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Summer algal communities of wetlands situated near Floreşti village, Cluj County

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Abstract. The investigations aimed to establish the qualitative composition of summer algal communities of the ponds which are the strategic drinking water reserves for the city of Cluj-Napoca. They are located on the right bank of the Someşu Mic River, between the Floreşti village and the city Cluj-Napoca. There have been identified 201 algal taxa, 152 of them in the plankton and 143 in the benthos, with 105 taxa occurring in both plankton and benthos samples. The algal flora is characterized by a large number of ubiquitous, cosmopolitan elements, together with several algae having well defined ecological preferences (basiphilous), or indicators of the trophic status and saprobic level of the water. The estimation of water trophicity level was performed based on phytoplankton indices. The floristic affinity of the investigated communities was tested by Jaccard's similarity index. Together with autochthonous algae there have been found some alien ones, washed into the ponds from the Someşu Mic River drainage basin.
Key Words: algae, wetland, phytoplankton indices, floristic similarity.

Zusammenfassung. Sommer-Algengemeinschaften von Feuchtgebieten in der Nähe der Ortschaft Floreşti, Canton Cluj. Diese Untersuchung analysiert die qualitative Zusammensetzung der sommerlichen Algen-Artengemeinschaften von Weihern, die eine strategische Trinkwasserreserve für die Stadt Cluj-Napoca darstellen. Sie befinden sich am rechten Ufer des Someşu Mic Flusses zwischen der Ortschaft Floreşti und der Stadt Cluj-Napoca. Es wurden 201 Algentaxa identifiziert, von denen 152 im Plankton, 143 im Benthos und 105 Taxa in beiden Fraktionen auftraten. Die Algenflora ist durch eine große Zahl an ubiquitären kosmopolitischen Elementen charakterisiert, jedoch zusammen mit einigen Algen, die gut definierte ökologische Präferenzen (basophil) besitzen oder Indikatoren des trophischen Status und des Saprobiensystems des Wassers darstellen. Die Abschätzung des trophischen Niveaus des Wassers wurde über Phytoplankton-Indices durchgeführt. Die floristische Affinität der untersuchten Gemeinschaften wurde mittels Jaccard-Ähnlichkeitsindices untersucht. Zusammen mit autochthonen Algen wurden gebietsfremde Arten festgestellt, die aus dem Someşu Mic Abflusssystem in diese Weiher eingespühlt wurden.
Schlüsselwörter: Algen, Feuchtgebiete, Phytoplankton-Indices, floristische Ähnlichkeit

Rezumat. Cercetările efectuate au urmărit stabilirea compoziţiei calitative a comunităţilor algale de vară din iazurile ce reprezintă rezerva strategică de apă potabilă a municipiului Cluj-Napoca. Aceste iazuri sunt localizate pe malul drept ar râului Someşu Mic, între comuna Floreşti şi oraşul Cluj-Napoca. Au fost identificaţi 201 taxoni algali, dintre care 152 în plancton şi 143 în bentos, iar 105 în ambele habitate. Flora algală a fost caracterizată de un număr mare de elemente ubicviste, cosmopolite, alături de alge cu preferinţe ecologice bine definite (alcalifile) sau indicatoare de diferite niveluri de troficitate şi saprobitate a apei. S-a realizat estimarea nivelului de troficitate al apei pe baza indicilor fitoplanctonici iar afinitatea floristică a comunităţilor analizate a fost testată cu indicele de similaritate Jaccard. Pe lângă speciile autohtone de alge s-au remarcat şi elemente cenoxene provenite din bazinul de drenaj al Someşului Mic.
Cuvinte cheie: alge, zone umede, indici fitoplanctonici, similaritate floristică.

Introduction. The wetlands herein dealt with are located at the contact zone of the crystalline Gilăului Mountain mass with the sedimentary deposits of the Transylvanian Depression, in a hilly area ranging between 500 and 600 m above sea level. The geological substratum consists of metamorphic rocks, volcanic and sedimentary ones, of very different ages and petrographic types. The soils are mostly alluvial, poorly or moderately supplied with humus, but rich in nitrogen. The vegetation of ponds is natural or semi-natural, dominated by paludal communities, the phytocoenoses consisting of various sedges, rush, reed and bulrush (Cristea et al 2002).

The present study aimed to reveal the floristic composition of the algal communities inhabiting the above mentioned ponds and, according to the Water Directive 60/2000 and the Law of Waters, to establish their ecological state based on their community structure. There have been tested some of the correlations between community structure and the physico-chemical parameters measured at the time of sampling.

Materials and Method. The ponds are supplied with water from the Someşu Mic River, flowing parallel with the chain of ponds. The ponds are numbered from the most remote one from the water source, towards the closest one to the river, the water passing successively from the river in ponds VI, V, IV, III, II and I. These ponds are the strategic drinking water reservoirs for the nearby city (Figure 1).

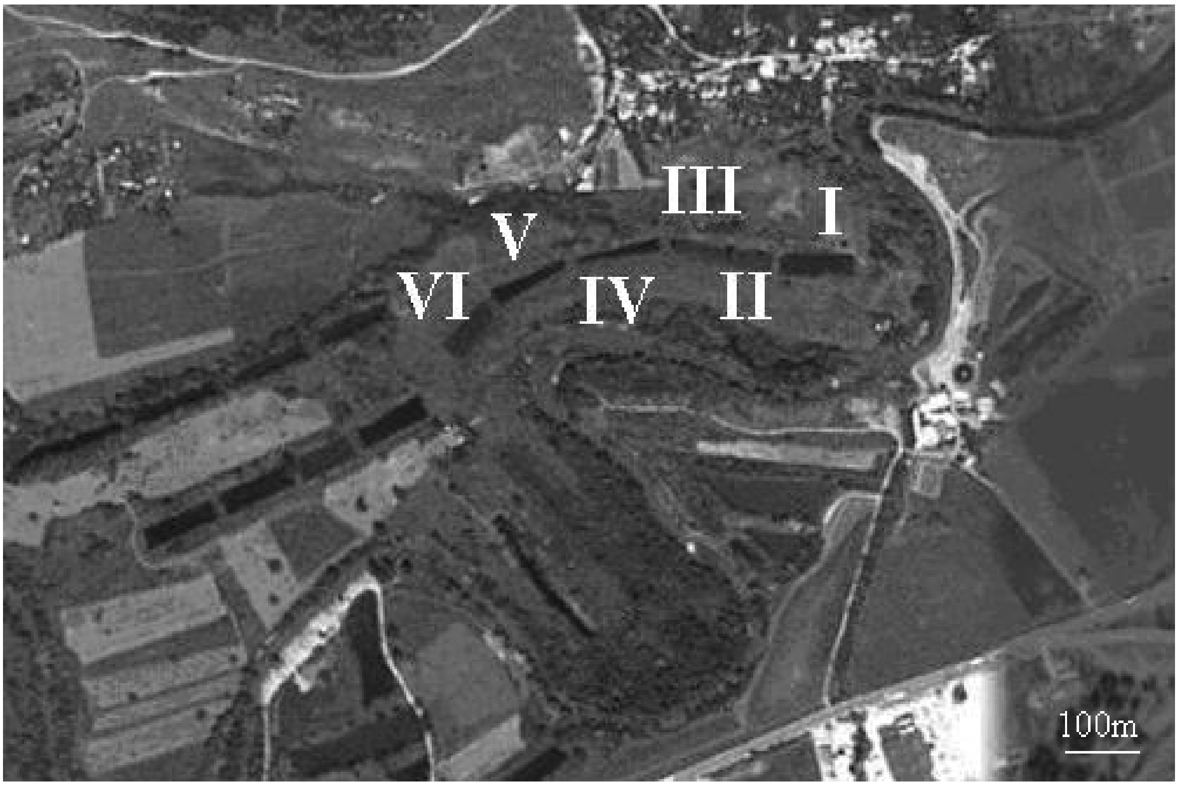

Figure 1. The position of the six ponds (I – VI) next to the Someşu Mic River course (Google Earth 4.3 beta).

Plankton and periphyton samples had been collected on 24th of August 2006, from the six drinking water reservoirs using standard methods and subsequently preserved in 4% formalin. The processing of algae was performed differently for diatoms and other taxonomical groups. The samples were examined with Nikon Eclipse E400 light microscope. There have been computed some of the common indices: Nygaard's algal compound index, trophicity index of Heinonen (Willen 2000), as well as the mesotrophy index (Oltean 1977). The degree of floristic affinities among communities was tested by Jaccard's similarity index. There had also been measured some physico-chemical parameters of the water, namely temperature, conductivity, salinity and dissolved oxygen ($mg.l^{-1}$ and %).

