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A Contribution to the Knowledge of Dinoflagellates from Bohemia

Příspěvek k poznání českých obrněnek

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Abstract — From the territory of Bohemia the author mentions 25 species and 8 lower taxa of dinoflagellates. Newly described was the species *Katodinium polyplastidum* from peat-bogs from the environment of Doksy. The species *Gymnodinium rotundatum* Klebs, *Gymnodinium* sp., Wołosz., *Gyrodinium traunsteineri* Lind., *Gymnodinium limitatum* Skuja, *Gymnodinium irregulare* Christen have been merged and placed in the species *Gymnodinium uberrimum* (Allm.) Kof. et Sw. as a variety.

The studied material was collected in Bohemia during 1955—1962. Unpreservable species were treated immediately after sampling, the rest was preserved for later treatment. The majority of the preserved samples were placed at my disposal by my cooperators, who also furnished the necessary data on the localities. Thanks to these collections I could compile sufficient material on dinoflagellates, which occurred sporadically within the region under study.

A vegetative colouring, caused by dinoflagellates, was found in two instances only; a rich one in the dam-lake Souš in the Jizerské Mountains, caused by *Peridinium inconspicuum* Lemm., and a faint one in a stone-pit near Velká Kuše (Blatná region), caused by *Peridinium cinctum* (O. F. Müller) Ehrenb., *P. bipes* Stein, and *Ceratium hirundinella* f. *austriacum* (Zeder.) Bachm.

Dinoflagellates without carapaces

Some species were found for the first time since their description, others were new for Czechoslovakia. *Katodinium polyplastidum* n. sp. has been described as a new species.

A similar course of both furrows and the shape of the cell permitted the establishing of a continnous series on the basis of literary data and my observations: *Gymnodinium uberrimum* (Allm.) Kof. et Sw., *Gymnodinium uberrimum* fo., Skuja, *Gymnodinium rotundatum* Klebs, *Gymnodinium* sp., Wołosz., *Gymnodinium limitatum* Skuja, *Gymnodinium irregulare* Christen, my specimens, *Gyrodinium traunsteineri* Lind. The species *Gymnodinium rotundatum* Klebs, *Gymnodinium* sp., Wołosz., *Gyrodinium traunsteneri* Lind., *Gymnodinium limitatum* Skuja, and *Gymnodinium irregulare* Christen have been merged and included in the species *Gymnodinium uberrimum* (Allm.) Kof. et Sw. as a variety *Gymnodinium uberrimum* var. *rotundatum* (Klebs) Popovský c. n.

The species was in agreement with the description with a few exceptions (mostly regarding their dimensions), which have not been considered as taxonomically significant. Species typical of some localities generally appeared together with their varieties or forms.

The "tabulatio" and a variation of the sutures (not recorded up to the present) have been found in the species *Peridinium goslaviense* Wołosz. and *Peridinium polonicum* Wołosz. The classification of dinoflagellates with a ± firm, skin-like membrane (periplast) without the common structure of the membrane, in one genus *Glenodinium* (Ehrenb.) Stein is artificial and provisional. These species most probably belong to different genera, perhaps to the genera *Woloszynskia*, *Glenodinium*, or *Peridinium*.

I assume this from a determination of the species *Peridinium penardii* (Lemm.) Lemm.; I saw with great difficulty the plates of both valves in about 2—3 per cent of the specimens. On the other hand, in all specimens of the same population there was a clearly visible apical porus, and both the transverse and the longitudinal furrows were also well discernible. A species without an apical porus could be easily confused with some species of the genus *Glenodinium* which had not the usual structure of the membrane.

The species *Glenodinium steinii* Lemm. could be compared with the species *Glenodiniopsis uliginosa* (Schilling) Wołosz.; from the difference between the two species we may that *Glenodinium steinii* Lemm. is a separate species, considering the reservations mentioned above.

A boundary line between the species *Peridinium inconspicuum* Lemm. and *Peridinium umbonatum* Stein can be drawn with great difficulty only, particularly with regard to some varieties of both species which have some transitional distinguishing investigation.

The marking of the plates in the scheme of the valves is carried out (with a slight modification) after Kofoid (1901, 1909) sec. Huber-Pestalozzi (1950).

For example: *Peridinium willei*

Kofoid (1901, 1909): 4′ 2a 7″ 5‴ 2⁗

Bütschli (1885) sec. Huber-Pestalozzi (1950): 7pr + 1r + 2vap + 3map + 1dap + 5pst + 2at

my designation: $2 + 4^1 + 7^2 + 5^3 + 2^4$

Systematics

Gymnodiniales Lind. 1928

Amphidinium larvale Clap. et Lachm. 1858—61

Amphidinium larvale Lind. 1928 (Tab. IX, 1—5)

A colourless species with a greatly variable epicone, changing from a button-like shape to a broadly conical one. The transverse and the longitudinal furrows are deep; the longitudinal sulcus reaches as far as the antapex in the majority of the specimens. The longitudinal flagellum is double the cell's length. The plasma is hyaline and colourless, and includes small refractive corpuscules of reserve materials. No stigma was observed. Dimensions: 10.4—11.0 μm × 10.1 to 12.0 μm. Locality: the River Vltava in Prague (January 1962) and a concrete tank (April—May 1959).

Amphidinium elenkinii Skwortzow 1925 (Tab. IX, 6)

Epicone much flattened. The transverse sulcus deep, the longitudinal one firste broad, then much narrowing towards the antapex without reaching it. The longitudinal flagellum is double the cell's length. The movement of the monades is a fast rolling. Chromatophores light yellow-brown, of various sizes, oval-shaped; they are absent in the epicone. No stigma was observed. Dimensions: Approximately 15 μm in diameter. Locality: Peat-bog near Novozámecký pond (May 1962).

Discussion: The species differs from the preceding species *Amphidinium larvale* LIND. by a typical flattening of the epicone, the course of the longitudinal sulcus, the presence of the chromatophores and the length of the flagellum.

Gymnodinium STEIN emend. KOF. et SW. 1921

Gymnodinium inversum NYGAARD 1949 (Tab. IX, 7)

The tranverse sulcus turning strongly to the left, pointed towards the apex. The longitudinal sulcus does not reach the antpex. Chromatophores small, oval, brownish-green. Dimensions: 30.0—38.6 µm × 22.1—30.9 µm. Locality: Řežabinec-Pool (May 1960).

Gymnodinium inversum var. *elongatum* NYGAARD 1949 (Tab. IX, 8)

Chromatophores oval-shaped to prolonged ellipsoid, brown-green. Dimensions: 44.5 to 65,5 µm × 30.4—41,6 µm. Locality: Řežabinec-Pool (May 1960).

Discussion: According to the course of the transverse sulcus, the species could be placed together with its variety to the genus *Gyrodinium* KOF. et SW. 1921, since the diacritical feature of this genus is among other characteristics the distance between the ends of the spiral of the transverse furrow, which must be than one fifth of the cell's length (KOFOID et SWEZY 1921).

Gymnodinium uberrimum (ALLMAN) KOFOID et SWEZY var. *uberrimum* (KOFOID et SWEZY, 264, fig. 10/9, 1921) (Tab. IX, 9)

Basionym: *Peridinium uberrima* ALLMAN (118—120, 1854; 24—25, tab. 3, fig. 9—17, 1855).

Synonyms: *Melodinium uberrimum* KENT (445—446, tab. 26, fig. 34—35, 1880—81), *Gymnodinium mirabile* var. *rufescens* PÉNARD (34, 57, tab. 5, fig. 8—9, 1891), *Gymnodinium rufescens* LEMMERMANN (565, fig. 17—18, 1910), *Gymnodinium uberrimum* fo., SKUJA (335, tab. 61, fig. 28, 1956).

