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ZOOPLANKTON INVESTIGATIONS IN AN EXPERIMENTAL AREA AT THE KISKÖRE RIVER BARRAGE

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Abstract

In the course of our investigations the differences between the areas of various physiognomies concerning their composition of species and individual numbers indicated the consequences of the different organic-matter loading of the open-water and woody-bushy water surfaces and, in that way, the early ageing of the latter one, the deterioration of the water quality in it.

Introduction

After creating shallow-water reservoirs, the plant remains of the inundated areas provide a continuous food supply to the aquatic animals with their decomposition lasting for several years. The outcome of that may be a rise in the saprobity degree of water and necessarily a quicker tempo of the process of eutrophication. In 1974, therefore, our laboratory carried out hydroecological investigations in an experimental area of an about 4 sq.km surface, of 1 to 3.5 m water-depth, overgrown with trees and shrubs, inundated with the water of the Tisza that will give food-water also to the Kisköre Reservoir to be created in the Tisza, for establishing parallelisms and differences between the water qualities of the areas of different vegetations, overgrown with woods and having open-water sites. In the course of the work we performed hydrochemical (H. TÓTH 1975), bacteriological and algological (HAMAR 1975) investigations and studied the macrovegetation (B. TÓTH—HAMAR 1975). On many occassions, the diurnal changes were followed with attention, as well (HAMAR—BANCSI 1975).

Material and method

In the course of investigating the experimental area, we have studied the qualitative and quantitative development of the zooplankton (Zooflagellata-, Rotatoria- and Crustacea-fauna) systematically. The elaboration of the Zooflagellata fauna was performed by my colleague J. Hamar. I am most grateful to him for abandoning me his results. From the five sampling points designated (B. TÓTH—VÉGVÁRI 1975) we ladled samples weekly, resp. fortnightly. For collecting the species Rotatoria and Crustacea, we have used a net made of 50 μ mesh sieve cloth. Occasionally and at some point we have filtered 10 l water for the quantitative elaboration and 50 to 100 l water for qualitative investigations, the latter one being used for the determination of all the three groups from living samples. The quantitative investigation of the Zooflagellate fauna tok place from ladled samples, fixed with Lugol's solution, according to Utermöhl's technique.

Results

From the water of the experimental area we have identified 16 Zooflagellate species, namely: *Acinetactis mirabilis* KENT, *Bicoeca conica* LEMN., *B. lacustris* J. CLARK, *B. planctonica* KISS, *B. turrigera* BOURR., *Cercobodo dubius* SKUJA, *Codonosiga botrytis* (EHR.) KENT, *C. ornata* ROSKIN, *Collodyction tricilliatum* CARTER, *Desmarella moniliformis* KENT, *Diplosigopsis entzii* FRANCÉ, *Monosiga ovata* KENT, *Pleuromonas jaculans* PERTY, *Poteriodendron petiolatum* STEIN, *Salpingoeca bütschlii* LEMN., *S. frequentissima* (ZACH.) LEMN.

Among the species turning up we have not found any indicating expressly polluted water although *Acinetis mirabilis* was found in an oxidizing lake, *Collodyction tricilliatum* below the inflow of waste-water from the paper-mill of Szolnok into the Tisza (HAMAR 1973). The majority of species contain organisms living in eutrophic waters.

The Rotatoria fauna of the experimental area is rich both in species and in individual numbers. In the course of the investigations 95 taxons were found. In Table 1, from the data obtained during the annual investigation of the five sampling points, only the data of the samples coming from three characteristic periods of two sampling points (15=open water, 15/3=wooded area) are recorded.

In the Rotatoria plankton of the shallow backwaters, apart from the euplanktonic forms, there occur regularly phytophilous and pelophilous species, as well. The obligate planktonic species are characteristic members of the water living-spaces during the whole year. The multipliaction of the phytophilous species, containing constantly bottom-bound (sessile) forms and some groups becoming fixed only periodically (metaphytic species), is connected with the appearance and spreading of the macrovegetation.

