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THE ECOLOGICAL STATE OF THE TISA RIVER AND ITS TRIBUTARIES INDICATED BY THE MACROINVERTEBRATES

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Abstract

People start to be aware of the possibility to use the tolerant species as environment indicators. Covering up the ecological demand of different species, we would be able to understand more and more from their signals and to use them in qualification of the ecological changes.

The ecological qualification may be on a species level only. The upper species categories are not enough for this work. The lack of benthic invertebrates may be often due to the lack of the sediment, like in the Upper Tisa Region.

The high individual density of a species may be caused by the optimal food source for them, but extraordinary high in hypertrophic situation sometimes. Oligochaete species often produce extreme high individual density, but the species richness is reduced to one or two species only. *Limnodrilus hoffmeisteri* is the most tolerant species in our investigated regions, it is present in hypertrophic relations.

The lack of the tolerant indicator species in an ecosystem may indicate continuous or temporary oxygen depletion, moreover high organic material pollution or chemical poisoning.

The monitoring data show a temporary picture about the state of the investigated ecosystems. The continuous and complex works may detect and present the ecological changes.

Clean water indicator, moderate tolerant and tolerant species were identified.

Keywords: river ecology, invertebrata, benthos, indicator species

Introduction

The biomonitoring is a continuous quality investigation and control system, which shows the environmental quality changes by the species composition and individual density changes in the communities. The scientific background of the monitoring is the fact that environmental factors affect the plants and animals. The affecting biological and abiotic environmental factors provide them with the opportunity to find their essential conditions, to settle down and to reproduce.

The biologists already recognized more than 150 years before that the demands of the organisms for the environmental factors are different. The most sensitive organisms were used as environmental quality indicators, because the positive environmental changes are productive for their presence, reproduction and individual density. Their response to negative effects results in their individual decrease and the disappearance from the ecosystem. This realization is used by the specialists for the qualification of different water ecosystems. The qualification of the different water ecosystems by indicator species is a complementary, but important method for the chemical analyses.

The quality of a water ecosystem is determined by chemical and biological parameters of the water and sediment, but their complex effect could be indicated by the quality and quantity changes of the communities. The biomonitoring produces temporary information about the state of the investigated ecosystem, but this periodical data collection offers a continuous picture. The presence of species, their individual density or disappearance are such informations which can be used for qualification of the changes in the community structures and the ecological state changes. If we know the environmental demands of the species, we are able to describe the quality of the ecosystem by their presence or disappearance.

We use a lot of plant and animal species as environmental indicators, especially the steno-types, because they indicate one or two environmental factors only, which are as follows: pH, light, temperature, food, water currency, chemical pollution. The eury-type species can survive the extreme effects, therefore they were not used as indicators.

In the last years scientists try to use the taxons over the species (genus, family etc.). These people don`t think that it is a mistake. The reactions of the species are different to the environmental factors inside a family or a genus. For example: there are Oligochaete and Chironomid species which indicate the clean water, the others the polluted waters, moreover a lot of Oligochaete and Chironomid species live only in standing waters, in running waters, but we can find some other species living both in standing and running waters. The qualification of the ecosystems by the presence or disappearance of the taxons over species is an ostrichism only, instead the relations of the education and training of specialists to solve this complex education problem at state level (*Szító, 1998a*).

If the river was able to eliminate the organic and inorganic pollutants, the species composition of the community signalized this process downstream (*Nuttall et al., 1974*). The species composition and structure of macrobenthos was used for evaluation of water quality of Scioto River System (*Olive et al., 1975*). The Chironomids were used at Hungary in the River Tisa monitoring similarly (*Szító, 1981*).

The big and continuous, organic pollution results in oxygen depletion on the sediment surface in the big rivers too, thereafter the macrobenthos community disappears (*Dratnal et al., 1980*).

The tolerant species of the macroinvertebrates were used for indicating the environment quality changes by the heavy metal pollution (Waterhouse et al., 1985). Increasing the number of private farms resulted in the pollution of the small streams with organic materials, in which a new macrobenthos community formed with tolerant species (Schofield et al., 1989). The community structure of a river changed hard in the town part. The sensitive species for environment changes disappeared from here and only the tolerant ones were present. The fauna regenerated slowly downstream the town (Hynes et al., 1989). Similar changes of the macroinvertebrate communities were recognized in the Transylvanian rivers and river systems *(Szító, 1995, Szító et al., 1997; 1999; Szító, 1998a,b; 1999a-c, 2000a-c)*.

Increasing the trophic level by non-point pollution effects of the agriculture, therefore the individual density of the macrobenthos community increased too. The consumers did not follow the hard developed epilithic algae in individual densities (*Delong et al., 1998*).

The species number was much lower on the chemically or physically disturbed parts, than on the undisturbed sites. The larvae drifted from the drifted parts to the nondisturbed sites. The species composition showed better the disturbance downstream, than the changes of the heavy metal concentration (*Ruse et al., 2000*).

Our monitoring work may give up-to-date pictures about the environment quality changes in different rivers and the recommendations help the modifications of the negative progressions.

Material and Methods

Qualitative samples were taken from the surface of the stone and gravel piece by washing into a drifting net in each profiles. Sampling sites were at various distances from the left, the right bank and in the main current as well when it was possible.

Each sample was washed through a metal screen with pore mesh size of 250 µm and preserved in 3-4 % formol solution. The retained material was separated into groups of Oligochaetes, Chironomids and other groups of animals with a Zeiss stereomicroscope in the laboratory, with a 4 to 6 times magnification, and animals were preserved in 80 % ethylic alcohol.

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*).

Results and Discussion

The species presence, disappearance, individual density

Dikerogammarus haemobaphes fluviatilis and *Rivulogammarus balcanicus dacicus* (Amphipoda) formed the shrimp fauna in the River Mureş/Maros in 1991. This species were present between the region of source and Suseni. The effects of both the reservoir upper Târgu Mureş and the sewage water of the town resulted in a big change in the species composition. Downstream Târgu Mureş, the tolerant Caenis sepcies appeared near Sintimbru only, when the quantity of the pollutants decreased because of the self purification of the river (*Table 1*).

Oligochaete were tolerant to pollution and the environment quality changes therefore its species richness was high. *Limodrilus profundicola* by Târgu-Mureş, *Isochaeta virulenta* by Deva and *Limnodrilus hoffmesiteri* by Deva had high individual density and showed hypertrophic environment in this river part. The deep sediment was rich in organic material, too (*Table 2*).

The presence of predator Chironomid species depended on the food source, therefore they indicated the environment quality only indirectly.

The epiphytic Chironomid species were rare between the source region and Rastolita in this clean river part. The epilithon was very poor on the surface of gravels and boulders, the food source was poor. No species appeared between Târgu-Mureş and Alba Julia, in spite of the river bed covered by gravels in this river part (*Table 3*). Benthic Chironomid species appeared first in Rastolita, because some sediment was found here. *Microchironomus bicolor, Microtendipes chloris and Polypedilum convictum* indicated the clean river part by Rastolita. *Chironomus thummi (fluviatilis), Chironomus riparius, Chironomus plumosus, Chironomus semireductus, Dicrotendipes nervosus, D. pulsus* and *Paratendipes albimanus* needed eutrophic environment, therefore they were tolerant to organic pollution. Some tolerant Chironomid species disappeared between Gura Aries and the influent, *Cryptochironomus redekei, Paracladopelma camptolabis, Tripodura (Polypedilum) scalaenum* and *Robackia demeijerei* were present (*Table 3*).

The control investigations showed in 1999 that both the species richness and individual density of Oligochaete increased between the source region and Senetea, between Ungheni and Sintimbru they decreased and they increased by Pecica (*Figure 1*). Both the species richness and the individual density of Chironomid increased between the source region and Senetea, which was the clean river part in 1991, which fact indicated sedimentation and pollution in this area, too. The epilithic Chironomid fauna increased by Senetea, 9 species were found here and they were present in sampling places downstream.

