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Diatom flora and syntaxonomy of an oligotrophic-dystrophic algal community in a nature reservation Swamp (Doksy, Northern Bohemia)

Flóra rozsivek a syntaxonomie oligotrofně dystrofního řasového společenstva přírodní rezervace Swamp (Doksy, severní Čechy)

Panče Stojanovski and Tomáš Kalina

Stojanovski P. [1]) et Kalina T.[2]) (1989): Diatom flora and syntaxonomy of an oligotrophic-dystrophic algal community in a nature reservation Swamp (Doksy, Nothern Bohemia). — Preslia, Praha, 61 : 97—105.

Keywords: Swamp nature reservation, diatom flora, syntaxonomy.

Diatom flora of a Swamp revealed 85 taxa. Among them the oligotrophic-dystrophic species occupy a dominant position. For this community the assotiation *Tetmemoro granulati-Anomoeoneietum seriantis* is described as new.

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INTRODUCTION

The nature reservation Swamp is situated in the south-eastern corner of Máchovo jezero fishpond (Mácha Lake, in German der Hirschberger Grossteich). The prominent Borný hill (443 m a.s.l.) forms the background of the reservation in the north-east direction. The territory of the Swamp is constantly covered with water. It is surrounded with thin pine forest with the exception of its west side which is open to Mácha Lake. The nearest town, Doksy (district Česká Lípa), is about 1.5 km southwest of the locality.

The reservation covers an area of 1.45 ha. The water depth varies between 30—80 cm and depends on fishpond water-level. In the rainy period the fishpond water partly floods the Swamp territory. During the dry summer the Swamp is separated from the fishpond with a low-laying shore belt. The geological substrate is formed by white sand. The coast line is broken into numerous small islands with a typical mire vegetation of higher plants and moses.

From the beginning of this century to recent time the vincity of Doksy was in the focus of algological investigation. The scientific activity of the prominent German algologist, A. Pascher, was in close connection with this region and especialy with the Swamp. A short review of the history or algological research was published by Sládečková-Vinniková (1957). She found 79 taxa of algae which were discovered and described from vicinity of Doksy by various authorities. The number of newly discovered taxa grants this region the leading position in Czechoslovakia. It is also the reason for estab-

lishing the nature reservation Swamp which was proposed in 1972. The reservation served for a long time as a source of algal material for detailed taxonomical work, but no systematic attention was devoted to single algal groups. Our contribution to the diatom flora of the Swamp with the phytocenological conclusions is the first attempt of this kind.

MATERIAL AND METHODS

The material for this nvestigation was collected mainly in the course of our excursion on May 26, 1986. In the whole we have collected 8 samples which form two sets for further examination. The first set consists of two samples. One of them represents the brownish-green mucilaginous coating of submersed *Sphagnum* plants in the littoral (water-level 0.3 m). The second sample was collected by hand squeezing of submersed *Drepanocladus* clump from the littoral (water level 0.3 m). Both of these samples were fixed in 3 % formalin and stored for direct microscopic observation. The second set consists of 6 specimen. They all contain the surface mud layer from the bottom and were collected in various places of the Swamp, with the exception of the contact zone with the fishpond water. Water level varies from 40—60 cm. This set of samples was later prepared for permanent slides in Algological laboratory of Skopje University. For cleaning of diatom frustules the hot mineralization method after HUSTEDT (1930) was used. The laboratory made enclosing medium Pleurax was used for permanent slide preparation (HINDÁK 1978). In addition one older sample, collected on June 26, 1980 was examined. It originated from the bottom of littoral on which a green mucilagineous layer was developed.

For measuring pH the Precision pH meter Radelkis OP 205/1 was used. The pH measuring was carried out in the laboratory 5 h after collection of the samples.

All other conventional methods (microscopy, microphotography) are not described in detail.

For estimation of relative abundance of algae the scale of MESSIKOMMER (1927) modified by us was used (tab. 1)

Tab. 1. Relative abundance scale adopted from MESSIKOMMER (1927)

5 — dominant species representing more than 50 % of all individuals in the prep
4 — very frequent species forming 25—50 % of all individuals in the prep
3 — frequent species forming 10—25 % of all individuals in the prep
2 — less frequent species forming 5—10 % of all individuals in one prep
1 — rarely found species, forming only 1—5 % of all individuals in the prep
+ — the species was found as single individuals in many observed preps

OBSERVATION AND RESULTS

The rainy and cold spring in 1986 slowed the growth of algal vegetation in the Swamp. In the course of our excursion (May 26, 1986) the water-level was high (0.8 m) and direct contact with the fishpond water was formed. In spite of this, the fishpond water and Swamp water were mixed up only in the extent of the contact zone. It was quite visible, because the fishpond water differed in colour (slightly greenish) from Swamp water, which was clear and slightly brownish. Swamp water temperature was 17 °C, its pH 4.13—4.35.