The shape of the cell broadly ellipsoid to globular. The transverse furrow is deep, turning to the left. It proceeds on the ventral side towards the apex from between $^1/_3$ and $^2/_3$ of the epicone's length, being parallel in this part to the longitudinal axis of the monade. The longitudinal furrow may reach as far as the apex and is also ± parallel to the longitudinal axis of the cell. The chromatophores are yellow-brown, wedge-shaped, arranged radially. The protoplast contains red storage products. The nucleus is in the apical part of the cell. No stigma was noted. Dimensions: 25.7—26.0 × 22.8 µm. Locality: Plešné Lake (May 1959).

Gymnodinium uberrimum var. *rotundatum* (KLEBS) POPOVSKÝ comb. nova (Tab. IX, 10)

Basionym: *Gymnodinium rotundatum* KLEBS Verh. Nat.-Med. Ver. Heidelberg, ser. nov. 11 (3), p. 392, 439, fig. 5, 1912.

Synonyms: *Gymnodinium* sp., WOLOSZYNSKA (198, tab. 14, fig. 18—19, 1918), *Gyrodinium Traunsteineri* LINDEMANN (292, fig. 11, 1928), *Gymnodinium limitatum* SKUJA (356, tab. 61, fig. 29—31, 1956), *Gymnodinium irregulare* CHRISTEN (187, fig. 6, 1959).

The cells are globular. The transverse sulcus is deep, descending to the left, reaching as far as $^2/_3$ of the epicone, withdrawing to the left from the longitudinal axis. The protoplast contains pinkish storage products. The chromatophores are elongated ellipsoid, radially arranged. Dimensions: 34.1—36.0 × 29.2—31.2 µm. Locality: Prášilské Lake (August 1961).

Diagnosis: The shape of the cells is variable, ellipsoid to globular. The transverse furrow is deep, left-hand, and may reach as far as 2/3 of the epicone. It passes to the left from the longitudinal axis of the cell. The longitudinal furrow may reach as far as the antapex, similarly passing to the left from the longitudinal axis of the cell. Nucleus centrally placed; chromatophores disc-like to elongated ellipsoids, arranged radially. Stigma absent. The protoplast contains pinkish and red storage products. Dimensions: 24—40 × 20—34 µm.

Discussion. I have placed *Gymnodinium uberrimum* fo., SKUJA to the species *Gymnodinium uberrimum* (ALLM.) KOF. et SW. var. *uberrimum* in view of the minute differences. SKUJA (1964) in his description of *Gymnodinium palustre* SCHILLING reports that the chromatophores are numerous, rod-like, probably radially arranged. According to the author's drawing they are placed distinctly radially. Since the shape, arrangement, and insertion of the chromatophores within the cell is the only distinguishing feature, and consequently an important one, between the species *Gymnodinium palustre* SCHILLING and *Gymnodinium uberrimum* (ALLM.) KOF. et SW., it is necessary to assign SKUJA's species to *Gymnodinium uberrimum* (ALLM.) KOF. et SW. 1921 var. *uberrimum*.

Similarly also *Gymnodinium mirabile* PÉNARD (SKUJA 1964, Nova Acta Reg. Soc. Sci. uppsal. 18 (3) : 348, tab. 67, fig. 1) is most probably *Gymnodinium uberrimum* (ALLM.) KOF. et SW. var. *uberrimum*, differing by somewhat larger dimensions only.

KOFOID et SWEZY (1921) report affinities between *Gymnodinium rotundatum* Klebs 1912 and *Gymnodinium uberrimum* (ALLM.) KOF. et SW. 1921, *Gymnodinium mirabile* PÉNARD 1891, *Gymnodinium bogoriense* KLEBS 1912. According to the same authors *Gymnodinium paradoxum* SCHILLING 1912 and *Gymnodinium viride* PÉNARD 1891. One group is reported to comprise *Gymnodinium carinatum* SCHILLING 1913, *Gymnodinium aeruginosum* STEIN 1883, *Gymnodinium palustre* SCHILLING 1891, and *Gymnodinium viride* PÉNARD 1891.

I should like to add that the colour of the chromatophores is a good diagnostic feature between the single species. Thus for instance, the species *Gymnodinium aeruginosum* STEIN 1883 could not possibly be combined with a species, the chromatophores of which would possess various shades of a brownish yellow colour. This is also true for the species *Gymnodinium viride* PÉNARD 1891.

If KOFOID et SWEZY report affinities, e.g. between *Gymnodinium rotundatum* and *Gymnodinium mirabile*, then only individuals with ± brown-yellow chromatophores, placed in the species *Gymnodinium mirabile* up to now, can be related to *Gymnodinium rotundatum*. Organisms with green chromatophores seem to have been included erroneously, since they belong to a different species, probably to *Gymnodinium viride* PÉNARD 1891.

The number of organisms whose chromatophores are described as green and ± brown, is small: *Gymnodinium mirabile* PÉNARD 1891, *Gymnodinium mirabile* var. *rufescens* PÉNARD 1891, *Gymnodinium varians* MASKELL 1887.

The recognition of the species *Gymnodinium paradoxum* SCHILLING, *Gymnodinium bogoriense* KLEBS (recently this species has been recognized by JAVORNICKÝ (1965) in a small Mazurian lake), *Gymnodinium minimum* KLEBS most probably anables the assignement of these species to *Gymnodinium uberrimum* (ALLM.) KOF. et SW.

I place *Gymnodinium rotundatum* KLEBS 1912 to *Gymnodinium uberrimum* var. *rotundatum* (KLEBS) POPOVSKÝ c. n., particularly because of the course of transverse and longitudinal furrow, the position and the shape of the chromatophores, and the cell dimensions, respectively. Somewhat different is the greatly variable shape of the cells [sensu SCHILLER (1933)]. I also place herein *Gymnodinium* sp., WOŁOSZYŃSKA 1918 according to the shape of the cells, size, and course of both furrows.

Gymnodinium obesum SCHILLER 1933 greatly resembles *Gymnodinium rotundatum* KLEBS. According to the description, it differs from *Gymnodinium*

rotundatum by somewhat smaller dimensions. SCHILLER (1933) did not describe precisely the position of the chromatophores in the cell. He only remarked that they were "gelb, plättenförmig", in opposition to those of *Gymnodinium rotundatum*, which he described as "gelb-braun, oft schön strahlenförmig angeordnet" (SCHILLER 1933). This difference must be confirmed on the basis of comparative material. It is, therefore, not possible at present to establish the classification to the variety *rotundatum*.

CHRISTEN (1959) gives different minute characteristcs for his *Gymnodinium irregulare* in comparison with *Gyrodinium traunsteineri* LIND., namely: "Die Grössenverhältnisse beider Arten sind ähnlich . . .", and "Auch das Vorhandensein radiär angeordneter, stäbchenförmiger Chromatophoren ist beiden Arten gemeinsam". Elsewhere: " . . . die plättenförmigen Chromatophoren von *Gyrodinium Traunsteineri* erlauben aber eine Gleichsetzung der beiden Arten nicht." He also remarks later that "Sie (both species, author's note) unterscheiden sich jedoch stark im Verlauf der Längsfurche, welche . . .", and "Diese (Längfurche, author's note) erinnert stark an die sehr unsymmetrische Längsfurche von *Gyrodinium Traunsteineri* LIND., welche . . .".

The picture and the description given by CHRISTEN (1959) is virtually alike with the description and picture of *Gymnodinium limitatum* SKUJA 1956.

The individuals I found are identical with *Gyrodinium traunsteineri* LIND. by the shape of the cell, with *Gymnodinium irregulare* CHRISTEN and *Gymnodinium limitatum* SKUJA by the shape and arrangement of the chromatophores. The ends of the transverse sulcus on the ventral side have a distance of less than 1/5 the cell's length.

