

Long-term zooplankton investigations in the Hungarian section of the Körös catchment area

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Abstract: The Hungarian section of the Körös catchment area has been examined since 1988. In this paper a summary is given on the quantitative and qualitative composition of the zooplankton community in the different water-courses. On the basis of investigations the ecological condition of rivers is considerably influenced by the seasonal dynamic, the river regime (floods, low-water periods), the damming-up, the reservoirs and pollution. According to results the water of Körös water-courses is mesotrophic-eutrophic, moderately polluted in the Hungarian sections.

Keywords: Körös catchment area, Rotatoria, Cladocera, Copepoda community, zooplankton abundance, species composition, ecological condition, water quality.

Introduction

Detailed hydroecological investigations of the Hungarian sections of the Körös catchment area have been conducted in the framework of a regional program since 1988. I performed the determination of the zooplankton from the biological examinations, and investigated in detail the groups of Rotatoria, Cladocera and Copepoda from the zooplankton elements.

With respect to the earlier time, very few data about planktonic fauna of the Körös catchment area are known. Megyeri (1972) examined the River Hármas-Körös at Csongrád on five occasions: 1953 (October), 1957, 1958, 1961, 1965 (July). On the basis of these investigations he described 24 Rotatoria, 14 Cladocera and 6 Copepoda taxa from the river. According to his evaluation, a lot of species live in the River Körös, and abundance of some well adaptable organisms can reach a high value. The Rotatoria and Entomostraca fauna of the whole Hungarian section of the Körös water-system were studied by Zsuga, Nagy (1989, 1991). The last results about planktonic fauna of the Körös water-courses were published by Gulyás et al. (Gulyás, Bancsi, Zsuga 1995).

Matherial and methods

Examination of the zooplankton of the Körös catchment area in the Hungarian section was conducted in 1988-1996. The collection period covered all year from February until October, generally on three occasions. Frequency of sampling was set to take into account seasonal changes, the winter, spring, summer and autumn aspects of zooplankton, as well as flood, medium and low water periods.

Investigated water-courses and sampling sites include the following:

Berettyó: Pocsaj, Szeghalom, Sebes-Körös: Körösszakál, Körösladány, Fekete-Körös: Sarkad, Fehér-Körös: Gyulavári, Kettős-Körös: Mezőberény (in 1966: Köröstarcsa), Hármaskörös: Magyarács (in 1966 Szelevény).

I performed detailed qualitative and quantitative examinations of the Rotatoria, Cladocera and Copepoda fauna from the zooplankton groups. For the investigations 20-50 liters water were collected from the surface with a plankton net made from silk, mesh-sized of plankton is 45 μm . The filtered samples were conserved on site by using 40% formaldehyde solution to reach 4% final concentration. The quantity of zooplankton were counted by using a plexi-box sized 80 x 35 x 6 mm and cubby-hole numbered with a graticule of 5 x 5 mm. For the preparation of Rotatoria mastax I used hypochlorid (NaOCl) solution. Animals were determined using the identification keys by Bancsi (1986, 1988), Damian-Georgescu (1963, 1970), Dévai (1977), Donner (1965), Gulyás (1974), Koste (1978), Kutikova (1970), Negrea (1983), Rudescu (1970).

Results

Rotatoria fauna

In the winter time (February, March) the abundance of Rotatoria is small, and in spring (April, May) it is medium. The planktonic organisms dominate in the zooplankton stand. In summer (June, July, August) and early autumn (September) qualitative and quantitative composition of zooplankton community is determined considerably by the water-level of water-courses. In the flood period the turbulent current brings up a lot of sediment from the bottom of rivers. In consequence of this the proportion of benthic elements increases plankton. The quantity of suspended load is high, and the abundance decreases. In the low water period a qualitatively and quantitatively rich community develops in the water-courses, besides planktonic species the metaphytic organisms are found also in high proportion. In late autumn (October, November) the individual number is low, and the

composition of Rotatoria plankton is similar to the winter plankton community. On the basis of average abundance the quantitatively richest Rotatoria plankton was in the Kettős-Körös (Fig. 1.), and the poorest was found in Berettyó.

