

4.2. THE MACROZOOBENTHOS OF THE RIVER BODROG REGION AND ITS TRIBUTARIES

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4.2.1. INTRODUCTION

The River Tisza and its tributaries serve a possibility for organisms, living in water to migrate as in a corridor. The drifting of different animals is well known, which is a passive travelling form for them. Fishes often swim against the stream.

Scientific data showed that other animals were able to migrate against to water stream too. Invertebrates, such the snail species of *Theodoxus fluviatilis* (Soós, 1965), a fresh water mussel (*Dreissena polymorpha*: Mollusca, Bivalvia) or a worm species (*Hypania invalida*: Annelida, Polychaeta) showed the praxis of the migration form in the last years. *Hypania invalida* was detected first in 1969 near Szeged (Ferencz, 1969), and its specimens were common in River Tisza near Tokaj nowadays (Szító, 1996).

The different parts of rivers serve as a refuge for the species.

There were no literature sources of Oligochaeta and Chironomid fauna in Upper Tisza Region (Pop, 1943, 1950; Albu, 1966), and therefore our present data collection will be a basic, showing the situation nowadays.

The main goals were as follows: to make a data collection, which shows the present situation of the species, and the identification of the species and their richness in different parts of the river system; to find the character species on different river courses, and to try the qualification of the river profiles by presence or absence of indicator species in river courses. This work is a part of the data collection and the evaluation of the state of ecological health in the River Tisza and its tributaries now, and serve as a standard for the ecological changes in the future (Szító, 1995). The present work followed the previous data collections in Bodrog and its tributaries now.

4.2.2. MATERIALS AND METHODS

Detailed sampling sites presented with the results together and see Tables 1-3.

Samples were collected by hand net and washed throughout net with 250 mesh size. After sampling we conserved the remained material in 3 per cent of formol solution. Finishing the expedition, animals were picked up from the organic and inorganic material and conserved in 80 % alcohol solution and it followed the species determination.

For taxonomic identification the following works were used: (Bíró, 1981; Brinkhurst and Jamieson, 1971; Cranston et al. 1983; Ferencz, 1979, Fittkau, 1962; Fittkau et al. 1983; Pinder et al. 1983; Pop, 1943, 1950).

4.2.3. RESULTS AND DISCUSSION

We found 769 individuals of 91 species during the expedition. The richest was the benthos in River Ung on the spring area by Storozhnica, where 13 species found on both

the running and standing water area as well. The collected species differed on the mentioned sampling places, and therefore 26 species characterized the sampling place. 19 individuals of the *Psammoryctides moravicus* (Oligochaeta) and 4-4 ind. of *Potamothrix vejdoskyi* and *Limnodrilus hoffmeisteri* were present here.

12 species of chironomids were present in standing water area, and 11 species were in the running water type too. *Chironomus riparius* was characteristic and dominant in standing water. Temporary ecosystems had rich food source after inundations for different insect larvae. The primary production and detrite in these temporary ecosystems were the food source for chironomid larve.

1-3 individuals of other 11 chironomid species were present here and showed a big diversity of the sampling place. The most of the chironomid species were very tolerant to environmental factors, living here (Table 1).

The hard running water with boulders and gravels was characteristic ecosystem. Some sedimentation started under the gravels covered by epiphiton their surface, which was living place and food source for them. Both of the *Eukiefferiella* and *Dicrotendipes* had high individual richness. The species of *Eukiefferiella* ger.us were common in epiphiton, bacteria and algae served as food source them, but the species of *Dicrotendipes* was characteristic for sediment, its larvae often lived in epiphiton too.

River Ung by Nevicke upstream (2nd sampling site). The main food source was the algal epiphiton on the boulders. Some sedimentation with sand was detected in stagnant water parts and formed benthos there. 2 chironomid species and the *Perlodes microcephalus* (Plecoptera) were present in the main current. 1-2 individuals of other chironomid species were present here characterized the clean water, living in epiphiton, for example as the species of *Cricotopus*, or *Cladotanytarsus* and *Tanytarsus*, which species tolerated the ecological factors both of the current and stagnant waters.

2 Oligochaeta species and 8 chironomid species were present in mady sediment. Oligochaeta were not present near the banks, only 10 chironomid species formed the macrobenthos here. *Krenopelopia binotata* and *Cryptochironomus redekei* were common for muddy part and for sandy place near the bank. *Chironomus riparius* was dominant from the muddy sediment, and the other chironomid species were present with 1-2 individuals only (Table 1).

Macrozoobenthos was absent in the spring area of the river Ung (site 3), but 2 Oligochaeta species and one chironomid species were present with some distance from here, by Stavne upstream. *Tubifex nevaensis* characterized a clean water area, but *Nais pseudobtusa* was most tolerant for environmental factors. 6 individuals of *Macropelopia nebulosa* presented here. Species of *Cricotopus* and *Eukiefferiella* were typical here because of the large periphiton. There were *Polypedilum* species living both in the periphiton and sediment. The *Perlodes microcephalus* (Plecoptera) found here too (Table 1). The River Latorica by Pidpolozja was bad in species on the spring area (site 4). Only one Oligochaeta species, *Tubifex nevaensis* and 5 chironomid species formed the fauna here. The presented Oligochaeta species indicated a clean water area, and the chironomid species were tolerant to the environmental factors.

