The Oligochaeta and the chironomida fauna in the River Someş/Szamos[1] system

András Szító and Katalin Mózes

Abstract

The epiphiton and benthos were examined in the Rivers Someşul Cald/Meleg Szamos, Someşul Rece/Hideg Szamos, Someşul Mic/Kis Szamos, Someşul Mare/Nagy Szamos, and „United" Someşul/Szamos to the mouth of the river system near Vásárosnamény in Hungary in 16 sections. The sampling took place between 1 and 22 August of 1992, and repeated between 1 and 21 August of 1996. Main results of the first expedition: *Isochaeta michaelseni Last.*, *Eiseniella tetraedra Savigny* were dominant in high mountain river parts, *Potamothrix vejdovskyi Hrabe* and *Tubifex nevaensis Brinkhurst* on middle mountain river parts in clean water. The Oligochaeta fauna was changed because of anthropogen effects (pollution): *Limnodrilus hoffmeisteri Claparéde* and *Tubifex ignotus Ditlevsen* were dominant and abundant.

Tubifex nevaensis Brinkhurst was found and dominant in self-purificated river parts. High density of chironomid larvae was found in biotecton: *Tanytarsus gregarius Kieffer* and *Prodiamesa olivacea Meigen* were dominant here. *Eukiefferiella brevicalcar Kieffer* and *Polypedilum laetum Meigen* were dominant on the high mountain river parts. *Polypedilum laetum Meigen* and *Prodiamesa bathophila Kieffer* were dominant in clean water on the middle mountain river parts. The chironomid fauna was deteriorated and changed very strongly because of anthropogenic effects. *Cricotopus bicinctus Meigen* was almost the only species in high density in biotecton on this polluted parts of river system. Presence of *Chironomus riparius Meigen* indicated the self-purification of water on the lower parts of rivers.

Results of the second expedition: the benthos diversity (Oligochaeta and chironomid fauna) decreased, but the density of epiphytic chironomid species increased between Năsăud and A-Letea.

Keywords: river ecology, invertebrate, Oligochaeta, chironomid, water quality

Introduction

There were sporadic literature sources of Oligocheta and chironomid fauna in the Someş River System (*Pop, 1943, 1950; Albu, 1966; Cure, 1984, 1985*), therefore our present data will be basic about the situation of Oligochaeta of the species and their richness in different parts of the river system, to find the character and chironomid fauna nowadays.

[1] The first name is Romanian, and the second Hungarian

The main goals were as follows: identification species on different river courses. We tried the qualification of the river profiles by presence or absence of indicator species during the river courses, and to make recommendations for the recreation of the water and sediment quality in the river system.

Materials and methods

Sediment samples were carried out from the spring area of Someşul Cald/Meleg Szamos, Someşul Rece/Hideg Szamos, Someşul Mic/Kis Szamos, Someşul Mare/Nagy Szamos, and „United" Someşul/Szamos to the mouth of the river system in 16 sections (Figure 1.).

Qualitative samples were taken from the surface of the stone and gravel pieces by washing into a benthometer in each profiles. Sampling sites were at various distance from the left, the right bank and in the main current as well when it was possible. Three quantitative samples were taken from each sampling sites. One sample contained the macrozoobenthos from 882 cm^2.

Each sample was washed through a metal screen with pore mesh size of 200 µm. The retained material was separated into groups of Oligochete, Chironomids and other group of animals by a Zeiss stereo microscope, with a 4 to 6 times magnification, and they were preserved in 80 % ethylic alcohol.

For taxonomic identification the following works were used: *Bíró, 1981; Brinkhurst, 1963, Brinkhurst and Jamieson, 1971; Cranston et al., 1983, Ferencz 1979, Fittkau, 1962, Fittkau et al., 1983; Hirvenoja, 1973; Pinder et al.,1983; Pop, 1950; Tsernowskii, 1949.* Individual density was extrapolated to square meter and the frequency of the species was calculated.

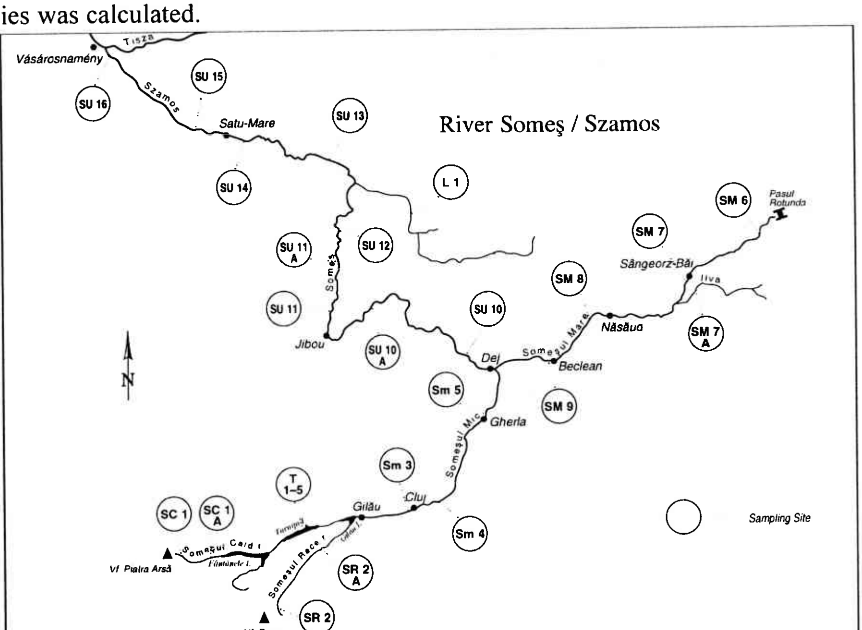

Figure 1. Sampling sites (Sárkány et al., 1999)