Instantaneous species composition of growing littoral algal communities is demonstrated in tab. 2. The first sample is composed from the species which form the mucilagineous brownish- green coating on the surface of submersed and fully illuminated *Sphagnum* plants. The dominant species, *Anomoeoneis serians* (Pl. I : 5), is known from oligotrophic acid water and it growths in the optimal pH of 5.2—5.5 (CHOLNOKY, 1960). KRAMMER et LANGE-BERTALOT (1986) reported this species as less frequent in Central Europe. The next characteristic species is the desmid *Tetmemorus granulatus* (Pl. I : 10). *Frustulia rhomboides* var. *saxonica* is in general more frequent than the type variety

Tab 2 Species distribution and relative abundance in Swamp samples (with the exception of permanent slide analysis given in tab. 4). The fraction means: number of individuals/relative abundance.

List of species	Localities		
	1	2	3
Actinotaenium cucurbita (BRÉB. ex RALFS) TEIL.	+	–	–
Anomoeoneis serians (BRÉB.) CLEVE	470/5	60/3	+
Chrysomonads cysts	26/2	30/2	6/1
Cylindrocystis brebissonii (MENEGH. ex RALFS) DE BARY	+	+	107/4
Dinobryon sertularia EHRENB.	15/2	–	–
Eunotia arcus EHRENB.	–	218/4	75/3
E. gracilis (EHRENB.) RABENH.	–	+	24/2
Frustulia rhomboides (EHRENB.) DE TONI var. *rhomboides*	–	80/3	–
F. rhomboides (EHRENB.) DE TONI var. *saxonica* (RABENH.) DE TONI	52/3	400/5	6/1
Merismopedia sp. (cells)	–	16/2	–
Micrasterias jenneri RALFS	3/1	–	–
Microspora sp. (cells in filaments)	–	102/4	255/5
Mougeotia sp. (cells in filaments)	–	6/1	–
Pinnularia gibba EHRENB. var. *linearis* HUSTEDT	32/3	–	54/3
Staurastrum sp.	+	–	–
Tabellaria fenestrata (LYNGB.) KÜTZ.	+	–	–
Tetmemorus granulatus (BRÉB.) RALFS	60/3	+	118/4
T. laevis KÜTZ. ex RALFS	6/1	+	–
Tribonema sp. (cells in filaments)	–	–	255/5

Localities:

1. Swamp, greenish- brown mucilagineous coatings of submersed Sphagnum; pH 4.35; May 26, 1986
2. Swamp, hand squeezed clumps of Drepanocladus; water pH 4.13; May 26, 1986
3. Swamp, green mucilagineous layer from littoral, pH unknown, June 26, 1980

var. *rhomboides* with the larger frustules. Both varieties live in acid waters with pH below 6. *Pinnularia gibba* var. *linearis* (Pl. I : 8) is the characteristic species of dystrophic waters. In accordance with our earlier observations the species distribution undergoes some changes in the course of the year. *Micrasterias jenneri* (Pl. I : 11) is often present in remarkable quantity.

The second sample (tab. 2 : 2) was prepared by hand squeezing of submersed *Drepanocladus* clumps which indicated the presence of algal vegetation (water depth 0.4 m). *Frustulia rhomboides* var. *saxonica* is the dominant species of this sample. The next very common diatom is *Eunotia arcus* which inhabits the periphyton of moderate acid waters (pH over 6, CHOLNOKY, 1960). Comparison with the above described sample shows some shifting in the species abundance. The weak illumination correlated with low water temperature is the presumable cause of the limited presence of desmids.

In tab. 2 : 3 the additional sample, collected in the above mentioned locality is analyzed. In the warm summer period (June 26, 1980) the littoral was covered by a green mucilaginous layer which consisted predominantly

Tab. 3. Survey of ecological characteristics and relative abundance of diatom species found in permanent slides. Ecology: A — acidophilic, O — oligotrophic, E — eutrophic species. Numbers means the abundance found.