Oligochaeta were absent in Latorica by Pasika downstream (site 5), but the *Baëtis pumilus* (Ephemeroptera) and 12 of chironomid species detected. The large number of *Eukiefferiella* collected here, but the highest richness had the *Pentapedilum sordens* with 28 individuals, that showed a trophic ecosystem here.

Table 1. (cont.)

Sampling sites	Ung									
	1. Storožnica									
Species	stagnant w.	current w.	the main current	muddy	near bank	spring area	Stavne upstr.	the main current		
<i>Endochironomus tendens</i> (Fabricius 1775)									1	
<i>Microtendipes chloris</i> (Meigen 1818)	1				1					
<i>Cladotanytarsus manicus</i> (Walker 1856)			3							
<i>Constempellina brevicosta</i> (Edwards 1937)									8	
<i>Micropsectra atrofasciata</i> (Kieffer 1911)								2		
<i>Micropsectra junci</i> (Meigen 1818)		1								
<i>Rheotanytarsus curtishylus</i> (Goetghebuer 1921)		1			1					11
<i>Tanytarsus gregarius</i> (Kieffer 1909)	2		2		1			4	2	
<i>Tanytarsus gregarius</i> (Kieffer 1913)										1
<i>Dicrotendipes nervosus</i> (Staeger 1838)	1	14								4
<i>Dicrotendipes tritonus</i> (Kieffer 1916)		5								
<i>Parachironomus arcuatus</i> (Goetghebuer 1919)										2
<i>Paracladopelma nigrifila</i> (Goetghebuer 1942)					1					
<i>Paralauterborniella nigrohalteralis</i> (Malloch 1915)					3					2
<i>Polypedilum convictum</i> (Walker 1856)									1	2
<i>Polypedilum laetum</i> (Meigen 1818)								2	1	4
<i>Polypedilum nubifer</i> (Stase 1889)										12
<i>Tripodura scalaenum</i> (Schrank 1803)	5				1					
<i>Pentapedilum sordens</i> (van d. Wulp 1874)								1	28	
<i>Sergentia longiventris</i> (Kieffer 1924)			1							4
Ephemeroptera (Kérészek)										
<i>Baëtis pumilus</i> (Burmeister 1839)									2	
Plecoptera (Álkérészek)										
<i>Perlodes microcephalus</i> (Pictet 1833)			1					1		3
<i>Perla</i> sp.										1
Species no.	13	13	8	9	10	14	6	13	0	2
										2
										11
										10
										6

The River Latorica had no benthos by Chop upstream (site 6).

The River Ung by Pavlovce (site 7) was rich in food sources for benthos. 18 individuals of *Chironomus riparius*, 12 ind. of *Polypedilum nubifer* and 13 ind. of *Tripodura scalaenum* were present here. The presence of *Chironomus riparius* and *Polypedilum* species, and their individual richness showed a probability of temporary human pollution (Table 1).

Perla sp. and 10 chironomid species formed the macrozoobenthos in River Laborec by Certizne upstream, in spring area. All the species were clean water indicator.

The presence of 6 individuals of the predator chironomid *Apsectrotanytus* suggested food richness for them in River Laborec by Koskovec downstream (site 9). Chironomid species were present, which were common living both in the periphiton and sediment.

River Laborec by Petrovce downstream (site 10). Oligochaeta absent, 6 chironomid species was present. Species of *Cricotopus* and *Eukiefferiella* were present in the periphiton, the others were common for both the periphiton and sediment too (Table 1.)

The River Laborec was bad in species by Stretavka downstream (site 11). The deep and in organic material rich sediment had a bad zoocoenose. 6 individuals of the tolerant *Limnodrilus hoffmeisteri*, 8 ind. of *Chironomus riparius*, and 4 ind. of both the *Polypedilum nubifer* and *Polypedilum convictum* showed an eutrophic environment in the left bank river side (Table 2).

The sediment of River Latorica was rich in organic material by Zlatin (site 12), but the left river bank side was bad in species. 6 ind. of *Limnodrilus hoffmeisteri*, 8 ind. of *Chironomus riparius*, and 4 ind. of both the *Polypedilum convictum* and *Polypedilum nubifer* were present here. Both the species and their individual richness indicated the probability of the richness of the organic materials in the sediment (Table 2).

River Bodrog by Vinicky showed deep muddy sediment (site 13). Only one individuum of *Branchiura sowerbyi* (Oligochaeta) was found. It was the only one from the investigated area during the expedition. We don't know its earlier data from these rivers, and its presence indicated the food richness in sediment as soon as *Limnodrilus hoffmeisteri*, which was present with 13 individuals too. The *Chaoborus crystallinus* and *Cloëon dipterum* were also present here. Moreover 5 chironomid species were detected, the presence and high individual richness of *Chironomus riparius* showed eutrophic sediment (Table 2).

