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Aquatic fungi in the Lake Sejny complex[1]

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The mycoflora of the Lake Sejny complex was studied. Samples of water were collected in 1990-1991 for hydrochemical analysis and determination of fungi species. In total 69 species of fungi reported for the first time from Poland (*Myzocytium vermicolum, Angulospora aquatica, Zoophthora rhizospora*).

Key words: Hydromycoflora, aquatic fungi, lakes, chemical parameters.

INTRODUCTION

A considerable diversity of water bodies in the north-eastern region of Poland attracted the author's attention during the studies on hydromycoflora of this region. We investigated Great Mazurian Lake District (C z e c z u g a, W o r o n o w i c z, 1992; C z e c z u g a et al., 1990), Lake Wigry and a few adjacent lakes (C z e c z u g a, 1991 a, 1995 b), Augustów lakes (C z e c z u g a, 1994 a), Ełk lakes (C z e c z u g a, 1995 a) and those situated in the Suwałki Landscape Park (C z e c z u g a, 1994 b).

To obtain a complete picture of the hydromycoflora distribution with respect to the chemistry of the environment in the north-eastern part of Poland, we initiated the investigations of Sejny lakes, which are known for an abundance of various limnologic types.

THE CHARACTERISTICS OF THE LAKES

The Sejny lakes investigated are situated in the close vicinity of the town of Sejny. In the north and east, this region extends as for as the Polish border (Lake Gaładuś), while in the south it reaches to the Augustów Forest (Lake Wiłkokuk), in the west it is enclosed by the lakes Jegliniec and Zubrowo. The area was sculptured

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during the last glaciation. In this region the lakes are of melting-tunnel nature (C z e c z u g a, 1987). Most of the lakes are there are surrounded by fields and meadows. However, such lakes as Pomorze, Jelwa, Kunis, Wiłkokuk and to a lesser extent Hołny are surrounded by mixed forests. Some of the morphometrical data on the lakes studied are presentesd in Table 1.

T a b l e 1

Characteristics of the lakes investigated

Lake	Area (ha)	Max. depth (m)	Mean depth (m)
1. Berżniki	81.0	38.8	10.5
2. Białe Sejneńskie	23.4	12.5	3.8
3. Boczniel	25.5	5.5	3.2
4. Długie	102.4	48.0	7.5
5. Dowcień	79.0	10.4	1.5
6. Dmitrowo	61.2	42.0	10.6
7. Gaładuś (in the polish border)	560.0	54.8	12.6
8. Gieret	67.3	17.0	8.6
9. Głuche	35.0		
10. Gremzdel	59.3	10.0	3.2
11. Gremzdy	188.1	14.3	4.7
12. Hołny	158.1	15.2	5.8
13. Ilgiełk	7.5		
14. Jegliniec	22.6	8.2	4.0
15. Kunis	42.5		
16. Miałkie	27.5		
17. Płaskie near Jeziorek	23.5		
17. Płaskie near Romanowic	26.3	5.8	2.6
19. Pogorzelce	15.0		
20. Pomorze	295.4	23.5	8.6
21. Ryngis	25.2	16.8	4.8
22. Sejny	64.3	3.8	1.8
23. Szejpiszki	71.4	21.6	7.4
24. Sztabinki	60.5		5.6
25. Wierśnie	32.3	8.4	4.4
26. Wiłkokuk	39.1	12.2	3.8
27. Zelwa	103.7	12.3	5.8
28. Żubrowo	97.3	17.0	5.4

METHODS

Samples of water were collected once a month over the years 1990-1991 for hydrochemical analysis and determination of species composition of hydromycoflora. For the determination of chemical properties of water, the methods recommended by Standard Methods (G o l t e r m a n, C l y m o, 1969) were employed.

In the water zoosporic fungi were studied by direct microscopic examination of water samples collected from materials in the water as well as by bait method F u l l e r and J a w o r s k i (1986) (onion, skin, hemp-seeds, clover-seeds, hairs and

fillings of horn). In addition (for *Hyphomycetes*) the foam collected from the surface of eddies in running water or at the edges of stagnant water was examined directly under a microscope. The smaples were fixed in formalin-acetic-alcohol immediately after collection and transported to the laboratory.