After the experimental area had been filled up, we could evaluate the conditions developed in the water spaces of various physiognomies, on the basis of the results of the Rotatoria-plankton investigations, as well: In the open-water area initially the *Keratella-Polyarthra — Synchaeta*, then in July the *Keratella — Anuraeopsis — Brachionus — Polyarthra* plankton were characteristic. In August, the Rotatoria plankton of *Brachionus — Keratella — Filinia*, in September that of *Keratella — Polyarthra — Trichocerca*-composition developed. In the *Keratella — Polyarthra — Synchaeta* plankton, characteristic between October and December, only the dominance of the three genera underwent a change. In the wooded areas from May the 28th till July the 2nd we found Keratella, in the middle of July *Anuraeopsis — Keratella*, at the end of July *Anuraeopsis — Keratella — Polyarthra — Trichocerca* plankton. In August, *Keratella — Brachionus — Polyarthra*, then *Polyarthra — Pedalia — Pompholy* plankton developed. In September, we found *Keratella — Polyarthra* plankton. From October, similarly to the open-water areas, the *Keratella — Polyarthra — Synchaeta* plankton became characteristic here, too. At assorting the plankton types observed in the course of the year, the dominant genera were taken into consideration. On this basis a considerable similarity may be established. But *Fedalia mira* and *Pompholyx sulcata*, found in large numbers in the wooded area inundated with water and causing the dominant appearance of their genera, are referring to the difference of the two water-spaces of different physiognomies, as well.

In July, *Anuraeopsis* fissa was one of the dominant species of the open-water area. In the wooded places it appeared similarly in July and its number was here the multiple of that observed in the open water. Among the characteristic species of

the open-water area also *Conochiloides dossuarius* is to be mentioned, although we know rather little about its ecological value.

The richness in form of the genus *Keratella* was striking: there occurred together eleven taxons in the experimental area. In the epxerimental period, there were found only 2 to 5 taxons of the genus in large numbers, now and again. The plankton could be characterized therefore by this group almost in the whole year. The distribution of the taxons found was not uniform. In the open-water parts, the numbers of *Keratella cochlearis* var. *marcacantha, K. cochlearis cochlearis, K. cochlearis* f. *micracantha, K. cochlearis* var. *tecta, K. cochlearis* var. *hispida* f. *pustulata,* and *K. quadrata* were considerable, in the parts grown with woods the genus was represented in large numbers by *K. testudo* and *K. testudo gossei.*

The phytofilous Rotatoria species, following the distribution of the aquatic macrovegetation, got into our plankton samples in species and individual numbers increasing progressively. The planktonic and metaphytic species found in the open-water area *(Anuraeopsis fissa, Brachionus falcatus, Br. quadridentatus, Colurella uncinata, Filinia longiseta, Flscularia ringens, Lecane bulla, L. luna, L. quadridentata, Siantherina socialis, Trichocerca bicristata, Trichotria pocillum)* have indicated a eutrophic backwater.

In the woody-shruby areas we have often found some species *(Euchlanis lyra, Lecane stenroosi, Lecane ungulata, Lepadella acuminata, L. rhomboides, Mytilina mucronata, Trichotria tetractis)* that are the dwellers of strongly overshaded, shallow backwaters, grown old and rich in humus-matters.

The result of the quantitative investigations is proving the lively population-dynamics of the Rotatoria plankton (Fig. 1).

