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## Algae inhabiting creeks of the region of "H. Arctowski" Polish Antarctic Station, King George Island, South Shetlands

**ABSTRACT:** In the material collected in 26 stations along the course of three creeks in the vicinity of Polish Antarctic Station 183 taxa of algae have been identified: 25 of Cyanophyta, 123 of Bacillariophyceae, 2 of Xanthophyceae, 2 of Chrysophyceae and 31 of Chlorophyta. The highest species diversity was found in the algal community in Creek II (132 taxa), the second place was occupied by the "Petrified Forest Creek" (97 taxa), and the least diversified algal community was that from the "Ornithologists' Creek" (73 taxa).

**Key words:** Antarctic, South Shetlands, King George Island, creeks, Cyanophyceae, Bacillariophyceae, Xanthophyceae, Chrysophyceae, Chlorophyceae

### Introduction

During XII Antarctic Expedition to the "Arctowski" Station, organized by Polish Academy of Sciences in 1987/88, untimely deceased Andrzej Oleksowicz has collected a great number of samples from various sites situated on King George Island.

Reserch on diatom communities from two creeks of King George Island: „Vanishing” and „Ornitologists’ Creek” was done by Kawecka and Olech (1993).

In this paper we present the results of study of the species composition of algae from three creeks situated in close vicinity of the Polish Antarctic Station.

### Material and methods

Samples of algae collected in January 1988 come from three creeks: the creek called the "Petrified Forest Creek" (Creek I), Creek II, outflowing from a snow-patch near the Gentoo penguin (*Pygoscelis papua*) colony and Creek III, called also the "Ornithologists' Creek" (Fig. 1).

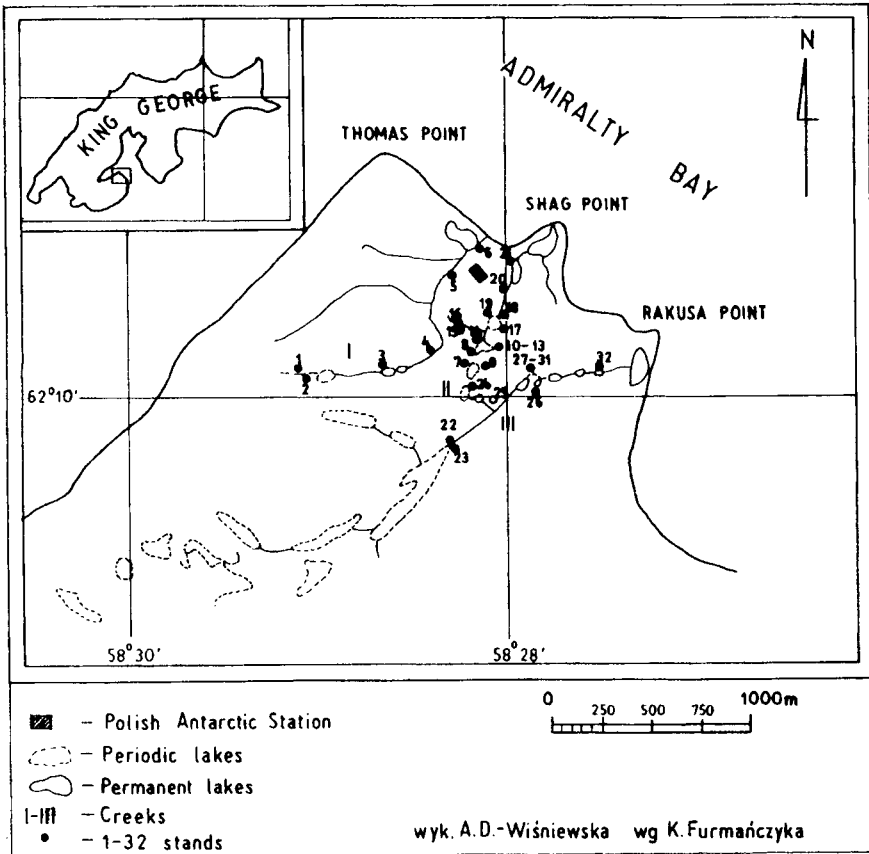


Fig. 1. Location of the studied area and the distribution of stations in the creeks: I — The “Petrified Forest Creek”, II — Creek II, III — The “Ornithologists’ Creek”

Samples were taken from the water body, from the bottom together with fragments of substratum, as well from water squeezed out of the moss. The samples were fixed on the spot with 4% formaline and stored in plastic containers. The diatoms were cleaned in the mixture of sulfuric and nitric acids in the ratio 3:1. The slides were made using „naphrax”, a synthetic resin.

The “Petrified Forest Creek” (Creek I) is a small water course, with a maximum width of 1.5 m, outflowing from a snow-patch. First it flows among rocks, then spreads over the lowland and flows into a small lake situated close to the shore of the Admiralty Bay. Samples of algae were collected along its course: about 50 m from its outflow from the bottom under snow-patch (1 and 2), at the place where the creek crosses another water course near a rock, also from the bottom (3), from the water in the middle part of the creek on the plateau (4), near the lake (5) and its inflow into the lake (6 — four samples). The current of the creek is rapid in its upper and lower course, but slow in its middle

course where it spreads over the lowland. A total of 9 samples were taken from 6 stations.

Creek II outflows from the snow-patch near the Gentoo penguin colony, dries up intermittently and spreads forming swamps and frequently drying up pools. 15 stations were set along its entire length and 19 samples were taken from them. The samples were squeezed out from the moss from the first reach spreading into swamps (7, 8, 9 and 14), from the drying ditch in the region of the Aerial field (10, 11, 12 and 13), from the pool situated near the Aerial field (15) and from the water course draining that pool (16). Three samples (17, 18, 19) were taken from water body in the middle course of the creek, and the remaining two from its lower course, just upstream its mouth into a small lake (20), the other in the mouth itself (21).

The "Ornithologists' Creek" (Creek III) outflows from a snow-patch, flows through a number of pools and falls into a small lake situated close to the shore of the Admiralty Bay. 11 samples of algae were taken from five stations: two samples come from swamps where the creek outflows from a snow-patch (22 and 23), two (24 and 25) are water squeezed out from the moss (*Drepanocladus* sp.) growing around a small pool, the remaining seven come from the middle part: from a swamp (26), from the bottom of the creek (27–31) and from a small lake into which the creek empties (32).

## Results

In the total of 32 samples 183 taxa of algae have been identified. Most of them have been identified to the species or form level, only a few to the genus level, and several taxa are still not determined or their identification is uncertain.

Among 183 taxa the most numerous group were diatoms (123 taxa), followed by green algae (31 including 18 desmid taxa) and blue-green algae (25 taxa). The remaining four taxa were Chrysophyceae and Xanthophyceae.

The list of species contains Latin names, numbers of stations where given taxon was found, the number of the figure and information on the abundance: r — rare (scattered specimens in the sample), d — predominants in the sample; taxa without denotations were medium frequent; frequency (%) in the samples is also given.

All taxa are presented in figures (Figs. 2–8). The species occurring frequently and of variable characters are presented in full scale of their variability.

## List of species

## CYANOPHYTA

- Planktolyngbya contorta* (Lemm.) Anagn. et Kom. — Fig. 2–1, stations 2 (d), 6, 20; F (frequency) = 9.4.
- Leptolyngbya scotti* (Fritsch) Anagn. et Kom. — Fig. 2–2, sts. 14, 26 (d); F = 6.2.
- Phormidium kuetzingianum* (Kirchner) Anagn. et Kom. — Fig. 2–3, st. 26; F = 3.1.
- P. subuliforme* (Thw. ex Gom.) Anagn. et Kom. — Fig. 2–18, sts. 1–5, 7, 17, 20, 21; F = 28.1.
- P. pristleyi* Fritsch — Fig. 2–20, st. 16 (r); F = 3.1.
- P. dimorphum* Lemm. — Fig. 2–21, st. 7 (r); F = 3.1.
- P. tenue* var. *laevis* Gardner — Fig. 2–14, sts. 2, 9 (r); F = 6.2.
- P. irriguum* (Kütz ex Gom.) Anagn. et Kom. — Fig. 2–15, sts. 1, 2–16, 27, 28; F = 56.3.
- P. terebriforme* (Ag. ex Gom.) Anagn. et Kom. — Fig. 2–16, sts. 1–4, 5 (d), 6, 15–20, 24–26, 28–31; F = 59.3.
- P. favosum* (Bory) Gom. — Fig. 2–22, sts. 1, 2, 4, 5, 15, 16, 20, 21 (d), 26 (d), 28, 29, 31; F = 37.5.
- Porphyrosiphon martensianus* (Menegh. ex Gom.) Anagn. et Kom. — Fig. 2–4 sts. 2–4; F = 9.4.
- P. luteus* (Gom. ex Gom.) Anagn. et Kom. — Fig. 2–6, st. 27; F = 3.1.
- Lyngbya* sp. div. — Fig. 2–5, st. 26; F = 3.1.
- Symploca* sp. — fig. 2–7, st. 26; F = 3.1.
- Jaaginema pseudogeminatum* (Schmid.) Anagn. et Kom. — Figs. 2–8, 2–12, sts. 3, 5, 6, 8, 10, 11, 19, 27 (d); F = 21.9.
- J. subtilissimum* (Kütz. ex De Toni) Anagn. et Kom. — Fig. 2–9, sts. 2, 3, 7–11, 17, 19, 20, 24, 27, 28, 30, 31; F = 46.9.
- Oscillatoria limosa* Ag. — Fig. 2–19, sts. 2–5, 7, 9, 14–19, 21, 27; F = 43.8.
- O. cf. lauterbornii* Schmidle (cf. *Limnothrix* Anagn. et Kom.), very few specimens, cell contents unperceivable — Fig. 2–10, st. 6 (r); F = 3.1.
- O. annae* Van Goor — Fig. 2–13, st. 24; F = 3.1.
- O. sancta* Kütz. — Fig. 2–17, sts. 1, 2, 8; F = 9.4.
- Tychonema granulatum* (Gardn.) Anagn. et Kom. — Fig. 2–11, sts. 24, 26; F = 9.2.
- Nodularia harveyana* (Thwaites) Thuret — Fig. 2–23, st. 11 (r); F = 3.1.
- N. spumigena* Mertens — Fig. 2–24, sts. 1, 17, 20; F = 9.4.
- Spirulina albida* Kolkwitz — Fig. 2–25, sts. 10, 12 (r); F = 6.2.
- Anabaena inaequalis* (Kötz.) Born. et Flah. — Fig. 2–26, st. 6 (r); F = 3.1.