For the identification of fungi the following keys were used: (S k i r g i e ł ł o, 1954; S p a r r o w, 1960; D u d k a, 1974; B a t k o, 1975; I n g o l d, 1975 and K a r l i n g, 1977).

RESULTS

The results of chemical analysis of water (Table 2) indicate that these lakes are mostly of eutrophic type, while some, like Lake Sejny, have pond-like nature. Differences were found in the concentration of such chemical parameters as biogenes and chlorides in spring and in autumn. In autumn the highest concentration of all forms of nitrogen and phosphorus and a lower content of chlorides was noted compared with the spring time. Moreover, in spring, the pH of water in all the lakes was higher than in autumn.

Sixty-eight aquatic fungi species were detected in the water of 28 Sejny lakes investigated (Table 3). In is noteworthy that such species as *Aphanodictyon papillatum, Aphanomyces amphigynus, Lagenidum humanum, Myzocytium vermicolum, Zoophthora rhizosphora, Angulospora aquatica* (Fig. 1) and *Trichophyton mentagrophytes*, were found in some of the lakes.

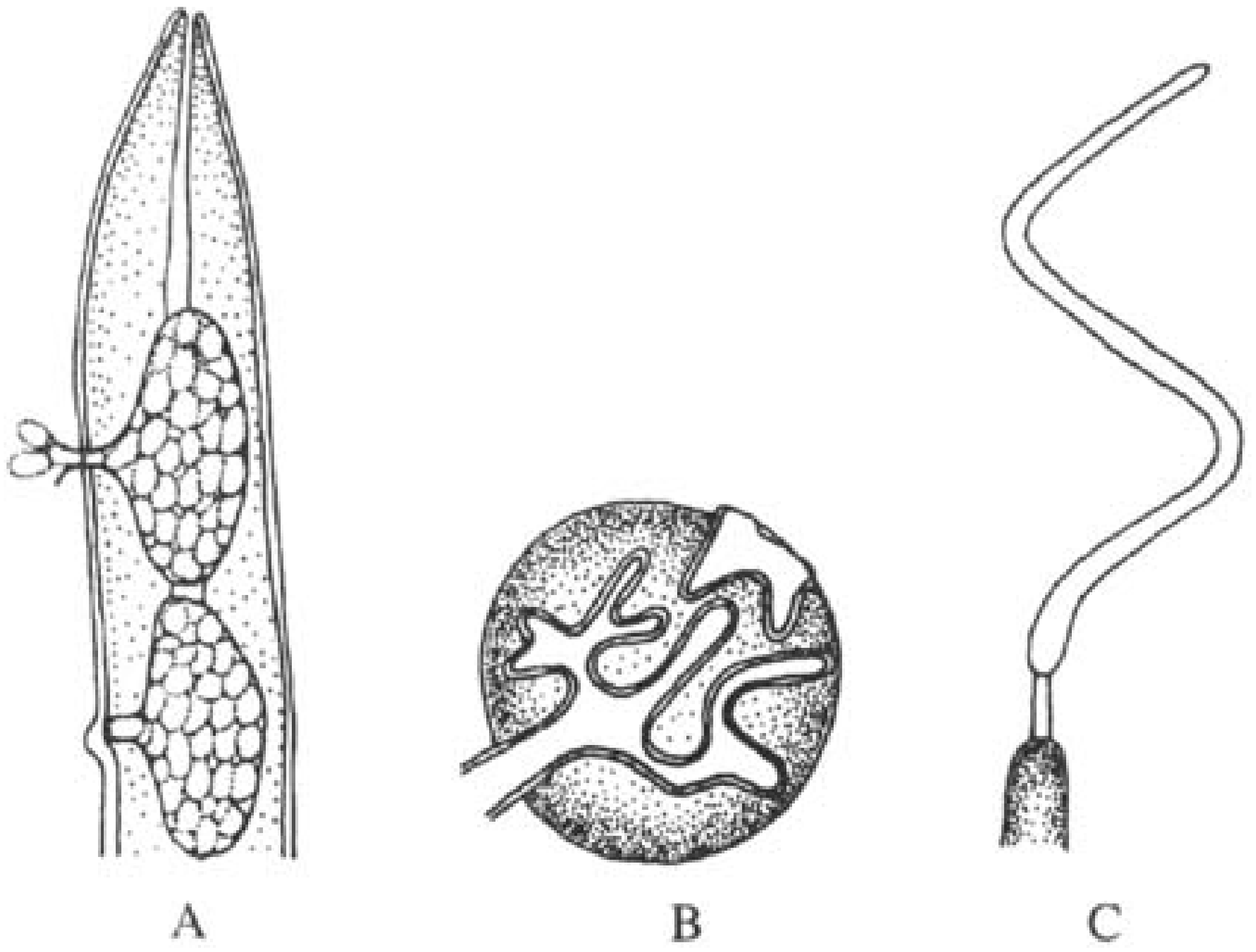

Fig. 1. Some aquatic fungi

A — *Myzocytium vermicolum* – part of thallus in nematode body (zoospore 3.4-4.8 µm); B — *Zoophthora rhizospora* – zygospore from thallus; C — *Angulospora aquatica* – conidium (1.8-88 µm)

Table 2

