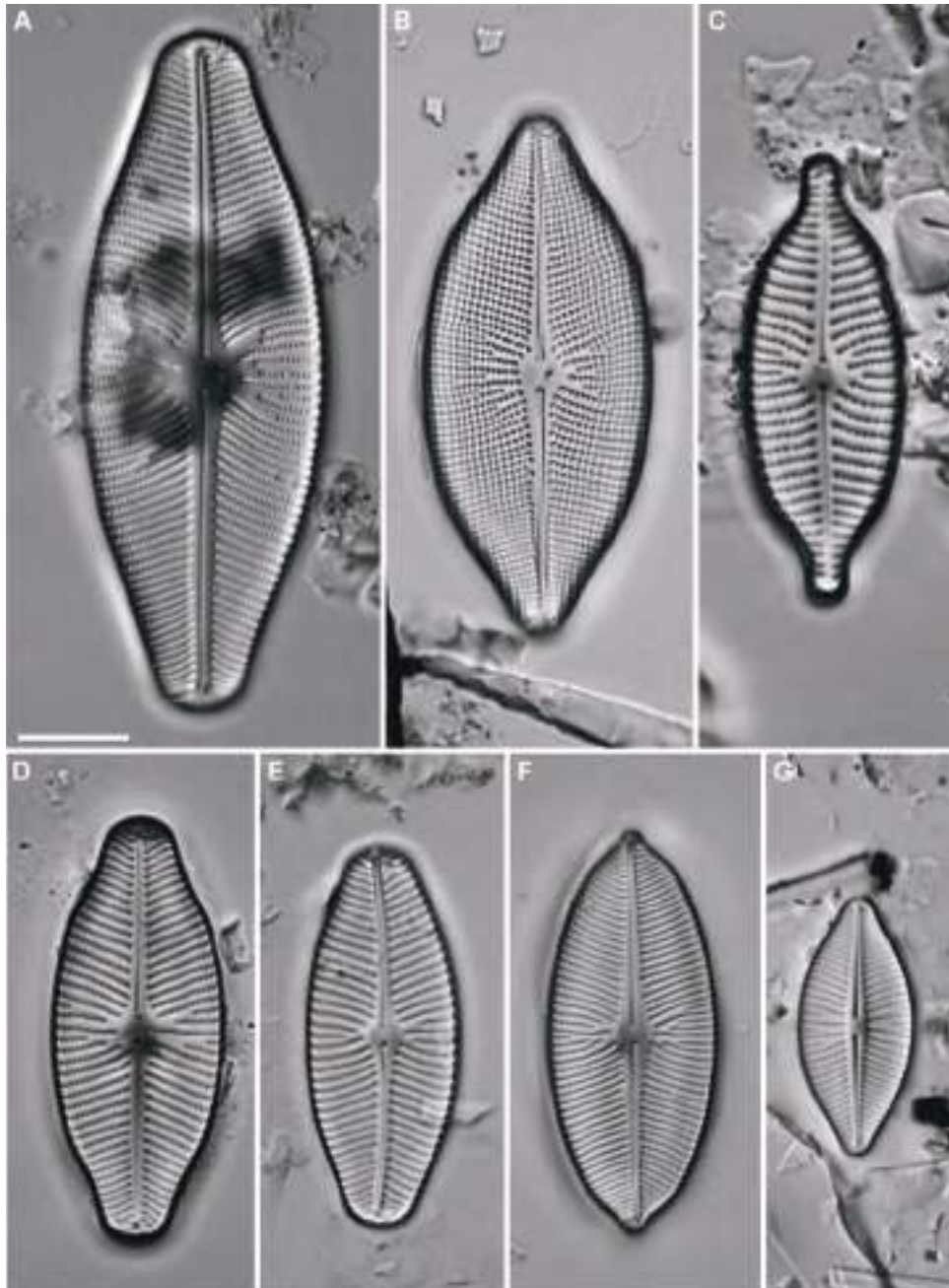
**Characteristics** – Cells **biraphid**, generally large and robust, elliptical with broadly rounded, rounded or sub-capitate apices. Striae easily discernable under LM (Fig. 84) and composed of single rows of round or elongate, **denticulate** (internally occluded) areolae (Fig. 85: F). Raphe straight with expanded central endings (Fig. 85: A-B), terminal raphe endings bent towards same (Fig. 85: B) or opposite (Fig. 85: A) directions. Central area generally expanded with **stigma(ta)** occasionally present (II; Fig. 84: B; Fig. 85: E).

**Plastid structure** – Single plastid has a central axis along the apical axis of the cell with four lobes at each end which extend under the valves. Many scattered lipid bodies.

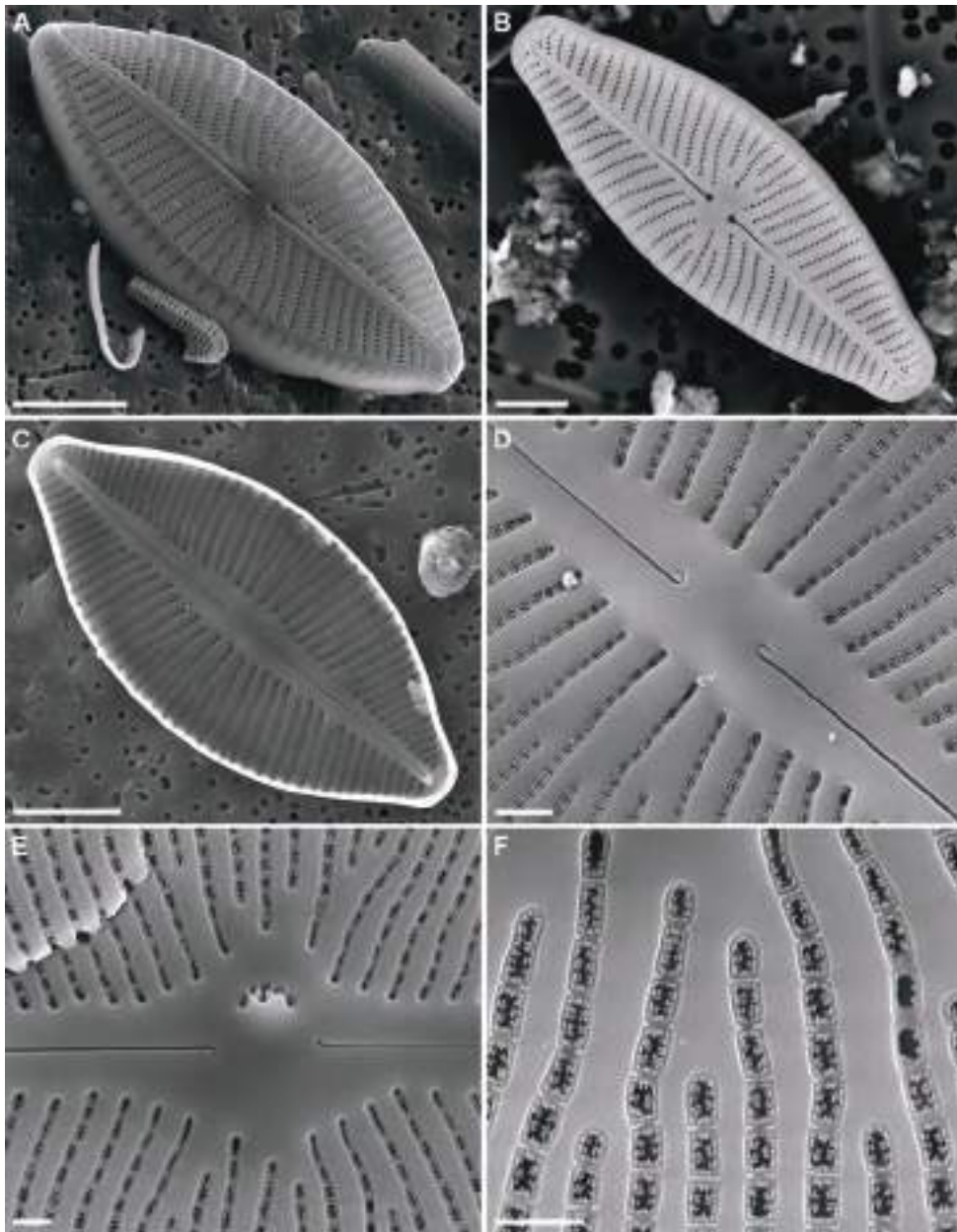
**Identification of species** – Species can be identified by cell size, cell shape, shape of the apices, structure and density of the striae as well as structure of the central area and the shape of the central raphe endings and the presence/absence of a stigma.

**Ecology** – Cells solitary, free living and motile. Found in the benthos of a variety of water types, in tropical Africa this taxon seems to favour oligotrophic waters with low to moderate conductivities.





**Fig. 84.** *Placoneis* spp. **A-G.** LM. **A.** *Placoneis* sp., valve view. **B.** “*Navicula omegopsis*” Hustedt, valve view. **E.** *P. cocquytiae* Fofana, Sow, J.C. Taylor, Ector & Van de Vijver, valve view. **F.** “*Navicula ashantiensis*” Foged, valve view. **G.** *P. hambergii* (Hustedt) Bruder, valve view.  
Scale bar = 10  $\mu$ m.