The number of benthic Chironomid species was 5 in Senetea, and 11 in Pecica (*Figure 1*). Both the species richness and individual density indicated rich food sources and eutrophic relations. The species richness with 9 and 12 epilithic species in Senetea and Salard area was that same as in Vintu de Jos, but the high species abundance was formed by benthic Chironomids by Pecica. Presence of Cladotanytarsus, Dicrotendipes, Chironomus and Einfeldia species indicated standing water relations near the river banks and high diversity of the investigated river parts. The lack of *Beckidia zabolotzkyi, Paralauterborniella nigrohalteralis, Paratendipes albimanus, Paratendipes (intermedius) nudisquama* indicated that the River Mureş/Maros had communal and industrial pollution from Târgu-Mureş to Pecica (*Table 4*).

During the investigations of the Someş/Szamos River System between 1-22, August, 1992, the presence of *Isochaeta mischaelseni* indicated clean water river part, while its disappearance showed the increase of organic and other pollutants. Eutrophic and hypertrophic relations were indicated by *Limnodrilus hoffmesiteri, Tubifex ignotus* and *Psammoryctides moravicus* between Cluj and Gherla. Data show that the self purification of the river was not effective enough on an about 50 km long distance. The pollution level was lower between Beclean and the mouth, than on the upper river part (*Table 5*).

Anatopynia plumipes and *Apsectrotanypus trifascipennis* (Chironomidae, Tanypodinae) indicated clean and cold water river part. Species of Orthocladiinae were found as living in epiphyton and epilithon. Their species richness showed the high diversity of the investigated river part, but low individual density of *Eukiefferiella brevicalcar, Eukiefferiella coerulescens, Euorthocladius (Orthocladius) thienemanni, Orthocladius saxicola, Propsilocerus paradoxus, Psectrocladius barbimanus, Psectrocladius obvius, P. simulans, Monodiamesa bathiphyla* and *Corynoneura scutellata* indicated clean water in the Someşul Cald/Meleg Szamos River and R. Someşul Rece/Hideg Szamos, and upstream Cluj. The phytophyle Chironomid species disappeared between Cluj and Gherla because of hypertrophic relations (*Table 6*).

Continuous increasing of the number of benthic Chironomids upstream Cluj indicated the sedimentation process and some food source for them. They disappeared between Cluj and Gherla because of hypertrophic environmental relations in sediment, their both low species richness and individual density showed a polluted river part from the confluence with Arin brook to the mouth (*Table 6*).

The ecological state of the Crişul Alb/Fehér Körös River was investigated in 1994. Regarding the Oligochate fauna, *Limnodrilus claparedeianus, Limnodrilus hoffmesiteri* and *Limnodrilus profundicola* indicated eutrophic relations between Brad and Ineu, the pollution level decreased by Chişineu Criş because of the self purification (*Table 7*). The Chironomid fauna indicated eutrophic relations, the organic material content of the sediment was moderate, the fauna was diverse because of the high species abundance (*Table 8*).

The complex evaluation of the ecological state of the Crişul Negru/Fekete Körös River was made in 1994. Both the species richness and individual density of Oligochaete and Chironomids indicated eutrophic relations between Poiana and Sarkad. The presence of the only one species of *Branchiura sowerbyi* and the lack of other species showed the temporary oxygen depletion (*Table 9*). The species richness of benthic Chironomid fauna was high only in Tinca, but the larvae of this species lived in epilithon, like in Poiana, Ştei (Petru Groza) and Borz (*Table 10*).

The ecological state of the Crişul Repede/Sebes Körös River was investigated in 1995. Oligochaete appeared in Şaula, 3443 ind./m^2 of *Limnodrilus hoffmeisteri* indicated eutrophic relations here, but the individual density of *Limnodrilus claparedeianus, Limnodrilus udekemianus* and the *Tubifex* sp. confirmed our conclusion. The individual density of Oligochate was low between Ciucea and Fughiu, they disappeared by Stâna de Vale, but showed eutrophic relations by Cheresig (*Table 11*).

The phytophyle Chironomid fauna showed moderate eutrophic relations. *Orthocladius saxicola* and *Cricotopus trifasciatus* indicated the clean water part (Spring area, Aleşd, Ciucea, Oşorhei). The individual density was low for all species.

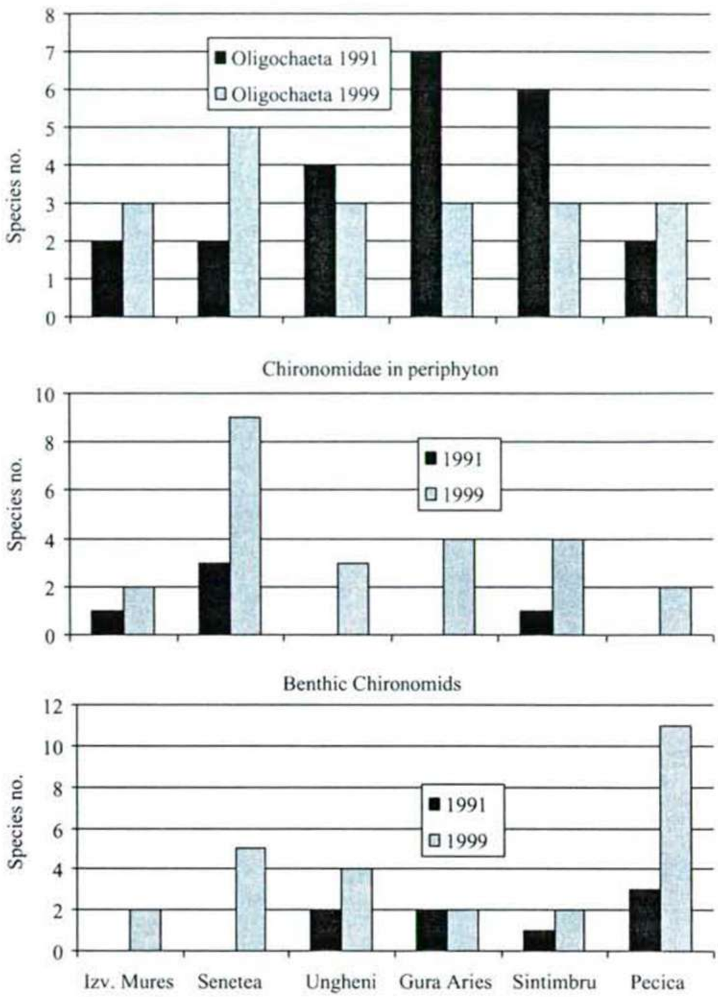

Fig. 1. Invertebrata species number in the River Mureş/Maros

The benthic Chironomid fauna showed diverse relations. Chironomus sp., *Cladotanytarsus mancus* and *Cryptochironomus redekei* were frequent in the sediment near the banks, *Paratendipes (intermedius) nudisquama* and *Paracladopelma rolli* appeared, indicated the rivers, which were found in Mureş/Maros earlier (*Table 12*).

A very important data collection was made in the international expedition, to cover up the Oligochaete and Chironomid fauna on the Upper Tisa Region and its tributaries, because there were no similar data and information from here.

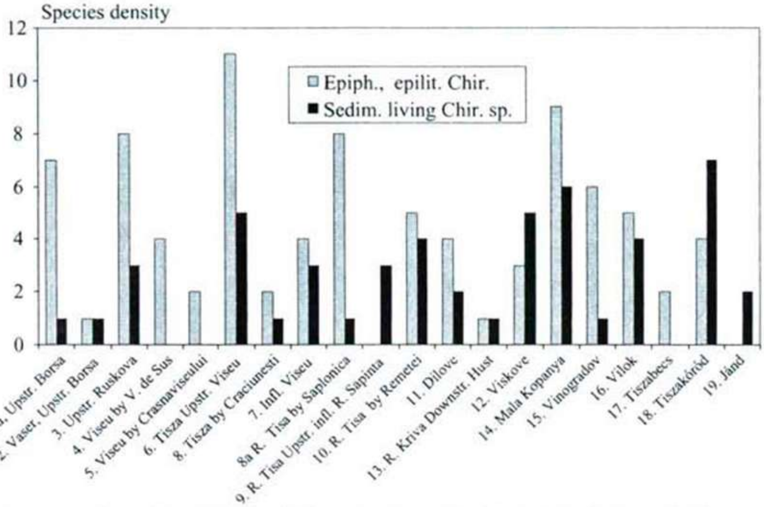

Fig. 2. Species composition of the Chironomid fauna in Upper Tisa Region (10-19 Sep., 2000)

The river beds were covered by boulders and gravels, sediment was found only rarely and it was not characteristic of this region. That was the reason why the macrozoobenthos was poor in species and individuals, too. The species and individual richness was bigger in the epiphyton than in the sediment.