Results and Discussion. The measurements of the physico-chemical parameters (Table 1) revealed the slight decrease of conductivity and salinity and the increase of oxygen from the most remote (ponds I and II) towards the nearest ponds (V and VI) related to the water source. The amount of oxygen seems to be correlated with changes in water temperature and location of ponds related to the distance to the Someşu Mic River, the water source of the reservoirs.

There have been identified 201 algal taxa, belonging to six divisions: Cyanoprokaryota – 25, Euglenophyta – 17, Bacillariophyta – 69, Chlorophyta – 84, Chrysophyta – 1 and Dinophyta – 5 (Table 2).

Table 1

Physical and chemical parameters measured in the six ponds

Parameters / ponds	***I***	***II***	***III***	***IV***	***V***	***VI***
Conductivity (µs/cm)	364	397	252	237	253	251
Salinity (mg/l)	184	211	136	125	136	133
Water temperature (ºC)	19.4	21.4	19.9	22.8	22.7	20.2
Air temperature (ºC)	25	24.5	26	27	28	28
Dissolved oxygen (mg/l)	9.00	7.79	9.83	7.42	8.02	8.60
Dissolved oxygen (%)	104.2	96.8	107.6	86.4	92.4	93.4

The percentage of numeric contribution of the main groups (Figure 2) reveals that in the algal flora dominates the greens (43%), followed by diatoms (35%), the others being less or poorly represented. The ponds have not yet been investigated for their algal flora, therefore all records are new for this wetland area. The richest ones were ponds III and IV (103, respectively 94 taxa), the others exhibited somewhat lower species diversity: pond I – 91 taxa, ponds V and VI – 83 taxa each, pond II – 82 taxa (Table 2). The green algae are the most important in each of the investigated ponds, followed by diatoms (Table 2). Except ponds II and III in which the number of plankton algae is higher than that of periphytic ones, in the other ponds the periphyton exhibit higher species diversity. This fact is related to the development degree of submerged and emerged aquatic vegetation in the ponds.

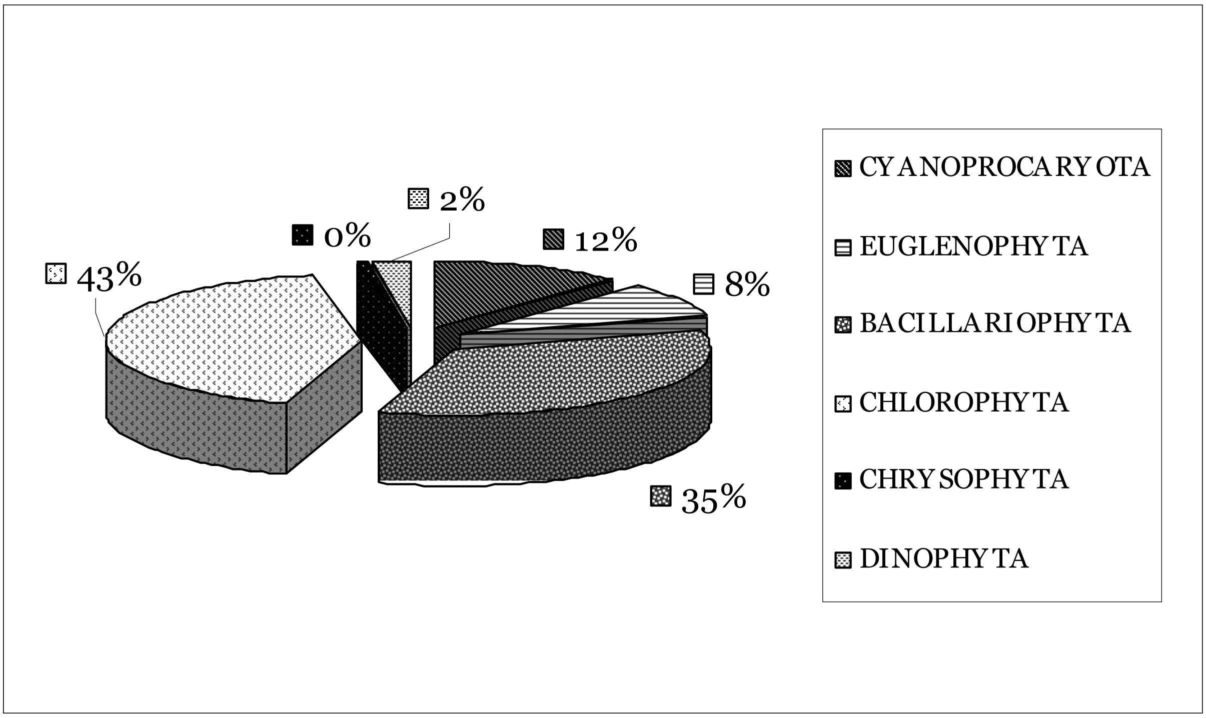

Figure 2. Percent distribution of algal taxonomical groups in the six ponds

94 Algal taxa (46%) of the overall flora (201 taxa) occurred in both planktonic and periphytic samples, 58 taxa (29%) were found only in periphyton and 49 (25%) only in plankton. The large percentage of common taxa in both community types might be

explained by the shallow nature of the ponds, and the water could be mixed up when sampled.

The euplanktonic cyanobacteria are various species of *Gomphosphaeria*, *Microcystis* and *Oscillatoria*, whereas the true planktonic flagellate algae are represented by species of *Euglena, Phacus* and *Trachelomonas* (Euglenophyta), as well as by *Peridinium* and *Peridiniosis* taxa (Dinophyta). The euplanktonic diatoms are *Asterionella formosa* and *Fragilaria crotonensis*.

Most diatoms (epilithic species of *Achnanthes*, *Amphora*, *Cymbella*, *Diatoma*, *Fragilaria*, and *Navicula*) are benthic forms, like the detected desmids (*Cosmarium, Closterium*, *Penium*, *Pleurotaenium* taxa). Some of the benthic diatoms are epiphytic (*Cocconeis*, *Epithemia, Rhopalodia*) or epipelic (*Gyrosigma*, *Navicula, Nitzschia* taxa). Many of the epilithic diatoms mentioned above are allochton elements originate in the river. The source of other algae is possibly the boggy area of the Someşu Mic River drainage basin; various algae could be washed into the river and subsequently drained into the ponds (for ex. *Merismopedia glauca, Anomoeoneis brachysira, Pinnularia gibba, Penium margaritiferum, Staurastrum furcigerum, Cosmarium contractum*). Some of the most interesting species are included in Annex 1.

In both plankton and periphyton communities there have been recorded several cosmopolitan elements, widely distributed in all ecosystem types with flowing or standing waters like *Merismopedia tenuissima* (Cyanobacteria), *Achnanthes minutissima, Amphora ovalis, Cocconeis placentula, Cymbella silesiaca* (diatoms), *Pediastrum boryanum, Tetraedron minimum, Botryococcus braunii* (green algae) and others. The estimation of water trophicity of the investigated ponds was performed based on the published ecological data concerning the periphytic communities and based on Heinonen trophicity index for plankton assemblages. The high number of identified desmids, 22.5% of green algae (43 from the total of 84 green algae), suggest the mesotrophic or meso-eutrophic status of the waters. This fact is emphasized on periphytic community level by the occurrence of some genuine mesotrophic elements, namely *Cosmarium angulare, C. contractum, C. margaritatum, C. reniforme, C. wittrockii, Staurastrum manfeldtii* and *Staurodesmus cuspidatus*, cohabiting with desmids of eutrophic preferences (*Closterium venus, Cl. acerosum, Cl. moniliferum, Staurastrum paradoxum, S. tetracerum*). There are also many taxa of cyanobacteria (*Microcystis, Oscillatoria*), euglenoid flagellates (*Euglena, Phacus, Trachelomonas*) and coccoid greens (*Coelastrum, Kirchneriella, Oocystis, Scenedesmus*) mostly with eutrophic preferences. The values of trophicity indices calculated for the plankton communities (Nygaard's compound index, Heinonen's trophicity index) suggest mesotrophy. According to the sub-eutrophy index recommended by Oltean (1977) the ponds are mesotrophic with tendency towards eutrophication. The level of saprobity was estimated according to the occurrence of indicator species (Slàdeček 1973). There have been identified 95 algae, known as indicator species (according to the published data) for different saprobity levels. Most of them suggest that the water of these ponds belong to the o-β – β-mesosaprobic categories: 31% of the species indicate o-β-, 26% β-mesosaprobity, and only 16% are characteristic for o-saprobic waters (Figure 3). The other indicator species are less important: 11% are x-o-saprobic indicators, 2% are α-polysaprobic elements. The occurrence of indicator elements of critical saprobity levels (β – α, α – β, α-, poly-saprobity) suggest anthropical influences in the Someşu Mic river's drainage basin (tourism, forest clearing, waste waters, industrial wastes etc.).