If the species are placed in a row from *Gymnodinium uberrimum*, over *Gymnodinium uberrimum* f., *Gymnodinium rotundatum*, *Gymnodinium* sp., *Gymnodinium limitatum*, *Gymnodinium irregulare* and my specimens, up to *Gyrodinium traunsteineri* (see picture in the text), it is striking to note that only one species has a variable course of both furrows. Otherwise they resemble one another in the shape (given as always very variable) and size of the cells as well as by the shape and arrangement of the chromatophores. As, however, *Gymnodinium uberrimum* differs at first sight from *Gyrodinium traunsteineri*, two varieties may be distinguished, namely var. *uberrimum* and var. *rotundatum* (KLEBS) comb. n. Doing justice to priority, I have used the name *rotundatum* according to KLEBS (1912).

Gymnodinium ordinatum SKUJA 1929 (Tab. IX, 11)

Transverse sulcus, broad and deep, reaching to the antapex. Chromatophores 3 to 6, oval, light yellowish brown. Red storage products in the protoplast. Nucleus oval-shaped, arranged centrally. No stigma was noted. Dimensions: 10—12—16 × 8—10—11 μm. Locality: Pool Nr. 343 (May 1962).

Gymnodinium bohemicum FOTT 1938 (Tab. IX, 12)

Transverse sulcus, relatively broad and deep. Longitudinal sulcus, broad, not easily discernible, without reaching to the antapex. The longitudinal flagellum has the cell's length. Chromatophores oval-shaped, brown, 7—5 in number, lying freely around the centre of the cell. The cell contains red-coloured storage products. Nucleus central. No stigma was observed. In the place of the insertion of the flagella "sackförmige Pseudopodien" (FOTT 1938) not observed. Dimensions: 12.9 × 7.7 μm. Locality: Peat-bog near the pond Novozámecký (May 1962).

D i s c u s s i o n. THOMPSON (1950) reports during the recognition of the species from Kansas (U.S.A.): "The chromatophores are discoidal, perietal, and number from 2 to 8. FOTT (1938): "Chromatophori . . . orbiculati, aliquantum convexi . . . in cellula peripheria circa nucleum sitam confluen-

tes . . .". The chromatophores and the cell's shape differ according to Thompson's picture and description, from the original diagnosis. My material agrees well with the original description.

Gymnodinium impar HARRIS 1939—40 (Tab. X, 1)

Hypoconus irregularly bell-shaped, at the antapex always pointed. In the epicone 1—2 chromatophores, olive-green. The cell contains red coloured storage products. The nucleus is in the hypocone, oval-shaped. No stigma was recorded. Dimensions: 12.9—14.6 × 10.3—14.6 μm. Locality: Doksy peat-bog (October 1961).

Gymnodinium sp. (Tab. X, 2)

Cells broadly ellipsoid, epicone larger than the hypocone. The transverse sulcus broad, indistinct. The longitudinal one broad, not reaching the antapex. A typical stigma is present. The chromatophores are plate-like, large, yellow-brown, very indistinct. Dimensions: 12.9 × 10.5 μm. Locality: Doksy peat-bog (October 1959).

Discussion: I have seen this monade only twice. It differs from *Gymnodinium Thomasi* CHRISTEN 1959 by its broader longitudinal sulcus, the presence of a stigma and smaller length. The number of the chromatophores is smaller (according to the drawing by Christen 1959), these are larger, arranged more densely, and differ in their shape.

Gymnodinium eurytopum SKUJA 1948 (Tab. X, 3, 4)

The longitudinal furrow broad, indistinct. The protoplast hyaline; red storage products in the epicone. The nucleus is large, centrally placed, filling up nearly $^1/_3$ of the cell. Dimensions: 19.4 × 18.9 μm. Locality: The River Vltava in Prague (January 1962).

Gymnodinium lantzschii UTERMÖHL 1925 (Tab. X, 5)

Synonyms: *Gymnodinium minimum* LANTZSCH 1914, non *Gymnodinium minimum* KLEBS 1912, *Glenodinium minimum* (LANTZSCH) BACHMANN 1923, *Gymnodinium blax* HARRIS 1940, Proc. Limn. Soc. 152 6, Fig. 1, A—F ex JAVORNICKÝ 1957.

The tranverse furrow is very indistinct, shalow; the longitudinal furrow is invisible. No flagella were recorded. Protoplast hyaline, silver-coloured, contains 1—2 small brown chromatophores. The nucleus is in the epicone. No stigma was recorded. Dimensions: 18.0 × 12.1 μm. Locality: Klíčava-dam-reservoir (February 1960).

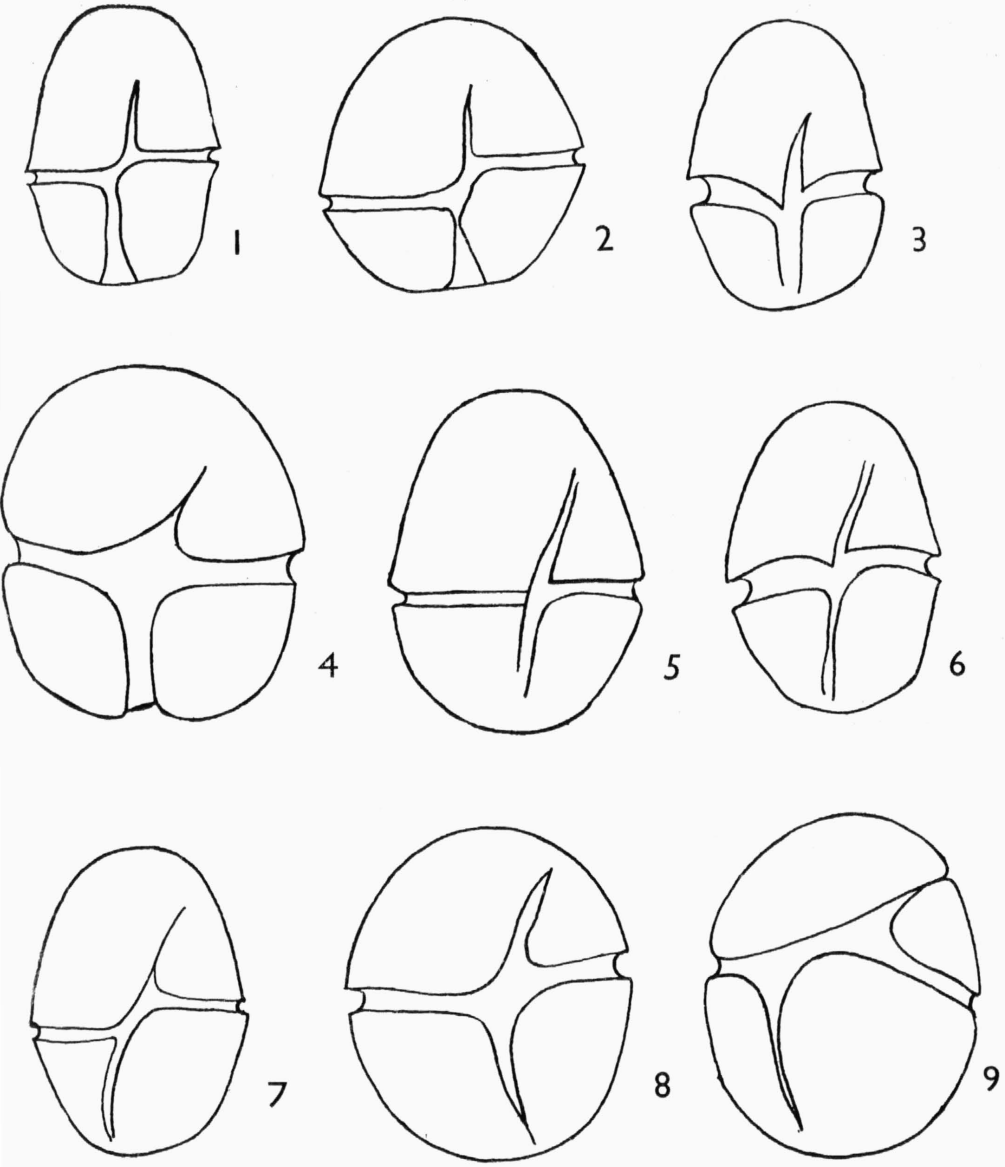
Discussion. *Gymnodinium lantzschii* UTERMÖHL differ somewhat from *Gymnodinium eurytopum* SKUJA by the cell's length and breadth. It conspicuously differs by the size of the nucleus in relation to the cell's size. I have also seen the "silvery" protoplast solely in *Gymnodinium lantzschii* UTERMÖHL.