Pollutants cannot concentrate because of lack of the sediment, but these materials were transported downstream and diluted. Anthropogenic pollution effects were not detected during the expedition, but the Chironomid species *Prodiamesa olivacea* was not present in the river at Rahiv. The disappearance of this species showed that some pollution effects existed periodically in this river region (*Figure 2*).

The investigations and the indicator species showed that Ung, Latorica, Ondava, Laborec Rivers and Bodrog River were mostly clean. The rivers were polluted on some sampling areas as follows:

The River Latorica had no benthos by Chop upstream (place 6). The River Ung by Pavlovce (place 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 *13*).

River Latorica by Velky Kapusany downstream: the sediment was deep, clay *Limnodrilus hoffmeisteri* (Oligochaeta) and *Chironomus riparius* was present with 12 ind./m^2 and indicated communal pollution.

The presence of 6 individuals of the predator chironomid Apsectrotanypus suggested a food richness for them in the Laborec River by Koskovce downstream (place 9). Those Chironomid species which were commonly living both in the periphiton and sediment were present.

The Laborec River was poor in species by Stretavka downstream (place 11). The deep and organic material rich sediment had a poor zoocoenose. 6 individuals of the tolerant *Limnodrillus hoffmeisteri*, 8 ind. of *Chironomus riparius*, and 4 ind. of both the *Polypedilum nubifer* and *Polypedilum convictum* showed an eutrophic environment on the left bank river side (Table *14*).

The sedimement of Latorica River was rich in organic material by Zlatin (place 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 *Polipedilum 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 14*).

River Bodrog by Vinicky showed deep muddy sediment (place 13). Only one individum of *Branchiura sowerbyi* (Oligochaete) was found. It was the only one from the investigated area during the expedition. We do not know its earlier data from these rivers, and its presence indicated the food richness in sediment, as well as *Limnodrilus hoffmeisteri*, which was present with 13 individuals, too. The *Corethra plumicornis* and *Cloëon dipterum* were also present here. Moreower, 5 chironomid species were detected, the presence and high individual richness of *Chironomus riparius* showed an eutrophic sediment (Table *14*).

The mouth area of River Ondava by Brechov had deep sediment. The Gomphus flavipes was the only species here. Some species presence of Oligochate and chironomid would be prognostized with high individual richness by the environment, but we dont know the cause of their lack.

River Bodorog by Bodrogolaszi (place 19). The sediment was rich in organic materials by right side of the river bank. The very tolerant *Limnodrilus hoffmeisteri* (Oligochaete) species was present only, but the tolerant chironomid species disappeared.

River Bodrog by Felsőberecki (place 18). The sediment was deep, with aerobic surface. The lack of the fauna was surprising (*Table 14*).

River Bodrog by Bodrogkeresztúr, mouth area (place 20). It was rich in organic materials. 4 species found. The *Limnodrilus hoffmeisteri* was the only Oligochaete species present here, 3 chironomid species were present with 1-2 individuals only. The fauna was poor both in species and individuals (Table *14*).

The sediment fauna was formed by Perla sp and 10 chironomid species in River Laborec by Certizne upstream, in spring area. All the species were clean water indicators.

The presence of 6 individuals of the predator chironomid Apsectrotanypus suggested a food richness for them in River Laborec by Koskovce downstream (place 9). Those Chironomid species were present which were commonly living both in the litophiton and sediment.

Tables

Table 1. Changes of the species and their individual density from the spring to the estuary of the River Mureş/Maros

1	Profile (section)	1	2	3	4	5
2	Sampling site	Izv. Mureş	Senetea	Suseni	Sărmaş	Răstoliţa
3		Individ/m^2				
4	Crustacea					
5	Amphipoda					
6	Dicerogammarus haemobaphes fluv. Mart.	564	195	24		
7	Rivulogammarus balc. dac. Dobr.-Man.		36	72	24	
8	Insecta					
9	Ephemeroptera					
10	Siphlonurus arnatus Etn.		18	18	186	114
11	Siphlonurus lacustris Etn.			12		12
12	Siphlonurus linneanus Etn.				54	6
13	Ameletus inopinatus Etn.				24	
14	Baëtis atrebatinus Etn.				18	
15	Baëtis muticus L.				6	12
16	Baëtis niger L.				6	
17	Baëtis rodani Pict.			6	6	
18	Baëtis pumilus Burn.			12		18
19	Baëtis scambus Etn.		84	72	510	18
20	Ecdyonurus insignis Etn.				54	6
21	Ephemerella notata Etn.				36	
22	Caenis horaria L.				12	42
23	Caenis macrura Steph.					6
24	Caenis moesta Bengtss.					
25	Caenis rivulorum Etn.					12
26	Caenis robusta Etn.					6
27	Potamanthus luteus L.				12	6
28	Simuliidae					
29	Simulium ornatum Meig.		6			204
30	Simulium sublacustre Davies					6
31	Simulium equinum L.					6

1	6	7	8	9	10	11	12	13	14	15
2	Târgu Mureş	Ungheni	Gheja	Gura Arieş	Sîntimbru	Alba Iulia	Deva	Zam	Pecica	Szeged
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22					6					
23										
24					6					
25					18					
26					6					
27										
28										
29										
30										
31										

Table 2. Oligochaeta species and their individual density in the River Mureş/Maros (in 1991)

1	Sampling site	Izv. Mureş	Senetea	Suseni	Sărmaş	Răstoliţa
2	Oligochaeta					Ind./m²
3	*Aurodrilus limnobius Bretsh.*					
4	*Branchiura sowerbyi Bedd.*					
5	*Eiseniella tetraedra Mich.*					
6	*Isochaeta virulenta Point.*					6
7	*Limnodrilus claparedeianus Rat.*					
8	*Limnodrilus hoffmeisteri Clap.*					6
9	*Limnodrilus profundicola Brinkh.*	6				60
10	*Limnodrilus udekemianus Clap.*					6
11	*Lumbricillus lineatus Mich.*		6			
12	*Peloscolex speciosus Hrabe*					
13	*Potamothrix hammoniensis Brinkh.*					
14	*Potamothrix vejdowskyi Hrabe*	12	6			12
15	*Thalassodrilus prostatus Kn÷ll.*				6	12
16	*Tubifex ignotus Stolz*				6	18
17	*Tubifex nevaensis Mich.*					
18	Ind.	18	12	0	12	120
19	Species richness	2	2	0	2	7

1	Târgu Mureş	Ungheni	Gherla	Gura Arieş	Sîntimbru	Alba Iulia	Deva	Zam	Pecica	Szeged
2										
3				30						
4								6		42
5				12						
6							4152			
7					6					
8	48	804	180	48	12	61	30856	894		58
9	7152	54	348		30				24	
10		12	6		18		30			30
11										
12				48						
13				6	12		66			
14		12		12			766	18		30
15										
16			6							
17	6		24	12	6		24		48	
18	7206	882	564	168	84	61	35894	918	72	160
19	3	4	5	7	6	1	6	3	2	4

Table 3. Chironomid species as environment indicators (Mureş/Maros, 1991)