Results

The first expedition

Oligochaete

There were found 16 species of Oligochaete in the Someş River System. *Eiseniella tetraedra* was present near the springs and in high mountain river parts in clean water as soon as the *Isochaeta michaelseni* in the River Someşul Rece/Hideg-, Someşul Cald/Meleg-, Someşul Mic/Kis-, Someşul Mare/Nagy-, and „United" Someşul/Szamos as well. *Enchytraeus buchholzi* was found in the River Someşul Mare/Nagy Szamos, while *Stilodrilus heringeanus* was detected once in Someşul Cald/Meleg Szamos (Table 1.).

Table1. Oligochet fauna and the individual density in Someş River System (First Expedition)

August 1-22, 1992	1. Someşul Cald	2. Someşul Rece	3. Upstream Cluj	4. Downstream Cluj	5. Downstream Gherla	6. Confluence with Arin brook	7. Downstream Singeorz Băi	8. Downstream Năsăud	9. Downstream Beclean	10. Downstream of Dej	11. Someş Odorhei	12. Sălsig	13. Porni	14. Păuleşti	15. Vetiş	16. Vásárosnamény	Frequency (%)
Species	ind./m2																
1. Eiseniella tetraedra (Savigny 1826)	4	34				5	4										7
2. Enchytraeus buchholzi Vejdovsky 1879						1											1
3. Isochaeta michaelseni (Lastockin 1937)	7	21				1	4										7
4. Limnodrilus hoffmeisteri (Claparède 1862)			2	9000	7660	4			683	2	13	20	12	4	65	96	23
5. Limnodrilus udekemianus (Claparède 1862)					301									12			3
6. Peloscolex speciosus (Hrabe 1931)			1				4										3
7. Peloscolex ferox (Eisen 1879)										1							1
8. Potamotrix hammoniensis (Michaelsen 1901)												1	1				3
9. Potamotrix vejdovskyi (Hrabe 1941)		11	2						33	9							7
10. Psammoryctides moravicus (Hrabe 1934)					1204												1
11. Psammoryctides barbatus (Grube 1861)												1	1				3
12. Stilodrilus heringianus (Claparède 1862)		4															1
13. Stylaria lacustris (Linnaeus 1767)			1														1
14. Tubifex nevaensis (Michaelsen 1903)			1							17	7	4	68	12	4	36	16
15. Tubifex ignotus (Stolc 1886)				1000	3400			2	532	7		14	34	7	12	22	19
16. Tubifex tubifex (Müller 1774)												4	6				3
Species	2	4	5	2	4	4	3	1	3	5	3	5	6	4	3	3	

Tubifex nevaensis was detected by Upstream Cluj in clean water, but absent after the sewage water inflow of Cluj, and this species was found after Dej again. This species was present on all river part to the mouth (Figure 1., Table 1.).Oligochete were present in all rivers as follows: Someşul Mic/Kis Szamos contained 5, Someşul Rece/Hideg Szamos: 4, Someşul Mare/Nagy Szamos: 3, Someşul Cald/Meleg Szamos 2 and in the United Someşul/Szamos by Dej/Dés 8 species down-stream. *Peloscolex ferox, Potamothrix hammoniensis, Stylaria lacustris* and *Tubifex tubifex* were present sporadically only in the River System.

The frequency of Oligochete was as follows: *Limnodrilus hoffmeisteri*: 22,8 %, *Tubifex ignotus*: 18,7 % and *Tubifex nevaensis:* 15,6 % (*Table 1.*).

Chironomids

57 species were found on the 16 sampling places. The fauna with 30 species was the richest by Upstream Cluj, but they were absent by Downstream Cluj. *Chironomus riparius* was the only species, present Downstream Gherla. Eukiefferiella and Cricotopus species were characteristic by Gherla, where 10 chironomid species were present. *Cricotopus bicinctus* was dominant with 39 ind./m^2. A rich biotecton developed on the boulders and gravels here. Macrozoobenthos was formed by *Cryptochironomus redekei* and *Endochironomus nymphoides*.

