STUDIA BOTANICA HUNGARICA
(Antea: Fragmenta Botanica)
XXIII. 1992 pp. 17–48

# The alga species of the Csömör pool II

By
E. STOLLMAYER-BONCZ
(Received 30 May, 1991)

A b s t r a c t: Near Csömör (Pest County), a site surrounded by agricultural areas, has been under protection of the county administration since 1977. Part of this area, the so-called Csömör pool is a peaty, marshy area. Higher plants of the region as well as some algal species have already been published by the author, and the consequences of an ecological stress which occurred in February of 1987, were studied with special regard to algal species. Among the 111 species investigated, 17 are registered as definitely rare in Hungary. The species *Oedogonium inversum* f. *subclusum* is regarded as a new record, on the basis of the monograph Flora et Iconographia Algarum Hungariae.

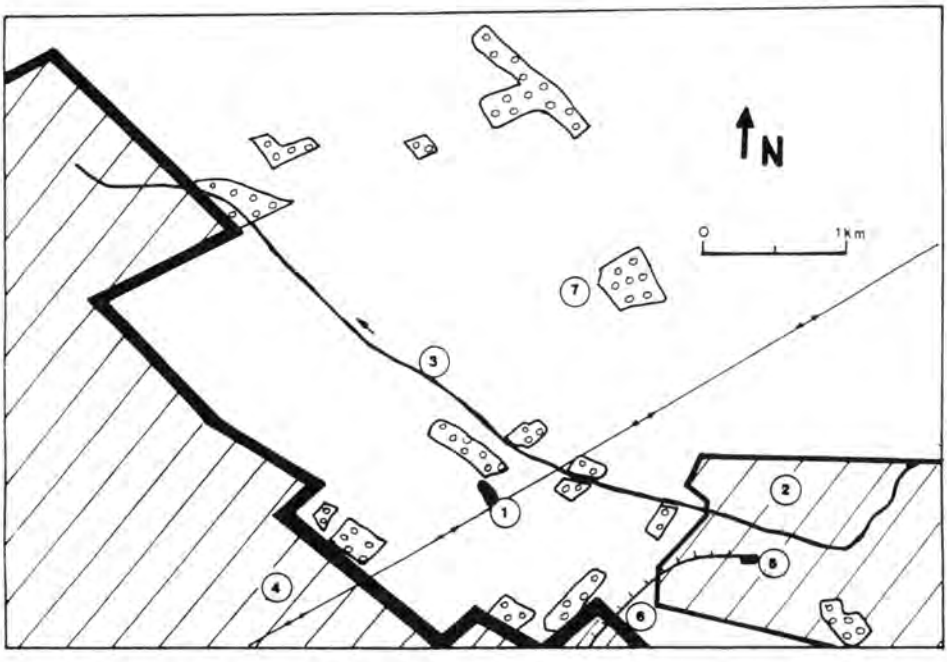
The geographical conditions around the Csömör pool have already been described in two papers STOLLMAYER-BONCZ (1982, 1988). The study area is located in the left-side secondary valley of the "Forrás" brook (Csömör brook) in the Pest Plain with varied surface morphology, situated within the riparian floodplain of the River Danube, dissected by talus remnants (Map 1).

## CHANGES IN THE ECOLOGICAL CONDITIONS OF THE POOL

In the years 1984-85, the pH of the water fluctuated between 5.5-6, with a mean value of pH 5.7. The environs of a high voltage electric pole set up in the southern part of the pool is marked by giant specimens of *Populus alba* and *Salix* sp. In course of the unusually cold winter of 1987, weather conditions in January and February lead to complete freezing of the pool. The authorities seized the opportunity and had the trees cut. The twigs clipped off detached from the logs were left remaining on the ice. By the end of the season, the vegetation of the pool took flames and was burnt to ashes. By early spring, catastrophic circumstances ruled around the pool. Young trees and bushes of *Salix* sp. and *Populus* sp. on the small island in the pool got badly burnt, the thicker pieces remaining in charred state until now. The considerable amount of wooden debris and vegetable ash, resulting mainly from vestiges of *Typha* species, served as a heavy dose of artificial fertilizer (mainly potassium). Huge amount of snow and early spring precipitation raised the water level to flooding. The island with *Sphagnum* species could not raise to the elevated water level unlike in previous years. By May, it was already

evident that the *Sphagnum* species could not possibly survive this shock. Fern species started to regenerate to some extent, otherwise vegetation life practically ceased on the island. The vegetation of the pool started to regenerate slowly, with theexception of the island, with *Typha angustifolia* spreading heavily. The fire had terminated several mosses and flowering-plant species. As autumn came, the 'island' could be neared on foot. Spreading of *Lastrea thelypteris* and masses of *Amblystegium riparium* was plainly visible. In some parts and certain periods, the moss species *Ricciocarpus natans* and *Lemna trisulca* became more frequent on the water surface.

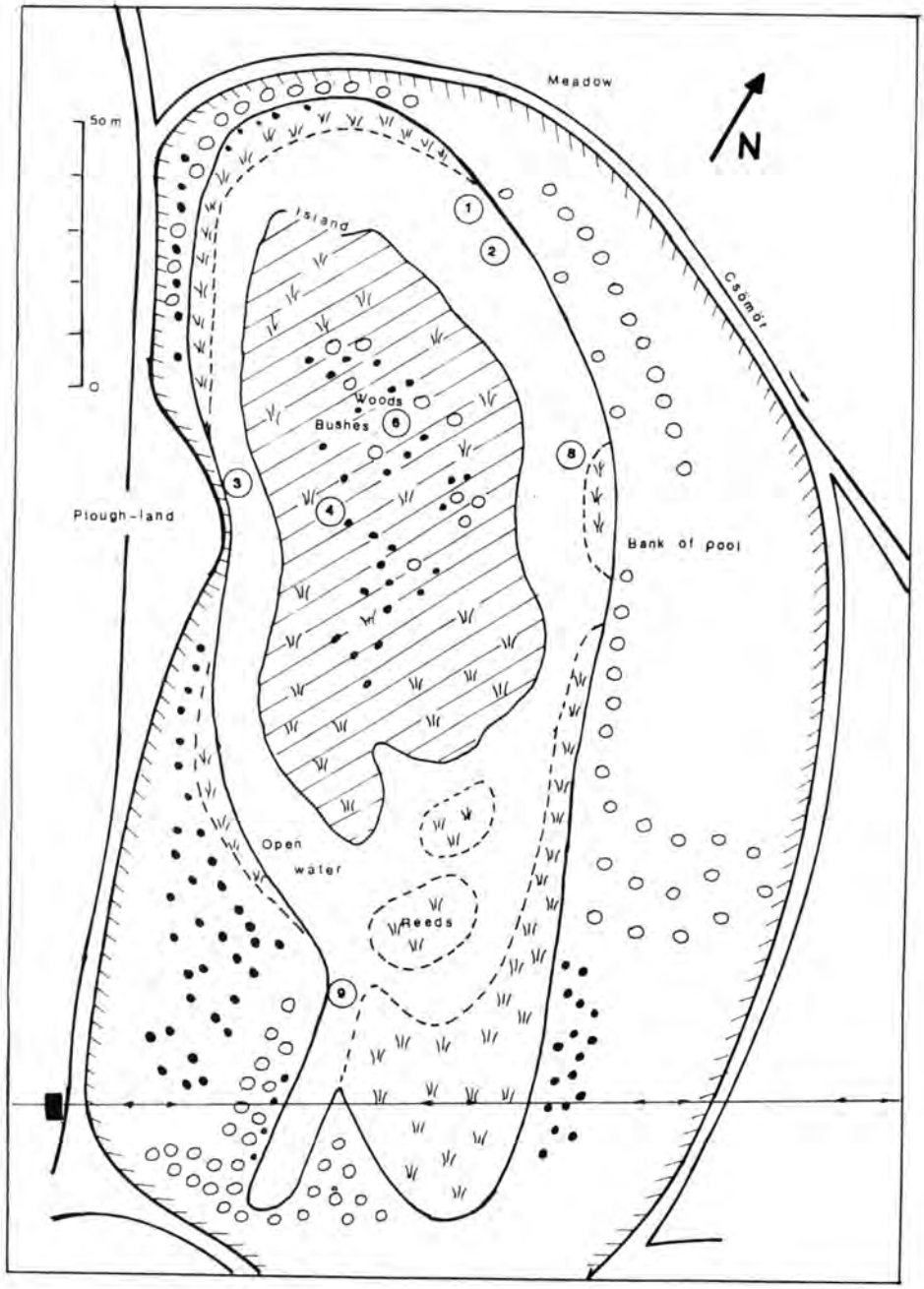
The changes were quite appealing. The pH value rose to 7. This change in itself necessitated new algological investigations. The sampling procedure was started in September, 1987 and continued during 1988. Water samples were taken in November 1989 and March, April, May of 1990 as well. The value of pH was uniformly 6-7. In most places and times, it was about 6, otherwise around 6.5 or 7 (average value pH 6.5). This shows one degree of raise compared to 1984-85. The measurements of pH indicate that the slightly acidic marshy waters have shifted towards neutral water chemistry.




Map 1. Map of Csömör pool

1= Csömör pool, 2= Csömör village, 3= Csömör brook, 4= 16th district of Budapest, 5= suburban railway terminal, 6= suburban railway, 7= forest

Section of the Budapest 1971-601-949/IV map from Cartographia. The pool was marked by B.E. Ákos Stollmayer.




Map 2. Topography and flora of Csömör pool
The Arabic numerals from 1 to 9 refer to the localities

## CHARACTERIZATION AND SYMBOLS OF THE SAMPLING POINTS

After snow thaws in early spring, the lake is filled with water, especially in wetter years, like 1987. In years like that we can often see open-water surfaces, and access to the island is a problem (Map 2). In warm-summer periods, especially following a dry winter (e.g. in 1988), by August we find water only at sampling point 2. After the fire, the island gets dry as well, with some water accumulating only in the footprints.

After 1988 the water conditions became similar to those of 1984. Thus sampling was carried out with difficulties again in some periods and certain sampling points, due to high water level or evaporation. The sampling points used in 1984 were maintained, with exception of those located on the island. There, the morphology became more even after the extinction of the *Sphagnums*. Sampling points 5 and 7 'ceased'. The current sampling point 6 corresponds to the former point 7. Sampling points 1, 2, 3, 8 and 9 can be easily reached from the shore. Sampling point 1 is populated by reed-grass and mut-grass. Sampling point 3 seems to become similar to the sampling point 1 due to the spreading of *Typha*. At sampling point 2 we can find water throughout the year, sometimes populated by floating *Lemna minor* and *Ricciocarpus natans*.

The 'island' can be reached best from the direction of sampling site 3. Opposite the "entrance" we find sampling point 4, generally covered with water. At sampling point 6, only two samples could be gathered during the study period. One of them was collected from hollows with peat moss (*Sphagnum*), while the other was collected from trodden footprint, moisture accumulated in the traces of human steps.

Sampling points of the period 1987-90 are summarized in Table 1.

## SAMPLING PROCEDURE

The samples were collected monthly, about 8 a.m. each time, into glass-jars which can be hermetically closed. The pH values were measured with Universal indicator paper. Most of the samples were immersed ones, not marked specifically in the Tables.

It was experienced as early as 1984 that the leaves of the *Typha* were densely incrusted, and in the shallow parts, algal masses in the benthos could be observed by the naked eye. Therefore the recent investigations were extended to these spots of interest as well. The benthos was sampled laterally by opening the glass under water, taking special care not to stir up the mud. These samples are marked as 'B' (benthic).

The incrustation on the *Typha* leaves was sampled in two ways:

1. over the water level, on dry parts formerly covered with water, 5 cm long leaf parts were cut off from *Typha latifolia* and put into dry glass. Under laboratory

circumstances it was filled with tap water. These samples were marked 'Td' (from dry parts of *Typha latifolia*).

2. under the water level, another 5 cm piece was cut from the same plant and put into dry glass again. Subsequently they were also filled with tap water and marked 'Ta' (from subaquatic part of *Typha latifolia*).

The sample taken from sampling point 6 in 1987 is an immersed one, but differs from the rest in that the water in the hollows was filled with moisture filled with plant debris (*Amblystegium, Typha* and *Carex* fragments) like a cabbage soup. The sample is marked 'h' (from hollows). At the same place, during the dry summer of 1988, sample was taken from trodden footprint, marked 't'. The above marks are used consequently in Tables 1 and 4.