**Fig. 85.** *Placoneis*. **A-F.** SEM. **A-B.** External view of valve. **C.** Internal view of valve. **D.** Detail of the internal central raphe endings. **E.** Internal view of valve, note the stigmata in the central area. **F.** Internal view of valve, detail of the striae composed of single rows of denticulate areolae.  
Scale bars = 10  $\mu\text{m}$  (A-C), 1  $\mu\text{m}$  (D-F).

## ***Gomphonema*** Ehrenberg 1832

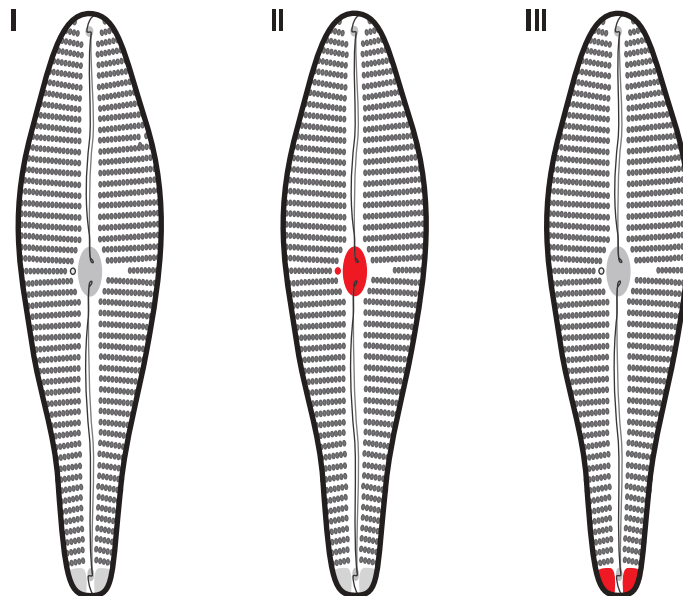
Type species: *Gomphonema acuminatum* Ehrenberg

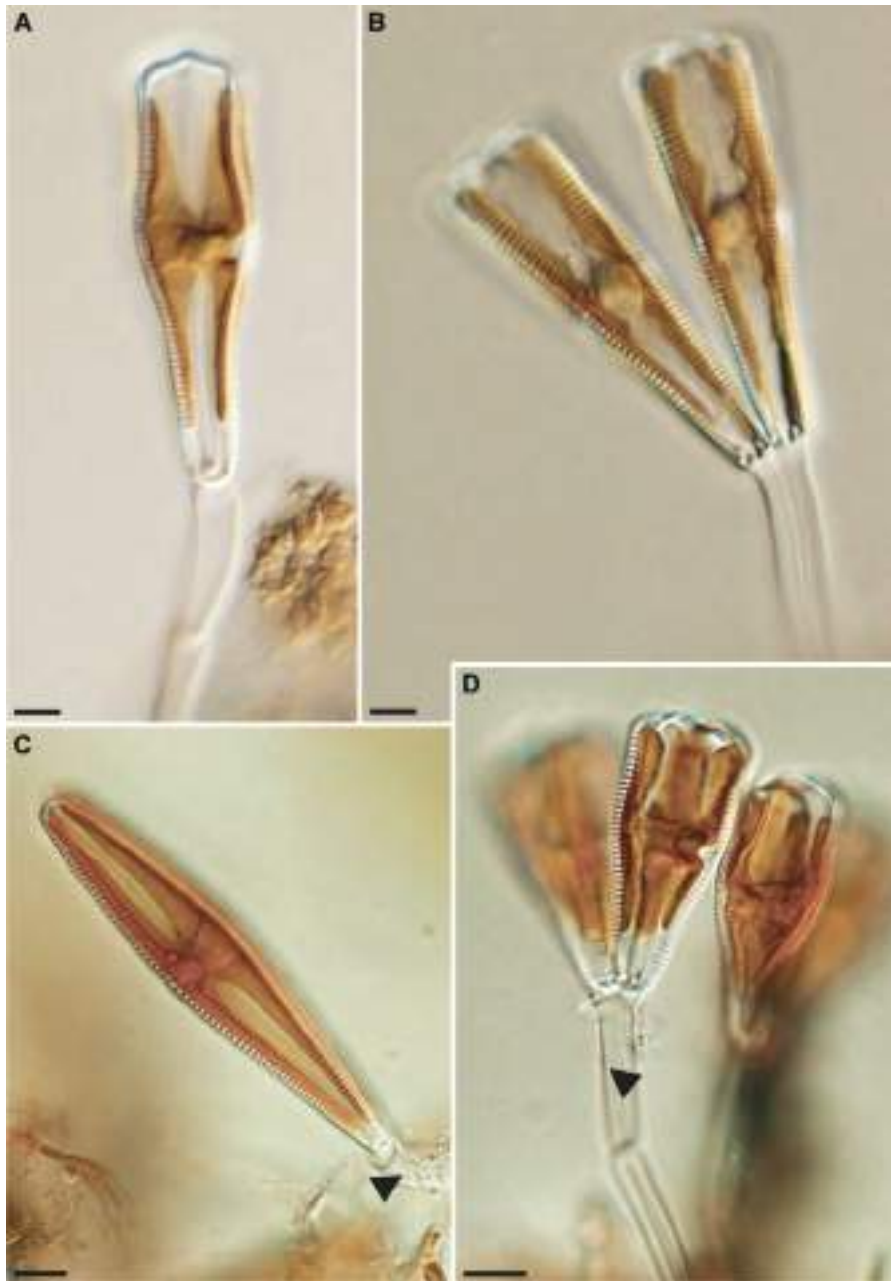
**Characteristics** – Cells **biraphid**, **heteropolar**, highly variable in cell size, valve shape and apex shape. Striae composed of single or double rows of areolae which may not be discernable under LM. Raphe straight and simple (Fig. 87: D-H). Central area (II) variable in size and usually with one stigma present. Apical pore field present at the foot pole (III; Fig. 91: C). Rarely large species from tropical Africa have an isolated apical spine (Fig. 91: A, B).

**Plastid structure** – Single H-shaped plastid extending under both valve faces with a central pyrenoid against the girdle (Fig. 86; Fig. 87: 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 of the central and axial area. The proximity of the stigma to the striae and the presence of an apical spine are also important characters.

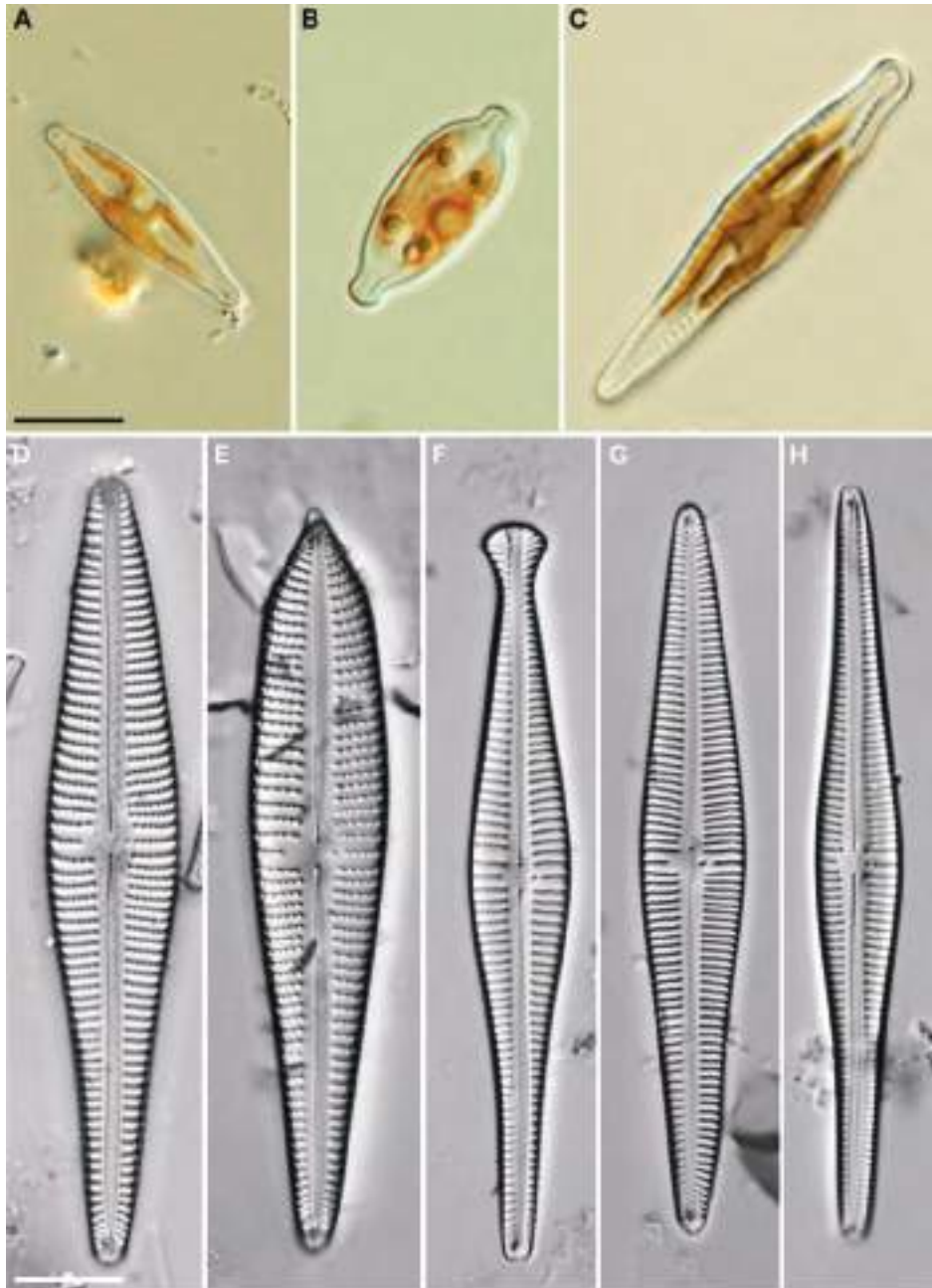
**Ecology** – Cells solitary or in pairs commonly attached by mucilage stalks (Fig. 86; Fig. 87: A-C) and forming colonies. Also solitary, free living and motile. Found in the benthos of oligotrophic to eutrophic waters in both low and moderate conductivities.