Anomoeoneis serians (BRÉB.) CLEVE	O	5
Eunotia arcus EHRENB.	A	4
E. gracilis (EHRENB.) RABENH.	A	3
E. pectinalis (KÜTZ.) RABENH. var. *pectinalis*	A	3
Frustulia rhomboides (EHRENB.) DE TONI var. *saxonica* (RABENH.) DE TONI	A	3
Pinnularia gibba EHRENB. var. *linearis* HUSTEDT	A	3
10 taxa	E	2
7 taxa	A	2
1 taxon	O	2
31 taxa	E	1
8 taxa	A	1
4 taxa	O	1
9 taxa	E	+
4 taxa	O	+
3 taxa	A	+

from desmids (*Tetmemorus granulatus*, *Cylindrocystis brebissonii*) and from filamentous green alga *Microspora sp.* The diatom species composition is identical to the above described samples.

The main part of this investigation is based on the analysis of permanent diatom slides, prepared from submersed plant remains, peat and mud from the surface of the bottom collected on May 26, 1986 in different places in the Swamp (water depth 0.4—0.7 m). The permanent slides reveal 84 taxons of diatoms. In accordance with the evident ecological data, the diatom flora of the Swamp belongs tree ecological groups:

1. Acidophilic, dystrophic, sphagnicolous species (pH below 5—6.8)
2. Oligotrophic species (pH 6—6.8). This group contains also the species living in acid waters, but the exact delimitation is imposible.
3. Eutrophic, alkaliphilic, halophilous species (pH 7.2—8.2). This group consists predominantly from euryoecious species.

The survey of ecological distribution and abundance of diatoms found in permanent slides is given in tab. 3. A complete list of diatoms from permenent slides is in tab. 4.

In accordance with the relative abundance, *Anomoeoneis serians* is the dominant species found in permanent slides. Typical for acid water is the presence of *Eunotia* species (*E. arcus*, *E. gracilis*, *E. pectinalis*) and *Frustulia rhomboides* var. *saxonica*. *Pinnularia gibba* var. *linearis* (Pl. I : 8) holds an important place among the characteristic species. This group of six diatom species together with the above- mentioned desmids determines the acidophilic, oligotrophic- dystrophic character of the Swamp algal flora. The group of nine eutrophic taxons are of limited importance for ecological characteristics of the studied locality. All the species listed below are euryoecious: *Achnanthes lanceolata*, *Cocconeis placentula* var. *euglypha*, *Cyclotella comta*, *Cymbella cistula*, *C. helvetica*, *Epithemia turgida*, *Fragilaria leptostauron*,

Tab. 4. Complete list of diatom species found in permanent slides. The number following the specific name means the relative abundance. Numbers in parenthesis are for references: 1 — Cholnoky, 1960; 2 — Foged, 1974; 3 — Foged, 1977; 4 — Foged, 1978; Hindák, ed., 1978; 6 — Krammer et Lange-Bertalot, 1986; 7 — Patrick et Reimer, 1966; 8 — Patrick et Reimer, 1975; 9 — Topačevskij et Oksijuk, 1960; 10 — Zabelina et al., 1951.