For the indoors examination 50 ml of the shaken (homogenized) samples were separated for 'in vivo' analysis. They were freshly examined and stored subsequently in well-lit space facing north void of freezing. These 'micro-aquaria' were equally suitable for the analysis of different stages of evolution in later times as well. The bulk of the samples was preserved in formalin on the day of sampling.

## EVALUATION OF THE SAMPLES

For the assignation of the species, the following manuals were used: BARTA *et al.* 1976, FELFÖLDY 1981, HORTOBÁGYI 1968, HUBER-PESTALOZZI 1950, KADLUBOWSKA 1984, KRAMMER *et al.* 1986, 1988, MROSINSKY 1985, NÉMETH 1988, RIETH 1980, PASCHER 1930, UHERKOVICH 1966, WOLLE 1887.

A normal light microscope was used for identification of the species. Only part of the species were identified, with special regard to Cyanophyta, Euglenophyta, Xanthophycaea, Bacillariophyceae, Pyrrophyta and Chlorophyta taxa. Cyanophyta and Chlorophyta taxa with very thin and very small textural elements (3-4 μm) were equally omitted, just as the very small Bacillariophyceae which are very abundant in the lake.

In the accounts of the results, the expression 'rare' was used when the species was found in less than 5 samples; 'frequent' is used for presence exceeding 5 but not more than 10 samples; 'very frequent' was used for presence in more than 10 samples. The expression 'epiphytic' was used only for algae located on floating water plants (mosses with fibres, *Lemna* sp., *Ricciocarpus natans*).

# RESULTS

## Taxonomic evaluation

It is apparent from the species list (Table 4) that the number of taxa identified is 111. This is an obvious increase compared to the years 1984-85, when 65 species were identified. The new species are marked on the list with an asterisk. Among the 20 Cyanophyta species, there are seven new ones, but six rare species have been 'lost'. The pattern of most species is similar to those of 1984-85. The eight Euglenophytae can be considered as new, as none of them were found during the previous analysis. In the previous study, only occasional occurrences of *Euglena* and *Phacus* were recorded. By now, species number and frequency of occurrence have increased, thus their publication (with certain reservation) became necessary.

Among the eight species of Xanthophyceae, four species were formerly unknown from the pool. The species *Ophyocytium arbuscula* as well as three species of *Tribonema* are among them. These latter taxa can occur quite frequently in sampling points 1 and 3. No explanation for this was found. Reproductive specimens of *Vaucheria terrestris*, mentioned in the preceding study, were not found. The reproductive forms of *Vaucheria* specimens were assigned with certainty to the species *V. sessilis*. Thus the fibres found this time, the fibres germinating from the oospore (calabash and bottle gourd) and the oogonium were also assigned, with a question mark, to *V. sessilis*. Thus this species is counted among the new records as well.

Among the 29 Bacillariophyceae, there were four items which were connected to the fibrous algae with gelatinous stalk. Including these forms, nine species are new to the flora of the pool and only one of the species was 'lost'.

The two Pyrrophyta species are regarded as new elements, not observed in the 1984-85 material. As the species *Peridinium willei* was found in masses in May 1988, I paid close attention to sample 3 of 1984 again, where in the April collection, 1-2 specimens were found.

Among the 44 Chlorophyta species, there are 30 new ones and eight species 'lost' compared to the previous material. This considerable increase in species number can be attributed, partly, to the *Oedogonium* species appearing in great numbers and variable fibre width. On the basis of reproductive forms three species were identified: *Oedogonium* sp. (*Oe. pisanum?*), *Oe.* sp. (*Oe. pringsheimii?*) and a new one, namely *Oe. inversum f. subclusum*. The other members of the taxon were separated only after the width and character of the fibre. Several (4) new species of *Characium* were found as well.

Generally speaking, the number of the euphyton species is increasing. They can form thick incrustation on some *Cladophora* and *Vaucheria* fibres and floating *Lemna* species. The bulk of these forms was not identified. Many of them were small Bacillariophyceae and thin fibreous algae. Five new *Closterium* species were found, some of them occurring in great masses. The *Zygnema* sp., found in the material of 1984-85, was probably *Z. pectinatum*.

All the species 'lost' were among the rare species. Thus I am convinced their

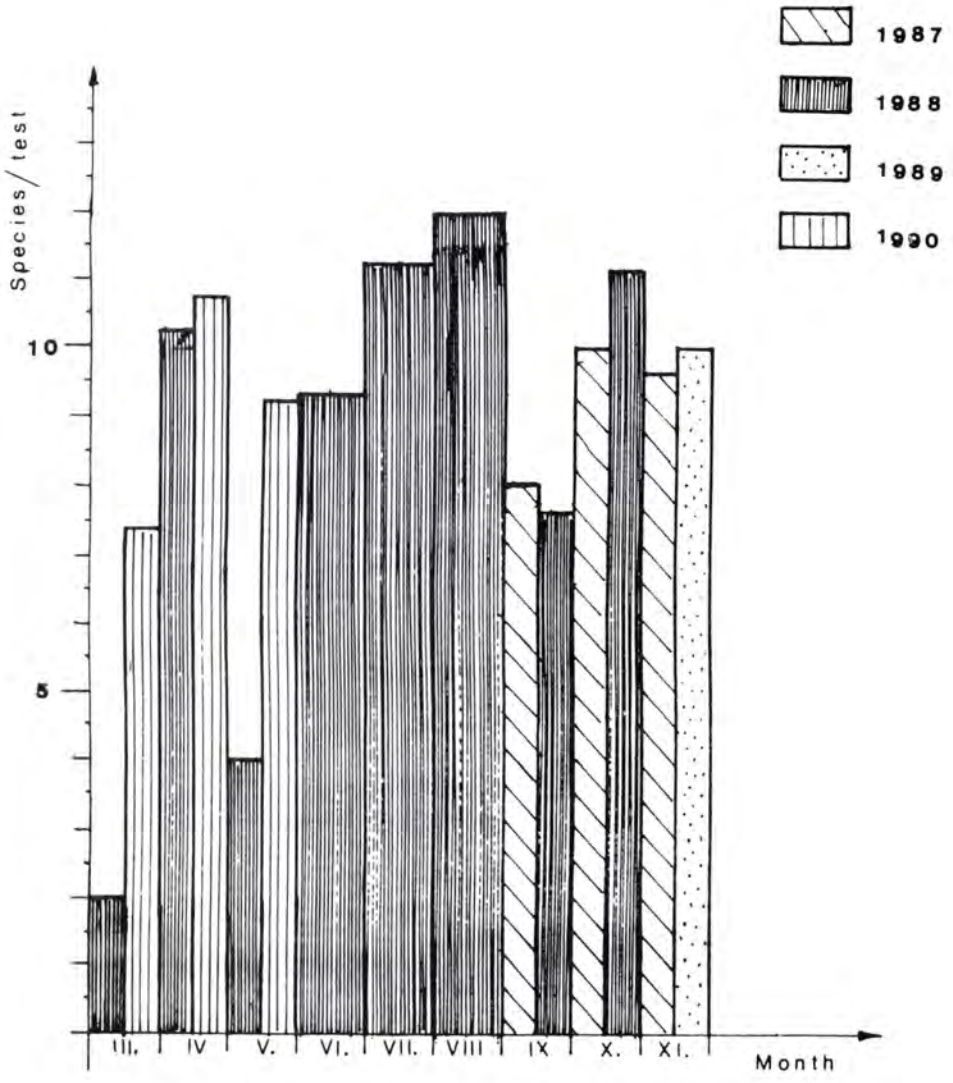



Fig. 1. Monthly distribution of the algal species found in the Csömör pool 1987–1990

occurrence in the sample investigated is casual. This is true partly for the newly described species as well. Different methods of sampling contributed to the increase of species and of material. Some species were found only in the benthic samples (e.g., *Closterium moniliferum, Oedogonium* sp. 2., *Oe.* sp. 4., *Spirogyra* sp.

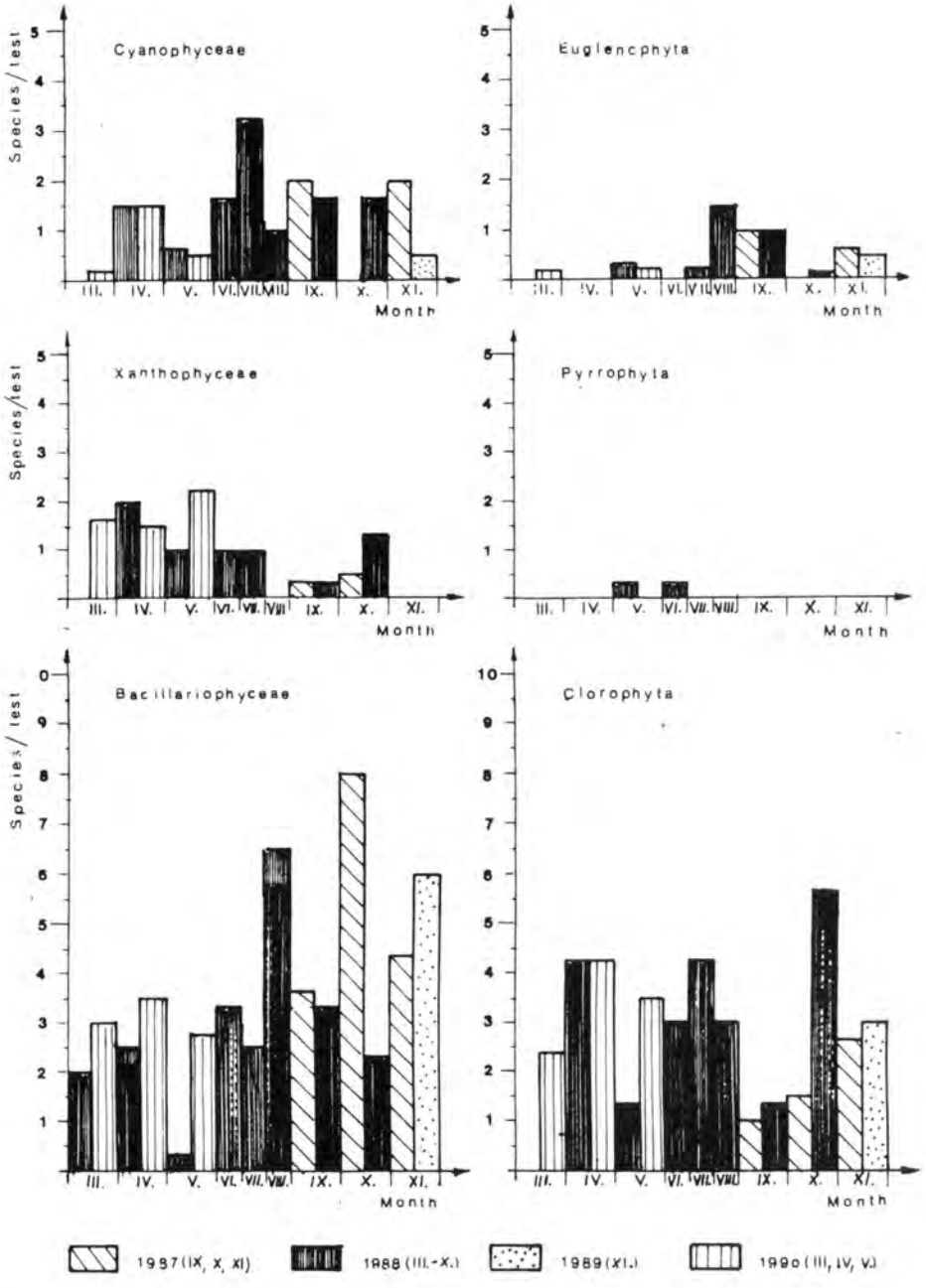



Fig. 2. Seasonality of the algal species of the Csömöri pool according to taxonomic groups

4). *Ophyocytium maius* was found only in the samples taken from the subaquatic part of *Typha latifolia*.

## Seasonality

Studying the seasonality of the algae (Table 1, Fig. 1) we can say that the greatest species richness was gathered (12 species/sample) in August 1988. This seemingly contradictory statement can be explained considering the unusually high number of Bacillariophyceae and Euglenophyta species, collected from the foot-trodden sampling point 6 (Fig. 2, Table 1). The average number of algae was also fairly high in July 1988 and October 1988 (11.25 species/sample and 11.16 species/sample, respectively). In July, Cyanophyta and Chlorophytae dominated the assemblage, while in October, an overwhelming dominance of Chlorophytae was observed. Apart from the immersed samples, there were samples collected from the *Typha* leaves as well.

