

# Some data concerning the biodiversity of stygofauna in the River Someşul Cald/Meleg Szamos<sup>1</sup> basin

*Corneliu Pleşa, Alexandru Fekete, Géza Rajka and Ruxandra Buzilă*

## *Abstract*

The present study analyses generally and comparatively the community structure of 3 habitats of the Someşul Cald/Meleg-Szamos river basin, belonging to the subterranean realm: springs or emergencies, free basins in caves and interstitial waters (=psammal). The preliminary results comprise the comparative analysis of the biodiversity of faunistical groups treated qualitatively and quantitatively.

**Keywords:** Someş/Szamos river basin, biodiversity, stygofauna, psammal.

## *Introduction*

As part of the Apuseni Mountains, the Someşul Cald hydrographic basin, a tributary of the Someşul Mic/Kis-Szamos river, covers a large area (around 450 km<sup>2</sup>). Its north border is the Crişul Repede/Sebes-Körös basin, the west border is the Crişul Negru/Fekete-Körös basin, the south border is the Arieş/Aranyos basin (it is a tributary of the Mureş/Maros river) and the east border is the Someşul Mic basin. Concerning its upper basin, this covers a large and picturesque area, composed mainly by coniferous forests, also having a great touristic value. In its greatest part, this area was integrated in a project of national park 40 years (M. Bleahu & M. Şerban, 1959).

Till now the entire zone of the Someşul Cald river has not been the subject of any hydrobiological study, except one single work (E. Prunescu-Arion & M. Baltac, 1967), which deals with the area on the whole and treats only some epigeal habitats.

The first investigations on the aquatic subterranean fauna (=stygofauna) took place earlier by the team of Speleological Institute of Cluj, as a part of the international campaign „Biospeologica“, but this study refers exclusively to the fauna of some well known caves (P.A. Chappuis & R. Jeannel, 1951). During this study only Copepods were collected from two caves, namely from Peştera de la Alun and Peştera Zmeilor de la Onceasa.

Since the epigeal streams of the whole Someşul Cald basin are bordered by sand and gravel sediments, which supposedly lodge a remarkable fauna (psammon) in their interstitial waters (psammal), our attention turned to this unexplored habitat since the 1960s.

<sup>1</sup> The first name is Romanian, and the second Hungarian

In this study, we present the preliminary results of a lot of samples collected by C. Pleșa between 1963-1979. These give us an overall view on the biodiversity of the stygofauna.

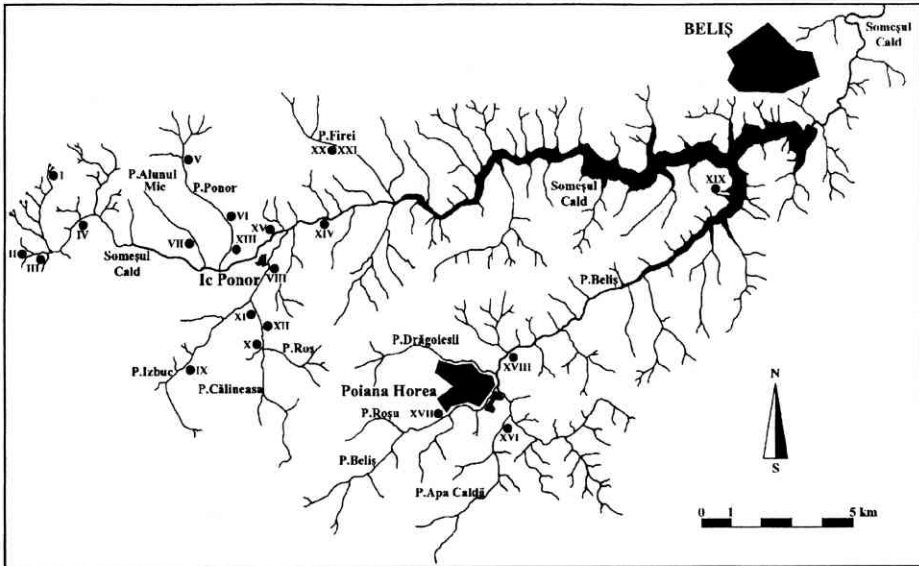


Figure 1. The map of the Someșul Cald/Meleg-Szamos river basin with the sampling sites

### *Materials and methods*

In order to study the stygofauna, we collected material from 3 habitats, namely from springs or emergences (2 samples), from free aquatic basins of caves (3 samples) and from interstitial waters of the sediments deposited in epigeal streams or in cave-streams (19 samples). This last habitat, namely the psammal (only in epigeal streams it is also called „*hyporheic*“) seems to be always the richest habitat in stygofauna and forms with its community (=psammon) a real ecosystem for which the name *psammocoen* was suggested (Pleșa, 1995).

The material was collected with a plankton net, fixed in 75-80 % ethyl alcohol, then faunistic groups were sorted in laboratory. For collecting samples from psammal, we made holes in the sand or gravel sediments, which were deposited along the stream borders. The interstitial water was filtered and then fixed. This method is known as „the Karaman-Chappuis procedure“.