Table 2

List of algal species identified in the six ponds

No.	Taxa / sampling ponds	I		II		III		IV		V		VI	
		Pl	Pr	Pl	Pr	Pl	Pr	Pl	Pr	Pl	Pr	Pl	Pr
	CYANOPROCARYOTA												
1	*Anabaena variabilis*	+	-	-	-	-	-	+	-	+	-	-	-
2	*Calothrix fusca*	-	+	-	-	-	-	-	-	-	-	-	-
3	*Chroococcus minutus*	-	+	+	+	+	+	+	+	-	-	-	-
4	*Chroococcus turgidus*	-	-	-	+	-	+	-	+	-	-	-	+
5	*Gomphospheria aponina*	+	-	-	-	-	-	-	-	-	-	-	-
6	*Gomphospheria compacta*	-	+	+	-	+	+	+	-	-	-	-	-
7	*Gomphospheria lacustris*	+	-	-	+	+	-	+	-	-	-	-	-
8	*Gomphospheria naegeliana*	+	+	-	+	+	-	+	+	+	-	+	-
9	*Merismopedia glauca*	-	+	-	-	+	-	+	+	-	+	+	-
10	*Merismopedia teniussima*	-	-	-	-	-	+	-	+	-	+	-	+
11	*Microcystis aeruginosa*	-	-	+	-	+	-	+	-	+	-	-	-
12	*Microcystis incerta*	-	-	-	-	-	-	+	-	-	-	-	-
13	*Microcystis viridis*	-	-	-	-	-	-	-	+	-	-	-	-
14	*Nostoc coeruleum* var. *planctonicum*	-	+	-	-	-	-	-	-	-	-	-	-
15	*Oscillatoria agardhii*	-	-	-	-	-	+	-	-	-	+	-	-
16	*Oscillatoria chlorina*	-	-	-	-	+	-	-	-	-	-	-	-
17	*Oscillatoria formosa*	+	-	-	-	-	-	-	-	-	-	-	-
18	*Oscillatoria geminata*	-	-	-	+	+	+	-	+	-	+	+	+
19	*Oscillatoria limosa*	-	-	-	-	+	+	-	+	+	+	+	-
20	*Oscillatoria simplicissima*	-	-	-	-	+	-	-	-	-	-	-	-
21	*Oscillatoria splendida*	-	-	+	-	-	-	-	+	-	+	-	-
22	*Oscillatoria subcapitata*	-	-	-	-	-	-	+	-	-	-	-	-
23	*Oscillatoria tenuis*	+	+	+	+	-	-	-	-	-	-	-	-
24	*Pseudanabaena limnetica*	-	+	-	+	-	+	-	-	-	-	-	-
25	*Spirulina jenneri*	+	+	+	-	+	-	-	-	-	-	-	-
	EUGLENOPHYTA												
26	*Colacium cyclopicola*	-	-	+	-	-	-	-	-	+	-	-	-
27	*Euglena acus*	-	+	-	+	-	-	-	+	-	-	-	-
28	*Euglena deses*	-	+	-	-	-	-	-	-	-	-	-	-
29	*Euglena oblonga*	+	-	-	-	-	-	-	-	-	-	-	-
30	*Euglena pisciformis*	-	-	+	-	-	-	-	-	-	-	-	-
31	*Euglena polymorpha*	+	-	-	-	-	-	-	-	-	-	-	-
32	*Euglena texta*	-	-	+	-	-	-	-	-	-	-	-	-
33	*Euglena velata*	-	+	-	-	-	-	-	-	-	-	-	-
34	*Euglena viridis*	+	-	-	-	-	-	-	-	-	-	-	-
35	*Phacus agilis*	-	-	-	+	-	-	-	-	-	-	-	-
36	*Phacus longicauda*	-	-	+	-	+	-	-	-	-	-	-	-
37	*Phacus pleuronectes*	-	-	+	-	-	-	-	-	-	-	-	-
38	*Phacus tortus*	-	-	+	-	-	-	+	-	-	-	-	-
39	*Trachelomonas hispida*	-	-	-	-	-	+	-	-	-	-	+	-
40	*Trachelomonas lacustris*	-	-	-	-	-	-	-	-	-	-	+	-
41	*Trachelomonas oblonga*	-	-	-	-	+	-	-	-	-	-	-	-
42	*Trachelomonas volvocina*	+	+	-	-	+	-	-	-	-	-	-	-
	BACILLARIOPHYTA												
43	*Achnanthes minutissima*	+	+	-	+	+	+	+	+	+	+	+	+
44	*Amphora ovalis*	-	+	+	+	+	+	-	+	+	+	+	-
45	*Amphora pediculus*	-	-	-	-	-	-	-	+	+	-	-	-
46	*Anomoeoneis brachysira*	-	-	-	-	-	+	-	-	-	-	-	-
47	*Asterionella formosa*	-	-	-	-	-	-	+	-	-	-	+	-
48	*Cocconeis pediculus*	+	+	+	+	+	+	+	+	+	+	-	+
49	*Cocconeis placentula*	+	+	+	+	+	+	+	+	+	+	+	+
50	*Caloneis silicula*	-	+	-	+	-	-	-	+	+	-	+	+
51	*Cyclostephanos invisitatus*	-	-	-	-	-	-	-	-	+	-	+	-
52	*Cyclotella radiosa*	-	-	-	-	-	-	-	+	-	+	-	+
53	*Cyclotella stelligera*	-	-	+	+	+	+	+	+	-	+	-	+
54	*Cymatopleura elliptica*	-	-	-	-	+	-	-	-	+	+	+	-
55	*Cymatopleura solea*	-	-	+	-	+	-	+	+	+	+	+	-
56	*Cymbella caespitosa*	-	-	-	+	+	-	-	-	+	-	+	+
57	*Cymbella affinis*	-	-	-	-	-	-	-	-	-	-	-	+
58	*Cymbella cistula*	-	-	+	-	+	+	-	+	+	+	+	-
59	*Cymbella helvetica*	-	-	-	-	-	-	-	-	-	-	-	+
60	*Cymbella laevis*	+	-	-	-	-	-	-	-	-	-	-	+
61	*Cymbella lanceolata*	+	-	+	-	+	+	-	-	-	-	+	-
62	*Cymbella microcephala*	-	-	-	-	-	-	-	+	-	-	-	-
62	*Cymbella minuta*	-	-	-	-	-	+	-	-	+	-	+	-
64	*Cymbella silesiaca*	-	+	+	+	+	+	+	+	+	+	+	-
65	*Cymbella sinuata*	-	-	-	-	-	-	-	-	-	-	+	+
66	*Cymbella tumida*	-	-	-	+	-	-	-	-	-	+	-	-
67	*Cymbella tumidula*	+	-	-	-	-	-	-	-	-	-	-	+
68	*Diatoma vulgare*	-	-	-	-	-	+	-	-	-	-	-	-
69	*Didymosphenia geminata*	-	-	-	-	+	+	-	-	-	-	-	-
70	*Diploneis elliptica*	-	+	-	+	+	-	-	+	+	+	+	-
71	*Epithemia adnata*	+	+	-	+	-	-	-	-	-	-	+	+
72	*Epithemia sorex*	+	+	-	-	-	-	-	-	-	-	-	+

Table 2 (continued)

