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Faunistical investigations on Ephemeroptera and  
Plecoptera along the Apátkút Stream,  
Visegrád Mountains, Hungary

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**Abstract:** 16 Ephemeroptera and 11 Plecoptera species were found along the Apátkút Stream. Along the stream Ecdyonurus starmachi (Sowa, 1971) occurred in large individual numbers, this species is proved to be new for the Hungarian fauna. Occurrence of Caenis luctuosa (Burmeister, 1839) is also new Hungarian datum. Among Plecoptera, Leuctra pseudosignifera is interesting, which has been found only in the Börzsöny Mountains so far. Leuctra digitata is also new for the fauna of the Visegrád Mountains.

The Apátkút Stream can be found in the Visegrád Mountains, it flows from Pilisszentlászló (380 m) north-northeastwards along 9 kms length and meets the Danube at Visegrád at the river km no. 1695. It has a fall of 250 ms and gradient of 2.73%. The main mass of the Visegrád Mountains is andesite, it dates from the Middle-Miocene. In accordance with it, the stream-bed is formed by andesite-pebbles, breccia and the running of the stream is followed by agglomerates, tuff and lava rocks. Accumulation of detritus in bigger quantity can be found only seldom on parts having lower falling gradient and a more quiet flowing. Amount of constructive organisms in the stream is very small, allochthon materials have major importance in the energy economy flow (SIMONYI 1981). Downstream, on the right and left side water of three and four lesser stream are collected (Fig. 1). The subsidiary streams become dry during the summer, but the main stream is permanent. The average speed of the water is very high, it reaches as much as  $1 \text{ ms}^{-1}$ . The dissolved  $\text{O}_2$ -content of the water is high, and its alteration depends mainly on pollution circumstances. At the source of the stream the  $\text{O}_2$ -content is low, water is heavily polluted here. Farther down the cleansing of the water is indicated by a higher  $\text{O}_2$ -content and on the lower parts, at Visegrád, the water is again polluted by communal waste materials, but the rate of pollution is a little bit lesser than it is at Pilisszentlászló (ANDRIKOVICS and HADNAGY 1988).

Three types of substrate occur in the stream, in an arrangement according to the forming effects of waterspeed. On clear, sandy substrate larvae of aquatic insect are almost entirely absent. On places having low waterspeed the dissolved  $\text{O}_2$ -content is relatively low and Ephemeroptera (Baetis rhodani) and Limnephilidae (Trichoptera) larvae are more abundant here, in the detritus.

On the stony parts of the stream waterspeed and the dissolved  $\text{O}_2$ -content are the highest and the rhithron organisms are the most abundant both in species and individual numbers.

Of the rich macrofauna of the stream, two groups were investigated: Ephemeroptera and Plecoptera. Reason for the investigation lies in the long lapse of time, since a comprehensive study about the Ephemeroptera and Plecoptera fauna was published at the end of the 1960s, but studies dealing with more detailed elaborations certain streams are almost totally lacking (UJHELYI 1959, 1966, 1969, STEINMANN 1968).

This study was carried out in the organisation of the Ecological and Botanical Research Institute of the Hungarian Academy of Sciences, Vácrátót, by the aid of the Hungarian Academy of Sciences.