Katodinium FOTT 1957

Katodinium polyplastidum n. sp. (Tab. X, 6,7)

Cells broadly oval-shaped, dorsoventrally flattened. Epicone rounded, sometimes obliquely cut, hypocone ellipsoid, $^1/_3$—$^1/_4$ the cell's length. The periplast very thin, without observable structure. The transverse sulcus broad, probably not reaching to the antapex; the longitudinal sulcus broad, reaching nearly to the antapex. The longitudinal flagellum is as long as the entire length of the cell. Numerous chromatophores, light brown, oval, parietal. The nucleus centrally placed. The cell contains numerous storage products. No stigma was observed. Dimensions: 20.6—25.7 × 15.4 μm. Crass. about 10.3 μm. Iconotype: Tab. II, Fig. 6. Locality: Peat-bog near Novozámecký pond (May 1962), Marienteich (May 1962).

Diagnosis: cellulae late ovoidae, dorsiventraliter compressae. Epiconus rotundatus vel oblique truncatus, hypoconus ellipsoideus, $^1/_3$—$^1/_4$ cellulae longitudinis. Membrana tenuis sine structura visibili. Sulcus transversus latus ad epiconum fortasse non attingit. Sulcus longitudinalis latus, paene ad antapicem attingit. Flagellum longitudinale cellulae longitudinis. Chromatophora plurima, pallidae fusca, ovalia, parietalia. Nucleus centralis. Granula parva hyalina in cellula dispersa. Stigma non observabatur. Dimensiones: 20.6—27.7 × 15.4 μm. Crassitudo circum 10.3 μm.



1—2 *Gymnodinium uberrimum* (ALLM.) KOF. et SW. var. *uberrimum*; 3 *Gymnodinium uberrimum* f., SKUJA; 4 *Gymnodinium rotundatum* KLEBS; 5 *Gymnodinium* sp., WOŁOSZ.; 6 *Gymnodinium limitatum* SKUJA; 7 *Gymnodinium irregulare* CHRISTEN; 8 *Gymnodinium uberrimum* var. *rotundatum* POPOVSKÝ c. n. (orig.); 9 *Gyrodinium traunsteineri* LIND.)

Iconotypus: figura nostra II, 6 (e localite palus Marienteich, 15. 5. 1962, leg. Popovský). Habitatio: palus prope piscinam Novozámecký apud vicum Zahrádky et palus Marienteich apud vicum Okna.

Discussion. The new species *Katodinium polyplastidum* differs from other species with chromatophores first of all by a large number of chromatophores, which are relatively small. Its name *polyplastidum* is derived from this fact.

Gyrodinium Kofoid ed Swezy 1921

Gyrodinium pusillum (Schilling) Kof. et Sw. 1921 (Tab. X, 8)

Cell ellipsoid, epicone rounded, hypocone elongated, rounded at the end. Epicone by $^1/_3$ smaller that the hypocone. The transverse furrow deep, turned strongly to the left. The longitudinal furrow does not reach the antapex. Chromatophores ellipsoid, parietal, olive-green. The hypocone has one big nucleus; the other cells contain numerous storage products. Dimensions: 16.3×9.3 μm. Locality: Muzikantský pond (October 1961).

Discussion. The species differs somewhat from the description by the shape of both cones; these are not vesicular, but the entire shape of the cell is an obliquely cut ellipsoid. The collected specimens have smaller dimensions then the ones described (20.0×18.4 μm). I do not consider these deviations as taxonomically significant.

Peridiniales Schütt 1896

I generally worked on preserved material. Exceptions are specified for each case.

Glenodiniopsis Woloszyńska 1916

Glenodiniopsis uliginosa (Schilling) Wołosz. 1916 (Tab. XI, 1—3)

Formula of the fields: $4+4^1+8^2+7^3+2^4$. Dimensions: $27.0-43.2 \times 24.0-39.2$ μm. Locality: Trpnouze near Č. Velenice (April 1957) (leg. Javornický); Žabinec (October 1957) (leg. Růžička); Řežabinec (May 1960, 1961); the material from the latter was studied alive.

Glenodinium (Ehrenb.) Stein 1883

Glenodinium steinii Lemm. 1900 (Tab. XI, 4, 5)

Membrane tough, without any structure; two furrows and the insertion of the longitudinal flagellum are only apparent. Chromatophores green-brown, radially arranged. Nucleus central. No stigma was observed. Dimensions: $33.3-43.2 \times 28.7-38.9$ μm. Locality: Řežabinec (May 1960), Řežabinec pool (May 1960), Doksy peat-bog (October 1961). The material from Řežabinec was studied alive.

Discussion. The species somewhat differs from the description by the shape and the position of the nucleus and larger cell dimensions. It is distinguishable from *Glenodiniopsis uliginosa* (Schilling) Wołosz. first of all by the absence of fields and the position and the shape of the chromatophores.

Glenodinium dinobryonis (Wołosz.) Lind. 1925 (Tab. XI, 6, 7)

Cells rarely attached to the colonies of the genus *Dinobryon*. Epivalve smaller or as large as the hypovalve. Membrane structure smooth, often indistinct. The formula of the fields of the epivalve: $1+4^1+7^2$. Dimensions: $25.7-26.1 \times 25.1-25.6$ μm. Locality: Pond Štilec (September 1962) (leg. Dejdar).

Peridinium Ehrenberg 1832

Peridinium cinctum (O. F. Müller) Ehrenb. 1838

A frequent species in various types of localities, usually found together with varieties and forms. The species together with *Peridinium bipes* and

Ceratium hirundinella caused the discoloration of the water of the locality Stone-pit near Velká Kuše (June 1958) (leg. Komárek).
Peridinium cinctum var. *cinctum* f. *irregulatum* (LIND.) LEF. 1932 tab. γ travecta was found very sporadically with the var. *cinctum*. Dimensions: 42,7 × 39,2 μm. (Tab. XI, 8)

Peridinium bipes STEIN 1883

A relatively common species. A more interesting findings was made from the locality Pool near Frahelž (August 1958) (leg. Růžička) i.e. *Peridinium bipes* var. *bipes* f. *tabulatum* (EHRENB.) LEF. 1932 tab. γ travecta.
(Tab. XI, 9)

Peridinium aciculiferum var. *aciculiferum* f. *inerme* WOŁOSZ. 1936
(Tab. XI, 10)

The apex has a hyaline papilla, no spikes on the hypovalve. a short, hyaline projection only is present. The transverse furrow has a hyaline edge. Chromatophores globular, parietal, brown. Nucleus placed centrally; no stigma was observed. In the protoplast large, red brown storage products. Dimensions: 34.1—34.9 × 24.5 μm. Locality: Lipno-dam-reservoir (March 1962). Living material was studied.

