ZOOPLANKTON INVESTIGATIONS IN A LONGITUDINAL SECTION OF THE MAROS (MUREŞ) RIVER

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Introduction

A detailed examination of a longitudinal section of the Maros River was conducted in August 1991. I performed the determination of the zooplankton from the biological examinations. The composition of the zooplankton stock, the large-scale presence or lack of certain organisms provides important information for evaluating the quality of a given waterway. I examined the groups of Rotatoria, Cladocera and Copepoda from the zooplankton elements in detail. In the course of the investigation of samples I addressed the following main questions:

- What sort of qualitative and quantitative changes characterize the zooplankton fauna of the Maros River?
- What sort of species describe the river in the given period?
- What sort of riparian categories are found along the longitudinal section? Are they separable, and, if so, what kinds of reaches are they?
- How can we describe the water quality of the Maros by the composition of the zooplankton fauna during the period of the examination?
- How can we evaluate the results of a single examination?

In Romania Rudescu (1960), Damian-Georgescu (1963,1970), Negrea (1983) refer to faunal, taxonomic research which mainly refers to the Danube, to the delta of the Danube, to the sea, to the high mountains, etc. I did not find any Romanian literature referring to the Maros. In the Hungarian reaches of this river Megyeri (1955,1970,1971,1972), Bancsi (1981), Zsuga-Nagy (1989), Zsuga (1981,1990) performed examinations in the area around Makó and Szeged. I would like to contribute with this research to the disclosure of the Maros zooplankton fauna, to a more exact determination of changes in its water quality.

Material and methods

Time and location of the examination:

A zooplankton examination from the river Maros was performed in August 1991. The samples were taken from source to mouth in 15 segments (see Figure at p. 6).

Collecting method:

50-litre samples of water were filtered through plankton net, which is made of silk bolting cloth. The size of its mesh was 45 µm. The condensed samples were approx. 15-20 mls each, conserved on site with a 4-5% formaldehyde solution.

Processing method:

In the course of microscopic examinations I performed all the quantitative and qualitative processing of 15 samples. I used an Ergaval microscope and I did the counting in a box sized 80x35x6 mm and cubby-hole numbered with a graticule of 5x5 mm. For the preparation of mastax of Rotatoria I used hypoklorid (NaOCl). I gave the quantitative data in 100 i/l unit of measure. For identification of the species I used the taxonomic books from Bancsi (1986,1988), Damian-Georgescu (1983,1970), Dévai (1977), Donner (1965), Carlin (1943), Gulyás (1974), Negrea (1983), Rudescu (1960), Ruttner-Kolisko (1974) and Voigt (1956).

Results

The development of the zooplankton of the rivers is influenced in great measure beside the known ecological factors (weather, nutrient state, temperature, etc.) by the hydrographical fundamentals of the area, the quality of the riverbed, the rise, the water speed, the quantity of the suspended load, etc. These effects are all observable in the development of the zooplankton of the Maros.

Rotatoria

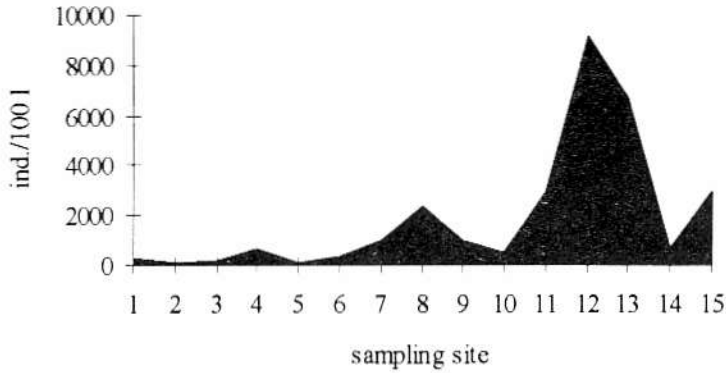
The samples were taken in a period following a small flood. The numbers of the Rotatoria were rather few, in the 15 segments between 72 and 9120 i/100 l individual density was measured (Fig. 1). This great difference relates to the subsequent changes from the source to the mouth, to the differences between biotopes. During the examinations there were 62 species found altogether (Table 1). Around the source (Izvorul Mureş) and downwards to it (Senetea, Suseni) a few species numbers were found beside the few individual numbers. The Maros River has a low water output here, with mountanous characteristics. In its Rotatoria fauna the organisms typical of low water, sources and streams (e.g. Encentrum orthodactylum, Lecane arcuata, Trichocerca myersi etc. Fig. 3) are present. Also there are a great number of representatives of the benthic and crust-dwelling creatures (e.g. Cepalodella forficata v. macruca, Encentrum grande, Lophocharis oxysternon, Notommata tripus, Pleurotrocha hyalina etc. Fig. 5), as the planktonic and benthic living spaces do not separate definitely from each other as a consequence of the state of riverbeds, and the littoral region plays a great role as well.