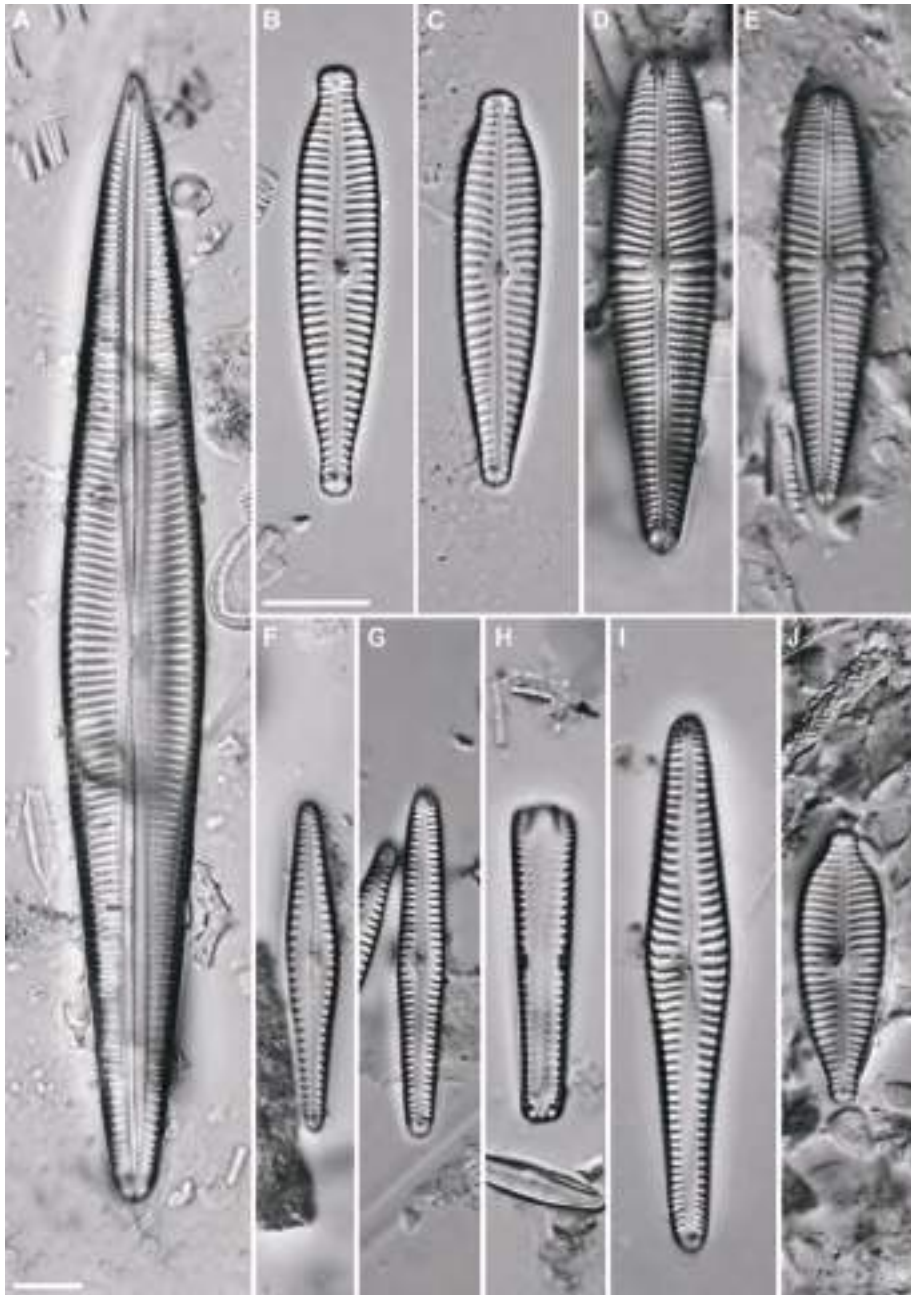
**Fig. 86.** *Gomphonema* spp. **A-D.** LM, living cells. **A.** *G. truncatum* Ehrenberg, valve view. **B.** *Gomphonema* sp., girdle views. **C.** *Gomphonema* sp., valve view, note mucilage stalk (arrow). **D.** *G. truncatum*, girdle views, note mucilage stalks (arrow).

Scale bars = 10  $\mu$ m (A-D).

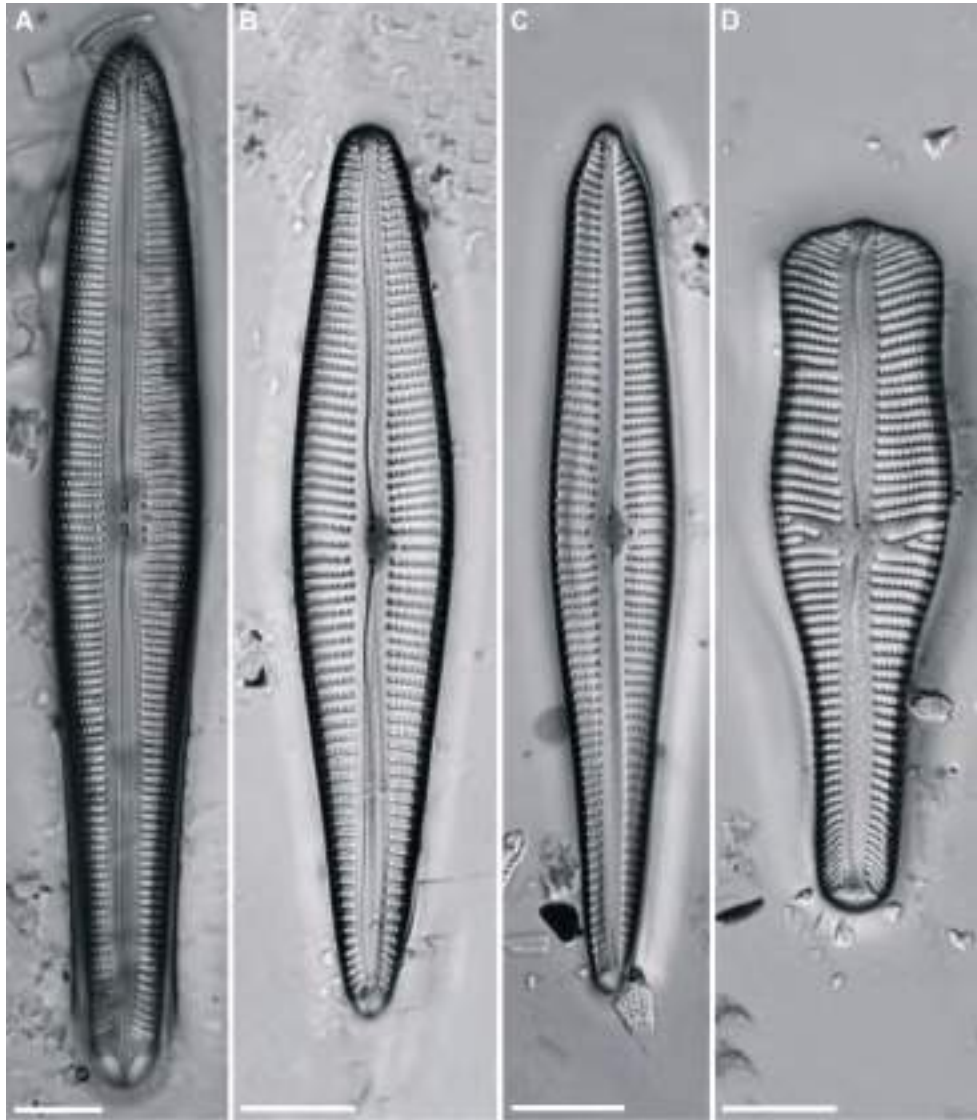


**Fig. 87.** *Gomphonema* spp. **A-H.** LM. **A-C.** Living cells, valve views. **B.** *Gomphonema parvulum* Kützing. **D-H.** Cleaned valves. **D.** *Gomphonema affine* Kützing.  
Scale bars = 10  $\mu\text{m}$  (A-H).