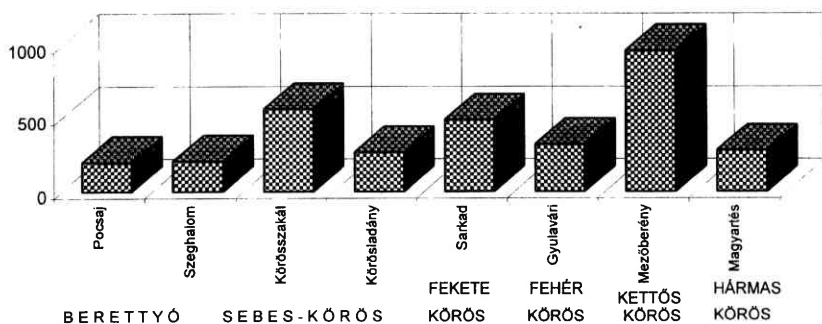


Fig. 1. Average Rotatoria abundance (i/10 l)

Investigations revealed the occurrence of 151 Rotatoria taxa (Tab. 1.). Most of them metaphytic species, but the proportion of planktonic elements is also high. In view of qualitative composition of Rotatoria plankton a species rich fauna characterizes the Sebes-Körös (99 taxa) and Berettyó (91 taxa), medium rich species composition is in the Kettős-Körös (74 taxa) and Hármaskörös (70 taxa), and the least species was found in the Fekete-Körös (68 taxa) and Fehér-Körös (64 taxa) (Tab. 1.).

From the found 151 Rotatoria taxa 22 species are rare in the fauna of Hungary. These include the following:

<i>Brachionus bidentata</i> Anderson	<i>Brachionus nilsoni</i> Ahlstrom
<i>Cephalodella limosa</i> (Wulfert)	<i>Cephalodella mucronata</i> (Myers)
<i>Cephalodella obvia</i> (Donner)	<i>Dicranophorus epicharis</i> (Harring et Myers)
<i>Encentrum oculatum</i> (Harring et Myers)	<i>Encentrum orthodactylum</i> (Wulfert)
<i>Epiphanes macrourus</i> (Barrois et Daday)	<i>Itura viridis</i> (Stenroos)
<i>Lecane ohioensis appendiculata</i> (Levander)	<i>Lindia torulosa</i> Dujardin
<i>Metadiaschiza trigona</i> Rousselet	<i>Paradicranophorus hudsoni</i> (Glascott)
<i>Postclausa hyptopus</i> (Ehrenberg)	<i>Proales theodora</i> (Gosse)
<i>Ptygura melicerta</i> (Ehrenberg)	<i>Rotaria tridens</i> Montet
<i>Taphrocampa selenura</i> Gosse	<i>Trichocerca agnata</i> Wulfert
<i>Trichocerca dixon-nuttali</i> (Jennings)	<i>Trichotria curta</i> (Skorikov)

Crustacea fauna

The Cladocera abundance of Körös catchment area generally is few. A large community develops only in that site and in that time when the conditions (water dynamic, water quality, temperature, food) are favorable. According to the average of individuals, the richest Cladocera stand characterizes the Kettős-Körös (Fig. 2.). The abundance in the Berettyó and Fehér-Körös is very low in most cases, or zero.

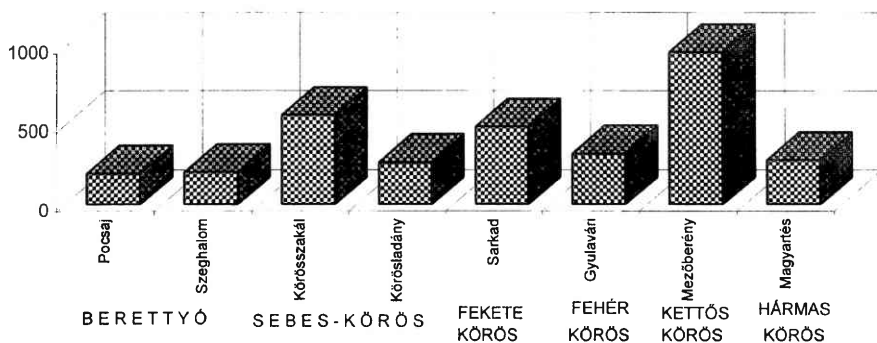


Fig. 2. Average Cladocera abundance (i/10 l)

In the time of the investigations, all together 20 Cladocera taxa were found in the Körös catchment area (Tab. 2.). The rate of the biotecton grazers metaphytic and the detritus feeders benthic organisms is the most in the water-courses, while the proportion of the planktonic elements is less. The most species was found in the Sebes-Körös and in the Hármas-Körös (Tab. 2.), while the Kettős-Körös is characterized by the poorest Cladocera composition.