Chemical properties of water in particular lakes (in mg l^{-1})

Specification	Number of lake (see Table 1)						
	1	2	3	4	5	6	7
Temperature (°C)	7.2[a]-12.7[b]	7.6-14.3	7.0-12.2	7.6-13.8	8.2-14.0	7.4-12.0	7.6-13.8
pH	8.2-7.0	8.3-7.1	8.0-7.1	8.1-6.8	8.1-7.4	7.9-7.0	8.3-7.1
Oxidability	6.2-8.1	10.5-9.0	12-14.4	5.6-8.0	5.6-7.2	6.8-24.0	6.7-7.9
CO_2	17.6-26.4	0.0-22	24.2-27.5	0.0-16.5	18.7-20.1	0.0-33.0	0.0-5.8
Alkalinity in $CaCO_3$*	3.2-3.4	4.2-3.5	2.9-3.0	2.0-1.8	3.5-3.2	2.1-3.1	2.6-2.8
N (NH_3)	0.46-0.14	0.33-0.16	0.59-0.32	0.44-0.12	0.36-0.14	0.46-0.53	0.54-0.13
N (NO_2)	0.01-0.02	0.01-0.01	0.01-0.01	0.01-0.01	0.01-0.01	0.00-0.01	0.01-0.01
N (NO_3)	0.00-0.11	0.0-0.1	0.00-0.16	0.06-0.04	0.08-0.01	0.00-0.02	0.01-0.16
P (PO_4)	0.07-0.51	0.35-1.29	0.1-0.6	0.10-1.01	0.01-0.54	0.01-2.95	0.10-1.61
Cl	34-8	37-7	39-9	28-8	39-12	43-8	39-8
Total hardness in Ca	46.8-17.3	20.2-36.7	50.4-46.8	29.5-23.8	25.2-24.2	36.0-43.2	46.1-39.6
Total hardness in Mg	27.5-33.5	43.9-22.8	12.0-16.3	12.9-12.8	39.1-38.4	12.0-55.9	18.9-19.4
S (SO_4)	8.87-10.3	9.1-10.7	16.5-17.7	10.7-9.5	21.8-21.1	14.8-14.6	33.3-27.6
Fe	0.18-0.78	0.30-0.43	0.45-0.18	0.18-0.30	0.3-0.4	0.10-0.43	0.18-0.50
Dry residue	266-237	278-268	253-279	159-173	277-268	205-459	320-338
Dissolved solids	208-224	152-220	201-271	158-169	234-110	168-225	264-314
Suspended solids	53-13	126-48	52-8	1-4	43-68	37-234	56-24

