

REVIEW AND CONTRIBUTION TO THE PLECOPTERA FAUNA OF SĂLAJ COUNTY, ROMANIA

Dávid Murányi^{1*}, Tibor Kovács²

¹Department of Civil and Environmental Engineering, Ehime University, Matsuyama and Department of Zoology, Hungarian Natural History Museum, Budapest

²Mátra Museum of the Hungarian Natural History Museum, Gyöngyös

ABSTRACT: An annotated list of the eleven Plecoptera species reported from Sălaj county, Romania, and data of the stonefly material collected in 2014 are given. Four species (*Leuctra digitata* Kempny, 1899, *L. carpathica* Kis, 1966, *Protonemura aestiva* Kis, 1965 and *Perla cf. pallida* Guérin-Méneville, 1838, sp. II.) are new records for the area. Taxonomical characters of larvae of two species related to *Perla pallida* Guérin-Méneville, 1838 are briefly discussed. Most of the stoneflies found are common European species, but at least *L. carpathica* can be considered as a Carpathian endemic.

Keywords: Stoneflies, faunistic, new data, *Perla*, larval morphology

INTRODUCTION:

Due to the activity of Béla Kis during the sixties and the seventies, the Plecoptera fauna of Romania still can be considered as well-known among the European countries (Fochetti 2004, Murányi 2006). In his monograph he listed 112 species occurring in the country (Kis 1974), since then only five species were added, although the occurrence of certain taxa are in need of confirmation (Murányi 2006, Vinçon & Murányi 2007, 2009).

Up to now, only seven species of Plecoptera turned up from Sălaj county, all of these were depicted on maps in the Romanian monograph (Kis 1974). With the research program "Invertebrate faunistic investigation of the Sălaj county" we had the opportunity to collect at various sites of the county during eleven tours between 2014 and 2015, however, special efforts were taken on stonefly collecting only during a single autumnal tour. The Plecoptera material of these collecting tours is worked up below.

MATERIAL AND METHODS:

The specimens were collected with singling, beating sheet, water net, sweeping net or with light trap. The most of the material is stored in 70% ethanol but some specimens are in 96% ethanol for molecular studies, and the material is deposited in the Collection of Smaller Insect Orders, Department of Zoology, Hungarian Natural History Museum and the collection of the University Vasile Goldiș. Photos were taken with an Olympus DP20 camera applied on a Nikon SMZ1500 microscope.

The species previously reported from the country were enumerated in the monograph of Kis (1974), herein those are listed under the name that he used. The nomenclature follows De Walt et al. (2015). Type of distribution and ecological demands refer to Kis (1974), Illies (1978) and Fochetti (2004), or the source is marked in the text.

List of localities

The localities are given associated with mountain systems. Their numbers refers to Gubányi (2015) where more detailed information can be found on each.

For the comparison with old records, we also give the Hungarian names in parentheses after the Romanian names.

Collectors are: ZB – Zsolt Bálint; LD – László Dányi; AG – András Gubányi; GK – Gergely Katona; CK – Csaba Kutasi; DM – Dávid Murányi; AO – András Orosz; GP – Gellért Puskás; ZS – Zoltán Soltész; MT – Mária Tóth.

Dealurile Crasnei (Krasznamenti-dombság):

53: Aghireș (Egrespatak), dry swards, 23-24.05.2014, N47.15716° E22.99252°; leg. ZB-AG-GK-CK.

Munții Meseșului (Meszes-hegység):

37: Huta (Csákyújfalu), wet meadow, clearing in beech forest, *Calluna* heath, 21-22.05.2014, N46.99569° E22.92313°; leg. ZB-AG-GK-CK.

99: Treznea (Ördökgút), main valley of the Treznea Stream, 29.09.2014, N47.11005° E23.06443°; leg. ZB-LD-GK-DM.

100: Treznea (Ördökgút), upper valley of the Treznea Stream, 29.09.2014, N47.11063° E23.04968°; leg. ZB-LD-GK-DM.

111: Cizer (Csiszér), above the village at the Boului Stream, 01.10.2014, N47.02765° E22.85603°; leg. ZB-LD-GK-DM.

115: Huta (Csákyújfalu), 01.10.2014, N46.99416° E22.92813°; leg. ZB-LD-GK-DM.

Munții Plopiș (Réz-hegység):

29: Iaz (Krasznajáz), Mlaștina de la Iaz 2, streamside, 20-21.05.2014, N47.11019° E22.66388°; leg. ZB-AG-GK-CK.

61A: Iaz (Krasznajáz), 03.06.2014, N47.111° E22.659°; leg. AO-GP-ZS-MT.

62A: Tusa (Tuszatelke), above the village, at Barcău (Berettyó) springs, 03.06.2014, N47.02° E22.749°; leg. AO-GP-ZS-MT.

105: Iaz (Krasznajáz), valley of the Iaz Stream, 30.09.2014, N47.08698° E22.6511°; leg. ZB-LD-GK-DM.

125: Tusa (Tuszatelke), Ponor, Barcău (Berettyó) springs, 02.10.2014, N47.02031° E22.74875°; leg. ZB-LD-GK-DM.