The Copepoda abundance in winter and spring is little, but in summer can be higher. Large individual numbers were measured in the Kettős-Körös and Fekete-Körös, but the Copepoda community of Berettyó and Hármas-Körös was both quantitatively and qualitatively poor. On the basis of examinations the rate of juvenile forms (nauplii, copepodits) is higher, but the number of adult individuals is very low. According to average abundance the Copepoda fauna of Kettős-Körös and Fekete-Körös was the richest (Fig. 3.).

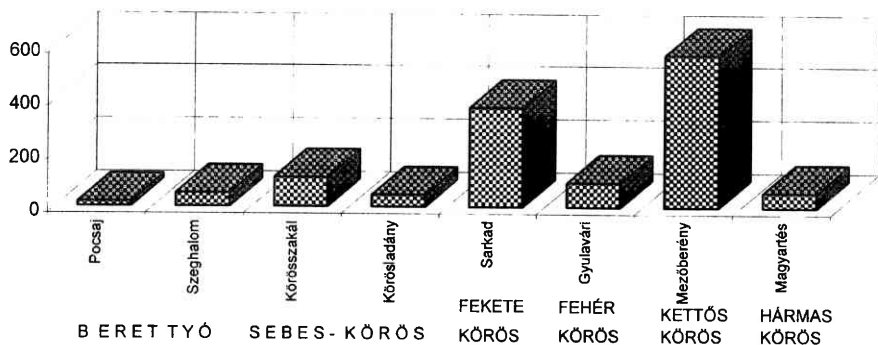


Fig. 3. Average Copepoda abundance (i/10 l)

Evaluation of results

On the basis of examinations the Hungarian section of Körös water-courses are characterized by the following ecological condition:

Berettyó River

The quantity of Rotatoria plankton is medium, the Crustacea plankton is few. Species rich Rotatoria community is characteristic, indicated by the occurrence of 91 Rotatoria taxa.. Most of the rare species (13) were found here (*Cephalodella mucronata*, *Cephalodella obvia*, *Dicranophorus epicharis*, *Encentrum oculatum*, *Encentrum orthodactylum*, *Itura viridis*, *Lecane ohioensis appendiculata*, *Lindia orulosa*, *Metadiaschiza trigona*, *Paradicranophorus hudsoni*, *Postclausa hyptopus*, *Taphrocampa selenura*, *Trichotria curta*). In the Crustacea fauna 6 Cladocera taxa were found, while in the Copepoda community only nauplius and copepodit forms were found. Abundance values indicate the presence of small to medium zooplankton community, the composition of species is variable, and most of the organisms are metaphytic. More species indicate

meso-eutrophic and moderately polluted water quality. The water quality of the two sampling sites was similar.

Sebes-Körös River

On the basis of examinations the richer zooplankton stand is at the frontier sampling site (Körösszakál). This is probably the effect of Romanian reservoirs, but before the mouth (Körösladány) the quantity is less. The river is characterized by quantitatively medium, qualitatively rich Rotatoria community. From the 99 Rotatoria taxa there were 8 rare organisms (*Cephalodella limosa*, *Encentrum orthodactylum*, *Epiphanes macrourus*, *Proales theodora*, *Ptygura melicerta*, *Taphrocampa selenura*, *Trichocerca agnata*, *Trichocerca birostris*). Besides planktonic elements, significant amounts of metaphyton organisms were found. The quantity of Crustacea fauna is low. In spite of this, the most diversified Cladocera composition is characterized by 12 species. In the Cladocera fauna the metaphytic elements dominate, and sediment dwelling species also occurred in smaller proportion. The Copepoda community is both quantitatively and qualitatively is poor. Water quality of the river is generally acceptable, with occasional more polluted conditions.