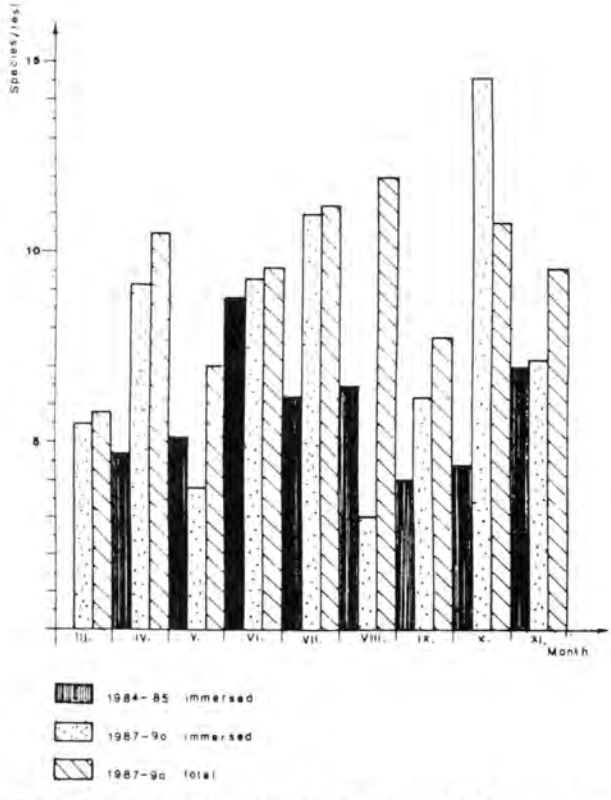



Fig. 3. Comparison of algal number in the Csömör pool
(Table 2, STOLLMAYER-BONCZ 1988 Fig. 1)

Other values above the average include those of April 1990 (10.75 species/sample) and April 1988, October 1987 and November 1989 (10 species/sample). In the samples collected in April, besides considerable number of Chlorophytons there were numerous representatives of Xanthophyceae and Bacillariophyceae as well as samples collected from the benthos. In the two samples collected in October we find very high number of Bacillariophyceae.

The values of the samples June 1988 and May 1990 can be considered as relatively high (9.33 and 9.25 species/sample, respectively). In June, this fairly high value resulted from the relative abundance of several taxa and a Xanthophyaceae-Chlorophyton dominance (immersed and benthic samples).

It is striking that compared to the algal peaks of June in 1984 and 1985, the highest values were found in July and August in the period 1987-1990 (Fig. 1). In the study period 1984-85, only immersed samples were taken; therefore immersed samples were selected for comparison from the period 1987-1990 as well, with Euglenophyta and Pyrrophyta species extracted. The resulting values of 1987-1990 were compared to them as well (Fig. 3, Table 2).

It seemed reasonable to study the seasonality of the individual algal groups (Fig. 2). On the basis of this, a Cyanophyton peak was observed in July 1988 (3.25), it was relatively high in September and November 1987. This taxon was not observed in October 1987 and very few in March 1990 (0.20), May 1990 and November 1989 (0.50).

An Euglenophyton peak was observed in August 1988 (1.5), as well as in September 1987 and 1988 (1.0). The taxon was completely missing in April and June, as well as October 1987.

A Xanthophyceae peak was demonstrated in May 1990 (2.25) and April 1988 (2). The species was absent in March 1988 but relatively high in 1990 (1.66). It was missing in August, which is not a great surprise because only sampling points 2 and 6, otherwise poor in Xanthophyceae species, were available (Table 3).

Pyrrhophyta species occurred in May and June only.

A Bacillariophyceae peak was observed in October 1987 (8), the taxon was relatively frequent in August and November 1989 (6.5). The minimum was observed in May 1988 (0.33).

A Chlorophyton peak was found in October 1988 (5.66), they were fairly frequent in April and July (4.25). The taxon was absent in March 1988.

It seems that the biotops of the Csömör pool can be characterised by a definite dominance of Bacillariophyceae and a less marked dominance of Chlorophytons.

## Pattern

The number of the individual sampling points changed from year to year and month to month. For the sake of comparison, the values in the Table (Table 3) already represent the number of species per sample (species/test). As the individual sampling points could be used for different times, as a background of information, the number of sampling is marked at each point. Thus the relative

importance of sampling points with one sample taken only (8, 9) or 3 samples (sampling point 6) is different.

Taking all the algal groups into consideration, the highest number of species was found in point 4. It is immediately followed by, from the sampling points with considerable test number, point 3. Collating averages with reality, sampling point 2 is the poorest and 3 is the richest in algae. Evaluating the individual algal groups by sampling points, also points 3 and 4 turned out to be most productive in respect of algae.

Most of the Cyanophyta were registered at sampling point 4, bulk of the Euglenophytons at sampling point 6, Xanthophyceae were mainly accumulated at point 3, while Bacillariophyceae reached their maximum at sampling point 6. Pyrrhophytons were found exclusively at sampling point 4, while Chlorophytons occurred at point 4 only. This is, of course, not exactly true for each month. E.g., the maximum of Cyanophyta took place in June at sampling point 3, that of Xanthophyceae at point 1 in May, Bacillariophyceae became most numerous at point 6 in August, Pyrrhophytons were occurring in June at sampling point 3, and Chlorophytons were observed in July at sampling point 3.

Individual regions of the pool (the "island" and the "pool", respectively) were represented by different values of species/sample. Also, changes have been observed since 1984-85. In the course of the previous study, all the "lacustrine" values were higher (points 1, 2, 3, 8 and 9) than samples 4 and 7 of the island (sampling point 7 equivalent to recent sampling point 6). The group of Xanthophyceae did not even occur in the "island" samples of that series.

By 1987-1990, the situation had changed. All groups (with the exception of Pyrrophytons present only in the lacustrine samples of sampling point 3) occurred in higher number on the two island sampling points (4, 6). Within the lake, the number of Cyanophytons generally decreased as compared to the values of 1984-85. In the other places, the average species number belonging to this taxon increased. As the flora of the lake became quite uniform as regards algal species, no specific tables are enclosed here. Rather, some characteristic features are stressed. E.g., species of *Characium, Peridinium* and Xanthopyceae (with two exceptions) were recovered only from lacustrine samples like *Nitzschia heufleriana*, e.g. samples from the island contained only *Eunotia lunaris* again; in single cases, the 1987-1990 samples contained *Closteriococcus viernheimensis* f. *maior, Scenedesmus acutus* f. *alternans, Epithemia sp.* (*E. muelleri?*) etc. As the main difference between the sampling points in the pool and on the island, i.e., pH value and the presence of *Sphagnum* species had disappeared, some local ecological factors are probably still at work. Even in the "island" samples of 1984-85, no species with definite preference for *Sphagnum* were found. There are more species in common between the "pool" and the island, respectively, than those typical of the pool only. This is understandable because the pool is small, and due to its sloping in S-N direction, the water can 'move' during higher water-levels; vegetation is not essentially different in any parts. The only exception is *Lastrea thelypteris*, occurring exclusively on the "island" and along the eastern shore.

## EVALUATION OF THE RESULTS

It is evident from the taxonomic list of the algae of the pool (Table 4) that here we have to do with a marshy lake rich in species, a rare situation in Hungary. Some of the elements considered rare in Hungarian conditions include *Anabaena aequalis, Closterium pusillum, Nostoc paludosum* (peat species), *Microcystis firma, Nostoc entophytum, Tribonema regulare, T. viride, Vaucheria sessilis, Epithemia* sp. (*muelleri?*), *Nitzschia heufleriana, Peridinium willei, Characium braunii, Cylindrocapsa geminella, Oocystidium ovale, Spirogyra* sp. (*dubia?*), *Tetraedron proteiforme* and *Zygnema* sp. (*pectinatum?*).

As a novelty, we can mention *Oedogonium inversum* f. *subclusum* (reference: Flora et Iconographia Algarum Hungariae). Therefore a more detailed description of the female fibres found in our samples (3 June, 1988 and 3 November, 1989) is given here. The vegetative cells are slightly capitated with smooth wall. Their width is between 10-12.5 μm, their length is 35, 50, 57.5, 60 and 70 μm, respectively. The oogonia with the oospores are 30, 35 and 40 μm wide and 25, 27.5, 30 and 40 μm long. The basic cell is 20 μm wide at the base and the footing is 10 μm long. In quite a number of fibres we can find only 1-1 vegetative cell between the oogonia, but in the same fibre 2-3-4 oogonia can be equally found in a series. Their colour is brown and green, some of them are split around the basis. The 'head' of the vegetative cell is slightly intruding in a convex manner into the oogonium.

In 1984-85, the algal taxa of the Csömör pool were compared to those of the Nagy-tó ('Great lake') at Öcs (UHERKOVICH 1979), the Szürühely-spring in the *Juniperus* reserve at Barcs (UHERKOVICH 1981) and the Kerek-tó ('Round lake') of Feketehegy (UHERKOVICH 1982). Similarities mentioned in the previous paper were found again during the 1987-1990 investigations as well.

From an algological point of view, the consequences of the 1987 fire were severe. Higher species number and mass occurrence of certain species can be regarded, clearly, as consequences of this 'artificial fertilisation'. In case of several species, significant changes took place in the frequency of occurrence. Rare species like *Meridion circulare* (x-0, G2), *Ophiocytium parvulum* became very frequent. Frequent species turned to be very frequent: *Epithemia turgida* ( b, G–), *Fragilaria capucina* (o-b, G3), *Pinnularia maior* (b, G5), *Rhopalodia gibba* (o, G–), *Cladophora glomerata* (b, G1), *Oedogonium* sp. Species not recorded in 1984-85, noted now as frequent are species of *Tribonema*. Rare species found now frequently include *Lyngbya cryptovaginata, L. limnetica, Microcystis pulvera* (o-b, G3), *Ophyiocytium cochleare* (o-b, G–), *Vaucheria sessilis* (x-b, G2), *Amphora ovalis* (o-b, G1), *Cymbella aspera* (b, G4), *Navicula cuspidata* (b-a, G3), *N. radiosa* (o-b, G3), *Nitzschia sigmoidea* (b, G4), *N. spectabilis, Chlorella vulgaris* (p-a, G3).

Species with decreasing frequency are *Anabaena minutissima, Microchaeta tenera, Nostoc entophytum, N. paludosum, Oscillatoria planctonica, Epithemia argus, Synedra ulna*. The relative frequency of the following species did not change: among the rare species, *Crucigenia quadrata, Cylindrocapsa geminella, Tetraedron proteiforme*, of the frequent species, *Melosira italica, Stauroneis anceps* and of the very frequent ones, *Spirogyra longata.*

As many of the new species and some of the species which became more

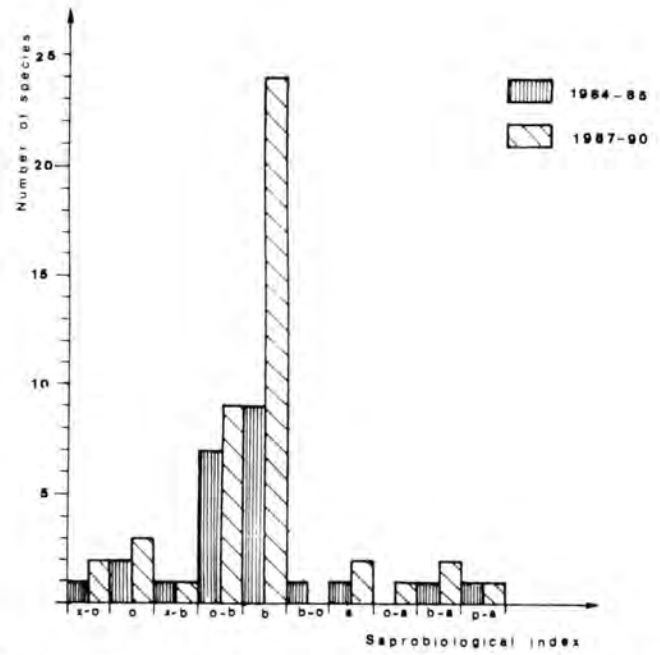



Fig. 4. Fluctuation of species with saprobiotic indices in the Csömöri pool

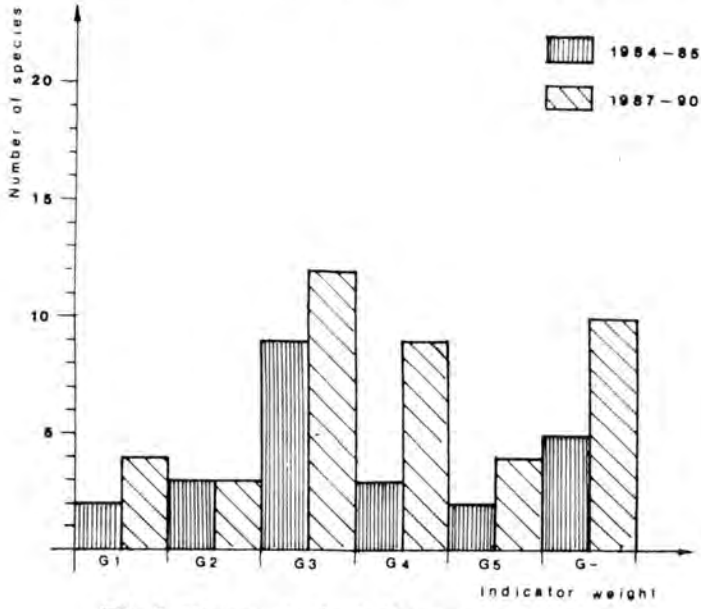



Fig. 5. Changes in the indicator weight (G)