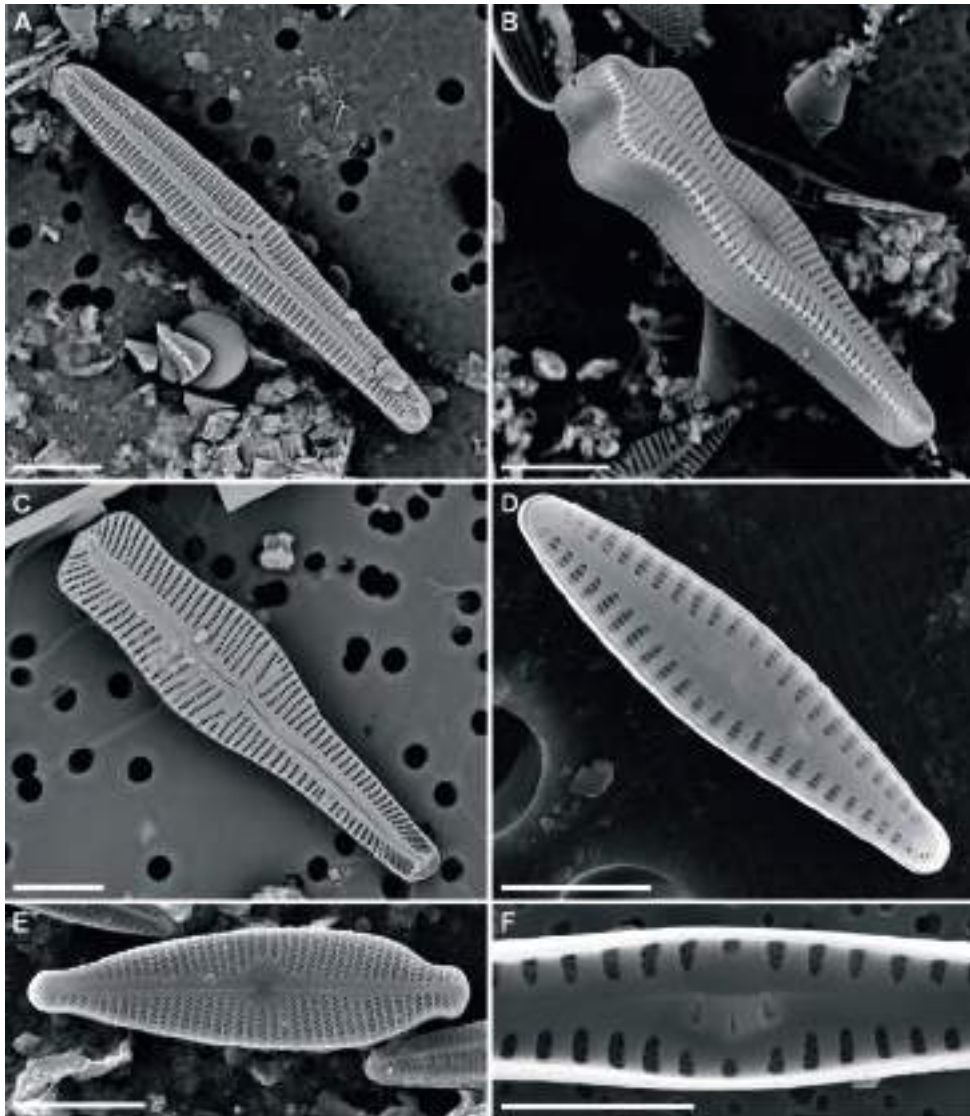




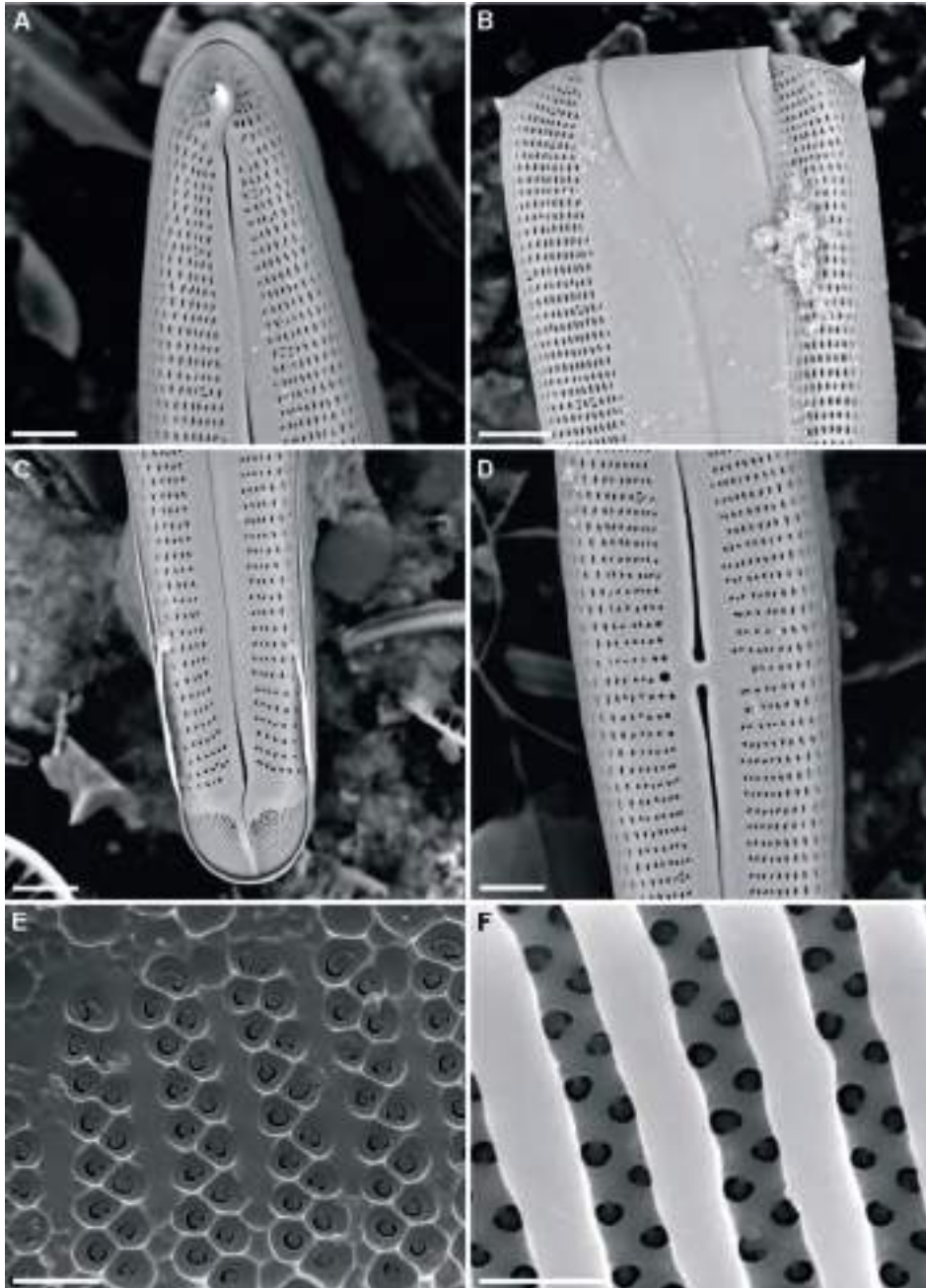
**Fig. 88.** *Gomphonema* spp. **A-J.** LM, cleaned valves. **A.** *G. kilhamii* Kociolek & Stoermer, valve view. **B-C.** *G. zairense* Compère, valve view. **D-E.** *G. aequatoriale* Hustedt, valve views. **F-G.** *Gomphonema* spp., valve view. **H.** *Gomphonema* sp., girdle view. **I-J.** *Gomphonema* spp., valve view. Scale bar = 10 µm (A-I).



**Fig. 89.** *Gomphonema* spp. **A-D.** LM, cleaned valves. **A, C.** *G. africanum* G.S. West, valve view. **B.** *Gomphonema* sp., valve view. **D.** *G. truncatum*, valve view. Scale bars = 10  $\mu\text{m}$  (A-D).



**Fig. 90.** *Gomphonema* spp. **A-F.** SEM. **A.** *Gomphonema* sp., external view of valve, note striae composed of double rows of areolae. **B.** *G. acuminatum*, external view of valve. **C.** *G. truncatum*, external view of valve, note striae composed of single rows of areolae. **D.** *G. brasiliense* subsp. *pacificum* Gerd Moser, Lange-Bertalot & Metzeltin, external view of valve. **E.** *G. zairense*, external view of valve. **F.** *Gomphonema* sp., internal view of valve. Scale bars = 10 µm (A-C, E), 5 µm (D, F).



**Fig. 91.** *Gomphonema* spp. **A-F.** SEM. **A, C-D.** *G. kilhamii*, external view of valve, note apical spine (**A**) and apical pore field (**C**). **B.** *G. kilhamii*, girdle view, note apical spines. **E.** *G. grande* Karthick, Kociolek, J.C. Taylor & Cocquyt, external view of valve, detail of striae. **F.** *G. grande*, internal view of valve, detail of striae. Scale bars = 4  $\mu\text{m}$  (A, C-D), 5  $\mu\text{m}$  (B), 1  $\mu\text{m}$  (E-F).

