STUDIA BOTANICA HUNGARICA
(Antea: Fragmenta Botanica)
XX. 1988 p. 63-75

The alga species of the Csömör pool

By
E. STOLLMAYER-BONCZ

(Received October 30, 1987)

Abstract: There is a peaty, marshy area near the village of Csömör, Pest county, surrounded by agricultural land which received protection in 1977. The higher plants of this pool have previously been reported by the author. In this publication a survey of the alga species found in the turbary pool is presented. Fifteen out of the 69 identified species are considered to be rare in Hungary.

THE NATURAL GEOGRAPHICAL CONDITIONS OF THE CSÖMÖR POOL AND ITS SURROUNDINGS

The small pool near Csömör is found in the left-hand side lateral valley of the stream Forrás, surrounded by agricultural land. It is marked by the OMMI genetic soil map as agriculturally untillable land. The pool cannot be found on maps, probably because of its small size. There is not much open water. In accordance with the weather and precipitation either the mobile sphagnum "island" in the middle of the pool is covered by water or, especially when drained, one can easily reach it in ankle boots on the moving moory surface.

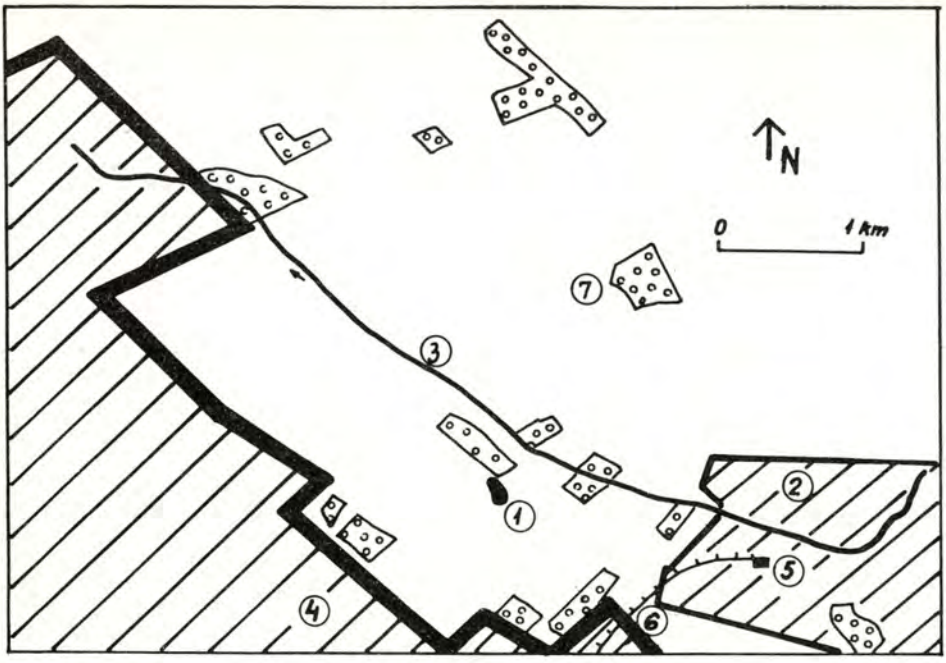
The studied pool is found in the northern Pest Plain part of the Dunamenti (Danube) Plain of varied relief, broken by alluvial aprons in the left-hand side lateral valley of the stream Forrás (alternatively known as Csömör) (Map 1). The stream Forrás is one of the third-rate left-hand side affluents of the Danube with extremely clear water. It runs into the stream Mogyoród which is the right-hand side current of the stream Szilas.

The most important characteristics of the Pest Plain are as follows: Its area covers 700 km^2, mean annual temperature is 10°C, annual precipitation is 600 mm, annual evaporation is 525 mm, annual outlet rate is 2.5 l/sec/km^2. The currents of the region are fed by springs seeping through the surface of Pliocene-Miocene strata on its eastern border (MAROSI and SZILÁRD 1967).

The pH of the water of the pool was 5.5 to 6.0, as determined by the generally used test paper on the spot.

The valley surrounding the pool is placed on bed No. 3 of the Danube of the Middle Pleistocene, 34 m above the zero point of the Danube, north of the bed No. 4 without an overflow.

The protected valley is covered by meadows, on boggy soils mainly with hayfields. Although the land on the northeastern and southwestern side of the pool is covered by sand and gravel, they are cultivated.



Map 1. Map of Csömör pool
1= Csömör pool, 2= village Csömör, 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 lake was marked by B.E. Ákos Stollmayer.