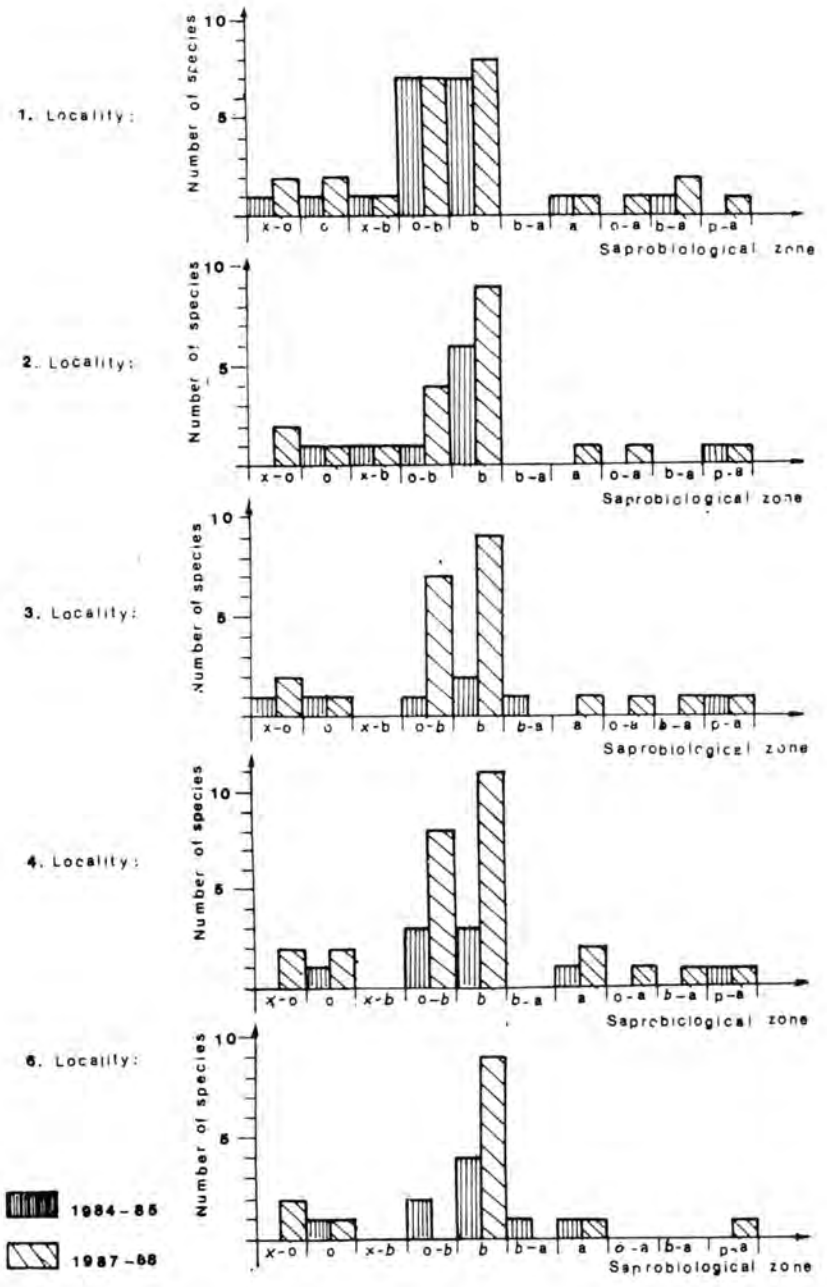



Fig. 6. Fluctuation of species with saprobiotic indices an the various sampling points

frequent are included in the saprobiotic species list of the COMECON, the saprobiotic analysis of the lake was performed and compared to the state of affairs in 1984-85. Keys denoting the zones (s) and indicator weight (G) was introduced according to the COMECON standards. These values are marked in the species list. As not all the algal taxa are included on the list referred to, only samples of saprobiotic graphs are published here. It may be seen in Fig. 4, that the beta-mesosaprobiotic (b) species were essentially increasing. The changes of the indicator weight since 1984 are demonstrated in Fig. 5. The advance of the group G4 is the most significant (3 times more); considerable increase was observed in G5 (two times more) and G3 (1.3 times more). We can see in Fig. 6 that the oligo-beta-mesosaprobiotic species (o-b) have multiplied in sampling points 2, 3 and 4. Beta-saprobiotic species (b) were increasing several times at sampling points 3, 4 and 6. These changes prove that fire affected the less polluted parts as well. Sampling points 1 and 2 lie nearest to the shore and therefore they are most exposed to pollution caused by visitors.

I am aware of the fact that these saprobity data have no indicator value under normal circumstances. Still I hope that the data presented demonstrate clearly that the Csömör pool is shifting rapidly towards the beta-mesosaprobiotic zone, reflected by algal taxa as well. The quick progress of eutrophication and that of the succession is even more spectacular on the macrophyte vegetation of the marsh.

Last but not least, let me express my warmest thanks to Júlia SZUJKÓ-LACZA who made the present investigations possible, to Éva ÁCS and Krisztina BUCZKÓ for their professional help and Lilla HABLY for editoral instructions.

## REFERENCES

BARTA, Zs., FELFÖLDI, L., HAJDÚ, L., HORVÁTH, K., KISS, K. T., SCHMIDT, A., TAMÁS, G., UHERKOVICH, G. and VÖRÖS, L. (1976): A zöld algák (Chlorococcales) rendjének kishatározója. (Identification Manual of Order of Green Algae.) - *Vízügyi Hidrobiológia* 4, VÍZDOK, Budapest, 343 pp.

DIEL, I. (1975): *Kl'uc na urcovanie vytrusnych rastlín.* - Bratislava, 397 pp.

ETTL, H. (1978): Xanthophyceae 1. Teil. - *Süsswasserflora von Mitteleuropa* 3, Jena, 530 pp.

FELFÖLDY, L. (1972): A kékalgák (Cyanophyta) kishatározója. (Identification Manual of Blue-green Algae.) - *Vízügyi Hidrobiológia* 1, VÍZDOK, Budapest, 257 pp.

FELFÖLDY, L. (1981): A zöldalgák Desmidiales rendjének kishatározója. (Identification Manual for the Desmidiales of Green Algae.) - *Vízügyi Hidrobiológia* 10, VÍZDOK, Budapest, 275 pp.

FELFÖLDY, L. (1984): Hidrobiológia szavakban. Hidrobiológiai értelmező szótár. (Hydrobiology in words. Hydrobiological explaining dictionary.) - *Vízügyi Hidrobiológia* 13, VÍZDOK, Budapest, 250 pp.

GULYÁS, P. (1983): KGST biológiai módszerek. (COMECON biological methods.) - *Vízügyi Hidrobiológia* 12, VÍZDOK, Budapest, 244 pp.

HORTOBÁGYI, T. (1968): *Növényhatározó* I. (Plant Identification Manual I.) - Tankönyvkiadó, Budapest, 626 pp.
HUBER-PESTALOZZI, G. (1950): Phytoplankton des Süsswassers. Systematik und Biologie 3. Teil: Cryptophyceen, Chloromonadien, Peridineen. - In: THIENEMANN, A. (ed.): *Die Binnengewässer*, Band XVI, Stuttgart, 310 pp.
KADLUBOWSKA, I. Z. (1984): Conjugatophyceae I. Chlorophyta VIII. Zygnemales. - *Süsswasserflora von Mitteleuropa* 16, Jena, 532 pp.
KRAMMER, K. and LANGE-BERTALOT, H. (1986): Bacillariophyceae 1. Teil: Naviculaceae. - *Süsswasserflora von Mitteleuropa* 2/1, Jena, 876 pp.
KRAMMER, K. and LANGE-BERTALOT, H. (1989): Bacillariophyceae 2. Teil: Bacillariaceae, Epithemiceae, Surirellaceae. - *Süsswasserflora von Mitteleuropa* 2/2, Jena, 596 pp.
MROZINSKA, T. (1985): Chlorophyta VI. Oedogoniophyceae, Oedogoniales. - *Süsswasserflora von Mitteleuropa* 14, Jena, 624 pp.
NÉMETH, J. (1980): Az ostoros algák (Euglenophyta) kishatározója 1. (Identification Manual of Flagellate Algae.) - *Vízügyi Hidrobiológia* 8, VÍZDOK, Budapest, 294 pp.
PASCHER, A. (1930): Bacillariophyta (Diatomeae). - *Die Süsswasserflora Mitteleuropas* Heft 10, Jena, 466 pp.
RIETH, A. (1980): Xanthophyceae 2. Teil. - *Süsswasserflora von Mitteleuropa* 4, Jena, 147 pp.
STOLLMAYER-BONCZ, E. (1983): The Flora of the Csömör pool. - *Studia bot. hung.* **16** (1982): 73-82.
STOLLMAYER-BONCZ, E. (1988): The alga species of the Csömör pool. - *Studia bot. hung.* **20**: 63-75.
UHERKOVICH, G. (1966): *Die Scenedesmus-Arten Ungarns.* - Akadémiai Kiadó, Budapest, 173 pp.
UHERKOVICH, G. (1979): Az Öcsi Nagy-tó limnológiája. (Limnologie des Grossen Sees von Öcs.) - *A Veszprém megyei múzeumok közleményei* **14**: 25-53.
UHERKOVICH, G. (1981): A Szürühely-folyás (Barcsi-Borókás) tőzegmohás tavacskájának algái. (On the algae of the pond "Szürühely-folyás" in the Juniper Woodland of Barcs, Hungary.) - *Dunántuli dolgozatok term. tud. sor.* **2**: 5-23.
UHERKOVICH G. (1982): A Fekete-hegy (Balaton-felvidék) Kerek-tava algavegetációja. (Die Algenvegetation des Kerek(Rund)- Sees von Fekete(Schwarz)-Berg Balaton-Oberland.) - *Folia musei historico-naturalis bakonyensis* **1**: 81-110.
WOLLE, F. (1887): *Fresh-water Algae of United States I.-II.* - Betlehem, 364 pp.