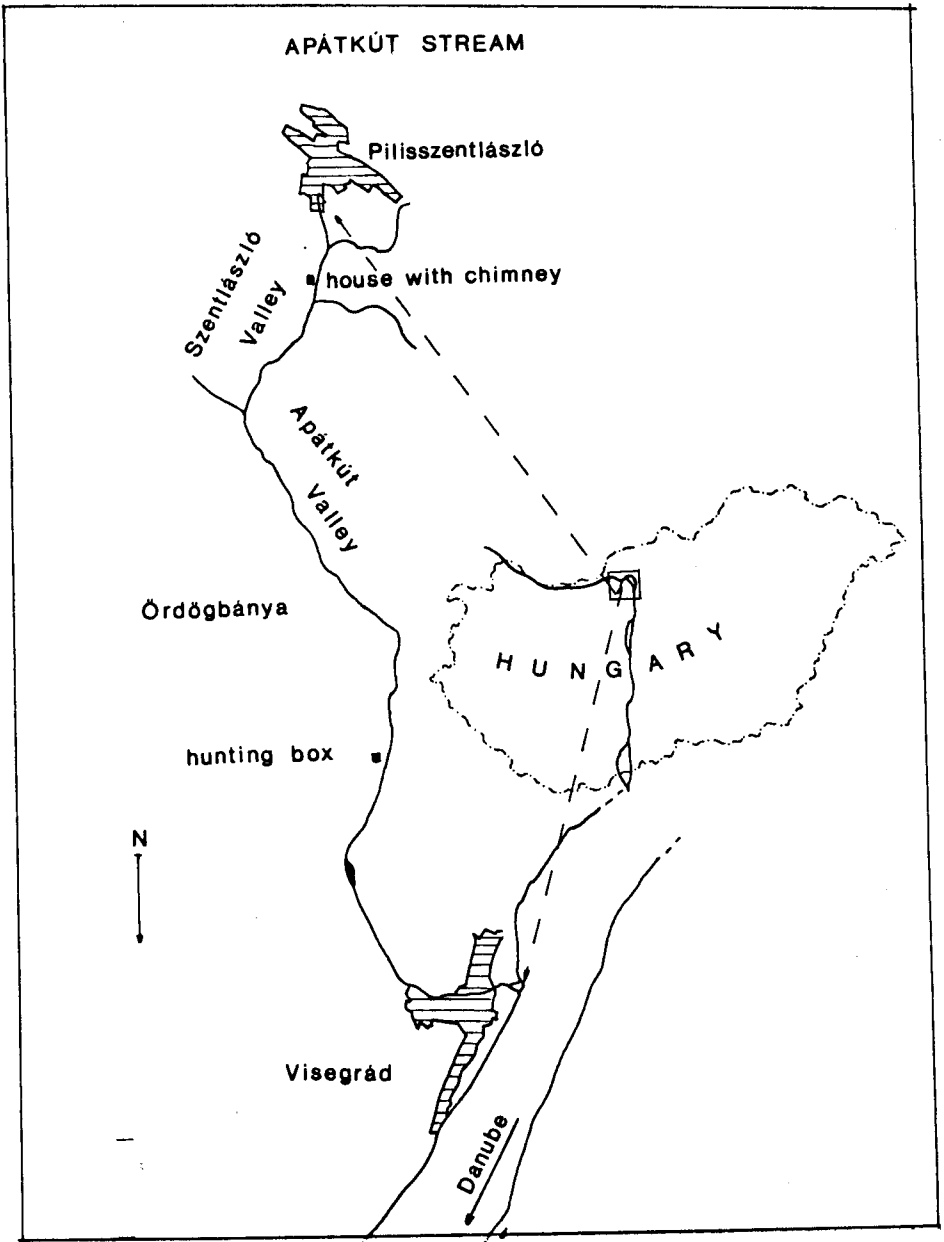


Fig. 1. Geographical setting of the Apátkút Stream

## PLACES, DATES AND METHODS OF INVESTIGATION

Collections were made 22 times in the valley of the Apátkut Stream, between April and November in 1984. During these collections the whole length of the stream was covered. Collections made in frequency of 1-2 weeks provided the opportunity to reach phenological conclusions. At the hunting box of Apátkut (Fig. 1) a HgL light-trap of 125 W was operated, with the permission of the Nature and Environmental Conservancy Institute. Our results are based on imago investigations (370 Ephemeroptera and 300 Plecoptera individuals) and by the map-like representation of the localities.

Reports of the visits to the spot and the identified material can be found in the scientific collection of Department of Systematic Zoology and Ecology of the Eötvös Loránd University.

After surveying the area a work-map was made using a basis map on which localities of each species were marked. Identifications were made by the help of taxonomic books and articles dealing with the given group (ILLIES, 1955, KIS, 1974, LANDA, 1969, UJHELYI 1959, ELLIOTT-HUMPESCH, 1983, MALZACHER, 1984, SOWA, 1971, MÜLLER-LIEBENAU, 1969).

Dates of collections: 13.03, 17.03, 02.04, 12.04, 17.04, 30.04, 03.05, 10.05, 17.05, 19.05, 25.05, 30.05, 12-13.06, 13-14.07, 17.07, 06-07.08, 16-17.08, 4-5.09, 12.09, 09-10.10, 18-19.10, 30.10, 1-2.11, 13.11, 20.11, 1984. Between 13th Nov. and 20th Nov. Ephemeroptera and Plecoptera could not be collected either by light trapping or field collecting.

## SPECIES OBSERVED AND ECOLOGICAL NOTES

### Ephemeroptera

Ephemera danica (Müller, 1764): 12-13.07. 1 ♀, 01.06. 1 ♀, 13.06. 1 ♂, 17.05. 1 ♂, 08.06. 1 ♂, Larvae are silt-dwelling, flying season in May-June.