The investigation area comprises the following more important zones:

- The Someșul Cald springs, bordered in north and west by „Vf .Micău“ (1640 m), „Piatra Tâharului“, „Coasta Brăiesei“ (1678 m) and „Șaua Cumpănățelu“ (1640 m);
- “Cetatea Rădeasa“, „Cheile Someșului Cald“ (the so called „Szamos bazăr“, after an earlier toponym), the Șomeșul Cald valley upstream Ic Ponor, with its tributaries

(„Alunul Mare“, „Pârâul Porcului“, „Alunul Mic“ and „Pârâul Ponorului”;  
 -The „Călineasa“ area, with „V. Izbucului“, „Pârâul Bătrâna“, „Pârâul Roșu“;  
 -“Valea Belișului“, between „Poiana Mare“ (=“Poiana Horea“) and its confluence with the Someșului Cald valley. Nowadays, the inferior region of the Belișului Valley is occupied by the „Fântânele“ reservoir, formed in the 1970s.  
 -“Valea Firei“, an important tributary of the river Someșul Cald.  
 The sample sites and their location are shown in Figure 1.

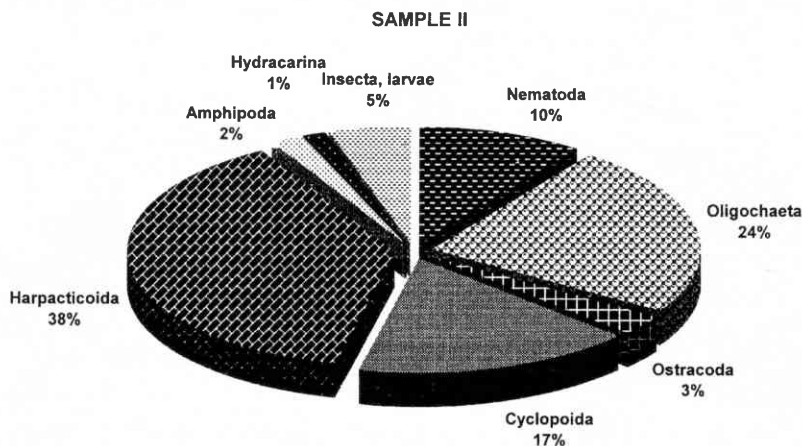
The most important ecological factors, for example the water temperature of each sample, sometimes also of the stream water and only once also the pH was noted. The details concerning the sample sites are presented in Table 1.

### Results

As a result of the sample sorting representatives of 10 faunistical groups were identified. The community composition is illustrated in Table 2.

As it can be seen, the most abundant biodiversity is represented in psammal both from the qualitative and quantitative point of view. This habitat provides optimal survival conditions for the groups living here, first of all because the ecological factors are relatively constant in spite of the external seasonal variations. The associated fauna is represented most frequently by Copepods (Cyclopids and Harpacticoids), Oligochaetes (particularly Naididae and Pristinidae), insect larvae (mainly Ephemeroptera, Plecoptera and Chironomida) and occasionally Hydracarina.

It has been ascertained that in the psammal the frequency of the faunistical groups differs from sample by sample. Thus, in order to illustrate this fact, we present the percentage distribution of the identified groups in two quantitative samples (Figure 2., 3.).



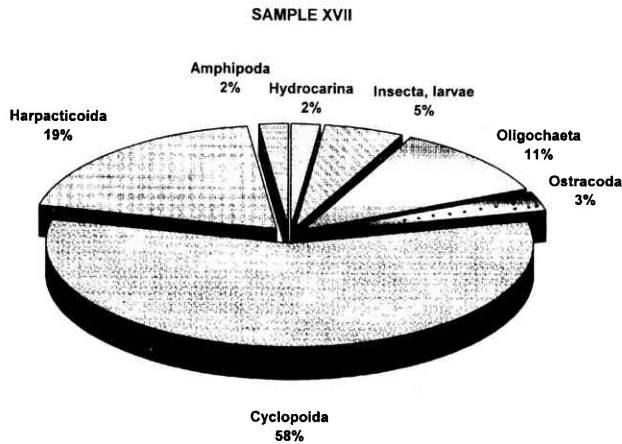


Figure 2., 3. The percentage distribution of the different faunistic groups in two quantitative samples.

### *Conclusions*

Our present study offers an overall view about the living organisms populating the subterranean waters and, especially, the interstitial ones (=psammal) in the Someșul Cald river basin.

In a study of the rhytrofauna in the Someșul Cald river basin E. Prunescu-Arion & M. Baltac (1967) defined three main „zoocoenoses“: „that of the mosses, of the periphyton, and the litho-rheophilous fauna“. Our own study permitted the enlargement of this ecological spectrum, by the extension of the researches also on the subterranean habitats, which shelter a very interesting and variable stygofauna.

The taxa from each group are going to be identified by specialists. The results will permit a completion of our knowledge concerning the biodiversity of these communities.

