

THE STRUCTURE AND DYNAMICS OF *CLADOCERA* IN THE YUGOSLAVIAN SECTION OF THE RIVER TISZA

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Abstract. The structure of *Cladocera* fauna was investigated in the period 1981-1988 at five localities of Tisza from the Hungarian border up to its mouth into Danube in seasonal intervals. In the investigated period, a total number of 22 *Cladocera* species were ascertained. With regard to qualitative structure and number of species, differences were noticed between seasons and particular years investigated. When seasonal variations are in question, the lowest number of species was found in winter, than in spring and summer, while the highest number was observed in autumn. The number of species was the highest during summer only in the years 1982 and 1988. *Alona quadrangularis*, *Bosmina longirostris*, *Chydorus sphaericus* and *Moina micrura* species were present in all seasons. *Diaphanosoma brachyurum* had the highest frequency in the warmer period of the year. Other species appeared in small number of samples and as individual samples. The highest number of species was recorded in the year 1983 (13), and the lowest in the years 1981 and 1985 (7).

Keywords: annual variation, *Cladocera*, community structure, seasonal variation.

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Introduction

This paper presents results of the investigation of seasonal and annual changes of *Cladocera* species in the river Tisza. This group was not much investigated (Kalafatic et al., 1982; Pujin et al., 1984), neither much attention was paid to it. For this reason, we considered it as interesting to give a synthesis of our many years' study on the *Cladocera* group in Tisza, which were conducted within the frame of the complex community ecology researches of the river Tisza.

Material and methods

Material was collected along Tisza during eight years (1981-1988) at 5 localities: Martonos, Padej, Novi Becej, Zabalj and Titel. Sampling was done in seasonal intervals in all localities, it was more frequent only in Tisza near Martonos. Total of 200 samples was elaborated. Standard methods were used for sampling and treatment of the material. Investigations were done in Institute of Biology in Novi Sad.

Results and discussion

A total of 22 *Cladocera* species was collected. The highest number of species was found in the year 1983 (13), and the lowest number in the years 1981 and 1985 (7), (Tab 1). Regarding seasonal variations, the highest number of species was in autumn, whereas the lowest number was in winter as a rule. The number of species was the highest during summer only in the years 1982 and 1988 (Fig. 1). The species *Bosmina longirostris*, *Chydorus sphaericus* and *Moina micrura* were represented in all seasons and each investigated year, while *Alona quadrangularis* was represented in all seasons. The species *Diaphanosoma brachyurum* was frequently present in the warmer period of the year. These species were also most frequent in samples, together with *Daphnia longispina* and *D. cucullata*. Other species appeared in few samples or in certain period of the year and with fewer individuals. We can say that these came into Tisza from surrounding terrains, since they are characteristic for smaller water basins, floody surfaces and more polluted waters.

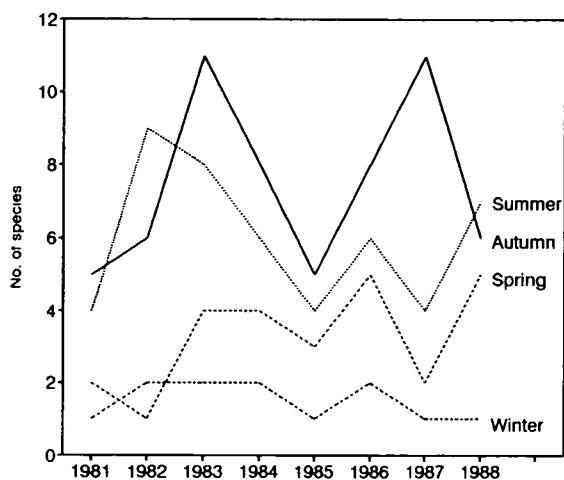


Fig. 1. Number of *Cladocera* species in the river Tisza.

The phytoplanktonic species *Acroperus harpae* was recorded only in 2 investigated years, as well as *Daphnia pulex* and *Moina brachiata* characteristic for eutrophic waters. The species *Macrothrix laticornis* and the representatives of the genus *Scapholeberis*, characteristic for the littoral zone and benthos, were represented only in few samples and in small number of individuals. All other species (Tab. 1) were found rarely and never as dominant, were found in this investigation of Tisza as individual samples and in small number of samples.