In Sărmaş area greater individual numbers (640 i/100 l) and a higher number of species (19) were found than in the upper reaches (Figs. 1-2).

The Rotatoria fauna was the least at Răstoliţa and the species number was very few too, it was 4 altogether (Figs. 1-2). These organisms have a wide limit of tolerance

(Cephalodella sterea, Lecane closterocerca, Lepadella patella, Rotaria sp.) and are even well adaptable to the great water-velocity too.

Fig. 1. Number of the Rotatoria (ind/100 l) in the Ruver Maros



The most varied Rotatoria fauna (23 species) was developed in the neighborhood of Tirgu Mures and to Sintimbru the characteristic organisms of both upper and lower courses can be found. The species of shallow waters, littoral region and euplanktonic elements were found equally (Fig. 2). The individual number grew as an effect of swelling and where this effect is not yet appreciable, decreased again.

Fig. 2. Number of Rotatoria species in the River Maros

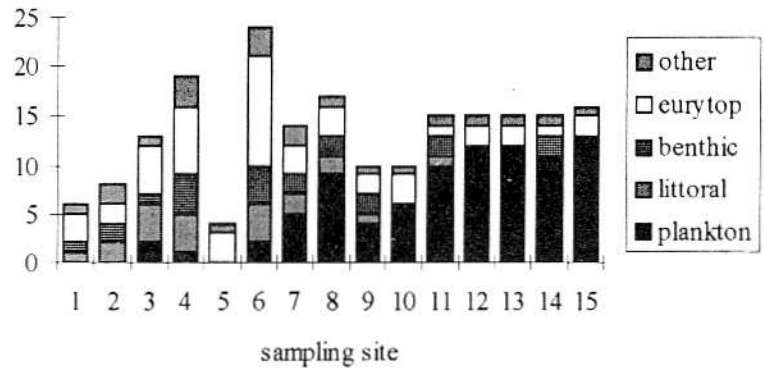


Table 1. The zooplankton organisms of the river Maros

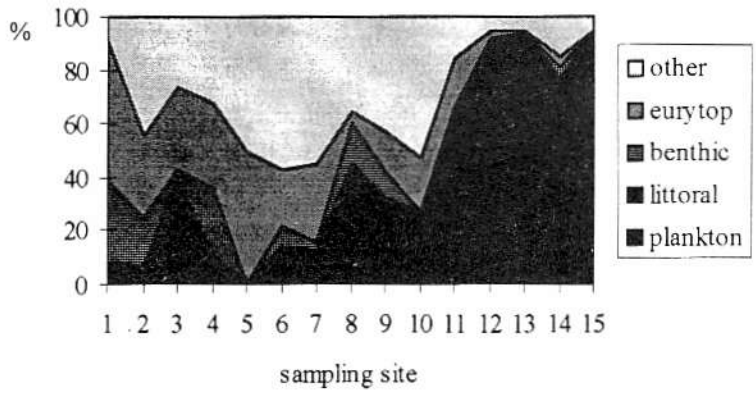
TAXON	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ROTATORIA															
Anuraeopsis fissa				16			40	80	48	16	288	1776	384	12	24
Brachionus angularis						12	16	288	120	48	216	1152	672	12	120
Brachionus budapestinensis								192	24	8	240	240	512	24	72
Brachionus calyciflorus f. calyciflorus							8	16		8		3216	3328	228	2064
Brachionus calyciflorus f. dorcas											312				312
Brachionus calyciflorus f. spinosus								80							
Brachionus quadridentatus v. quadridentatus						4								12	24
Brachionus urceolaris								288	48					12	
Cephalodella biungulata	20		4	16		16	16	48							
Cephalodella forficata v. macrura			4												
Cephalodella forficula				16							24				
Cephalodella gibba			4	16											
Cephalodella gigantea						4					48				
Cephalodella gracilis						4									
Cephalodella intuta						4									
Cephalodella sterea					12										
Cephalodella ventripes v. angustior						4									
Cephalodella sp.				32		4	16								
Colurella adriatica	40		8	16		8									
Colurella colurus						8	16								
Colurella uncinata				48		8		16							
Encentrum grande				112											
Encentrum orthodactylum		4													
Encentrum putoris v. armatum				16		4			120						
Encentrum saundersiae		16													
Encentrum sp.						4									
Eothinia elongata							8								
Epiphanes macrourus							8	80	96	16	504	816	512	24	12
Euchlanis dilatata				32		4									
Filinia longiseta											48	48	64		24
Hexarthra mira													32		
Keratella cochlearis v. cochlearis											24	48			