Peridinium umbonatum STEIN 1883

Usually a very abundant species in the localities. Plates ± convex, with distinct areolae placed in rows. Dimensions: 16.9—35.5 × 13.0—25.7 μm. Crass.: 10—16 μm. Found usually with tabulatio conjucta (Tab. III, 11, 12) and contacta in the surveyed localities. Only exceptionally *Peridinium umbonatum* LEF. tab. remota was found in the locality Žabinec (October 1957) (leg. Růžička).

Peridinium inconspicuum LEMM. 1899

A very widespread species. This armoured flagellate causes a strong discoloration of the Souš-dam-reservoir (October 1960) (leg. Lhotský). Plates ± concave, areolae on the plates placed in rows, little discernible or entirely indistinct. Monades were present in all localities usually with all three modes of conjugation (tabulatio) of the sutures, namely contacta, conjuncta, and remota. Dimensions: 16.2—21.3 × 12.9—20.6 μm.
Besides *Peridinium inconspicuum* var. *inconspicuum*, also *Peridinium inconspicuum* var. *excavatum* (PLAYF.) LEF. 1932 and *Peridinium inconspicuum* var. *excavatum* f. *armatum* (LEMM.) LEF. 1932 (Tab. IV, 1) were identified. Locality: Žabinec (October 1957) (leg. Růžička); Kamenička (September 1958) (leg. Řeháčková).

D i s c u s s i o n. During the determination of both species it was necessary to observe a larger quantity of material. On the basis of the total character of the population it was possible to classify the species *Peridinium umbonatum* or *Peridinium inconspicuum* with an 80 percentage of probability. The transitional features between the two species, particularly in their varieties, are specially conspicuous. A reliable diacritical feature is unknown up to now.

Peridinium deflandrei LEF. 1927 tab. conjuncta (Tab. XII, 2)

The plates show thin aerolae in parallel rows. The spines on the hypovalve measure as much as 3.3 μm in length. Formula: $2+4^1+7^2+5^3+2^4$. Dimensions: 25.0—26.4 × 24.0—25.9 μm. Locality: Trpnouze near Č. Velenice (June 1957) (leg. Javornický).

Peridinium goslaviense WOŁOSZ. 1916 tab. remota (Tab. XII, 3)

Dimensions: 33—39 × 27—30 μm. Formula: $2+4^1+7^2+5^3+2^4$. Locality: Plešné Lake (May 1950) (leg. Komárek).

Peridinium goslaviense WOŁOSZ. 1916 tab. contacta (Tab. XII, 4)

It differs from the tabulatio conjuncta and remota by the conjunction of the apical plates (3^1) with the 4th preequatorial plate (4^2). Dimensions: 33—39 × 27—30 μm. Locality: Plešné Lake (May 1959) (leg. Komárek).

Peridinium polonicum Wołosz. 1916 (Tab. XII, 5, 6)

Formula: $1+4^1+7^2+5^3+2^4$. The plates contain a dense net of areolae. Dimensions: 37,5 to 45.0 × 33.8—39.7 μm. Locality: Lodenický pond (August 1958) (leg. Komárek).

Peridinium polonicum Wołosz. 1916 β collineata (Tab. XII, 7, 8)

About 10 per cent of the population in the locality Lodenický pond (August 1958) (leg. Komárek), had a different variability of the sutures.

Discussion. The tabulatio contacta has not been published until now for the species *Peridinium goslaviense* and the neither the variation in the sutures cold β collineata was published for species *Peridinium polonicum.*

Peridinium penardii (Lemm.) Lemm. 1910 (Tab. XII, 9, 10)

The majority of cells without visible structure. The apical pore and furrows are always visible. Formula: $1+3^1+6^2+5^3+2^4$. Dimensions: 39.0 × 29.2 μm. Locality: Pool near Frahelž (August 1962); very rare (leg. Růžička).

Ceratium Schrank 1793 em. Stein 1883

Ceratium hirundinella var. *hirundinella* f. *austriacum* (Zederb. 1904) Bachm. 1911

A very abundant species in various localities. From all findings it is possible to judge that only f. *austriacum* vill be present within the studied region of Bohemia.

Discussion. Zederbauer (1904) described new species such as *Ceratium carinthiacum, Ceratium piburgense,* and *Ceratium austriacum.* Bachmann (1911) did not consider the differences given by Zederbauer (1904) as taxonomically important for the species and reported: "Die vorliegende Formengliederung hat nicht den Zweck die Aufstellung von Varietäten zu befürworten". He ackowledges only one species, i.e. *Ceratium hirundinella* Bergh and its forms, which he assigns, e.g. as „*Austriacum*-Form" Zederbauer. He added: "Diese Formentypen sollen den ausschliesslich praktischen Zweck verfolgen, bei . . ." (S. 75).

Lefèvre (1925) used the following designation in the text (S. 692): "*C. hirundinella* O. F. Müller var. *robustum* (Amberg)", however, in the text to the picture (Fig. B, 1—5) he used "fa. *robustum* (Amberg)".

I consider the designation "*austriacum* typus (Zederb.) Bachm." in Huber-Pestalozzi (1950) as entirely incorrect. It is right to use the original - *Ceratium hirundinella* f. *austriacum* (Zederb.) Bachmann 1911.

Dinococcales Pascher 1914

Cystodinium Klebs 1912

Cystodinium steinii var. *steinii* f. *tenuirostris* Wołosz. 1916 (Tab. XIII, 1—3)

The cell's ends narrowly tapering. Chromatophores olive-brown, elongated, radially arranged. The majority of the studied cells have vacuoles at their ends. Nucleus in the centre. Dimensions: 53.2—77.2 × 18.9—36.6 μm. Locality: Řežabinec (October 1957) (leg. Růžička); Řežabinec (May 1960).

Cystodinium phaseolus Pascher 1928 (Tab. XIII, 4)

The ventral side of the cell ± concave. The nucleus is placed centrally; chromatophores ribbon-shaped, brown. Occasionally red storage products in the cell, rarely 1—2 vacuoles. Dimensions: 18.0—20.6 μm long, 12.9—15.4 μm wide. Locality: Souš-dam-reservoir (October 1961) (leg. Lhotský).

List and brief description of the localities

Southern Bohemia

Trpnouze near České Velenice — drains along the woodway; *Sphagnum*.
Lipno-dam-reservoir on the Vltava River, Bohemian Forest; plankton.
Štilec-pond, Nové Hrady district; plankton.
Plešné Lake, Bohemian Forest; plankton.
Prášilské Lake, Bohemian Forest; plankton.
Stone — pit near Velká Kuše, Blatná district. Small pool without higher vegetation. Slight vegetative colouring caused by armoured dinoflagellates.
Motor pool, České Budějovice district. Old sand-pit, sparse higher vegetation, depth 2 m.
Žabinec, Třeboň district. Uncultivated pond, very shallow; *Sphagnum*, *Utricularia*.
Řežabinec-pond, Písek district. Bird reservation; plankton.
Řežabinec-pool — small pools ranging from 3 m² to 1 ar, near a pond. (Squeezed out of *Sphagnum* and *Drepanocladus*.)
Pool near Frahelž — periodical pools along the railway between Veselí-on-Lužnice and Třeboň.