BRIEF FLORISTIC CHARACTERIZATION OF THE CSÖMÖR POOL

The surroundings of the Csömör pool belong to the Praematricum district of the Europannonicum floristic region of the Pannonian sector (Pannonicum) within the Central European province of the Holarctic Realm. The territory had been unexplored botanically until 1976. Previous to the author's publication (1982), only Amblystegium riparium was mentioned by BORBÁS (1879) of all the plants of the fields along the stream Forrás.

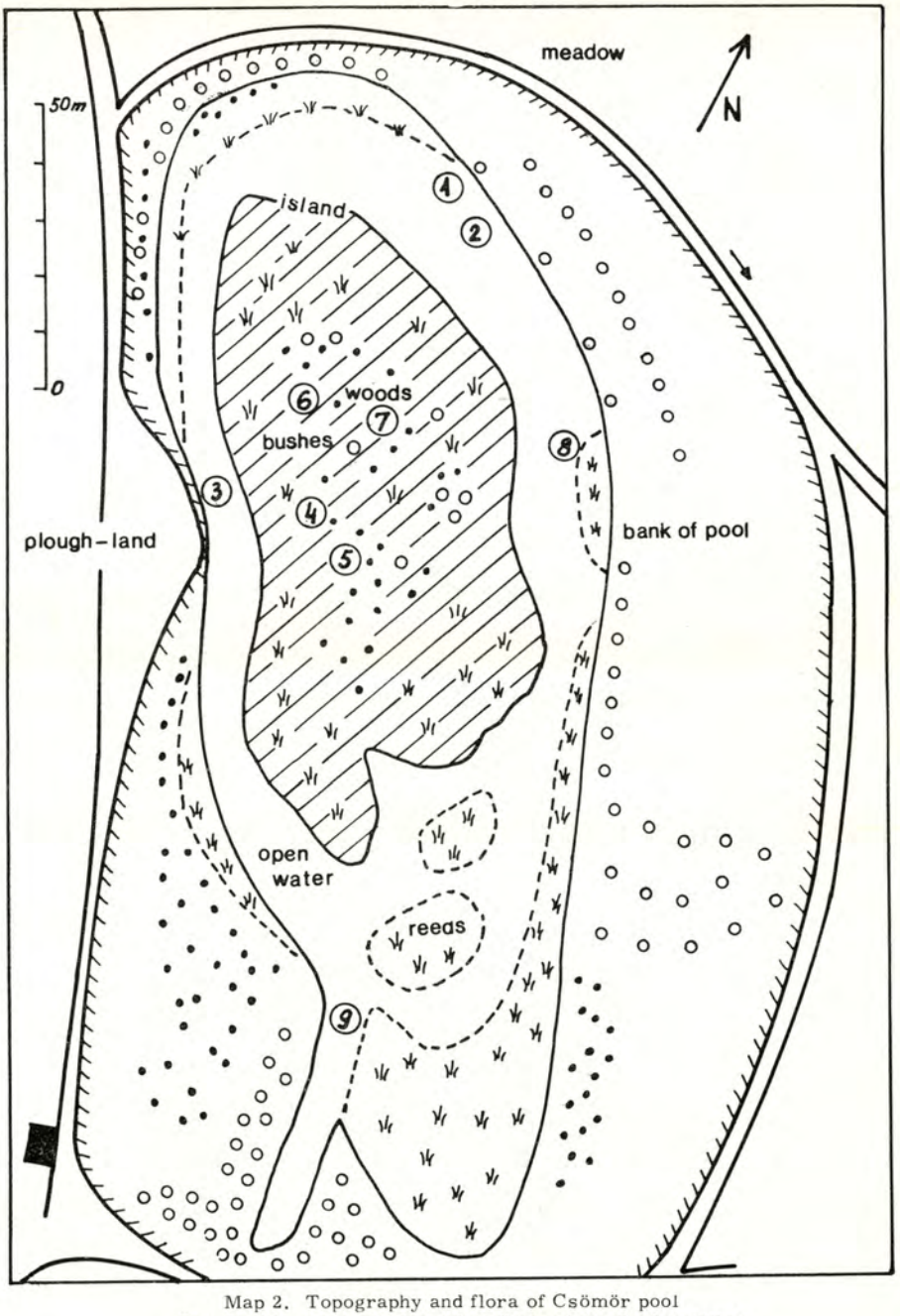
While exploring the territory earlier, many valuable species were found. The boreal Thuidium lanatum (Syn.: Helodium Blandowii) and 3 Sphagnum species (S. fimbriatum, S. recurvum, S. squarrosum) should be noted among the 17 species of mosses identified from the pool.