Fekete Körös River

On the basis of average abundance values the quantity of zooplankton is medium. Amongst the 68 Rotatoria and 6 Cladocera species planktonic, metaphytic and benthic species can be found. In the river 2 rare Rotatoria organisms were found (*Brachionus nilsoni*, *Rotaria tridens*). The Cladocera fauna is characterized by medium individual and species number. The quantity of Copepoda can be considerable in summer. Water quality is characterized by a mesotrophic, occasionally meso-eutrophic, moderately polluted ecological condition.

Fehér-Körös River

The Rotatoria plankton community is medium, and in summer can be higher in abundance. In the stream was found the least species (64). The individual number is characterized by the dominance of euplanktonic elements, and large values are due to *Synchaeta*, *Polyarthra*, and some *Brachionus* species. The Crustacea fauna is both quantitatively and qualitatively poor, and only in the lower water period reach medium or high abundance. The ecological condition is similar to the Fekete-Körös.

Kettős-Körös River

The quantitatively richest zooplankton community is in the river which is as effect of the damming-up (at Békés). The species composition is sufficiently variable, as indicated by the occurrence of 74 Rotatoria, 10 Cladocera and 3 Copepoda taxa. As an effect of damming-up the planktonic species become dominant. Abundance values of plankton

communities indicate eutrophic conditions in summer. The water of the river was only moderately polluted.

Hármas-Körös River

Composition of the Rotatoria fauna is variable (70 taxa were found). Combining the results of examinations with data of Megyeri (1972) it can be ascertained that as the number of individual species rose, the water of River Hármas-Körös became more eutrophic. The average abundance of Cladocera community is medium (Fig. 2.), and Copepoda community is small (Fig. 3.). 12 Cladocera and 1 Copepoda taxa have occurred in the investigation period. Organisms of different habitat types occurred in similar proportion as the other Körös water-courses. Periodically the abundance and dominance of some well adaptable organisms can be very high (this is similar to the results of Megyeri).

Summary

During the examination time there were found 151 Rotatoria taxa, 20 Cladocera taxa and 3 Copepoda taxa. From these, 22 Rotatoria species were rare. Investigations revealed that the zooplankton composition of the catchment area is variable, and the community is built-up by cosmopolitan, well adaptable euplanktonic and metaphytic species. The quantity of zooplankton is considerably influenced by the river regime (floods, low-water periods). The effects of damming-up and reservoirs can be measured mainly in summer at low water level. In this time the water quality of the catchment area is characterized by the eutrophic ecological condition. The waters of investigated Körös sections are moderately polluted, with some organisms indicating, from time to time, higher organic and inorganic pollutants.

