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Author(s) STARMACH, K.

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STARMACH, K. (1974) [Translation of Ceratium hirundinella (O.F. Müll.) Bergh. 1882 only. pp 395-400] Flora Slodkowodna Polski. Volume 4 Cryptophyceae, Dinophyceae, Raphidophyceae. Warsaw. Polska Akademia Nauk.

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pp. 395-400. Ceratium hirundinella (O.F. Müll.) Bergh 1882 (= Bursaria hirundinella O.F. Muller; Ceratium macroceros Schrank 1802; C. tetraceros Schrank 1802; C. longicorne Perty 1849; C. brevicorne, C. leptoceros, C. pumilum Zacharias 1905; C. Handelii Skuja 1937) (fig. 537-540).

Cells dorsoventrally compressed, 40-450 mμ long. The apical horn is narrow and long, blunt at the end with a pore and corona. Posterior horns number 2-3, are closed at the ends and usually pointed, straight or curved. The orbicular sulcus is almost circular, more thinly coiled slightly on the left or right. The ventral sulcus is rather wide, overlaps the epivalve and reaches the base of the cell at the back. Plates are reticulate and have shorter or longer spines at the crossing points. The numerous chromatophores are spherical, plate-like, yellow or yellow-tawny. A large oval nucleus is situated near to the ventral sulcus. Round, brownish-red bodies are found in the protoplasm, and are particularly numerous towards the rear part of the cell. Cysts have 2-4 horns and thick, yellow or brown walls.

Common in the plankton of lakes and ponds. The species is very variable, there are extensive works dating from the earliest years, particularly from Central Europe. For differentiation, the accepted system of Schroeder (1918) is based on the number of horns, width of cells, direction of the position of the apical and posterior horns.

Huber-Pestalozzi gives the following key to the difference in types.

A. Forms narrow, long or very long, with 3 horns, up to 45 but rarely 55 mμ wide. The apical part of cell narrow, conical and slender.

1. Antapical horn situated in the same direction as the apical.

.....Type furcoides (fig. 540a)

2. Anapical horn directed a little outwards.

a) Width of cell 28-34 mμ, length 148-280 mμ.

... Type silesiacum (fig 540b)

b) Cell width 44-55 mμ, length 375-443 mμ, very slender form.

... Type yuennanense (fig. 540c)

3. Antapical horn directed centrally, comparatively short, sometimes almost parallel to the apical horn, cells often up to 50 mμ wide.

... Type brachyceroides (fig. 540d)

B. Shorter or longer forms under optimal conditions have 3 horns and are above 45 mμ wide, 115-170 mμ long. Both posterior horns are slightly parted.

... Type carynthiacum (fig. 540e)

C. Shorter or longer forms under optimal conditions have 4 horns and are above 45 mμ wide. The left horn can be short, thumb-like or long. The apical portion of the cell is shorter than in A, and caplike.

1. Posterior horns do not deviate outwards, only slightly deviate, in general forms are slender.

a) Antapical horn is situated in the direction of the apical horn, the posterior right horn being parallel to this, rarely weakly deviate. The dorsal side of the cell is not compressed, delicate reticulations.

... Type gracile (fig. 540g)

b) Posterior horns strongly deviate outwards, the complete cell is curved, large reticulations and usually irregular.

... Type robustum (fig. 540h)

2. On the average posterior horns deviate outwards, cell appears a little smaller, wider and very compact. The antapical horn is directed outwards.

... Type austriacum (fig. 540f)

3. Posterior horns strongly deviate outwards.

a) Antapical horn is short, and lies in the same direction as the apical. Hypovalve very short.

... Type scotticum (fig. 540i)

b) Antapical horn larger, deviates outwards, hypovalve a little larger.

... Type piburgense (fig. 540j)

Type furcoides Schroeder (non Ceratium hirundinella var. furcoides Levander)
Relatively narrow cells, 30-45 mμ wide, 130-300 mμ long; apical and antapical horns in same direction. Found in all seasons of the year.