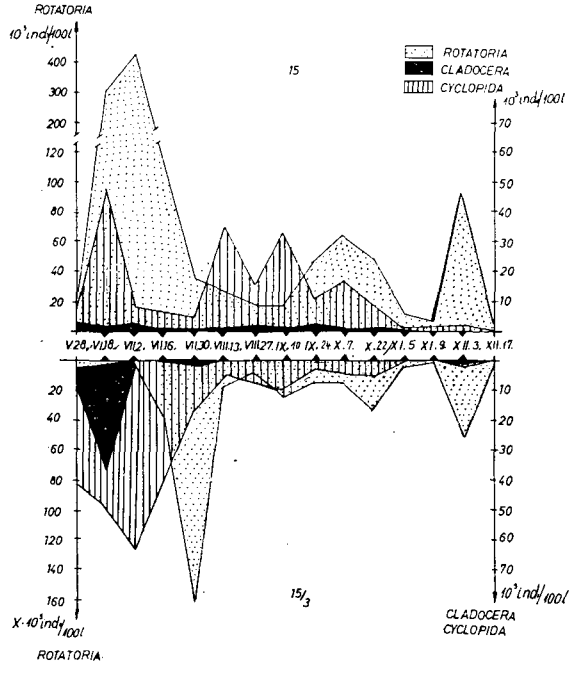

Fig. 1. The quantitative dynamism of the Rotatoria, Cladocera, and Cyclopida plankton in an open-water site (15) and in one covered with woods (15/3)

Taxon Sampling time Sampling points	June 18		August 27		October 7	
	15	15/3	15	15/3	15	15/3
ROTATORIA						
Anuraeopsis fissa (GOSSE)	2 700	0	0	1 100	0	600
Ascomorpha ecaudis PERTY	0	0	0	0	700	0
Asplanchna priodonta GOSSE	800	0	140	0	440	0
GOSSE *Brachionus angularis*	1 600	0	1 200	800	280	0
Br. calyciflorus var. *dorcas* (GOSSE)	0	0	400	0	0	0
Br. calyciflorus var. *dorcas* f. *spinosa* (WIERZ.)	0	0	380	0	0	0
Br. calyciflorus f. *amphiceros* (EHRB.)	0	0	0	0	30	0
Br. falcatus Zacharias	0	0	3 600	190	0	0
Br. quadridentatus var. *typica* HERMANN	0	0	290	90	90	0
Cephalodella gibban (EHRB.)	0	0	0	0	70	0
Conochiloides dossuarius (HUDSON)	0	0	150	0	0	0
Dicranophorus caudatus (EHRB.)	0	0	0	0	0	180
Euchlanis dilatata EHRB.	0	0	30	0	0	0
Filinia longiseta (EHRB.)	3 600	0	1 200	260	120	0
Keratella cochlearis cochlearis (GOSSE)	132 000	1 800	1 100	0	150 000	2 900
K. cochlearis var. *hispida* f. *pustulata* (LAUT.)	77 000	0	0	0	0	0
K. cochlearis var. *irregularis* f. *angulifera* LAUT.	0	0	0	300	2 900	3 000
K. cochlearis var. *irregularis* f. *angulifera* LAUT.	0	0	0	300	2 900	3 000
K. cochlearis f. *micracantha* LAUTERBORN	800	0	1 900	0	700	1 400
K. cochlearis var. *tecta* (GOSSE)	13 000	0	1 300	0	1 400	0
K. testudo (EHRB.)	0	0	0	0	50	4 400
K. valga (EHRB.)	0	0	950	0	0	0
K. quadrata (O. F. MÜLLER)	1900	0	0	0	0	0
Lecane bulla (GOSSE)	0	0	0	80	0	0
Lepadella rhomboides (GOSSE)	0	0	0	0	0	30
Lophocharis salpina (EHRB.)	0	0	0	100	30	0
Pedalia mira (HUDSON)	0	0	660	4 900	0	0
Platyias quadricornis var. *pentagona Wulfert*	0	0	0	20	0	0
Polyarthra euriptera WIERZEJSKI	0	0	700	0	0	0
P. major BURCKHARDT	7 500	0	0	0	80	0