The chironomid fauna was bad both in species and individual density. *Tanypus punctipennis* and *Rheotanytarsus curtistylus* were present in the sediment, *Cricotopus bicinctus* and *Propsilocerus orielius* lived in the biotecton. *Cricotopus bicinctus* was the characteristic for the chironomid fauna. 6 species were found by Dej from which 3 species were present in sediment (*Cryptochironomus redekei*, *Polypedilum convictum*, *Tripodura (Polypedilum) scalaenum*), while *Nanocladius bicolor*, *Cricotopus trifascia* and *Cricotopus bicinctus* were in biotecton.

The species density decreased after Someş Odorhei, but some were characteristic, living in biotecton. The species richness increased in biotecton by Vásárosnamény, at the mouth . *Cricotopus bicinctus* was dominant almost in every sampling site, and had the biggest frequency (62.5 %), following by *Tripodura scalaenum* (37.5 %), and *Eukiefferiella similis* (25 %). Other species were additional elements (Table 2.).

The river system showed clean, polluted and mostly high polluted parts (Table 3.).

The 2nd Expedition

Oligochaete and chironomids were present in 6 sampling sites only, and absent in 10 former sampling places. 5 Oligochaete and 39 chironomid species and larvae of 2 other Insect species were collected. The individual density was higher and the species richness was lower than during the former expedition. Oligochaete were not found in River Someşul Rece/Hideg Szamos, but 5 species were present in River Someşul Mare/Nagy Szamos near Năsăud, and they all absent by Beclean. *Potamothrix vejdovskyi* was only present with 4 ind./m^2 in the „United“ Someş/Szamos River near A-Letea (Table 4.). That same species was dominant (22 ind./m^2) by Năsăud.

18 chironomid species lived in the biotecton and 21 species formed the macrozoobenthos in the river system. *Cricotopus algarum* was dominant in biotecton by Beclean (294 ind./m^2). Species richness was higher in that same sampling places than in former expedition (Table 2.,4.).

The species density of Cricotopus and Eukiefferiella genus, living in biotecton, increased in all sampling sites. Dominant species were as follows: *Eukiefferiella brevicalcar* (129 ind./m^2) in River Someşul Rece/Hideg Szamos, *Polypedilum laetum* (121 ind./m^2) near Năsăud, and *Cricotopus algarum* (294 ind./m^2) by Beclean, while *Paratanytarsus lauterborni* was subdominant (150 ind./m^2) by Beclean. Both the species richness and larval density decreased hardly by A-Letea (SU10, Figure 1.).

The frequency of the different species changed between 6.25-37.5 % . *Polypedilum laetum* had the biggest frequency (Table 4.).

Table 2. Chironomid species and their density of the Someș/Szamos River System (1-22 August, 1992)