Type silesiacum Schroeder (= Ceratium hirundinella var. furcoides Levander; C. furcoides (Levander) Langhans). Appears slender, 28-34 mμ wide, 148-280 mμ long. Posterior horns deviate a little.

Type yuennanense (Skuja) Huber Pestalozzi (= Ceratium Handelii Skuja 1937).
Appears 3-cornered with cells very long and narrow, 44-55 mμ wide and 375-443 mμ long.

Type brachyceroides Schroeder (non f. brachyceros Ostenfeld).
Cells 3-cornered with antapical horn bending inwards, 30-45 mμ wide, 130-145 mμ long.

Type carinthiacum (Zederbaum) Bachm.
Short appearance, with 3-4 horns, 45-60 mμ wide, 120-145 mμ long.
Hypovalve always shorter than epivalve.

Type gracile Bachmann.
Posterior horns show minimal deviation outwards, cells 60-75 mμ wide, 140-290-302 mμ long. 2 or 3 horns.

Type robustum (Amberg) Bachmann.
Cells irregularly reticulate, 45-55 mμ wide, 270-310 mμ long.
Bend inwards towards the ventral side.

Type austriacum (Zederbaum) Bachmann.

Cells 40-60-70 mμ wide, 120-160-235 mμ long, apical horn parallel to antapical, epivalve evenly conical. The most widespread type in Europe.

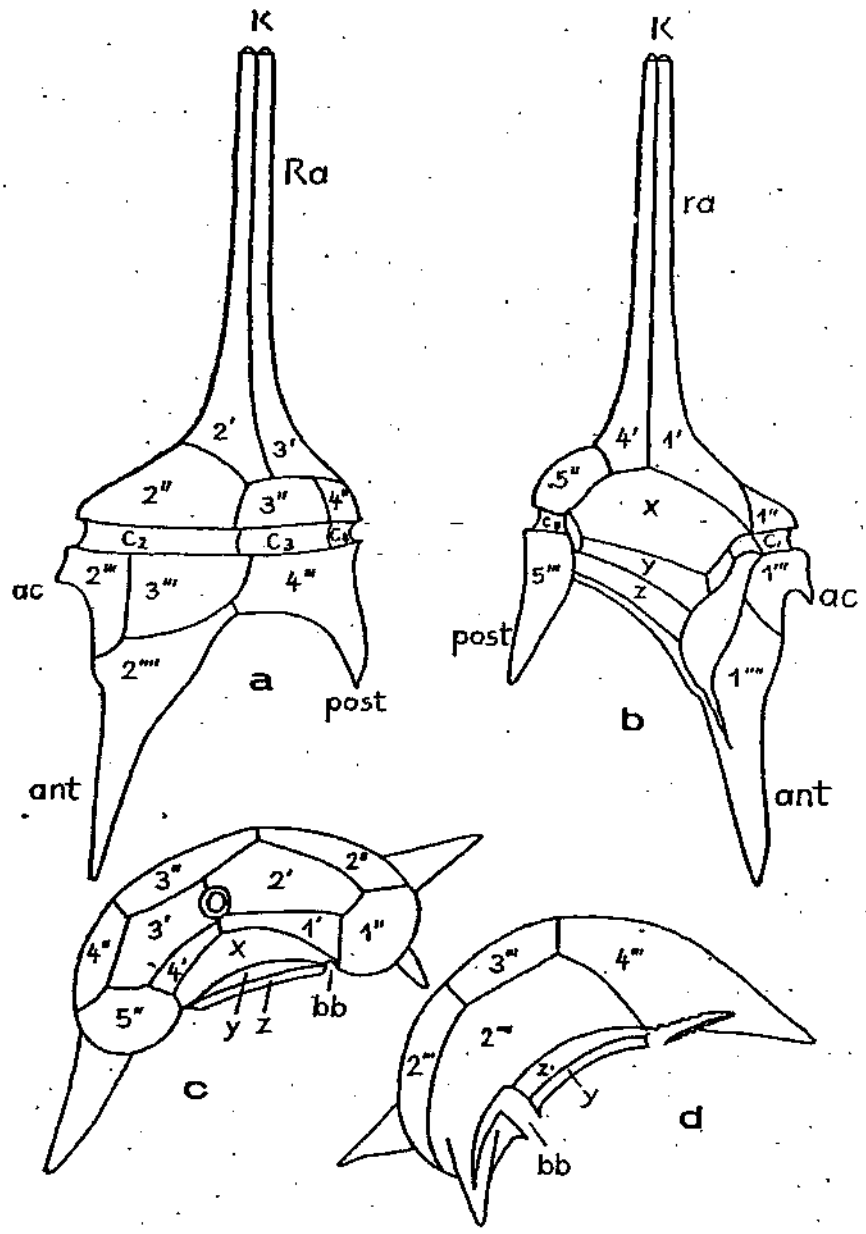
Type scotticum Bachmann.