## BACILLARIOPHYCEAE

- Cyclotella bodanica* Grun. — Fig. 3–1, sts. 2, 6, 8, 10, 13, 19; F = 18.8.

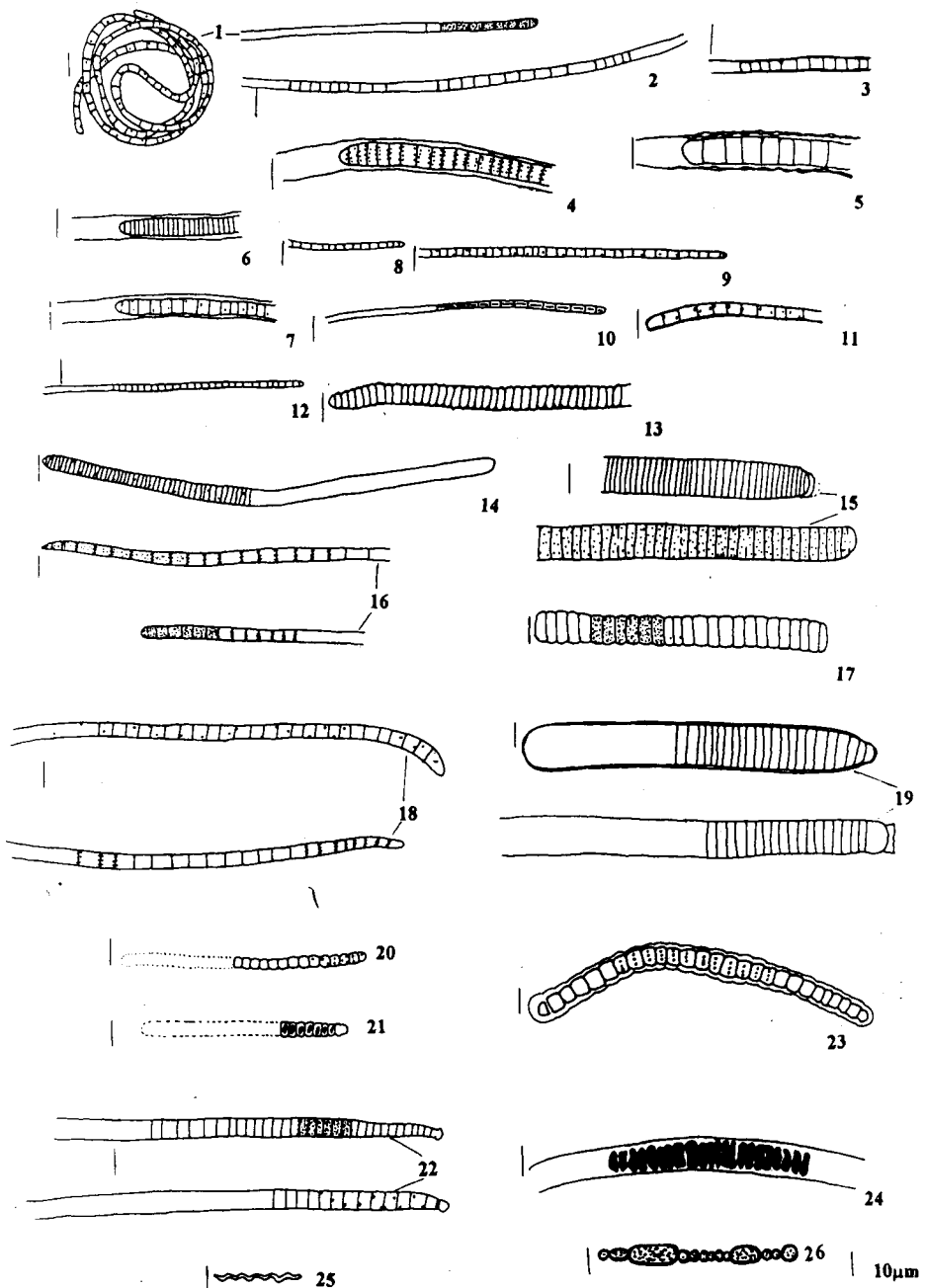


Fig. 2.

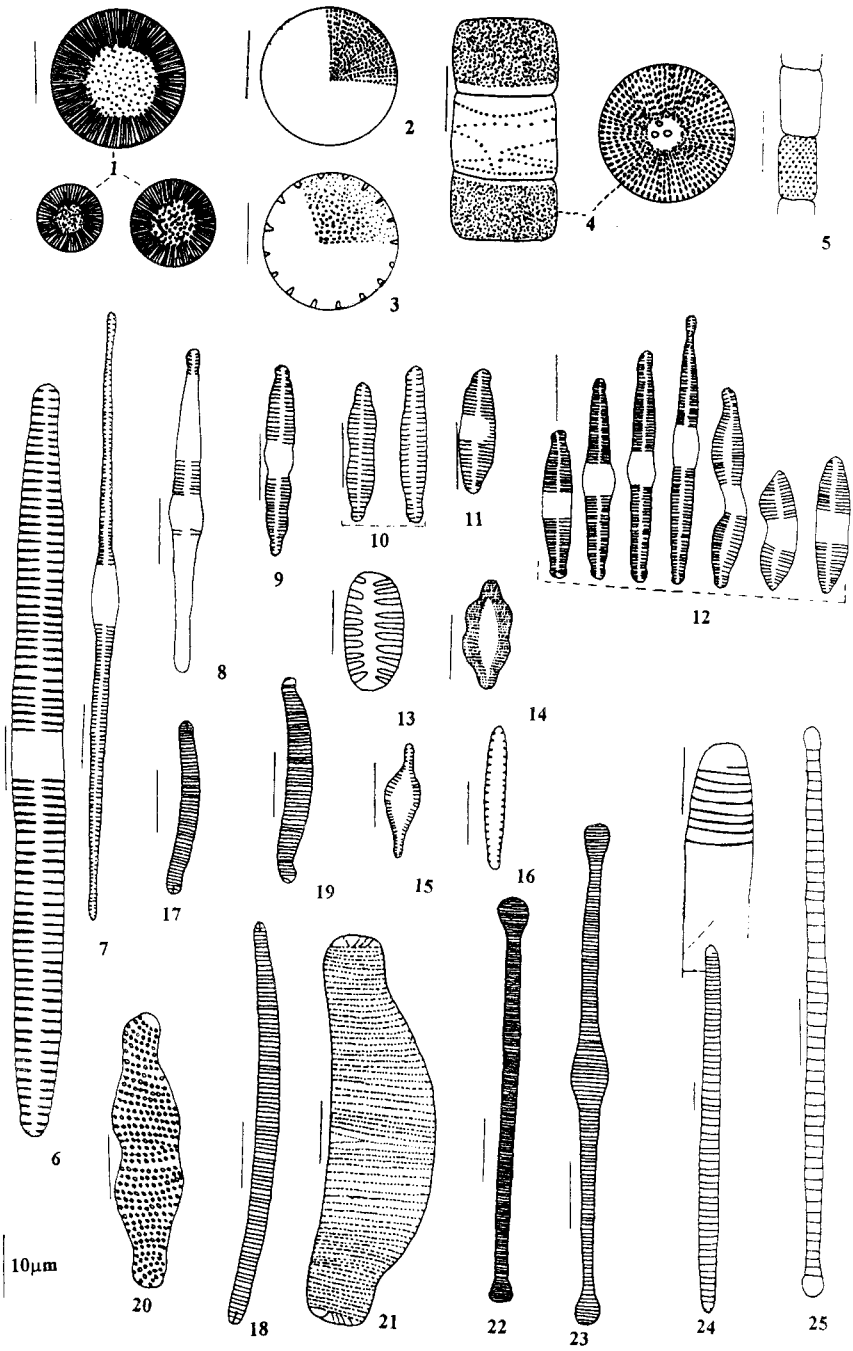


Fig. 3.

Fig. 2. Cyanophyta

1 --- *Panktolyngbya contorta* (Lemm.) Anagn. et Kom., 2 --- *Leptolyngbya scotti* (Fritsch) Anagn. et Kom., 3 --- *Phormidium kuetzingianum* (Kirchner) Anagn. et Kom., 4 --- *Porphyrosiphon martensianus* (Menegh. ex Gom.) Anagn. et Kom., 5 --- *Lyngbya* sp. div., 6 --- *Porphyrosiphon luteus* (Gom. ex Gom.) Anagn. et Kom., 7 --- *Symploca* sp. 8, 12 --- *Jaaginema pseudogeminatum* (Schmid) Anagn. et Kom., 9 --- *J. subtilissimum* Kütz., 10 --- *Oscillatoria* cf. *lauterbornii* Schmidle, (cf. *Limnothrix* Anagn. et Kom. --- very few specimens, cell contents unpreceivable), 11 --- *Tychonema granulatum* (Gardner) Anagn. et Kom., 13 --- *Oscillatoria annae* Van Goor, 14 --- *Phormidium tenue* var. *laevis* Gardner, 15 --- *P. irriguum* (Kütz. ex Gom.), Anagn. et Kom., 16 --- *P. terebriforme* (Ag. ex Gom.) Anagn. et Kom., 17 --- *Oscillatoria sancta* Kütz., 18 --- *O. subuliformis* Le Jolins, 19 --- *O. limosa* Ag., 20 --- *Phormidium pristleyi* Fritsch., 21 --- *P. dimorphum* Lemm., 22 --- *P. favosum* (Bory) Gom., 23 --- *Nodularia harveyana* (Thwaites) Thuret, 24 --- *N. spumigena* Mertens, 25 --- *Spirulina albidia* Kolkwitz, 26 --- *Anabaena inaequalis* (Kütz.) Born. et Flah.