The great quantity of the fern Lastrea thelypteris is especially valuable among the Pteridophyta.

Epipactis palustris blooming on the "island" and the tremendous number of Dactylorhiza incarnata on the meadow between the pool and the stream are of especially great value.

Several species of Populus (P. alba, P. tremula) and Salix (S. cinerea, S. triandra) are found on the shore and on the island.

There are many Phragmites australis, Typha latifolia and a great number of Typha augustifolia, mainly in the northern and western parts. The pool - especially in dry weather



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

when the water almost disappears - is totally covered by them. The open water is overgrown by Lemna species (L. minor, L. trisulca), Mentha aquatica, Myosotis palustris, Myosoton aquaticum, Polygonum amphibium f. aquaticum, Rorippa amphibia, etc. depending on the season and the quantity of water.

The filamentous algae sometimes cause water-bloom to the great delight of the frogs and small crabs.

Seeing the abundance of alga species in the samples taken during the water-bloom made me really be interested in the flora of the pool. Species of Vorticella, Rotatoria, Ostracoda, etc. could always be found in the samples. I had found such a great number of species in such a large quantities that it became possible for me to begin my preliminary studies in 1984-85. At the same time I had the opportunity of starting my algological research in the Botanical Department of the Hungarian Natural History Museum.

CHARACTERISTIC FEATURES OF THE LOCALITIES

Following the snowbreak in spring, especially if this season is rather wet, the pool is full of water. At that time even some open water can be seen. It is rather difficult to reach the island at that time (Map 2).

Some open water can even be found in the localities Nos 2, 3 and 9 following warm summer weather if the precipitation in winter and spring was abundant. The pool can become so dry after a very droughty weather that the island can be approached on foot but among the sphagnum spots water can be ladled out.

The year of 1984 was just the same as described above. Not all the localities were suitable for taking samples. It was almost impossible to get there because of the deep water, then because of the drainage. I chose those localities which seemed to be different from the distance, however, which could be approached easily (Map 2).

In 1984 I collected monthly samples at localities Nos 1-7 from April to December. Samples were taken only in May in 1985, but the number of localities grew to 9.

Samples were taken to obtain some information on localities Nos 1, 2, 3, 4 in April 1984. Later on some more investigation was carried out at 3 further localities and with different methods. Both in August and in September it was so dry that samples could be taken only from the water by seeping into the footprints of my boots, and even so only at two (Nos 1, 5) and one (No. 2) localities, respectively. Samples were taken at two further localities of the pool (Nos 8, 9) in May 1985. May could be considered as the most successful month of the year in 1984 (Table 5).

Localities Nos 1, 2, 3, 8 and 9 can easily by approached from the shore. Locality No. 1 is covered with bulrush and sedge, the others have areas with open water surface for a rather long time.

Localities Nos 4-7 are found on the island covered with sphagnum and Lastrea thelypteris. Sample No. 6 is water squeezed from sphagnum, sample No. 4 was collected from the open water among the sphagnum. Samples Nos 5, 6 are from the water collected in a bottle sunk into an open sphagnum bolster.

Samples were taken from two further localities (Nos 8, 9) during the year 1985 (Map 2).

THE METHOD OF TESTING

Samples were taken monthly in 3 dls fruit-jars with screw-cap. The pH of the water of the pool was determined by test paper on the spot. (The value of pH determined at localities Nos 1, 2, 3, 4, 5 was 6.0, but at localities Nos 6, 7, 8, 9 it was only 5.5).

The samples were taken by ladling, except for the one taken at locality No. 6, as it was squeezed from the sphagnum. At home the samples were stirred, then a small quantity of each was poured into small bottles of about 50 mls for the live tests to be carried out. I tested these samples at once. I cultured the alga samples by keeping the bottles on a terrace, or in winter in front of a window facing north. Both the size of the bottles and the place proved to serve well as a micro-acquarium. These micro-acquariums were also useful for testing the further phases of development at a later date.

The remaining quantities of the samples were fixed in formalin on the day of collection. After leaving the sample to settle for some days, the dense sediment was placed into bottles of 150 mls. Principally the fixed samples were identified. Diatoms were dissected by destruction with hydrogen peroxide.

The following works were used to identify the species: BARTA et al. (1976), DIEL (1975), ETTL (1978), FELFÖLDY (1972, 1981), HORTOBÁGYI (1968), KADŁUBOWSKA (1984), KRAMMER and LANGE-BERTALOT (1986), MROZINSKA (1985), PASCHER (1930), RIETH (1980), UHERKOVICH (1966), WOLLE (1887).