1. Oligotrophic species, pH 6—6.8 (1)		
Achnanthes lanceolata (Bréb.) Grun.		
var. *elliptica* Cl.	1	periphyton & benthos (7, 10)
Anomoeoneis serians (Bréb.) Cleve	5	littoral & periphyton (6)
A. vitrea (Grun.) Ross	+	littoral (6)
Cymbella amphicephala Nägeli *in* Kütz.	1	periphyton (6, 8)
C. minuta Hilse ex Rabenh.	+	littoral & periphyton (6)
C. sinuata Gregory	2	aerial, in bryophyte (6)
C. cuspidata Kütz.	1	periphyton & littoral (6)
Fragilaria construens (Ehrenb.) Grun.		
var. *binodis* (Ehrenb.) Grun.	+	littoral & benthos (7)
Neidium affine (Ehrenb.) Pfitzer		
var. *affine*	+	epipelic & littoral (6)
N. iridis (Ehrenb.) Cleve	+	epipelic (6)
Pinnularia interrupta W. Smith	1	littoral (6)
2. Dystrophic, acidophilic, sphagnicolous species, pH 5—6.8 (1)		
Achnanthes peragallii Brun. et Herib.	+	periphyton (10)
Eucocconeis lapponica Hust.	+	periphyton (5, 10)
Eunotia arcus Ehrenb.	4	periphyton (5, 10)
E. diodon Ehrenb.	2	periphyton (7)
E. gracilis (Ehrenb.) Rabenh.	3	periphyton (8)
E. lunaris (Ehrenb.) Grun.	2	periphyton (7)
E. pectinalis (Kütz.) Rabenh.		
var. *pectinalis*	3	periphyton (7)
var. *minor* (Kütz.) Rabenh.	2	periphyton (7)
E. veneris (Kütz.) O. Müll.	1	periphyton (3, 10)
Frustulia rhomboides (Ehrenb.) De Toni		
var. *rhomboides*	2	periphyton & benthos (6, 9)
var. *amphipleuroides* (Grun.) De Toni	1	littoral & periphyton (6)
var. *saxonica* (Rabenh.) De Toni	3	littoral & wet rocks (6)
Navicula radiosa Kütz.	2	littoral & benthos (6)
Pinnularia divergens W. Smith	2	littoral & benthos (6)
P. gibba Ehrenb. var. *gibba*	1	littoral & benthos (6)
var. *linearis* Hustedt	3	littoral & benthos (6)
P. maior (Kütz.) Rabenh.	2	littoral (6, 10)
P. subcapitata Gregory	1	littoral & benthos (6, 10)
P. viridis (Nitzsch) Ehrenb.	2	littoral & benthos (6, 10)
Tabellaria flocculosa (Roth.) Kütz.	1	littoral (8)
T. fenestrata (Lyngb.) Kütz.	1	plankton & littoral (5, 10)
Surirella linearis W. Smith		
var. *constricta* (Ehrenb.) Grun.	1	littoral (10)
3. Eutrophic, alkaliphilic, halophilous species, pH 7.2—8.2 (1)		
Achnanthes clevei Grun.	+	periphyton (2)
A. lanceolata (Bréb.) Grun.		
var. *lanceolata*	2	periphyton (5)
Amphora ovalis (Kütz.) Kütz.	1	littoral (7)
Cocconeis placentula Ehrenb.		
var. *euglypha* (Ehrenb.) Cl.	2	periphyton (7, 10)
Cyclotella comta (Ehrenb.) Kütz.	2	plankton & littoral (3, 5)
C. meneghiniana Kütz.	1	plankton & littoral (9)
Cymatopleura angulata Greville	+	benthos, Plattensee (9)
C. librilis (Ehrenb.) Pant.	+	benthos & littoral (5)
Cymbella cistula (Ehrenb.) Kirchner	2	epiphyte in littoral (6)

Tab. 4. (continuation 1)

C. cuspidata KÜTZ.	1	periphyton (10)
C. helvetica KÜTZ.	2	periphyton (6)
C. lanceolata (EHRENB.) KIRCHNER	1	epiphyte in littoral (6)
C. prostrata (BERKELEY) CLEVE	1	littoral & benthos (6)
Diatoma elongatum AG.		
var. *elongatum*	1	littoral & plankton (10)
var. *tenue* LYNGB.	1	littoral & plankton (10)
Diploneis ovalis (HILSE) Cleve	1	epipelic (6)
Epithemia adnata KÜTZ.	2	littoral & benthos (7)
E. turgida (EHRENB.) KÜTZ.	2	littoral & benthos (5)
E. sorex KÜTZ.	2	benthos & littoral (5)
Fragilaria capucina DESM.		
var. *mesolepta* RABENH.	1	littoral & plankton (10)
F. construens (EHRENB.) GRUN.		
var. *construens*	1	littoral & benthos (10)
var. *venter* (EHRENB.) GRUN.	1	littoral & benthos (10)
F. crotonensis KITT	1	littoral (3, 8)
F. intermedia GRUN.	1	littoral (7, 10)
F. leptostauron (EHRENB.) HUSTEDT		
var. *leptostauron*	2	littoral & periphyton (10)
var. *rhomboides* GRUN.	1	littoral & periphyton (10)
F. pinnata EHRENB.	1	littoral & periphyton (9)
Frustulia vulgaris (THWAITES) DE TONI	+	littoral (6)
Gomphonema acuminatum EHRENB.	1	periphyton (6)
Gomphonema olivaceum (HORNEMANN) BRÉB.	1	periphyton & littoral (6)
G. parvulum (KÜTZ.) KÜTZ.	1	periphyton & littoral (6)
G. truncatum EHRENB.	2	periphyton & littoral (6)
Hantzschia amphioxys (EHRENB.) GRUNOW		
var. *intermedia* GRUNOW	1	littoral (10)
Melosira granulata (EHRENB.) RALFS	2	plankton (10)
Meridion circulare (GREV.) AG.		
var. *circulare*	1	periphyton (5, 10)
var. *constrictum* (RALFS) V. H.	1	periphyton (5, 10)
Navicula capitata EHRENB.		
var. *hungarica* (GRUN.) ROSS	1	littoral & benthos (6)
N. cuspidata (KÜTZ.) KÜTZ.	1	littoral & benthos (6)
N. mutica KÜTZ. var. *mutica*	+	littoral & benthos (6)
N. scutelloides W. SMITH ex GREGORY	+	epipelic (6)
N. tuscula (EHRENB.) GRUN.	1	epipelic (6)
Nitzschia angustata (W. SMITH) GRUNOW		
var. *acuta* GRUNOW	1	littoral (10)
N. sinuata (W. SMITH) GRUNOW		
var. *tabellaria* GRUNOW	1	littoral (4)
Ophephora martyi HERIB.	+	littoral (5, 10)
Rhopalodia gibba (EHRENB.) O. MÜLLER	1	littoral (5)
Stauroneis anceps EHRENB.	1	littoral (6)
S. smithii GRUN. var. *smithii*	1	littoral & benthos (6)
Stephanodiscus tenuis HUSTEDT (?)	1	plankton (CASPER et al., 1977)
S. hantzschii GRUN.	1	plankton & littoral (5)
S. angusta KÜTZ.	1	benthos (5)
Synedra amphicephala KÜTZ.	1	littoral (4, 5)
S. ulna (NITZSCH) EHRENB.	1	littoral (5, 10)