1	Profile (section)	1	2	3	4	5
2	Sampling site	Izv. Mureş	Senetea	Suseni	Sărmaş	Răstoliţa
3		ind./m^2				
4	Chironomidae					
5	Procladius choreus Meig.					18
6	Tanypus punctipennis Meig.					
7	Thienemannimyia lentiginosa Fries					
8	Thienemannimyia northumbrica Edw.					
9	Thienemannimyia sp.					
10	Brillia modesta Meig.					6
11	Cricotopus bicinctus meig.		24			
12	Cricotopus sylvestris Fabr.		6			
13	Metriocnemus hygropetricus Kieff.		6			
14	Prodiamesa olivacea Meig.	6				36
15	Chironomus fluviatilis Lenz					
16	Chironomus plumosus L.					
17	Chironomus riparius Meig.					
18	Chironomus semireductus Lenz					
19	Cryptochironomus redekei Krus.					24
20	Dicrotendipes nervosus Staeg.					
21	Dicrotendipes pulsus Walk.					
22	Einfeldia pectoralis Kieff.					
23	Microchironomus bicolor Zett.					6
24	Microtendipes chloris Meig.					186
25	Paracladopelma camptolabis Kieff.					
26	Paratendipes albimanus Meig.					6
27	Polypedilum convictum Walk.					114
28	Polypedilum nubeculosum Meig.					
29	Tripodura (Polypedilum) scalaenum Schr.					6
30	Robackia demeijerei Krus.					

1	6	7	8	9	10	11	12	13	14	15
2	Târgu Mureş	Ungheni	Gherla	Gura Arieş	Sîntimbru	Alba Iulia	Deva	Zam	Pecica	Szeged
3										
4										
5	102				6					
6	6									
7					6					
8					6					
9					6					
10										
11										
12										
13										
14										
15	12		6							
16	192									
17	78									
18										
19	24			24						
20			24							
21			18							
22	6									
23										
24										
25						6			6	
26										
27										
28		312								
29	96	6	6	12	18			6	126	12
30									18	

Table 4. Benthic and epilithic Chironomid species and their individual density in different parts of the River Mureş in 1999

	Izvorul Mureş	Senetea	Sălard	Ungheni	Sintimbru	Gura Arieş	Sîntimbru	Vinţu de Jos	Pecica
	27. 07	27. 07	27, 07	02. 09	15. 09	06.09	26. 09	19. 09	21. 09
Species				Ind./m^2					
Nematoda									47
Oligochaeta									
Amphicaeta leydigii Tauber	3								
Ophidonais serpentina Müller	17	13							
Enchytraeus buchholzi Vejd.			3						
Limnodrilus hoffmeisteri Claparéde		33				80	163	23	10
Limnodrilus profundicola Verrill						27			
Potamothrix vejdovskyi Hrabe		63	10	23					
Pristina bilobata Bretsch.	550	277	23		10		2387	17	
Stylaria lacustris Linnaeus				27	10				27
Tubifex nevaensis Mich.		340	33	120	10	53	227	420	23
Oligochaeta (ind./m^2)	570	727	70	170	30	160	2777	460	60
Oligochaeta (species richness)	3	5	4	3	3	3	3	3	4
Chironomidae									
Tanypodinae									
Psilotanypus imicola Kieff.		7							
Tanypus punctipennis Meig.				3		177	687	143	37
Krenopelopia binotata Wied.	7		50		13	3		20	10
Corynoneurinae									
Corynoneura validicornis Kieff.							3		
Orthocladiinae									
Acricotopus lucens Staeg.				3					
Briophaenocladius nitidicolis Goetgh.								3	
Cricotopus bicinctus Meig.		80	223				70	77	7

Table 4. (continued)

	Izvorul Mureş	Senetea	Sălard	Ungheni	Sîntimbru	Gura Arieş	Sîntimbru	Vinţu de Jos	Pecica
	27. 07	27. 07	27, 07	02. 09	15. 09	06.09	26. 09	19. 09	21. 09
Species	Ind./m^2								
Cricotopus cylindraceus Kieff.		157	70	3					
Cricotopus fuscus Kieff.									
Eukiefferiella brevicalcar Kieff.								3	
Eukiefferiella claripennis Lundbeck			60						
Eukiefferiella coerulescens Kieff.		37							
Eukiefferiella devonica Edwards			47						
Heleniella thienemanni Gowin	17	3			20			7	
Monodiamesa bathyphila Kieff.						3		120	
Nanocladius bicolor Zett.		3						20	
Orthocladius barbatus Cindea			3						
Orthocladius olivaceus Kieff.								7	
Orthocladius rivulorum Kieff.			60						
Orthocladius saxicola Kieff.		153	1527		140	3	30	750	180
Parakiefferiella bathophila Kieff.			17						
Prodiamesa olivacea Meig.		13							
Prodiamesa rufovittata Goetgh.			10						
Psectrocladius psilopterus Kieff.		47	260		300				
Trissocladius brevipalpis Kieff.								397	
Zavrelimyia nubila Meig.			60						
Orthocladiinae (Ind./m^2)	23	500	2387	10	473	187	827	1663	293
Orthocladiinae (Species richness)	2	9	12	3	4	4	5	12	2
Chironominae									
Chironomini									

Table 4. (continued)

	Izvorul Mureş 27. 07	Senetea 27. 07	Sălard 27, 07	Ungheni 02. 09	Sintimbru 15. 09	Gura Arieş 06.09	Sintimbru 26. 09	Vinţu de Jos 19. 09	Pecica 21. 09
Species	Ind./m^2								
Chironomus riparius Meig.						20			
Chironomus salinarius Kieff.				3			10	13	10
Cryptochironomus redekei Krus.			3						
Cryptotendipes pseudotener Goetgh.									3
Dicrotendipes nervosus Staeg.									
Einfeldia dissidens Walk.							3	7	10
Einfeldia pectoralis Kieff.									
Parachironomus tenuicaudatus Mall.		3							
Paracladopelma camptolabis Kieff.		33		17		123	330	207	520
Polypedilum convictum Walk.		10	13	3				27	760

Table 4. (continued)

	Izvorul Mureş	Senetea	Sălard	Ungheni	Sîntimbru	Gura Arieş	Sîntimbru	Vinţu de Jos	Pecica
	27. 07	27. 07	27, 07	02. 09	15. 09	06.09	26. 09	19. 09	21. 09
Species	Ind./m^2								
Polypedilum nubeculosum Meig.									
Polypedilum sordens v.d. Wulp		3	950						3
Tripodura scalaenum Schrank			7	80					167
Tanytarsini									
Cladotanytarsus mancus Walk.	3								23
Rheotanytarsus curtistylus Goetgh.			20		27		13	33	40
Tanytarsus curticornis Kieff.									17
Tanytarsus gregarius Kieff.					37				57
Simulida	13	10							
Chironominae (Ind./m^2)	3	50	993	103	63	123	357	287	1610
Species richness	2	5	4	4	2	1	4	5	11

Table 5. Oligochet fauna and the individual density in the Someş River System (1-22 August, 1992)

1		Eiseniella	Enchytraeus	Isochaeta	Limno.	Limno.	Pelosc.	Pelosc.	Pot.
2		tetra.	buchholzi	michaelseni	hoffm.	udek.	speciosus	ferox	hamm.
3		ind./m2							
4	1. Someş Cald.	4		7	0	0	0		
5	2. Someş Rece	34		21	0	0	0		
6	3. Upstr. Cluj				2	0	1		
7	4. Downstr. Cluj				9000	0			
8	5. Upstr. Gherla				7660	301			
9	6. Confl. With Arin brook	5	1	1	4				
10	7. Sângeorzi Băi	4		4			4		
11	8. Downstr. Năsăud								
12	9.Downstr. Beclean				683				
13	10. Downstr. Dej				2			1	
14	11. Someş Odorhei				13				1
15	12. Sălsig				20				
16	13. Pomi				12				1
17	14. Păuleşti				4	12			
18	15. Vetiş				65				
19	16. V. namény				96				
20	Frequency (%)	7	1	7	22.8	3.2	3.2	1	3.2