I had only a light-microscope at my disposal to identify the species. Not all the species found in the samples could be identified. Mainly I was interested in the species belonging to the Cyanophyta, Chlorophyta, Xanthophyceae, and Bacillariophyceae groups. I did not identify the Cyanophyta and Chlorophyta threads as they were either very thin or identification was uncertain. The small Bacillariophyceae species, though abundant in the pool, were not identified either.

This test was only carried out in order to register the different species and then to state whether it is worth studying these alga species or not, and when the samples have to be taken. No quantitative data on the species were obtained in this study. Some of the algae could only be identified to the genus (Vaucheria sp., Ulothrix sp., Zygnema sp., Oedogonium sp.).

RESULTS

Taxonomic evaluation

As one can read out of Table 1, there are 19 cyanophytes among the 69 species identified here. Fifteen species out of these 19 can be found both in the pool and on the island, two species were found only in the pool (Anabaena aequalis at locality No. 1 and Plectonema gracillimum from Nos 1, 2, 3) and two only on the island (Lyngbya cryptovaginata from localities Nos 5, 7 and Hapalosiphon hybernicus from No. 4). After thoroughly checking in the Flora et Iconographia Algarum Hungariae, only Anabaena and Hapalosiphon can be specially found at any peaty locality in Hungary.

All the species of Xanthophyceae (7 species altogether) are from the pool, from localities Nos 1 and 3 (May, June).

Nine out of the 21 Bacillariophyceae species can be found both in the pool and on the island, 9 were found only in the pool and three occurred only on the island (Eunotia lunaris, Eunotia monodon var. maior, Nitzschia spectabilis). Yet they are not typical turbary species.

Among the 22 species of green algae nine were found both in the pool and the island, 10 were identified only in the pool, while three more species occurred only on the island (Characium hookeri, Crucigenia quadrata, Zygnema sp.) none of them characteristic for bogs.

SEASONALITY

Studying the seasonality of the groups (Table 2, Fig. 1) it can be stated that the most species occurred in June 1984 (8.8 species/sample) and in November (7 species/sample), the least number in September (4 species/sample), in October (4.4 species/sample) and in April (4.7 species/sample), respectively.

There is no essential difference between the species/sample ratio found in May, 1984 and in 1985. This value was 5.7 species/sample in May, 1984 and 5.5 species/sample in 1985, while 6.5 species/sample was found in August.

When studying the different groups (Table 3, Fig. 2) it can be observed that most of the Blue-green algae were found in November (20) and in June (14) while there were only three in September. The most diatoms were found in November (16) and July (12), while the minimum value could be observed in April (3). Once - during the drought in September - the sample was taken from the water gathering in an artificial hole. This must have been the reason for its zero value.

PATTERN

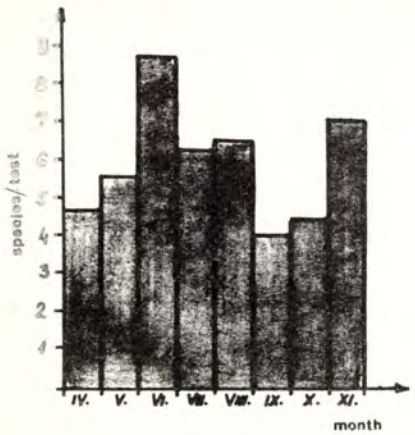


Fig. 1 Monthly distribution number of the alga species found in the Csömör pool

The different localities produced the alge species in a different quantities.

Locality No. 9 had practically no alga species at all. There were only few species found at Nos 8 and 6, none of them new for the area except for Crucigenia quadrata at No. 6. Localities Nos 1 and 3 - which seemed to have the most species even from a great distance - proved to have the greatest number of alga species. There was a high number of species in the samples taken at localities Nos 4, 5 and 7 as well.

It is worth-while to study the different species according to the localities. First let us survey them in a summary according to the groups and taxa (Table 1). There was a large number of species both in the pool and on the island. Some species occurred only in the pool, especially at locality No. 1. All the Xanthophyceae were found only in the pool. Eight species - which are not characteristic for sphagnum - could be collected only from the island. Turbary species were found in the pool, too. The fact that this pool is of a small size and it has a slope running from south to north, can explain the assumption that there is an overflow. Hence there is no great difference in the vegetation so that it could form special localities for the algae. Rather, the difference can be noted between the open water and the areas covered with bulrush, reed and sedge.