Fig. 3. Bacillariophyceae

1 --- *Cyclotella bodanica* Grun., 2 --- *Stephanodiscus* sp. (1), 3 --- *Stephanodiscus* sp. (2), 4 --- *Orthoseira roeseana* (Rabenh.) O'Meara, 5 --- *Aulacoseira subarctica* (O. Müller) Haworth, 6 --- *Fragilaria ulna* (Nitzsch) Lange-Bertalot, 7 --- *F. crotonensis* Kitton, 8 --- *F. capucina* var. *rumpens* (Kütz.) Lange-Bertalot or *F. capucina* var. *gracilis* (Oestrup) Hust. (very similar descriptions), 9 --- *F. bidens* Heiberg, 10 --- *F. construens* *F. binodis* (Ehr.) Hust., 11 --- *F. capucina* var. *vaucheriae* (Kütz.) Lange-Bertalot, 12 --- *F. capucina* var. *capucina* (highly variable species, many deformed specimens), 13 --- *F. leptostauron* var. *dubia* (Grunow) Hust., 14 --- *F. robusta* (Fusey) Manguin or *F. brevistriata* Grun., 15 --- *F. parasitica* (W. Smith) Grun., 16 --- *F. lapponica* Grun., 18 --- *Eunotia bilunaris* (Ehr.) Mills, 17 --- *E. bilunaris* var. *mucophila* Lange-Bertalot et Nörpel, 19 --- *E. denticulata* (Bréb.) Rabenh. cf. *E. exigua* (Bréb.) Rabenh., 20 --- *E. gibbosa* Grun., 21 --- *E. praerupta* Ehr., 22 --- *Asterionella formosa* Hassal, 23 --- *Tabellaria fenestrata* (Lyngb.) Kütz., 24 --- *Diatoma vulgare* Bory, 25 --- *D. tenue* Ag.

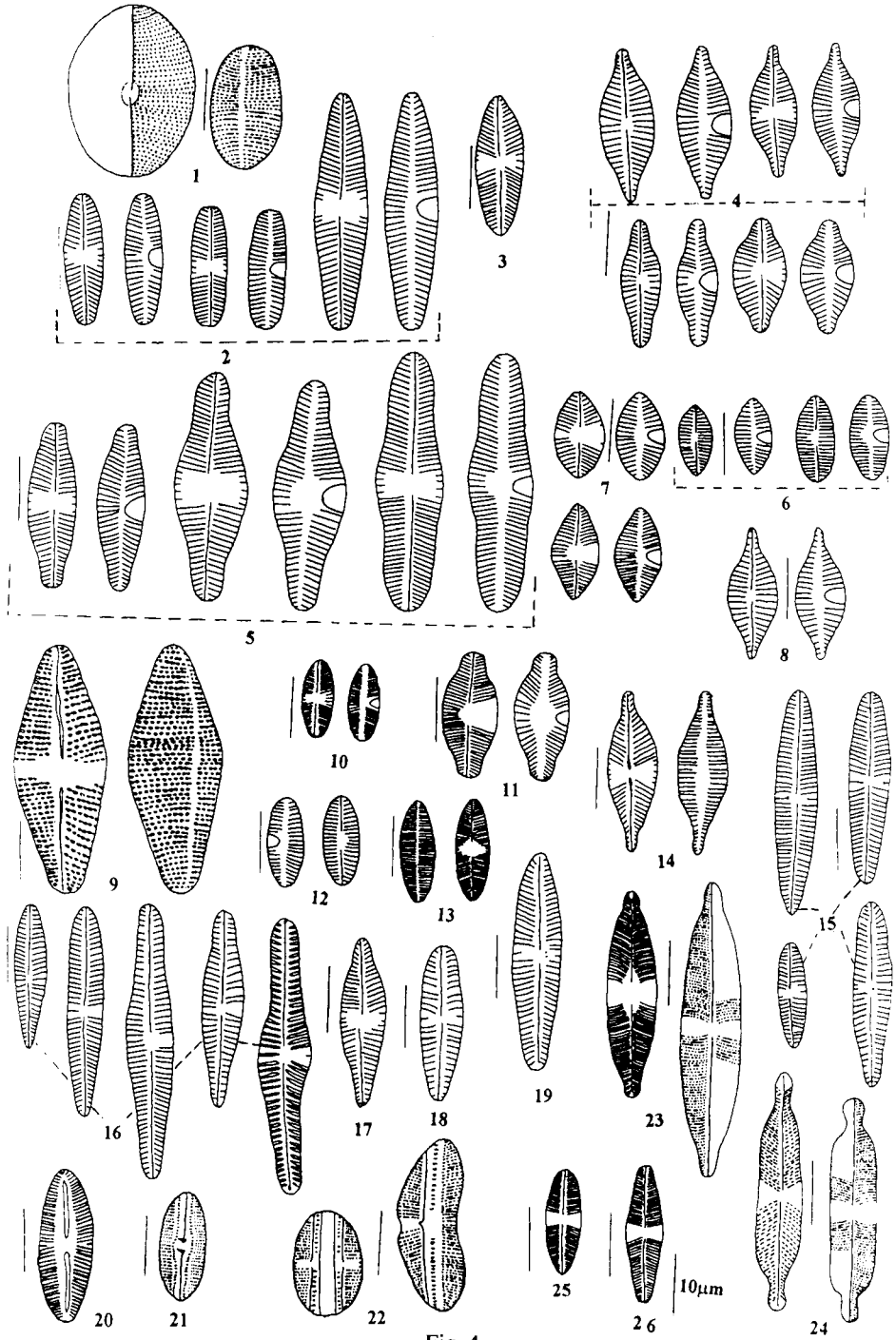


Fig. 4.



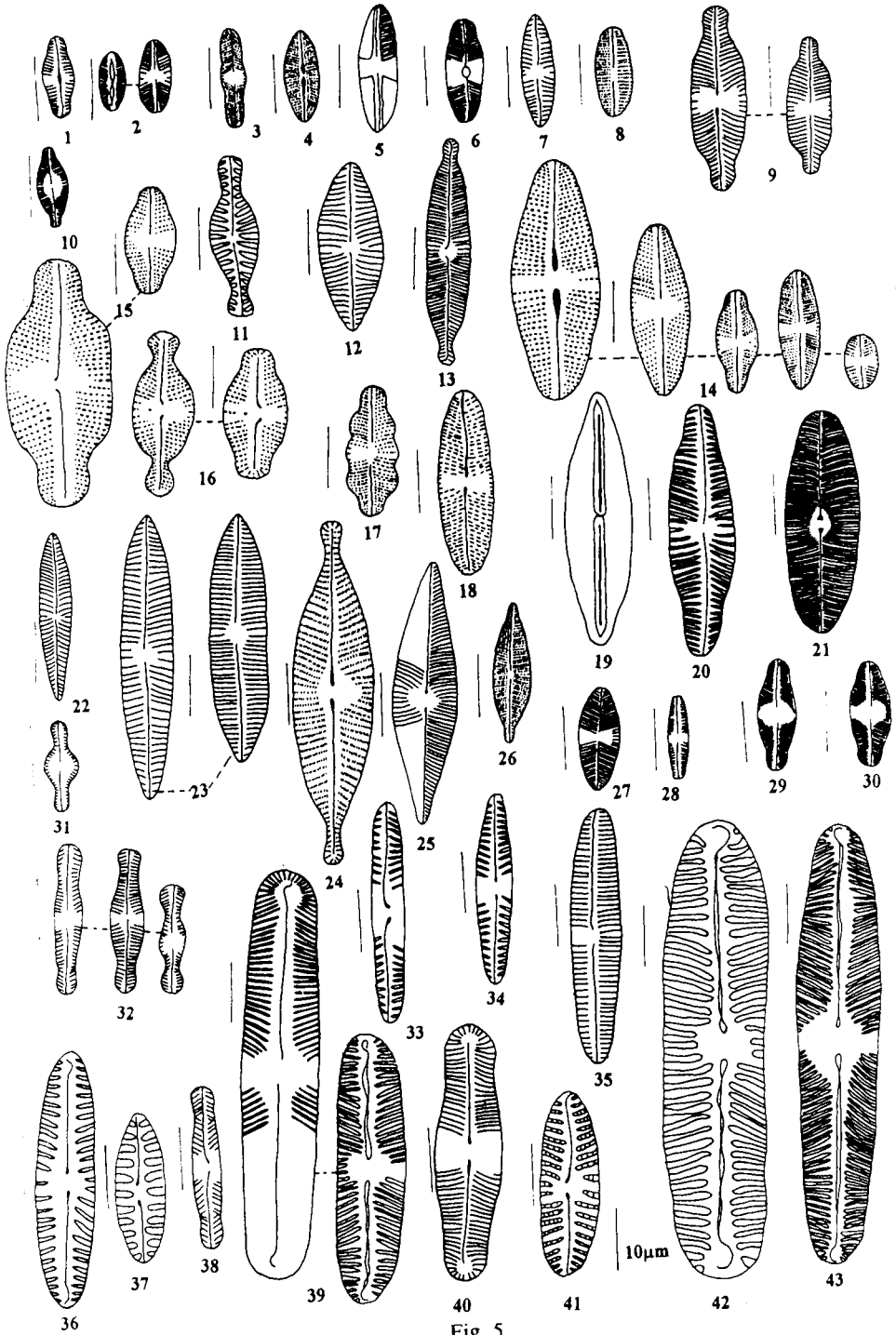


Fig. 5.