Baetis rhodani (Pictet, 1843-45): 12.06. 8 ♂, 5 ♀, 12-13.07. 33 ♂, Ördögbánya-Hunting box. Larvae are abundant along the whole length of the stream. Flying imagos were captured between Ördögbánya and the hunting box. Larvae and imagos were determined on the basis of the taxonomic book written by MÜLLER-LIEBENAU (1969).

Cloeon dipterum (Linné, 1761): 06.10. 6 subimagos, 25.05. 1 ♂, and 15 subimagos. Standing water-dwelling species, specimen were found at the hunting box of Apátkut.

Proclleon bifidum (Bengtsson, 1915): 23.05. 1 ♂, 1 ♀, hunting box.

Centroptilum luteolum (Müller, 1776): 08.06. 2 ♂ and 1 ♀, hunting box.

Epeorus sylvicola (Eaton, 1885): 17.05. 3 ♂ and 6 ♀, hunting box, 01.06. 1 ♂, 08.06. 3 ♂, Ördögbánya.

Rhithrogena semicolorata group: 30.04. 1 ♂, house with chimney, 03.05. 1 ♀, Ördögbánya, 12.06. 10 ♂, 12.07. 2 ♂, hunting box, 9 species of this group occur in Europe. It is sure that the specimens captured by the author do not belong to the denominating species, Rhithrogena semicolorata. Exact identification can only be carried out by having a large material collected along other streams of the Visegrád Mountains. Larvae are abundant in the whole Apátkut Valley.

Ecdyonurus (Heptagenia) lateralis group: 10.05. 2 ♂, 2 ♀, hunting box, 08.06. 1 ♂, 1 ♀, fore-part of Szentlászló Valley. Exact identification is in progress.

Ecdyonurus starmachi (Sowa, 1971): This species was relatively late, in the submountain region of the Carpathians. It belongs to the Ecdyonurus helveticus group. It proved to be new for the Hungarian fauna; so male and female body parts important in identification have been drawn. Larvae and imagos are the most abundant between Ördögbánya and the hunting box. 17.07. 6 ♂, 2 ♀, hunting box, 06-07. 07. 1 ♂, 1 ♀, Ördögbánya.

Ephemerella ignita (Poda, 1761): 12-13.07. 5 ♀, hunting box, 06-07. 08. 1 ♂, 3 ♀, hunting box. Larvae are the most abundant between Ördögbánya and the hunting box.

Caenis horaria (Linné, 1758): 12-13.07. 5 ♂. The most abundant standing water-dwelling Caenis species in Hungary. Larvae develops in the retained ponds behind the hunting box.

Caenis robusta (Eaton, 1884): It was recently observed in several places (ANDRIKOVICS, 1988). Presumably it is a standing water-dwelling species that may occur in every kind of standing waters, from lowland alkaliflats to stagnant waters. 12-13.07. 3 ♂, hunting box.

Caenis macrura (Stephens, 1835): A rather running water-dwelling species. 12-13. 07. 2 ♂, 2 ♀. Hunting box.

Caenis luctuosa (Burmeister, 1839): It was found during light-trapping beside the hunting box. Identification of males is undeniable. Caenis luctuosa is new for the Hungarian fauna. The most important character to distinguish it is the shape of the second segment of the antenna and its penis (Fig. 3). 16-17.07. 4 ♂.

Paraleptophlebia submarginata (Stephens, 1835): 25.05. 1 ♂, 1 ♀, Ördögánya.  
Habroleptoides modesta (Hagen, 1864): 16-17.07. 1 ♂, 04.09. 2 ♂, hunting box.

