

Data to the distribution of *Helenoperla malickyi* Sivec, 1997 (Plecoptera: Perlidae)

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ABSTRACT: We present six new localities of the rare perlid *Helenoperla malickyi*: one in Greece and five in Albania, in addition to the two Greek localities hitherto known. The distribution of the species is illustrated on a map. We provide pictures of the larva and state that it has two years long development. We characterize the habitats and present the list of cohabiting Plecoptera and Odonata. We draw attention to the risk factors of the species.

Introduction

The turn up of *Helenoperla malickyi* Sivec, 1997, a new monotypic European perlid genus was a great surprise in the 90ies (ZWICK 2004). The taxon was first collected by the excellent trichopterologist Hans Malicky, and hitherto it was only known from the type specimens collected in two watercourses of the Greek Epirus (SIVEC 1997). Life cycle, cohabiting fauna and habitat demands remained largely unknown, and only ZWICK (2004) contributed to its larval taxonomy, on the basis of paratype specimens. During the last two decades, we re-collected it at the locus typicus, and found the species at a new Greek and 5 other Albanian watercourses (Fig. 1).



Fig. 1. Occurrence of *Helenoperla malickyi* in the Balkan Peninsula: ★ = locus typicus (confirmed with new data), ● = paratype locality (we did not visited); ▲ = new data

Material and methods

For collecting methods of larvae see Kovács *et al.* (1998). Exuviae were singled along waterflows, adults were singled and/or collected by beating sheet along waterflows. The specimens collected have been preserved in 70% ethanol, and housed in the Hungarian Natural History Museum, Budapest (HNHM) and the Mátra Museum of the Hungarian Natural History Museum, Gyöngyös (MM).

Abbreviations: Collectors – AA = András Ambrus, CSz = Czigány Szilvia, DL = Dányi László, FZ = Fehér Zoltán, HK = Krisztián Harnos, JP = Péter Juhász, KJ = Kontschán Jenő, KT = Tibor Kovács, MD = Dávid Murányi, PG = Gellért Puskás, Gergely Szövényi, SzT = Szederjesi Tímea, UZs = Ujvári Zsolt; life stages – L = larva, E = exuvium, ♂ = male imago, ♀ = female imago.

New data, and co-occurring Plecoptera and Odonata

Albania, Gjirokastrë county, Tepelenë district, Tepelenë, **Uji i Ftohtë**, karst springs, 185 m, N40°15'00.5", E20°03'52.6" – Fig. 2a, 13.03.2008, CSz, MD (HNHM: 2L, PLP2541); 13.10.2012, JP, KT, MD, PG (HNHM: 1L, PLP4028; MM: 3L, 2012-186); 19.06.2017, KT, PG, SzG (MM: 1♂, 1♀, 2017-72).

Plecoptera – *Dinocras megacephala*: 13.03.2008, CSz, MD (HNHM: 1L); 13.10.2004, FZ, KJ, MD (HNHM: 9L, 2E, 3♂); 13.10.2012, JP, KT, MD, PG (HNHM: 4L; MM: 2L, 2E, 3♂, 1♀ + 15egg); 28.06.2023, AA, HK, KT (2L, observed) – *Leuctra bronislawi*: 13.10.2004, FZ, KJ, MD (HNHM: 1♀) – *Leuctra fusca fusca*: 13.10.2012, JP, KT, MD, PG (HNHM: 1♂) – *Leuctra hirsuta*: 13.10.2004, FZ, KJ, MD (HNHM: 12♂, 10♀); 13.10.2012, JP, KT, MD, PG (HNHM: 1♂; MM: 5♂, 3♀) – *Protonemura albanica*: MURÁNYI (2007b); 13.03.2008, CSz, MD (HNHM: 1♂, 1♀); 13.10.2012, JP, KT, MD, PG (HNHM: 2L; MM: 2♂, 2♀).

Odonata – *Caliaeschna microstigma*: 28.06.2023, AA, HK, KT (1♂, observed) – *Cordulegaster bidentata*: MURÁNYI & KOVÁCS (2013); 28.06.2023, AA, HK, KT (1♂, observed).

Albania, Vlorë county, Delvinë district, Gjerë Mts, **Bistricë**, forest karst spring E of the village, 125 m, N39°55'07.2", E20°08'47.4" – Fig. 2b, 13.10.2013, JP, KT, MD, PG (HNHM: 1L, PLP4536; MM: 4L, 2013-109); 19.06.2017, KT, PG, SzG (MM: 1L – Fig. 4a-c, 1E, 5♂ – Fig. 3f, 4♀ – Fig. 3e, f, 2017-71); 29.06.2018, JP, KT, MD (1♂, HNHM: PLP5015); 30.06.2023, 2 larva, observed, AA, HK, KT.

