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First record of *Hydroptila ivisa* Malicky, 1972 (Trichoptera, Hydroptilidae) from the Ecoregion 6, Hellenic Western Balkans

Astrit BILALLI[1] Halil IBRAHIMI[2]* Milaim MUSLIU[3]

Donard GECI[4] Linda GRAPCI-KOTORI[5]

[1,3]University of Peja "Haxhi Zeka", Faculty of Agribusiness, 30000 Pejë, KOSOVO

[2,4,5]University of Prishtina "Hasan Prishtina", Faculty of Mathematics and Natural Sciences, Department of Biology, 10000 Prishtina, KOSOVO

e-mails:[1]astrit.bilalli@unhz.eu; [2]halil.ibrahimi@uni-pr.edu; [3]milaim.musliu@unhz.eu; [4]donard.geci@uni-pr.edu; [5]linda.grapci@uni-pr.edu

ORCID IDs: [1]0000-0003-2820-8009; [2]0000-0002-4301-4387; [3]0000-0001-9835-6934; [4]0000-0002-6587-3414; [5]0000-0002-9084-042X

*Corresponding Author

ABSTRACT

Adult caddisfly specimens were collected from the Karadak Mountain in Kosovo along the border area with the Republic of North Macedonia during June 2020. Seven species belonging to seven caddisfly families were found. From this area, we report *Hydroptila ivisa* Malicky, 1972 for the first time for Kosovo and the Ecoregion 6, Hellenic Western Balkans. Range extension for *Synagapetus slavorum* Botosaneanu, 1960, *Hydropsyche emarginata* Navàs, 1923 and *Polycentropus slovenica* Malicky, 1998 is also reported. These findings increase the knowledge on the distribution and diversity of several rare species of caddisflies and especially of the new finding, *H. ivisa* in the Western Balkans and highlight the importance of further studies and conservation efforts for freshwater biodiversity in this region.

Keywords: caddisflies, aquatic insects, Kosovo, biodiversity, rare species, Balkan Peninsula

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INTRODUCTION

The knowledge about the caddisflies of the Balkan Peninsula has increased significantly over the past years with the description of several new species and records of other rare species of this order of aquatic insects. In this regard the caddisflies of Kosovo are relatively well investigated (Ibrahimi & Sejdiu, 2018; Ibrahimi & Vehapi, 2017; Ibrahimi, Kučinić, Gashi, & Grapci-Kotori, 2014; Ibrahimi et al, 2014; 2015a, 2015b, 2016a, 2016b, 2018, 2019a, 2019b, 2021, 2023; Ibrahimi, Kuçi, Bilalli, & Gashi, 2017b; Karaouzas et al, 2018; Oláh, Chvojka, Cubuc, Coppa, & Ibrahimi, 2015; Oláh et al, 2018); followed by North Macedonia (e.g., Bilalli, Ibrahimi, & Musliu, 2018; Bilalli et al, 2019; Hinić et al, 2020; Musliu et al, 2020; Oláh, Kovács, & Ibrahimi, 2018; Oláh et al, 2022; Slavevska-Stamenković et al, 2016, 2020, 2021; Valladolid et al, 2022); Albania (Ibrahimi & Bilalli, 2021; Ibrahimi & Kučinić, 2018; Oláh & Beshkov, 2016; Oláh et al, 2022); Serbia (Ibrahimi, Jahiji, & Bilalli, 2017a; Ibrahimi et al, 2022; Oláh et al, 2018, 2019, 2022; Stojanović et al, 2015) and Montenegro (Ibrahimi, Pali, Bilalli, & Musliu, 2019e; Oláh & Beshkov, 2016; Oláh & Kovács, 2014).

Family Hydroptilidae is the largest caddisfly family in terms of species diversity, with 2,642 species found in all faunal regions of the world and distributed in six subfamilies and 76 genera (including three fossil genera) (Thomson, 2023), but the smallest in terms of body size. Adults body size is about 1.5-5 mm (Holzenthal et al, 2007). The Hydroptilidae, known as microcaddisflies, are extremely diverse; larvae occur in a wide array of aquatic habitats, display numerous feeding patterns, and last instars construct a variety of larval cases known collectively for the family as “purse-cases”, exhibiting an interesting hypermetamorphosis observed within Trichoptera only in Hydroptilidae and its sister group, Ptilocolepidae. The Hydroptilidae, are holometabolous insects with a terrestrial adult stage and aquatic larval and pupal stages. The adults are attracted to ultraviolet lights and may congregate in huge numbers at collecting sites, giving them the potential to be one of the most commonly collected families of all Trichoptera. However, the aquatic larvae of Hydroptilidae are often more difficult to collect than the adults (Thomson, 2023).