No.	Taxa / sampling ponds	I		II		III		IV		V		VI	
		Pl	Pr	Pl	Pr	Pl	Pr	Pl	Pr	Pl	Pr	Pl	Pr
73	*Epithemia turgida*	-	+	+	+	+	+	-	-	-	-	-	-
74	*Fragilaria arcus*	-	-	-	-	-	-	-	-	-	-	+	-
75	*Fragilaria capucina*	-	-	-	-	-	+	-	-	-	+	+	-
76	*Fragilaria construens*	-	-	-	+	-	-	-	-	-	-	-	-
77	*Fragilaria crotonensis*	-	-	-	-	+	+	+	+	+	+	+	+
78	*Fragilaria dilatata*	-	-	-	-	-	-	-	-	-	+	-	-
79	*Fragilaria leptostauron*	-	-	-	-	-	-	-	-	+	-	-	-
80	*Fragilaria pinnata*	+	-	+	-	-	-	-	+	-	-	-	-
81	*Fragilaria ulna*	-	+	-	-	+	-	-	+	+	+	+	+
82	*Fragilaria ulna var. acus*	-	-	-	-	-	-	-	-	-	-	+	+
83	*Fragilaria virescens*	-	-	-	-	-	-	-	-	+	-	-	-
84	*Gomphonema acuminatum*	-	-	-	-	-	-	-	-	+	+	-	-
85	*Gomphonema parvulum*	-	+	-	-	-	+	-	-	-	-	+	-
86	*Gomphonema truncatum*	-	-	-	-	+	+	-	-	-	-	-	-
87	*Gyrosigma acuminatum*	-	-	-	-	-	-	-	-	-	+	-	-
88	*Gyrosigma scalproides*	-	-	-	+	-	-	-	-	-	-	-	-
89	*Gyrosigma spencerii*	+	-	-	-	+	-	+	+	+	-	+	-
90	*Hantzschia amphioxys*	-	-	-	-	-	-	-	-	-	-	-	+
91	*Melosira varians*	-	-	-	-	+	+	-	-	+	-	+	-
92	*Navicula ambigua*	-	-	-	+	-	-	-	+	-	+	-	-
93	*Navicula bacillum*	-	-	-	-	-	-	-	-	+	-	-	-
94	*Navicula capitata*	-	-	-	-	-	+	-	-	-	-	-	-
95	*Navicula capitatoradiata*	+	-	-	-	-	+	-	-	+	-	+	+
96	*Navicula cincta*	-	-	-	-	-	-	-	+	+	-	+	-
97	*Navicula cryptocephala*	-	+	-	+	-	-	-	-	+	+	-	+
98	*Navicula cryptotenella*	-	-	-	-	-	+	-	-	-	-	+	-
99	*Navicula cuspidata*	-	+	+	+	-	-	-	+	+	+	-	-
100	*Navicula lanceolata*	-	-	-	-	-	-	-	-	+	-	+	-
101	*Navicula pupula*	-	-	-	-	+	-	-	-	-	-	-	-
102	*Navicula radiosa*	-	+	+	+	+	+	+	+	+	+	+	+
103	*Navicula tripunctata*	-	+	-	-	+	-	-	-	+	-	+	-
104	*Navicula veneta*	-	-	-	+	-	-	-	-	-	-	-	-
105	*Nitzschia amphibia*	-	-	-	+	-	+	-	-	+	+	-	-
106	*Nitzschia liniaris*	-	-	-	-	-	+	+	+	+	-	-	-
107	*Nitzschia sinuata var. tabellaria*	-	-	+	+	+	+	+	+	+	+	+	-
108	*Pinnularia gibba*	-	+	-	-	+	-	-	-	-	-	-	-
109	*Rhopalodia gibba*	+	+	+	+	+	-	-	-	-	-	+	+
110	*Surirella linearis*	-	-	-	-	-	-	-	-	+	-	+	-
111	*Surirella splendida*	-	-	-	-	-	-	-	+	-	-	-	-
	CHLOROPHYTA** – **Microsporales												
112	*Microspora stagnorum*	-	+	-	-	-	-	-	-	-	-	-	-
	CHLOROPHITA – Volvocales												
113	*Pandorina morum*	-	-	+	+	+	-	-	-	-	-	+	-
	CHLOROPHYTA – Chlorococcales												
114	*Botryococcus braunii*	-	-	+	-	+	-	-	-	-	-	-	+
115	*Coelastrum microporum*	-	-	-	-	+	-	-	-	-	-	-	-
116	*Coelastrum pseudomicroporum*	-	+	-	-	+	-	-	-	-	-	-	-
117	*Coelastrum sphaericum*	-	-	-	+	+	+	+	+	-	+	+	+
118	*Coenochloris asymetrica*	-	-	-	-	-	+	-	-	-	-	-	-
119	*Coenochloris pyrenoidosa*	+	+	-	-	+	-	+	+	+	-	+	-
120	*Coenococcus planctonicus*	-	-	-	-	+	-	+	-	+	-	-	-
121	*Dimorphococcus variabilis*	-	-	-	+	-	-	-	-	-	-	-	-
122	*Eutetramorus fottii*	-	-	-	-	-	-	-	-	-	+	-	-
123	*Kirchneriella cornuta*	-	-	-	-	-	-	+	-	-	-	-	-
124	*Kirchneriella dianae*	-	-	-	-	-	-	+	-	-	-	-	-
125	*Kirchneriella irregularis*	-	-	-	-	+	-	-	-	-	-	-	-
126	*Lagerheimia ciliata*	-	-	-	-	-	+	+	+	-	+	-	+
127	*Lagerheimia genevensis*	-	-	-	-	-	+	-	+	-	-	-	+
128	*Nephrocytium agardhianum*	-	-	-	-	-	+	-	+	-	-	-	+
129	*Nephrocytium lunatum*	-	-	+	-	+	-	+	-	-	-	-	-
130	*Oocystis lacustris*	+	-	-	-	-	-	+	-	-	-	-	-
131	*Oocystis solitaria*	+	+	-	-	+	+	+	+	+	+	+	+
132	*Pediastrum boryanum*	+	+	+	-	+	+	+	+	+	+	+	+
133	*Pediastrum tetras*	+	+	-	+	+	+	-	+	-	-	-	-
134	*Radiococcus planctonicus*	-	-	-	-	-	-	-	+	-	-	-	-
135	*Scenedesmus abundans*	-	-	-	+	-	-	-	+	-	-	-	-
136	*Scenedesmus acutus*	-	+	-	+	-	+	-	-	-	-	-	-
137	*Scenedesmus dimorphus*	-	-	-	-	+	-	+	-	+	+	+	-
138	*Scenedesmus disciformis*	-	+	-	-	-	-	+	-	-	-	-	-
139	*Scenedesmus ecornis*	-	-	-	-	-	+	-	+	-	-	-	+
140	*Scenedesmus granulatus*	-	+	-	-	-	-	-	+	-	+	-	+
141	*Scenedesmus ovalternus*	-	+	-	-	-	-	-	-	-	-	-	-
142	*Scenedesmus quadricauda*	+	+	-	-	+	+	-	+	-	+	+	-
143	*Scenedesmus regularis*	-	-	-	-	-	+	-	+	-	-	-	+
144	*Tetraedron caudatum*	+	-	-	-	-	-	-	-	-	-	-	-
145	*Tetraedron minimum*	+	+	-	+	+	+	+	+	+	+	+	+
146	*Tetraedron triangulare*	-	+	-	+	-	-	-	+	-	-	-	-
147	*Trochiscia aciculifera*	-	-	-	-	-	-	+	-	-	-	-	-

Table 2 (continued)