Plecoptera – *Protonemura albanica*: 13.10.2013, JP, KT, MD, PG (HNHM: 1♀; MM: 1L, 1♂).

Odonata – *Caliaeschna microstigma*: KOVÁCS & MURÁNYI (2013) – *Cordulegaster bidentata*: KOVÁCS *et al.* (2022), MURÁNYI & KOVÁCS (2013).

Albania, Vlorë county, Delvinë district, Gjerë Mts, Muzinë, **Syri i Kaltër**, karst springs SW of the village, 175 m, N39°55'31.4", E20°11'33.9" – Fig. 2c, 12.05.2006, DL, KJ, MD (1E, 4♂, HNHM: PLP2078); 13.10.2013, JP, KT, MD, PG (MM: 1L, 2013-110).

Plecoptera – *Leuctra bronislawi*: 13.10.2004, FZ, KJ, MD (HNHM: 2♂, 1♀); 13.10.2013, JP, KT, MD, PG (HNHM: 1♂, 1♀; MM: 3♂, 5♀) – *Leuctra hirsuta*: 13.10.2004, FZ, KJ, MD (HNHM: 4♂, 3♀); 13.10.2013, JP, KT, MD, PG (HNHM: 4♂, 9♀; MM: 10♂, 19♀) – *Leuctra major*: 13.10.2004, FZ, KJ, MD (HNHM: 3E, 1♂) – *Perla cf. pallida*: 13.10.2004, FZ, KJ, MD (HNHM: 1L); 12.06.2006, DL, KJ, MD (HNHM: 1E); 12.03.2008, CSz, MD (HNHM:

1843 1L) – *Protonemura albanica*: MURÁNYI (2007b); 12.03.2008, CSz, MD (HNHM: 1L, 1E); 13.10.2013, JP, KT, MD, PG (MM: 1L, 4♀).

Odonata – *Caliaeschna microstigma*: MURÁNYI (2007a), KOVÁCS & MURÁNYI (2013) – *Callopteryx virgo festiva*: MURÁNYI (2007a) – *Cordulegaster bidentata*: MURÁNYI (2007a), MURÁNYI & KOVÁCS (2013).

Albania, Gjirokastër county, Dropull municipality, Tsamantas Mts, **Krioner**, forest karst stream NE of the village, 463 m, N39°50'12.6", E20°22'01.9", 30.06.2023, AA, HK, KT (MM: 1 L, 2023-74).

Albania, Gjirokastër county, Dropull municipality, Tsamantas Mts, **Sotirë**, karst stream in the village, 505 m, N39°49'10.8", E20°21'40.0" – Fig. 2e, f, 13.10.2013, JP, KT, MD, PG (HNHM: 2L, PLP4539); 29.06.2018, JP, KT, MD (HNHM: 2 ♀, PLP5016; MM: 1 ♀, 2018-49); 01.07.2023, AA, HK, KT (MM: 1L observed – Fig. 3b, 2♂ – Fig. 3c, 1♀ – Fig. 3d, 2023-76).

Plecoptera – *Isoperla* cf. *tripartita*: 29.06.2018, JP, KT, MD (HNHM: 1♀) – *Leuctra bronislavi*: 13.10.2013, JP, KT, MD, PG (HNHM: 1♀; MM: 2♂, 4♀) – *Leuctra graeca*: 13.10.2013, JP, KT, MD, PG (HNHM: 1♂, 4♀; MM: 7♂, 5♀) – *Leuctra hirsuta*: 13.10.2013, JP, KT, MD, PG (HNHM: 1♂, 2♀; MM: 2♀) – *Perla* cf. *pallida*: 13.10.2013, JP, KT, MD, PG (HNHM: 1L); 01.07.2023, AA, HK, KT (MM: 3L, 6E, 1♂, 4♀) – *Protonemura autumnalis*: 13.10.2013, JP, KT, MD, PG (MM: 1♂) – *Protonemura nitida*: 13.10.2013, JP, KT, MD, PG (HNHM: 4L, 1♂).

Odonata – *Caliaeschna microstigma*: KOVÁCS & MURÁNYI (2013); 01.07.2023, AA, HK, KT (1♂, observed) – *Callopteryx virgo festiva*: 01.07.2023, AA, HK, KT (MM: 1♂) – *Cordulegaster bidentata*: 01.07.2023, AA, HK, KT (MM: 1♂) – *Onychogomphus forcipatus*: 01.07.2023, AA, HK, KT (1♂, observed).

