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September's plankton of the Poščenska lakes

ABSTRACT AND SUMMARY

In September 1975 some orientational studies of the Pošćenska Lakes in Montenegro were done. These are the two small, shallow (around 5 m) low mountain range lakes (890 m. a.) with the insignificant surface (0.5 ha), situated near Šavnik. Oxygen contents rated 4.79 on the bottom and 5.62 mg/l on depth of 2.5 m, more exactly 52.33 to 61.42%; acidity rate (pH) was 7.6 on the bottom, water temperature ranges from 18.1 on the bottom to 18.5°C on the surface. Transparency of water was 2.5 m. Plankton was composed of 24 phytoplankton species: *Diatomeae* (14), *Cyanophyta* (3), *Chlorophyta* (3), *Euglenophyta* (3), and *Pyrrophyta* (1); 15 species of zooplankton: *Rotatoria* (6), *Cladocera* (3), *Copepoda* (3), and *Protozoa* (2). The most abundant were periphyton, tychoplankton and benthos algae species *Diatomeae* and euplankton ones: *Closterium ehrenbergii, Merismopedia punctata* and *Microcystis pulverea*, and in zooplankton: adult generations *Acanthodiaptomus denticornis* and *Daphnia longispina*. A dense population of *Chaoborus crystalinus* was also recorded in these lakes.

INTRODUCTION

In September 1975 a visit to the Pošćenska lakes has been arranged in order to do the investigations in scope of study on fishery--economic base of open waters of Šavnik's community.

Pošćenska lakes are the two small natural water basins on the altitude of 890 m, 3.5 km northwest of Šavnik, and around 2 km northwest of the peak Turija (1184 m a.); they are situated between 42°55' and 43° of north geographic latitude and 19°5' of east geo-

graphic longitude, right between the Komarnica and the Pridvorica rivers, in the area of the village Pošćenje. Between the lakes and the Komarnica River there is a temporary water link. The lakes are shallow (maximum depth around 5 m); their surface is small (0.5 ha) and they are densly overgrown by the aquatic macrophyte vegetation: mainly submerged and floating ones (*Potamogetonaceae-Nymphaeaceae* and others), and their littoral parts are populated by *Phragmites, Juncaceae, Cyperaceae* and other. All this, and the presence of rich mud layers, points out the tendency of the natural »covering« of the lakes, that is their dieing out and transformation into marshes and swamps.

MATERIALS AND METHODS

Plankton samples were taken on few sampling stations in the littoral and the pelagic area with plankton net No 25 and Friedinger's one liter sampler. Submerged and floating vegetation has also been washed off in order to get the data on composition and character of plankton and periphyton communities of these waters. Parallely with taking of biological samples, some physico-chemical parameters of lakes' water have been taken and measured: temperature, oxygen contents, alkalinity, carbonates, bicarbonates, water hardness, calcium, magnesium, chlorine, organic matter and acidity rate (Tab. I). (These data were taken from Fishery-economic base of open waters of Community Šavnik, which was done by Biological Institute in Titograd, 1977).

RESULTS

a) Composition and character of phytoplankton. The following groups were presented in phytoplankton and periphyton: *Bacillariophyceae, Cyanophyta, Chlorophyta, Pyrrophyta* and *Euglenophyta.* Group *Bacillariophyceae* is characterized by the biggest number of species: *Cocconeis placentula, Caloneis schumanniana, Cymbella sp., Eunotia praerupta, Epithemia sp., Fragilaria crotonensis, Gomphonema sp., G. acuminatum v. coronata, Hantzschia amphioxys, Navicula cryptocephala, N. cuspidata, N. viridula, Synedra acus, Tabellaria fenestrata.*

In other groups smaller number of species was recorded — *Cyanophyta: Coelosphaerium sp., Merismopedia punctata, Microcystis pulverea;* — Chlorophyta: *Closterium ehrenbergii, Scenedesmus obliquus, Spirogyra sp.;* — *Pyrrophyta: Ceratium hirundinella;* — *Euglenophyta: Lepocinclis sp., Phacus acuminatus, Phacus sp.*