Species	Sampling places																
	S. Cald/Meleg Sz.	S. Rece/Hideg Sz.	Upstr. Cluj	Downstr. Cluj	Downstr. Gherla	Confl. with Arin brook	Sângeorz Băi	Downstr. Năsăud	Downstr. Beclean	Downstr. Dej	Someș Odorhei	Sălsig	Pomi	Păulești	Vetiș	Vásárosnamény	Frequency (%)
Tanypodinae	ind./m2																
1. Anatopynia plumipes (Fries, 1823)			2														6.2
2. Apsectrotanypus trifascipennis (Zetterstedt, 1838)	1	2															12.5
3. Macropelopia notata (Meigen, 1818)			1														6.2
4. Natarsia punctata (Fabricius, Meigen, 1804)			1														6.2
5. Procladius choreus (Meigen, 1804)															1		6.2
6. Tanypus punctipennis (Meigen, 1818)			1						1								12.5
Orthocladiinae																	
7. Brillia longifusca (Kieffer, 1921)			1														6.2
8. Bryophaenocladius nitidicollis (Goetghebuer, 1913)						1		2									12.5
9. Cricotopus bicinctus (Meigen, 1818)			11					3	12	39	127	12	36	21	5	22	62.5
10. Cricotopus fuscus (Kieffer, 1909)																1	6.2
11. Cricotopus trifascia (Edwards, 1929)										1							6.2
12. Eukieferiella bravicalcar (Kieffer, 1911)	2	1															12.5
13. Eukiefferiella clypeata (Kieffer, 1923)								2									6.2
14. Eukiefferiella coerulescens (Kieffer, 1926)		1															6.2
15. Eukiefferiella gracei (Edwards, 1929)								2									6.2
16. Eukiefferiella lobifera (Goetghebuer, 1934)	1	1															12.5
17. Eukiefferiella similis (Goetghebuer, 1939)	11	5	1					2									25.0
18. Euorthocladius (Orthocladius) thienemanni (Kieffer, 1906)			1														6.2
19. Isocladius (Cricotopus) sylvestris (Fabricius, 1794)	1							8									12.5
20. Nanocladius bicolor (Zetterstedt, 1838)			1							16							12.5
21. Orthocladius saxicola (Kieffer, 1911)			6														6.2
22. Orthocladius sp.			7														6.2
23. Paracladius conversus (Walker, 1856)			8					3									12.5
24. Propsilocerus danubialis (Botnariuc et Albu, 1956)	1		2						1								18.7
25. Propsilocerus paradoxus (Lundström, 1915)		1															6.2
26. Psectrocladius barbimanus (Edwards, 1929)	1																6.2
27. Psectrocladius obvius (Walker, 1856)	1																6.2
28. Psectrocladius simulans (Johannsen, 1937)			3														6.2
29. Smittia aterrima (Meigen, 1818)								6									6.2
30. Thienemannia gracilis (Kieffer, 1909)	1		1			1											18.7
31. Zalutschia mucronata (Brundin, 1949)																2	6.2
Diamesinae																	
32. Monodiamesa (Prodiamesa) bathyphila (Kieffer, 1918)			2														6.2
33. Prodiamesa olivacea (Meigen, 1818)			1			7											12.5
34. Pseudodiamesa branickii (Nowicki, 1853)	1																6.2
Corynoneurinae																	
35. Corynoneura scutellata (Winnertz, 1846)	4																6.2
Chironomini																	
36. Chironomus annularius (Meigen, 1818)							22										6.2
37. Chironomus riparius (Meigen, 1804)			5		1						1						18,7
38. Cryptochironomus defectus (Kieffer, 1913)		2															6.2
39. Cryptochironomus holsatus (Lenz, 1959)			1														6.2
40. Cryptochironomus redekei (Kruseman, 1933)								2		26				3			18.7
41. Endochironomus tendens (Fabricius, 1775)								1									6.2
42. Microtendipes tarsalis (Walker, 1856)			1														6.2
43. Paracladopelma camptolabis (Kieffer, 1913)		6															6.2
44. Microtendipes pedellus (De Geer, 1776)			20														6.2
45. Microtendipes tarsalis (Walker, 1856)			8														6.2
46. Microtendipes chloris (Meigen, 1818)			10														6.2
47. Polypedilum convictum (Walker, 1856)										3	1						12.5
48. Polypedilum laetum (Meigen, 1818)			2														6.2
49. Tripodura (Polypedilum) scalaenum (Schrank, 1803)		45								5	8		2		2	1	37.5
50. Stictochironomus crassiforceps (Kieffer, 1922)			38								1						12.5
51. Zavreliella marmorata (v. d. Wulp, 1858)			6														6.2
Tanytarsini																	
52. Micropsectra apposita (Walker, 1856)						1											6.2
53. Micropsectra junci (Meigen, 1818)			2														6.2
54. Paratanytarsus lauterborni (Kieffer, 1909)									1								6.2
55. Rheotanytarsus curtistylus (Goetghebuer, 1921)	1																6.2
56. Tanytarsus gracilentus (Holmgren, 1883)			2													2	12.5
57. Tanytarsus gregarius (Kieffer, 1909)	43	6	6														18.7
Species number	13	10	30	0	1	4	1	10	4	6	5	1	2	2	3	5	

Table 3. Qualification of the Someş River Syst

Sampling places	I. (excellent)	II. (good)	III. (polluted)	IV (high polluted)
1. Somcşul Cald	x			
2. Someşul Rece	x			
3. Upstream Cluj	x			
4. Downstream Cluj				x
5. Downstream Gherla				x
6 Confluence with Arin brook				x
7 Downstream Sîngeorz Băi				x
8. Downstream Năsăud		x		
9. Downstream Bcclcan				x
10. Downstream of Dej				x
11. Someş Odorhci				x
12. Sălsig				x
13. Pomi			x	
14. Păuleştı			x	
15. Vetiş				x
16. Vásárosnamény			x	

Different injuries and deformities were found on labium of chironomid species during the determinations collected in Năsăud, Beclean and A-Letea sampling sites. The injuries or deformities were as follows: *Cricotopus bicinctus* (26 per cent), *Cricotopus fuscus* (100 per cent, 4 ind./m^2 only), *Polypediulum laetum* (6 per cent) in Downstream Năsăud. *Cricotopus algarum* (22 per cent), *Cricotopus fuscus* (12 per cent), *Cricotopus tremulus* 30 (per cent) and *Cricotopus triannulatus* (26 per cent) in Downstream Beclean, *Cricotopus algarum* (14 per cent) near A-Letea (Table 5.).

Table 4 Oligochaete and chironomids in Someş River System in 2nd Expedition (August 1-21, 1996)