1	Potam.	Psammoryct.	Psammoryct.	Stilodr.	Stylaria	Tubifex	Tubifex	Tubifex	Species
2	vejd.	morav.	barbatus	heringe.	lac.	nevae.	ignotus	tubifex	
3									
4	0	0		0	0	0	0		2
5	11	0		4	0	0	0		4
6	2	0			1	1	0		5
7		0					1000		2
8		1204					3400		4
9									4
10									3
11							2		1
12	33						532		3
13	9					17	7		5
14						7			3
15			1			4	14	4	5
16			1			68	34	6	5
17						12	7		4
18						4	12		3
19						36	22		3
20	7	1	3.2	1	1	15.6	18.7	3.2	

Table 6. Chironomid species and their density in the Someş/Szamos River System (1-22 August, 1992)

1			Sampling sites						
2	Feeding type		1. S. Cald	2. S. Rece	3. Upstr. Cluj	4. Downstr. Cluj	5. Upstr. Gherla	6. Confl. with Arin brook	7. Sângeorzi Băi
3		Species	ind./m^2						
4		**Tanypodinae**							
5	Pre-	*Anatopynia plumipes (Fries, 1823)*			2				
6	dators	*Apsectrotanypus trifascipennis (Zett., 1838)*	1	2					
7		*Macropelopia notata Meig.*			1				
8		*Natarsia punctata Fabr.*			1				
9		*Procladius choreus Meig.*							
10		*Tanypus punctipennis (Meig., 1818)*			1				
11		**Orthocladiinae**							
12	P	*Brillia longifusca (Kieff., 1921)*			1				
13	h	*Bryophaenocladius nitidicollis Goetgh.*						1	
14	y	*Cricotopus bicinctus Meig.*			11				
15	t	*Cricotopus fuscus Kieff.*							
16	o	*Cricotopus trifascia*							
17	p	*Eukieferiella brevicalcar Kieff.*	2	1					
18	h	*Eukiefferiella clypeata Kieff.*							
19	i	*Eukiefferiella coerulescens Kieff.*		1					
20	l	*Eukiefferiella gracei (Edw., 1929)*							
21	e	*Eukiefferiella lobifera Goetgh.*	1	1					
22		*Eukiefferiella similis Goetgh.*	11	5	1				
23	f	*Euorthocladius) Orthocladius thienemanni Kieff.*			1				
24	a	*Isocladius (Cricotopus) sylvestris Fabr.*	1						
25	u	*Nanocladius bicolor Zett.*			1				
26	n	*Orthocladius saxicola Kieff.*			6				
27	a	*Orthocladius sp.*			7				
28		*Paracladius conversus Walk.*			8				
29		*Propsilocerus danubialis (Botn. et Albu, 1956)*	1		2				
30		*Propsilocerus paradoxus Lundstr.*		1					
31		*Psectrocladius barbimanus Edw.*	1						

1									
2	8. Downstr. Năsăud	9. Downstr. Beclean	10. Downstr. Dej	11. Someş Odorhei	12. Sălsig	13. Pomi	14. Păuleşti	15. Vetiş	16. V.nameny
3									
4									
5									
6									
7									
8									
9								1	
10		1							
11									
12									
13	2								
14	3	12	39	127	12				
15									1
16			1						
17									
18	2					36	21	5	22
19									
20	2								
21									
22	2								
23									
24	8								
25			16						
26									
27									
28	3								
29		1							2
30									
31									

Table 6. (continued)

1			Sampling sites						
2	Feeding type		1. S. Cald	2. S. Rece	3. Upstr. Cluj	4. Downstr. Cluj	5. Upstr. Gherla	6. Confl. with Arin brook	7. Sângeorzi Băi
32		*Psectrocladius obvius (Walker, 1856)*	1						
33		*Psectrocladius simulans*			3				
34		*Smittia aterrima Meig.*							
35		*Thienemannia gracilis (Kieff., 1909)*	1		1			1	
36		*Zalutschia mucronata (Brundin, 1949)*							
37		**Diamesinae**							
38		*Monodiamesa (Prodiamesa) bathypila (Kieff., 1918)*			2				
39		*Prodiamesa olivacea Meig.*			1			7	
40		*Pseudodiamesa branichii Now.*	1						
41		**Corynoneurinae**							
42		*Corynoneura scutellata Win.*	4						
43		**Ind. density of phytophile fauna**	24	9	45	0	0	9	0
44		Species richness	10	5	13	0	0	3	0
45		**Chironominae**							
46		**Chironomini**							
47	B	*Chironomus annularius Meig.*							22
48	e	*Chironomus riparius Meig.*			5		1		
49	n	*Cryptochironomus defectus Kieff.*		2					
50	t	*Cryptochironomus holsatus (Lenz, 1959)*			1				
51	h	*Cryptochironomus redekei Krus.*							
52	i	*Endochironomus tendens (Fabr., 1775)*							
53	c	*Microtendipes chloris (Meig., 1818)*			10				
54		*Microtendipes pedellus d. Geer*			20				
55	f	*Microtendipes tarsalis Walk.*			8				
56	a	*Paracladopelma camptolabis (Kieff., 1913)*		6					
57	u	*Polypedilum convictum Walk.*							
58	n	*Polypedilum laetum Meig.*			2				
59	a	*Stictochironomus crassiforceps Kieff.*			38				

1									
2	8. Downstr. Năsăud	9. Downstr. Beclean	10. Downstr. Dej	11. Someş Odorhei	12. Sălsig	13. Pomi	14. Păuleşti	15. Vetiş	16. V.namény
32									
33									
34	6								
35									
36									2
37									
38									
39									
40									
41									
42									
43	28	13	56	127	12	36	21	5	27
44	8	2	3	1	1	1	1	1	4
45									
46									
47									
48				1					
49									
50									
51	2		26				3		
52	1								
53									
54									
55									
56									
57			3	1					
58									
59				1					

Table 6. (continued)

1			Sampling sites						
2	Feeding type		1. S. Cald	2. S. Rece	3. Upstr. Cluj	4. Downstr. Cluj	5. Upstr. Gherla	6. Confl. with Arin brook	7. Sângeorzi Băi
60		*Tripodura (Polypedilum) scalaenum (Schrank, 1803)*		45					
61		*Zavreliella marmorata (v. d. Wulp, 1858)*			6				
62		**Tanytarsini**							
63		*Micropsectra apposita (Walker, 1856)*						1	
64		*Micropsectra junci (Meig., 1818)*			2				
65		*Paratanytarsus lauterborni Kieff.*							
66		*Rheotanytarsus curtistylus Kieff.*	1						
67		*Tanytarsus gracilentus (Holmgr., 1883)*			2				
68		*Tanytarsus gregarius Kieff.*	43	6	6				
69		**Ind. density of Chironomini**	44	59	100	0	1	1	22
70		Species richness	3	4	11	0	1	1	1
71		Total ind. density	69	70	150	0	1	10	22
72		Species density	13	10	30	0	1	4	1

1									
2	8. Downstr. Năsăud	9. Downstr. Beclean	10. Downstr. Dej	11. Someş Odorhei	12. Sălsig	13. Pomi	14. Păuleşti	15. Vetiş	16. V.namény
60			5	8		2		2	1
61									
62									
63									
64									
65		1							
66									
67									2
68									
69	3	1	34	11	0	2	3	2	3
70	2	1	3	4	0	1	1	1	2
71	31	15	90	138	12	38	24	8	30
72	10	4	6	5	1	2	2	3	5

Table 7. Quantitative data of the Oligochaete in the River Fehér Körös (Crişul Alb, in 1994)

Species	Sampling places				
	Criş	Brad	Aciuţa	Ineu	Ch. Criş
	ind./m²				
Limnodrilus claparedeianus		171	302	3006	40
Limnodrilus hoffmeisteri		2313	845	306	
Limnodrilus profundicola		428	181	982	30

Table 8. Chironomid fauna in the River Crişul Alb (Fehér Körös, in 1994)