* in mval l^{-1}; a – May, b – September

Specification	Number of lake (see Table 1)						
	8	9	10	11	12	13	14
Temperature (°C)	8.1-14.2	7.4-13.0	7.0-12.2	7.2-12.2	8.2-14.5	7.8-13.0	8.0-14.0
pH	8.3-7.1	8.3-7.0	8.0-6.9	8.2-6.2	8.3-7.1	8.1-7.2	8.1-7.0
Oxidability	7.8-8.7	6.0-22.8	15.8-12.8	14.5-11.6	8.4-8.7	29.5-7.4	10.0-13.4
CO_2	0.0-19.8	0.0-70.2	32.1-49.5	0.0-19.8	0.0-19.8	31.9-26.4	16.5-27.5
Alkalinity in $CaCO_3$*	3.5-3.6	3.8-4.7	3.6-3.5	3.8-3.3	3.2-3.1	3.8-3.6	3.0-3.0
N (NH_3)	0.64-0.28	0.68-0.77	0.64-0.33	0.83-0.16	0.44-0.13	0.44-0.19	0.61-0.32
N (NO_2)	0.01-0.11	0.01-0.02	0.01-0.01	0.01-0.01	0.00-0.01	0.01-0.01	0.01-0.01
N (NO_3)	0.11-0.06	0.10-0.64	0.00-0.16	0.12-0.12	0.00-0.11	0.00-0.14	0.00-0.17
P (PO_4)	0.01-0.35	0.07-4.15	0.00-0.67	0.24-0.88	0.04-2.1	0.03-0.99	0.07-0.60
Cl	46-9	39-12	39-8	39-7	39-9	32-8	36-8
Total hardness in Ca	50.4-19.6	11.5-88.6	66.2-51.8	13.0-46.8	38.2-27.4	36.0-35.3	34.6-44.2
Total hardness in Mg	23.2-19.4	51.2-33.1	16.8-17.2	53.8-20.6	28.8-31.8	40.0-24.5	25.8-16.8
S (SO_4)	29.2-22.1	26.7-47.3	23.9-15.6	29.6-23.0	30.4-30.6	21.0-13.6	23.1-16.5
Fe	0.18-0.45	0.45-1.58	0.55-0.45	0.18-0.30	0.68-0.98	1.23-0.30	0.18-0.45
Dry residue	285-304	305-484	325-294	307-319	295-274	281-237	229-266
Dissolved solids	277-247	295-480	228-292	290-314	275-272	251-224	151-260
Suspended solids	8-57	10-4	97-2	17-5	20-2	30-13	78-6

* in mval l^{-1}

cont. Tab. 2

Specification	Number of lake (see Table 1)						
	22	23	24	25	26	27	28
Temperature (°C)	8.0-13.4	8.2-14.0	7.8-12.5	8.0-14.3	8.6-15.0	8.4-14.5	8.2-13.6
pH	8.3-7.0	7.8-7.1	8.3-8.1	8.3-7.0	8.3-7.2	8.2-7.2	8.2-7.8
Oxidability	13.8-15.6	15.3-12.0	6.2-12.8	16.0-12.0	6.7-8.7	5.1-6.1	5.6-8.4
CO_2	14.3-28.4	19.8-15.4	17.6-19.8	0.0-17.6	12.1-12.4	12.1-15.4	0.0-12.3
Alkalinity in $CaCO_3$*	4.2-3.5	1.9-1.9	3.2-2.5	4.0-4.0	2.9-2.7	2.7-2.6	4.0-3.8
N (NH_3)	0.64-0.28	0.33-0.31	0.46-0.75	0.82-0.57	0.46-0.29	0.49-0.10	0.42-054
N (NO_2)	0.01-0.01	0.01-0.01	0.01-0.01	0.01-0.01	0.00-0.01	0.01-0.01	0.01-0.01
N (NO_3)	0.03-0.26	0.00-0.12	010-0.10	0.00-0.06	0.1-0.1	0.00-0.18	0.12-0.16
P (PO_4)	1.51-1.38	0.00-0.51	0.00-0.81	0.01-0.49	0.10-1.28	0.00-1.38	0.04-0.62
Cl	42-7	38-9	35-8	43-11	34-8	34-10	35-8
Total hardness in Ca	38.2-32.4	34.6-29.5	35.3-27.4	78.5-67.7	43.2-35.3	39.6-28.8	18.4-20.4
Total hardness in Mg	47.7-28.8	12.5-10.8	14.2-17.8	17.2-14.4	15.9-13.3	15.9-17.6	45.2-30.2
S (SO_4)	38.6-25.9	10.3-26.3	9.1-11.5	36.2-25.1	12.3-16.5	13.6-10.7	16.5-17.4
Fe	0.13-0.32	0.45-0.30	0.13-0.65	0.48-0.55	0.00-0.48	0.00-0.38	0.45-0.50
Dry residue	390-290	195-224	166-144	321-377	193-191	185-187	251-268
Dissolved solids	367-258	177-209	163-123	239-358	191-164	184-179	235-210
Suspended solids	27-32	18-15	3-21	82-19	2-27	1-8	16-58