River Ondava, spring area by Nizny Milosow (site 14). 10 individuals of *Baëtis pumilus* presence indicated a clean water area, Oligochaeta absent, 7 species of chironomid were present. 12 ind. of the predator *Apsectrotanytus trifascipennis* (Chironomidae) indicated food richness for them. The epiphiton living species were characteristic for this area (Table 2).

River Ondava by Cicava (site 15). The periphiton was thin, and the sedimentation was not optimal for benthos. Oligochaeta absent, 3 chironomid species formed the fauna with dominant amphipods. *Baëtis fuscus* indicated a clean water area with the other species.

River Ondava by Horovce (site 16). Oligochaeta absent, 1 ind. of *Cloëon dipterum* found with 6 chironomid species. 16 individuum of *Tripodura scalaenum* were more than the total ind. of other species (Table 2).

The mouth area of River Ondava by Brechov had deep sediment. The *Gomphus flavipes* was the only species here. Some species presence of Oligochaeta and chironomid would be prognostized with high individual richness by the environment, but we don't know the cause of their lack.

River Bodrog by Felsőberecki (site 18). The sediment was deep with aerobic surface. The lack of the fauna was surprising (Table 2).

River Bodrog by Bodrogolaszi (site 19). The sediment was rich in organic material by right side of the river bank. The very tolerant *Limnodrilus hoffmeisteri* (Oligochaeta) species was present only, but the tolerant chironomid species absent.

River Bodrog by Bodrogkeresztúr, mouth area (site 20). It was rich in organic materials. 4 species found. The *Limnodrilus hoffmeisteri* was the only Oligochaeta species present here, 3 chironomid species were present with 1-2 individuals only. The fauna was bad both in species and individuals too (Table 2).

Table 2. The macrozoobenthos in River Bodrog and its tributaries between August 2-16, 1999

Species	11. Stretawka downstream Ebbrec	Latorca	Bodrog	Ondava spring area	Ondava Nizny Milosow	Ondava Cicava	Ondava Horovce	Ondava Brehov	Ondava Felsőberecki	Ondava B. olaszi	Bodrog	Bodrog	Bodrog
Oligochaeta	Individuals in samples												
<i>Branchiura souerbyi</i> (Beddard 1892)			1										
<i>Tubifex newaensis</i> (Michaelsen 1903)	8												
<i>Limnodrilus hoffmeisteri</i> (Claparède 1862)	8	6	13								5		1
Chironomidae													
<i>Anatopynia plumipes</i> (Fries 1823)			6										
<i>Assectrotanytus trifasciipennis</i> (Zetterstedt 1838)				12									
<i>Procladius choreus</i> (Meigen 1804)													1
<i>Procladius olivaceus</i> (Meigen 1818)						1							
<i>Cricotopus bicinctus</i> (Meigen 1818)				3									1
<i>Cricotopus flavocinctus</i> (Kieffer 1924)							2						
<i>Rheocricotopus effusus</i> (Walker 1856)				4									
<i>Eukiefferiella breviculcar</i> (Kieffer 1911)				2			1						
<i>Eukiefferiella clypeata</i> (Kieffer 1923)				8									
<i>Chironomus riparius</i> (Meigen 1804)	12	8	7										
<i>Tanytarsus gregarius</i> (Kieffer 1909)							3						
<i>Paracladopelma camptolabis</i> (Kieffer 1913)			1										
<i>Paralauterborniella nigrohalteralis</i> (Malloch 1915)													2
<i>Polypedilum convictum</i> (Walker 1856)		4											
<i>Polypedilum nubifer</i> (Stase 1889)	6	4											
<i>Tripodura scalaenum</i> (Schrank 1803)			1	2	1	17							
<i>Pentapedilum sordens</i> (van d. Wulp 1874)				22	1	1							
Amphipoda (Felemás lábú rákok)													
<i>Dikerogammarus haemobaphes fluviatilis</i> (Martínov 1919)					34	2							
Odonata (Szállókötők)													
<i>Gomphus flavipes</i> (Charpentier 1825)					1			1					
Ephemeroptera (Kérészek)													
<i>Boëtis punilus</i> (Burmeister 1839)				10									
<i>Habrophlebia fusca</i> (Curtis 1831)					4								
<i>Cloëon dipterum</i> (Linnaeus 1761)			2				1						
Culicidae (szígyogok)													
<i>Chaoborus crystallinus</i> (De Geer 1776)			7										
Species no.	4	4	8	8	6	7	1	0	1				4

4.2.4. SUMMARY

The investigations and the indicator species showed that River Ung, Latorica, Ondava, Laborec and River Bodrog were clean mostly. The rivers were polluted on some sampling areas as follows: River Latorica by Chop upstream, River Ung by Pavlovce, River Latorica by Velky Kapusany downstream, River Laborec by Koskovce and Stretavka downstream, River Latorica by Zlatin, River Bodrog by Vinicky, River Ondava mouth area by Brechov, River Bodrog by Felsőberecki and Bodrogolaszi.

The backwaters were hypertrophic and therefore anaerobic conditions were during summer periods on the sediment surface. The benthos mostly absent or very bad, if it present.

4.2.5. REFERENCES

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