Tab. I. Some physycal and chemical water parameters of Pošćenska jezera (lakes) in September 1975

Tab. I. Neki fizičko-hemijski parametri vode Pošćenskih jezera u septembru 1975.

	površ. — surface	sred. — middle	dno — botom
t° vode C Water temperature	18,5	18,2	18,1
O_2 mg/l	4,99	5,62	4,79
O_2%	54,83	61,42	52,33
fenolft. alkalinitet fenolft. alcalinity m val/l	0,15	0,16	0,18
CO_3 mg/l	10,05	9,9	10,8
HCO_3 mg/l	209,8	206,1	207,3
karbon. tvrdoća carbon hardness °dH	9	9,6	9,85
Ca mg/l		67,2	
Mg mg/l		3,4	
ukupna tvrdoća total hardness °dH		10,19	
pH	7,6	7,6	7,6
organske materije organ. mater. mg/l $KMnO_4$		28,2	
Cl		6,0	
ukup. alkal. total alcalin. m val/l	3,74	3,70	3,70

dubina (depth) = 4,5 m; providnost (transparency) = 2,5 m;
t° vazd. (air temperature) = 17°C

24 species of varieties have been indentified. In composition and character *Diatomeae* — 14 are predominant; however, majority of these forms, and those from other groups, mostly populates the area of macrophytic vegetation; open water is populated by a small number of plankton algae, typical for swamps and other small eutrophic waters, like: *Closterium ehrenbergii, Merismopedia punctata and Microcystis pulverea.* In quantitative sense the same relations, order and significance were noted.

b) Composition and character of zooplankton. The following groups are represented in zooplankton: *Copepoda, Cladocera, Rotatoria* and *Protozoa. Copepoda* and *Cladocera* are predominant.

The zoplankters living in the open waters are: *Acanthodiaptomus denticornis, Daphnia longispina* and *Ceriodaphnia reticulata.* In relation to the biomass *Acanthodiaptomus* and *Daphnia* are predominant. In moment of investigation their populations have been composed mainly of sexually adult forms (females and males), and they were very abundant. It was particularly in *Acanthodiaptomus* whose females bore a rather high number of adult eggs that were in phase of hatching. The population of this copepod has been analyzed, and it was found that copepodite stadiums I to V (females and males) were represented as well as all the nauplial stadiums from I to VI; however, in this moment adult forms were dominating over the juvenile ones — to a higher extent. Out of 70 ovigernal females bearing 4 to 18 eggs, most of them were with 9, 10 and 11, what is around 45%. Also, the rare females with spermatophores, whose number did not overlap 1, were recorded.

In the vegetation zone many more forms from mentioned groups were recorded. For coenotic physiognomy of the lakes are especially significant the species from the group *Rotatoria: Lecane closterocerca, L. lunaris, Lepadella ovalis, Platyas quadricornis, Rotaria neptunia, Trichocerca porcellus,* and various *Rotatoria indeterminata (iloricata);* from *Cladocera* group: *Pleuroxus (Peracantha) truncatus, Alona guttata, Chydorus ovalis;* from *Copepoda* group: *Macrocyclops albidus, Paracyclops fimbriatus chiltoni, Eucyclops serrulatus;* and from *Protozoa* group: *Arcella vulgaris* and *Trachelocerca sp.*

In plankton samples, particularly those from the open water the following insect larvae was present: *Chaoborus crystallinus (=Corethra plumicornis-Culicidae);* it is developed to a rather high extent.

However, in order to have a more complete picture of life in the lakes, it is worth saying that in some samples were also recorded the forms of the non-plankton groups of *Invertebrata,* like: *Stylaria lacustris (Oligochaeta),* various *Nematodes, Gastropoda, Hydra oligactis (Hydrozoa),* insect larvae of other *Chironomida,* then *Ephemeroptera* and others.