### *References*

- Bleahu, M., Șerban, M. (1959): Bazinul endoreic Padiș - Cetățile Ponorului. Propunere pentru un viitor parc național. - *Ocotirea Naturii*, 4, 89-125.
- Chappuis, P. A., Jeannel, R. (1951): Enumeration des grottes visitées, 1927-1949 (huitième série). *Biospeologica*, LXXII. - *Arch. de Zool. exp. et gen.*, 88/2., 81-230.
- Pleșa, C. (1985): *Microglossaire de Stygologie*. - *Theor. and Appl. Karstology*, 2, 25-45.
- Pleșa, C. (1995): Un compartiment écologique majeur pour la Stygofaune. Le psammal. - *Trav. Inst. Speol. „Emile Racovitza“*, XXXIV, 167-169.
- Prunescu-Arion, E., Baltac, M. (1967): Contribuții la studiul hidrobiologic al râului Someșul Cald. - *Hidrobiologia*, 8, 81-98.

*Corneliu Pleșa, Alexandru Fekete, Géza Rajka, Ruxandra Buzilă*  
*Speleological Institute „E. Racovitza“*  
*5 Clinicilor St., POBox 58*  
*3400 Cluj-Napoca 1 Romania*

SAMPLE	SAMPLING SITES	DATE	Tw °C in site	Tw °C stream	pH	SEDIMENT STRUCTURE
I	Helocrene spring, on "Cornul Muntelui"	13.09.63	-	-	-	-
II	Psammal, Rădeasa cave	27.07.71	7.2	-	-	gravel
III	Psammal, Someșul Cald valley at Poiana Rădeasa	12.08.71	13.4	-	-	-
IV	Psammal, Someșul Cald gorges, under Moloch cave	27.07.71	-	-	-	-
V	"Peștera Zmeilor" cave from Onceasa, little basin on the clayous bottom	09.07.70	4.0	-	-	-
VI	Psammal, Ponorului stream	09.07.70	-	-	-	sand and gravel
VII	"Peștera de la Alun" cave, little basins and rimstone pools	05.07.70	4.0	-	-	-
VIII	Psammal, "Pârâul Bătrâna" upstream, from Ic Ponor	29.08.67	11.0	-	-	-
IX	Psammal, "Pârâul Izbulului" stream	06.07.68	-	-	-	sand and gravel
Xa	Psammal, "Pârâul Porcului" stream	30.08.67	8.5	-	-	-
Xb	Psammal, Călineasa stream	30.08.67	8.5	-	-	gravel
XI	Psammal, Călineasa stream, downstream from Pârâul Roșu	29.08.67	10.0	-	-	-
XII	Psammal, Călineasa stream	06.07.68	-	-	-	sand and gravel
XIII	Psammal, "Pârâuș Ponor" stream, 3 km upstream from the confluence	09.07.70	15.0	10.0	6.3	-
XIVa	Psammal, Someșului Cald valley, 1,5 km upstream from Ic Ponor	08.07.70	14.5	14.0	-	-
XIVb	Psammal, upstream from XIV <sup>th</sup> sample	08.07.70	-	-	-	-
XV	Psammal, "Pârâul Șimii" stream	11.07.70	11.0	13.0	-	-
XVI	Psammal, Apa Caldă stream, between Poiana Mare and Șaua Ursoaia	30.08.67	-	-	-	-
XVIIa	Psammal, "Pârâul Beliș" stream, near the bridge	30.08.67	-	-	-	clayous beach
XVIIb	Psammal, "Pârâul Beliș" stream, near the bridge	30.08.67	-	-	-	-
XVIII	Psammal, "Pârâul Beliș" stream, 500 m downstream from Poiana Horea	06.07.68	-	-	-	-
XIX	Psammal, "Pârâul Rece" stream, near Beliș, 200 m upstream from the confluence with Someșul Cald Valley	07.07.70	-	-	-	-
XX	Psammal, "Valea Firei" stream under "Șura Mare" cave	29.08.67	10.0	-	-	fine gravel
XXI	Emergence nr. 1 in "Valea Firei" stream	3-6.09.79	5.2	-	7.0	-

Table 1. Sampling sites in the Someșul Cald/Meleg-Szamos river basin

SAMPLE	Nematoda	Oligochaeta	Gasteropoda	Ostracoda	Cyclopoida	Harpacticoida	Amphipoda	Hydracarina	Collembola	Insecta, larvae
I		+			+	+	+			
II	+	+		+	+	+	+	+		+
III		+			+	+		+		+
IV		+		+	+	+		+		
V						+	+			
VI		+		+	+	+				+
VII		+			+					
VIII	+	+		+	+	+				+
IX		+		+	+	+		+		+
Xa	+	+		+	+	+	+	+	+	+
Xb	+	+		+	+	+		+	+	+
XI		+		+	+	+			+	+
XII	+	+		+	+	+		+		+
XIII	+	+		+	+	+				+
XIVa	+	+		+	+	+				+
XIVb		+			+	+				+
XV	+	+			+	+	+	+		+
XVI		+			+	+				+
XVIIa		+				+				+
XVIIb		+		+	+	+	+	+		+
XVIII	+	+		+	+	+		+	+	+
XIX	+	+			+	+			+	+
XX	+	+		+	+	+	+			+
XXI	+	+	+		+	+	+	+	+	+

Table 2. The community composition of the samples presented in Table 1.