Greece, Tsamantas Mts, **Tsamantas**, karst stream NE of the village, 590 m, N39°46'50.4", E20°20'47.4", 18.07.2004, Erős Zoltán, András Hunyadi (HNHM: 1♂, PLP1408).

Greece, Epirus, Preveza regional unit, Thesprotiko Mts, **Vrysoula**, karst stream S of the village (N of Louros), 220 m, N39°14'54.2", E20°41'44.1", locus typicus – Fig. 2d, 05.05.2011, KJ, MD, SzT, UZs (HNHM: 5L – Fig. 3a, 1♂, 1♀, PLP3648).

Some paratypes from the locus typicus were donated by Ignac Sivec to the Mátra Museum (now Mátra Museum of the Hungarian Natural History Museum) in 2001: 2 male, 1 female with mature eggs, data as holotype: Greece: Epirus, 10 km N Louros, 200 m, 39°14'20"N, 20°42'00"E, 26.5.1994, leg. Sivec, I. & B. Horvat; 1 female larva, same locality, and collectors, 17.5.1994.

Plecoptera – *Isoperla* cf. *tripartita*: 05.05.2011, 05.05.2011, KJ, MD, SzT, UZs (HNHM: 2♂, 7L). – *Protonemura rauschi*: 05.05.2011, 05.05.2011, KJ, MD, SzT, UZs (HNHM: 1♀).

Odonata – *Caliaeschna microstigma*: KOVÁCS & MURÁNYI (2013).



Fig. 2. Habitats of *Helenoperla malickyi*: a = Uji i Ftohtë, b = Bisticë, c = Syri i Kaltër, d = Vrysoula (locus typicus), e = Sotirë, f = Sotirë, after cutting off littoral *Platanus orientalis* (photo: a-e – D. Murányi, f – T. Kovács)

Results and discussion

The larvae of *Helenoperla malickyi* live in the cold, fast and oxygen-rich water of karst springs (Uji i Ftohtë, Bisticë, Syri i Kaltër) and karst streams (Krioner, Sotirë, Tsamantas, Vrysoula). They were found on the larger stones of the stream bed. The typical riparian tree of the habitats is the huge *Platanus orientalis*.

Based on the different age groups of the larvae caught at the same time, it can be established that the species has two years long development. The adults stay on the herbaceous and woody vegetation of the waterside. The activity of adults, combining the observation dates of different years in Greece falls between 5 May-18 July, in Albania 12 May-1 July.

Other Plecoptera and Odonata species living in the known *Helenoperla* habitats are summarized in Table 1.

Table 1. Plecoptera and Odonata species occurring together with *Helenoperla malickyi*, listed by localities

faj/lelőhely	Uji i Ftohtë	Bisticë	Syri i Kaltër	Krioner	Sotirë	Tsamantas	Vrysoula
Plecoptera							
<i>Dinocras megacephala</i>	*						
<i>Isoperla</i> cf. <i>tripartita</i>					*		*
<i>Leuctra bronislawi</i>	*		*		*		
<i>Leuctra fusca fusca</i>	*						
<i>Leuctra graeca</i>					*		
<i>Leuctra hirsuta</i>	*		*		*		
<i>Leuctra major</i>			*				
<i>Perla</i> cf. <i>pallida</i>			*		*		
<i>Protonemura albanica</i>	*	*	*				
<i>Protonemura autumnalis</i>					*		
<i>Protonemura nitida</i>					*		
<i>Protonemura rauschi</i>							*
Odonata							
<i>Caliaeschna microstigma</i>	*	*	*		*		*
<i>Calopteryx virgo festiva</i>			*		*		
<i>Cordulegaster bidentata</i>	*	*	*		*		
<i>Onychogomphus forcipatus</i>					*		
összesen	7	3	8	0	11	0	3



Fig. 3. *Helenoperla malickyi*: a = matured larva, b = younger larva, c = male, d = female, e = female on a *Cordulegaster bidentata* exuvium, f = pair in copula, on a fig leaf (photos: a – D. Murányi, b-f – T. Kovács)