Gomphonema truncatum, *Melosira granulata*. The other 42 taxa are not frequent and they do not play any important role in the Swamp ecology.

The characteristic group of diatom species found in permanent slides are identical with the diatom found in samples analysed in tab. 2. At the same

time the prominent plankton centric diatoms (*Stephanodiscus tenuis* (?), P. I : 3; *Stephanodiscus hantzschii*, Pl. II : 6 and *Cyclotella comta*) are present in permanent slide only. These diatoms originated from the past vegetation periods and some of them are the inhabitants of fishpond plankton. *Cyclotella comta* represents an euryoecious species, and MESSIKOMMER (1942) found it in acid oligotrophic alpine lakes in the altitude of 220 m a.s.l.

At the present time the taxonomy and morphology of freshwater centric diatoms hold the attention of phycologists. CASPER et al. (1987) demonstrated the width of structural variability of Stephanodiscus valves, which caused the species determination very difficult. Microphotos of *Cyclotella comta* demonstrate the structural variability of some single valves (Pl. II: 2—5). The comparison with an ultrastructural observation (Lowe, 1975) allows to explain the central zone as a group of strutted processes (fultoportuli) scattered with loculi. Marginal strutted processes (Pl. II : 2, arrow) occured on each rib connecting the mantel to the central zone.

DISCUSION AND CONCLUSION

The application of phytocenological methods appears to be the best possible method for synthetic evaluation of floristic algal study. MESSIKOMMER (1927, 1942) was the first who applied in algal sociology the principles formulated by BRAUN-BLANQUET for higher plant sociology. In the publications mentioned MESSIKOMMER described two algal associations distributed in the foothills mire biotope and in the high mountain lakes in the vincity of Robenhausen and Davos, Switzerland. The first association, *Micrasterietum truncatae-Frustulietum saxonicae* inhabits the moderately acid *Sphagnum* mire, transitional bogs and peat bogs. The water of these localities is of ombrogeneous origin and it contains a low electrolyte concentration; pH value 6.8—6.0—5.8. Maximal algal growth was observed at pH 6.0. The second association, *Eunotietum exigue* is closely related to the above- mentioned and in some case it is difficult to differentiate them. The second association inhabits the periodicaly dried *Sphagnum* bogs with acid water reaction (pH 6.5—5.5—4.5). Maximal algal growth is at pH 5.5.

The Swamp algal community is in ecological relation with MESSIKOMMER's associations. It can be explained as the succesional state of very slow silting in the acid environment. It represents a transitional bog containing oligotrophic-dystrophic water and it is developed on the base of very deficient silicate substrate. The acid water reaction, pH 4.53—4.13 was found in eight samples in May 26, 1986. The bottom deposition is of different plant remains (*Carex sp.*, *Eriophorum sp.*, *Sphagnum sp.* and *Drepanocladus sp.*).

The ecological and floristic character of the Swamp does not allow identification of the algal community with the MESSIKOMMER's assotiations. This is the reason for describing a new association, *Tetmemoro granulati — Anomoeoneietum seriantis* for the algal community of transitional bogs with oligotrophic- dystrophic water and strong acid reaction (pH 4.35—4.13). Tab. 5 includes the group of characteristic species, their abundance and constancy in four relèves made from the samples collected on the Swamp territory. The accompanying species are listed in tab. 2 and 4. Our contribution is only the first attempt to understand the Swamp algal flora as a

Tab. 5. Association *Tetmemoro granulati-Anomoeoneietum seriantis* Stojanovski et Kalina
The characteristic and dominant species. The accompanying species are listed in tab. 2 and tab. 4 of this publication.