No.	***Taxa / sampling ponds***	***I***		***II***		***III***		***IV***		***V***		***VI***	
		Pl	***Pr***	***Pl***	***Pr***	***Pl***	***Pr***	***Pl***	***Pr***	***Pl***	***Pr***	***Pl***	***Pr***
	CHLOROPHYTA - Desmidiales												
148	*Closterium acerosum*	+	-	-	-	-	-	-	-	-	+	-	-
149	*Closterium acutum*	-	-	-	-	-	-	-	-	+	-	-	-
150	*Closterium moniliferum*	-	-	-	-	-	-	-	-	-	-	+	-
151	*Closterium venus*	-	-	-	+	-	+	-	+	-	-	-	+
152	*Cosmarium abbreviatum*	-	-	-	-	-	+	-	+	-	+	-	+
153	*Cosmarium angulare*	-	+	-	+	-	+	-	-	-	+	-	+
154	*Cosmarium botrytis*	+	-	-	-	-	-	-	-	-	-	-	-
155	*Cosmarium contractum*	+	+	+	+	+	+	+	+	+	+	-	+
156	*Cosmarium crenulatum*	-	-	-	+	+	-	-	+	-	-	-	-
157	*Cosmarium depressum* var. *planctonicum*	-	-	-	+	-	-	-	-	-	-	-	-
158	*Cosmarium granatum*	+	-	-	+	+	+	-	+	+	+	+	+
159	*Cosmarium laeve*	+	-	-	-	-	-	+	-	-	-	-	-
160	*Cosmarium margaritatum*	-	+	-	-	+	-	-	+	-	-	-	-
161	*Cosmarium obsoletum*	+	-	-	-	-	-	-	-	-	-	-	-
162	*Cosmarium pachydermum*	-	+	-	-	-	-	+	-	-	-	+	-
163	*Cosmarium phaseolus*	-	-	+	-	-	-	-	-	-	-	-	-
164	*Cosmarium praemorsum*	-	+	-	-	-	-	-	-	-	-	-	-
165	*Cosmarium regnellii*	+	+	-	-	+	+	-	+	-	-	-	-
166	*Cosmarium reniforme*	+	-	+	+	-	+	+	+	+	+	+	+
167	*Cosmarium subcucumis*	-	-	+	+	+	-	-	-	-	-	-	-
168	*Cosmarium subprotumidum*	-	+	-	+	-	-	-	-	-	-	-	-
169	*Cosmarium taxichondriforme*	-	-	-	-	+	-	-	-	-	-	+	-
170	*Cosmarium turpinii*	-	-	-	-	+	-	-	+	+	-	+	-
171	*Cosmarium venustum*	-	-	+	+	-	-	-	+	-	-	-	-
172	*Cosmarium wittrockii*	-	+	-	+	-	+	-	+	-	-	-	+
173	*Desmidium aptogonum*	-	-	-	-	-	-	-	-	-	-	+	-
174	*Desmidium cylindricum*	-	-	-	-	+	+	+	-	-	-	-	-
175	*Penium margaritiferum*	-	-	-	+	-	+	-	+	-	+	+	+
176	*Penium spirostriolatum*	-	-	-	-	+	-	-	-	+	-	-	-
177	*Pleurotenium trabecula*	-	-	+	+	+	+	-	-	-	-	-	-
178	*Spondylosium planum*	+	-	-	-	-	-	-	-	-	-	-	-
179	*Staurastrum alternans*	+	-	-	-	-	-	-	-	-	-	-	-
180	*Staurastrum dispar*	+	+	-	-	-	-	-	-	-	+	-	-
181	*Staurastrum furcigerum*	-	-	+	-	+	+	-	-	-	-	-	-
182	*Staurastrum hexacerum*	-	-	+	-	-	-	-	-	-	-	-	-
183	*Staurastrum longipes*	-	-	-	-	-	-	+	-	-	-	-	-
184	*Staurastrum manfeldtii*	+	+	+	+	+	+	+	+	+	+	+	+
185	*Staurastrum muticum*	-	-	-	-	-	-	+	-	-	-	-	+
186	*Staurastrum orbiculare*	-	-	-	-	-	+	-	+	-	-	-	-
187	*Staurastrum paradoxum*	-	-	+	-	-	-	+	-	+	-	+	-
188	*Staurastrum striatum*	-	-	-	-	-	-	-	-	+	-	-	-
189	*Staurastrum tetracerum*	-	-	+	-	-	+	+	+	-	-	-	+
190	*Staurodesmus cuspidatus*	+	+	-	+	+	+	+	+	+	-	+	+
	CHLOROPHYTA – Zygnematales												
191	*Gonatozygon brebissonii*	-	-	-	+	-	-	-	+	+	-	+	+
192	*Mougeotia parvula*	+	-	+	-	-	-	-	-	+	-	-	-
193	*Mougeotia viridis*	+	+	+	+	-	+	-	-	+	-	-	+
194	*Spirogira sp.*	-	-	-	-	-	+	-	-	+	-	-	+
195	*Teilingia granulata*	+	+	+	+	+	+	+	+	+	-	-	-
	CHRYSOPHYTA												
196	*Dinobryon divergens*	-	-	-	-	+	+	-	-	+	-	+	-
	DINOPHYTA												
197	*Peridiniopsis cunnigtonii*	-	-	-	-	-	-	-	+	-	-	-	+
198	*Peridiniopsis elpatiewskyi*	-	-	-	-	-	-	+	-	+	-	+	-
199	*Peridinium aciculiferum*	-	-	-	-	+	-	+	-	-	-	-	-
200	*Peridinium cinctum*	+	-	-	+	-	-	-	+	-	-	+	-
201	*Peridinium umbonatum*	+	+	-	+	-	-	-	-	-	-	-	-

Pl – plankton algae; Pr – periphyton algae; I – VI – sampling ponds

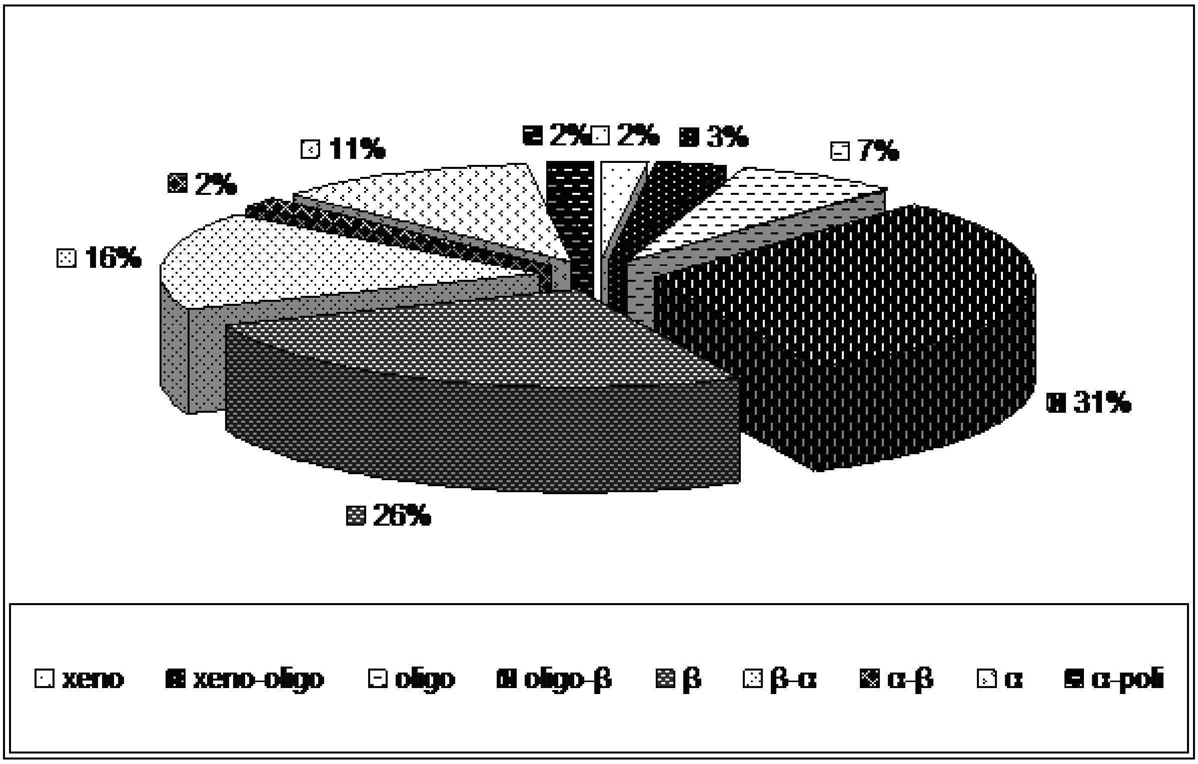

Figure 3. Numerical percent contribution of algal taxa indicating different levels of saprobity

There are only slight differences as concerning the floristic affinities among the communities of the ponds (Figure 4). The values of Jaccard's similarity index exhibit low values and uniformity: the maximum 0.5 found between ponds VI and V, minimum 0.3 – being the joining level of pond 1 to the main aggregate. This pattern is due to the location in chain of the ponds, namely pond VI and V are the nearest ones receiving first the river water, and pond 1 is the most remote one alimented with the water after it flows through all other ponds. In ponds VI and V occur most of the rheophilic elements detected for this wetland, by the contrary pond I is characterized by the occurrence of numerous typically lentic species.

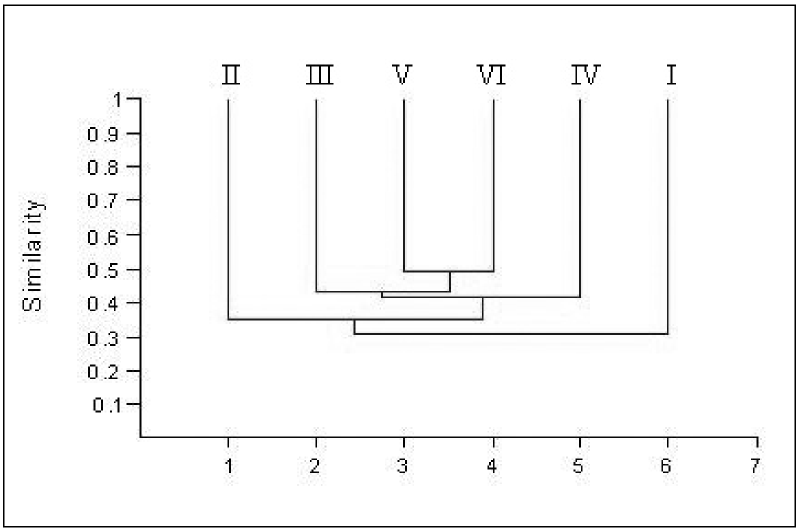

Figure 4. The level of floristic similarity between algal communities from the six ponds (I – VI) based on the Jaccard index

It should also be mentioned the presence in the ponds of two invasive species: *Didymosphenia geminata* (Momeu, in press) and *Spirulina jenneri* (Cărăuş 2002). The last one is widely spread in different aquatic ecosystems both lentic and lotic, especially in Câmpia Română and the Danube Delta (Cărăuş 2002).