Author's address: STOLLMAYER-BONCZ, E.
H-1037 Budapest, Erdőalja u. 127
HUNGARY

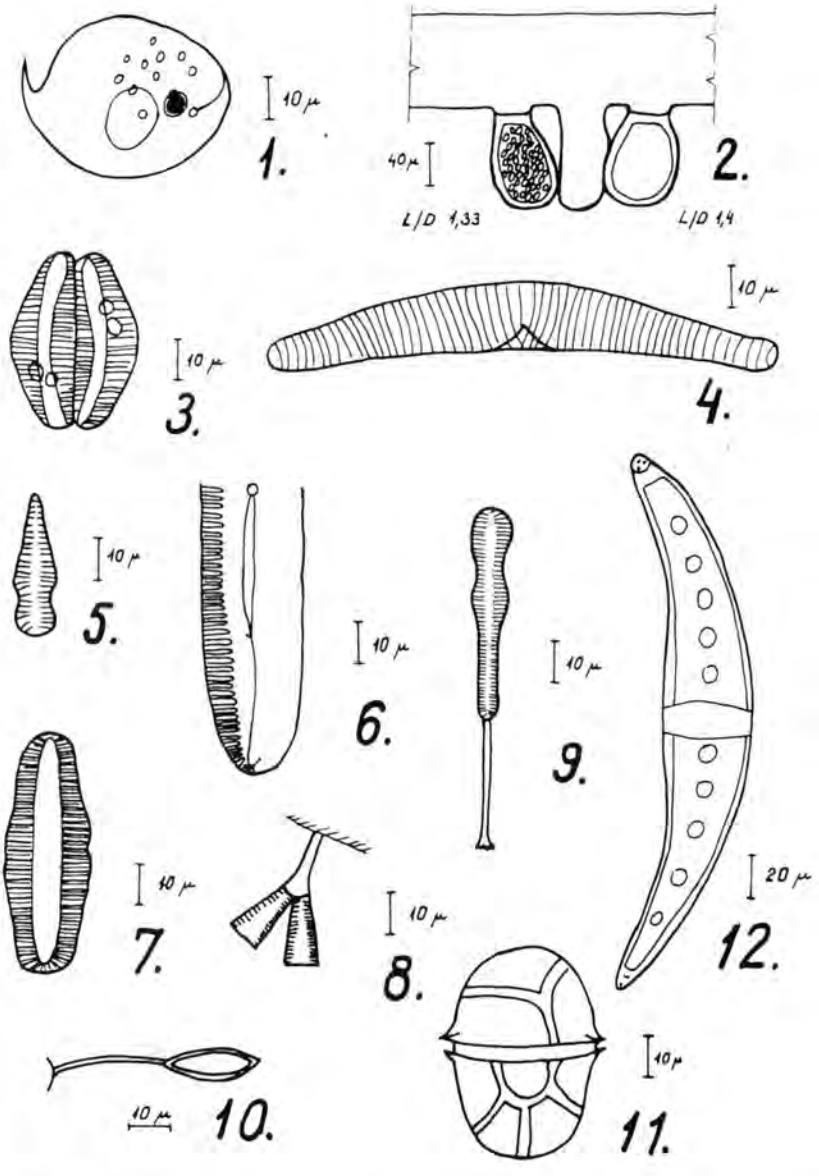



Fig. 7. 1. *Phacus hamatus* Pochm.; 2. *Vaucheria sessilis* (Vaucher) de Candolle in de Lamarck et de Candolle; 3. *Cymbella aspera* (Ehr.) Cleve; 4. *Epithemia turgida* (Ehr.) Kütz.; 5. *Gomphonema acuminatum* (Ehr.) Grunow; 6. *Pinnularia maior* (Kütz.) Cleve; 7. *Rhopalodia gibba* (Ehr.) O. Müll.; 8. *Gomphonema* sp.(g.); 9. *G.* sp. (*G. acuminatum* (Ehr.) Grunow?) (g.); 10. *Navicula* sp. (*N. radiosa* Kütz.?) (g.); 11. *Peridinium* sp.; 12. *Closterium moniliferum* (Bory) Ehr.

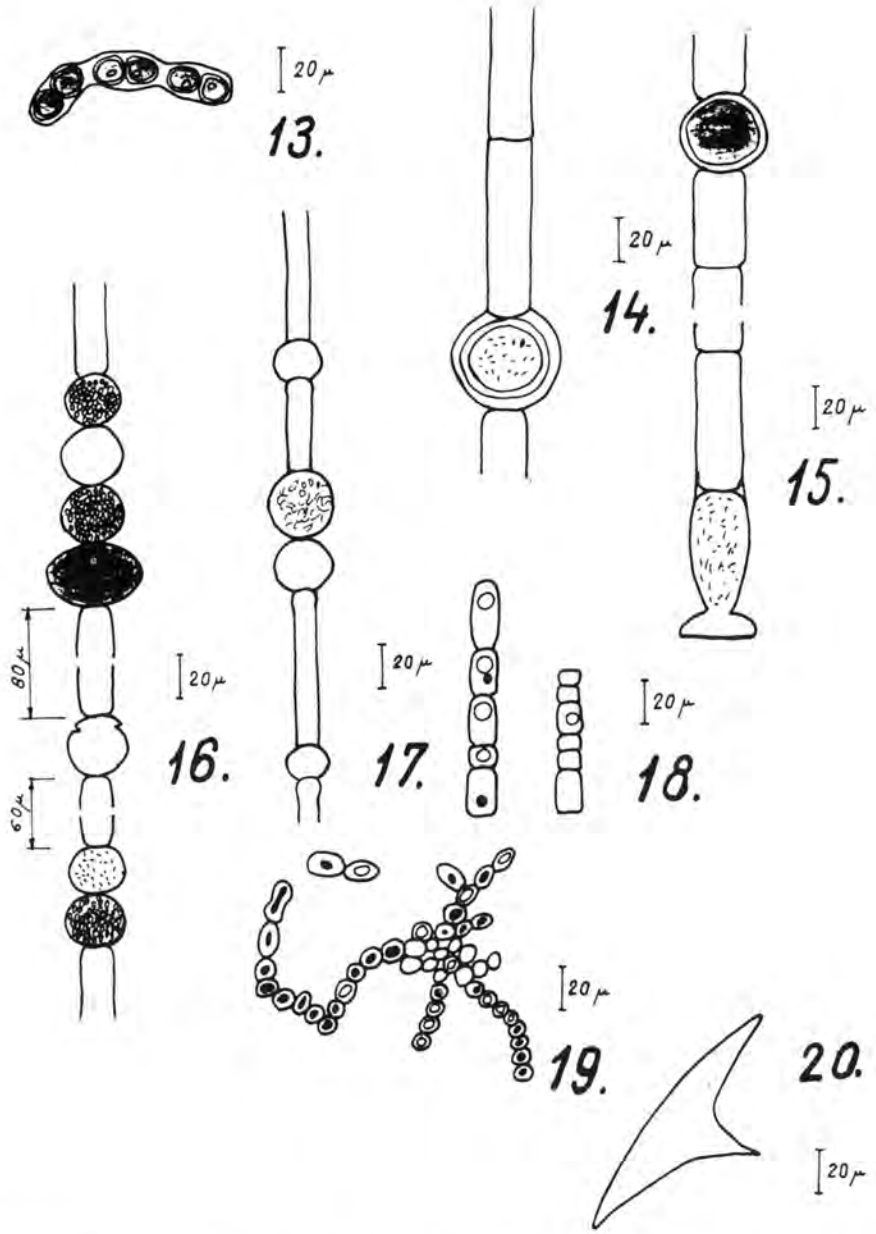



Fig. 7. 13. *Cylindrocapsa geminella* Wolle; 14. *Oedogonium* sp.1. ♀; 15. *O.* sp.2. ♀; 16. *O.* sp.4. (*O. pringsheimii* Cramer ?) ♀; 17. *O. inversum* Wittrock f. *subclusum;* 18. *O.* sp.7. ? ♂?; 19. *Protococcus viridis* Ag. ?; 20. *Tetraëdron proteiforme* (Turn) Brunneth

Table 1. Average species number of algal species in the Csömör pool according in monthly and annual distribution (Fig. 1, Fig. 2)
B: benthic; Ta: from subaquatic part of *Typha latifolia;* Td: from dry part of *T. latifolia;* h: from hollow; t: from trodden footprint

| | | March | | April | | May | | | July | | September | | October | | November | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1988 | 1990 | 1988 | 1990 | 1988 | 1990 | 1988 | 1988 | 1988 | 1987 | 1988 | 1987 | 1988 | 1987 | 1989 |
| | | 2,3 | 1,2, 3,3B,9 | 1,2, 3,8 | 2,2B, 3,3B | 1,2,3 | 1,1B, 2,3B | 1,2,3 | 1,2,3,4, 2,6t | 2,6, 6h | 1Td, 2,4 | 2,4 | 1,1Ta, 1Td,2, 4,4Ta | 2,4, 4B | 2,3 | |
| species/ test | Cyanophyta | — | 0.20 | 1.50 | 1.50 | 0.66 | 0.50 | 1.66 | 3.25 | 1 | 2 | 1.66 | — | 1.66 | 2 | 0.50 |
| | Euglenophyta | — | 0.20 | — | — | 0.33 | 0.25 | — | 0.25 | 1.50 | 1 | 1 | — | 0.16 | 0.66 | 0.50 |
| | Xanthophyceae | — | 1.60 | 2 | 1.50 | 1 | 2.25 | 1.33 | 1 | — | 0.33 | 0.33 | 0.50 | 1.33 | — | — |
| | Bacillarophyceae | 2 | 3 | 2.50 | 3.50 | 0.33 | 2.75 | 3.33 | 2.50 | 6.50 | 3.66 | 3.33 | 8 | 2.33 | 4.33 | 6 |
| | Pyrrophyta | — | — | — | — | 0.33 | — | 0.33 | — | — | — | — | — | — | — | — |
| | Chlorophyta | — | 2.40 | 4.25 | 4.25 | 1.33 | 3.50 | 3 | 4.25 | 3 | 1 | 1.33 | 1.50 | 5.66 | 2.66 | 3 |
| | Total | 2 | 7.4 | 10.25 | 10.75 | 4 | 9.25 | 9.66 | 11.25 | 12 | 8 | 7.66 | 10 | 11.16 | 9.66 | 10 |

Table 2. Monthly distribution of algal species in the Csömör pool in immersed samples and other samples during 1987-1990
1.: immersed (species/test); 2.: total (species/test)

| | Cyanophta | | Eugleno-phyta | Xanthophyceae | | Bacillariophyceae | | Pyrrophyta | Chlorophyta | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1. | 2. | 2. | 1. | 2. | 1. | 2. | 2. | 1. | 2. | 1. | 2. |
| March | 0.16 | 0.14 | 0.14 | 1.30 | 1.14 | 2.10 | 2.57 | — | 1.83 | 1.71 | 5.50 | 5.85 |
| April | 1.33 | 1.50 | — | 1.60 | 1.75 | 2 | 3 | — | 4.16 | 4.25 | 9.16 | 10.5 |
| May | 0.60 | 0.57 | 0.28 | 1 | 1.71 | 0.80 | 1.71 | 0.14 | 1.40 | 2.57 | 3.80 | 7 |
| June | 1.66 | 1.66 | — | 1 | 1 | 3.33 | 3.33 | 0.33 | 3.33 | 3.33 | 9.30 | 9.60 |
| July | 3.25 | 3.25 | 0.25 | 1 | 1 | 2.50 | 2.25 | — | 4.25 | 4.25 | 11 | 11.25 |
| August | — | 1 | 1.50 | — | — | 1 | 6.50 | — | 2 | 3 | 3 | 12 |
| September | 2.50 | 1.83 | 1 | 0.25 | 0.33 | 2.25 | 3.50 | — | 1.25 | 1.16 | 6.20 | 7.80 |
| October | 1.60 | 1.25 | 0.12 | 1 | 1.12 | 5.60 | 3.75 | — | 6.40 | 4.62 | 14.6 | 10.8 |
| November | 1 | 1.40 | 0.60 | — | — | 4.25 | 5 | — | 2 | 2.6 | 7.20 | 9.60 |

Table 3. Average species number of algae at the different sampling points and months (1987-1990)
(The numerals by the months represent the number of the sample)