* in mval l^{-1}

cont. Tab. 2

Specification	Number of lake (see Table 1)						
	15	16	17	18	19	20	21
Temperature (°C)	7.0-10.2	7.2-12.1	7.4-13.0	7.0-11.7	8.2-14.5	8.2-14.5	8.1-14.4
pH	8.3-7.0	8.1-7.1	8.2-7.0	8.1-7.0	8.1-7.0	8.3-7.1	8.2-7.1
Oxidability	11.8-18.4	24.0-10.8	11.5-12.2	15.0-10.3	16.8-13.4	12.0-7.4	7.0-7.2
CO_2	26.4-41.8	22.0-24.2	12.1-30.8	23.1-14.2	7.7-12.1	0.0-19.8	8.8-22.0
Alkalinity in $CaCO_3$*	3.9-3.6	3.6-3.2	2.7-3.0	1.7-1.3	2.7-2.8	4.2-3.4	3.1-3.1
N (NH_3)	0.61-0.16	0.94-0.71	0.98-0.76	0.64-0.31	1.26-1.43	0.72-0.16	0.36-0.47
N (NO_2)	0.01-0.17	0.01-0.02	0.01-0.01	0.01-0.01	0.04-0.01	0.02-0.02	0.01-0.01
N (NO_3)	0.00-0.12	0.03-0.04	0.09-0.03	0.00-0.18	0.36-0.12	0.06-0.04	0.00-0.27
P (PO_4)	0.20-0.76	0.10-0.88	0.51-0.76	0.21-1.10	0.14-0.61	0.14-0.99	0.14-0.48
Cl	36-8	40-10	42-7	37-9	38-8	41-12	33-6
Total hardness in Ca	20.2-33.8	63.4-43.2	59.1-41.8	25.9-21.6	59.8-52.6	57.6-54.0	27.4-35.3
Total hardness in Mg	41.3-35.7	18.1-17.6	14.2-19.8	12.9-12.0	15.1-15.2	32.7-16.3	28.4-18.9
S (SO_4)	10.7-21.4	29.1-19.3	27.2-132.8	11.9-1`6.9	31.3-31.4	45.7-26.3	11.9-6.6
Fe	0.30-0.65	0.45-0.88	0.48-0.65	0.30-0.43	0.85-0.12	0.18-0.55	0.10-0.45
Dry residue	256-306	288-288	291-252	190-168	294-301	384-273	217-226
Dissolved solids	97-303	286-277	280-210	172-157	271-231	364-258	183-210
Suspended solids	159-3	2-11	11-22	18-11	23-70	20-15	34-16

* in mval l^{-1}

Table 3

Aquatic fungi in particular lakes (s – spring, a – autumn)