Fig. 4. Bacillariophyceae

1 — *Cocconeis plantentula* var. *euglypta* (Ehr.) Cleve, 2 — *Achnanthes lanceolata* var. *lanceolata* (Bréb.) Grun., 3 — *A. lanceolata* f. *rhombica* Carter, 4 — *A. lanceolata* var. *rostrata* (Oestrup) Hust., 5 — *A. lanceolata* var. *ventricosa* Hust., 6 — *A. lanceolata* var. *elliptica* Cleve, 7 — *A. oestrupii* Hust., 8 — *A. delicatula* (Kütz.) Grun., 9 — *A. brevipes* Ag., 10 — *A. rupestris* Krasske, 11 — *A. quadratarea* Oestrup., 12 — *A. saxonica* Krasske, 13 — *A. austriaca* Hust., 14 — *Achnanthes* sp. (1), 15 — *Gomphonema parvulum* (Kütz.) Kütz., 16 — *G. olivaceum* (Hornemann) Bréb., 17 — *G. olivaceum* var. *calcareum* (Cleve) Cleve, 18 — *G. olivaceum* var. *minutissimum* Hust., 19 — *G. bipunctatum* Krasske, 20 — *Diploneis petersenii* Hust., 21 — *D. ovalis* (Hilse) Cl., 22 — *Amphora lihyca* Ehr., 23 — *Stauroneis anceps* Ehr., 24 — *S. agrestis* Petersen, 25 — *Stauroneis* sp. (1), 26 — *Stauroneis* sp. (2)

Fig. 5. Bacillariophyceae

1 — *Navicula absoluta* Hustedt, 2 — *N. atomus* (Kütz.) Grun., 3 — *N. contenta* Grun., 4 — *N. confervacea* Kütz., 5 — *N. minima* Grun., 6 — *N. lapidosa* Krasske, 7 — *N. cincta* (Ehr.) Ralfs, 8 — *N. subminuscula* Manguin, 9 — *N. elginensis* (Gregory) Ralfs, 10 — *N. gallica* var. *perpusilla* ((Grumow) Lange-Bertalot, 11 — *N. capitata* Ehr., 12 — *N. meniscus* var. *menisculus* Schumann, 13 — *N. protracta* (Grun.) Cleve, 14 — *N. mutica* var. *mutica* Kütz., 15 — *N. mutica* var. *ventricosa* Schumann Cleve et Grun., 16 — *N. muticopsis* Van Heurck, 17 — *N. nivalis* Ehr., 18 — *N. cohnii* (Hilse) Lange-Bertalot, 19 — *N. cuspidata* (Kütz.), 20 — *N. globulifera* Hust., 21 — *N. bacillum* Ehr., 22 — *N. pseudolanceolata* Lange-Bertalot, 23 — *N. tripunctata* (O.F. Müller) Bory, 24 — *N. rhynchocephala* Kütz., 25 — *Navicula* sp. cf. *hasta* Pantocsek, 26 — *Navicula* sp. (1), 27 — *Navicula* sp. (2), 28 — *Navicula* sp. (3), 29 — *Navicula* sp. (4), 30 — *Navicula* sp. (5), 31 — *Pinnularia* sp., 32 — *P. ignobilis* (Krasske) Cl.-Euler, 33 — *P. obscura* Krasske, 34 — *P. intermedia* (Lager.) Cl., 35 — *P. viridis* (Nitzsch) Ehr., 36 — *P. borealis* Ehr., 37 — *P. borealis* var. *rectangularis* Carlson, 38 — *P. divergentissima* (Grun.) Cl., 39 — *P. microstauron* (Ehr.) Cl., 40 — *P. lundii* Hust., 41 — *P. lagerstedtii* (Cl.) Cl.-Euler, 42 — *P. lata* (Bréb.) W. Smith, 43 — *P. divergens* W. Smith



Fig. 6. Bacillariophyceae

1 — *Caloneis bacillum* (Grun.) Cleve, 2 — *C. molaris* (Grun.) Krammer, 3 — *Caloneis* sp. (1) (differs from *C. molaris* in having a smaller number of stripes in 10µm), 4 — *C. schumanniana* (Grun.) Cleve, 5 — *C. silicula* (Ehr.) Cleve, 6 — *Caloneis* sp. (2), 7 — *Cymbella cesatii* (Rabenh.) Grunow, 8 — *C. gracilis* (Ehr.) Kütz., 9 — *C. cistula* (Ehr.) Kirchner, 10 — *C. minuta* Hilse, 11 — *C. silesiaca* Bleisch, 12 — *C. delicatula* Kütz., 13 — *Cymbella* sp. (1), 14 — *Cymbella* sp. (2), 15 — *Gyrosigma acuminatum* (Kütz.) Rabenh., 16 — *Nitzschia gracilis* Hantzsch, 17 — *N. hamburgiensis* Lange-Bertalot, 18 — *N. inconspicua* Grun., 19 — *N. microcephala* Grun., 20 — *N. pusilla* Grun., 21 — *N. solita* Hust., 22 — *N. intermedia* Hantzsch, 23 — *N. frustulum* (Kütz.) Grun., 24 — *Hantzschia amphioxys* (Ehr.) Grun., 25 — *Campylodiscus bicostatus* W. Smith, 26 — *Surirella linearis* var. *helvetica* (Brun.) Meister, 27 — *S. linearis* var. ?, 28 — *Denticula tenuis* Kütz., 29 — *Cymatopleura solea* (Bréb.) W. Smith

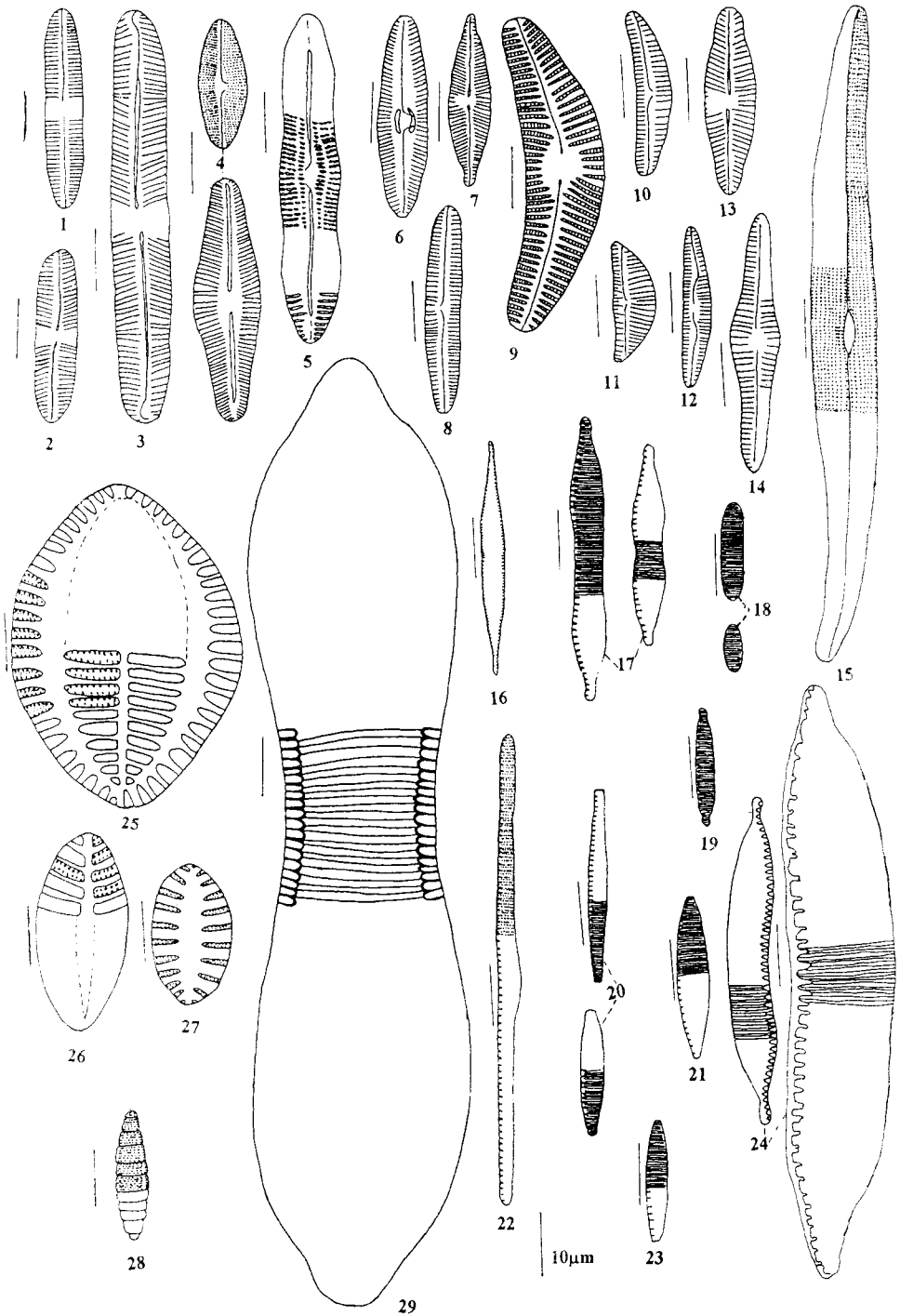


Fig. 6.