1. Cyanophyceae, 2. Euglenophyta, 3. Xanthophyceae, 4. Bacillariophyceae, 5. Pyrrophyta, 6. Chlorophyta, 7. total (Species/test)

| | 1. Locality | | | | | | | | 2. Locality | | | | | | | | | | 3. Locality | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | III. | IV. | V.3 | VI. | VII. | IX. | X.3 | To-tal | III.2 | IV.3 | V.2 | VI. | VII. | VIII. | IX.2 | X.2 | XI.2 | To-tal | III.2 | IV.3 | V.2 | VI. | VII. | XI. | To-tal |
| 1. | — | — | 1.3 | — | 1 | — | 1 | 0.7 | — | 2 | — | 2 | 1 | — | 1 | 0.5 | 0.5 | 08 | 0.5 | 0.33 | - | 3 | 6 | 1 | 1.2 |
| 2. | — | — | 0.33 | — | — | — | 0.33 | 0.18 | — | — | 0.5 | — | — | — | — | — | — | 0.06 | 0.5 | — | — | — | — | 1 | 0.2 |
| 3. | 3 | 2 | 1.66 | 2 | 2 | 1 | 1 | 1.5 | 1.5 | 1 | 1 | — | 1 | — | — | — | — | 0.56 | 1 | 2.6 | 2.5 | 1 | 1 | — | 1.7 |
| 4. | 3 | 2 | 1.3 | 4 | 4 | 7 | 2.3 | 2.8 | 2 | 2.6 | 0.5 | — | — | 1 | 2 | 3 | 4.5 | 2 | 4.5 | 3 | 3.5 | 6 | 3 | 6 | 4 |
| 5. | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 0.5 | 1 | — | — | 0.2 |
| 6. | 6 | 5 | 2.3 | 3 | 1 | — | 1.6 | 2.4 | 0.5 | 4 | 05 | — | — | 2 | — | 6 | 2 | 2 | 1.5 | 4.3 | 5 | 7 | 9 | 2 | 4.4 |
| 7. | 12 | 9 | 7 | 9 | 8 | 8 | 6.3 | 7.8 | 4 | 9.6 | 2.5 | 2 | 2 | 3 | 3 | 9.5 | 7 | 5.5 | 8 | 10.3 | 11.5 | 18 | 19 | 10 | 11.7 |

| | 8. | 9. | 4. Locality | | | | | 6. Locality | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | IV. | III. | VII. | IX. | X.3 | XI.2 | To-tal | VIII. | IX.2 | To-tal |
| 1. | 5 | — | 5 | 4 | 2 | 2.5 | 5 | 2 | 2.5 | 2.3 |
| 2. | — | — | 1 | 3 | — | 1 | 1.5 | 3 | 1.5 | 2 |
| 3. | 1 | — | — | — | 2 | — | 1.5 | — | 0.5 | 0.33 |
| 4. | 5 | 3 | 3 | 3 | 5.6 | 5 | 4.7 | 12 | 3.5 | 6.3 |
| 5. | — | — | — | — | — | — | — | — | — | — |
| 6. | 4 | 2 | 7 | 4 | 6.6 | 3.5 | 5.4 | 4 | 1.5 | 2.3 |
| 7. | 14 | 5 | 16 | 14 | 16.3 | 12 | 14.7 | 20 | 9 | 12.6 |

Table 4. Details of the algal taxa of the Csömör pool

The Arabic numerals refer to the localities (see Map 2) The sign + stands for presence, x: for abundance. B: benthic, Td: from dry part of *Typha latifolia*, Ta: from subaquatic part of *T. latifolia*, h: from hollows, t: from trodden footprint, g: with gelatinous stalk, s: saprobiological zone, d: diameter, G: indicator weight, *: marks species new compared to previous collectings. In brackets ( ), number of relevant figure is indicated.

Localities

| s | G | | | Year | 1 March | 2 March | 3 March | 3B March | 9 March | 1 April | 2 April | 2B April | 3 April | 3B April | 8 April | 1 May | 1B May | 2 May | 3 May | 3B May | 1 June | 2 June | 3 June | 1 July | 2 July | 3 July | 4 July | 2 August | 6t August |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cyanophyta: *Anabaena aequalis* Borge | 1988 | | | | | | | | | | | | | | | | | | + | | | | | | |
| | | | | 1990 | | | + | | | | | + | | | | | | | | | | | | | | | | | |
| | | * | *A. constricta* (Szaf.) Geitl. f. *minima* Palik | 1990 | | | | | | | | + | | | | | | | | | | | | | | | | | |
| | | | *A. minutissima* Lemm. | 1990 | | | | | | | + | | | | | | | | | | | | | | | | | | |
| | | | | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | * | *A. sphaerica* Born. et Flah. | 1988 | | | | | | | | | | | | + | | | | | | * | | | | + | | | |
| | | | | 1990 | | | | | | | | + | | | | | | | | | | | | | | | | | |
| | | | *A. sp.* (d: 3 µm) | 1988 | | | | | | | | | | | + | | | | | | | | | | | | + | | |
| | | * | *A. sp.* (d: 7 µm) | 1988 | | | | | | | | | | | + | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | + | | | | | | | | | | | | | | | | | |
| | | * | *A. sp.* ? (8.7x11.2 µm) | 1990 | | | | | | | | | + | | | | | | | | | | | | | | | | |
| | | * | *Letestuinema bourelly* Hortob.? | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *Lyngbya cryptovaginata* Schorb. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | | | | | | | | | | | + | + | | x |
| | | | *L. hyeronymusii* Lemm. | 1988 | | | | | | | | | | | + | | | | | | | | | | | + | + | | |

| s | G | | | Year | 1Td September | 2 September | 4 September | 6 September | 6h September | 1 October | 1Ta October | 1Td October | 2 October | 4 October | 4Ta October | 2 November | 3 November | 2 November | 4B November |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Cyanophyta: *Anabaena aequalis* Borge | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *A. constricta* (Szaf.) Geitl. f. *minima* Palik | 1990 | | | | | | | | | | | | | | | |
| | | | *A. minutissima* Lemm. | 1990 | | | | | | | | | | | | | | | |
| | | | | 1987 | | | | | | | | | | | | | | | x |
| | | * | *A. sphaerica* Born. et Flah. | 1988 | | | | | | | | | | + | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *A. sp.* (d: 3 µm) | 1988 | | | | | | | | | | | + | | | | |
| | | * | *A. sp.* (d: 7 µm) | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *A. sp.* ? (8.7x11.2 µm) | 1990 | | | | | | | | | | | | | | | |
| | | * | *Letestuinema bourelly* Hortob.? | 1988 | | | | | | + | | | | | | | | | |
| | | | *Lyngbya cryptovaginata* Schorb. | 1987 | | + | | + | + | | | | | | | | | | |
| | | | | 1988 | | | + | | | | | | + | | | | | | |
| | | | *L. hyeronymusii* Lemm. | 1988 | | | | | | | | | + | | | | | | |

Table 4/1. Localities

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | |
| | | | *L. limnetica* Lemm. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | + | | |
| | | • | *L. sp.* (*L. limnetica* Lemm. ?) (d: 1 µm) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | + | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *Microchaeta tenera* Thur. | 1988 | | | | | | | | | | | | | | | | | + | | | | | | | | |
| | | | *Microcystis firma* (Bréb. et Lenorm.) Schmidle | 1988 | | | | | | | | | | | | | | | | | | + | | | | | | | |
| b | 4 | • | *M. flos-aquae* (Wittr.) Kirchn. | 1988 | | | | | | | | | | | + | | | | | | | | | | | | | | |
| o-b | 3 | | *M. pulvera* (Wood) Forti. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | + | | | | | | | | | | | | | + | | + | + | | x |
| | | | | 1990 | | | | | | | | | | | | | + | | | | | | | | | | | | |
| | | | *Nostoc entophytum* Born. et Flah. | 1988 | | | | | | | | | | | + | | | | | | | | + | | | | | | |
| | | | *N. paludosum* Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *Oscillatoria planctonica* Wolosz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | x | | | | | | | | | | | | | |
| a | 3 | | *O. tenuis* Agardh | 1988 | | | | | | | | | | | | | | | | | | | | + | + | | | | |
| | | | | 1990 | | | | | | | | | | | | + | | | | | | | | | | | | | |
| | | | Euglenophyta: | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | • | *Euglena* sp. | 1988 | | | | | | | | | | | | | | x | | | | | | | | | + | | |
| | | | | 1990 | | | + | | | | | | | | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6h | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| | | | *L. limnetica* Lemm. | 1987 | | | | + | | | | | | | | | | + | x |
| | | | | 1988 | | | + | | | x | | | | | + | | | | |
| | | • | *L. sp.* (*L. limnetica* Lemm. ?) (d: 1 µm) | 1987 | | | | | | | | | | | | + | | | |
| | | | | 1988 | | + | | | | | | | | | + | | | | |
| | | | | 1989 | | | | | | | | | | | | | + | | |
| | | | *Microchaeta tenera* Thur. | 1988 | | | | | | | | | | | | | | | |
| | | | *Microcystis firma* (Bréb. et Lenorm.) Schmidle | 1988 | | | | | | | | | | | | | | | |
| b | 4 | • | *M. flos-aquae* (Wittr.) Kirchn. | 1988 | | | | | | | | | | | | | | | |
| o-b | 3 | | *M. pulvera* (Wood) Forti. | 1987 | | | | + | | | | | | | | | | | + |
| | | | | 1988 | | | + | | | + | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *Nostoc entophytum* Born. et Flah. | 1988 | | | | | | | | | | | | | | | |
| | | | *N. paludosum* Kütz. | 1987 | | | | + | | | | | | | | | | | |
| | | | *Oscillatoria planctonica* Wolosz. | 1987 | | | | | | | | | | | | | | | + |
| | | | | 1988 | | | | | | | | | | | | | | | |
| a | 3 | | *O. tenuis* Agardh | 1988 | | | + | | | | | | | | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | Euglenophyta: | 1987 | | | | | + | | | | | | | | | | |
| | | • | *Euglena* sp. | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | | |
| b | 3 | • | *E.* sp. (*E. ehrenbergii* Kleb.?) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| b | 4 | • | *E.* sp. (*E. gasteroideus* Skuja?) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| b | 4 | • | *Phacus* sp. (*Ph. caudatus* Hübn.?) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | • | *Ph. hamatus* Pochm. (Fig. 7/1) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | + | | | | | | | | | | | | | |
| b | 5 | • | *Ph.* sp. (*Ph. pleuronectes* (O.F.Müll.) Duj. var. *pleuronectes*?) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| b | — | • | *Ph.* sp. (*Ph. pyrum* (Ehr.) Stein?) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | • | *Ph.* sp. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| o | — | • | Xanthophyceae: *Ophiocytium arbuscula* (A. Br.) Rabenhorst | 1988 | | | | | | | | | | | | | | | | | x | | | | | | | | |
| o-b | — | | *O. cochleare* (Eichwald) A. Br. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | x | | | + | | | | | | + | | x | | | | | | | | |
| | | | | 1990 | | | | | | | | | | + | | | | | | + | | | | | | | | | |
| | | | *O. maius* Naegeli | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *O. parvulum* (Perty) A. Br. | 1988 | | | | | | + | + | | x | | + | + | | | | | | | | + | | | | | |
| | | | | 1990 | + | + | | | | | | | | + | | | + | | | + | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6h | 1 | 1Ta | 1Td | 2 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | November | | | |
| b | 3 | • | *E.* sp. (*E. ehrenbergii* Kleb.?) | 1988 | | | | | | + | | | | | | | | |
| b | 4 | • | *E.* sp. (*E. gasteroideus* Skuja?) | 1988 | | | x | | | | | | | | | | | |
| b | 4 | • | *Phacus* sp. (*Ph. caudatus* Hübn.?) | 1988 | | | + | | | | | | | | | | | |
| | | • | *Ph. hamatus* Pochm. (Fig. 7/1) | 1987 | | | | | | | | | | | | | | + |
| | | | | 1988 | | | + | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | |
| b | 5 | • | *Ph.* sp. (*Ph. pleuronectes* (O.F.Müll.) Duj. var. *pleuronectes*?) | 1987 | | | | + | + | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | + | | |
| b | — | • | *Ph.* sp. (*Ph. pyrum* (Ehr.) Stein?) | 1988 | | | | | | | | | | | | | | |
| | | • | *Ph.* sp. | 1987 | | | | | | | | | | | | | | + |
| o | — | • | Xanthophyceae: *Ophiocytium arbuscula* (A. Br.) Rabenhorst | 1988 | | | | | | | | | | | | | | |
| o-b | — | | *O. cochleare* (Eichwald) A. Br. | 1987 | | | | | | | | | | + | | | | |
| | | | | 1988 | | | | | | | | | | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | |
| | | | *O. maius* Naegeli | 1988 | | | | | | | | | | | + | | | |
| | | | *O. parvulum* (Perty) A. Br. | 1988 | | | | | | | | | | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 March | 2 March | 3 March | 3B March | 9 March | 1 April | 2 April | 2B April | 3 April | 3B April | 8 April | 1 May | 1B May | 2 May | 3 May | 3B May | 1 June | 2 June | 3 June | 1 July | 2 July | 3 July | 4 July | 2 August | 6t August |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Tribonema regulare* Pascher | 1990 | + | | | | | | | | | | | | | | | | | | | | | | | |
| o-a | — | | *T. viride* Pascher | 1988 | | | | | | | | | + | | | | | | | | | | | + | | | | |
| | | | | 1990 | | + | + | | | | + | + | + | | | | + | + | + | + | | | | | | | | |
| x-o | — | * | *T. vulgare* Pascher | 1987 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | + | | | | | | + | | | | + | x | | + | | |
| | | | | 1990 | + | + | + | | | | | | | + | | | + | | | | | | | | | | | |
| x-b | 2 | | *Vaucheria sessilis* (Vaucher) DC. in Lam. et DC. (Fig. 7/2.) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | + | + | | | | | | | | | | |
| | | | *V.* sp. (*V. sessilis* ?) oogonium | 1988 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *V.* sp. (*V. sessilis* ?) filaments | 1988 | | | | | | | | | | | | | | | | | | | | | | | | |
| o-b | 1 | | Bacillariophyceae: | 1987 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *Amphora ovalis* Kütz. | 1988 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | + | | | | | | | | | + | | | | | | | | | | | | | | |
| b | 4 | | *Cymbella aspera* (Ehr.) Cleve (Fig. 7/3) | 1988 | | | | | | | | | | | + | | | | | | | + | | | | | | |
| | | | | 1990 | | | | | + | | | | | | | | | | | + | | | | | | | | |
| | | | *Epithemia argus* Kütz. | 1988 | | | | | | | + | | | | | | | | | | + | | | | | | | |
| | | * | *E.* sp. (*E. Muelleri* Fricke?) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | + |

Table 4. (continued)

| s | G | | | Year | 1Td September | 2 September | 4 September | 6 September | 6h September | 1 October | 1Ta October | 1Td October | 2 October | 4 October | 4Ta October | 2 November | 3 November | 4 November | 4B November |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *Tribonema regulare* Pascher | 1990 | | | | | | | | | | | | | | | |
| o-a | — | | *T. viride* Pascher | 1988 | | | | | | | | | | | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| x-o | — | * | *T. vulgare* Pascher | 1987 | | | | + | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| x-b | 2 | | *Vaucheria sessilis* (Vaucher) DC. in Lam. et DC. (Fig. 7/2) | 1988 | | | | | | + | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *V.* sp. (*V. sessilis* ?) oogonium | 1988 | + | | | | | | | | | | | | | | |
| | | | *V.* sp. (*V. sessilis* ?) filaments | 1988 | | | | | | + | | + | | | | | | | |
| o-b | 1 | | Bacillariophyceae: | 1987 | | | | | | | | | | x | | | | | |
| | | | *Amphora ovalis* Kütz. | 1988 | | | | | | + | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b | 4 | | *Cymbella aspera* (Ehr.) Cleve (Fig. 7/3) | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *Epithemia argus* Kütz. | 1988 | | | | | | | | | | | | | | | |
| | | * | *E.* sp. (*E. Muelleri* Fricke?) | 1988 | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | |
| b | — | | *E. turgida* (Ehr.) Kütz. (Fig. 7/4.) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | + | | | + | x | | + |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | + | | | | + | + | | + | | | | | | + | | | | | | | | | |
| o | 2 | | *Eunotia lunaris* (Ehr.) Grunow | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| o-b | 3 | | *Fragilaria capucina* Desmazières | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | + | | | + | | | | | | | | | | | | | | | | + |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | + | | | + | | | | | | | | | + | | | x | | | | | | | | | |
| b | 4 | | *Gomphonema acuminatum* (Ehr.) Grunow (Fig. 7/5) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | • | *G.* sp. (*G. acuminatum* (Ehr.) Grunow?) (g.) (Fig. 7/9) | 1990 | | | | | + | | | | | | | | | | | | | | | | | | | | |
| b | 1 | • | *G. olivaceum* (Lyngbye) Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | + |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | • | *G.* sp. (*G. olivaceum* (Lyngbye) Kütz. ?) (g.) | 1990 | | | | | + | | | | | | | | | | | | | | | | | | | | |
| | | • | *G.* sp. (g.) (Fig. 7/8) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | + | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6h | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | B | 2 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| b | — | | *E. turgida* (Ehr.) Kütz. (Fig. 7/4.) | 1987 | | + | | + | + | | | | + | x | | | | x | x |
| | | | | 1988 | + | | | | | | | | + | | | | | | |
| | | | | 1989 | | | | | | | | | | | | x | x | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| o | 2 | | *Eunotia lunaris* (Ehr.) Grunow | 1987 | | | | | | | | | | + | | | | | |
| o-b | 3 | | *Fragilaria capucina* Desmazières | 1987 | | | | + | | | | | | + | | | | | + |
| | | | | 1988 | + | | | | | | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | + | + | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b | 4 | | *Gomphonema acuminatum* (Ehr.) Grunow (Fig. 7/5) | 1987 | | | | | | | | | | | | + | | | |
| | | | | 1988 | + | | | | | | | | | | | | | | |
| | | • | *G.* sp. (*G. acuminatum* (Ehr.) Grunow?) (g.) (Fig. 7/9) | 1990 | | | | | | | | | | | | | | | |
| b | 1 | • | *G. olivaceum* (Lyngbye) Kütz. | 1987 | | | | | | | | | | | | + | | | + |
| | | | | 1988 | + | | | | | | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | + | | | |
| | | • | *G.* sp. (*G. olivaceum* (Lyngbye) Kütz. ?) (g.) | 1990 | | | | | | | | | | | | | | | |
| | | • | *G.* sp. (g.) (Fig. 7/8.) | 1987 | | | | | | | | | | + | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | + | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | |
| o-b | 3 | | *Melosira italica* (Ehr.) Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | + |
| | | | | 1990 | | | | | | | | | | + | | | | | | | | | | | | | | | |
| x-o | 2 | | *Meridion circulare* Agardh | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | + | | | | | | | | | | | | | | | + | | | + | | | | | + |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | + | | | | + | | | | | | | | | | | | | | | | | |
| b-a | 3 | | *Navicula cuspidata* Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | + | | | | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | + | | | | | | + | | | | | | | | | | | | | | | |
| o-b | — | | *N. oblonga* Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | | | | | | | | + | | | | | | |
| | | | | 1990 | | | | | | | | | | + | | | | | | + | | | | | | | | | |
| o-b | 3 | | *N. radiosa* Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | | | | + | | | | | | | | | | + |
| | | | | 1990 | | | | | | | | | | + | | | + | | | | | | | | | | | | |
| | | • | *N.* sp. (*N. radiosa* Kütz.?) (g.) (Fig. 7/10) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | + | |
| o-b | 3 | • | *Nitzschia Heufleriana* Grunow | 1988 | | | | | | | | | | | | | | | | | | | | + | | | | | |
| a | 5 | • | *N. hungarica* Grunow | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | x |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6h | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| o-b | 3 | | *Melosira italica* (Ehr.) Kütz. | 1987 | | | | | | | | | | + | | | | | |
| | | | | 1988 | + | | | | | + | | | | + | + | + | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| x-o | 2 | | *Meridion circulare* Agardh | 1987 | | + | | | | | | | | + | | + | | | + |
| | | | | 1988 | + | | | | | + | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | + | + | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b-a | 3 | | *Navicula cuspidata* Kütz. | 1987 | | | | | | | | | | + | | | | | + |
| | | | | 1988 | | | | | | + | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | | + | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| o-b | — | | *N. oblonga* Kütz. | 1987 | | | | | | | | | | + | | | | | |
| | | | | 1988 | | | + | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| o-b | 3 | | *N. radiosa* Kütz. | 1987 | | | | | x | | | | | | | | | | + |
| | | | | 1988 | + | | | | | + | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | • | *N.* sp. (*N. radiosa* Kütz.?) (g.) (Fig. 7/10) | 1988 | | | | | | | | | | | + | | | | |
| o-b | 3 | • | *Nitzschia Heufleriana* Grunow | 1988 | | | | | | | | | | | | | | | |
| a | 5 | • | *N. hungarica* Grunow | 1988 | | | + | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | |
| b | 4 | | *N. signoidea* (Ehr.) W. Smith | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | + | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | | + | | | | | | | | | |
| | | | *N. spectabilis* (Ehr.) Ralfs | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | + | + | | | | | |
| | | | | 1990 | | | | + | | | | | | | | | + | | + | | | | | | | | | | |
| b | 5 | | *Pinnularia maior* (Kütz.) Cleve (Fig. 7/6) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | | | | | | | + | | | + | | | | + |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | + | + | | | + | | | x | | + | | + | | | | | | | | | | | |
| b | 5 | | *P. viridis* (Nitzsch.) Ehr. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | x | + | | | | | | | | | | | | | | | | | | |
| o | — | | *Rhopalodia gibba* (Ehr.) O. Müll. (Fig. 7/7) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | x | + | | | | | | | | | | | | | | | + | | | + | x | | | + |
| | | | | 1990 | + | + | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *R. gibba* var. *ventricosa* (Ehr.) Grunow | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | + |
| | | | | 1990 | | | | | | | | | | + | | | | | | | | | | | | | | | |
| b | — | | *Stauroneis anceps* Ehr. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | | | | | | | | | | | | | | + |
| | | | | 1990 | | | | | | | | + | | + | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6h | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| b | 4 | | *N. signoidea* (Ehr.) W. Smith | 1987 | | | | | | | | | | + | | | | | + |
| | | | | 1988 | | | | | | x | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | + | + | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *N. spectabilis* (Ehr.) Ralfs | 1987 | | | | | | | | | | + | | | | + | |
| | | | | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b | 5 | | *Pinnularia maior* (Kütz.) Cleve (Fig. 7/6) | 1987 | | + | | | | | | | | + | | | | | x |
| | | | | 1988 | | | + | | | x | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | | + | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b | 5 | | *P. viridis* (Nitzsch.) Ehr. | 1987 | | | | + | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | |
| o | — | | *Rhopalodia gibba* (Ehr.) O. Müll. (Fig. 7/7) | 1987 | | | | | | | | | | + | + | | | | |
| | | | | 1988 | | | | | | | | | | + | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *R. gibba* var. *ventricosa* (Ehr.) Grunow | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b | — | | *Stauroneis anceps* Ehr. | 1987 | | | | + | x | | | | | + | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | | |
| | | • | *Synedra* sp. (*S. tenera* W. Smith ?) | 1990 | | | | | | | | + | | | | | | | | | | | | | | | | | |
| | | | *S. ulna* (Nitzsch.) Ehr. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | + | | | | | | + | | |
| | | • | Pyrrophyta: *Peridinium willei* Huitf.-Kass | 1988 | | | | | | | | | | | | | | | x | | | | | | | | | | |
| | | • | *P.* sp. (Fig. 7/11) | 1988 | | | | | | | | | | | | | | | | | | | + | | | | | | | |
| | | | Chlorophyta: *Characium braunii* Brügg. | 1988 | | | | | | | | | x | | | | | | | | | | | | | | | | | |
| | | • | *C. ornithocephalum* A.Br. | 1990 | | | | | | | | x | | | | | | | | | | | | | | | | | | |
| | | • | *C. obtusum* A.Br. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | + | | | | | + | | | | | | | | | |
| | | • | *C. sieboldii* A.Br. | 1988 | | | | | | + | | | | | | | | | | | | | | | | | | | | |
| | | • | *C. strictum* A.Br. | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | + | | | | | | | | | | | | | | | | | | | | | | | |
| p-a | 3 | | *Chlorella vulgaris* Beyernick | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | x | | | | | | | | | | | | | | | | + | | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | + | | | + | | | | | | | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6h | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| | | • | *Synedra* sp. (*S. tenera* W. Smith ?) | 1990 | | | | | | | | | | | | | | | |
| | | | *S. ulna* (Nitzsch.) Ehr. | 1987 | | + | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | |
| | | • | Pyrrophyta: *Peridinium willei* Huitf.-Kass | 1988 | | | | | | | | | | | | | | | |
| | | • | *P.* sp. (Fig. 7/11) | 1988 | | | | | | | | | | | | | | | |
| | | | Chlorophyta: *Characium braunii* Brügg. | 1988 | | | | | | | | | | | | | | | |
| | | • | *C. ornithocephalum* A.Br. | 1990 | | | | | | | | | | | | | | | |
| | | • | *C. obtusum* A.Br. | 1987 | | | | | | | | | | | | | | | + |
| | | | | 1988 | | | | | | | | | | + | + | | | | |
| | | • | *C. sieboldii* A.Br. | 1988 | | | | | | | | | | | | | | | |
| | | • | *C. strictum* A.Br. | 1988 | | | | | | + | | | | + | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| p-a | 3 | | *Chlorella vulgaris* Beyernick | 1987 | | | | + | | | | | | + | | | | + | |
| | | | | 1988 | | | | | | | | | | + | + | | | | |
| | | | | 1989 | | | | | | | | | | | | + | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | |
| b | 1 | | *Cladophora glomerata* (L.) Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | + | | | | | | | | | + | | | | | + | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | + | | | | + | | | | | | | | | | | + | | | | | | | | | |
| | | * | *Closteriococcus viernheimensis* Schmidle | 1990 | + | | + | | | | | | | | | | | | | | | | | | | | | | |
| | | * | *C. viernheimensis* Schmidle f. *maior* Hortob. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | + |
| b | 4 | * | *Closterium ehrenbergii* Menegh. var. *ehrenbergii* | 1988 | | | | | | | | | | | | | | | | | + | | + | | | | | | |
| | | * | *Closterium lanceolatum* Kütz. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | + | | x | | | | | | | | | | | | | | | |
| b | 3 | * | *C. moniliferum* (Bory) Ehr. (Fig. 7/12) | 1990 | | | | | | | | + | | | | | | | | | | | | | | | | | |
| b | 4 | * | *Closterium parvulum* Naegeli | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | x | | | | | | | | | | | | + | | |
| | | * | *C. pusillum* Hantzsch | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | + | | | | | | | + | | | | | | | | | | | | | | | | | |
| | | * | *Coelastrum* sp. ? | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *Crucigenia quadrata* Morren | 1988 | | | | | | + | | | | | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6k | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| b | 1 | | *Cladophora glomerata* (L.) Kütz. | 1987 | | | | | + | | | | | | | | | | + |
| | | | | 1988 | | | + | | | | | | | + | + | | | | |
| | | | | 1989 | | | | | | | | | | | | | + | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *Closteriococcus viernheimensis* Schmidle | 1990 | | | | | | | | | | | | | | | |
| | | * | *C. viernheimensis* Schmidle f. *maior* Hortob. | 1987 | | | | | | | | | | | | | | | + |
| | | | | 1988 | | | | | | | | | | | | | | | |
| b | 4 | * | *Closterium ehrenbergii* Menegh. var. *ehrenbergii* | 1988 | | | | | x | | | | | | + | | | | |
| | | * | *Closterium lanceolatum* Kütz. | 1987 | | | | | | | | | | | | | | | + |
| | | | | 1988 | | | | | + | | | | + | | x | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b | 3 | * | *C. moniliferum* (Bory) Ehr. (Fig. 7/12) | 1990 | | | | | | | | | | | | | | | |
| b | 4 | * | *Closterium parvulum* Naegeli | 1987 | | | | | + | | | | x | | | | | | |
| | | | | 1988 | | | | | | | | | | | + | | | | |
| | | * | *C. pusillum Hantzsch* | 1989 | | | | | | | | | | | | + | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *Coelastrum* sp. ? | 1988 | | | + | | | | | | | | | | | | |
| | | | *Crucigenia quadrata* Morren | 1988 | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | |
| | | | *Cylindrocapsa geminella* Wolle (Fig. 7/13) | 1988 | | | | | | | | | | | | | | | | | | | | | x | + | | |
| | | * | *C. geminella* Wolle cells? (d: 15 µm) | 1988 | | | | | | | | | | | | | | | | | | | | | + | x | | |
| | | | | 1990 | | | | | | | | | | + | | | | | | | | | | | | | | |
| | | * | *Oedogonium* sp.1. (20 µm wide ♀) (Fig. 7/14) | 1988 | | | | | | | | | + | | | | | | | | | | + | | | | | |
| | | * | *O.* sp.2. (25 µm wide ♀) (Fig. 7/15) | 1990 | | | | | | | | | | | | | | | | + | | | | | | | | |
| | | * | *O.* sp.3. (17.5 µm wide) | 1988 | | | | | | | | | + | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | + | | | | | | | | | | | | | | | | | | |
| | | * | *O.* sp.4. (*O. pringsheimii* Cramer ?)(15 µm wide) (Fig. 7/16) | 1990 | | | | | | | | | | | | | | | | + | | | | | | | | |
| | | * | *O.* sp.5. (15 µm wide) | 1988 | | | | | | | | | | | | | | | | + | | | | | | | | |
| | | | | 1990 | | | | | | | | + | + | | | | + | | | | | | | | | | | | |
| novum | | * | *O. inversum* Wittr. f. *subclusum* (12.5 µm wide) (Fig. 7/17) | 1988 | | | | | | | | | | | | | | | | x | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | * | *O.* sp.77. (12.5 µm wide ♂?) (Fig. 7/18) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | * | *O.* sp.8. (*O. inversum* Wittr.?) (12.5 µm wide ♀) | 1988 | | | | | | | + | | | | | | | | | | | | | | x | + | | + |
| | | | | 1990 | + | | | | | | + | | | | | | | | | | | | | | | | | | |
| | | | *O.* sp.9. (*O. pisanum* Wittr.?) (10 µm wide, ♀) | 1988 | | | | | | + | | | | | | + | | | | + | | | | | + | | + | |
| | | | | 1990 | | | | | + | | | | | + | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6h | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| | | | *Cylindrocapsa geminella* Wolle (Fig. 7/13) | 1988 | | | | | | | | | | + | | | | | |
| | | * | *C. geminella* Wolle cells? (d: 15 µm) | 1988 | | | | | | | | | | x | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *Oedogonium* sp.1. (20 µm wide ♀) (Fig. 7/14) | 1988 | | | | | | | | | | | | | | | |
| | | * | *O.* sp.2. (25 µm wide ♀) (Fig. 7/15) | 1990 | | | | | | | | | | | | | | | |
| | | * | *O.* sp.3. (17.5 µm wide) | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *O.* sp.4. (*O. pringsheimii* Cramer ?)(15 µm wide) (Fig. 7/16) | 1990 | | | | | | | | | | | | | | | |
| | | * | *O.* sp.5. (15 µm wide) | 1988 | | | | | | | | | | | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| novum | | * | *O. inversum* Wittr. f. *subclusum* (12.5 µm wide) (Fig. 7/17) | 1988 | | | | | | | | | | | | | | | |
| | | | | 1989 | | | | | | | | | | | | | + | | |
| | | * | *O.* sp.77. (12.5 µm wide ♂?) (Fig. 7/18) | 1987 | | | | | | | | | | | | + | | | |
| | | * | *O.* sp.8. (*O. inversum* Wittr.?) 12.5 µm wide ♀) | 1988 | | | | | | + | | | | + | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *O.* sp.9. (*O. pisanum* Wittr.?) 10 µm wide, ♀) | 1988 | | | | | | | | | | + | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 | 2 | 3 | 3B | 9 | 1 | 2 | 2B | 3 | 3B | 8 | 1 | 1B | 2 | 3 | 3B | 1 | 2 | 3 | 1 | 2 | 3 | 4 | 2 | 6t |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | March | | | | | April | | | | | | May | | | | | June | | | July | | | | August | |
| | | • | *O.* sp.10. (8-8.7 μm wide ) | 1988 | | | | | | + | | | | | | | | | | | | | | | | + | | | |
| | | • | *O.* sp.11. (7.5 μm wide) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | + |
| | | | | 1990 | | | | | | | + | | | | | | | | | | | | | | | | | | |
| | | • | *O.* sp.12. (5 μm wide, ♀) | 1988 | | | | | | | | | | | + | | | | | | | | | | | | | | |
| | | • | *Oocystis pelagica* Lemm. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | | | | | | | | | | + | | | | | x | | |
| | | | | 1990 | + | | | | | | + | | + | | | | | | | | | | | | | | | | |
| | | | *Oocystidium ovale* Kors. | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | • | *Protococcus viridis* Agardh ? (Fig. 7/19) | 1988 | | | | | | | | | | | | | | | | | + | | | | | | | | |
| | | | *Scenedesmus acutus* (Meyen) Chod. | 1988 | | | | | | | | | | | | | | | | | | | | | | | | + | |
| | | • | *S. acutus* (Meyen) Chod. f. *alternans* Hortob. | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *S. ecornis* (Ralfs) Chod. | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1988 | | | | | | | | | + | | | | | | | | | | | | | | | | x |
| | | | | 1990 | | | | | | | | | | | | | | | | + | | | | | | | | | |
| b | 3 | | *S. quadricaudata* (Turp.) Bréb. | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | • | *Spirogyra* sp.1. (17.5 μm wide, chromatophore: 1) | 1988 | | | | | | | | | | | | | | | | | | | | | | + | | | |
| | | | | 1990 | | | | | | | | | | | | | | | + | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td | 2 | 4 | 6 | 6b | 1 | 1Ta | 1Td | 2 | 4 | 4Ta | 2 | 3 | 4 | 4B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | September | | | | | October | | | | | | November | | | |
| | | • | *O.* sp.10. (8-8.7 μm wide) | 1988 | | | | | | | | | | | | | | | |
| | | • | *O.* sp.11. (7.5 μm wide) | 1988 | | | | | | + | | | | + | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | • | *O.* sp.12. (5 μm wide, ♀) | 1988 | | | | | | | | | | | | | | | |
| | | • | *Oocystis pelagica* Lemm. | 1987 | | | | | | | | | | | | | | + | |
| | | | | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | | *Oocystidium ovale* Kors. | 1988 | | | | | | | | | | | + | | | | |
| | | • | *Protococcus viridis* Agardh ? (Fig. 7/19) | 1988 | | | | | | | | | | | | | | | |
| | | | *Scenedesmus acutus* (Meyen) Chod. | 1988 | | | | | | | | | | + | + | | | | |
| | | • | *S. acutus* (Meyen) Chod. f. *alternans* Hortob. | 1988 | | | | | | | | | | | + | | | | |
| | | | *S. ecornis* (Ralfs) Chod. | 1987 | | | | | | | | | | | + | | | | |
| | | | | 1988 | | | + | | | | | | | + | + | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| b | 3 | | *S. quadricaudata* (Turp.) Bréb. | 1988 | | | + | | | | | | | | + | | | | |
| | | • | *Spirogyra* sp.1. (17.5 μm wide, chromatophore: 1) | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1 March | 2 March | 3 March | 3B March | 9 March | 1 April | 2 April | 2B April | 3 April | 3B April | 8 April | 1 May | 1B May | 2 May | 3 May | 3B May | 1 June | 2 June | 3 June | 1 July | 2 July | 3 July | 4 July | 2 August | 6t August |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *S. longata* (Vaucher) Kütz. | 1988 | | | | | | | | | + | | | | | | + | | | | + | | | + | + | | |
| | | | | 1989 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | + | | | | | | | + | | | x | + | | | + | | | | | | | | | |
| | | * | *S.* sp.3. (30 μm wide, chromatophore: 2) | 1988 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | + | | | | | | + | | + | | | | | | | | | |
| | | * | *S.* sp. (*S. dubia* Kütz. ?) (50 μm wide, chromatophore: 2) | 1990 | | | | | | | | | | | | | | | | + | | | | | | | | | |
| b-a | — | * | *S.* sp. (*S.neglecta*(Hass) Kütz.?) (60 μm wide, chromatophore: 2—3) | 1990 | | | | | | | | | | | | + | | | | | | | | | | | | | |
| | | | *Tetraëdron proteiforme* (Turn) Brunneth (Fig. 7/20) | 1987 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | *Ulothrix* sp. | 1988 | | | | | | | | | + | | + | | | | | | | | | | | | | | |
| | | | | 1990 | + | | | | | | | | | | | + | | | | | | | | | | | | | |
| | | * | *Zygnema* sp. (*Z. pectinatum* (Vaucher) Agardh ?) | 1988 | | | | | | | | | | | | | | | | | | | + | | | + | | | |
| | | | | 1990 | | | | | | | | | | + | | | | | | | | | | | | | | | |