Keratella cochlearis v. tecta							16	180		32	120	720	448	100	24
Keratella valga														12	12

Table 1. (continued)

Keratella valga f. monospina														64		
Lecane arcuata				4												
Lecane bulla						4	248			8						
Lecane closterocerca		20	4	4	48	12	12	16	64		80	552	240	64	24	12
Lecane lunaris				8												
Lepadella acuminata							4									
Lepadella ovalis							4									
Lepadella patella		80	36	20	16	12	16	32		24	8					12
Lepadella patella v. similis				4	32								96			
Lindia torulosa										48						
Lophocharis oxysternon		20	4	4			8	8							12	
Lophocharis salpina					16				32							
Notommata tripus			4													
Platyias quadricornis							8									
Pleurotrocha hyalina					16											
Pleurotrocha petromyzon							4									
Polyarthra dolichoptera																
Pompholyx sulcata												24	96	32	24	48
Proales sp.					16								48		12	
Resticula melandocus										24						
Rotaria sp.		80	44	32	144	36	192	496	784	408	264	408	336	320	96	72
Synchaeta pectinata				4								48	96	64		12
Synchaeta tremula				28					16					128	12	84
Testudinella mucronata					16											
Testudinella patina							4		16			24				
Trichocerca myersi					16											
Trichocerca pusilla									64				192	32		
Trichocerca sp.			8													
Σ ROTATORIA	i/100 l	260	120	128	640	72	336	952	2304	960	488	2904	9120	6656	624	2928
CLADOCERA																
Alona guttata				4												
Alona rectangula				4												
Σ CLADOCERA	i/100 l	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0
COPEPODA																
nauplius			36	16	48		4	40	32			48		64	12	12
copeodit		20						8	32				24			
Σ COPEPODA	i/100 l	20	36	16	48	0	4	48	64	0	0	48	24	64	12	12

The number of individuals grew at Ludus-Gheja too. The composition of the zooplankton stock relates to pollution in this area; the Rotatoria spp, which consume organic debris, dominated.

Fig. 3. Percentage composition of the Rotatoria in the River Maros



The following section of the Maros can be marked off from Alba Iulia, where the euplanktonic Rotatoria are found in the highest proportion (Fig. 3) (e.g. Anuraeopsis fissa, Brachionus angularis, Brachionus calyciflorus, Keratella cochlearis v. tecta, Filinia longiseta, Polyarthra dolichoptera) and the individual numbers multiplied proportionately to the upper areas (Fig. 1).

From the middle section downwards the trophic and saprobic degree grow on the flowing tributaries and pollution, the river becomes richer in nutrients and moderate pollution. This change was indicated by e.g. Lindia torulosa, Resticula melandocus, Pleurotrocha petromyzon, Brachionus spp., Epiphanes macrourus, etc. (Fig. 3).

