MACROZOOBENTHOS IN THE MAROS (MUREŞ) RIVER

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Introduction

The ecological demand of living organisms determines the presence or absence of species in a biotope. Certain water organisms are very sensitive to ecological changes, and thus are useful as environmental indicators, if we know their ecological requirements.

The sediment fauna, except Mollusca, has been examined by other authors (Horváth, 1943; Wagner,1943; Gyurkó et al.1971; Sárkány-Kiss,1983a,b,1986). Their data and results serve as a basis for contemporary comparisions.

Material and methods

Sediment samples were collected from the spring to the mouth in 15 cross sections. In each profile three samples were taken by a benthometer (with a drifting net) from sections 1-6 and by a modified Petersen sampler of 18x31 cm surface from sections 7-15. Sampling sites were at various distances from the left (1), right (2) bank and in the main current (S) as well. The weight of each empty bag was approx. 30 kg; which made it possible to take sediment samples from the river's main channel.

Sampling sites were denoted by symbols of three numbers or letters (Bancsi et al. 1981). Accordingly the symbol 011 means the sample collected in the profile 01 near the left (1) bank (Table 1).

Each sample was washed through a metal screen of 200-mm pore mesh size and placed into a separate plastic dish of 2,000 cm^2 volume. Animals were picked up by tweezers from the remaining sediment, using a lupe with 3x magnification.

Animals were preserved in an 80% alcohol solution. Special works and keys of authors were used for identification (Bíró, 1981; Botoşăneanu, 1963; Cărăuşu et al. 1955; Chernovski, 1949; Cîrdei et al 1965; Davies, 1968; Ferencz,1979; Fittkau,1962; Hirvenoja,1973; Hynes,1977; Macan,1970; Pennak,1953; Pinder et al.1983; Richnovszky et el.1979 and Steinmann,1964).

Some insect larvae groups were determined for genera only due to a lack of suitable keys. The individual numbers of species were extrapolated to ind./m^2.

Results

The Maros Rriver divided into three parts by indicator animals. The first part (rhitone and potamon) ran from the spring to the "reservoir" and the third was the remaining river section from the dam by Tîrgu-Mureş to where it debouches into the Tisza River.

The characteristic animal species for a middle river course were absent, therefore the classification and qualification of river parts was possible by sediment quality only (moving gravels and rough sand). The large number of species and individual density was characteristic for upstream courses, mainly in profile 5. Ephemeroptera and Trichoptera species were dominant here but Amphipods were absent from the profile by the 16th river km on, as well as the Trichoptera and Chironomid species from the 62nd river km (Table 1). Greater species richness (59 species) was detected in the 5th profile: Ephemeroptera - 15 (mainly Bäetis sp.) and Trichoptera 13 species were present as well as 6 species of Oligochaets and 9 Chironomid species.

In the 6th profile (188 river km), 15 species were found in the dammed river section about 1,000 m from the barrage beside Tîrgu-Mureş, and they have composed a mixed fauna: the running-water species were dominant over the standing-water species. While the abundance of running-water species was low (Tubifex nevaensis 6 ind./m^2 Chironomus fluviatilis; 12.2 ind./m^2 the others were compliant and found on both the middle and lower (lowland) river courses. These were the following species: Limnodrilus udekemianus, L. profundicola, L. hoffmeisteri, Procladaus choreus, Cryptochironomus redekei and Polypedilum scalaenum. The sediment was deep and consisted of clay and sand of fine particle size.

On the ground of zoocoenose, the third river section went from Tîrgu-Mureş to the mouth with Oligochaets dominance. It was mainly Limnodrilus hoffmeisteri that showed a high density. That same species formed an extraordinary result in the 12th profile (455 river km) below the town of Deva: the density of Potamothrix vejdovskyi was 7,058 ind./m^2 Isochaeta virulenta was 4,152 ind./m^2 and Limnodrilus hoffmeisteri was 30,308 (!) ind./m^2. The abundance of these species together was 41,518 ind./m^2, but they were in low abundance in the later sections.

Discussion

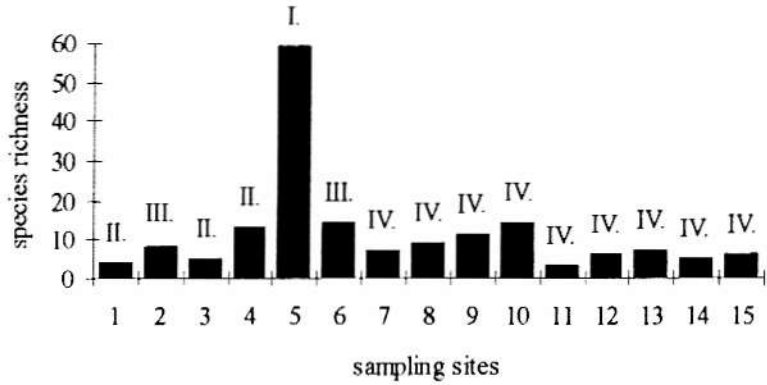
The present zoological composition cannot be explained by simple geography. Amphipods were present in profiles 1-4 but were absent from the 5th profile. This situation was probably caused by environmental pollution: high detergent concentrations in the upper four profiles were detected (Waijandt 1991). Simuliidae were present in the 5th profile only, though previous sections had the same stony riverbed.