Basic physico-chemical parameters of Pošćenska lakes are: small depth, small quantities of dissolved oxygen — quite a deficit (4.79--5.62 mg/l), relatively low rate of acidity with tendency of further lowering, especially in shallow parts, in zone of macrophytes, then rich layers of organic and inorganic mud on the bottom, morphometry of the lakes, abundant macrophyte vegetation and detritus, presence of *Rotaria neptunia, Chaoborus crystallinus* and *Styllaria*

lacustris, and dense populations of some species of *Cyanophyta (Merismopedia, Microcystis)*, point out the fact that these biotopes can be classified as the lakes of meso-dystrophic that is eutrophic type. As such, these lakes would be completely suitable for the upbringing of carp — *Cyprinus carpio (Cyprinidae)*.

Investigating the Pošćenska lakes and relatively allied water basins in the drainage basin of Pivsko lake (temporary link through the Komarnica), collected data indicated a massive presence of *Acanthodiaptomus denticornis* in them. This was very significant and useful for better understanding of genesis of plankton community of the Pivsko lake, which is just forming, because a massive apparence of *A. denticornis* occured (Petković and Petković, 1977).

SEPTEMBARSKI PLANKTON POŠĆENSKIH JEZERA KOD ŠAVNIKA

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Rezime

U septembru 1975. u okviru rada na Ribarsko-privrednoj osnovi otvorenih voda opštine Šavnik, vršena su orijentaciona istraživanja planktona Pošćenskih jezera u Crnoj Gori. To su dva mala, plitka (oko 5 m), niskoplaninska jezera (890 m n. m.) blizu Šavnika, neznatne površine (manje 0,5 ha). Sadržaj kiseonika u vodi iznosio je 4,79 na dnu i 5,62 mg/l na dubini od 2,5 m odnosno 52,33 do 61,42%; i stepen kiselosti — pH 7,6 na dnu, a temperatura vode se kretala od 18,1 na dnu do 18,5°C na površini. Providnost vode bila je 2,5 m. Plankton je tada bio sastavljen od 24 vrste fitoplanktona: *Diatomeae* (14), *Cyanophyta* (3), *Euglenophyta* (3) i *Pyrrophyta* (1); i 15 vrsta zooplanktona: *Rotatoria* (6), *Cladocera* (3), *Copepoda* (3), i *Protozoa* (2). Najabundantnije su bile perifitonske — tihoplanktonske — bentonske vrste alga *Diatomeae*, i euplanktonske: *Closterium ehrenbergii, Merismopedia punctata* i *Microcystis pulverea;* a u zoplanktonu: adultne generacije *Acanthodiaptomus denticornis* i *Daphnia longispina*. U ovim jezerima nađena je i bogata populacija *Chaoborus crystalinus (Culicidae)*. I u kvantitativnom pogledu zapaženi su isti odnosi redosled i značaj pojedinih planktonata.

Osnovni fizičko-hemijski parametri vode ovih jezera: mala dubina, male količine rastvorenog kiseonika (priličan deficit — 4,79 do 5,62 mg/l), relativno nizak stepen kiselosti — 7,6 uz tendenciju još većeg sniženja, naročito u plićim delovima u zoni makrofita, zatim bogate naslage organskog i neorganskog mulja na dnu, morfometrija jezera, bogata makrofitska vegetacija i detritus, zatim prisustvo *Rotaria neptunia, Chaoborus crystalinus* i *Styllaria lacustris* i gustih

populacija nekih vrsta *Cyanophyta (Merismopedia, Microcystis)* ukazuju na činjenicu da je kod istraživanih biotopa prisutna tendencija prirodnog »zatrpavanja« tj. odumiranja i prelaza u bare odnosno močvare. Stoga se ova jezera po trofičnosti, najverovatnije, mogu svrstati u jezera mezodistrofnog odnosno eutrofnog tipa. Kao takva ona bi, po svoj prilici, bila pogodna za uzgajanje šarana — *Cyprinus carpio.*

Istraživanjima Pošćenskih jezera, relativno bliskih vodenih bazena u slivnom području Pivskog jezera (povremena veza preko Komarnice), došlo se do podataka o masovnom prisustvu *Acanthodiaptomus denticornis (Copepoda)* u njima. Ovo je veoma važno i korisno za razumevanje geneze i formiranja planktonske zajednice Pivskog jezera u kome je takođe u periodu avgust-novembar 1976. zapažena masovna pojava *A. denticornis* (Petković i Petković, 1977).

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