Species	Lakes (see Table 1)
Zoosporic	
Achlya americana Humphrey	22s
A. debaryana Humphry	10a, 13s, 26a
A. flagellata Coker	8a, 23a, 2a, 3a, 20s, 22a
A. megasperma Humphrey	2a, 3a, 20s, 22a
A. oligacanta de Bary	2s, 19s, 21s
A. papillosa Humphrey	2a, 10s, 11s, 17a, 21a
A. polyandra Hildebrand	22a
A. racemosa Hildebrand	1s, 3s, 17s
A. recurva Cornu	1s
Aphanodiction papillatum Huneycutt	17a
Aphanomyces amphigynus Cutter	5s, 28s
A. irregularis Scott	1a, 2s, 3a, 3s, 4s, 5a, 5s, 6a, 8s, 9s, 14a, 14s, 15a, 19a, 19s, 21s, 22a, 22s, 25s, 26a
A. parasiticus Coker	4s, 9s, 17a, 24a
A. stellatus de Bary	3s, 10a, 27s
Asterophlyctis irregularis Karling	12s
Blastocladiopsis parva (Whiffen) Sparrow	1a, 4s, 7a, 8s, 9s, 14a.26a, 27a
Calyptralegnia achlyoides (Coker et Couch) Coker	2a
Catenaria anguillula Sorokin	1a, 2s, 4a, 4s, 9s, 25s
C. sphaerocarpa Karling	13a, 17s, 27a
C. verrucosae Karling	22a
Catenophlyctis variabilis (Karling) Karling	3a, 12a
Chytridium xylophilum Cornu	8a, 11s, 13s, 15s, 26a, 26s
Chytriomyces annulatus Dogma	24s
Dangeardia laevis Sparrow et Barr	27s
Dictyuchus monosporus Leitgeb	1s, 2a, 3s, 5a, 8a, 10a, 12s, 16a, 18a, 23a, 24s, 26s
Hyphochytrium catenoides Karling	8a, 8s, 12a, 14s, 18a
Isoachlya anisospora (de Bary) Coker	1a, 4a, 10a, 18a, 24a, 26a
Karlingia rosea (de Bary et Woronin) Johanson	10a, 12s, 19a
Lagenidium humanum Karling	3s
Leptomitus lacteus (Roth) Agardh	2s, 17a, 28s
Mitochytridium regale Hassan	15s, 17s
Myzocytium vermicolum (Zopf) Fischer	6s

cont. Tab. 3

Nowakowskiella elegans (Nowak.) Schroeter	1s, 10a, 27a
N. macrospora Karling	3a, 11s, 27s
Olpidiopsis saprolegnia (Braun) Cornu	1a, 1s, 2a, 4a, 7a, 8a, 14a, 24a
Olpidium granulatum Karling	6a, 27a, 27s
Polychytrium aggregatum Ajello	2a, 24a
Polyphagus euglenae Nowakowski	16s, 19a, 27s
Pythiogeton nigricans Batko	7a, 9a, 15a, 18a, 21s
Pythium artotrogus de Bary	1s, 22a
P. debaryanum Hesse	23s
P. ultimum Trow	17s
Rhizophydium carpophilum (Zopf) Fisher	17s, 22s
R. keratinophilum Karling	11a, 12a, 12s, 13a, 14a, 16a, 20s, 21a
R. nodulosum Karling	14s, 16a, 20a
R. pollinis-pini (Braun) Zopf	15s, 26s
Rozellopsis inflata (Butler) Karling	6a, 16a, 17s, 18a
Saprolegnia ferax (Gruith) Turnet	4s, 5a, 7s, 8a, 8s, 9s, 12a, 13s, 14a, 15a, 16a, 17a, 18a, 20a, 22a, 23a, 24a, 24s, 25a, 26s, 27a
S. monoica Pringsheim	7a
S. parasitica Coker	6a
Thraustotheca clavata (de Bary) Humphrey	3s
Zoophagus insidians Sommerstorff	26s
Conidial	
Alatospora acuminata Ingold	4a
Anguillospora longissima Sacc. et Sydow	1a, 7a, 10a, 11a, 20a, 21a, 26a
Angulospora aquatica Nilsson	7s
Arthrobotrys oligospora Fresenius	3a, 12s, 26a
Bacilliospora aquatica Nilsson	1s, 24a
Candida albicans (Robin) Berkhout	1s, 11a
Dactylella submersa (Ingold) Nilsson	6s
Fusarium aquaeductum (Radkl. et Rabh.) Lagerheim	1s, 19s
Lemonniera aquatica de Wildeman	14a, 15a, 20a, 23a, 25a
Robillarda phragmitis Cunnell	2a, 16s, 26s
Tetracladium marchalianum de Wildeman	15s
T. setigerum (Grove) Ingold	4a, 6s, 9a, 11s, 24a
Trichophyton mentagrophytes Blanchard	20a
Trichosporon cutaneum (de Beur. et al.) Ota	4a, 7s, 11a, 24s, 27s, 28s
Vargamyces aquaticus (Dudtka) Toth	12s
Zoophthora rhizosphora (Thaxter) Batko	20s