Table 1 Rotatoria fauna in the Hungarian section of the Körös Watershed

T A X A	s a m p l i n g s i t e s (1988-1996)								Megyeri 1972
	habitat type	ecol. indic.	Berettyó	Sebes Körös	Fekete Körös	Fehér Körös	Kettős Körös	Hármas Körös	
ROTATORIA									
Anuraeopsis fissa (Gosse)	pl	ww, eu	+	+	+	+	+	+	
Asplanchna brightwelli Gosse	pl	eu, op							+
Asplanchna priodonta (Gosse)	pl		+	+	+	+	+	+	+
Brachionus angularis Gosse	pl		+	+	+	+	+	+	+
B bennini (Leissling)	pl		+	+			+	+	
B. bidentata Anderson	pl	ww, !				+			
B budapestiensis Daday	pl		+	+		+	+	+	
B calyciflorus amphiceros Ehrb	pl		+	+	+	+	+	+	
B calyc. anuraeiformis (Brehm)	pl		+	+	+	+	+	+	
B calyc. calyciflorus (Pallas)	pl		+	+	+	+	+	+	
B calyc. dorcas (Gosse)	pl			+					+
B calyc. spinosus (Wierzejski)	pl		+		+	+	+		
B diversicornis (Daday)	pl		+						
B falcatus Zacharias	pl	ww			+		+		+
B. nilsoni Ahlstrom	me	li, !			+				
B rubens Ehrenberg			+	+					+
B urceolaris O F Müller	be, te	li	+	+		+		+	+
B quadridentatus (Hermann)	me, be			+				+	+
B q. ancylognatus (Schmarda)				+			+		
B q. brevispinus (Ehrenberg)	me, be		+	+		+	+	+	+
B q. cluniorbicularis (Skorikov)	me		+	+		+			
B q. rhenanus (Lauterborn)	me, be		+	+					
Cephalodella biungulata Wulfert			+	+	+	+	+	+	
C catellina O F Müller			+	+	+	+	+	+	
C forficula (Ehrenberg)		li	+	+		+		+	
C gibba (Ehrenberg)			+	+		+	+	+	
C gracilis (Ehrenberg)				+					
C. limosa (Wulfert)		!		+					
C megalcephala (Glascott)	be, te			+	+				
C misgurnus (Wulfert)			+	+			+	+	
C. mucronata (Myers)		ww, !	+						
C obvia (Donner)		!	+				+		
C remanei (Wiszniewski)								+	
C sterea sterea (Gosse)	me, be		+	+	+	+	+	+	
C ventripes (Dixon-Nuttall)	me, be		+	+	+	+	+	+	
Cephalodella sp			+	+	+	+	+	+	
Collotheca sp				+		+			
Colurella adriatica Ehrenberg			+	+	+	+	+		
C. colurus Ehrenberg			+	+			+		
C obtusa (Gosse)	me		+	+	+		+		
C uncinata O.F. Müller			+	+	+	+	+	+	
Conochilus dossuarius Hudson	pl						+		
Dicranophorus caudatus Ehrb				+		+		+	
D. epicharis (Harring et Myers)	be, te	!	+						
D forcipatus (O F Müller)		ps	+						
D grandis (Ehrenberg)	be, te		+	+		+	+		
D uncinatus (Milne)	me		+	+			+	+	
Dipleuchianis propatula (Gosse)	me			+					
Encentrum diglandula (Zawadowski)			+				+		
E mustela (Milne)	be, te		+						
E. oculatum (Harring et Myers)		!	+						
E. orthodactylum (Wulfert)		!	+	+					
E plicatum (Eyfert)		cw	+						
E saundersiae (Hudson)		cw	+	+	+	+	+		

T A X A	sampling sites (1988-1996)								Megyeri 1972
	habitat type	ecol indic.	Berettyó	Sebes Körös	Fekete Körös	Fehér Körös	Kettős Körös	Hármas Körös	
ROTATORIA									
Encentrum sp.			+		+		+	+	
Epiphanes macrourus (Bar. et Dad.)	pl	!		+		+	+	+	
Euchlanis dilatata Ehrb	me, pl		+	+	+	+	+	+	+
E. oropha Gosse	me		+	+	+			+	
Filinia cornuta brachiata (Rousselet)						+			
F. longiseta (Ehrb.)	pl		+	+	+	+	+	+	+
Hexathra mira (Hudson)	pl			+	+		+	+	
Itura aurita (Ehrb.)		eu		+					
I. viridis (Stenroos)	me	li, l	+						
Itura sp			+						
Keratella cochlearis (Gosse)	pl		+	+	+	+	+	+	+
Ker. cochl. macracantha (Lauterborn)	pl		+	+					+
Ker. cochl. micracantha (Lauterborn)	pl			+	+				
Ker. cochl. tecta (Gosse)	pl		+	+	+	+	+	+	+
Ker. testudo irregularis (Jakubski)	pl			+					
Keratella tropica f. reducta Fadeev	pl		+	+		+	+	+	
Keratella tropica Apstein	pl				+		+	+	
Keratella quadrata (O.F. Müller)	pl		+	+	+		+	+	+
Keratella valga (Ehrenberg)	pl								+
Lecane arcuata (Bryce)	me					+			
L. bulla (Gosse)			+	+	+	+	+	+	
L. closterocerca (Schmarda)			+	+	+	+	+	+	+
L. hamata Stokes			+	+	+	+	+	+	
L. luna (O.F. Müller)			+	+	+	+	+	+	+
L. luna presumpta Ahlstrom					+				
L. lunaris (Ehrenberg)	me, te		+	+	+	+	+	+	+
L. ohioensis appendiculata (Lev.)		!	+						
L. quadridentata (Ehrb.)	me		+	+	+		+	+	
L. stenroosi (Meissner)	me, te			+					
L. tenuiseta Harring				+		+			
Lecane sp.								+	
Lepadella acuminata (Ehrb.)	me		+	+	+		+		
L. ovalis (O.F. Müller)	me, te				+	+			
L. patella (O.F. Müller)			+	+	+	+	+	+	+
L. p. oblonga (Ehrb.)	me		+	+					
L. quadricarinata (Stenroos)	me			+					
Lindia torulosa Dujardin	me, te	eu, !	+						
Lophocharis oxyterson (Gosse)	me, be		+	+					
Metadiaschiza trigona Rousselet		!	+						
Monommata longiseta (O.F. Müller)	me		+		+	+	+		
M. grandis Tessin	me				+				
Mytilina compressa (Gosse)	me, te		+						
M. mucronata (O.F. Müller)			+	+		+		+	
M. ventralis (Ehrb.)	me			+			+		
M. ventr. brevispina (Ehrb.)	me				+		+	+	
M. ventr. macracantha (Gosse)	me			+	+		+	+	
Notholca acuminata (Ehrenberg)	pl	cw	+						
N. squamula (O.F. Müller)		cw	+	+		+	+	+	
Notommata pseudocerberus Beauch.	te					+			
Notommata sp				+					
Paradicranophorus hudsoni (Glasc.)	be	eu, !	+			+			
Platylas patulus (O.F. Müller)	me, be			+	+	+	+	+	
Pleurotrocha petromyzon Ehrb		eu	+	+					
Polyarthra dolichoptera (Idelson)	pl		+	+	+	+	+	+	+