Cells 50-60 mμ wide, 160-210 mμ long. Epivalve comparatively even. Described from Scottish lochs.

Type piburgense (Zederbauer) Bachmann.

Posterior horns deviate greatly, cells 50-60 mμ wide, 180-260 mμ long. Found in L. Piburg in Tyrol.

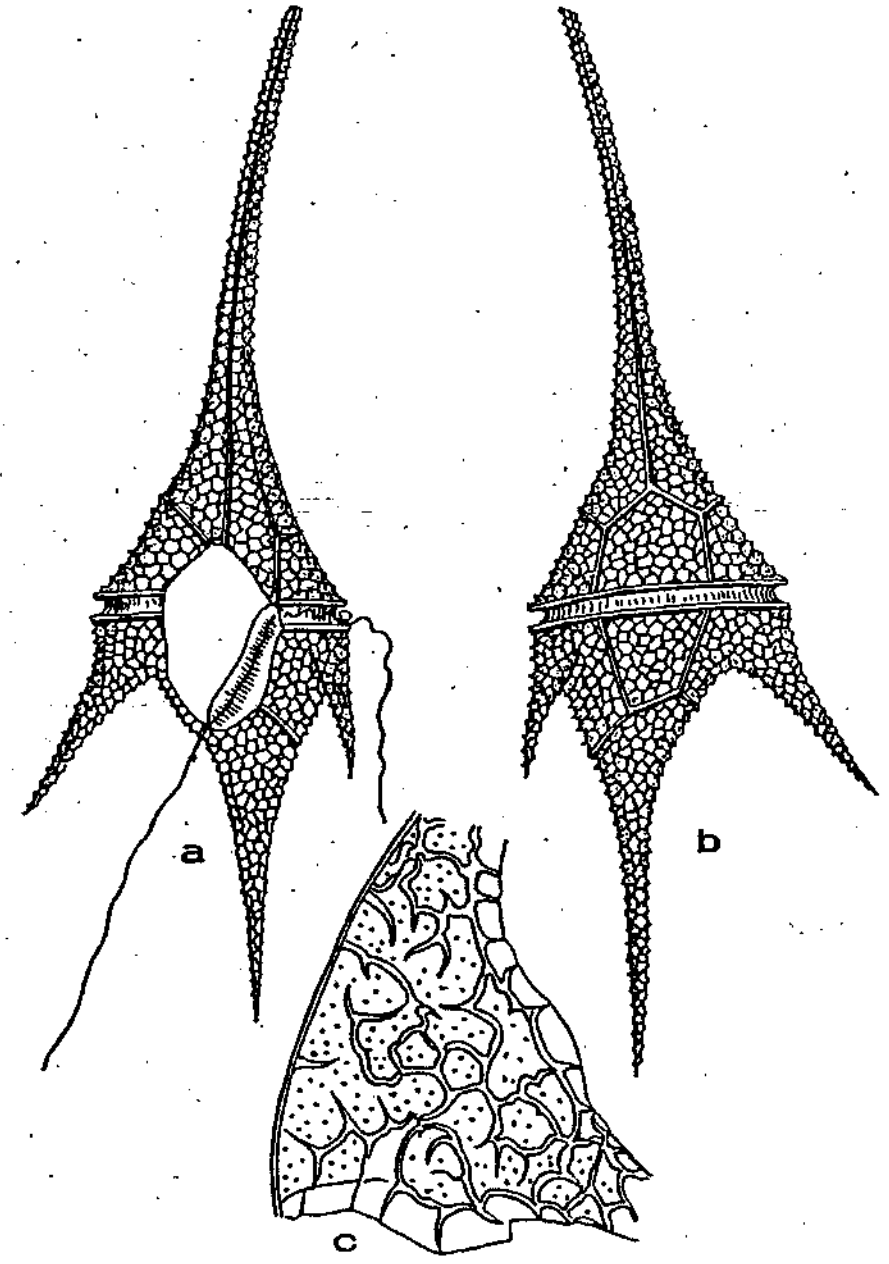
However, all the above types are connected by way of the precise difficulty of their designation. Seasonal changeability brings this about by way of the sizes and shapes of cells. Consequently, attempts to outline the differences between types by statistical methods did not give explicit results and have been abandoned. Besides, a series of anomalies in the development of cells has been reported. From specialized experiments, chiefly by Huber Pestalozzi and Nipkow, it arises that C. hirundinella is a warm water species, showing in summer a distinct cyclomorphosis, in autumn and winter it vanishes. Admittedly, in some years with mild winters it can be seen in the plankton, however maximum growth is always in summer. Established temperatures for growth are ; minimum 5°C - optimum 15-16°C - maximum 28-30°C. This range gives the species the possibility to have a widespread distribution. However it is not found in polar lakes. A characteristic is that Ceratium disappears when blue-green are numerous in the water (i.e. eutrophic lakes).