There is limited available data on the distribution and diversity of hydroptilids in the Balkan Peninsula, including Kosovo. In the past years, some data for the Hydroptilidae family have been reported from Kosovo, such as: Bilalli (2019), Ibrahimi & Sejdiu (2018), Ibrahimi et al, (2012), Ibrahimi (2011), however, more research is needed to fully understand the distribution and diversity of hydroptilids in Kosovo and adjacent areas.

In this paper, we report *Hydroptila ivisa* Malicky, 1972 for the first time from Ecoregion 6, Hellenic Western Balkans and discuss findings of some other rare caddisfly species with limited distribution in the Balkan Peninsula.

MATERIAL AND METHODS

Sampling was carried out at two sampling stations in the Karadak Mountain (Figures 1 & 2). This mountainous area is located in the Hani i Elezit Municipality (near the

border with North Macedonia), between the villages Dimcë and Dërmjak at altitudes up to 600 - 1000 meters a.s.l. The first sampling station (S1) is located at the main stream above the Dimcë village-Dërmjak (N° 42.173038; E° 21.316659; 620 m a.s.l; Figure 1a). The epifaunal substrate at this sampling station was suboptimal: 40-70% of stream bed and lower banks covered with a mix of substrates favorable for epifaunal colonization and fish cover; embeddedness: gravel, cobble and boulder particles are 20-50% surrounded by fine sediment; sediment deposition: some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools; flow status: water fills >75% of the available channel; or <25% of channel substrate is exposed; bank stability: moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion; bank vegetation protection: 70-90% of the streambank surfaces covered by native vegetation, disruption evident but not affecting full plant growth potential to a great extent; more than one half of the potential plant stubble height remaining; riparian vegetative zone width: width of riparian zone 6-12 meters; human activities have impacted zone a great deal. The second sampling station (S2) is located in the northeastern part of Dërmajk village, specifically at a streamlet known locally as “Te Çeshmja”, which is a tributary of the main stream (N° 42.189092 and E° 21.310585, 985 m a.s.l.; Figure 1b). The epifaunal substrate was poor: less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking; embeddedness: gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment; sediment deposition: heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition; flow status: very little water in channel and mostly present as standing pools; bank stability: unstable; many eroded areas; “raw” areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars; bank vegetation protection: less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height; riparian vegetative zone width: width of riparian zone <6 meters: little or no riparian vegetation due to human activities.

Adult caddisfly specimens were collected using ultraviolet light traps (UV), entomological nets (EN), and hand-picking. Sampling was carried out during June 2020. Collected specimens were preserved in 80% ethanol. The specimens were identified under a stereomicroscope with determination keys from Malicky (2004) and Kumanski (1985, 1988). Systematic nomenclature follows Morse (2024).

The collected material is deposited at the Laboratory of Zoology of the Faculty of Mathematics and Natural Sciences, University of Prishtina, Kosovo

Figure 1. Sampling stations in the Karadak Mountain, Kosovo. a) S1 - mainstream, b) S2 - “Te Çeshmja”.

Figure 2. Map of sampling stations in the Karadak Mountain, Kosovo.

RESULT AND DISCUSSION

During this investigation we found seven species belonging to seven families of caddisflies (Rhycaophilidae, Glossosomatidae, Hydroptilidae, Hydropsychidae, Polycentropodidae, Limnephilidae, and Beraeidae). All families were represented with a single species each. The highest number of specimens belongs to the species *Polycentropus slovenica* (8 males, 1 female), and *Hydropsyche emarginata* (5 males, 2 females), while *Ernodes articularis* was found with a single specimen.

Species list

Family: RHYACOPHILIDAE Stephens, 1836

Genus: *Rhyacophila* Pictet, 1834

***Rhyacophila loxias* Schmid, 1970**

Material examined: Kosovo, Dërmjak, (UV) 28.06.2020, 2 ♂♂, leg.: Bilalli. A., Musliu,. M., and Geci, D.

Family: GLOSSOSOMATIDAE Wallengren, 1891

Genus: *Synagapetus* McLachlan 187

***Synagapetus slavorum* Botosaneanu, 1960**

Material examined: Kosovo, Dërmjak, (UV) 28.06.2020, 4 ♂♂, leg.: Bilalli. A., Musliu,. M., and Geci, D.

Family: HYDROPTILIDAE Stephens, 1836

Genus: *Hydroptila* Dalman, 1819

***Hydroptila ivisa* Malicky, 1972 ***

Material examined: Kosovo, Dërmjak, (UV) 28.06.2020, 3 ♂♂, leg.: Bilalli. A., Musliu,. M., and Geci, D.