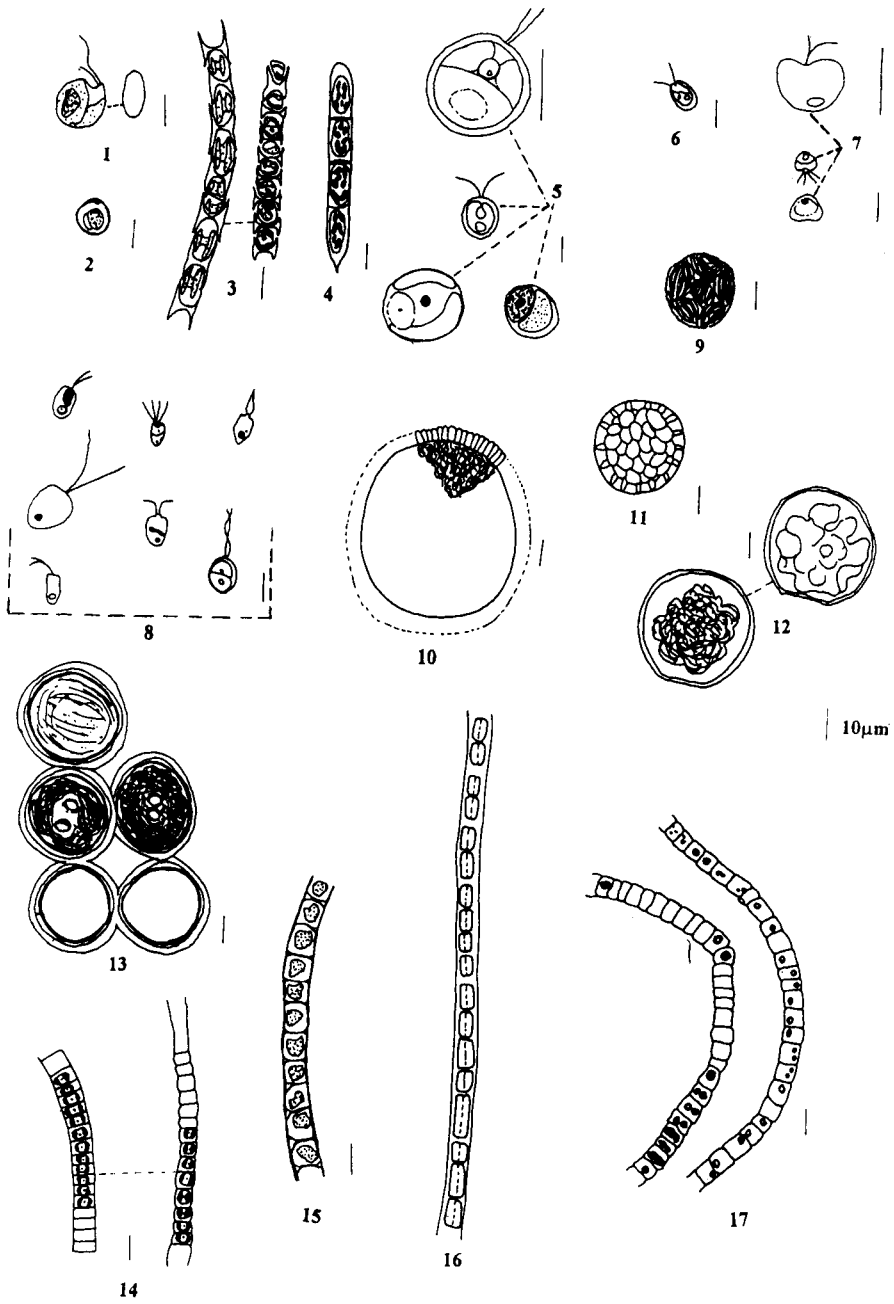


Fig. 7.

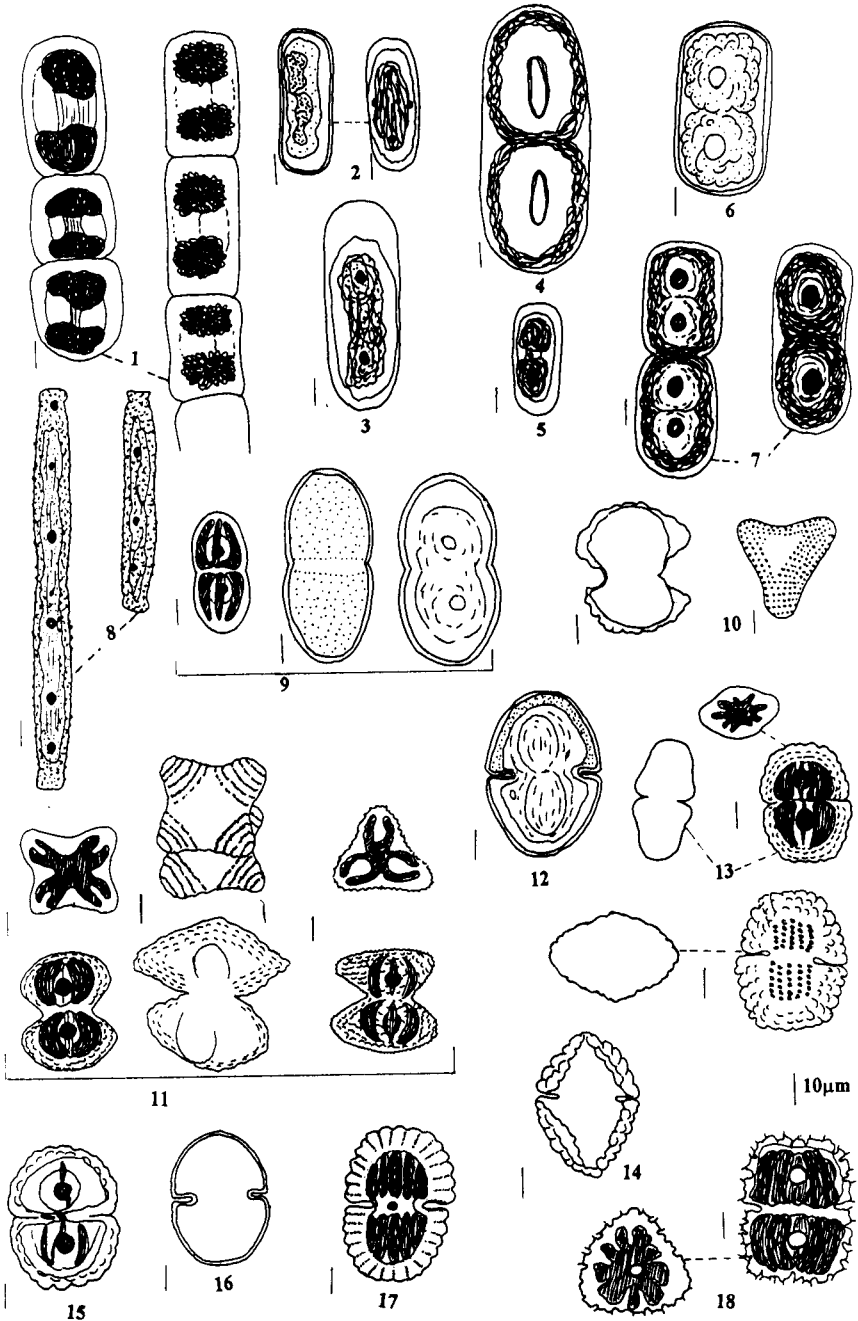


Fig. 8.

Fig. 7. Chrysophyceae:

- 1 — not determined Chrysophyceae, 2 — cyst form Chrysophyceae Xanthophyceae:
- 3 — *Tribonema ulotrichoides* Pascher, 4 — not determined filaments Chlorophyceae:
- 5 — *Chlamydomonas cf. lapponica* Skuja or *Ch. cf. incerta* Pascher, 6 — *Chlamydomonas* sp. (1),
- 7 — *Quadrichloris carterioides* (Pascher et Jahoda), Fott or *Chlamydonephris impressa* (Pascher) Ettl. H. et O., 8 — *Carteria alpina* Schmidle (cf. *C. cordata* Ettl and *Pyramichlamys semiglobosa* (Pascher) Ettl H. et O., (all four taxa are among the most frequent in the and the fixed material made more precise identification impossible), 9 — *Muriella terrestris* P. Broady, 10 — *Trochiscia rubra* Kol., 11 — *T. granulata* (Reinsch) Hansg., 12 — *Spongiococcum cf. multinucleatum* Deason et Bold., 13 — cf. *Spongiochloris* sp., 14 — *Ulothrix variabilis* Kütz., 15 — *Ulothrix* sp. (1), 16 — not determined alga from *Ulothrichales*, 17 — *Microspora tumidula* Hazen

Fig. 8. Conjugatophyceae

- 1 — *Zygnema* sp., 2 — *Mesotaenium macrococcum* (Kütz.) Roy et Biss., 3 — *M. de greyi* Turn.,
- 4 — *Cylindrocystis brebissonii* Menegh, 5 — *C. brebissonii* var. *minor* W. et G. West, 6 — *C. brebissonii* f. *turgida*, 7 — *C. crassa* de Bary, 8 — *Gonatozygon brebissonii* de Bary, 9 — *Actinotaenium cucurbita* (Bréb.) Teil ex Rüz. et Pouzar, 10 — *Cosmoastrum punctulatum* (Bréb.) Pal.-Mordv., 11 — *C. dilatatum* (Ehr.) Pal.-Mordv. var. *dilatatum*, 12 — *Cosmarium microsphinctum* Nordst., 13 — *C. speciosum* Lund., 14 — *C. speciosum* f. ?, 15 — *C. crenatum* Ralfs et Ralfs, 16 — *C. cf. pachydermum* Lund, 17 — *C. subspeciosum* Nordst., 18 — *Staurastrum acarides* Nordst.