Conclusions. This is the first paper dealing with the algal communities of these ponds; therefore all 201 identified species are new records for the Floreşti village wetland. The algal communities are dominated by green algae, followed by diatoms, blue-greens and euglenoid flagellates. From ecological point of view, algae with mesotrophic, meso-eutrophic and eutrophic preferences occur with the highest percentage; in accordance to the values of trophicity indices employed. The ponds are mesotrophic with eutrophication tendency. The occurrence of two invasive species was detected: *Didymosphenia geminata* and *Spirulina jenneri*.

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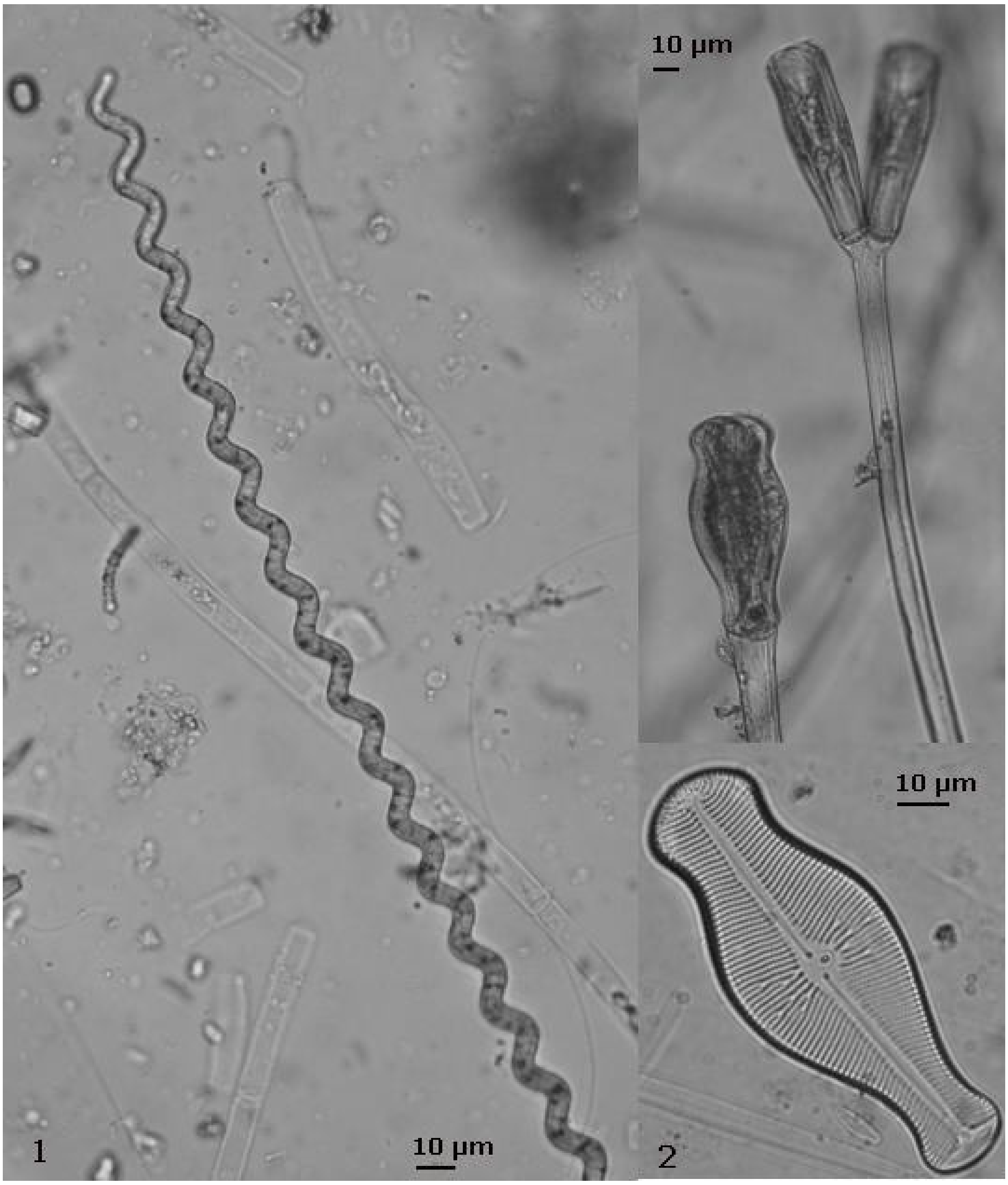
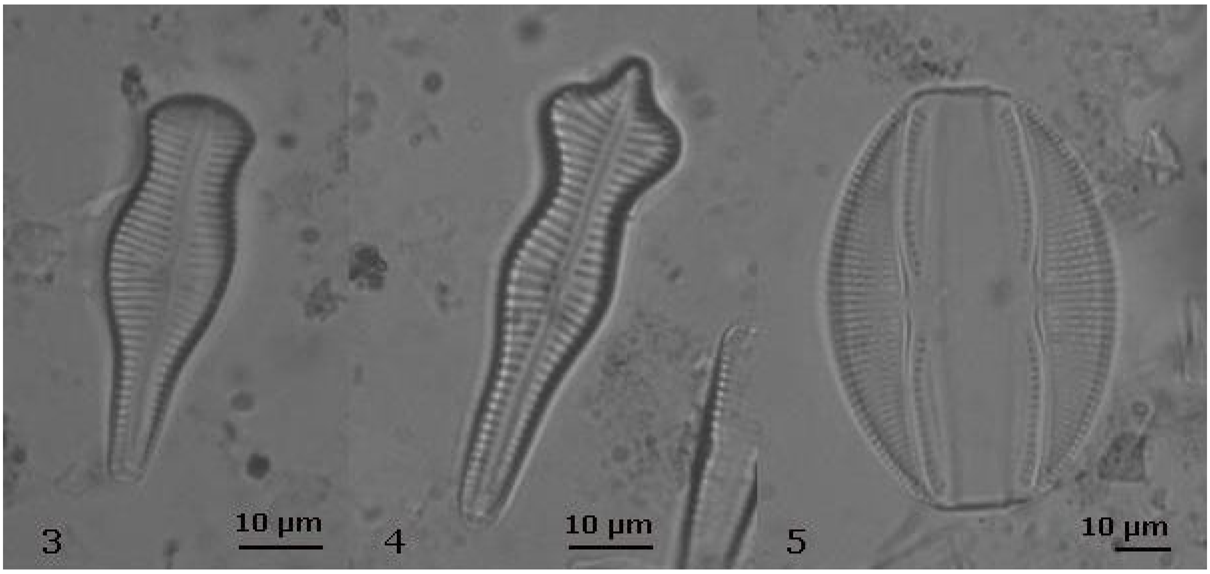
*** The European Parliament and the Council Directive 2000/60/EC of 23 October 2000, establishing a framework for Community action in the field of water policy, Official Journal of the European Communities, L 327/1, 22.12.2000.