Taxon Sampling time Sampling points	June 18		August 27		October 7	
	15	15/3	15	15/3	15	15/3
P. remata SKORIKOV	0	0	0	0	4 200	1 800
P. vulgaris CARLIN	22 000	700	1 500	1 600	17 000	1 200
Pompholyx sulcata HUDSON	0	0	1 800	0	160	0
Synthaeta grandis ZACHARIAS	29 000	0	0	0	0	0
S. pectinata EHRB.	14 000	0	0	0	12 000	0
Testudinella patina (HERMANN)	0	0	0	0	40	0
Trichocerca birostris (MINKIVICZ)	1 200	0	0	180	420	0
Tr. capucina (WIERZEJSKI U. ZACHARIAS)	0	0	270	140	130	0
Tr. dixon-nutalli (JENNINGS)	0	0	300	0	0	0
Tr. rattus (O. F. MÜLLER)	0	0	80	0	110	0
Tr. pusilla (JENNINGS)	0	0	180	0	0	0
TOTAL ROTATORIA:	314 300	2 500	18 130	9 760	62 250	15 510
CRUSTACEA						
Cladocera						
Alonella nana (BAIRD)	0	0	0	20	0	0
Bosmina longirostris (O. F. MÜLLER)	900	1 100	750	0	200	0
Ceriodaphnia pulchella SARS	0	4 000	0	0	0	10
Chydorus sphaericus (O. F. MÜLLER)	0	0	0	80	0	0
Daphnia longispina O. F. MÜLLER	0	24 000	0	0	0	0
Moina rectirostris (LEYDIG)	0	0	80	0	20	0
Pleuroxus aduncus (JURINE)	0	0	0	40	0	40
Scapholeberis mucronara O. F. MÜLLER	0	2 300	0	0	0	0
Simocephalus vetulus (O. F. MÜLLER)	0	1 900	0	0	0	10
Total Cladocera:	900	33 300	830	140	220	60
Calanoida						
Eudiaptomus gracilis G. O. SARS	0	450	0	0	0	0
Copepodit	0	100	0	0	0	0
Nauplius	0	0	0	400	0	0

Total Calanoida:	0	550	0	400	0	0
Cyclopoida						
Megacyclops viridis JURINE	0	400	0	0	0	0
Mesocyclops leuckartii CLAUS	140	1 500	0	0	0	0
Thermocyclops oithonoides G. O. SARS	0	0	190	360	0	0
Copepodit	4 800	2 000	3 200	400	450	1 500
Nauplius	430 000	44 000	21 000	5 900	16 000	3 800
Total Cyclopoida:	47 940	47 900	14 390	6 660	16 450	5 300
Total Crustacea:	48 840	81 750	7 200	16 670	5 360	*CCCCC*
Total Crustacea:	48 840	81 750	15 220	7 200	16 670	5 360
Rotatoria + Crustacea together:	363 140	84 250	33 350	16 960	78 920	20 870

In the experimental area, in June and July, the individual density of the Rotatoria approximated the conditions observed in fish-ponds in a similar period. In the wooded areas, the maxima of their individual numbers took place more than one month later, as compared to those observed in the open water, certainly owing to the food-competition of the Cladocera plankton and the consumption of the predatory Copepods. The October maxima developed after the destruction of the macrovegetation, and the December ones on the mass production of Synura uvella.

During investigating the Crustacea plankton, we have found 24 Cladocera, 1 Calanoida, 6 Cyclopoida, and 3 Ostracoda taxons.

The species number of Cladocera was high in the experimental area, their individual number was, however, very low, except for the initial period (Fig. 1). Some species of them *(Bosmina longirostris, Moina rectirostris)* were regularly found, their majority anyway only occasionally *(Alona rectangula, Alonella nana, Camptocercus lilljeborgi, Ceriodaphnia megops, Diapanosoma brachiurum, Macrothrix rosea)*, in some cases in considerable numbers *(Daphnia longispina, Scapholeberis mucronata, Simocephalus vetulus)*.

The plankton was populated in a considerably higher number by Cyclopoida. The well-developed individuals, with the exception of *Mesocyclops leuckartii*, and *Thermocyclops oithonoides*, were found in small numbers, but the number of the forms in phases copepodit and nauplius was considerable till the beginning of September (Fig. 1). The change in the density of the Cyclopoida plankton was following, in the majority of cases, the change in the individual number of Rotatoria.

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