- Stephanodiscus* sp. (1) — Fig. 3–2, sts. 8, 9, 14, 15, 17, 18, 20, 21; F = 25.0.  
*Stephanodiscus* sp. (2) — Fig. 2–3, sts. 2, 5, 10, 12, 13; F = 15.6.  
*Orthoseira roeseana* (Rabenh.) O'Meara — Fig. 3–4, sts. 1, 2, 5, 8, 9, 15–17, 20, 27; F = 31.3.  
*Aulacoseira subarctica* (O. Müller) Haworth — Fig. 3–5, st. 5 (r); F = 3.1.  
*Fragilaria ulna* (Nitzsch) Lange-Bertalot — Fig. 3–6, sts. 10, 17 (r); F = 6.2.  
*F. crotonensis* Kitton — Fig. 3–7, sts. 4, 10 (r); F = 6.2.  
*F. capucina* var. *capucina*, Desmazieres highly variable species, many deformed specimens — Fig. 3–12, sts. 1, 3–10, 13–22, 24, 26, 27, 29, 31, 32; F = 78.1.  
*F. capucina* var. *vaucheriae* (Kütz.) Lange-Bertalot — Fig. 3–11, sts. 3–5, 8, 9, 12–14, 17, 18, 21; F = 34.3  
*F. capucina* var. *rumpens* (Kütz.) Lange-Bertalot or *F. capucina* var. *gracilis* (Oestrup) Hust. (very similar descriptions) — Fig. 3–8, sts. 22, 24, 26, 27, 28 (d), 29–32; F = 28.1.  
*F. bidens* Heiberg — Fig. 3–9, st. 1 (r); F = 3.1.  
*F. construens* f. *binodis* (Ehr.) Hust. — Fig. 3–10, sts. 8 (r), 26, 27 (d), 28, 29 (d), 30; F = 18.8.  
*F. leptostauron* var. *dubia* (Grunow) Hust. — Fig. 3–13, sts. 1, 3, 7, 9, 11, 14, 16, 17; F = 25.0.  
*F. robusta* (Fusey) Manguin or *F. brevistriata* Grun. — Fig. 3–14, st. 5 (r); F = 3.1.  
*F. parasitica* (W. Smith) Grun. — Fig. 3–15, st. 10 (r); F = 3.1.  
*F. lapponica* Grun. — Fig. 3–16, sts. 1, 11 (r); F = 6.2.  
*Eunotia bilunaris* (Ehr.) Mills — Fig. 3–18, st. 21 (r); F = 3.1.  
*E. bilunaris* var. *mucophila* Lange-Bertalot et Nörpel — Fig. 3–17, sts. 3, 5, 7, 9, 10, 14–16, 20; F = 28.1.  
*E. denticulata* (Bréb.) Rabenh. cf. *E. exigua* (Bréb.) Rabenh. — Fig. 3–19, sts. 24, 25; F = 6.2.  
*E. gibbosa* Grun. — Fig. 3–20, st. 32; F = 3.1.  
*E. praerupta* Ehr. — Fig. 3–21, sts. 14, 17, 18, 19 (d), 21; F = 18.8.  
*Asterionella formosa* Hassal — Fig. 3–22, sts. 10–13; F = 12.5.  
*Tabellaria fenestrata* (Lyngb.) Kütz. — Fig. 3–23, sts. 1, 2 (r); F = 6.2.  
*Diatoma vulgare* Bory — Fig. 3–24, sts. 7, 10, 13, 14, 18; F = 15.6.  
*D. tenuis* Ag. — Fig. 3–25, sts. 10, 13 (r); F = 6.2.  
*Cocconeis placentula* var. *euglypta* Ehr. — Fig. 4–1, sts. 1, 2, 5, 8, 9, 10, 12, 13, 15; F = 28.1.  
*Achnanthes lanceolata* var. *lanceolata* (Bréb.) Grun. — Fig. 4–2, sts. 1, 3, 4–9, 11–17, 19–21, 24–28, 30, 31; F = 78.1.  
*A. lanceolata* f. *rhombica* Carter — Fig. 3–4 sts. 22, 24, 30, 32; F = 12.5.  
*A. lanceolata* var. *rostrata* (Oestrup.) Hust. — Fig. 4–4, sts. 1, 3–8, 10–19; F = 53.1.

- A. lanceolata* var. *ventricosa* Hust. — Fig. 4–5, sts. 1–22, 24–31, 32 (d); F = 96.9.
- A. lanceolata* var. *elliptica* Cleve — Fig. 4–6, sts. 3–7, 11, 16–21, 24, 25, 28, 29, 31; F = 53.1.
- A. oestrupii* Hust. — Fig. 4–7, sts. 5, 9 (r); F = 6.2.
- A. delicatula* (Kütz.) Grun. — Fig. 4–8, sts. 1, 11 (r); F = 6.2.
- A. brevipes* Ag. — Fig. 4–9, sts. 1, 3–5, 8–11, 13, 15–17, 21, 28, 31; F = 46.9.
- A. rupestris* Krasske — Fig. 4–10, sts. 9–11, 13; F = 12.5.
- A. quadratarea* Oestrup — Fig. 4–11, sts. 3–9, 22–25, 30; F = 37.5.
- A. saxonica* Krasske — Fig. 4–12, sts. 4–7, 9, 13, 15, 16, 20, 21; F = 31.3.
- A. austriaca* Hust. — Fig. 4–13, sts. 4, 6, 7, 9, 11, 14–16, 20, 21; F = 31.3.
- Achnanthes* sp. (1) — Fig. 4–14, sts. 25, 28–31; F = 15.6.
- Gomphonema parvulum* (Kütz.) Kütz. — Fig. 4–15, sts. 1–4, 8, 10, 16, 24, 25, 27; F = 31.3.
- G. olivaceum* (Hornemann) Bréb. — Fig. 4–16, sts. 1, 3–21; F = 62.5.
- G. olivaceum* var. *calcareum* (Cleve) Cleve — Fig. 4–17, sts. 27–29, 31, 32; F = 15.6.
- G. olivaceum* var. *minutissimum* Hust. — Fig. 4–18, sts. 31, 32; F = 6.2.
- G. bipunctatum* Krasske — Fig. 4–19, st. 24; F = 3.1.
- Diploneis petersenii* Hust. — Fig. 4–20, st. 25; F = 3.1.
- D. ovalis* (Hilse) Cl. — Fig. 4–21, sts. 3, 5 (r); F = 6.2.
- Amphora libyca* Ehr. — Fig. 4–22, sts. 8, 10, 13; F = 9.4.
- Stauroneis anceps* Ehr. — Fig. 4–23, sts. 1–5, 8–10, 14–17, 27–30, 32; F = 53.1.
- S. agrestis* Petersen — Fig. 4–24, sts. 6, 8, (r); F = 6.2.
- Stauroneis* sp. (1) — Fig. 4–25, sts. 1, 3–6; F = 18.2.
- Stauroneis* sp. (2) — Fig. 4–26, sts. 6; F = 3.1.
- Navicula absoluta* Hust. — Fig. 5–1, sts. 6, 9 (r); F = 6.2.
- N. atomus* (Kütz.) Grun. — Fig. 5–2, sts. 1, 3–18, 20–24, 26, 28, 29, 31; F = 81.3.
- N. contenta* Grun. — Fig. 5–3, sts. 4–9, 11–13, 15–17, 20, 21; F = 43.8.
- N. confervacea* Kütz. — Fig. 5–4, sts. 4, 6 (r); F = 6.2.
- N. minima* Grun. — Fig. 5–5, sts. 5, 7–9, 11–22, 24–26, 30, 32; F = 65.6.
- N. lapidosa* Krasske — Fig. 5–6, sts. 10, 16, 21; F = 9.4.
- N. cincta* (Ehr.) Ralfs — Fig. 5–7, sts. 10, 12, 16; F = 9.4.
- N. subminuscula* Manguin — Fig. 5–8, st. 4 (r); F = 3.1.
- N. elginensis* (Gregory) Ralfs — Fig. 5–9, sts. 1, 4, 6, 8, 10–13, 15, 16, 24, 28, 29; F = 40.6.
- N. gallica* var. *perpusilla* (Grunow) Lange-Bertalot — Fig. 5–10, st. 6 (r); F = 3.1.
- N. capitata* Ehr. — Fig. 5–11, st. 10 (r); F = 3.1.
- N. menisculus* var. *menisculus* Schumann — Fig. 5–12, st. 8, 10 (r); F = 6.2.