***Gomphosphenia*** Lange-Bertalot 1995

Type species: *Gomphosphenia lingulatiformis* (Lange-Bertalot & E. Reichardt) Lange-Bertalot

SYNONYM:

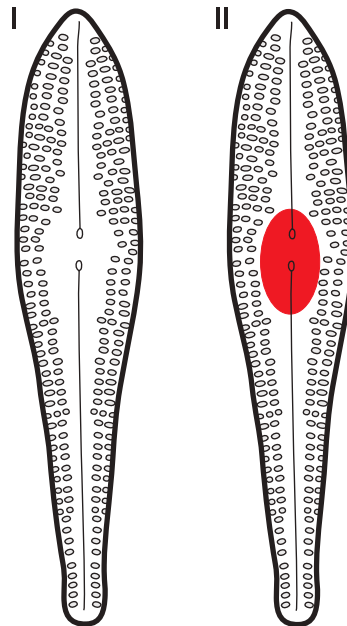
*Gomphonema* Ehrenberg 1832 pro parte

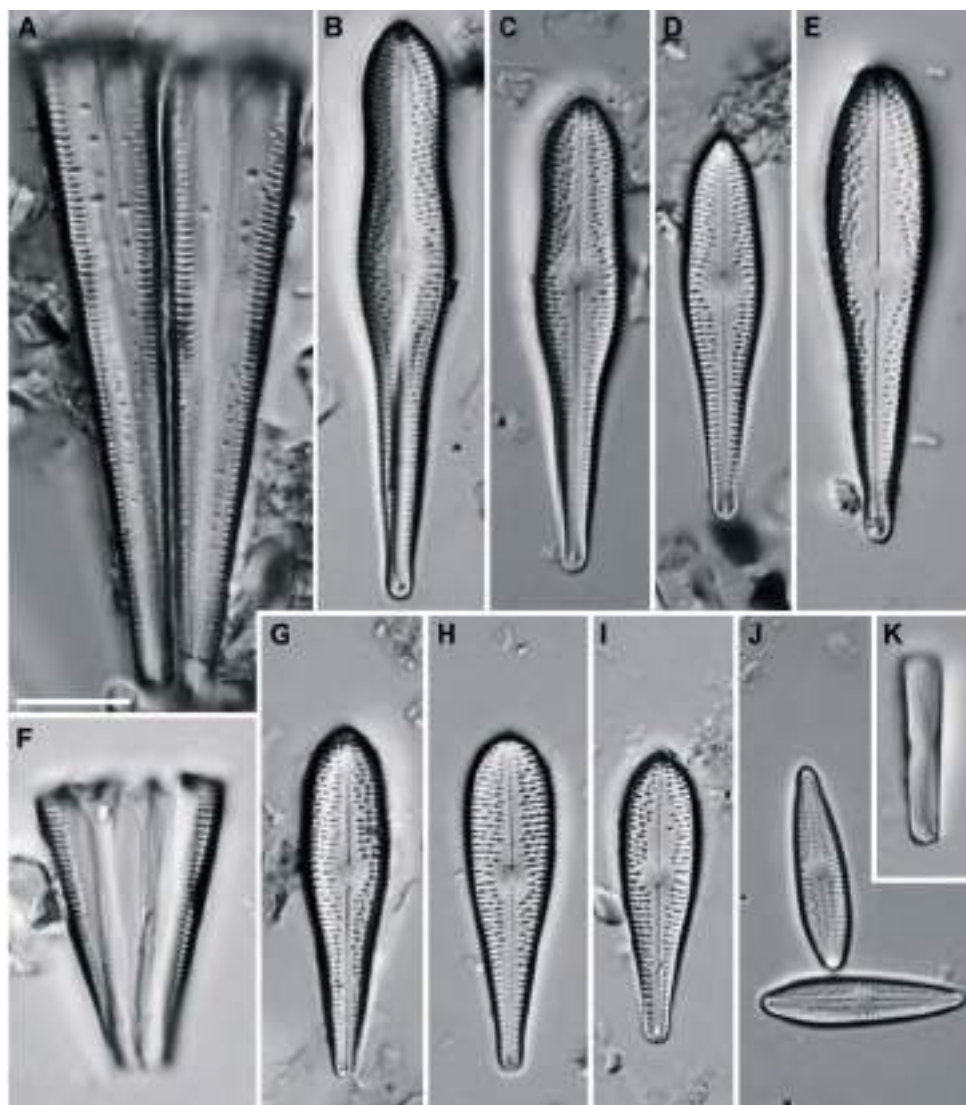
**Characteristics** – Cells **biraphid, heteropolar**, elliptical to linear elliptical with broadly rounded apices. Striae coarse composed of single rows of clearly discernable areolae. Raphe simple, straight, not extending onto the valve mantle. Central area (II) variable in size. Axial area broad to very broad (Fig. 92: B-E, G-J). Mantle with row of single large elongate areolae (Fig. 93: B). Stigma and apical pore field absent.

**Plastid structure** – Not observed in tropical African material.

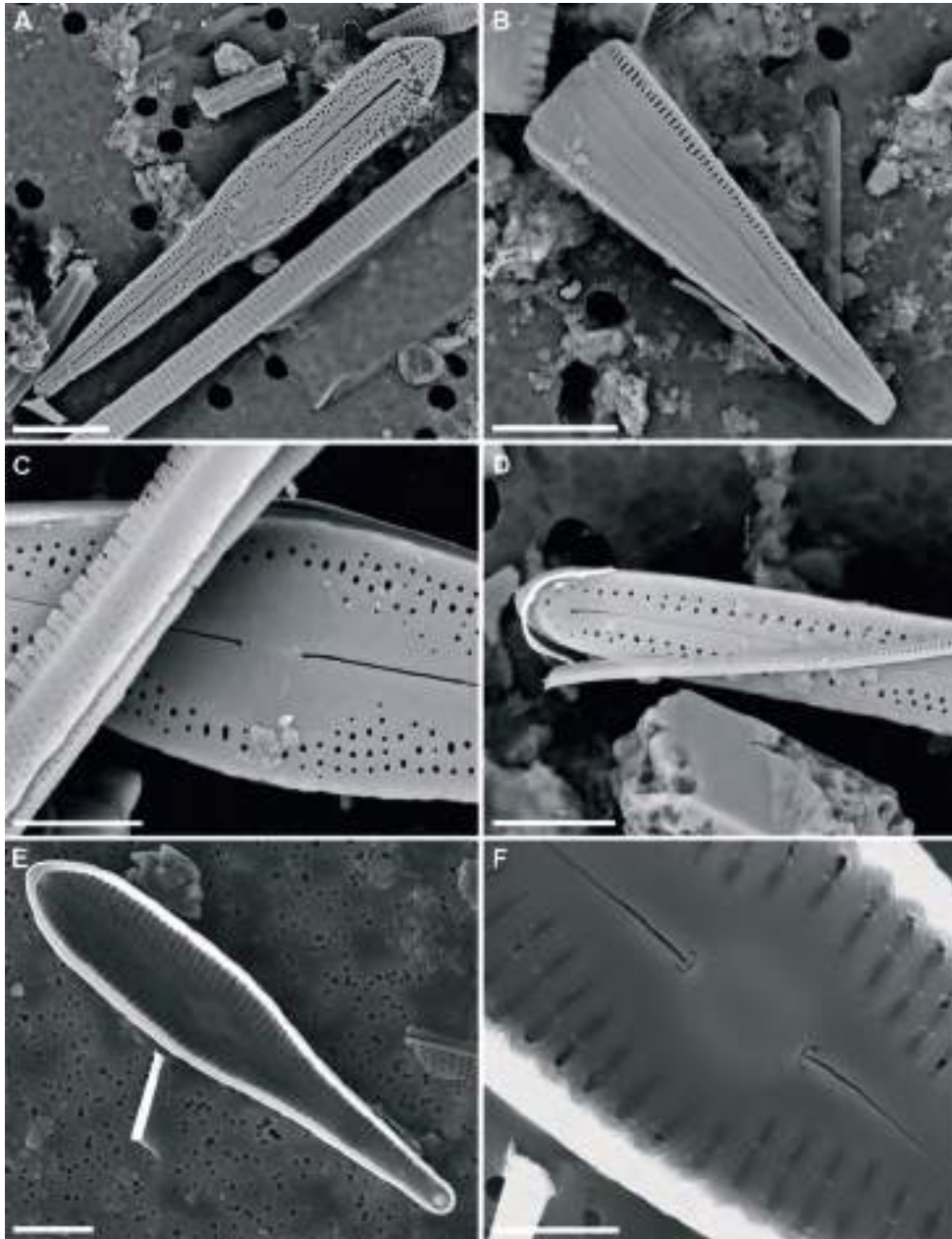
**Identification of species** – Species can be identified by cell size, cell shape, shape of the apices, structure and density of the striae as well as structure of the central and axial area.

**Ecology** – Cells solitary or in pairs, free living and motile. Found in the benthos of oligotrophic to eutrophic waters in both low and moderate conductivities. Some taxa e.g. *G. pfannkucheae* (Cholnoky) Lange-Bertalot are found in oligotrophic, acidic tropical African waters.





**Fig. 92.** *Gomphosphenia* spp. **A-K.** LM. **A.** *Gomphosphenia* sp., girdle views. **B-E, G-J.** *Gomphosphenia* spp., valve views, note variable size of central area and broad to very broad axial area. **F, K.** *Gomphosphenia* sp., girdle views. Scale bar = 10  $\mu$ m (A-K).