Studying the data of the species found in 1984-85 (Table 4), it can be stated that locality No. 1 comes first because of the 50 species found there. (Eleven species were identified only from here and 4 of them are considered to be rare species: Anabaena aequalis, Ophiocytium cochleare, O. parvulum, Navicula cuspidata, Characium eremosphaerae, Eudorina illinoisensis, Granulocystis verrucosa, Oocystidium sp., Pediastrum boryanum, Spirogyra insignis, Tetraedron proteiforme). Twelve species are from two localities, 4 of them being rare.

The next richest site is locality No. 2, where 26 species were found.

Twenty-four species were identified from locality No. 5 (one of these is rare known only from here: Eunotia monodon var. maior).

Locality No. 4 comes next with 23 species found only there. Three of them could be found only at this locality (Hapalosiphon hibernicus, Characium hookeri, Zygnema sp., two are considered to be rare) and other three species were collected from two localities (one of them rare).

Sixteen species were found at locality No. 7 (one of these species was collected only from this locality: Nitzschia spectabilis).

There was only one species at locality No. 6 (the sample was taken by squeezing) and this species occurred nowhere else (Crucigenia quadrata).

Neither locality No. 3 nor No. 8 had any species specific to these localities.

DISCUSSION

A taxonomic survey of the enumerated alga species (Table 4) clearly shows that the Csömör pool has a large number of species and many of them are considered rare in Hungary. The rare species found in the pool (based on own data) are the following: Anabaena aequalis, Hapalosiphon hibernicus, Nostoc paludosum, Spirogyra insignis (turbary species), Microchaete tenera, Microcystis firma, Nostoc entophytum, Plectonema gracillimum, Eu-