- N. protracta* (Grun.) Cleve — Fig. 5–13, st. 10, 12 (r); F = 6.2.  
*N. mutica* var. *mutica* Kütz. — Fig. 5–14, sts. 1–6, 8, 9, 12, 22–24, 26, 27, 30, 31; F = 50.0.  
*N. mutica* var. *ventricosa* (Kütz.) Cleve et Grun. — Fig. 5–15, sts. 1, 3–6, 8, 9, 11, 15–17, 20–27, 29–31; F = 71.9.  
*N. muticopsis* Van Heurck — Fig. 5–16, sts. 1, 3–21; F = 62.5.  
*N. nivalis* Ehr. — Fig. 5–17, sts. 5, 9, 12–14; F = 15.6.  
*N. cohnii* (Hilse) Lange-Bertalot — Fig. 5–18, st. 28; F = 3.1.  
*N. cuspidata* (Kütz.) Kütz. — Fig. 5–19, st. 7 (r); F = 3.1.  
*N. globulifera* Hust. — Fig. 5–20, st. 8 (r); F = 3.1.  
*N. bacillum* Ehr. — Fig. 5–21, sts. 10, 13 (r); F = 6.2.  
*N. pseudolanceolata* Lange-Bertalot — Fig. 5–22, st. 10 (r); F = 3.1.  
*N. tripunctata* (O.F. Müller) Bory — Fig. 5–23, sts. 1, 2, 8, 10, 13, 15; F = 18.8.  
*N. rhynchocephala* Kütz. — Fig. 5–245, sts. 1, 2 (r); F = 6.2.  
*Navicula* sp. cf. *hasta* Pantoscek — Fig. 5–25, sts. 12, 13, 21; F = 9.4.  
*Navicula* sp. (1) — Fig. 5–26, sts. 3, 5–7, 9, 11, 15–21; F = 40.6.  
*Navicula* sp. (2) — Fig. 5–27, st. 13; F = 3.1.  
*Navicula* sp. (3) — Fig. 5–28, sts. 4, 6, 8, 10–13, 15, 16; F = 28.1.  
*Navicula* sp. (4) — Fig. 5–29, st. 10; F = 3.1.  
*Navicula* sp. (5) — Fig. 5–30, st. 9 (r); F = 3.1.  
*Pinnularia* sp. — fig. 5–31, sts. 4–7, 9, 12–21, 24, 26, 28–32; F = 68.8.  
*P. ignobilis* (Krasske) Cl. — Euler. — Fig. 5–32, sts. 2, 3, 5–13, 15–22, 24, 25, 30–32; F = 75.0.  
*P. obscura* Krasske — Fig. 5–33, sts. 3, 7, 14, 17–20; F = 21.9.  
*P. intermedia* (Lag.) Cl. — Fig. 5–34, sts. 14–16; F = 9.4.  
*P. viridis* (Nitzsch) Ehr. — Fig. 5–35, sts. 20, 21 (r); F = 6.2.  
*P. borealis* Ehr. — Fig. 5–36, sts. 1–24, 26–29; F = 87.5.  
*P. borealis* var. *rectangularis* Carlson — Fig. 5–37, sts. 24, 25, 30; F = 9.4.  
*P. divergentissima* (Grun.) Cl. — Fig. 5–38, st. 15 (r); F = 3.1.  
*P. lundii* Hüst. — Fig. 5–40, sts. 1, 3–18, 20, 21; F = 56.2.  
*P. lagerstedtii* (Cl.) Cl. — Euler — Fig. 5–41, sts. 22, 31; F = 6.2.  
*P. lata* (Bréb.) W. Smith — Fig. 5–42, sts. 22, 26; F = 6.2.  
*P. divergens* W. Smith — Fig. 5–43, sts. 25, 29, 32; F = 9.4.  
*P. microstauron* (Ehr.) Cl. — Fig. 5–39, sts. 1–26; F = 81.2.  
*Caloneis bacillum* (Grun.) Cleve — Fig. 6–1, sts. 4–6, 9, 20, 21; F = 18.8.  
*C. molaris* (Grun.) Krammer — Fig. 6–2, st. 22–28; F = 21.9.  
*Caloneis* sp. (1), differs from *C. molaris* in having a smaller number of stripes in 10  $\mu\text{m}$  — fig. 6–3, sts. 2, 3, 7–9, 19, 22–25, 27; F = 34.4.  
*C. schumanniana* (Grun.) Cleve — Fig. 6–4, sts. 4–6, 9, 20, 21, 23; F = 21.9.  
*C. silicula* (Ehr.) Cleve — Fig. 6–5, sts. 1, 2, 4, 5, 9, 15–17, 20–23; F = 37.5.

- Caloneis* sp. (2) — Fig. 6–6, st. 22; F = 3.1.  
*Cymbella cesatii* (Rabenhorst) Grunow — Fig. 6–7, st. 31; F = 3.1.  
*C. gracilis* (Ehr.) Kütz. — Fig. 6–8, sts. 1, 2 (r); F = 6.2.  
*C. cistula* (Ehr.) Kirchner — Fig. 6–9, st. 10 (r); F = 3.1.  
*C. minuta* Hilse — Fig. 6–10, sts. 1, 2, 10; F = 9.4.  
*C. silesiaca* Bleisch — Fig. 6–11, sts. 1, 2, 8, 10, 13; F = 15.6.  
*C. delicatula* Kütz. — Fig. 6–12, st. 10 (r); F = 3.1.  
*Cymbella* sp. (1) — Fig. 6–13, st. 21; F = 3.1.  
*Cymbella* sp. (2) — Fig. 6–14, st. 28; F = 3.1.  
*Gyrosigma acuminatum* (Kütz.) Rabenh. — Fig. 6–15, sts. 10, 13 (r);  
 F = 6.2.  
*Nitzschia gracilis* Hantzsch — Fig. 6–16, sts. 1–8, 10–22, 24–30, 31  
 (d), 32; F = 93.8.  
*N. hamburghensis* Lange-Bertalot — Fig. 6–17, sts. 1–21, 27–29, 31;  
 F = 81.3.  
*N. inconspicua* Grun. — Fig. 6–18, sts. 4, 6, 8, 10–13, 16; F = 25.0.  
*N. microcephala* Grun. — Fig. 6–19, st. 13 (r); F = 3.1.  
*N. pusilla* Grun. — Fig. 6–20, sts. 2, 4, 6, 8, 12, 17, 18; F = 21.9.  
*N. solita* Hust. — Fig. 6–21, sts. 10, 12 (r); F = 6.2.  
*N. intermedia* Hantzsch — Fig. 6–22, st. 14 (r); F = 3.1.  
*N. frustulum* (Kütz.) Grun. — Fig. 6–23, sts. 22, 24, 26–32; F = 28.1.  
*Hantzschia amphioxys* (Ehr.) Grun. — Fig. 6–24, st. 6–32; F = 84.4.  
*Campylodiscus bicostatus* W. Smith — Fig. 6–25, st. 19 (r); F = 3.1.  
*Surirella linearis* var. *helvetica* (Brun.) Meister — Fig. 6–26, sts. 9, 10, 12,  
 13; F = 12.5.  
*S. linearis* var. ? — Fig. 6–27, st. 14 (r); F = 3.1.  
*Denticula tenuis* Kütz. — Fig. 6–28, sts. 8, 10, 12, 13; F = 12.5.  
*Cymatopleura solea* (Bréb.) W. Smith — Fig. 6–29, st. 10 (r); F = 3.1.

#### CHRYSOPHYCEAE

- not determined Chrysophyceae — Fig. 7–1, st. 25; F = 3.1.  
 cyst from Chrysophyceae — Fig. 7–2, st. 32 F = 3.1.

#### XANTHOPHYCEAE

- Tribonema ulotrichoides* Pascher — Fig. 7–3, sts. 15, 16, 28, 29, 31; F = 15.6.  
 not determined filaments — Fig. 7–4, sts. 16 (r), 17 (r); F = 6.2.

#### CHLOROPHYCEAE

- Chlamydomonas* cf. *lapponica* Skuja or *Chlamydomonas* cf. *incerta* Pascher  
 — Fig. 7–5, sts. 1–5, 7–19, 21; F = 59.4.  
*Chlamydomonas* sp. (1) — Fig. 7–6, sts. 1–5, 7–19, 21; F = 59.4.  
*Quadrichloris carterioides* (Pascher et Jahoda) Fott or *Chlamydonephris*  
*impressa* (Pascher) Ettl H. et O. — Fig. 7–7, sts. 1–3, 5, 7–19, 21;  
 F = 56.3.

*Carteria alpina* Schmidle cf. *C. cordata* Ettl and *Pyramichlamys semiglobosa* (Pascher) Ettl H. et O. — Fig. 7–8, sts. 1–5, 7–19, 21; F = 59.4. The last taxa belonged to the most frequent in the samples in question; unfortunately, the minuteness of the cells and the fixed material made more precise identification impossible.

*Muriella terrestris* P. Broady — Fig. 7–9, st. 13 (r); F = 3.1.

*Trochiscia rubra* Kol — Fig. 7–10, sts. 7, 14, 16; F = 9.4.

*T. granulata* (Reinsch) Hansg. — Fig. 7–11, sts. 14, 16; F = 6.2.

*Spongiococcum* cf. *multinucleatum* Deason et Bold — Fig. 7–12, sts. 1, 2 (r); F = 6.2.

cf. *Spongiochloris* sp. — Fig. 7–13, st. 20 (r); F = 3.1.

*Ulothrix variabilis* Kütz. — Fig. 7–14, sts. 1, 2, 7, 14, 16, 17 (d), 19, 21; F = 25.0.

*Ulothrix* sp. (1) — Fig. 7–15, sts. 11, 13, 18; F = 12.5.

non determined alga from *Ulothrichales* — Fig. 7–16, st. 4 (r); F = 3.1.

*Microspora tumidula* Hanzen — Fig. 7–17, sts. 3, 4 (d), 6; F = 9.4.

#### CONJUGATOPHYCEAE

*Zygnema* sp. — Fig. 8–1, sts. 1, 3, 11, 18–20; F = 18.8.

*Mesotaenium macrococcum* (Kütz.) Roy et Biss. — Fig. 8–2, sts. 1–3, 7, 18, 19, 22, 24, 25; F = 28.1.

*M. de greyi* Turn. — Fig. 8–3, sts. 2, 3, 7, 14, 18; F = 15.6.

*Cylindrocystis brebissonii* Menegh. — Fig. 8–4, sts. 2, 16–18; F = 12.5.

*C. brebissonii* var. *mimor* W. et G. West — Fig. 8–5, st. 2 (r); F = 3.1.

*C. brebissonii* f. *turgida* — Fig. 8–6, st. 27; F = 3.1.

*C. crassa* de Bary — Fig. 8–7, st. 2, 3, 11; F = 9.4.

*Gonatozygon brebissonii* de Bary — Fig. 8–8, sts. 3, 10–13, 18, 19; F = 21.9.

*Actinotaenium cucurbita* (Bréb.) Teil ex Ruz. et Pouzar — Fig. 8–9, sts. 1–6, 10, 13, 15, 19, 24, 25, 27; F = 40.6.