Table 4. (continued)

| s | G | | | Year | 1Td September | 2 September | 4 September | 6 September | 6h September | 1 October | 1Ta October | 1Td October | 2 October | 4 October | 4Ta October | 2 November | 3 November | 4 November | 4B November |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | *S. longata* (Vaucher) Kütz. | 1988 | | | | | | | | | + | | + | | | | |
| | | | | 1989 | | | | | | | | | | | | + | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *S.* sp.3. (30 μm wide, chromatophore: 2) | 1988 | | | | | | | | | | + | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *S.* sp. (*S. dubia* Kütz. ?) (50 μm wide, chromatophore: 2) | 1990 | | | | | | | | | | | | | | | |
| b-a | — | * | *S.* sp. (*S.neglecta*(Hass) Kütz.?) (60 μm wide, chromatophore: 2—3) | 1990 | | | | | | | | | | | | | | | |
| | | | *Tetraëdron proteiforme* (Turn) Brunneth (Fig. 7/20) | 1987 | | | | | | | | | | | | | | | + |
| | | | *Ulothrix* sp. | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |
| | | * | *Zygnema* sp. (*Z. pectinatum* (Vaucher) Agardh ?) | 1988 | | | | | | | | | | | | | | | |
| | | | | 1990 | | | | | | | | | | | | | | | |