Regarding the co-habiting Plecoptera, *Helenoperla* was found together with the following species: most often, at three localities – *Leuctra bronislawi* Sowa, 1970, *L. hirsuta* Bogoescu & Tabacaru, 1960, *Protonemura albanica* Raušer, 1963; at two localities – *Isoperla* cf. *tripartita* Illies, 1954, *Perla* cf. *pallida* Guérin-Méneville, 1843; and at one locality – *Dinocras megacephala* (Klapálek, 1907), *L. fusca fusca* (Linnaeus, 1758), *L. graeca* Zwick, 1978, *L. major* Brinck, 1949, *Protonemura autumnalis* Rauser, 1957, *P. nitida* (Pictet, 1836), *P. rauschi* Theischinger, 1975. It is interesting that *Helenoperla* lives together with two other large Perlidae species at three habitats. Regarding Odonata, *Helenoperla* was found together with the following species: most often, at five localities – *Caliaeschna microstigma* (Schneider, 1845); at four localities – *Cordulegaster bidentata* Sélys-Longchamps, 1843; at two localities – *Calopteryx virgo festiva* (Brullé, 1832); and at one locality – *Onychogomphus forcipatus* (Linnaeus, 1758).

The description of the larva can be found in SIVÉC (1997), some additional characters were added by ZWICK (2004). The distinctive pattern of the mature and younger larva is shown in Fig. 3a, b, 4a, while the setae whorls on the head and thorax illustrated in Fig. 4a. The Western Palaearctic Perlidae genera can be distinguished by the presence or absence of anal gills: anal gills present – *Agnentina*, *Dinocras*, *Eoperla*, *Marthamea*; anal gills absent or present – *Perla*, *Paragnetina*; anal gill absent – *Helenoperla* (SIVÉC *et al.* 1988, ZWICK 2004). The paraproct of the latter has a very distinctive shape, different from the *Perla* species that are lacking anal gills, see Fig 4. b, c.

The distribution area of *Helenoperla malicky* is very small, restricted to the Epirus region of southern Albania and northwestern Greece. The few watercourses in which it lives are seriously threatened by several aspects: negative human interventions, climatic effects, e.t.c. Due to their spectacular nature, some of the habitats are popular tourist destinations with hundreds of visitors per day: Uji i Ftohtë, Syri i Kaltër. Unfortunately, in recent years, *Platanus orientalis* perishes violently in part of its distribution area due to a fungal infection. At the moment, it is not known how the disappearance of the shading littoral wood affects the populations of *Helenoperla malicky* (Fig. 2f). In 2023, we still found larvae and adults in Sotirë, despite the cutting down of the shading oriental sycamore. Considering the above, its habitats require increased attention and legal protection.

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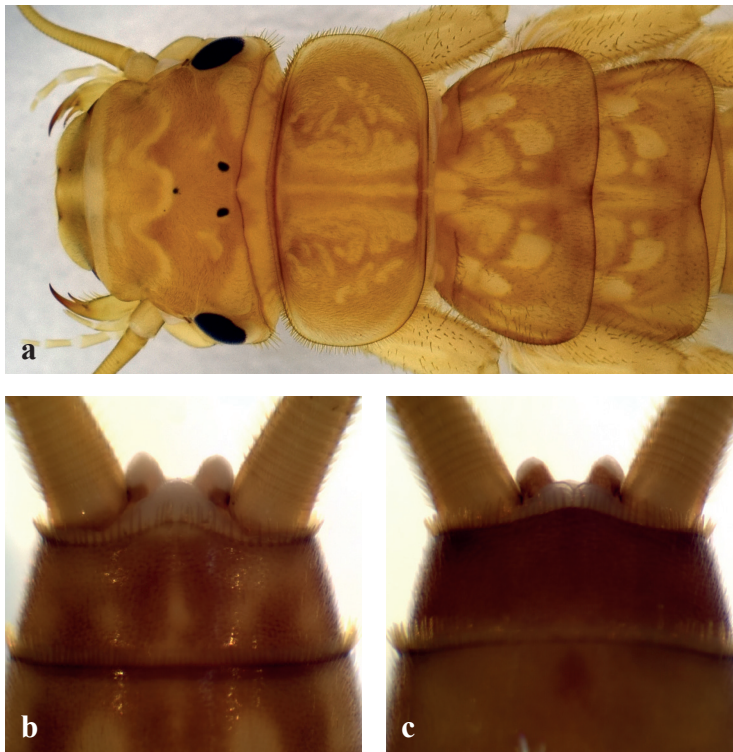


Fig. 4. *Helenerperla malickyi* larvae: a = the setae whorls and pattern of the head and thorax, b = paraprocts in dorsal view, c = paraprocts in ventral view (photos: T. Kovács)

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