DISCUSSION

We observed the development of *Aphanodictyon paplillatum* in autumn 1990 on the shore of Lake Płaskie near Jeziorki village. It is a keratynophillous fungus encountered mainly in ponds and rivers (C z e c z u g a, M u s z y ń s k a, 1994), Lake Płaskie was the second site apart from Lake Białe (Augustów), where this fungus was found. Likewise, *Lagenidium humanum* has hitherto been observed only in ponds and rivers; thus Lake Boczniel is the first water body of this type where this fungus has been noted. It is a saprophyte also found on human skin. As regars hydrochemistry of the sites where these two fungi were observed, Lake Płaskie had a mean content of all three nitrogen and phosphorus forms and mean range of oxydability in this group of lakes. However, in spring the water of Lake Boczniel had no detectable amounts of N-NO, and the amounts of the remaining two nitrogen forms were approximately the same as in the remaining lakes. Higher values were found in this lake for such parameters as carbon dioxide content and calcium concentration. *Aphanomyces amphigynus* occurred in the water of lake Dowcień and Żubrowo only in spring. It was isolated from the wings of afly as a bait. It should be noted that the water in both lakes contained nearly identical amounts nitrogen, phosphorus and total iron. It is noteworthy that *Myzocytium vermicolum*, a threat worm parasite was reported for the first time from the water of Lake Dmitrowo in Poland. In spring 1991 the water of this Lake had low oxydability, low concentration of phosphates and no detectable amounts of carbon dioxide and nitrates.

It is also worthy of notice that *Angulospora aquatica*, a relatively rare *Hyphomycetes* representative, was found in the western part of Lake Gaładuś in May. It has hitherto been encountered only at two sites in the world. It was first described from leaves decaying in a body of water in Venezuela (N i l s s o n, 1962) and then in a water body in Malaysia (D u d k a, 1985).

The water of Lake Gaładuś, as compared with that of the other lakes of this group, had no detectable amounts of carbon dioxide. In addition it had low oxydability and relatively high concentration of nitrite nitrogen and calcium in the period when the water samples were collected for analysis.

In autumn we observed the growth of a parasitic fungus of animals (L a T o u c h e, F o r e s t e r, 1963) and man (M e r g e r, V e r m a, 1963) – *Trichophyton mentagrophytes* in the water of lake Pomorze. *T. menagrophytes* keratin-containing tissues, particularly on hairy skin. Lake Pomorze is the third site where this fungus has been reported from Poland. It was also noted in the water of Lake Białe and Lake Necko (C z e c z u g a, 1994 a). The hydrochemistry of this lake was not different from that of the other lakes. However, a large number of rest-houses are situated on shores of Lake Pomorze, which are probably responsible for the occurrence of *Trichophyton mentagrophytes* in this lake.

In May 1991 we found *Zoophthora rhizospora*, a parasite of the *Trichoptera* and *Culicidae* representatives on dead frgaments of a caddish-fly lying in the place where water touches a sandy shore of Lake Pomorze. Lake Pomorze is the first body of water in Poland in which this fungus was found. The hydrochemistry of Lake Pomorze did not differ from that of the remaining lakes, altough no detectable amounts only at this site of carbon dioxide were found.

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REFERENCES

B a t k o A., 1975. Zarys hydromikologii. Warszawa, PWN, 487 p.