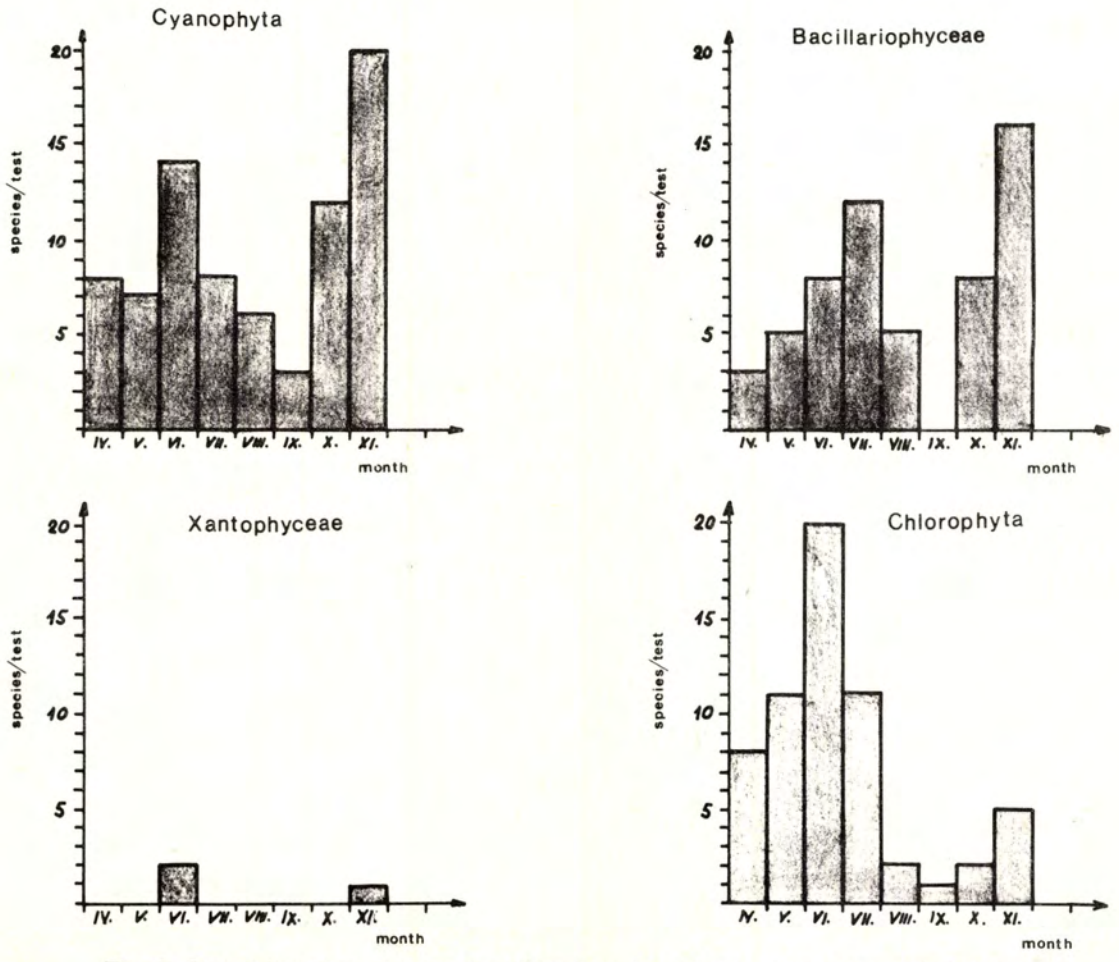


Fig. 2 Seasonality of the alga species of the Csömör pool according to taxonomic groups

Table 1

Distribution of the species according to their localities
(for the years 1984-85)

	Both pool and island	Only pool	Only island	Total
Cyanophyta	15	2	2	19
Xanthophyceae	-	7	-	7
Bacillariophyceae	9	9	3	21
Chlorophyta	9	10	3	22
Total	33	28	8	69

Table 2

Total number of the species according to both month and locality
(Map 2, Fig. 1)

	1984																																	1985							
	April				May					June					July					August		September	October					November						May							
	1	2	3	4	2	4	5	6	7	1	2	3	4	5	1	2	3	4	5	1	5	2	1	2	3	4	7	1	2	3	4	5	7	1	2	3	8	4	5	6	7
Cyanophyta	5	-	3	-	2	1	4	-	-	6	1	3	2	2	4	-	-	3	1	4	2	3	2	-	2	2	6	5	4	1	4	4	2	1	-	-	2	-	5	1	1
Xanthophyceae	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	1	-	-	-	-	-
Bacillariophyceae	1	-	2	-	5	-	-	-	-	5	2	-	1	-	8	-	-	2	2	4	1	-	-	-	-	-	8	6	3	4	2	-	1	6	1	-	8	1	3	-	-
Chlorophyta	4	-	2	2	3	2	4	1	1	6	6	5	1	2	2	2	-	3	3	1	1	1	-	-	-	-	2	2	-	-	1	2	-	4	-	-	-	3	3	-	1
Total	10	-	7	2	10	3	8	1	1	19	9	8	4	4	14	3	-	8	6	9	4	4	2	-	2	2	16	13	8	5	7	6	3	14	1	1	10	4	11	1	2
Species/sample	4.7				5.7					8.8					6.2					6.5		4	4.4					7						5.5							

Table 3

Monthly distribution of the studied algae
(See Fig. 2)

	1984								1985
	April	May	June	July	August	September	October	November	May
Cyanophyta	8	7	14	8	6	3	12	20	10
Xanthophyceae	-	-	2	-	-	-	-	1	4
Bacillariophyceae	3	5	8	12	5	-	8	16	19
Chlorophyta	8	11	20	11	2	1	2	5	11

Table 4

Details of the alga taxa of the Csömör pool.
The Arabic numerals stand for the localities (See Map 2)
The sign + stand for presence in 1984, x for 1984-85 and x for 1985.

	Localities																																			
	1	2	3	4	1	2	8	3	4	5	6	7	1	2	3	4	5	1	2	3	4	5	1	5	2	1	2	3	4	5	7	1	2	3	4	5	7
	April				May								June					July					August		September	October						November					
Cyanophyta:																																					
Anabaena aequalis Borge	+																																				
A. minutissima Lemm.	+										x		+					+			+		+			+		+	+		+	+	+				
A. sphaerica var. tenuis G.S. West.	+		+							+																											
A. sp.						+			+	+						+	+															+					
Aphanothece saxicola Näg.																		+																			+
Chroococcus minutus (Kütz.) Näg.	+				x		x																+	+	+						+				+		+
Coelosphaerium kützingianum Näg.			+							x																					+						
Hapalosiphon hibernicus W. et G.S. West.																																			+		
Lyngbya cryptovaginata Schkorb.										x																					+						
L. hyeronymusii Lemm.													+		+						+				+												
L. limnetica Lemm.						+							+														+			+							
Microchaete tenera Thur.													+																						+	+	

 Table 4 (cont. 1)