126: Tusa (Tuszatelke), valley of the Barcău (Berettyó) Stream, 02.10.2014, N47.04743° E22.7508°; leg. ZB-LD-GK-DM.

127A: Tusa (Tuszatelke), valley of the Boului Stream, 02.10.2014, N47.0449° E22.72536°; leg. ZB-LD-GK-DM.

RESULTS AND DISCUSSION:

Leuctridae

Leuctra nigra (Olivier, 1811)

Leuctra nigra (Olivier, 1811): Kis (1974).

European species. Frequent in small forest brooks and springs at different altitudes, often on muddy substrate. A common spring emerging species in Romania.

Leuctra fusca fusca (Linnaeus, 1758)

Leuctra fusca (Linnaeus, 1758): Kis (1974).

New data: Munții Plopiș: 126: 1♂.

Eurosiberian species; the nominal subspecies occurs in Europe, Russia and Korea. Frequent in large streams and smaller rivers. Its new Sălaj locality is a large stream, the upper section of the Barcău River. A common autumnal species in Romania.

Leuctra digitata Kempny, 1899

New data: Munții Meseșului: 99: 2♀.

Central and North European species. Frequent in brooks to large streams at different altitudes. The only locality in Sălaj is a medium sized stream with rather unstable water level conditions. A common autumnal species in Romania.

Leuctra carpathica Kis, 1966

New data: Munții Meseșului: 115: 1♂; Munții Plopiș: 125: 40♂, 49♀, 1 larva, 1 exuvia.

Carpathian endemic species. Inhabits cold mountain brooks and stream, mainly close to spring outlets. The single male from the Munții Meseșului was found at a small forest stream, while the habitat in the Munții Plopiș is a large karst spring outlet where we experienced mass emergence in early October. A moderately common autumnal species in Romania, known both from the Eastern and Southern Carpathians but not yet reported from the Transylvanian Alps.

Nemouridae

Amphinemura sulcicollis (Stephens, 1835)

Amphinemura sulcicollis (Stephens, 1835): Kis (1974).

European species. Inhabits different streams and brooks at different altitudes. A common spring and early summer species in Romania.

Protonemura aestiva Kis, 1965

New data: Munții Plopiș: 62A: 19♀; 125: 4♀, 2 larvae.

Carpatho-Balkanian species, its Balkanian occurrence is in need of confirmation. Inhabits montane and submontane springs, brooks and torrents, mostly in karst areas. The only Sălaj locality is a large karst spring where it was found co-habiting with *L. carpathica*. A moderately common species in Romania, having long emergence period from late spring to autumn.

Protonemura intricata intricata (Ris, 1902)

Protonemura intricata (Ris, 1902): Kis (1974).

New data: Munții Plopiș: 29: 1♂, 1♀.

European and Anatolian species; the nominal subspecies inhabits most of Europe with the exception of the southern Balkans. Frequent in most kind of running waters at different altitudes. The only Sălaj locality is a slow stream at low altitude. A common spring and early summer species in Romania.

Nemoura cinerea cinerea (Retzius, 1783)

Nemoura cinerea (Retzius, 1783): Kis (1974).

New data: Dealurile Crasnei: 53: 1♂, 1♀; Munții Meseșului: 37: 1♀; Munții Plopiș: 29: 1♂; 61A: 1♀.

Eurosiberian species; the nominal subspecies occurs in Europe but excluding most of the Mediterranean, and spreads eastwards to Mongolia. Probably the most common European stonefly, occurs in every kinds of waterflows, including also slow lowland channels. The Sălaj localities are all low elevation, vegetated watercourses. A common spring emerging species in Romania.

Perlodidae

Perlodes microcephalus (Pictet, 1833)

Perlodes microcephala (Pictet, 1833): Kis (1974).

West Palaearctic species. Inhabits submontane streams and small rivers. A common spring emerging species in Romania.

Perlodes sp.

New data: Munții Plopiș: 126: 1 larva.

Unfortunately, the single immatured larva that we caught in Sălaj, cannot be identified to species level. Regarding to its habitat, the rhitral section of the Barcău River, it most probably belongs to the widespread *P. microcephalus*, enumerated above. There are three species of *Perlodes* Banks, 1903 occur in the Carpathian Basin, all of them are known from Romania. Two of these (*P. microcephalus* and *P. intricatus* (Pictet, 1841)) are common in the whole country, while the potamal *P. dispar* (Rambur, 1842) is considerably rare.

Perlidae

Perla pallida Guérin-Méneville, 1838

Perla pallida Guérin, 1838: Kis (1974).

It was regarded as a Ponto-Caspian species, but Sivec & Stark (2002) proved that it is a complex of species. In Sălaj we found two members of this complex, as enumerated below.



Figs 1–4. *Perla cf. pallida* Guérin-Méneville, 1838 larvae from Sălaj county – 1, 4: *sp. II.*, Munții Plopiș, loc. 105; 2-3: *sp. I.*, Munții Meseșului, loc. 111– 1-2: abdomen, dorsal view; 3-4: gills ASC1 and AT2, ventral view – not to scale.