Annex 1 (Plates 1-22)

LEGEND: **1 –** *Spirulina jenneri;* **2 –** *Didymosphenia geminata;* **3 –** *Gomphonema truncatum;* **4 –** *Gomphonema acuminatum;* **5 –** *Amphora ovalis;* **6 –** *Cymbella caespitosa;* **7 –** *Cymbella cistula;* **8 –** *Cymbella tumida;* **9 –** *Cymatopleura elliptica;* **10 –** *Cymatopleura solea;* **11 –** *Diploneis elliptica;* **12 –** *Closterium acerosum;* **13 –** *Pleurotaenium trabecula;* **14** – *Gonatozygon brebissonii;* **15 –** *Penium margaritiferum;* **16 –** *Desmidium cylindricum;* **17 –** *Teilingia granulata;* **18 –** *Staurastrum alternans;* **19 –** *Staurastrum manfeldtii;* **20 –** *Cosmarium reniforme;* **21 –** *Cosmarium margaritatum;* **22 –** *Cosmarium botrytis.*

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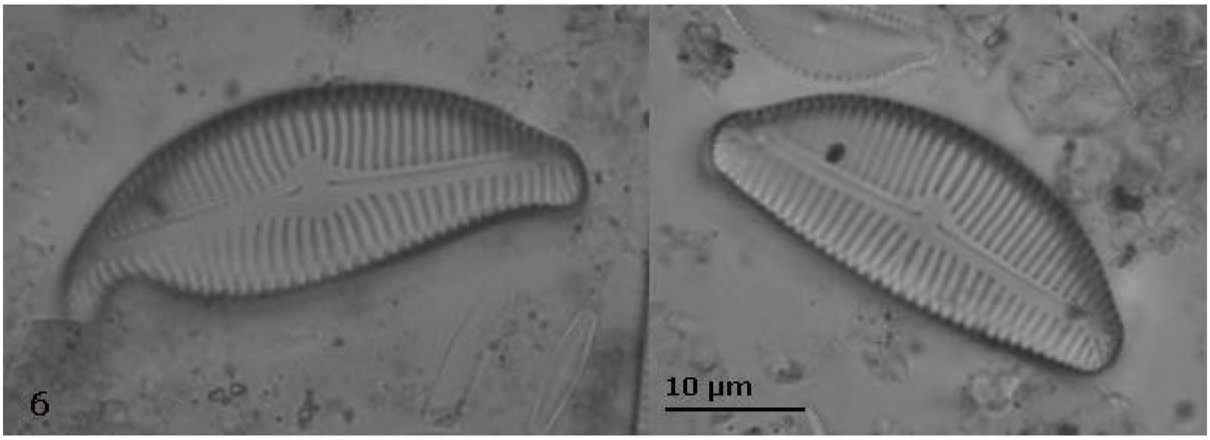
10 µm
4
10 µm
5
10 µm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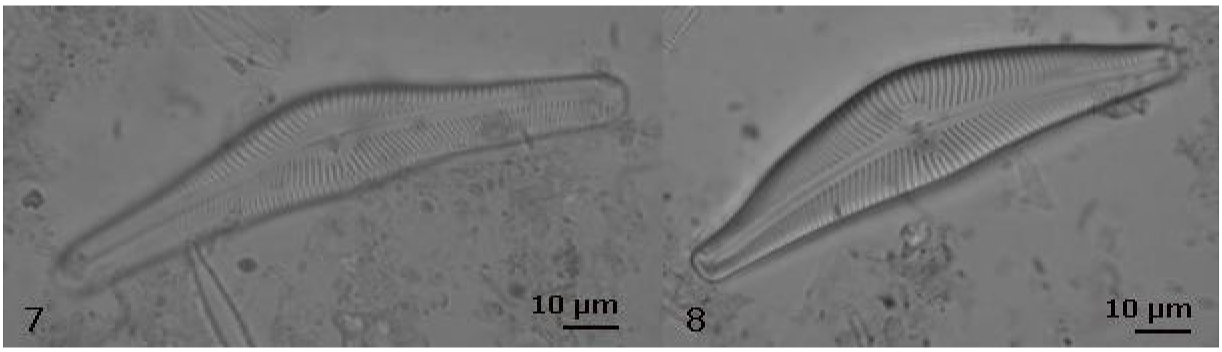
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8
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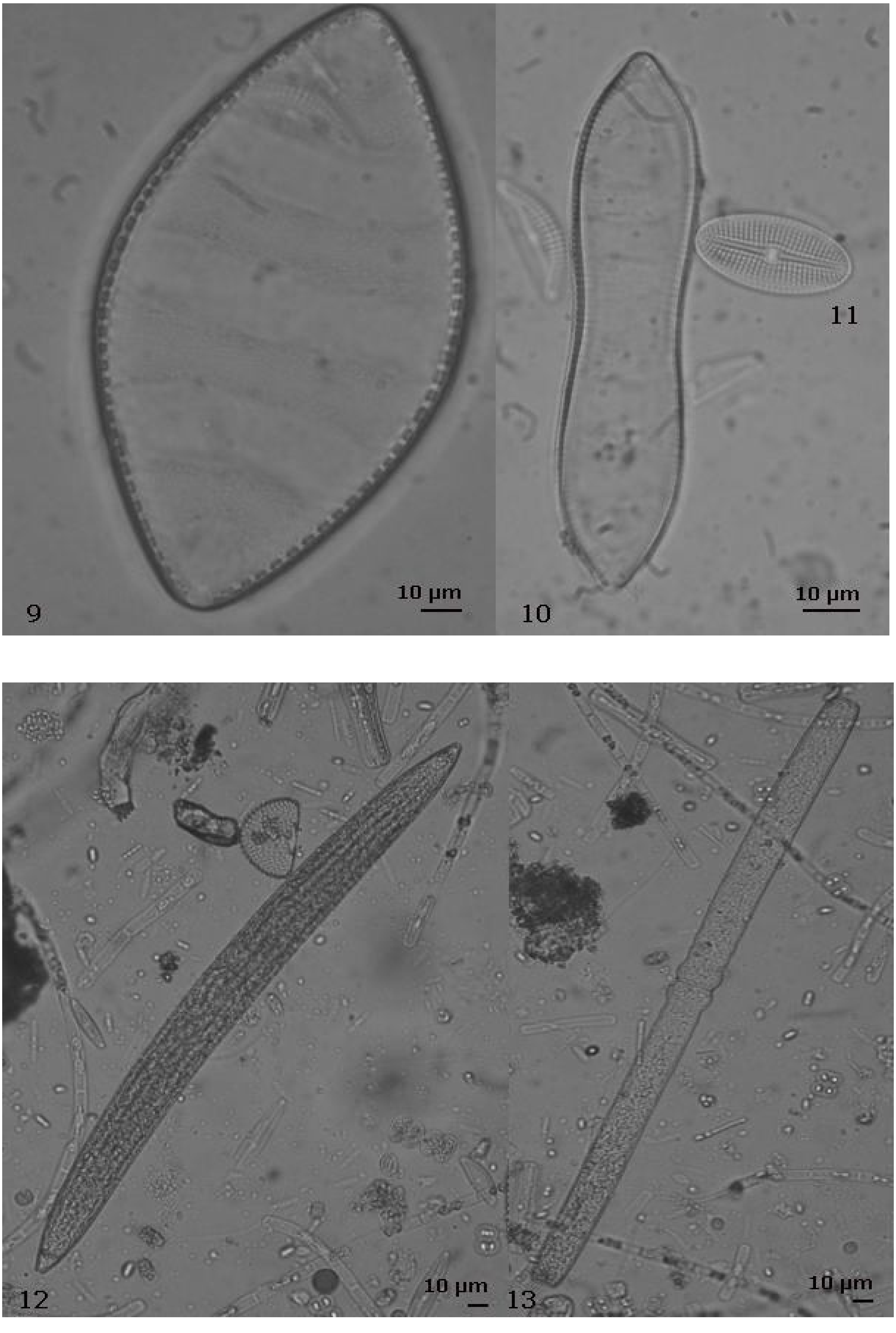
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11
12
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13
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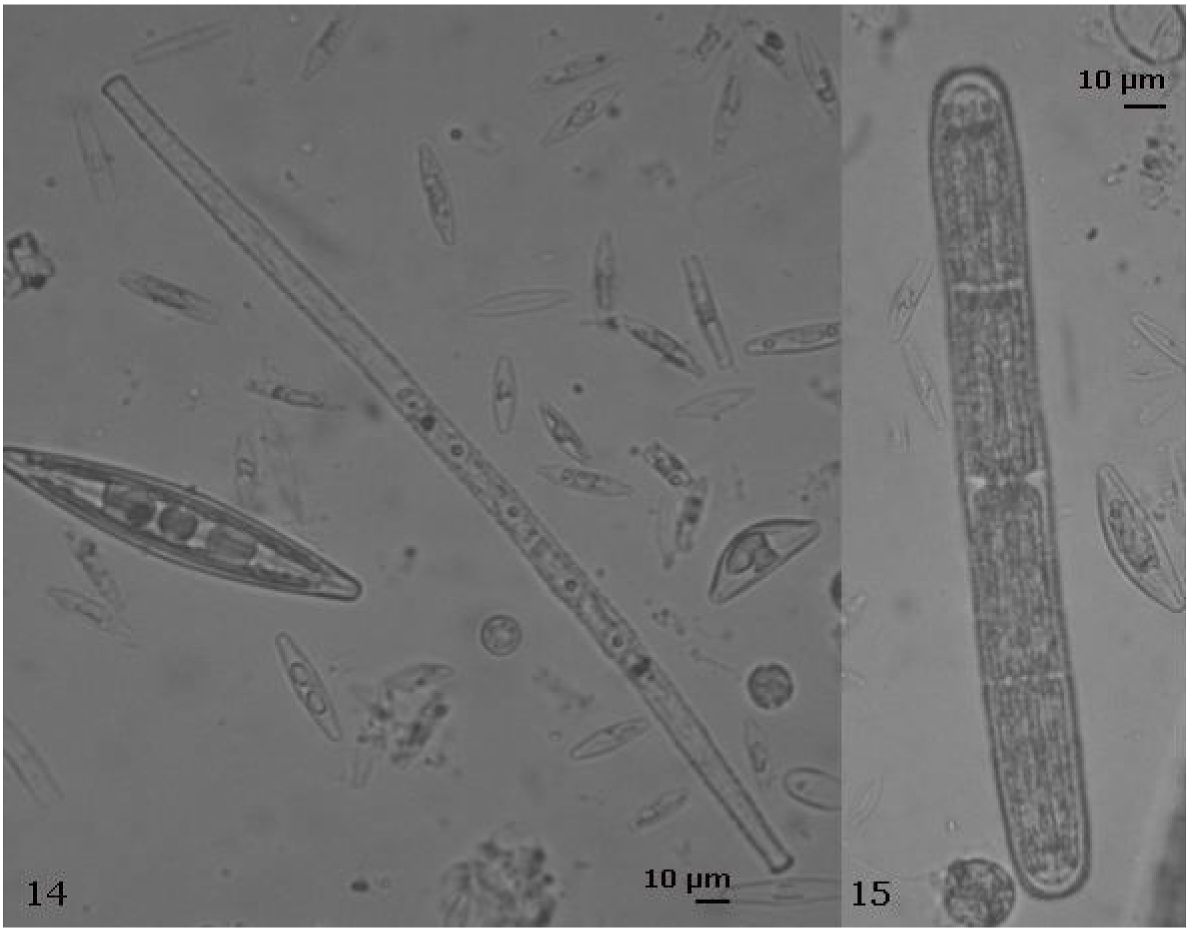
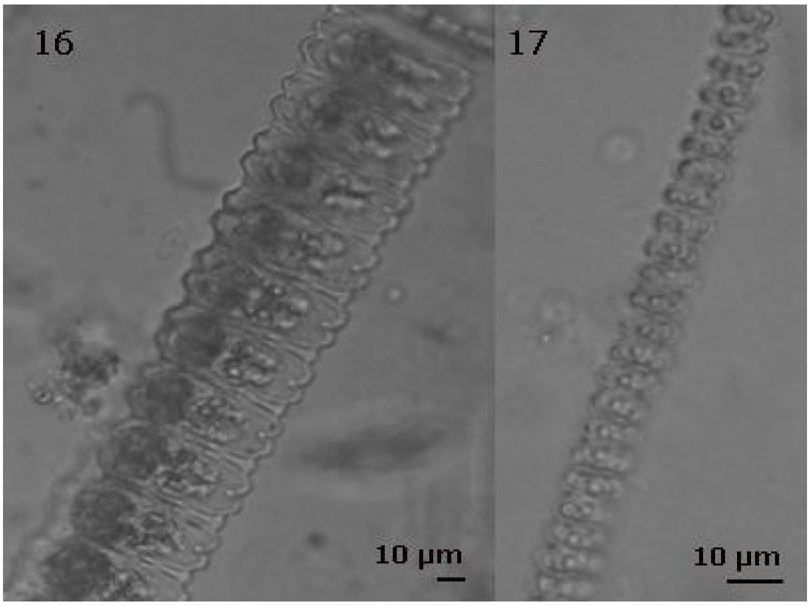
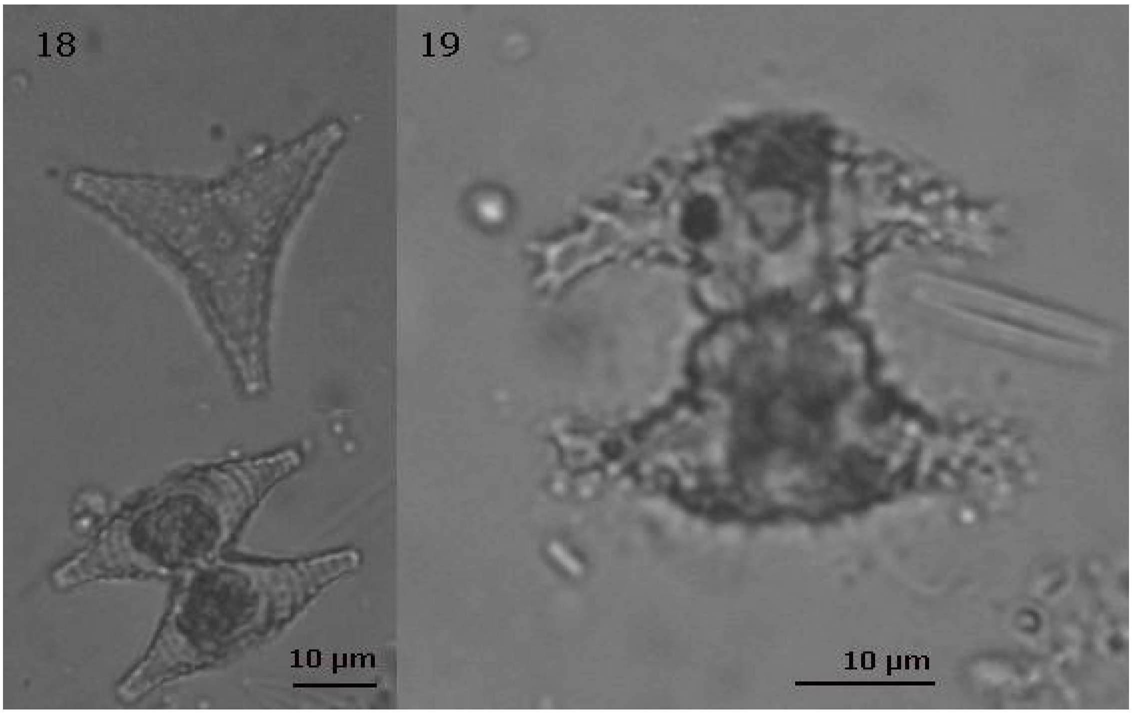
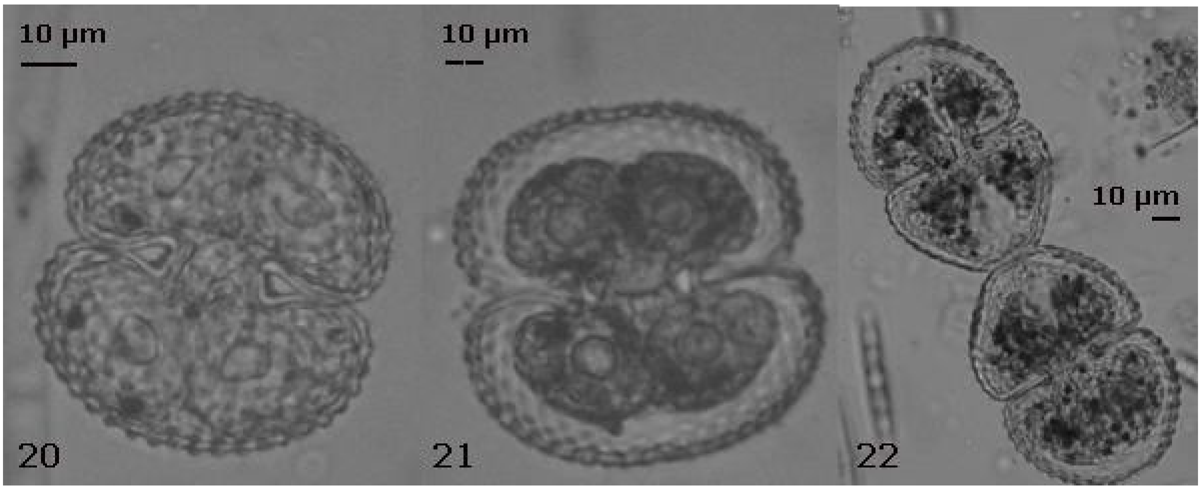

14
10 µm
15
10 µm


16
10 µm
17
10 µm





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