	Localities																																				
	1	2	3	4	1	2	8	3	4	5	6	7	1	2	3	4	5	1	2	3	4	5	1	5	2	1	2	3	4	5	7	1	2	3	4	5	7
	April				May								June					July					Au- gust		Sep- tem- ber	October						November					
Cyanophyta:																																					
Microcystis firma (Breb. et Lenorm) Schmidle																+		+														+					
M. pulverea (Wood) Forti										x							+	+			+	+															
Nostoc entophytum Born. et Flah.			+							+		x	+		+										+			+					+			+	
Nostoc paludosum Kg.																								+							+	+		+		+	
Oscillatoria planctonica Wolosz							x			x													+									+	+			+	
O. tenuis Agh										x													+								+				+		
Plectonema gracillimum (Zopf) Hang.	+												+	+	+																						
Xanthophyceae:																																					
Ophiocytium cochleare A. Braun													+																								
O. maius Naegeli					x			x																													
O. parvulum (Perty) A. Braun					x								+																								
Vaucheria sp. (terrestris?)					x																												+				
Bacillariophyceae:																																					
Amphora ovalis Kütz.						+																										+					
Cymbella aspera (Ehr.) Cleve			+													+																					
Epithemia argus Kütz.						+	x						+					+																+			
E. turgida (Ehr.) Kütz.	+								x																						+						
Eunotia lunaris (Ehr.) Grun.																					+										+						
E. monodon var. maior (W. Schmidt) Hust										x																											
Fragillaria capucina Desmazières					x		x			x			+									+										+					
Gomphonema acuminatum (Ehr.) Grunov					x	+	x																														
Melosira italica (Ehr.) Kütz.					x		x						+					+						+							+				+		
Meridion circulare Agh					x																													+			
Navicula cuspidata Kütz.																		+					+														

Table 4.. (cont. 2)

	Localities																																				
	1	2	3	4	1	2	8	3	4	5	6	7	1	2	3	4	5	1	2	3	4	5	1	5	2	1	2	3	4	5	7	1	2	3	4	5	7
	April				May								June					July					August		September	October						November					
Bacillariophyceae:																																					
N. oblonga Kütz.			+															+			+	+									+						
N. radiosa Kütz.					x		x											+														+					
Nitzschia sigmoidea (Erh.) W. Schmidt																							+								+						
N. spectabilis (Erh.) Ralfs																															+						
Pinnularia maior (Kütz.) Cleve						+		x		x								+														+					
P. viridis (Nitzsch) Ehr.																		+													+			+	+		+
Rhopalodia gibba (Ehr.) O. Müll													+	+				+					+									+	+	+			
R. gibba var. ventricosa (Erh.) Grun						x	x																														
Stauroneis anceps Ehr.					x		x																+								+	+	+				
Synedra ulna (Nitzsch) Ehr.						+							+	+																			+				
Chlorophyta:																																					
Characium braunii Brügg.													+		+																						
C. eremosphaerae Hieron.													+																			+					
C. hookeri (Reinsch) Hansg.																																			+		
Chlorella vulgaris Beyer															+										+												
Cladophora glomerata (L)														+					+																		
Closterium venus Kg.						+			x					+																							
Coelastrum microporum Näg.										+																						+					
Crucigenia quadrata Morren											+																										
Cylindrocapsa geminella Wolle	+									x			+		+																						
Eudorina illinoisensis (Kofoid) Pasch.													+																								
Granulocystis verrucosa (Roll) Hind													+																								
Oedogonium sp. (pisanum Wittr. ?)	+		+	+	x	+				+			+	+		+		+			+	+	+								+						
Oocystidium ovale Kors.												x			+									+													
Pediastrum boryanum (Turf.) Menegh.	+																																				
Scenedesmus acutus Meyen						+																															
Scenedesmus ecornis (Ralfs) Chod.					x					x				+					+																	+ +	
S. quadricauda (Turp) Breb.																			+																		
Spirogyra insignis (Hass.) Czurda					x																																
S. longata (Vauch.) Czurda	+		+	+	x				x	x		+		+			+				+	+															
Tetraedron proteiforme (Turn) Brumeth.																		+																			
Ulothrix sp.									+	+				+	+		+				+	+									+						
Zygnema sp.									x																												

notia monodon var. maior, Characium braunii, Characium eremosphaerae, Characium hookeri, Cylindrocapsa geminella, Granulocystis verrucosa, Oocystidium ovale and Tetraedron proteiforme.

Microcystis pulverea and the Closterium venus are also often found in turbary habitats.

Comparing with other sphagnum pools (based on data of the Flora et Iconographia Algarum Hungariae and according to the articles listed in the References) I have come to the following conclusions.