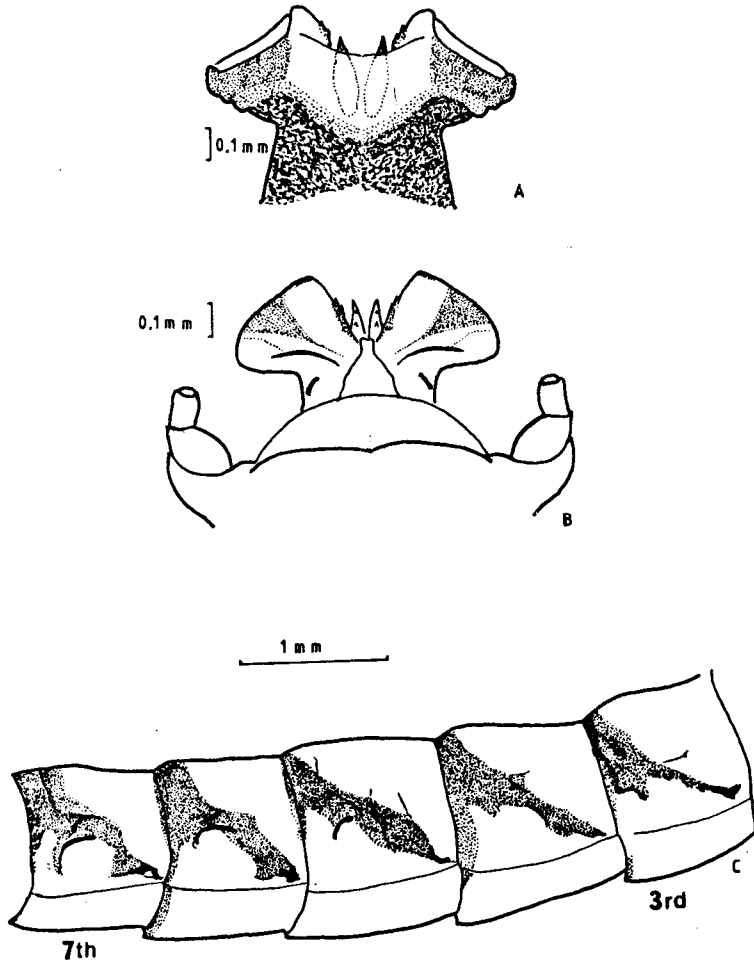


Fig. 2. Identification features of *Ecdyonurus starmachi* (Sowa, 1971)  
A = penis lobes, dorsal view, B = penis lobes, ventral view, C = tergites of abdomen, lateral view

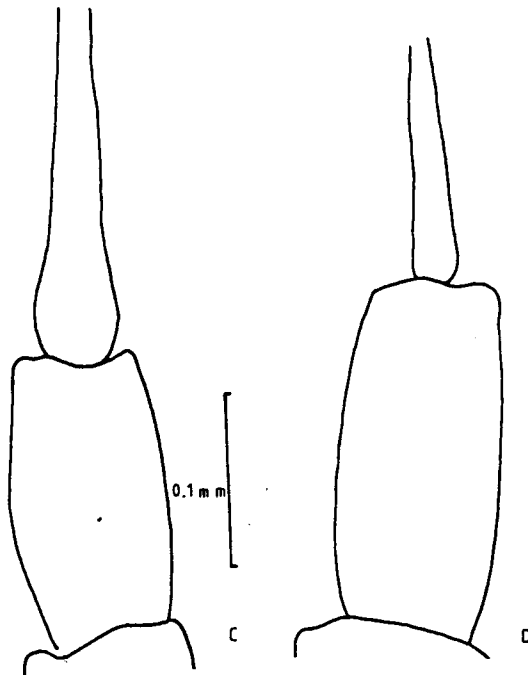
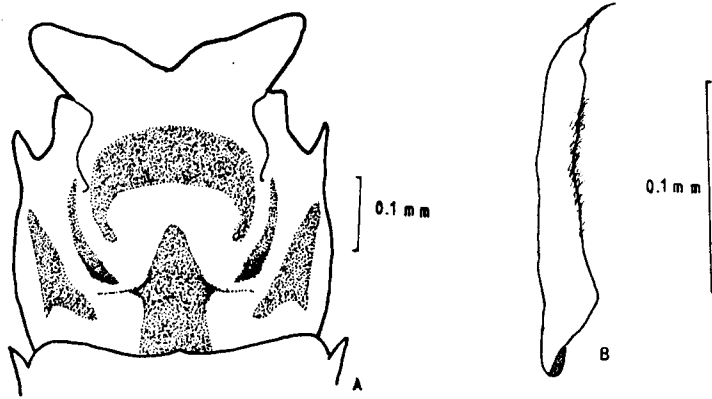


Fig. 3. Identification features of *Caenis luctuosa* (Burmeister, 1839)  
 A= male genitalia, ventral view, B= gonopodium, C= antenna (*C. luctuosa*), D= antenna (*C. macrura*)

## Plecoptera

Capnia bifrons (Newman, 1839): 13.03. 7 ♂, 7 ♀, 17.03. 5 ♂, 2 ♀, 12.04. 5 ♂, 4 ♀, 13.04. 1 ♂, 03.05. 1 ♂. Szentlászló Valley and Apátkut Valley. One of the earliest insects. It often occurs even on the snow. Larvae develop on the upper part of Szentlászló Valley.