**Fig. 93.** *Gomphosphenia* spp. **A-F.** SEM. **A.** External view of valve. **B.** Girdle view. **C.** External view of valve, detail of central area. **D.** External view of valve, detail of apex. **E.** Internal view of valve. **F.** Internal view of valve, detail of central raphe endings.

Scale bars = 10  $\mu\text{m}$  (A-B), 5  $\mu\text{m}$  (C-E), 2  $\mu\text{m}$  (F).

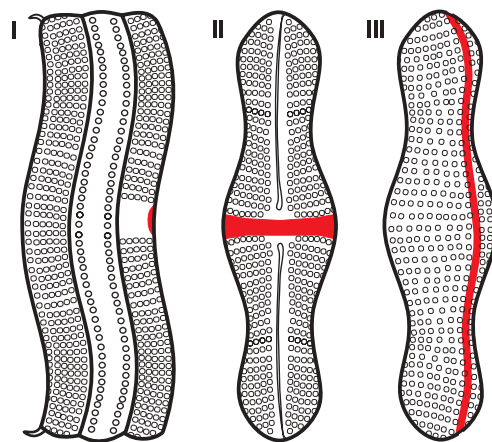
***Achnanthes* Bory 1822**Type species: *Achnanthes adnata* Bory

**Characteristics** – A relatively large and robust **monoraphid** taxon often seen in girdle view with the cell bent or flexed. One valve carries a raphe while the other does not (**heterovalvar**). When seen in valve view the valve margin is often more or less undulating and the apices are swollen (as in *A. inflata* (Kützing) Grunow – Fig. 94: B-C, E-F). Cells in valve view are difficult to focus due to the flexed shape of the cell (see Figs 94; B-C both represent the same valve). There is a pronounced and clear gap between the striae at the central area of the raphe bearing valve (RV), with a **fascia** or thickening visible on the inside of the cell wall (I, II). This **fascia** is absent on the **rapheless valve** (RLV). A narrow **sternum** is present near one of the margins of the RLV (III). The areolae are clearly visible and appear under LM as large distinctly separate dots, under SEM the areolae can be seen to have a rather complex structure (**cribra** with **volae**) (Fig. 94: I).

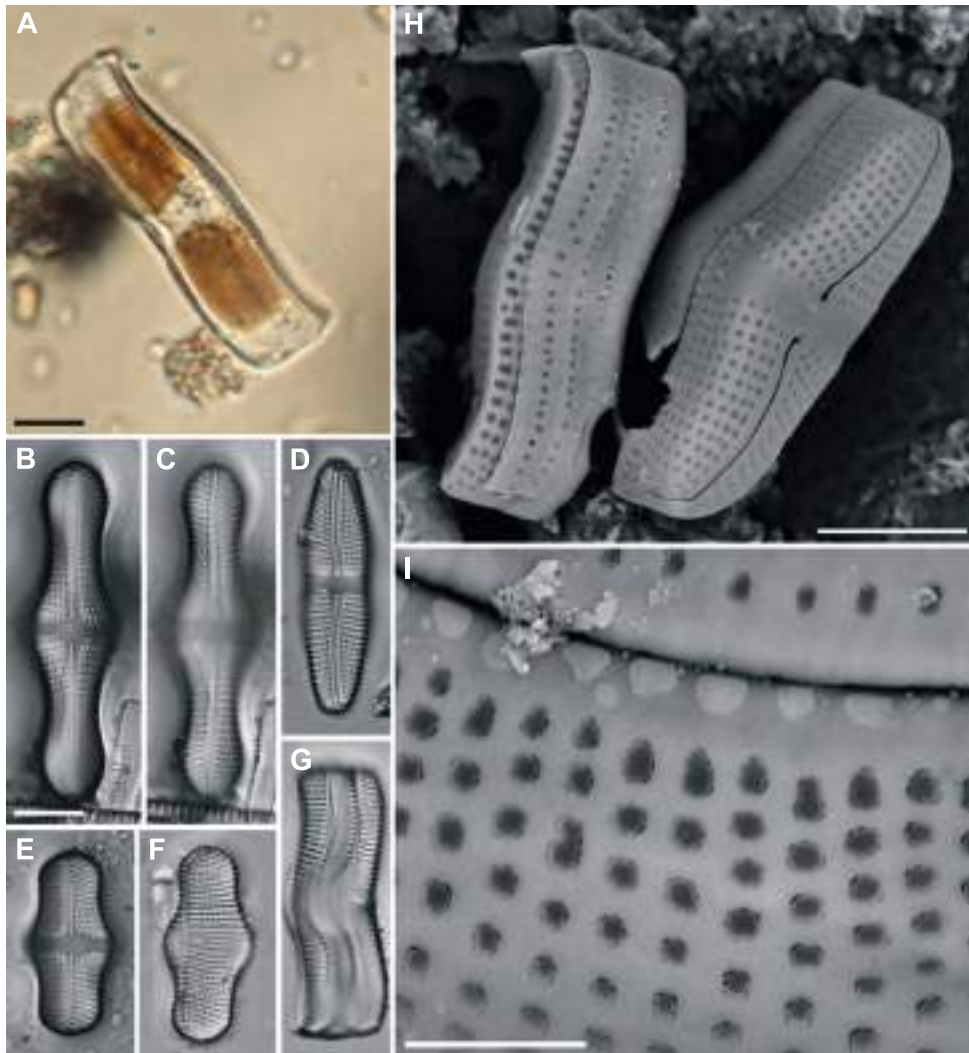
**Plastid structure** – There may be many granular plastids or two large plastids on either side of the transapical plane (Fig. 94: A). In valve view these are H-shaped and connected by a bridge bearing a pyrenoid.

**Identification of species** – Species and varieties in this genus are distinguished based on cell size and shape as well as the shape of the apices.

**Ecology** – Cells solitary or in pairs, usually attached by an apical mucilage stalk but also motile. Commonly found in waters of medium to high conductivity.







**Fig. 94.** *Achnanthes* spp. **A-G.** LM. **A.** Living cell, girdle view. **B-C.** Valve view of the RV of *Achnanthes inflata* (Kützing) Grunow, different foci of the same cell. **D.** Valve view of RV of *A. coarctata* (Brébisson ex W. Smith) Grunow. **E.** RV of *A. inflata*, small specimen. **F.** RLV of *A. inflata*, small specimen. **G.** Girdle view of *A. inflata*. **H-I.** SEM. **H.** Broken valve of *A. inflata*, oblique view. **I.** Detail of valve margin of *A. inflata* showing the structure of the areolae occlusions. Scale bars = 10 µm (A-H), 3 µm (I).

## ***Lemnicola*** Round & Basson 1997

Type species: *Lemnicola hungarica* (Grunow) Round & Basson

SYNONYM:

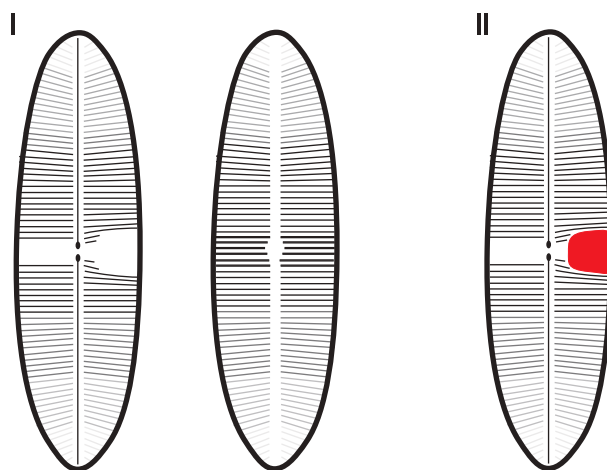
*Achnanthes* Bory 1822 pro parte

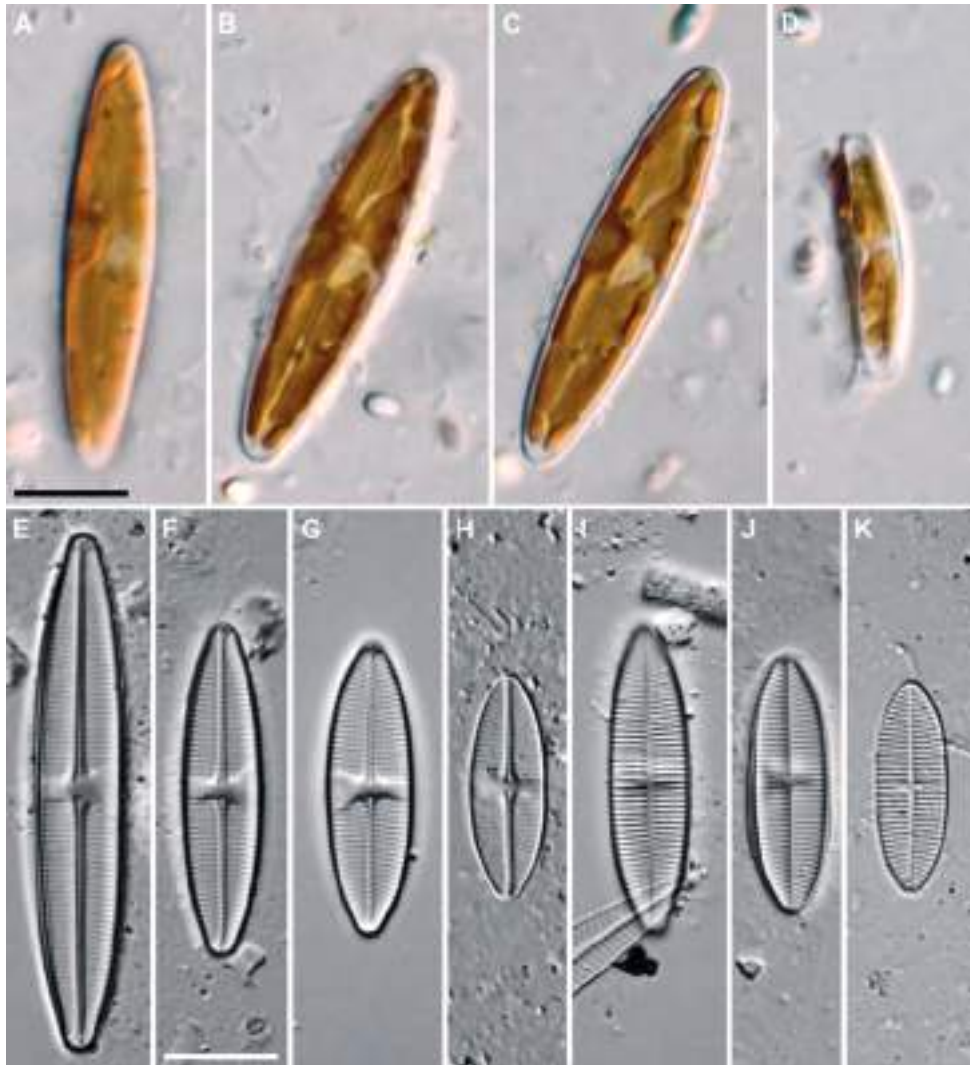
**Characteristics** – Cells **heterovalvar**, **monoraphid**, linear to elliptical with broadly rounded or cuneate apices. Curved in girdle view (one valve slightly convex the other slightly concave). Striae robust and clearly discernable under LM (Fig. 95: E-K), composed of 2 rows of very small round areolae, visible only under SEM (Fig. 96). Raphe straight and simple (Fig. 95: E-K) with expanded central endings, terminal endings curved to opposite sides. Rapheless valve (RLV) has a narrow axial area and may have a unilateral gap in the central striation. The raphe valve (RV) has a thickened asymmetric **stauros** (II; Fig. 96: A-B).

**Plastid structure** – Single plate-like plastid lying under the araphid valve extending under one or both girdles (Fig. 95: A-D).

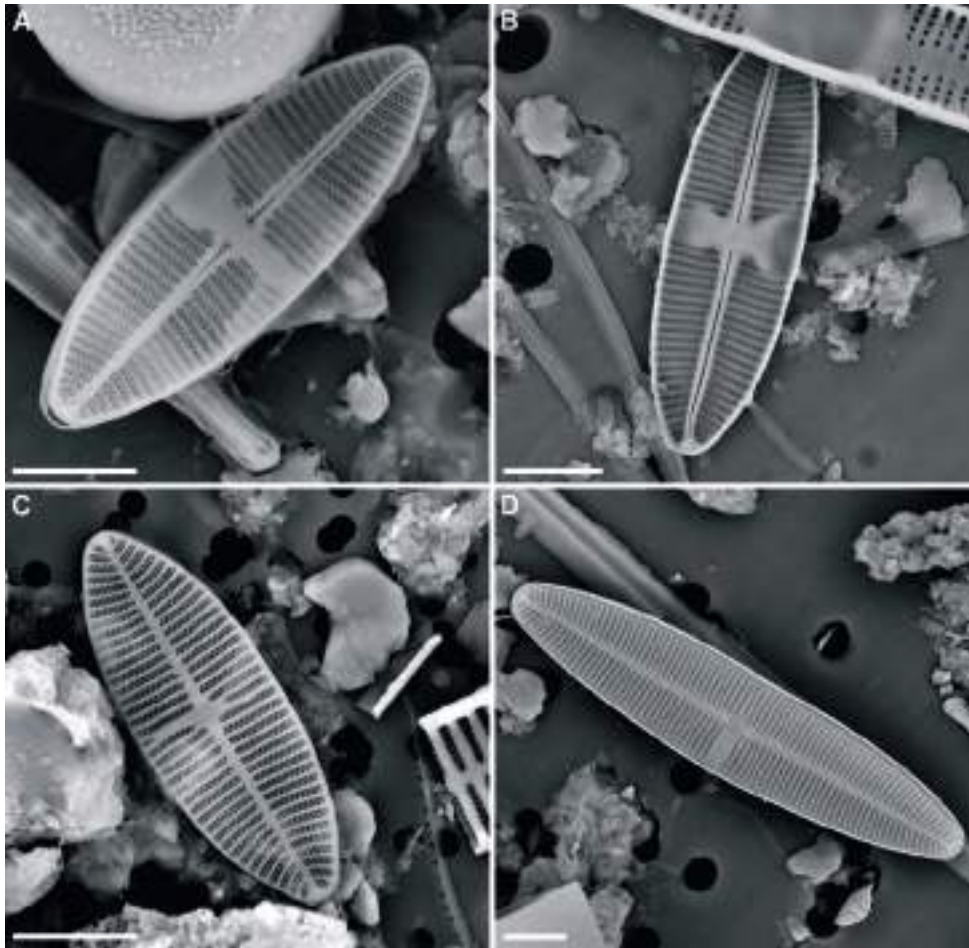
**Identification of species** – Up till now only one species is included in this genus: *Lemnicola hungarica*.

**Ecology** – Cells solitary, usually attached (**adnate**) on benthic substrates in particular aquatic plants. Found in neutral to alkaline waters.





**Fig. 95.** *Lemnicola hungarica*. **A-K.** LM. **A-D.** Living cells. **E-K.** Cleaned valves.  
**E-H.** Raphe valves, note asymmetric stauros. **I-K.** Rapheless valves, note narrow axial area.  
 Scale bars = 10  $\mu\text{m}$  (A-K).



**Fig. 96.** *Lemnicola hungarica*. **A-D.** SEM. **A.** External view of raphe valve. **B.** Internal view of raphe valve. **C-D.** External view of rapheless valves. Scale bars = 5  $\mu\text{m}$  (A-D).

***Psammothidium*** Bukhtiyarova & Round 1996

Type species: *Psammothidium marginulatum* (Grunow) Bukhtiyarova & Round

SYNONYM:

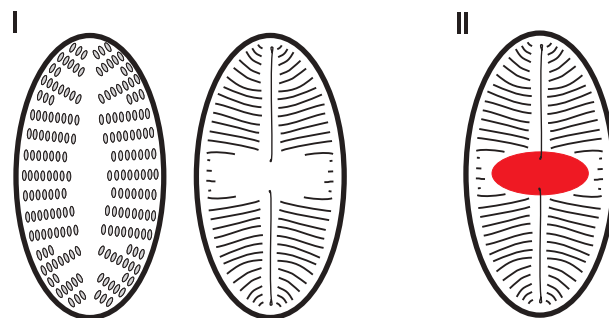
*Achnanthes* Bory 1822 pro parte

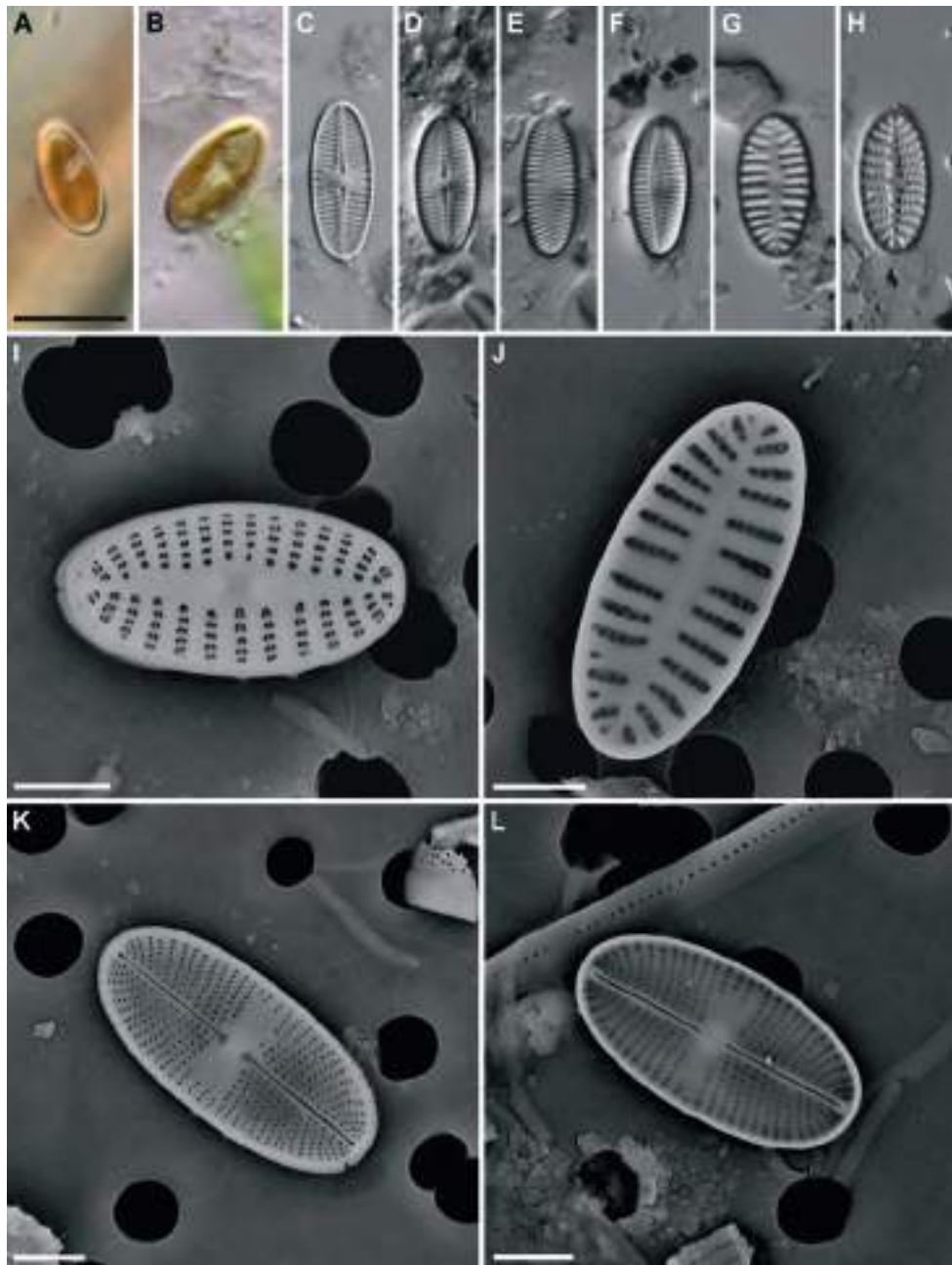
**Characteristics** – Cells **heterovalvar**, **monoraphid**, elliptical with broadly rounded apices. Slightly curved in girdle view (one valve slightly convex the other slightly concave). Striae robust and clearly discernable under LM (Fig. 97: C-H), composed of 1 row of small round areolae on the raphe valve (RV) and slightly larger areolae on the raphe-less valve (RLV), visible only under SEM (Fig. 97: I-L). Raphe straight and simple (Fig. 97: C-D) with expanded central endings. RLV often has a broad axial area. The RV often has a large central area which may stretch to the valve margins (II; Fig. 97: C-D, K-L).