Relevé No	1	2	3	4	K (constancy)
Area analyzed (m^2)	0.3	0.3	0.3	50	
Water depth (m)	0.3	0.4	0.3	0.4—0.7	
Number of species	12	11	10	84	
Anomoeoneis serians (Bréb.) Cleve	5	3	+	5	V
Cylindrocystis brebissonii (Menegh. ex Ralfs) De Bary	+	+	4	—	IV
Eunotia arcus Ehrenb.	—	4	3	4	IV
E. pectinalis (Kütz.) Rabenh.	—	—	+	4	III
Frustulia rhomboides (Ehrenb.) De Toni var. *saxonica* (Rabenh.) De Toni	3	5	1	3	V
Microspora sp.	—	4	5	—	III
Pinnularia gibba Ehrenb. var. *linearis* Hustedt	3	—	3	3	IV
Tetmemorus granulatus (Bréb.) Ralgs	3	+	4	—	III

Localities:

1. Swamp, greenish- brown mucilagineous coatings of submersed *Sphagnum*; pH 4.35, date of collection: May 26, 1986, type relevé.
2. Swamp, hand squeezed clumps of *Drepanocladus*; water pH 4.13; date of collection: May 26, 1986.
3. Swamp, green mucilagineous layer from the littoral, pH unknown; date of collection: June 26, 1980.
4. Swamp diatoms found in permanent slides, prepared from mud, plant remains and peat from different places of the reservation territory; pH 4.13—4.35; date of collection: May 26, 1986.

special biocenosis, and, it is evident that the study of Swamp algae must be continued.

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SOUHRN

Při studiu rozsivkové flory Swampu (okres Doksy, severní Čechy) bylo nalezeno 85 taxonů. Podle literárně zjištěných ekologických údajů patří charakteristické a dominující druhy k rozsivkám oligotrofních a dystrofních vod. Při syntaxonomickém hodnocení floristických údajů jsme popsali společenstvo řas Swampu jako novou asociaci *Tetmemoro granulati—Anomoeoneietum seriantis* Stojanovski et Kalina.

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See also Plates III—IV in the Appendix.

R. L. Dressler:

Die Orchideen

Biologie und Systematik der *Orchidaceae*

Z angl. orig. přel. G. J. Braem, vyd. Eugen Ulmer, Stuttgart 1987, 394 str., 95 barev + 22 černob. foto, 103 kreseb, cena váz. 98,— DM. (Kniha je v knihovně ČSBS.)

Autor recenzované knihy, prof. dr. R. L. Dressler pracuje ve Smithsonian Tropical Research Institute v Balboa (Panama). Zasvěceným je znám již více než 20 let svými příspěvky z výzkumu systematiky a biologie orchidejí, zejména Střední a Jižní Ameriky, které uveřejňuje v mnoha časopisech. V posledních letech studoval zejména otázky evoluce a klasifikace čel. *Orchidaceae*, s jejichž výsledky se v recenzované knize (mimo speciální kapitolu) průběžně setkáváme.

Kniha je členěna do 12 částí, od úvodních kapitol o systematickém postavení orchidejí v rostlinné říši přes jejich geografické rozšíření, morfologii, ekologii, evoluci a klasifikaci až po kapitoly, věnované čtyřem podčeledím: *Apostasioideae* a *Cypripedioideae*, *Spiranthoideae* a *Orchidoideae*, *Epidendroideae* a *Vandoideae*. Autor dále připojil důležitý klíč k určování podčeledí, tribů a subtribů. Závěrečné kapitoly jsou věnovány otázkám, které nejsou dosud ještě vědecky zodpovězeny, problémům taxonomického výzkumu, sběru orchidejí do herbářů a práci v terénu. Kniha obsahuje dále důležitou literaturu členěnou podle jednotlivých světadílů, nebo jejich částí. Ke knize je připojen obsáhlý dodatek, věnovaný novým poznatkům z evoluce orchidejí. Slovníček odborných výrazů s rejstříkem knihu uzavírají.