The Chironomid abundance was lower in the dammed section of the river than would have been with the high concentrations of heavy metals and detergents (water and sediment chemical data by Waijandt 1991).

Chironomid larvae were sensitive to these ecological factors (Saether 1979; Szitó et al. 1989). The abundance of Oligochaets was high here because of the rich sedimentation

and food sources (detrite, bacteria and algae). Because the Chironomid larvae were in low abundance, Oligochaets have not had food and place competitors.

Fig.1: Qualifications of the different profiles of the Maros River by indicator benthos species and their richness. I: excellent; II: good; III: middle; IV: polluted



The presence of Amphipods, Ephemeroperta, Trichoptera and Chironomid species would be reasonable after the dammed part of river in profiles 7-11 (207-376 river km), but they were absent from these sections. Limnodrilus hoffmeisteri and L. profundicola (Oligochaeta) species were present, which have already indicated a high organic matter concentration in the water on this river course.

The detergents and heavy metal concentrations were greater than the earlier levels (see the chemical analysis data). The absence of these sensitive animal groups and species from these profiles indicated high anthropogenic pollution (Fig.1-2).

After Deva the Maros gives a typical lowland river picture (profile 12, 455 river km) with a wide riverbed and very small sand particle size. A huge "field" of Oligochaets was found near the right bank in the deep fine-sand sediment. The density of Oligochaets was higher here than in other sampling sites. Limnodrilus hoffmeisteri species was dominant. This species has always shown a hard eutrophication (= pollution) of waters (Ferencz 1979). This same situation was indicated by two other species: Potamothrix vejdovskyi and Isochaeta virulenta (Table 1).

The high abundance of Oligochaets may be caused by a sewage water inflow up-stream on the right side and a typical hypertroph zoocoenose. This might be the reason that such typical Chironomid species were absent from the river course, which were often dominant in other rivers, for example in the Tisza River. Such Chironomid species included the following: Paratendipes, Beckidia and Chironomus fluviatilis (Szitó 1981). An industrial pollution effect might be present here, like a coal distillery earlier (Mălăcea et al.1954).

Table 1. Distribution of macrozzoobenthos individual numbers at different sampling sections

Profile (section)	01	02		03		04	05	06	07	08	09	10	11	12		13	14	15
Sampling site	S	S		S		S	S	S	S	S	S	S	S	S		S	S	S
SPECIES:																		
Annelida																		
Oligochaeta																		
Branchiura sowerbyi Beddard																		4
Potamothrix vejdovskyi																		
Brinkhurst	12						6		12		12			6	7058	18		3
Potamothrix hammoniensis																		
Brinkhurst											6	12		66				
Isochaeta virulenta Point															415			
Limnodrilus claparedeianus Rat.												6						
Limnodrilus udekemianus																		
Claparede									12									
Limnodrilus profundicola																		
Brinkhurst	6																	
Limnodrilus hoffmeistrei																		
Claparede																		
Peloscolex speciosus Hrabe																		
Tubifex ignotus Stole																		
Tubifex nevaensis Mich.																		
Aurodrilus limnobius Bretscher																		
Thalassodrilus prostatus Knöll																		
Lumbriculus lineatus Mich.		6																
Eiseniella tetraedra Mich.																		
Hirudinea																		
Glossiphonia complanata L.																		
Glossiphonia heteroclita L.																		
Oligobdella biannulata Moore																		
Placobdiella picta Verril																		
Arachnida																		
Hydracarina																		
Lebertia sp.		18																
Hydrachna sp.																		
Crustacea																		
Amphipoda																		
Dicerogammarus haemobaphes																		
fluviatilis Mart.	564	216	174	7		2												
Rivulogammarus balcanicus																		
dacicus Dobr.-Man.		36		3	18	7												
Insecta																		
Ephemeroptera																		
Siphlonurus armatus Etn		18			12	1	12											