Species	2. Someşul Rece/Hideg Sz.	SR 2A Downstream Blejoaia	6. Confluence with Arin brook	8. Downstream Năsăud	9. Downstream Beclean	10. A-Letea	Frequency (%)
Oligochaeta							
1. Limnodrilus hoffmeisteri (Claparéde, 1862)				7			6.25
2. Aulodrilus limnobius (Bretscher, 1899)				4			6 25
3. Uncinais uncinata (Orsted,1842)				4			6.25
4. Potamothrix vejdovskyi (Hrabe, 1941)				22		4	12.5
5. Limnodrilus hoffmeisteri (Claparéde, 1862)				7			6.25
Chironomidae							
1. Guttipelopia guttipennis (v d. Wulp, 1861)				7			6.25
2 Macropelopia nebulosa (Meigen, 1804)	4						6.25
3. Krenopelopia binotata (Wiedemann, 1817)	11				4		6.25
4. Krenopelopia nigropunctata (Staeger, 1839)					7		6.25
5. Natarsia punctata (Meigen,1804)						4	6.25
6. Rheopelopia ornata (Meigen, 1838)		29					6.25
7 Trissopelopia longimana (Staeger, 1839)	4			22	4	33	25 00
8. Cardiocladius fuscus (Kieffer, 1924)					4		6 25
9 Cricotopus algarum (Kieffer, 1911)				22	294	18	18.7
10 Cricotopus bicinctus (Meigen, 1818)	4			15			12.5
11 Cricotopus flavocinctus (Kieffer, 1924)					15		6.25
12. Cricotopus fuscus (Kieffer, 1909)				4	33		12.5
13. Cricotopus tremulus (Linnaeus, 1758)		4		11	66		18.75
14. Cricotopus triannulatus (Macquart, 1826)					92		6.25
15 Diplocladius cultiger (Kieffer, 1908)	4						6.25
16 Eukiefferiella brevicalcar (Kieffer, 1911)		121					6.25
17. Eukiefferiella clypeata (Kieffer, 1923)		26					6.25
18 Eukiefferiella gracei (Edwards, 1929)		22					6 25
19 Psectrocladius barbimanus (Edwards, 1929)				33			6.25
20 Psectrocladius psilopterus (Kieffer, 1906)		4		22	7		18.7
21 Synorthocladius semivirens (Kieffer, 1909)				7			6 25
22 Thienemannimyia lentiginosa (Fries, 1823)	4			18			12 5
23 Thienemannimyia northumbrica (Edwards, 1929)				15	4		12.5
24 Tventenia (Eukiefferiella) bavarica (Goetgh., 1934)		22					6.25
25 Tventenia (Eukiefferiella) calvescens (Edwards, 1929)		18					6.25
26 Chironomus riparius (Meigen, 1804)					4		6.25
27 Dicrotendipes modestus (Say, 1823)					7		6.25
28. Cryptochironomus redekei (Kruseman, 1933)				4			6.25
29. Microchironomus tener (Kieffer, 1918)		4					6.25
30 Paracladopelma camtolabis (Kieffer, 1913)		7			4		12.5
31. Polypedilum laetum (Meigen, 1818)	7	70	4	121	44	4	37.5
32. Pentapedilum sordens (v. d. Wulp, 1874)				11			6.25
33. Tripodura scalaenum (Schrank, 1803)				4	4		12.5
34 Cladotanytarsus mancus (Walker, 1856)					4		6.25
35 Heterotanytarsus apicalis (Kieffer, 1921)		4					6.25
36 Micropsectra junci (Meigen,1818)				7	4		12.5
37 Paratanytarsus lauterborni (Kieffer, 1909)	18			7	150	18	25.0
38. Tanytarsus curticornis (Kieffer,1911)						48	6.25
39 Tanytarsus gregarius (Kieffer, 1909)				7	7		12.5
Others							
Simulium brevicale Dorier and Grenier			4	4			12.5
Eriocera sp.			4				6.25
	Species density						
Oligochaete	0	0	0	0	5	1	
Chironomids	8	12	3	24	20	7	

Species	Downstr. Năsăud	Downstr. Beclean	10. A-Letea
	Rate (%)		
1. Cricotopus algarum (Kieffer, 1911)		22	14
2. Cricotopus bicinctus (Meigen, 1818)	26		
3. Cricotopus fuscus (Kieffer, 1909)	100	12	
4. Cricotopus tremulus (Linnaeus, 1758)		30	
5. Cricotopus triannulatus (Macquart, 1826)		26	
6. Polypedilum laetum (Meigen, 1818)	6		

Table 5.

Discussion

The anthropogenic pollution effects were detected by the presence of *Limnodrilus hoffmeisteri, Limnodrilus udekemianus* and *Psammoryctides moravicus* as soon as the T*ubifex ignotus* species. Their density was high because of sewage water inflow by Cluj below (Table 1.). The hypertrophic water resulted an extreme situation here: a „red plain" during about 70 km long river part From Cluj to Gherla (Figure 1., Table 1.).

The zoobenthos community was almost only formed by Oligochete, but some Chironomus larva was present at the littoral zone, mainly at the shore line.

Three species were characteristic in River Someş after the Someşul Mare. *Limnodrilus hoffmeisteri* and the *Tubifex ignotus* had a tolerance against the extreme environment.

Tubifex nevaensis was detected by Cluj before, in clean water, but it was absent because of the sewage water inflow of Cluj and this species was found after Dej again because of self-purification of the water and was present on all river part to the mouth, flowing into the River Tisza at Hungary (Figure 1., Table 1.).

Low species richness of Oligochaetewas detected in both clean and polluted sampling sites. A qualification of the river parts was tried to use by the presence or absence of indicator species, living in sediment of river system in different profiles (Figure 2.).