Central Bohemia

Třtice, Nové Strašecí district. Not high peat layer partly overgrown by reed. Numerous ditches and small pools with *Sphagnum*.
Lodenický-pond, Mšec near Nové Strašecí; plankton.
Klíčava-dam-reservoir on the Klíčava brook and Lánský les, Zbečno, Rakovník district.
Nebřich — Slapy-dam-reservoir on the Vltava River, Benešov district; plankton.
Vltava River in Prague — left river bank, above the outlet of the municipal sewage system.
Concrete tank — Prague, water sewage plant, previous sewage reservoir, 5 m³, not used, filled with rain-water.
Doksy peat-bog — bay of the Large Pond of Doksy, Doksy district. Reservation; *Sphagnum*.
Peat-bog on the way to Novozámecký pond, Doksy district. Small peat-bog on the border of the inundation area of the pond.
Marienteich, Doksy district. Peat-bog; *Sphagnum*.
Muzikantský pond, Doksy district. Drainage area; *Sphagnum*.
Pool Nr. 343 — small pool (4 m²) with detritus near a solitary tree with mark Nr. 343 in the vicinity of Břehyně pond, Doksy district.

Northern Bohemia

Souš-dam-reservoir on the Černá Desná River. Jablonec-on-Nisa district.

Western Bohemia

Kamenička-dam-reservoir on the Novodomský brook, Chomutov district, Ore Mountains.

Souhrn

Z území Čech je autorem uváděno 26 druhů a 8 nižších taxonů obrněnek. Nově byl popsán druh *Katodinium polyplastidum* z rašelinných tůněk z okolí Doks. Bylo provedeno spojení druhů *Gymnodinium rotundatum* Klebs, *Gymnodinium* sp., Wołosz., *Gyrodinium traunsteineri* Lind., *Gymnodinium limitatum* Skuja, *Gymnodinium irregulare* Christen a ustavena varieta *rotundatum* (Klebs) comb. nova druhu *Gymnodinium uberrimum* (Allm.) Kof. et Sw.

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See also plates IX—XIII in the appendix.

W. Nultsch:

Allgemeine Botanik

Kurzes Lehrbuch für Mediziner und Naturwissenschaftler

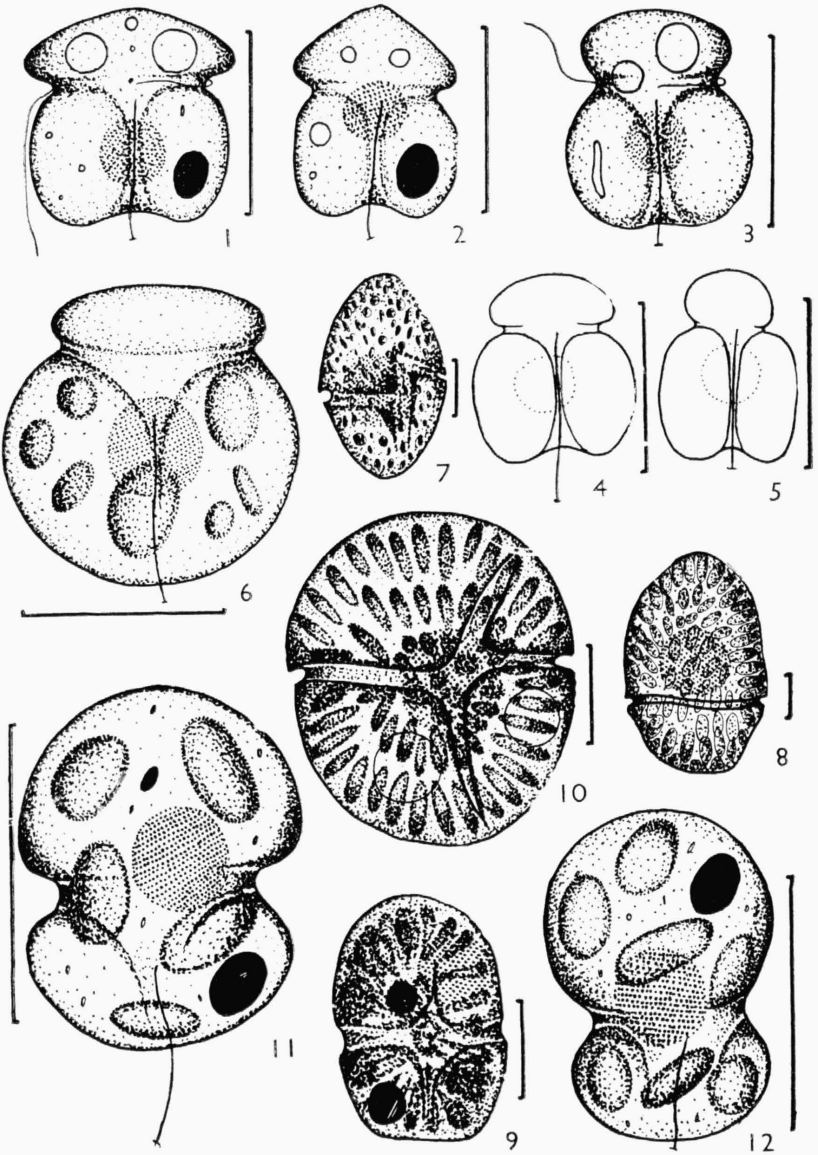
3., überarbeitete Aufl., G. Thieme Verlag, Stuttgart 1968, (12) + 399 str., 200 obr., cena 9,80 DM. (Kniha je v knihovně ČSBS.)

Tato knížka kapesního formátu je úvodem do obecné botaniky. Autor, profesor na universitě v Marburgu, rozvrhl její látku do těchto kapitol: 1. Der molekulare Aufbau des pflanzlichen Organismus. 2. Der strukturelle Aufbau des Protoplasmas. 3. Die Zelle. 4. Die Differenzierung der Zelle. 5. Die Organisationsformen des pflanzlichen Vegetationskörpers. 6. Die innere und äussere Organisation der Sprossachse. 7. Das Blatt. 8. Die Wurzel. 9. Wasser- und Salzhaushalt. Stofftransport. 10. Energiegewinnung und Syntheseleistungen autotropher Pflanzen. 11. Dissimilation und Energieumwandlungen. 12. Stickstoffhaushalt. 13. Heterotrophie. 14. Fortpflanzung. 15. Vererbung. 16. Wachstum und Entwicklung. 17. Bewegungserscheinungen. Závěr publikace tvoří přehled systému rostlinné říše, seznam literatury a rejstřík.