C z e c z u g a B., 1987. The genesis of the lakes in north-eastern Poland. Intern. Ptoject Paelimnol. late Cenozoic Climate, Kyoto, Japan, 4: 31-33.

C z e c z u g a B., 1991 a. The mycoflora of Lake Wigry and seven adjacent lakes. Arch. Hydrobiol. 129: 495-510.

C z e c z u g a B., 1991 b. Aquatic fungi in Lake Śniardwy and eighteen neighbouring lakes. Int. Revue Ges. Hydrobiol. 76: 121-135. – 1994 a. Aquatic fungi of twelve Augustów lakes with reference to the chemicstry of the environment. Acta Mycol. 29: 217-227. – 1994 b. Aquatic fungi in Lake Hańcza in the Suwałki Scenic Park and of some adjacent lakes (north-eastern Poland). Acta Hydrobiol. 36: 371-385. – 1995 a. Hydromycoflora of thirty-one lakes in Ełk Lake District and adjacent waters with reference to the chemistry of the environment. Acta Mycol. 30: 49-63. – 1995 b. Aquatic fungi in small forest lakes "Suchary" of the Wigry National Park. Ibid. 30: 167-180.

C z e c z u g a B., C h o m u t o w s k a H., W o r o n o w i c z L., 1990. The hydromycoflora of the Biosphere Sanctuary, lake Łuknajno. Acta Mycol. 26: 37-44.

C z e c z u g a B., M u s z y ń s k a E., 1994. Keratinophilic fungi in various types of water bodies. Ibid., 29: 201-215.

C z e c z u g a B., W o r o n o w i c z L., 1992. Studies of aquatic fungi. The Lake Mamry complex. Ibid. 27: 93-103.

D u d k a I. O., 1974. Vodni hifomiceti Ukraini. Nauk. Dumka, Kijev.

D u d k a I. O., 1985. Wodnyje nesowerŝennyje griby ZSRR. Kijev, Nauk, Dumka.

F u l l e r M. S., J a w o r s k i A., 1986. Zoosporic fungi in teaching and research. Southeast. Publ. Corp. Athens, 310 p.

G o l t e r m a n H. L., C l y m o R. S., 1971. Methods for physical and chemical analysis of fresh water. IBP. Handbook No. 8. Oxford Blackwell Sci. Publs.

I n g o l d C. T., 1975. An illustrated guide to aquatic and water borne Hyphomycetes (*Fungi imperfecti*) with notes on their biology. Freshwater Biolog. Assoc. Sci. Publ. 30: 1-96.

K a r l i n g J. S., 1977. Chytridiomycetarum Iconographia. An Illustrated and Brief Descriptive Guide to the Chytridiomycetous genera with a supplement of the Hypochytriomycetes. Vaduz.

L a T o u c h e C. J., F o r s t e r R. A., 1963. Spontaeaus infection in the hedgehog (*Erinaceus europaeus*) by a variety of *Trichophyton metagrophytes* (Robin) Blanchard. Sabouraudia 2: 143-145.

M e r g e r E. H. and V e r m a B. S., 1963. Hair digested by *Trichophyton mentagrophytes*. An electron microscope examination. Archs Derm. 87: 125-360.

N i l s s o n S., 1962. Second note Swedish fresh-water Hyphomycetes. Bot. Not. 115: 73-86.

S k i r g i e ł ł o A., 1954. Grzyby niższe. Grzyby i glonowce, Warszawa.

S p a r r o w F. K., 1960. Aquatic Phycomycetes. Ann. Arbor. Univ. Michigan Press.

Grzyby wodne w kompleksie jezior sejneńskich

S t r e s z c z e n i e

Autor badał grzyby wodne w kompleksie jezior sejneńskich. Próbki wody poddał analizie hydrochemicznej. W liczbie 68 znalezionych grzybów znalazły się 3 gatunki dotychczas w Polsce nie stwierdzone: *Myzocytium vermicolum, Angulospora aquatica, Zoophthora rhizospora.*