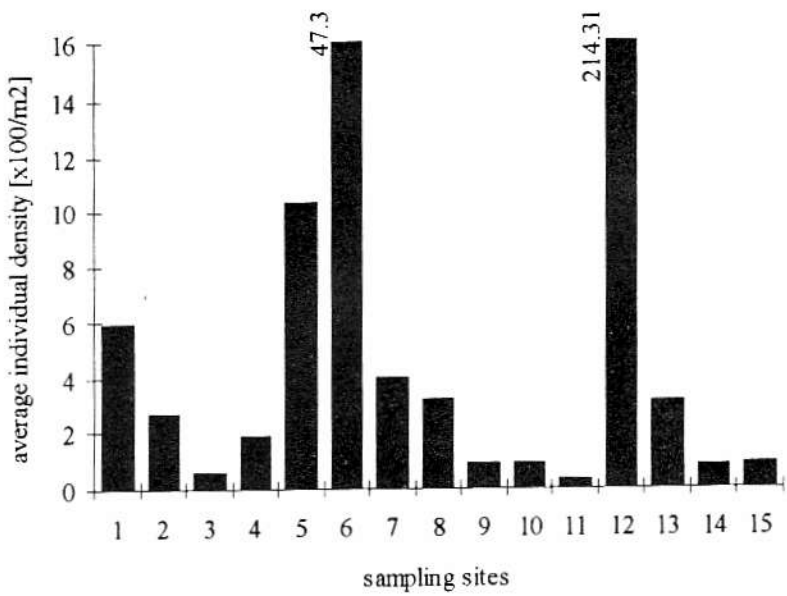
Siphlonurus lacustris Etn.				12																																									
Siphlonurus linneanus Etn.											18																																		
Ameletus inopinatus Etn.																																													
Baetis atrebatinus Etn.																																													
Baetis muticus L.											6																																		
Baetis niger L.																																													
Baetis rhodani Pict.																																													
Baetis pumilus Burm.			1																																										
Baetis scaxbus Etn.			8		30	1		6	7																																				
Ecdyonurus insignis Etn.																																													
Ephemerella notata Etn.																																													
Prodiamesa olivacea Meig.		6													3																														
Brillia modesta Meig.														6																															
Cricotopus bicinctus Meig.				24																																									
Cricotopus sylvestris Fabr.																																													
Metriocnemus hygropetricus Kieff.				6																																									
Chironomus fluvitilis Lenz.																	12					6																							
Chironomus riparius Meig.																	78																												
Chironomus semireductus Lenz.																																													
Chironomus plumosus L.																24	186	19																											
Microcricotopus bicolor Zett.														6																															
Cryptochironomus redekei Krus.													6		2		24	1								6	24																		
Dicrotendipes nervosus Staeg.																						24																							
Dicrotendipes pulsus Walk.																						18																							
Einfeldia pectoralis Kieffer																6																													
Microtendipes chloris Meig.													186	84																															
Paracladopelma camtolabis Kieff.																																6	6												
Paratendipes albimanus Meig.																																													
Polypedilum convictum Walk.													24	114																															
Polypedilum nubeculosum Meig.																			312																										
Polypedilum scalaenum Schr.																	96			6						6	12	66	18	18								6				12			1
Robackia demeijerei Krus.																																								18	12				
<u>Ceratopogonidae</u>																																													
Culicoides nubeculosus Meig.																18																													
<u>Athericidae</u>																																													
Atherix variegata Walk.				6									12	18																															
<u>Ephydridae</u>																																													
Ephydra macellaria Egg.													12																																
<u>Mollusca</u>																																													
Ancylus fluviatilis Müll.														12																															
Others	4			4																																									
Speciess richness	8			16	6			2		2	6		35	28	1	6	7	1	4	3		6		6	2	9	4	14	3	3	1	2	2	5		3	2	1	5	1	1	4	1		6
Total species No.	8				22			5			13			59			15			7			10			12			15			2			6			7			5			7	
Individual (1,2) density (S)	596			486	204	11	18	18	15	24	120	40	1074	1818	24	6024	636	75	1146	78		96		540	12	186	84	192	42	48	33	30	12	672		41518	72	6	870	18	12	203	12		178

The importance of Simuliidae as environmental pollution indicators was studied and explained by Kovachev (1977) because these species have shown a "whole strict stenotopicity".

The Mollusca fauna gave a depressing picture. From 1974 to 1982 more than 30 species lived in the Maros River (Lamellibranchiata 7 species, Gastropoda 23 species, Ancylus fluviatilis was found from 40 to 188 river km (Sárkány-Kiss 1983a,b,1986).

Now, Molluscs were found by the source, in the second, fifth and sixth profiles, and Ancylus fluviatilis was present in the fifth profile, but two specimens only. The indicator importance of this last species is well known (Richnovszky et al. 1979; Sárkány-Kiss 1986). Our last data showed a withdrawal in Ancylus fluvatilis from earlier river sections: Topliţa and Voşlobeni. Its total disappearance may be realized in the immediate future.

Fig.2: Average individual densities of sediment fauna in the profiles of the Maros River



Summary

Animals were found in all profiles of the river at the time of sampling. The Maros River has three characteristic sections by its zoocoenose: upper course, dammed river portion and lowland river. The typical middle summer fauna was absent due to

anthropogenic pollution. Our opinions and signs given by indicator species were confirmed by data from water and sediment chemical analyses as well (Table 1, Fig. 1-2).

The different communal pollutions of the Maros River have continued, which was shown by the withdrawal of the earlier rich and wide-spread Mollusca fauna.

The clean water indicator Ancylus fluviatilis was found in the fifth profile, 12 ind./m^2 only. Oil was often present in the sediment and the animal richness was very low in such samples. The classification of sampling sites by presence or absence of indicator species was as follows: Izvorul Mureş II, Senetea III, Suseni II, Sărmas II, Răstoliţa I, Tîrgu-Mureş III, Ungheni-Moreşti IV, Luduş-Gheja IV, Gura-Arieşului IV, Sîntimbru IV, Alba Iulia (below) IV, Deva (below) IV, Zam IV, Pecica IV, Szeged IV (Fig. 1).

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