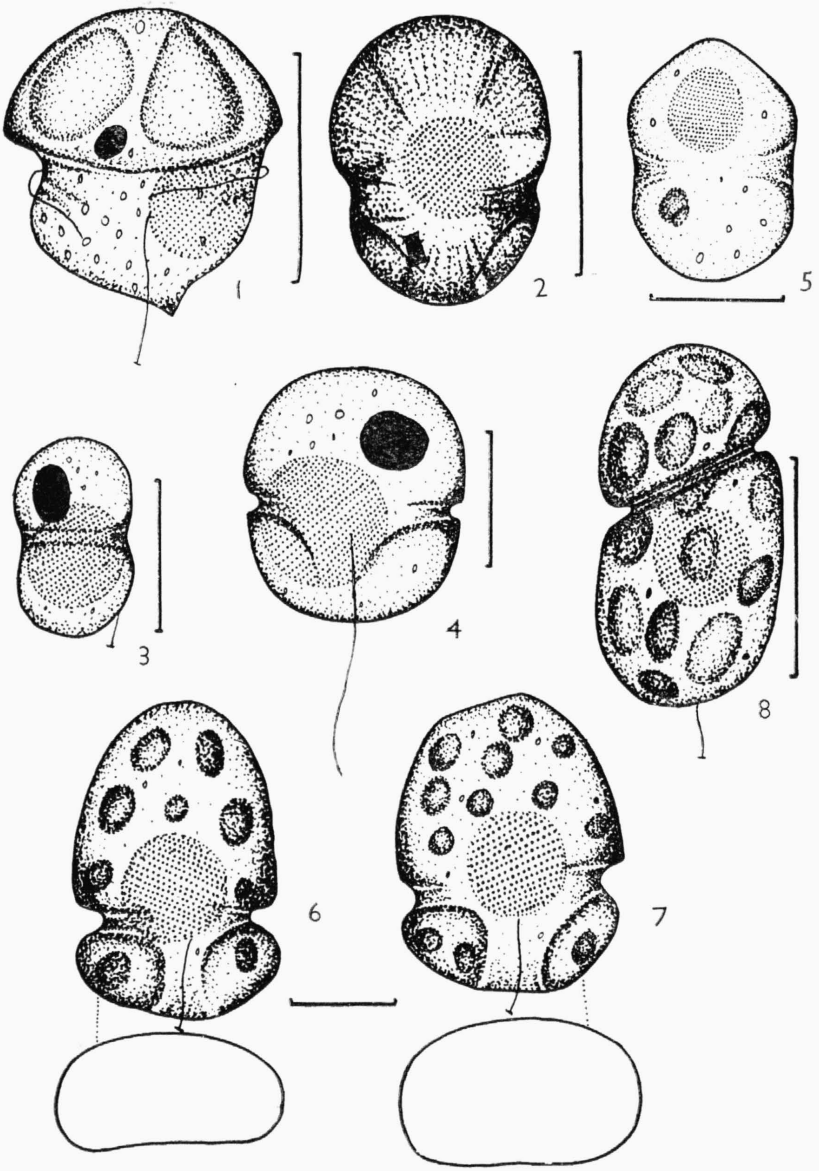
Z výčtu kapitol je zřejmé, že autor podává nejdříve chemický popř. biochemický výklad, nutný pro pochopení další látky. Po něm probírá moderně pojatou cytologii a posléze organologii rostlin ve vegetativním stavu (se základy histologie). Autor zdůrazňuje vztah mezi strukturou a funkcí, a proto zařazuje hned za vegetativními orgány kapitoly z fysiologie metabolismu. Po nich následuje stať o rozmnožování, dále přehled genetiky a konečně látka z fysiologie růstu, vývoje a pohybů.

Kniha je logicky stavěna, a to z hlediska odborného i didaktického, a dobře se studuje. Má vkusnou úpravu; četné obrázky (perokresby, mikrofotografie a elektronmikroskopické snímky) jsou velmi instruktivní.

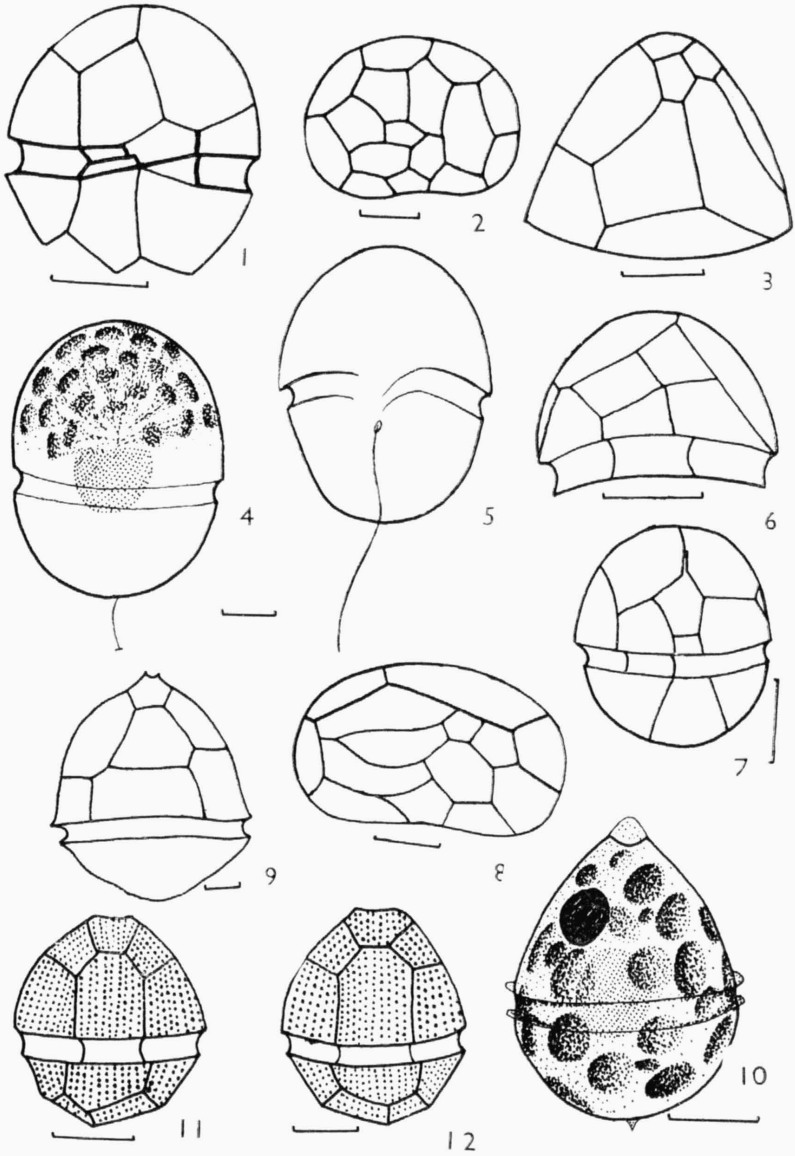
Zd. Černohorský



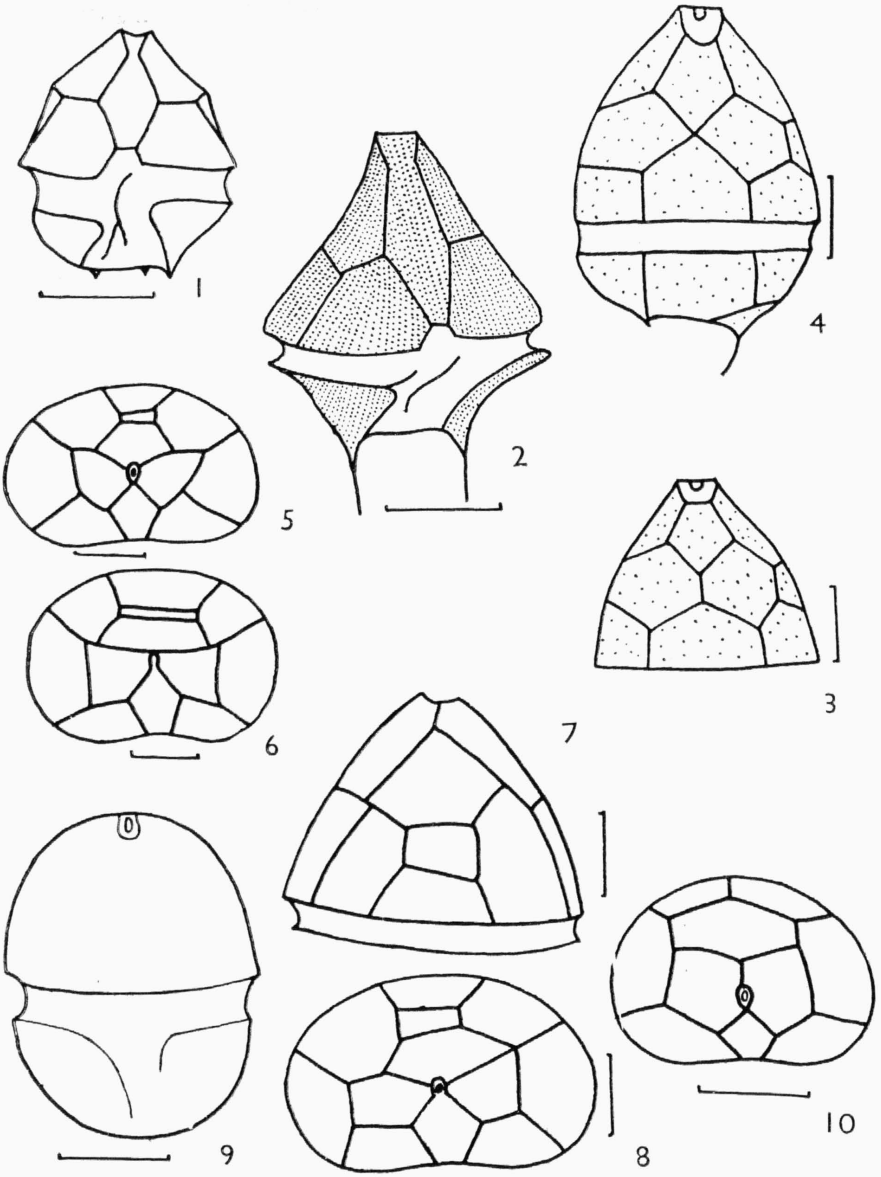
1—5 *Amphidinium larvale* LIND. (a greatly variable epicone); 6 *Amphidinium elenkinii* SKWORTZOW; 7 *Gymnodinium inversum* NYG.; 8 *Gymnodinium inversum* var. *elongatum* NYG. — dorsal view; 9 *Gymnodinium uberrimum* (ALLM.) KOF. et SW. var. *uberrimum*; 10 *Gymnodinium uberrimum* var. *rotundatum* (KLEBS) POPOVSKÝ; *Gymnodinium ordinatum* SKUJA; *Gymnodinium bohemicum* FOTT.