While the variations of the fauna of different rivers are determined by different geographical situations and water chemistry parameters (*McCulloch, 1986*), e.g. the pH (*Townsend et al., 1983*), the variation of the fauna inside a river are caused by the variability of the ecological factors (*Minshall and Minshall, 1977; Reice, 1980; Brown and Brown, 1984; Botos et al., 1990*). The structure and activity of the zoobenthos community of a stream are adapted to the morphological, physical and biological variables, like the current of the streams (*Ambühl, 1959*), the flooding of the streams (*Albrecht, 1959; Schwank, 1981*), the structure and nutrient content of the bottom

(*Wachs, 1967; Cushing et al., 1983*), the size of organic matter particles in the water bodies (*Szító et al., 1983*), the light conditions and in relation to them the primary production (*Hughes, 1966; Szító et al., 1989*).Their role is very important in the high polluted water bodies on different river parts, principally near big towns and industrial-, or agricultural centres.

Almost 90 % of the collected Oligocheta individuals was found by Cluj below and Gherla before, where the pollution was strong. High Oligocheta density was at the sewage water inflow by Beclean too, but a lower peak of individual density was detected here (Table1., Figure 1.).

Chironomid larvae were not present in Downstream Cluj only, because of the concentrate waste water inflow. The river system may be detailed to two parts by the species richness of the Oligochaete and chironomids: the clean (mountain) river parts, where the species richness was high, and the polluted river part, where the river system got different pollutants continuously, or temporary. The chironomid fauna had a species richness in biotecton on the mountain parts, developed on the surface of the boulders, and some species were already found in the sediment of the lenitic river parts too (River Someşul Cald/Meleg Szamos, Someşul Rece/Hideg Szamos R.), 12 chironomid species formed the benthos Upstream Cluj. The species richness decreased on the polluted part of the river system. Chironomids (Orthocladiinae), living in the biotecton, were absent Downstream Cluj and they were detected by Năsăud only as *Eukiefferiella clypeata, E. longicalcar, E. similis, Cricotopus bicinctus, Isocladius (Cricotopus) sylvestris, Briophaenocladius nitidicollis, Smittia aterrima and Procladius conversus. Cricotopus bicinctus* was present from Beclean to the mouth (Vásárosnamény) and dominant, the other, above listed species were absent. *Cricotopus bicinctus* was more tolerant to the pollution effects, than the other species probably. Its high individual density, dominance and continuous presence showed the biotecton presence as food for them. That same food source might be served for other Cricotopus species too, like on the former sites, when their tolerance would be more to the environmental factors. It seems that other chironomid species tolerate the pollution effects neider in biotecton, nor in the sediment. A low species richness of (1-6 species/sampling site) was detected from Beclean to the mouth (Table 2.).

Oligochete were present everywhere in the river system and we can use some species to qualify the ecosystem. Indicator species of Oligochete and chironomids showed a good self-purification in the river system, but this ability of the river is inappropriate to eliminate the anthropogenic pollution effects. The quantity and the quality of the pollution sources would be necessary to determine along the Someş River System. because they have been not covered up nowadays.

The qualification of water was presented by sensitive Oligocheta species but I am afraid, we have not enough information about the environmental factors determining the zoobenthos communities in different courses of the River System.

The 2nd Expedition

Sampling sites were partly the same, than former, or not far away from them. Nevertheless, Oligochaete were present by Beclean and A-Letea. Species richness changed between 1 and 6. 10 sampling sites were free from Oligochaete and chironomids, but the reason was not known.

Low individual density of Oligochaete were present on the sampling places, therefore we supposed, that the pollutants had lasting effect in the sediment. The worms indicated that condition as by other investigations (*Kaniewska-Prus, 1983; Malacea, 1969; Marcoci et al., 1966*). Their reproduction confined to the Spring and Autumn season, therefore the individual density decreasing by lethal concentrations of pollutants could be regenerated slowly.

Chironomid had three or more generations, which overlapped each- other, the fauna regeneration was possible shorter. Drifting of their larvae was common, settled the river parts downstream.. Although, Oligochete and chironomids were present in the mountain and middle part of the river system only (Someşul Rece/Hideg Szamos, and 2A, Confluence with Arin brook, Năsăud, Beclean, A-Letea). The River System got probably hard pollution pressures after A-Letea too.

The lack, or presence of animals indicated the environment quality in sampling sites. The rate of the deformed and injured chironomid labiums showed the damage of pollutants to animals. Heawy metals were dangerous, accumulated in the sediment and in the macrozoobenthos (*Cushman, 1984; Cushman et al., 1984; Frank, 1983; Warwick, 1988, 1989, Szító and Waijandt, 1989*).

Conclusions and proposals

River Someşul Cald/Meleg Szamos was clean, and not showed anthropogenic pollution effects. Plecoptera, Ephemeroptera, species were characteristic with chironomids, and Simulid (black fly) larvae, living the biotecton. Chironomid species showed clean water here too. River Someşul Rece/Hideg Szamos was clean, Trichoptera, Ephemeroptera and chironomid species indicated that same quality.

River Someşul Mic/Kis Szamos was also clean to Cluj, but hardly polluted after Cluj, therefore the self-purification was slow. The red plain of Oligochaete was detected in this river part to Gherla providing a high saprobity.