Dresslerova kniha se vymyká záplavě populárně vědeckých publikací o orchidejích. Nepopisuje jednotlivé rody a druhy, a nezabývá se jejich pěstováním, jak bývá v těchto publikacích zvykem. Zpracovává metodami srovnávací morfologie a ekologie problémy evoluce celé čel. *Orchidaceae*. Čtenář se mimo jiné dovídá nové skutečnosti o veliké plastičnosti vegetativních i generativních orgánů, růstových formách, morfologii květů a květenství, a způsobech opylování orchidejí. Srovnávané vegetativní a zejména generativní orgány jsou výstižně nakresleny. Barevné fotografie jsou uspořádány tak, že představují jednak biotopy orchidejí, jednak růstové formy terestrických a epifytických orchidejí, dále některé příklady opylování hmyzem a přehled hlavních typů květů a květenství taxonomických skupin (podčeledí, tribů a subtribů).

Š. Husák

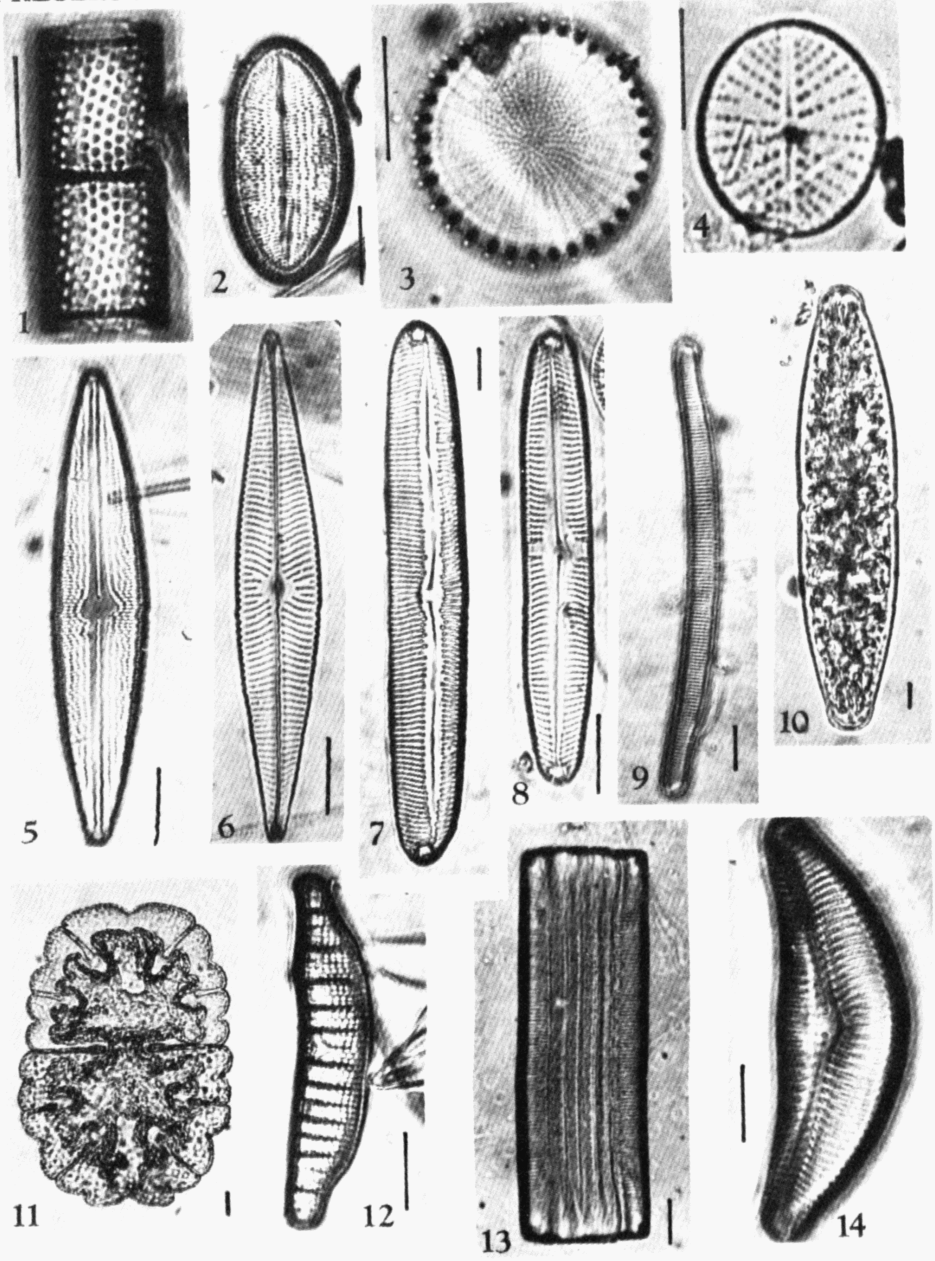
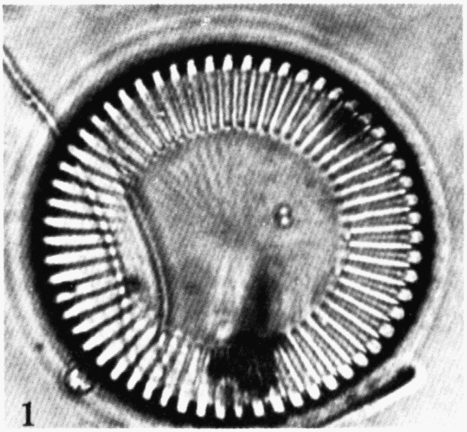
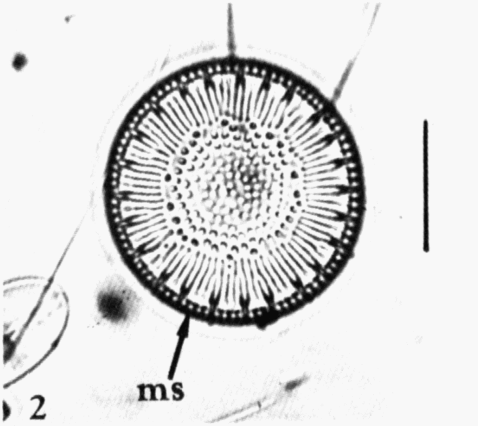
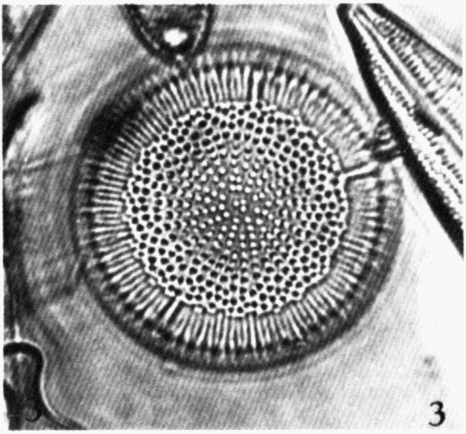
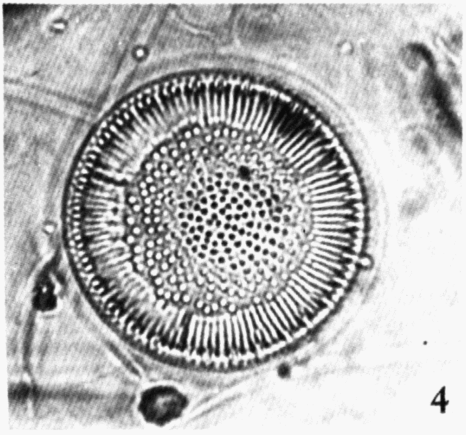


