

A study of the plecoptera species in the Criş/Körös¹ rivers

Cristina Buzan & Andrei Sárkány-Kiss

Abstract

The authors studied the prevalence larvae in the benthos of Criş/Körös rivers. According to eight identified indicator species (the quality of the water has been determined). In the case of many species new sites are designated for the Romanian fauna. The species *Dinocras cephalotes* was identified in Crişul Negru. This species hadn't been found for the last 20 years in Romania.

Keywords: Insecta, larvae of Plecoptera, benthos.

Introduction

The Plecoptera species spend most of their lives in larva form in the water. Due to their sensitivity towards the environmental conditions, the different species appear only in a certain type of water and in general they prefer the upper run of the rivers. They prefer oxygen and vegetation rich stenotherm waters. Due to these preferences the plecoptera species are present only in the upper run of the rivers, where the temperature conditions of the water, their organic load and in general the climatic and the hydrological conditions correspond to the necessities of life of the larvae.

In the specialised bibliography do not exist references to the plecoptera larvae in the Criş Basin. In B. Kis' s (1974) faunistic study the majority of the species identified by us are mentioned as adult forms in the Apuseni Mountains.

1 The first name is Romanian, and the second Hungarian.

Materials and methods

The study method was based on the observations made during the fieldwork (especially the observations that characterise the river bed at the collecting sites) and on the collected material that was later prepared in the lab. It was taken qualitative samples (larvae specimens collected with tweezers from the inner surface of the stones and from the river vegetation or from the leaves, branches fallen in the water) and quantitative samples collecting all the larvae from the determined surfaces. In the majority of the habitats the quantitative collection is impossible with benthon sorber because of the low abundance.

The determination of the material, especially of the small-size genus was performed with stereomicroscope. For the determination of the species we used the following characteristics of the larvae: the dorsum patterns, the branchiae, the hoary, the cover of the pteroptecs, the legs and the abdomen. Many of these characteristics have various forms, which in certain individual variations, larvae age variations, ecological variations may superpose cases and variations according to the altitude of the collecting sites. After selecting the benthos in the valley of the three Criş rivers (Crişul Alb/Fehér-Körös, Crişul Negru/Fekete-Körös and Crişul Repede/Sebes-Körös) we determined 260 plecoptera larvae, belonging to 4 families 5 genus, represented by 8 species.

Results and discussions

The analysis of the identified plecoptera species and the populations:

Due to the performed studies the following species, presented in the Table 1., were identified:

1. *Perla marginata* Panzer, 1799, is a species that characterises the upper run of the rivers, being very abundant especially at the spring. It appears in all the three rivers: in the Crişul Alb, downstream the spring, the species is very abundant at the first collecting site. While leaving the spring it becomes rarer and rarer, its place being overtaken by the small phytophagous of the Nemuridae genus, so at the 2nd collecting site (upstream the Mihăileni dam) we collected only 3 specimens. At the following two sites (3 and 4) it disappears, because of the pollution at the locality Brad, and reappears at the 5th site (Almaş), where we could collect only 3 specimens and some exuviae.

On the Crişul Negru river this species is only present in a quite considerable population at the upper reach of the river, downstream the spring, at the 8th site (Poiana), where we collected 12 specimens, in association with the species *Dinocras cephalotes* and *Rhabdiopteryx alpina*.

On the Crișul Repede river the species *P. marginata* appears 53 km from the spring only at the 9th site (Stâna de Vale) next to the defile where the ascent of the river is more abrupt compared to the upper reach where the river has a slow run.

On the Drăgan mountain stream, tributary of the Crișul Repede, *P. marginata* is present in a very abundant population near other 5 species (Table 1.).

The larvae of this species are represented by many variations, so our collected specimens on the Crișul Alb at Almaș have a less pigmentation than those found in the spring zone.

2. The species *Perla grandis* Rambur, 1841 is a rarer species than the *P. marginata*. It characterises the upper run of the rivers. We collected only in the Drăgan stream, among the *P. marginata* and phytophagous species. The adult forms from this stream are mentioned by B. Kis (1974.).

3. The species *Dinocras cephalotes* Klappek, 1907 also prefers rapid flowing and well-oxygenated mountain waters. We collected only in the spring zones on the Crișul Negru river, at the 8th site (Poiana), where the population abundance is low. Generally the species of this genus are rare. Till now this species was mentioned only at the Lacul Bicz and Lacul Rosu, (Kis, 1974), but in the last period it wasn't found in these lakes either.

4. The species *Dinocras megacephala* Curtis, 1827, has a similarly limited spreading. In the Criș Basin was identified only in the Drăgan stream, where the adult forms were mentioned, and in the Iad stream, too (Kis, 1974).

5. The species *Isoperla rivulorum* Pictet, 1841, is a rare one in Romania, collected only in the Drăgan stream. Not even the adult forms were mentioned in the Apuseni Mountains.

6. The species *Nemoura cinerea* Retzius, 1783, is the commonest plecoptera species in this geographical zone. Being an eurybiont it may appear at the spring zone as well as at the lower reaches of the rivers. In the Criș Basin we determined this species on the Crișul Alb 12 km from the spring, at the 2nd site (Mihăileni) where an abundant population. Similar to the population in the Drăgan stream, was found at two collecting points: on the Iad stream with less specimens and at Ciucea (S. CR 11) on the Crișul Repede.