The clean and the polluted parts followed each-other in River Someşul Mare/Nagy Szamos. The rapid water currency helped the self-purification. It got the tons of the sawdust and shaving from the factories. That was the most important pollution source here. Species density was bad, forming the benthos.

The „United“ Someşul/Szamos river got communal, agricultural and industrial pollution. Oligochaeta and chironomid fauna indicated, that its self-purification was effective, but showed an eutrophic, often hypertrophic habitat by investigations of the expeditions.

1. Instead of former sporadic data now we have a wide range of the information's about both the number and species of Oligochete : 14 species of Oligochete and 57 chironomid were found in river system during the first Expedition.

2. Oligochete were present everywhere in the river system and we can use some species to qualify the ecosystem.

The epiphytic chironomid community was most important, than the other group, living in sediment. The sediment was poor in chironomid species because of frequent (or continuous) pollution effects, consisting of communal-, industrial and\or agricultural sources.

3. Indicator species of Oligochete and chironomids showed a self-purification in the river system, but this ability of the river is inappropriate to eliminate the pollution effects.

4. The qualification of water was presented by sensitive Oligochaeta species by the results of the first Expedition.

5. General economical and environmental protection precautionary measures would be necessary to save the river system. After making such a project, an international aid would be needed to realise it probably.

References

Albrecht, M.-L. (1959): Die quantitative Untersuchung der Bodenfauna fliessender Gewässer. -Z. Fisherei N. F., 12: 479-506.

Albu, P. (1966): Verzeichnis der bis jetzt aus Rumänien bekannten Chironomiden. - Gewässer und Abwässer 41/42: 145-148.

Ambühl, H. (1959): Die Bedeutung der Strömung als ökologischer Faktor. -Schweiz. Z. Hydrobiol., 21: 133-264.

Bíró, K. (1981): Árvaszúnyoglárvák (Chironomidae) kishatározója (A guide for the identification of Chironomidae larvae). -In: Felföldy (ed.) Vízügyi Hidrobiológia, VÍZDOK, Budapest, 11: 1-230 (Hungarian).

Botos, M., Szító, A. & Oláh, J. (1990): Macrozoobenthos communities in Hungarian lowland rivers. -Aquacult. Hung. (Szarvas), VI: 133-152.

Brinkhurst, R. O. & Jamieson, B.G.M. (1971): Aquatic Oligochaeta of the world. - Oliver and Boyd, Edinburgh, 1-860.

Brinkhurst, R. O. (1963): A guide for identification of British aquatic Oligochaeta. - Freshwat. Biol. Assoc. Sci. Publ. 22: 1-52.

Brown, A.V. & Brown K.B. (1984): Distribution of insects within riffles of streams. - Freshw. invertebr. Biol., 3: 2-11.

Cranston P. S., Olivier D.S. and Saether O.A. (1983): The larvae of Orthocladiinae (Diptera: Chironomidae) of the Holoarctic region - Keys and diagnoses. - Ent. Scand. Suppl. 19: 149-291.

Cure, V. (1984): Chironomidae (Diptera-Nematocera) gasite pina in prezent in Romania (Chironomids (Diptera-Nematocera) founded till now in Romania). - Bul. Cerc. Pisc. IV (XXXVII) 1-2: 1-60.

Cure, V. (1985): Chironomidae (Diptera-Nematocera) aus Rumänien unter besonderer Berücksichtigung jener aus dem hydrographischen Einzugsgebiet der Donau. - Arch, Hydrobiol. Suppl. 68 (Veröff. Arbeitsgemeinschaft Donauforschung 7) 2: 163-217.

Cushing, C.E., Mclntrie, C.D., Cummins, K.W., Minshall, G.W., Petersen, R.C., Sedell, J.R. & Vannote, R.L. (1983): Relationship among chemical, physical and biological indices along river continua based on multivariate analyses. -Arch. Hydrobiol., 98 (3): 317-326.

Cushman, R. M. and Goyert, J. C. 1984: Effect of a synthetic crude oil on pond benthic insects. - Environ. Pollut. Ser. A 33: 163-186.

Cushman, R. M. (1984): Chironomid deformities as indicators of pollution from a synthetic, coal-derived oil. -Freshwater Biol. 14: 179-182.

Ferencz, M. (1979): A vízi kevéssertéjű gyűrűsférgek (Oligochaeta) kishatározója (A guide for the identification of aquatic Oligochaeta). - In: Felföldy, L. (ed.): Vízügyi Hidrobiol., VÍZDOK, Budapest, 7: 1-167.

Fittkau, E. J. (1962): Die Tanypodinae (Diptera, Chironomidae). -Abh. Larvalsyst. Insekten, 6: 1-453.

Fittkau, E. J. and Roback, S. S. (1983): The larvae of Tanypodinae (Diptera: Chironomidae) of the Holoarctic region - Keys and diagnoses. -Ent Scand.Suppl. 19: 33-110.