Leuctra pseudosignifera (Aubert, 1954): 13.03. 2 ♂, 1 ♀, Szentlászló Valley, 02.04. 1 ♂. Imagos were captured by the author on the upper, cleaner part of the stream.

Leuctra digitata (Kempny, 1899): 18.10. 2 ♂, 1 ♀ Szentlászló Valley and Apátkut Valley, 30.10. 3 ♂, 5 ♀, Ördögbánya.

Protonemoura intricata (Ris, 1902): 21.01. 5 ♂, Ördögbánya.

Nemoura flexuosa (Aubert, 1949): 12.04. 3 ♂, 5 ♀, 13.04. 1 ♂, 17.04. 3 ♂. Apátkut Valley and Szentlászló Valley.

Nemoura sciurus (Aubert, 1949): 12.04. 8 ♂, Szentlászló Valley, 13.04. 1 ♂, 17.04. 1 ♂, Ördögbánya, 10.05. 7 ♂, Apátkut Valley, 25.05. 1 ♂, 30.05. 1 ♂, Ördögbánya.

Nemoura cambrica (Stephens, 1835): 12.04. 5 ♂, 10.05. 2 ♂, Apátkut Valley.

Nemurella picteti (Klapálek, 1900): 12.04. 4 ♂, 2 ♀, Apátkut Valley and Szentlászló Valley, 12.06. 1 ♂, Apátkut Valley.

Isoperla tripartita (Illies, 1954): 10.05. 5 ♂, Apátkut Valley, 17.05. 1 ♂, 2 ♀, 25.05. 2 ♀.

Chloroperla tripunctata (Scopoli, 1763): 13.04. 1 ♀, Szentlászló Valley, Apátkut Valley, 10.05. 1 ♀, 17.05. 3 ♀, 25.05. 5 ♂, 5 ♀.

Perla burmeisteriana (Classen, 1936): 10.05. 1 ♂, 4 ♀, Apátkut Valley (Ördögbánya).

## CONSEQUENCES

16 species of Ephemeroptera and 11 species of Plecoptera were found in one of the permanent streams of Visegrád Mountains. Imagos were the most abundant in species number flying mainly on parts from the River Danube and at Ördögbánya, in the Apátkut Valley. Sedimentary or standing water-dwelling Caenis species and Cloeon dipterum were captured around the artificial trout ponds, after the hunting box.

Ecdyonurus starmachi (Sowa, 1971) was proved to be new for the Hungarian fauna. In the Apátkut Stream this species prefers parts with higher waterspeed. Altitude of localities was a little bit lower than that of the Polish localities (200-700 m above the sea level), larvae were found at a waterspeed of 0.3-2.0 m sec<sup>-1</sup>. Flying season of imagos was from May to Sept. and they were inclined to fly towards light as well.

Distinguishing characters of males and females correspond to the Polish descriptions (Fig. 2).

An other interesting faunistic data is the occurrence of Caenis luctuosa (Burmeister, 1839), that is new for the Hungarian fauna. This species belongs to the Caenis macrura-group and it seems to live in smaller lakes, at lower altitudes. Among Plecoptera, Leuctra pseudosignifera is a new species for the Visegrád Mountains (up to now this species has been found only in the Börzsöny Mountains). Its occurrence indicates the close zoogeographical relationship of the two mountains. It is a rare species, that occurs both in the Alps and in Central Europe at higher altitudes. It occurs extrazonally on the deep gorge of Szentlászló Valley, at lower altitude.

Leuctra digitata, being common in Scandinavia, is also new for the Visegrád Mountains. It is a boreo-alpine species occurring in Hungary in the deep parts of the Apátkut Valley, that are surrounded by beech-trees and have a cold microclimate.

By covering the whole area it made a detailed analysis of the distribution of Ephemeroptera and Plecoptera species possible. Species of both groups live only in the Szentlászló Valley and in the Apátkut Valley, leaving the source of the stream, and most of the species occur in the deep, stony parts.

The imago fauna is represented by only a new species at the source at Pilisszentlászló, and in a small degree at Visegrád, these facts can presumably be explained by anthropogenic effects.

According to the prevailing investigations carried out by the author, Ecdyonurus and Rhithrogena species do not fit in the species given by Hungarian taxonomic books (UJHELYI

1959). The comparison of larvae, subimagos, males and females occurring in the same place and a revision of bigger materials probably would result in several species new for the Hungarian fauna, perhaps even for science.

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