7. The species *Rhabdiopteryx alpina* Kuhlreiber, 1934 prefers the torrential streams and rivers with rich vegetation on their bank. We determined it only on the river Crișul Negru at Poiana (S. 8.).

8. The species *Rhabdiopteryx neglecta* Albarda, 1889, was determined along the lower reach of the river Crișul Alb at Chișineu-Criș (S.CA 11). In Romania the adult form is mentioned only at the localities Mehedia and Sinaia (Kis, 1974).

The characterisation of the rivers based on the prevalence of the plecoptera associations

The plecoptera larvae, being very sensitive to the pollution of the waters and to the decrease of the oxygen in the water, may be used as valuable indicators in the study of the running waters. Contrary to the mayflies and to other pollution bioindicators when only certain species have the indicator values, the plecoptera larvae are indicators at the taxonomic group level.

Table 1.

RIVER	Crișul Alb				Crișul Negru	Crișul Repede				
	1	2	5	7	8	1	3	4	11	8
<i>Perla marginata</i>	94	3+	3+	-	12	5	-	-	-	10
<i>Perla maxima</i>	-	-	-	-	-	4	-	-	-	-
<i>Dinocras cephalotes</i>	-	-	-	-	2	-	-	-	-	-
<i>Dinocras megacephala</i>	-	-	-	-	-	3	-	-	-	-
<i>Isoperla rivulorum</i>	-	-	-	-	-	7	-	-	-	-
<i>Nemoura cinerea</i>	-	36	-	-	-	43	8	1	16	-
<i>Rhabdiopteryx alpina</i>	-	-	-	-	5	-	-	-	-	-
<i>Rhabdiopteryx neglecta</i>	-	-	-	5	-	-	-	-	-	-

LEGEND:

+ = exuvium

Crișul Alb

Site CA 1 = Criș village
 CA 2 = upstream from Mihăileni dam
 CA 5 = downstream from Almaș
 CA 7 = downstream from Chisineu - Criș

Crișul Negru

Site CN 8 = Poieni

Crișul Repede

Site CR 1 = Drăgan valley
 CR 3 = Iad valley
 CR 4 = Iad valley
 CR 11 = Ciucea
 CR 8 = Stâna de Vale

Along the Crișul Alb river we can distinguish 3 main reaches: 2 parts with mountain and sub-mountain characteristics and one with submontan and field characteristics, the Crișul Alb basin mostly being situated in a high hill region. As a consequence the river preserves the climatic conditions and the required structures for the existence of the plecoptera larvae. This was established on the upper reach of the river by collecting a very high number of *Perla marginata* and *Nemoura cinerea* species larvae. Downstream at the 1st and 2nd sites the main source of pollution is at Brad on the Crișul Alb, which determines the disappearance of the plecoptera species from the 3rd and 4th sites. Due to the natural clearing capacity of the waters the plecoptera species reappear on the lower reaches of the river at the 5th and 7th sites.

On the Crișul Negru river the plecoptera species are present only in the upper run of the river at the spring (St. 1 Poiana), where all the required conditions for the development of the larvae are present, and 3 species were collected there in a great number of specimen. Due to the pollution from Ștei nowhere in the river appear plecoptera species.

The Crișul Repede river springs in a hilly country, so the upper reach of this river hasn't got a sub-mountain character; this is why its plecoptera fauna is poor. These species appear only downstream at Ciucea and Stâna de Vale, whence the unfavourable conditions cause their disappearance, due to the dams and the existing catchment lakes, and to the works on new dams that influence all the lives in this lower river reach. The presence of the plecoptera larvae requires the existence of the stony support on uniform sediment in the majority of the cases. In the village Cheresig (downstream at Oradea) where although

alluvial stones exist in the river bed embedded in a soft stratum, the water is warm, has a slow run which makes unfavourable conditions for the plecoptera species.

Neither a very fast water run means favourable life conditions for the existence of the plecoptera larvae, because such a rapid flow might wash intensively the surface of the stones and as a consequence the pellicule that creates the support for the existence of the plecoptera species is not formed. In some cases this substratum exists, on the other hand the larvae are washed away by the current. This might be the cause of the absence of the larvae in the Crișul Repede Defile where the deep is 1,5 - 2 m and the water speed is 1,5 m / sec.

The two tributaries, Drăgan and Iad, are rich in plecoptera larvae, the abundance is more obvious on the Drăgan. In the Iad valley, although less polluted, the diversity and the abundance is in decrease due to the drastic fluctuation in water temperature and to the large volume of the water determined by the occasional release of the water from the catchment lakes.

References

- Aubert, J. (1959): *Insecta helvetica, Plecoptera larves.* -Lausaune, 91-140
Despax, R. (1949): *Plecopteres Fauna de France.* -Paris, 1-25
Kis, B. (1974): *Fauna R.S.R., Plecoptera.* vol. 7., fasc.7. -Ed. Acad. R.S.R., București

*Cristina Buzan and Andrei Sárkány-Kiss
University Babeș-Bolyai
Department of Ecology-Genetics
Str Clinicilor 5-7.
3400 Cluj, Romania*