Frank, C. (1983): Beeinflussung von Chironomidenlarven durch Umveltchemikalien und ihre Eignung als Belastung- und Trophieindikatoren. - Verh. Dtsch. Zool. Ges. 1983: 143-146.

Hirvenoja M. (1973. Revision der Gattung Cricotopus van der Wulp und ihrer Verwandten (Diptera: Chironomidae). - Ann. Zool. Fenn., 10: 1-163.

Hughes, D.A. (1966): Montain streams of the Barbeton area, Eastern Transvaal. Part 2. The effect of vegetational shading and direct illumination on the distribution of stream fauna. -Hydrobiologia, 27: 439-459.

Kaniewska-Prus, M. (1983): Ecological characteristics of polisaprobic section of the Vistula River below Warsaw. -Pol. Arch. Hydrobiol., 30 (2):149-163.

Malacea, I. (1969). Biologia apelor impurificate (The biology of the polluted rivers). - Acad. R.S.R., Bucureşti.

Marcoci, S., Draganovici-Duca, M. & Botea, Fr. (1966): Consideratii asupra importantei oligochetelor in caracterizarea starii de murdarie a cursurilor de apa (The importance of the Oligochaete in the determination of the pollutiuon level of the river water). - Stud. Prot. Epur. Ape., Bucuresti, 7-2: 680-693.

McCulloch, D.L. (1986): Benthic macroinvertebrate distributions in the riffle - pool communities of two East Texas streams. -Hydrobiologia, 135:61-70.

Minshall G.W. and Minshall, J.N. (1977): Microdistribution of benthic invertebrates in a rocky montain (USA) stream. -Hydrobiologia 55(3): 231-249.

Pinder L.C.V. & Reiss F. (1983): The larvae of Chironominae (Diptera: (Chironomidae) of the Holoarctic Region. - Keys and diagnoses. - Ent. Scand. Suppl. 19: 293-435.

Pop, V. (1943): Einheimische und ausländische Lumbriciden des Ungarischen National-Museums in Budapest. - Ann. Nat. Hist. Mus. Hung., 36: 12-24.
Pop, V. (1950): Lumbricidele din Romania. Ann. Acad. Rep. Pop. Romane, Ser. A.1.
Reice, S.R. (1980): The role of substratum in benthic macroinvertebrate microdistribution and litter decomposition in a woodland stream. -Ecology, 61: 580-590.
Sárkány-Kiss, A., Mihailescu, N. & Sirbu, I. (1999): Description of the sampling sites along the River Someş/Szamos (Printed in this band).
Schwank, P. (1981): Turbellarien, Oligochaeten und Archianneliden des Breitenbachs und anderer oberheissischer Mittelgebirgsb„che.2. Systematik und Autökologie der einzelnen Arten. -Arch. Hydrobiol. Suppl., 62: 86-147.
Szító, A., Botos, M. (1993): Macrozoobenthos in the shallow Hungarian Kisköre Reservoir on the River Tisza. - Verh. Internat. Limnol. 25: 1196-1199.
Szító, A., Botos, M., Szabó, P. (1989): Factors, influencing the quantity and the quality of Oligochaets and Chironomids in the Kisköre reservoir. -Acta Biol. Debr. Oecol. Hung. 3: 329-338.
Szító, A., Waijandt, J. (1989): Nehézfémsók okozta elváltozások a Tisza üledékében élő árvaszúnyoglárvák labiumán (Deformities on labiums of sediment-dwelling Chironomid larvae caused by heavy metals in the River Tisza). (Abstr.) XXXI. Hidrobiológus Napok, Tihany, 29.Thienemann, A. (1954. Chironomus. Leben, Verbreitung und wirtchaftliche Bedeutung der Chironomiden. - Binnengewässer 20: 1-834.
Townsend, A.R., Hildrew, A.G. & Francis, J. (1983): Community structure in some southern English streams: the influence of physicochemical factors. -Freshwater Biology (13: 521-544.
Tshernowskii, A. A. (1949): Opredelitel' licsinok komarov szemejsztva Tendipedidae. Opredeliteli po faune SZSZSZR. - Izd. Akad. Nauk SZSZSZR., Leningrád, 31: 1-185.
Wachs, B. (1967): Die Oligochaetenfauna der Fliesgewässer unter besonderer Berücksichtigung der Beziehung zwishen der Tubificiden-Besiedlung und dem Substrat. -Arch. Hydrobiol., 63:310-386.
Warwick, W. F. (1988): Morphological deformities in Chironomidae (Diptera) larvae as biological indicators of toxic stress. -In: Toxic Contaminants and Ecosystem Health; a Great Lakes Focus, M. S. Evans (ed.), New York: John Wiley and Sons.
Warwick, W. F. (1989): Morphological deformities in larvae of Procladius Skuze (Diptera: Chironomidae) and their biomonitoring potential. - Can. J. Fish. Aquat. Sci. 46: 1255-1271.

András Szító
Fish Culture Research Institute
5540 Szarvas
Anna-liget 8.
Hungary

Katalin Mózes
4300 Târgu Mureş
Str. Hunedoara Juv. 9/7
Romania