The alga species given below are in common with those found in the Nagy-pool at Öcs (UHERKOVICH 1979): Lyngbya limnetica, Oscillatoria planctonica, Ophiocytium cochleare, Amphora ovalis, Cymbella aspera, Eunotia lunaris, Gomphonema acuminatum, Meridion circulare, Navicula cuspidata, Pinnularia maior, P. viridis, Rhopalodia gibba, R. gibba var. ventricosa, Stauroneis anceps, Characium braunii, Coelastrum microporum and Cylindrocapsa sp. (C. geminella).

The alga species given below are in common with those found at Szürühely-folyás (Juniper Woodland of Barcs) (UHERKOVICH 1981): Ophiocytium maius, O. parvulum, Eunotia lunaris, Pinnularia maior, P. viridis, Stauroneis anceps and Cylindrocapsa sp. (C. geminella).

The following alga species are also found in the Kerek-lake of the Fekete mountain (UHERKOVICH 1982): Chroococcus minutus, Coelosphaerium kuetzingianum, Nostoc paludosum, Oscillatoria tenuis, Ophiocytium maius, O. parvulum, Eunotia lunaris, Pinnularia maior, P. viridis and Stauroneis anceps.

These concordances substantiate the value of the Csömör pool. On the basis of the data above it can be stated that this small sphagnum pool is - from an algological point of view - of great value. The pool has lately become rather overgrown. Thirty years ago one could bathe in it!

The reason for this overgrowing - besides the dry weather - must be partly due to eutrophication caused by the intensive cultivation on this region and partly due to natural succession. Keeping all the above-mentioned facts in mind, the occurrence of especially eutrophic species together with those turbary ones can be easily understood.

Acknowledgements - My thanks are due to Mrs. JULIA SZUJKÓ-LACZA, through whose kindness it was possible to carry out this study. I thank Dr. JUDIT PADISÁK for important methodical advice on how algological investigations should be carried out and for checking my identifications. I am grateful to KRISZTINA BUCZKÓ and Dr. LILLA HABLY as well, who helped me in writing up the results.

REFERENCES

BARTA, Zs., FELFÖLDY, L., HAJDU, 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]. - Vizügyi Hidrobiológia 4 VIZDOK, Budapest, 343 pp.

BORBÁS, V. (1879): Budapestnek és környékének növényzete. [Vegetation of Budapest and its surroundings]. - Magy. Kir. Egy. Könyvkiadó, Budapest, 172 pp.

DIEL, I. (1975): Kl'uč na určovanie výtrausných 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] - Vizügyi Hidrobiológia 1 VIZDOK, Budapest, 257 pp.

FELFÖLDY, L. (1981): A zöldalgák Desmidiales rendjének kishatározója. [Identification Manual for the Desmidiales of Green Algae]. - Vizügyi Hidrobiológia 10 VIZDOK, Budapest, 275 pp.

HORTOBÁGYI, T. (1968): Növényhatározó I. [Plant Identification Manual I]. - Tankönyvkiadó, Budapest, 626 pp.

KADŁUBOWSKA, 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.
MAROSI, S. and SZILÁRD, J. (1967): Magyarország tájföldrajza I. A dunai Alföld. (Geography of the Regions of Hungary I. Lowland along the river Danube). - Akadémiai Kiadó, Budapest, 358 pp.
MROZINSKA, T. (1985): Chlorophyta VI. Oedogoniophyceae. Oedogoniales. - Süsswasserflora von Mitteleuropa 14., Jena, 624 pp.
PASCHER, A. (1930): Bacillariophyta (Diatomeae). - Die Süsswasser-Flora Mitteleuropas Heft 10., Jena, 466 pp.
RIETH, A. (1980): Xanthophyceae 2. Teil - Süsswasserflora von Mitteleuropa 4., Jena, 147 pp.
STOLLMAYER-BONCZ, E. (1982): The Flora of the Csömör pool.-Studia bot. hung. 17: 73-82.
UHERKOVICH, G. (1966): Die Scenedesmus-Arten Ungarns. - Akadémiai Kiadó, Budapest, 173 pp.
UHERKOVICH, G. (1979): Az Öcsi Nagy-tó limnológiája. (Die Limnologie des Grossen Sees von Öcs). - A Veszprém megyei muzeumok 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 vom Fekete (Schwarz)-Berg (Balaton-Oberland)). - Folia musei historico-naturalis bakonyiensis. 1: 81-110.
WOLLE, F. (1887): Fresh-Water Algae of the United States I.-II. - Bethlehem, 364 pp.

Author's address: E. STOLLMAYER-BONCZ
Szerb Antal Gimnázium
Budapest, Kulturház u. 12.
H-1164
HUNGARY