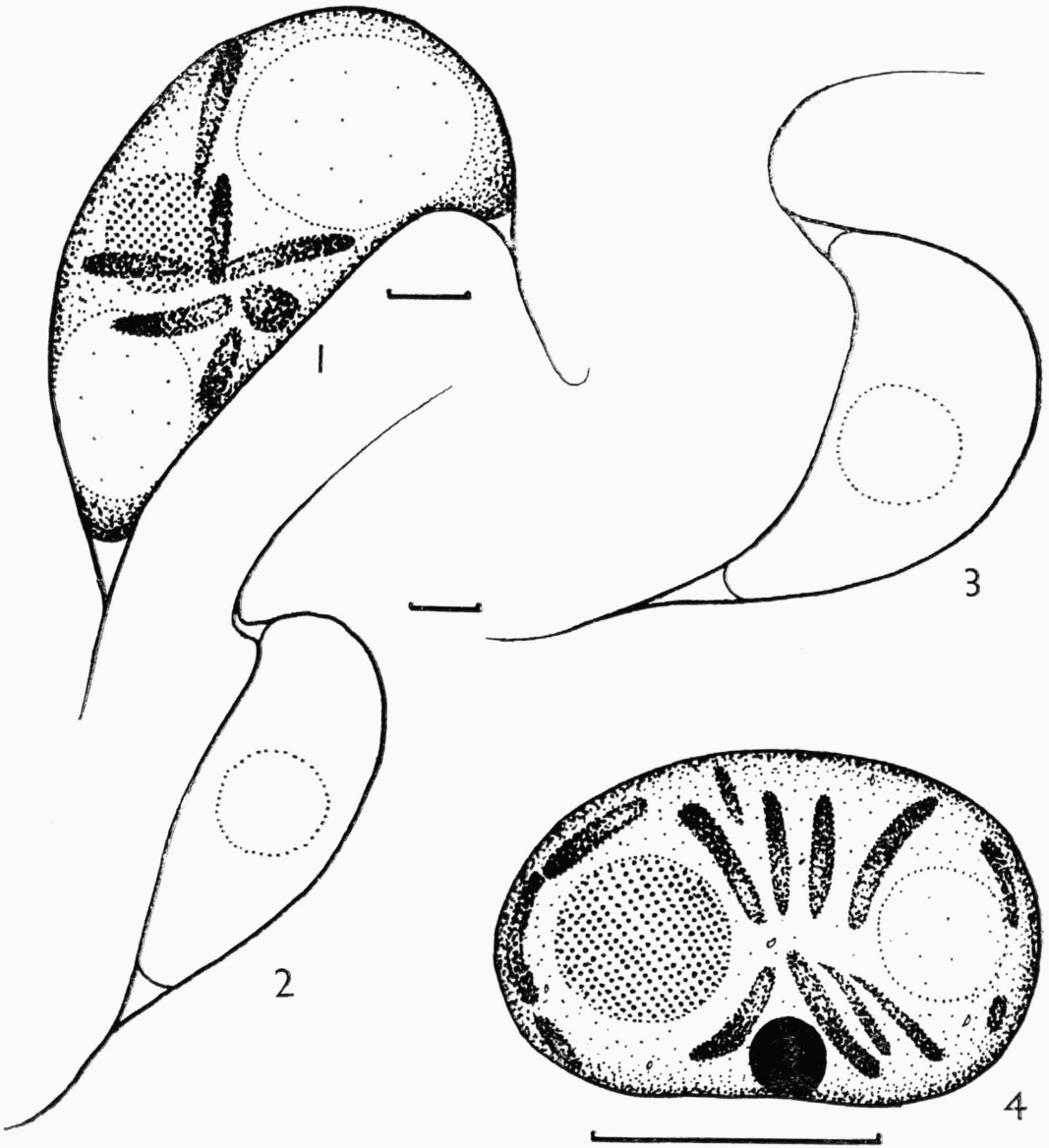
1 *Gymnodinium impar* HARRIS — ventral view; 2 *Gymnodinium* sp. — ventral view, stigma in the hypocone; 3—4 *Gymnodinium eurytopum* SKUJA (3 — lateral view, 4 — ventral view); 5 *Gymnodinium lantzschii* UTERMÖHL; 6—7 *Katodinium polyplastidum* n. sp. — ventral view, below the upper projection of the epicone; 8 *Gyrodinium pusillum* (SCHILLING) KOF. et SW. — dorsal view.



1—3 *Glenodiniopsis uliginosa* (Schilling) Wołosz. (1 — ventral view, 2 — projection of the epivalve, 3 — the epivalve, dorsal view); 4—5 *Glenodinium steinii* Lemn.; 6—7 *Glenodinium dinobryonis* (Wołosz.) Lind. (6 — the epivalve, dorsal view, 7 — ventral view); 8 *Peridinium cinctum* f. *irregulatum* (Lind.) Lef. tab. γ travecta — projection of the epivalve; 9 *Peridinium bipes* f. *tabulatum* (Ehrenb.) Lef. tab. γ travecta — dorsal view; 10 *Peridinium aciculiferum* f. *inerme* Wołosz. — dorsal view; 11—12 *Peridinium umbonatum* Stein tab. conjuncta — dorsal view.



1 *Peridinium inconspicuum* var. *excavatum* f. *armatum* (LEMM.) LEF. — ventral view; 2 *Peridinium deflandrei* LEF. tab. conjuncta; 3—4 *Peridinium goslaviense* WOŁOSZ. (3 — tab. remota, 4 — tab. contacta); 5—6 *Peridinium polonicum* WOŁOSZ. — projection of the epivalve; 7—8 *Peridinium polonicum* WOŁOSZ. *β* collineata (7 — dorsal view of the epivalve, 8 — projection of the epivalve); 9—10 *Peridinium penardii* (LEMM.) LEMM. (9 — ventral view, 10 projection of the epivalve.



1—3 *Cystodinium steinii* f. *tenuirostris* Wołosz. (1 — two vacuoles at the ends of the cell); 4 *Cystodinium phaseolus* Pascher — a vacuole on the right side of the cell.