Perla cf. pallida Guérin-Méneville, 1838, *sp. I.*

New data: Munții Meseșului: 99: 1♂, 1♀ larvae; 100: 2♀ larvae; 111: 3♀ larvae; 115: 2♂ larvae; Munții Plopiș: 125: 2♂, 2♀ larvae; 126: 2♀ larvae; 127A: 1♀ larva.

Morphological features of these larvae agree well with the description of a *Perla* Geoffroy, 1762 larva given by Kis & Imreh (1966), under the name *P. pallida dacica* Klap. This type of larva is common throughout the Carpathian Basin, inhabiting mostly submontane streams, and is conspecific with the adult reported and illustrated as *P. pallida* Guérin, 1838 Type 2 sensu Sivec & Stark (2002) from Maramureș (Murányi 2006).

Larvae of this species can be distinguished from others in the *P. pallida* species complex by the uniform brown coloration of the abdominal tergites, and presence of dense chloride cells on thoracal gills (Figs. 2-3). In Sălaj, it is one of the most common stonefly, found in most of the submontane streams investigated.

Perla cf. pallida Guérin-Méneville, 1838, *sp. II.*

New data: Munții Plopiș: 105: 4♀ larvae.

Morphological features of these larvae did not agree with the description of *P. pallida* larva given by Graf et al. (2003) on the basis of Austrian specimen, neither the *P. marginata* Panzer, 1799 larva as they described from the same region. Possibly it is congeneric with the Romanian species threatened as *P. marginata* by Kis (1974), however, clearly not identical with the larvae described as *P. marginata* by Kis & Imreh (1966).

Larvae of this species can be distinguished from others in the *P. pallida* species complex by the contrasting abdominal tergal pattern that reminds to *P. marginata*, but the thoracal gills bear dense chloride cells usual for the *P. pallida* complex (Figs. 1, 4). We found it only in one forest stream flows in the volcanic range of Munții Plopiș. It also was not found during the

extensive collectings in nearby Maramureș (Murányi 2006).

CONCLUSIONS:

Given from its low elevation and scarcity of mountain watercourses, the Plecoptera fauna of Sălaj is considerably poor in comparison with neighbouring Maramureș, where lately 55 species were reported to occur (Murányi 2006). However, our recent report practically come down to a single autumnal collecting tour, springtime collecting efforts would at least double the species reported herein.

On a faunistical and zoogeographical point of view, the species found are mostly widespread and common European species, the only rare species is the Carpathian endemic *Leuctra carpathica*.

To solve the identity of the two *Perla* species that belong to the rather problematic *P. pallida* species complex sensu Sivec & Stark (2002) is out of the scope of the present paper but will be done with ongoing multimethods taxonomical revision of the group. Herein we present illustrations on taxonomical features of the larvae, but molecular and bioacoustic studies will be also needed as well as morphological study of undoubtedly associated adults.

ACKNOWLEDGEMENTS:

We are very grateful to our colleagues who took part in the collectings, especially to Gellért Puskás, who provided most of the specimens collected besides the collecting trip in autumn 2014.

Collectings were done as part of the "Invertebrate faunistical investigation of the Sălaj county" research program of the University Vasile Goldiș and the Hungarian Natural History Museum.

REFERENCES:

DeWalt RE, Maehr MD, Neu-Becker U, Stueber G, Plecoptera Species File Online. version 5.0/5.0, <http://Plecoptera.Species.File.org>, 2015.

- Fochetti R (ed.), Plecoptera. Fauna Europea version 1.1, <http://www.faunaeur.org>, 2004.
- Graf W, Sivec I, Kovács T, *Perla pallida* Guérin, 1838, in Österreich, Slowenien und Ungarn. Lauterbornia, 47, 33–39, 2003.
- Gubányi A, Collecting sites of the Hungarian Natural History Museum in Sălaj, Romania, in 2014 and 2015. Studia Universitatis Vasile Goldiș Arad, 26, in press, 2015.
- Illies J, Plecoptera. In: Illies, J. (ed.) Limnofauna Europea, Gustav Fisher, Stuttgart, pp. 264–273, 1978.
- Kis B, Plecoptera. Fauna Republicii Socialiste Romania, 8, 1–271, 1974.
- Kis B, Imreh I, Die larvae von *Perla pallida dacica* Klap. (Plecoptera). Folia Entomologica Hungarica, 19, 135–141, 1966.
- Murányi D, Review and contribution to the Plecoptera fauna of Maramureș, Romania. Studia Universitatis Vasile Goldiș Arad, 17, 85–94, 2006.
- Sivec I, Stark BP, The species of *Perla* (Plecoptera: Perlidae): evidence from egg morphology. Scopolia, 49, 1–33, 2002.
- Vinçon G, Murányi D, *Leuctra dalmoni*, a new orophilic species with wide distribution in Europe (Plecoptera). Nouvelle Revue d'Entomologie, 23(3), 237–248, 2007.
- Vinçon G, Murányi D, Revision of the *Rhabdiopteryx neglecta* species group (Plecoptera: Taeniopterygidae). Aquatic Insects, 31(Suppl.1), 203–218, 2009.