*Cosmoastrum punctulatum* (Bréb.) Pal. — Mordv. — Fig. 8–10, sts. 18 (r), 24; F = 6.2.

*C. dilatatum* (Ehr.) Pal.-Mordv. var. *dilatatum* — Fig. 8–11, sts. 1, 6, 11–13, 15, 18, 19; F = 25.0.

*Cosmarium microsphinctum* Nordst. — Fig. 8–12, sts. 11, 12 (r), 24, 25; F = 12.5.

*C. speciosum* Lund — Fig. 8–13, sts. 1–3, 5, 7, 10–13, 15–19, 24, 25, 27; F = 53.1.

*C. speciosum* f. ? — Fig. 8–14, st. 24; F = 3.1.

*C. crenatum* Ralfs et Ralfs — Fig. 8–15, st. 10 (r)

*C.* cf. *pachydermum* Lund — Fig. 8–16, st. 19 (r)

*C. subspeciosum* Nordst. — Fig. 8–17, st. 19 (r)

*Staurastrum acarides* Nordst. — Fig. 8–18, sts. 7, 12, 13.

## Flora of particular creeks

### 1. The "Petrified Forest Creek" (Creek I)

64 of the algal taxa identified in six stations along the creek's course were diatoms, 19 green algae and 14 blue-green algae. The numbers of species found in particular stations were more or less equal (Fig. 9). The highest constancy, over 50%, was reached by the blue-green alga — *Phormidium terebriforme* and by the diatoms — *Achnanthes lanceolata* var. *ventricosa*, *Navicula mutica*, *Pinnularia borealis*, *P. microstauron*, *Nitzschia hamburgensis* and *Hantzschia amphioxys*.

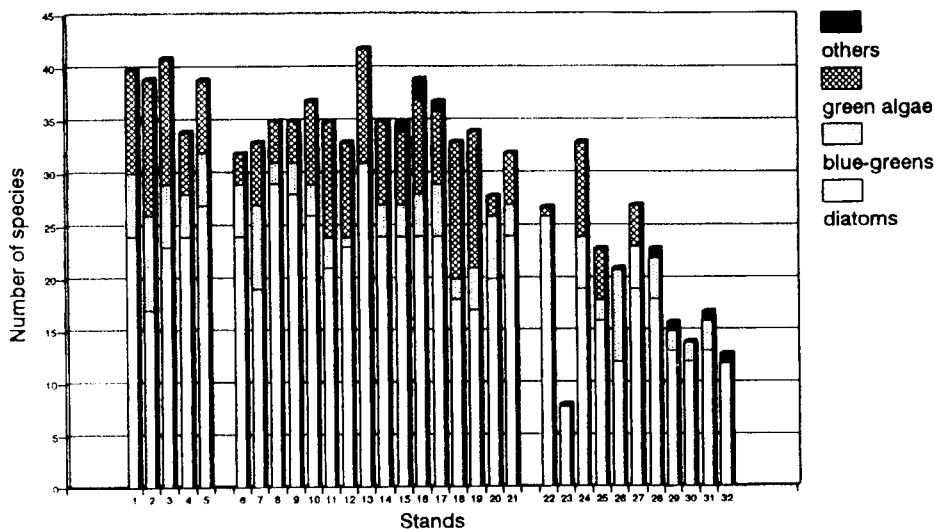


Fig. 9. Number of algal taxonomic units in particular stations in the creeks near "H. Arctowski" Station. Stations: 1–5 — The "Petrified Forest Creek", 6–21 — Creek II, 22–32 — The "Ornithologists' Creek"

### 2. Creek II

In 19 samples taken from 15 stations situated along the creek, 132 algal taxa were found: 90 diatoms, 25 green algae, 15 blue-greens and 2 Xanthophyceae. The differences in the number of taxa in particular stations were slight (Fig. 9), except in station 13 (ditch near Aerial field), where the number of diatom taxa was markedly higher than elsewhere. The following diatoms occurred invariably in all the samples: *Achnanthes lanceolata* var. *ventricosa*, *Navicula muticopsis*, *Gomphonema olivaceum*, *Pinnularia borealis*, *P. microstauron*, *Nitzschia hamburgensis* and *Hantzschia amphioxys*.

### 3. The "Ornithologists' Creek" (Creek III)

In 11 samples collected from four stations situated along the creek's course 73 algal taxa were identified, including 45 taxa of diatoms, 17 blue-green algae,

8 green algae, 2 Chrysophyceae and one Xanthophyceae. The number of taxa in particular stations was low and varied from 8 to 33 (Fig. 9). The highest constancy in that creek was reached by the blue-green alga *Phormidium terebriforme* and by the diatoms: *Achnanthes lanceolata* var. *ventricosa*, *Navicula mutica*, *Pinnularia borealis*, *Nitzschia gracilis* and *Hantzschia amphioxys*.

On the whole the most diversified group in algal communities of three creeks studied in the region of "Arctowski" Station were diatoms, which also predominated in numbers in many samples. Such dominants were: *Fragilaria construens* f. *binodis* in samples 27 and 29, *F. capucina* var. *rumpens* in sample 28, *Eunotia praerupta* in 19, *Achnanthes lanceolata* var. *ventricosa* in 32, and *Nitzschia gracilis* in sample 31.

Among diatoms as many as 17 taxa occurred in more than 50% of samples. These were: *Nitzschia gracilis*, *N. hamburgiensis*, *Hantzschia amphioxys*, *Pinnularia borealis*, *P. ignobilis*, *P. microstauron*, *P. lundii*, *Stauronensis anceps* var. *anceps*, *Navicula atomus*, *N. mutica* var. *mutica*, *N. muticopsis*, *Achnanthes lanceolata* var. *lanceolata*, *A. lanceolata* var. *elliptica*, *A. lanceolata* var. *ventricosa*, *A. lanceolata* var. *rostrata* and *Fragilaria capucina* var. *capucina*.

In some samples from the "Petrified Forest Creek" (4, 5) in its middle, slowly flowing course the prevailing algae were filamentous green algae of the genera *Ulothrix* and *Microspora*. Algae of the "Petrified Forest Creek" and Creek II that reached the highest constancy were monads of green algae of the *Chlamydomonadales* and *Dunalielales*. Of all the desmids only *Cosmarium speciosum* occurred in more than 50% of samples. None of the desmid species predominated in the samples. The richest in blue-green algae was station 2 with predominating *Planktolyngbya concerta*, and station 26 with *Jaaginema pseudogeminatum* and *Phormidium terebriforme*. Two blue-green algae species occurred in more than half of the samples; those were: *Phormidium terebriforme* and *Jaaginema subtilissimum*.

All groups of algae were richer in species in Creek II than in the other two. The greater species diversity was probably due to the habitats being more diversified and rich in nutrients. That in turn is due to the inflow of fertile water from places inhabited by penguins and to the large number of swamps, pools, intermittent small lakes and water courses forming many ecological niches favourable for the development of various algal taxa. Among diatoms which predominated in the investigating creeks there were some to qualify as numerous in „Vanishing" and „Ornithologists' Creeks", too (Kawecka and Olech, 1993). There were *Achnanthes lanceolata*, *Fragilaria capucina* and *Nitzschia frustulum* — the species of wide ecological spectrum, *Navicula atomus* which belongs to a group of very common soil algae and *Pinnularia microstauron* defined as halophil (Krammer and Lange-Bertalot 1986–1991)

32 of 183 algal taxa occurred in all three creeks (23 diatoms, 3 blue-green algae and 3 desmids). That constitutes only about 17% of species in common, in spite of the short distances between creeks. One should bear in

mind that the species composition of algal communities is not definitely established since the samples studied were taken only once and the material was fixed and therefore deformed. A large number of identified taxa occurred rarely, as single specimens or only in one station. Therefore, the present study should be regarded as a preliminary one. The remaining numerous samples collected by Dr. A. Oleksowicz from small lakes, swamps, soil and rocks will make it possible to accomplish a more precise characterization of algal communities in the region of "H. Arctowski" Antarctic Station.

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## Streszczenie

Oznaczono glony występujące w potokach położonych w okolicy Stacji Antarktycznej im. H. Arctowskiego na Wyspie Króla Jerzego, Szetlandy Południowe. Były to następujące potoki: „Potok Skamieniałego Lasu” (Potok I), potok wypływający z Hali Puchalskiego (Potok II) oraz „Potok Ornitologów” (Potok III). W 32 próbach z 26 stanowisk (Rys. 1) oznaczono 183 taksony glonów (Rys. 2–8), w tym: 25 sinic, 123 okrzemki, 31 zielenic, 2 różnowiciowce i 2 złotowiciowce. Dwa

taksony sinic występowały w ponad 50% prób: *Jaaginema subtilissimum* i *Phormidium terebriforme*. Spośród okrzemek w większości prób występowały: *Nitzschia gracilis*, *N. hamburugiensis*, *Hantzschia amphioxys*, *Pinnularia borealis*, *P. ignobilis*, *P. microstauron*, *P. lundii*, *Stauroneis anceps*, *Navicula atomus*, *N. minima*, *N. mutica*, *N. muticopsis*, *Achnanthes lanceolata*, *A. lanceolata* var. *rostrata* i *Fragilaria capucina*. Również zielenice z rzędów Chlamydomonadales i Dunalielales występowały w ponad połowie prób. Jednak ze względu na trudności w określaniu materiału konserwowanego nie zostały dokładnie oznaczone. Spośród sprzążnic natomiast w 53% prób wystąpiło *Cosmarium speciosum*.

Dalsze badania glonów innych siedlisk z Wyspy Króla Jerzego pozwolą na dokładniejsze scharakteryzowanie zbiorowisk glonów z tego terenu.