	Species	Spring area	Brad				Ch. Criş	Aciuţa	Ineu	Gyula
		main current	near the bank	fresh alder leaves in water	navvy holes	river bed				
		ind./m²								
P	*Brillia longifusca K.*		8	19						
h	*Cladopelma laccophila K.*				19					11
y	*Cricotopus sylvestris Fabr.*									8
t	*Eukiefferiella coerulescens K.*						4			
o	*Limnophies prolongatus K.*		15							
p	*Orthocladius olivaceus K.*	11								
h	*Orthocladius saxicola K.*			4			8		19	
i	*Parakiefferiella bathophila K.*							19		
l	*Paralauterborniella nigrohalteralis Mall.*							4		
e	*Psectrocladius barbimanus Edw.*					446		4		
	Rheocricotopus effusus Walk.		8							
s	*Syndiamesa branickii Now.*		4							
p	*Thienemanniella flavescens Edw.*		4							
e	*Thienemannimyia lentiginosa Fries*	79	38		132	4		87	42	
c.	Ind. density	91	76	23	151	450	12	114	61	19
	Species number	2	6	2	2	2	2	4	2	2

Table 8. (continued)

	Species	Spring area	Brad				Ch. Criş	Aciuţa	Ineu	Gyula
		main current	near the bank	fresh alder leaves in water	navvy holes	river bed				
B	*Chironomus thummi (fluviatilis Lenz)*					11				
e	*Chironomus plumosus Linnaeus*				8	4				
n	*Cladotanytarsus mancus Walk.*	4					4			
t	*Conchapelopia pallidula Mg.*				4	15				
h	*Cryptochironomus defectus K.*				49					
i	*Cryptochironomus redekei Krus.*	4			38			23	15	
c	*Cryptotendipes anomalus K.*				57				4	4
	Dicrotendipes nervosus Staeg.									19
s	*Dicrotendipes pulsus Walk.*									8
p	*Dicrotendipes tritomus K.*								4	
e	*Einfeldia insolita K.*				4					
c	*Einfeldia pectoralis K.*	4			4					
i	*Endochironomus intextus Walk.*			11						
e	*Krenopelopia binotata Wied.*								4	
s	*Macropelopia nebulosa Mg.*	4								42
	Micropsectra praecox Mg.	110	8						8	
	Micropsectra trivialis K.									8
	Microtendipes chloris Mg.							4	4	
	Parachironomus arcuatus Goetgh.				23					
	Parachironomus monochromus v.d. Wulp									11
	Paratanytarsus lauterborni K.	4	4			4		8		
	Pentapedilum sordens v. d. Wulp	4	8	34		30				

Table 8. (continued)

Species	Spring area	Brad				Ch. Criş	Aciuţa	Ineu	Gyula
	main current	near the bank	fresh alder leaves in water	navvy holes	river bed				
Polypedilum minutum Krug.			15	0	34	11	23		
Polypedilum nubeculosum Mg.		4	4	23					11
Polypedilum nubifer Skuse				8					
Tripodura (Polypedilum) scalaenum Schr.	11	15			64			4	4
Procladius choreus Mg.		4		15					
Robackia demeijerei Krus.						8			
Tanypus punctipennis Mg.				19					
Tanytarsus curticornis K.	8			8	11		4	4	11
Tanytarsus gregarius K.							4		
Ind. density	151	42	64	257	174	23	64	45	117
Species number	9	6	4	13	8	3	6	8	9
Total ind./m2	242	117	144	408	646	34	178	106	136
Species richness	11	12	6	15	10	5	10	10	11

Table 9. Species richness and quantitative data of the Oligochaete in the River Fekete Körös (Crişul Negru), River Kettős Körös and River Hármas Körös (August 10-17, 1994)

	Sampling places								
Species	Poiana	Ştei	Borz	Tinca	Zerind	Gyula	Sarkad	Békés, R. Kettős K.	Csongrád, R. Hármas K.
	Ind./m^2								
Branchiura sowerbyi				59				59	
Eiseniella tetraedra	200		51						
Limnodrilus claparedeianus		401							
Limnodrilus hoffmeisteri		987	89		182				44

Table 10. Chironomid fauna in the River Crişul Negru (Fekete Körös, in 1994)

	Species	Poiana		Ştei		Borz	Tinca	Zerind		Sarkad
		bank	gravels	sandy sediment	gravels	gravels	sediment	sediment	phyto-tecton	clay sediment
P	*Brillia longifusca K.*		8							
h	*Brillia modesta Mg.*	4								
y	*Briophaenocladius nitidicollis Goetgh.*		4							
t	*Cricotopus bicinctus Mg.*					4				
o	*Cricotopus trifascia Edw.*				4					
p	*Eukiefferiella longicalcar K.*				8					
h	*Eukiefferiella similis Goetgh.*				8					
i	*Eukiefferiella tshernovskii Pankr.*				106					
l	*Limnophies pusillus Eaton*		4							
e	*Metriocnemus hygropetricus K.*		8							
	Orthocladius olivaceus K.				23					
s	*Orthocladius saxicola K.*				15					
p	*Parakiefferiella bathophila K.*			4						
e	*Paralauterborniella nigrohalteralis Mall.*				4	8	4		8	
c	*Potthastia longimana K.*	4								
i	*Prodiamesa olivacea Mg.*	87					4			
e	*Propsilocerus danubialis Botnariuc et Albu*				11					
s	*Psectrocladius barbimanus Edw.*				19					
	Synorthocladius semivirens K.		8							
	Thienemanniella clavicornis K.	4								
	Ind. density	98	30	4	196	11	8	0	8	0
	Spec. number	4	5	1	9	2	2	0	1	0

Table 10. (continued)

	Species	Poiana		Ştei		Borz	Tinca	Zerind		Sarkad
		bank	gravels	sandy sediment	gravels	gravels	sediment	sediment	phyto-tecton	clay sediment
B	*Arctopelopia sp.*	4								
e	*Chironomus fluviatilis Lenz*					15				
n	*Chironomus riparius Mg.*					8				
t	*Cladotanytarsus mancus Walk.*							11	19	
h	*Conchapelopia pallidula Mg.*					15				
i	*Cryptochironomus redekei Krus.*					4		4		
c	*Cryptotendipes anomalus K.*					4	249			
	Demicryptochironomus vulneratus Zett.		19							
s	*Dicrotendipes nervosus Staeg.*					4				
p	*Macropelopia nebulosa Mg.*	4								4
e	*Micropsectra praecox Mg.*		4							
c	*Micropsectra trivialis K.*	23								
i	*Microtendipes chloris Mg.*						4			
e	*Microtendipes pedellus de Geer*						15			
s	*Paracladopelma camptolabis K.*						4			4
	Paratanytarsus lauterborni K.				8					
	Pentapedilum sordens v. d. Wulp	34	11		4					
	Polypedilum minutum Krug.	113	42			34			12	
	Polypedilum nubeculosum Mg.	634	8							
	Procladius choreus Mg.	23				4	8			
	Protanypus morio Zett.		8							
	Tanypus punctipennis Mg.					4	11			
	Tanytarsus arduensis Goetgh.						4			
	Tanytarsus curticornis K.	4			4	4				

Table 10. (continued)

	Species	Poiana		Ştei		Borz	Tinca	Zerind		Sarkad
		bank	gravels	sandy sediment	gravels	gravels	sediment	sediment	phyto-tecton	clay sediment
	Tanytarsus gracillentus Holmgr.						15			
	Tanytarsus gregarius K.		8			4				
	Thienemannimyia lentiginosa Fries	102	110							
	Tripodura (Polypedilum) scalaenum Schr.					53				
	Trissopelopia longimana Staeg.	4								
	Ind. density	944	208	0	15	151	310	15	31	8
	Spe number	10	8	0	3	12	8	2	2	2
	Total ind.	1042	238	4	211	162	317	15	38	8
	Species richness	14	13	1	12	14	10	2	3	2

Table 11. Oligochaete and their quantity in the River Crişul Repede (Sebes Körös, in 1995)

	Sampling places							
	Şaula	Ciucea	Bologa	Stâna de Vale	Vadul Crişului	Aleşd	Fughiu	Cheresig
Species	Ind./m^2							
Limnodrilus claparedeianus	328				6			266
Limnodrilus hoffmeisteri	3443	56	561			12	17	5665
Limnodrilus profundicola	11							
Limnodrilus udekemianus	439		27					54
Tubifex tubifex	859	6	53		13	46	3	742

Table 12. Chironomid fauna of the River Crişul Repede/Sebes Körös in 1995.