Kalafatic et al. (1982) recorded a very small population density in spring, when the water level of Tisza was high, only for three species of *Cladocera*. Out of these species *B. longirostris* and *D. longispina* were also frequently present in our samples, whereas the species *Alonella nana* Baird was not observed in our investigations.

In the work of Pujin et al. (1984), 7 *Cladocera* species were recorded in the lower flow of Tisza, out of which 6 are recorded also in this present work.

In the investigations of Pujin et al. (1986) in Carska bara which is linked with Tisza, 12 *Cladocera* species were recorded. Out of them, 9 were recorded also in our researches of Tisza.

It is interesting to compare the structure of *Cladocera* in Tisza and in Dead Tisza which is a stagnant tributary of river Tisza and is in connection with the main flow. In their investigation of zooplankton in Dead Tisza, Pujin and Ratajac (1988) registered 14 species of

Cladocera, out of which 12 were common for both water basins.

Ratajac (1989) investigated *Cladocera* in Dead Tisza registering 19 species, out of which 16 were common for both water basins. All these results show a great dependence of the *Cladocera* fauna on smaller water basins in the region of Tisza. The same species were dominant in Dead Tisza and Tisza, and they also had very similar frequency of appearance in samples and population density. The large number of species in Tisza can be explained by their arrival through confluences at surrounding terrains.

It can be said that *Cladocera* in Tisza represented by the number of species, but not by population density, take an important place in the zooplankton of this water basin.

Conclusion

Within the frame of complex biocenological researches of the river Tisza, special attention was paid to the structure of *Cladocera* fauna in this work.

Period of 1981-1988 was included, and five localities in Tisza starting from the Hungarian border up to the mouth of Tisza into Danube. A total of 22 *Cladocera* species were registered.

Seasonal variations and a different number of species in different investigation years were ascertained. The highest number of species were ascertained in the year 1983 (13), the lowest number in the years 1981 and 1985 (7). The highest number of species was recorded in autumn, than in summer and spring and the minimum during winter.

There were recorded species *Alona quadrangularis*, *Bosmina longirostris*, *Chydorus sphaericus* and *Moina micrura* in all seasons, while *Diaphanosoma brachyurum* appeared more frequently in the warmer period of the year. These species were also most frequent in samples, and also species *Daphnia longispina* and *D. cucullata*.

Other species appeared more rarely in a definite period of the year and as individual samples. In this group, there are phytoplanktonic species *Acroperus harpae*, *Daphnia pulex* and *Moina brachiata* characteristic for eutrophic waters, as well as species *Macrothrix laticornis* and the representatives of the genus *Scapholeberis*, characteristic for littoral and benthos.

Table 1. Species composition of *Cladocera* in the Tisza

Cladocera	1981	1982	1983	1984	1985	1986	1987	1988
<i>Acroperus harpae</i> (Baird)			x					x
<i>Alona costata</i> Sars		x				x	x	x
<i>A. quadrangularis</i> (O.F.Müll.)	x	x	x	x	x	x		
<i>A. rectangula</i> Sars							x	x
<i>Alonella excisa</i> Fischer				x	x	x		
<i>Bosmina coregoni</i> Baird			x					
<i>B. longirostris</i> (O.F.Müll.)	x	x	x	x	x	x	x	x
<i>Ceriodaphnia quadrangula</i> (O.F.Müll.)		x			x			
<i>Chydorus sphaericus</i> O.F.Müll.	x	x	x	x	x	x	x	x
<i>Daphnia cucullata</i> Sars	x	x	x	x		x	x	x
<i>D. longispina</i> O.F.Müll.	x	x	x	x		x	x	x
<i>D. hyalina</i> Leydig							x	
<i>D. pulex</i> Leydig. em. Scourfield		x	x					
<i>Diaphanosoma brachyurum</i> (Liev.)		x	x	x	x		x	x
<i>Leydigia leydigii</i> (Schoedler)			x	x			x	
<i>Macrothrix laticornis</i> (Jurine)			x	x			x	
<i>Moina micrura</i> Kurz	x	x	x	x	x	x	x	x
<i>M. brachiata</i> (Jur.)			x	x				
<i>Pleuroxus truncatus</i> (O.F.Müll.)							x	
<i>P. uncinatus</i> Baird								x
<i>Scapholeberis kingi</i> sars	x	x				x		
<i>S. mucronata</i> (O.F.Müller)						x		
total:	7	11	13	11	7	10	12	10

The names of all species are given according to the latest key by Margaritora (1985).

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