T A X A	s a m p l i n g s i t e s (1988-1996)								
	habitat type	ecol. indic.	Berettyó	Sebes Körös	Fekete Körös	Fehér Körös	Kettős Körös	Hármas Körös	Megyeri 1972
ROTATORIA									
<i>P. euryptera</i> (Wierzejski)	pl	ww	+		+		+		
<i>P. longiremis</i> Carlin	pl	ww, os	+			+			
<i>P. maior</i> (Bruckhardt)	pl						+	+	+
<i>P. remata</i> (Skorikov)	pl				+				
<i>P. vulgaris</i> Carlin	pl		+	+	+	+	+	+	
<i>Pompholyx complanata</i> Gosse	pl								+
<i>Pompholyx sulcata</i> Hudson	pl			+				+	
Postclausa hyptopus (Ehrenberg)		cw, l	+						
Proales theodora (Gosse)		l		+				+	
<i>Proales</i> sp.			+	+					
Ptygura melicerta (Ehrb.)	me	l		+					
<i>Rhinoglena frontalis</i> (Ehrb.)	pl	cw		+					
<i>Rotaria citrina</i> (Ehrenberg)	me	op						+	
<i>R. neptunia</i> (Ehrenberg)	me, be	op		+					
<i>R. rotatoria</i> (Pallas)	me, be	op						+	
R. tridens Montet		op, l			+				
<i>Rotaria</i> sp.			+	+	+	+	+	+	
<i>Scandium longicaudum</i> (O.F. Müller)	me			+	+	+	+	+	
<i>Sinanthrina socialis</i> (Linné)	me				+	+	+	+	
<i>Squatinella rostrum</i> (Schmarda)	me, te			+	+				
<i>Synchaeta kitina</i> Rousselet	pl		+		+	+		+	
<i>S. longipes</i> Gosse	pl	ww			+	+	+	+	
<i>S. oblonga</i> Ehrenberg	pl			+	+		+	+	
<i>S. pectinata</i> Ehrenberg	pl	om	+	+	+	+	+	+	
<i>S. stylata</i> Wierzejski	pl				+	+	+	+	
<i>S. tremula</i> (O.F. Müller)	pl		+	+	+	+	+	+	
<i>Synchaeta</i> sp.			+	+	+	+	+	+	
<i>Taphrocampa annulosa</i> Gosse	be, te	eu	+	+	+		+		
T. selenura Gosse	be, te	eu, l	+	+					
<i>Testudinella patina</i> (Hermann)	me, be		+	+	+	+	+	+	+
<i>T. p. f. trilobata</i> And. et Shepard	me						+		
<i>T. truncata</i> (Gosse)	me			+	+				
Trichocerca agnata Wulfert	pl	l		+					
<i>T. birostris</i> (Minkiewicz)		eu		+					
T. dixon-nuttall (Jennings)	be, te	l						+	
<i>T. elongata</i> (Gosse)	me			+					
<i>T. porcellus</i> (Gosse)	me, te		+	+	+				
<i>T. pusilla</i> (Lauterborn)	pl		+	+	+	+	+	+	
<i>T. rattus</i> (O.F. Müller)	me			+	+	+	+	+	
<i>T. similis</i> (Wierzejski)	pl		+	+	+	+	+		
<i>T. tenuior</i> (Gosse)	me, te		+	+					
<i>T. tigris</i> (O.F. Müller)	me, be						+		
<i>T. weberi</i> Jennings	me, te							+	
<i>Trichocerca</i> sp.			+	+	+	+	+		
Trichotria curta (Skorikov)		l	+						
<i>T. pocillum</i> (O.F. Müller)	me		+						
<i>T. tetractis</i> (Ehrenberg)	me				+				
Total species number of Rotatoria			91	99	68	64	74	71	24