1			Spring area		Aleşd				Bologa			Downstream Ciucea		
2			bank	main current	bank	2 ms from the bank	bank	26 ms from the bank	bank	2 ms from the bank	main current	right bank	main current	left bank
3		Species	Ind./m^2											
4	P	*Cardiocladius fuscus K.*												
5	h	*Cricotopus albiforceps K.*												
6	y	*Cricotopus algarum K*		4	8	4								
7	t	*Cricotopus annulator Goetgh.*		8										
8	o	*Cricotopus bicinctus Mg.*												
9	p	*Cricotopus fuscus K.*												
10	h	*Cricotopus sylvestris Fabr.*												
11	i	*Cricotopus tremulus Linnaeus*		8										
12	l	*Cricotopus trifasciatus Edw.*	15	15		8							4	
13	e	*Eukiefferiella brevicalcar K.*												
14		*Eukiefferiella quadridentata Tshern.*	19											
15	s	*Eukiefferiella tshernovskii Pankr.*	8											
16	p	*Limnophies prolongatus K.*									15			
17	e	*Limnophies pusillus Eaton*		8										
18	c	*Metriocnemus hygropetricus K.*			4									
19	i	*Nanocladius bicolor Zett.*												
20	e	*Orthocladius saxicola K.*	11	90		11						4		
21	s	*Orthocladius thienemanni K.*	23	4	11	38		8						
22		*Paracladius conversus Walk.*												
23		*Parakiefferiella bathophila K.*				5								
24		*Potthastia gaedi Mg.*												
25		*Prodiamesa olivacea Mg.*	4											

1			Upstream Oşorhei					Fughiu		Cheresig				Szeg-halom
2	2 ms from the bank	bank side	bank side	6 ms from the bank	main current	6 ms from the bank	2 ms from the bank	bank side	main current	bank side	2 ms from the bank	main current	main current	2 ms from the bank
3														
4							0		15					
5							4							
6							4			8				
7														
8		11												
9							8							
10							4							
11														
12							26							
13		8												
14														
15														
16														
17														
18														
19					4		4		4					
20	4	11	8		4		11		19				19	
21	11			4			15	8				11		
22									83					
23														
24									26					
25								79						

Table 12.(continued)

1			Spring area		Aleșd				Bologa			Downstream Ciucea		
2			bank	main current	bank	2 ms from the bank	bank	26 ms from the bank	bank	2 ms from the bank	main current	right bank	main current	left bank
3		Species	Ind./m²											
26		*Psectrocladius barbimanus Edw.*								4				
27		*Psectrocladius dilatatus v. d. Wulp*	125			4								
28		*Symposiocladius lignicola K.*												
29		*Thienemanniella vittata Edw.*												
30		*Trissocladius fluviatilis Goetgh.*									38			
31		Ind. density	204	136	23	69	0	8	0	4	53	4	4	0
32		Species number	7	7	3	6	0	1	0	1	2	1	1	0
33														
34	B	*Apsectrotanypus trifascipennis Zett.*												
35	e	*Chironomus (fluviatilis Lenz) thummi*												
36	n	*Chironomus riparius Mg.*												4
37	t	*Cladopelma laccophila K.*												
38	h	*Cladotanytarsus mancus Walk.*			155		465	41				4		4
39	i	*Clinotanypus nervosus Mg.*												
40	c	*Corynoneura celeripes Win.*	8											
41		*Corynoneura lemnae Frauenfeld*												
42	s	*Cryptochironomus redekei Krus.*			38		72	15					4	4
43	p	*Cryptotendipes anomalus K.*												
44	e	*Demicryptochironomus vulneratus Zett.*									11			
45	c	*Dicrotendipes nervosus Staeg.*												
46	i	*Dicrotendipes tritomus K.*												
47	e	*Einfeldia pectoralis K.*												4
48	s	*Glyptotendipes cauliginellus*			4									

1			Upstream Oşorhei					Fughi u		Cheresig				Szeg-halom
2	2 ms from the bank	bank side	bank side	6 ms from the bank	main current	6 ms from the bank	2 ms from the bank	bank side	main current	bank side	2 ms from the bank	main current	main current	2 ms from the bank
3														
26														
27								4	4			8		
28									15					
29			4											
30														
31	15	30	11	4	8	0	76	91	166	8	0	19	19	0
32	2	3	2	1	2	0	9	3	7	1	0	2	1	0
33														
34							15							
35				23			140	8				4		
36							8	15						
37														4
38		8	4	4		4	26						34	
39					4									
40														
41								4						
42				8	11		15	4			45	23	49	
43			4									4		
44														
45							11		11			8	72	
46			8	11			125				4	4		
47														
48														

Table 12.(continued)

1			Spring area		Aleşd				Bologa			Downstream Ciucea		
2			bank	main current	bank	2 ms from the bank	bank	26 ms from the bank	bank	2 ms from the bank	main current	right bank	main current	left bank
3		Species	Ind./m^2											
49		*Kiefferulus tendipediformis Goetgh.*												
50		*Lenzia flavipes Mg.*												
51		*Paracladopelma camptolabis K.*			8		11							
52		*Paracladopelma rolli Kirp.*												
53		*Macropelopia nebulosa Mg.*												
54		*Micropsectra praecox Mg.*				4					8			
55		*Microtendipes chloris Mg.*												8
56		*Parachironomus arcuatus Goetgh.*												
57		*Paratendipes intermedius Tsh.*												4
58		*Patatendipes connenctens Lipina*												4
59		*Pentapedilum sordens v. d. Wulp*	4		11	8							15	
60		*Polypedilum minutum Krug.*											4	
61		*Polypedilum nubeculosum Mg.*			4		8							
62		*Polypedilum scalaenum Schr.*	26	4				4				4	4	196
63		*Procladius choreus Mg.*			11		26							
64		*Procladius conversus Walk.*												
65		*Camptochironomus tentans Fabr.*												
66		*Thienemannimyia lentiginosa Fries*								4	4		11	
67		*Tanypus punctipennis Mg.*					4							
68		*Tanytarsus curticornis K.*												

1			Upstream Oşorhei					Fughi u		Cheresig				Szeg-halom
2	2 ms from the bank	bank side	bank side	6 ms from the bank	main current	6 ms from the bank	2 ms from the bank	bank side	main current	bank side	2 ms from the bank	main current	main current	2 ms from the bank
3														
49							4							
50				4										
51				4			4					8		
52														8
53						4	30	15						
54	4			11				19	4	4		4	4	
55		4						11						
56								4						
57			4	4				19						
58														
59	11	19						30	8					
60	4	4		4		4	4	4						
61			4				15	4				4	8	4
62	15	11	8	64	8		45	98		83	242	128	491	30
63			8					4						
64							4							
65				4										
66		8	4			4		4		4		4		
67														
68			4									8	4	

Table 12.(continued)

1			Spring area		Aleşd				Bologa			Downstream Ciucea		
2			bank	main current	bank	2 ms from the bank	bank	26 ms from the bank	bank	2 ms from the bank	main current	right bank	main current	left bank
3		Species	Ind./m^2											
69		*Tanytarsus gracillentus Holmgr.*	19											
70		*Tanytarsus gregarius K.*								4				
71		Ind. density	57	4	230	12	585	60	0	8	23	8	38	227
72		Species number	4	1	7	2	6	3	0	2	3	2	5	8
73														
74		Total ind./m^2	261	139	253	81	585	68	0	11	76	11	42	227
75		Species richness	11	8	10	8	6	4	0	3	5	3	6	8