**Plastid structure** – Single plate-like plastid lying under the rapheless valve extending under the girdle (Fig. 97: A-B).

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

**Ecology** – Cells solitary, attached (**adnate**) by the raphe valve face to the substrata. Found in the benthos of mesotrophic to hypereutrophic waters with moderate to high conductivities.





**Fig. 97.** *Psammothidium* spp. **A-H.** LM. **A-B.** Living cells. **C-H.** Cleaned valves. **C-D.** Raphe valves. **E-H.** Rapheless valves. **I-L.** SEM. **I.** External view of rapheless valve. **J.** Internal view of rapheless valve. **K.** External view of raphe valve. **L.** Internal view of raphe valve. Scale bars = 10 μm (A-H), 2 μm (I-L).

***Anorthoneis*** Grunow 1868

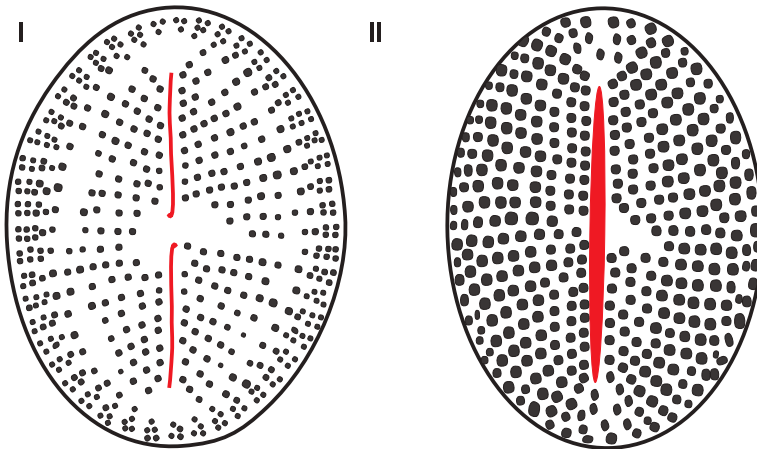
Type species: *Anorthoneis excentrica* (Donkin) Grunow

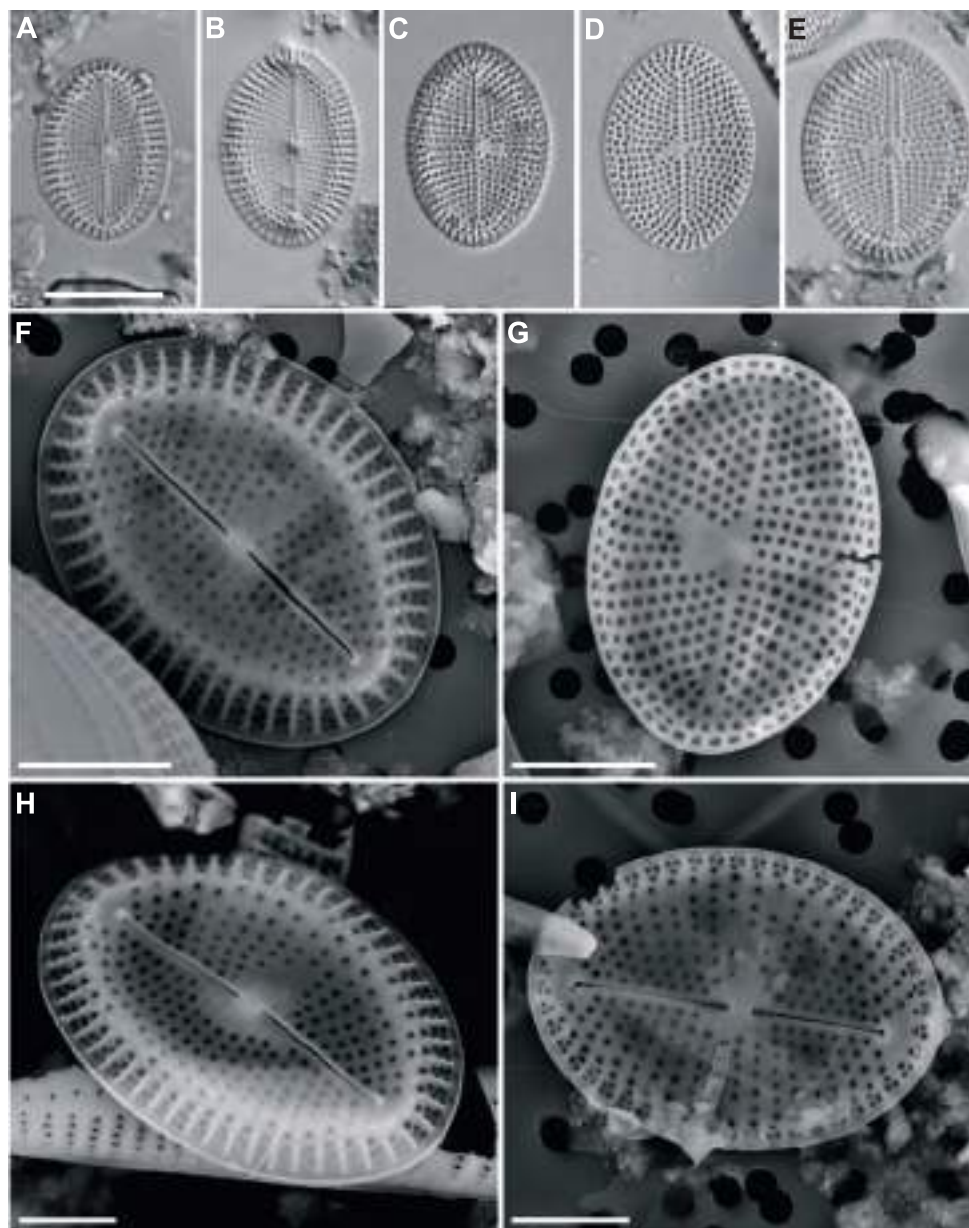
**Characteristics** – Cells **monoraphid**, elliptical to almost circular in shape. Cells **heterovalvar**, the raphe (I) and the **axial area** (II) are both located slightly off-center (eccentric). The central and terminal raphe endings are straight. Areolae clearly visible under LM. The valves are very shallow and the mantle is absent.

**Plastid structure** – Single flat C-shaped plastid (comparable to that of *Cocconeis* Ehrenberg).

**Identification of species** – Up till now only one species occurs commonly in the freshwaters of the tropics: *Anorthoneis dulcis* M.K. Hein.

**Ecology** – Cells solitary, free living but usually attached. *Anorthoneis dulcis* is found in benthic habitats in tropical African alkaline oligotrophic waters. Other members of this genus are considered to be restricted to marine habitats.





**Fig. 98.** *Anorthoneis dulcis*. **A-E.** LM, cleaned material. **A-C, E.** Valve view of RV. **D.** Valve view of RLV. **F-I.** SEM. **F, H.** External view of RV. **I.** Internal view of RV. **G.** Internal view of RLV, note unilateral expansion of the central area. Scale bars = 10  $\mu\text{m}$  (A-E), 5  $\mu\text{m}$  (F-G), 3  $\mu\text{m}$  (H), 4  $\mu\text{m}$  (I).