Rys. 537 — *Ceratium hirundinella*, układ tarczek: a — strona grzbietowa, b — strona brzuszna, c — epiwalwa, d — hypowalwa, *ra* — róg apikalny, *k* — korona, *ac* — róg dodatkowy, *ant* — róg antapikalny, *post* — róg postekwatorialny, *x* — górna płytka bruzdy brzusznej, *y* — środkowa płytka bruzdy brzusznej, *z* — dolna płytka bruzdy brzusznej, *bb* — bruzda brzuszna, c_1—c_5 — płytki bruzdy okrężnej (według Entza)

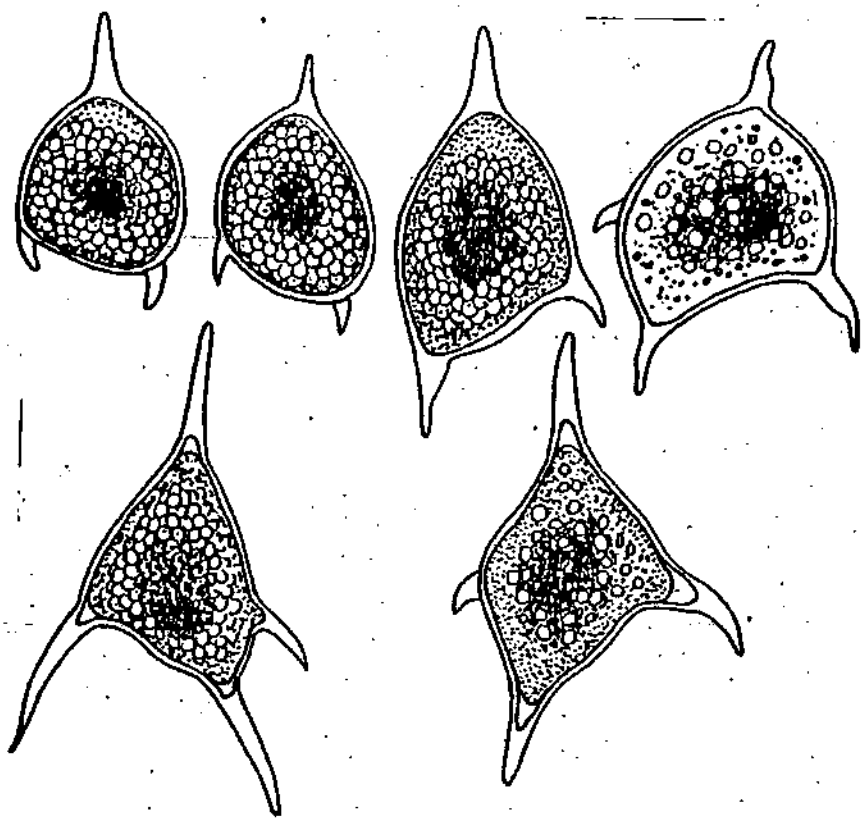
Fig 537 – Ceratium hirundinella, arrangement of plates:

a) dorsal view, b) ventral view, c) epivalve,
d) hypovalve, ra - apical horn, k - corona,
ac - additional horn, ant - antapical horn, post -
x - upper plate of ventral sulcus, y - central plate of the ventral sulcus,
z - lower plate of ventral sulcus, bb - ventral sulcus, c_1 - c_5 — plates of orbital sulcus (Entz)

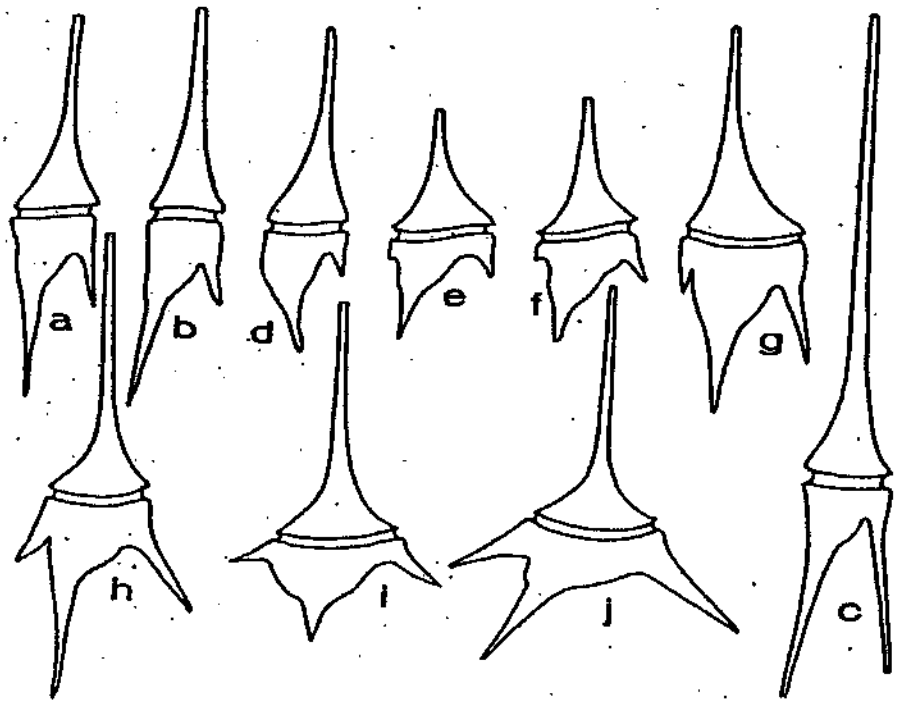


Rys. 539 — *Ceratium hirundinella*: a — strona brzuszna, b — strona grzbietowa, c — struktura tarczek pod silnym powiększeniem (według Schillinga)

Fig. 539 Ceratium hirundinella: a - ventral view, b - dorsal view, c - plate structure highly magnified (· Schilling)



Rys. 538 — Cysta *Ceratium hirundinella* (według Hubera i Nipkowa)



Rys. 540 — Typy komórek u *Ceratium hirundinella*: a — *C. hirundinella* typ *furcoides*, b — typ *silesiacum*, c — typ *yuennanense*, d — typ *brachyceros*, e — typ *carinthiacum*, f — typ *austriacum*, g — typ *gracile*, h — typ *robustum*, i — typ *scotticum*, j — typ *piburgense* (według Schrödera i Huber-Pestalozziego)

Notice

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.