Family: HYDROPSYCHIDAE Curtis, 1835

Genus: *Hydropsyche* Pictet, 1834

***Hydropsyche emarginata* Navàs, 1923**

Material examined: Kosovo, Dërmjak, (UV) 28.06.2020, 5 ♂♂, 2 ♀♀, leg.: Bilalli. A., Musliu,. M., and Geci, D.

Family: POLYCENTROPODIDAE Ulmer, 1903

Genus: *Polycentropus* Curtis, 1835

***Polycentropus slovenica* Malicky, 1998**

Material examined: Kosovo, Dërmjak, (UV) 28.06.2020, 8 ♂♂, 1 ♀, leg.: Bilalli. A., Musliu,. M., and Geci, D.

Family: LIMNEPHILIDAE Kolenati, 1848

Genus: *Micropterna* Stein, 1873

***Micropterna lateralis* (Stephens, 1837)**

Material examined: Kosovo, Dërmjak, (UV) 28.06.2020, 3 ♂♂, 2 ♀♀, leg.: Bilalli. A., Musliu,. M., and Geci, D.

Family: BERAEIDAE Wallengren, 1891

Genus: Ernodes, Wallengren, 1891

***Ernodes articularis* (Pictet, 1834)**

Material examined: Kosovo, Dërmjak, (Te Çeshmja): (EN) 28.06.2020, 1 ♂, leg.: Musliu. M. Bilalli. A., and Geci, D.

Hydroptila ivisa was described from Austria and is also found in a limited number of localities in Bulgaria, Czech Republic, France, Germany, Italy, Slovenia, and Ukraine (Thomson, 2023). Despite intensive caddisfly investigations during the past years in Kosovo and neighboring countries (Ibrahimi, Pali, Bilalli, & Musliu, 2019e; Ibrahimi, Jahiji, & Bilalli, 2017a; Ibrahimi et al, 2018; 2019c, 2019d; 2021; 2023; Karaouzas et al, 2018; Oláh & Kovács, 2014; Oláh, Chvojka, Cubuc, Coppa, & Ibrahimi, 2015; Oláh & Beshkov, 2016; Oláh et al, 2018a, 2019; 2022, Valladolid et al, 2022), this

species has never been found, suggesting a limited distribution and low populations. The species is also known from single localities in Italy and Bulgaria. In Italy, *H. ivisa* was reported from rhithral stream zones only (Corallini et al, 2013) which is also the case with the locality in the Dermjak stream in Kosovo where this species was found.

During this investigation, we encountered adult specimens of *H. ivisa* during June. Consistent with our findings, previous research by Komzák & Kroča (2011) also reported this species during the same month.

This discovery of this rare species of the Hydroptilidae family is an important contribution to the knowledge of aquatic biodiversity, considering the lack of knowledge about this family in the Balkan Peninsula. The finding of *Hydroptila ivisa* in new locations and for the first time in the Ecoregion Hellenic Western Balkans suggests a wider distribution of this species than previously known. This highlights the need for further research on the distribution, abundance, and ecology of this species.

During this investigation, we found several other species with limited distribution in the Balkan Peninsula, such as *Polycentropus slovenica*, *Synagapetus slavorum* and *Hydropsyche emarginata*.

Polycentropus slovenica, initially discovered in Slovenia, is also found in Italy and Bosnia and Herzegovina. It was first described as subspecies of *Polycentropus ierapetra*, but was later elevated to species level (Oláh et al, 2022). In 2014, it was reported for the first time from Kosovo (Ibrahimi, Kučinić, Gashi, & Grapci-Kotori, 2014) and was afterwards found at various locations in the Bjeshkët e Nemuna and Karadak Mountain (Ibrahimi et al, 2019c). Our current finding extends the species' range and most probably future investigations will show that this species is even widely distributed in the Balkan Peninsula, unlike all other species of the *Potamophylax ierapetra* complex which are narrow endemics of certain areas.

Range extension for *Synagapetus slavorum* and *Hydropsyche emarginata* is also reported in this work. Both species are scarcely distributed in the Balkan Peninsula (Neu et al, 2019) and are known from only few localities in Kosovo (Ibrahimi et al, 2012). Thus, their finding improves greatly the knowledge on the distributional patterns fo these rare species.

This investigation contributes to the knowledge on the distribution and diversity of the Trichoptera and especially of the Hydroptilidae family in the Balkan Peninsula. Additionally, the data gathered in this study can be used to improve the understanding of the ecological roles and interactions of hydroptilids in freshwater ecosystems.

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