Table 2.: Cladocera and Copepoda fauna is the Hungarian section of the Körös watershed

T A X A	s a m p l i n g s i t e s (1988-1996)								Megyeri 1972
	habitat type	ecol indic.	Berettyó	Sebes Körös	Fekete Körös	Fehér Körös	Kettős Körös	Hármas Körös	
CLADOCERA									
Acroperus harpae (Baird)	me								+
Alona costata Sars	me, be					+			
A. guttata Sars			+	+	+		+		
A. rectangula Sars	me		+	+			+	+	+
A. quadrangularis (O F Müller)									+
Bosmina longirostris (O.F.Müller)			+	+	+		+	+	+
Camptocercus rectirostris Schoedler	me								+
Ceriodaphnia laticaudata P. E. Müller	me	eu, ww							+
C. reticulata (Jurine)	me								+
Ceriodaphnia sp.					+				
Chydorus sphaericus (O F Müller)			+	+	+	+	+	+	+
Daphnia cucullata Sars	pl		+	+				+	
D. longispina O.F.Müller							+	+	+
Diaphanosoma brachyurum (Liévin)				+	+		+		+
Graptoleberis testudinaria (Fischer)	me			+				+	
Kurzia latissima (Kurz)	me		+						
Moina brachiata (Jurine)	me	op							+
Moina micrura Kurz	pl, me			+		+	+	+	
M. rectirostris (Leydig)	me	op							+
Moina sp.					+			+	
Oxyurella tenuicaudis (Sars)	me, te			+					
Peracantha truncata (O.F Müller)	me			+				+	
Pleuroxus aduncus (Jurine)	me, te	eu		+			+		
P. trigonellus (O F Müller)	be			+					
Scapholeberis mucronata (O.F Müller)						+	+	+	+
Sida crystallina (O F.Müller)	me							+	
Simocephalus exspinosus (Koch)	me						+	+	
S. vetulus (O F Müller)	me								+
Total species number of Cladocera			6	12	6	4	10	12	14
COPEPODA									
Calanoida									
Eudiaptomus gracilis (Sars)	pl								+
Cyclopoida									
Acanthocyclops vernalis (Fischer)	me, pl								+
Cyclops strenuus Fischer		cw							+
Eucyclops serrulatus (Fischer)				+			+		+
Megacyclops virdis (Jurine)	me, pl					+	+	+	+
Mesocyclops leuckarti (Claus)	pl	eu					+		
Thermocyclops oithonoides (Sars)	pl, me	ww, om							+
Total species number of Copepoda			0	1	0	1	3	1	6

habitat type:

pl - planktonic
me - metaphytic
be - benthic
te - tectonic

! - rare species

ecological indication:

eu - eutrophic state
om - oligo-mesotrophic state
os - oligosaprobic state
li - limnosaprobic state
ps - polisaprobic state
cw - cold weather
ww - warm weather
op - organic pollution

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