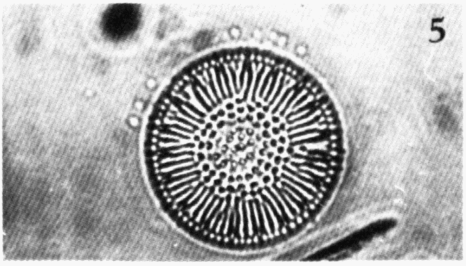
Plate I. Swamp diatoms and desmids: 1 — *Melosira granulata*, 2 — *Cocconeis placentula* var. *euglypha*, pseudoraphe valve, 3 — *Stephanodiscus tenuis* (?), 4 — *Navicula scutelloides*, 5 — *Anomoeoneis serians*, 6 — *Navicula radiosa*, 7 — *Pinnularia maior*, 8 — *P. gibba* var. *linearis*, 9 — *Eunotia pectinalis*, valve view, 10 — *Tetmemorus granulatus*, 11 — *Micrasterias jenneri*, 12 — *Epithemia adnata*, 13 — *Eunotia pectinalis*, girdle view, 14 — *Cymbella tumida*. Light microscope, variable phase contrast, scale = 10 μm.











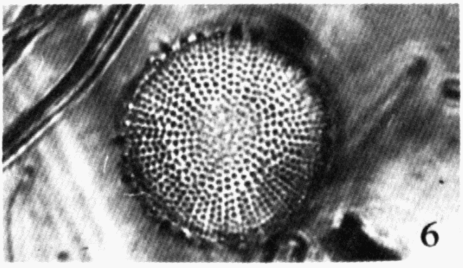


Plate II. Swamp diatoms: 1 – *Cyclotella meneghiniana*, 2 – 5 – *Cyclotella comta*, ms- marginal strutted processus, 6 – *Stephanodiscus hantzschii*. Light microscope, variable phase contrast, scale = 10 μm.