1			Upstream Oşorhei					Fughi u		Cheresig				Szeg-halom
2	2 ms from the bank	bank side	bank side	6 ms from the bank	main current	6 ms from the bank	2 ms from the bank	bank side	main current	bank side	2 ms from the bank	main current	main current	2 ms from the bank
3														
69														
70	4	42		4			15		19					
71	38	94	45	144	23	15	461	242	42	91	291	196	661	45
72	5	7	9	12	3	4	13	14	4	3	3	11	7	4
73														
74	53	125	57	147	30	15	536	332	208	98	291	215	680	45
75	7	10	11	13	5	4	22	17	11	4	3	13	8	4

Table 13. The macrozoobenthos in River Bodrog and its tributaries (2-16 August, 1999)

1		Ung	Ung	Ung	Ung	Ung	Ung	Ung
2	Sampling sites	1. Storozhnica		2. Nevickeupstr.	Nevicke upstr.	Nevicke upstr.	3. Uzhok	3/a
3	Species	stagnant w.	current w.	the main current	mudy	near bank	spring area	Stavne upstr.
4				Individuals in samples				
5	*Chironomus anthracinus (gr.)*							
6	*Chironomus riparius (Meigen 1804)*	5			15			
7	*Chironomus lacunarius (Wülker 1973)*				2			
8	*Chironomus aprilinus (Meigen 1830)*		1					
9	*Cryptochironomus defectus (Kieffer 1913)*	2			1	1		
10	*Cryptochironomus redekei (Kruseman 1933)*	2						
11	*Glyptotendipes pallens (Meigen 1804)*	1						
12	*Demicryptochironomus vulneratus (Zetterstedt 1838)*							1
13	*Einfeldia carbonaria (Meigen 1804)*		1					
14	*Endochironomus tendens (Fabricius 1775)*							
15	*Microtendipes chloris (Meigen 1818)*	1				1		
16	*Cladotanytarsus mancus (Walker 1856)*			3				
17	*Constempellina brevicosta (Edwards 1937)*							
18	*Micropsectra atrofasciata (Kieffer 1911)*							
19	*Micropsectra junci (Meigen 1818)*		1					
20	*Rheotanytarsus curtistylus (Goetghebuer 1921)*		1			1		
21	*Tanytarsus gregarius (Kieffer 1909)*	2		2		1		
22	*Tanytarsus gregarius (Kieffer 1913)*							
23	*Dicrotendipes nervosus (Staeger 1838)*	1	14					

1	Latorca	Latorca	Latorca	Ung	Latorca	Laborec	Laborec	Laborec
2	4. Pidpolozja	5. Pasika	6. Chop upstr.	7. Pavlovce	8. Velk. Kap.	9. Certizne upstr.	9/a Koskowce downstr.	10. Petrovce downstr.
3	the main current					spring area		
4								
5						1		
6				18	12			
7								
8								
9								
10								
11								
12								
13								
14		1						
15								
16								
17		8						2
18	2							
19								
20							11	
21	4	2						
22						1		
23							4	

Table 13. (continued)

1		Ung	Ung	Ung	Ung	Ung	Ung	Ung
2	Sampling sites	1. Storozhnica		2. Nevickeupstr.	Nevicke upstr.	Nevicke upstr.	3. Uzhok	3/a
3	Species	stagnant w.	current w.	the main current	mudy	near bank	spring area	Stavne upstr.
4				Individuals in samples				
24	*Dicrotendipes tritomus (Kieffer 1916)*		5					
25	*Parachironomus arcuatus (Goetghebuer 1919)*							
26	*Paracladopelma nigritula (Goetghebuer 1942)*					1		
27	*Paralauterborniella nigrohalteralis (Malloch 1915)*				3			
28	*Polypedilum convictum (Walker 1856)*							
29	*Polypedilum laetum (Meigen 1818)*							2
30	*Polypedilum nubifer (Skuse 1889)*							
31	*Tripodura scalaenum (Schrank 1803)*	5				1		1
32	*Pentapedilum sordens (van d. Wulp 1874)*							1
33	*Sergentia longiventris (Kieffer 1924)*			1				
34	**Ephemeroptera**							
35	*Baëtis pumilus (Burmeister 1839)*							
36	**Plecoptera**							
37	*Perlodes microcephalus (Pictet 1833)*			1				1
38	*Perla sp.*							
39	**Species no.**	**13**	**13**	**8**	**9**	**10**		**14**

1	Latorca	Latorca	Latorca	Ung	Latorca	Laborec	Laborec	Laborec
2	4. Pidpolozja	5. Pasika	6. Chop upstr.	7. Pavlovce	8. Velk. Kap.	9. Certizne upstr.	9/a Koskowce downstr.	10. Petrovce downstr.
3	the main current					spring area		
4								
24								
25						2		
26								
27						2		
28		1				2		3
29	1	4					2	
30				12				1
31								
32		28				4		
33								
34								
35		2						
36								
37							3	
38						1		
39	**6**	**13**	**0**	**2**	**2**	**11**	**10**	**6**

Table 14. The macrozoobenthos in River Bodrog and its tributaries between August 2-16, 1999

Species	Laborec 11. Stretawka down-stream	Latorca 12. Zatin	Bodrog 13. Vinicky	Ondava 14. Nizny Milosow	Ondava 15. Cicava	Ondava 16. Horovce	Ondava tork. vid. 17. Brehov	Bodrog 18. Felső-berecki	Bod-rog 19. B. olaszi	Bodrog 20. Bodrog-keresztúr
				spring area						
Oligochaeta				Individuals in samples						
Branchiura sowerbyi (Beddard 1892)			1							
Limnodrilus hoffmesiteri (Claparéde 1862)	8	6	13						5	1
Tubifex nevaensis (Michaelsen 1903)	8									
Chironomidae										
Tanypodinae										
Anatopynia plumipes (Fries 1823)			6							
Apsectrotanypus trifascipennis (Zetterstedt 1838)				12						
Procladius choreus (Meigen 1804)										1
Orthocladiinae										
Cricotopus bicinctus (Meigen 1818)				3						1
Cricotopus flavocinctus (Kieffer 1924)						2				
Eukiefferiella brevicalcar (Kieffer 1911)				2		1				
Eukiefferiella clypeata(Kieffer 1923)				8						
Prodiamesa olivacea (Meigen 1818)					1					
Rheocricotopus effusus (Walker 1856)				4						
Chironomini										
Chironomus riparius (Meigen 1804)	12	8	7							
Paracladopelma camptolabis (Kieffer 1913)			1							

Table 14. (continued)

Species	Laborec 11. Stretawka down-stream	Latorca 12. Zatin	Bodrog 13. Vinicky	Ondava 14. Nizny Milosow	Ondava 15. Cicava	Ondava 16. Horovce	Ondava tork. vid. 17. Brehov	Bodrog 18. Felső-berecki	Bod-rog 19. B. olaszi	Bodrog 20. Bodrog-keresztúr
				spring area						
Paralauterborniella nigrohalteralis (Malloch 1915)										2
Pentapedilum sordens (van d. Wulp 1874)				22	1	1				
Polypedilum convictum (Walker 1856)		4								
Polypedilum nubifer (Skuse 1889)	6	4								
Tripodura scalaenum (Schrank 1803)			1	2	1	17				
Tanytarsini										
Tanytarsus gregarius (Kieffer 1909)						3				
Amphipoda										
Dikerogammarus haemobaphes fluviatilis (Martinov 1919)					34	2				
Odonata										
Gomphus flavipes (Charpentier 1825)					1		1			
Ephemeroptera										
Baëtis pumilus (Burmeister 1839)				10						
Cloëon dipterum (Linnaeus 1761)			2			1				
Habrophlebia fusca (Curtis 1831)					4					
Culicidae										
Chaoborus crystallinus (De Geer 1776)			7							
Species richness	4	4	8	8	6	7	1	0	1	4

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