Independent of the different section charactersistics, Lecane closterocerca and Rotatoria spp. were found at almost every sampling location. This relates to the wide range of tolerance of these organisms.

It is not typical in the course of the actual examination, but earlier examinations showed that very high individual densities can develop from time to time on the lower reaches of the river with the multitudinous swarming of 1-2 species (e.g. Brachionus spp., Anuraeopsis fissa etc.). In this case the influence of the Maros for the Tisza can grow considerably too. (Megyeri 1972, Zsuga-Nagy 1989.).

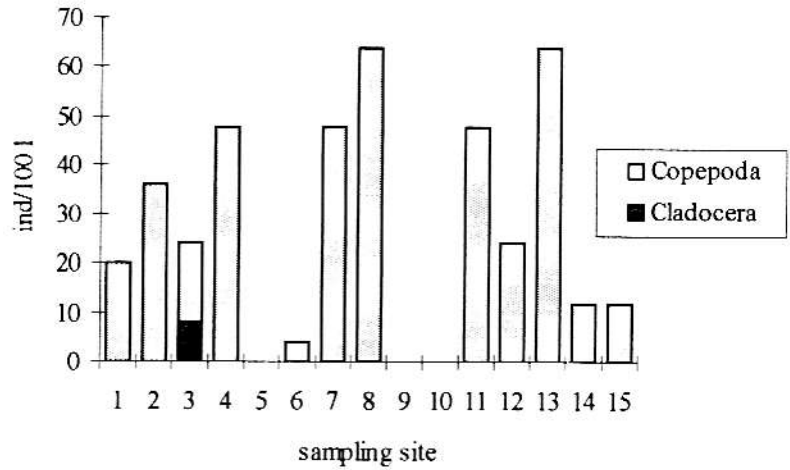
Crustacea

The results of the examinations showed the hydroecological conditions of the Maros were not favourable to Cladocera. They were only found in one area (Suseni), in small individual numbers (8 i/100 l). Both identified species (Alona guttata, Alona rectangula) are eurytop organisms, they can live in completely different waters. It is documented by

the earlier examinations performed in the neighborhood of Makó and Szeged that the Cladocera species are not frequent even in the lower reaches (Zsuga-Nagy 1989, Zsuga 1990).

The representatives of Copepoda are found at almost every sampling location though in few numbers (Fig. 4). The dominance of juvenile forms are identifiable by generation, thus nauplius and copepodite forms were found in different developmental phases and no adult species were found in the samples during the period of examination.

Fig. 4. Number of the Crustacea (ind/100 l) in the River Maros



Summary

The following conclusions may be drawn from this examination of the zooplankton in a longitudinal section of the Maros River.

-The quantity of zooplankton was generally low during the given time.

-By quantitative composition the proportion of Rotatoria dominated, the hydroecological conditions of the Maros were not favourable to Cladocera and in the Copepoda group the predominance of juvenile forms was characteristic in contradiction to adults.

-We could separate the Maros into three sections by the qualitative composition of Rotatoria, and by the presence of indicator species (Fig. 3).

1. Between Izvorul Mures and Rastolita the section has an upper course character, the oligotrophic, oligosaprobic water category was typical with low numbers of both species and individuals.

2.Between Tîrgu Mureş and Sîntimbru the most varied species-composition developed; the benthic, planktonic and littoral elements were mixed. The tropic and saprobic degree rose, the nutrient state and the pollution of the river grew.

3.Between Alba Iulia and Szeged the composition of the Rotatoria euplanktonic elements dominated. The number of the Rotatoria multiplied in proportion to conditions in the upper areas.

-In the different sections of the river, aside from the typical indicator species colouring elements were found which have good adaptability and a wide range of tolerance.

-This single examination gave only a few appreciable results for the characterization of Crustacea fauna of the Maros River. Repeated examinations are needed to know this group in greater detail.

-This results of this single examination have a disclosing character and indicating value. Because data in the scientific literature is limited, concerning zooplankton of the Maros, further examinations would be expedient for more detailed knowledge of the river. These present data may be considered as a basis for comparison.

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