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New distributional records of caddisflies (Insecta: Trichoptera) from Kosovo with the first record of *Hydroptila vectis* Curtis, 1834

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ABSTRACT

In this study, we report the first recorded occurrence of *Hydroptila vectis* Curtis, 1834 in Kosovo. The species was identified as part of recent investigations aimed at documenting caddisfly diversity across various freshwater habitats in Kosovo. Sampling efforts, carried out in June and August 2023, focused on two sampling sites located in the Drenica and Mirusha rivers. Adult caddisflies were collected using entomological nets and ultraviolet light traps. Rarely reported from the Balkan Peninsula, finding of *H. vectis* marks a significant addition to the caddisfly fauna of Kosovo and extends the species' known distribution in the Southeastern Europe.

A list of caddisfly species collected at both sites is also given, including several rarely encountered species. The study adds value and underscores the necessity of ongoing monitoring and research into the caddisfly communities inhabiting Kosovo's freshwater ecosystems.

Keywords: caddisflies, freshwater ecosystems, species distribution, biodiversity.

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INTRODUCTION

The Hydroptilidae family, with over 2265 species across six subfamilies and 76 genera, is one of the most widespread and ecologically significant families of Trichoptera (Thomson, 2023). Species from this family inhabit a variety of freshwater ecosystems, such as streams, rivers, lakes, and ponds, with a global distribution (Morse, 2025). The larvae of Hydroptilidae are particularly adapted to life in flowing waters, constructing protective silk cases from materials like sand, plant debris, and mineral grains. These cases provide both shelter and a means of transport. As vital components of freshwater ecosystems, Hydroptilidae larvae serve as prey for various aquatic organisms, and they play an essential role in the cycling of organic matter and nutrients. This family is also known for its sensitivity to changes in water quality and flow, making species of Hydroptilidae valuable bioindicators for assessing the health of freshwater ecosystems. Genus *Hydroptila* Dalman, 1819 contributes to approximately 5% of the total Trichoptera species' list of the Western Palearctic region (Ibrahimi, 2024).

In Kosovo, recent efforts (Bilalli, Ibrahimi, Musliu, & Geci, 2024; Ibrahimi, Bilalli, Geci & Grapci-Kotori, 2024; Ibrahimi, Kuçi, Bilalli, & Gashi, 2017; Ibrahimi et al, 2015, 2019a, 2019b, 2019c, 2021a, 2021b, 2023; Karaouzas et al, 2018; Musliu et al, 2020; Oláh et al, 2019, 2022; Valladolid et al, 2022) have increased the knowledge about the caddisfly fauna, particularly in spring areas and upstream sections of freshwater ecosystems. This is in line with the increase of caddisfly studies during the past decade from Southeastern Europe (e.g., Kučinić et al, 2015, 2019; Cerjanec et al, 2020; Hinić et al, 2020; Rimcheska et al, 2015; Slavevska-Stamenković et al, 2020; Ibrahimi et al, 2022). However, species of the Hydroptilidae family, often found in midstream and downstream sections, are still underrepresented in the literature in the Balkan Peninsula (e.g., Ibrahimi, Jahiji, & Bilalli, 2017; Ibrahimi, Pali, Bilalli, & Musliu, 2019) with a considerable increase lately from Kosovo (Bilalli, Ibrahimi, & Musliu, 2018; Bilalli et al, 2024; Ibrahimi & Sejdiu, 2018; Ibrahimi & Vehapi, 2017; Ibrahimi, Kučinić, Gashi, & Grapci-Kotori, 2014; Ibrahimi, Bilalli, Geci, & Musliu, 2024; Musliu, Bilalli, Geci, & Ibrahimi, 2024; Salihu et al, 2023). The need for further research is evident to fully understand the distribution, ecological roles, and conservation status of Hydroptilidae in the region.

In this paper, we report the first record of *Hydroptila vectis* from Kosovo, collected from the Drenica and Mirusha rivers. Furthermore, we discuss the presence of other rare caddisfly species, contributing to the broader understanding of freshwater biodiversity in Kosovo.

MATERIAL AND METHODS

Fieldwork and sampling

Adult caddisflies were collected using entomological nets and ultraviolet (UV) light traps during field investigations conducted in June and August 2023. For the UV light traps, a white pan with a diameter of 60 cm was filled with 10 cm of water and a few

drops of detergent to reduce surface tension. The UV light source was positioned above the pan and placed on the stream bank, where it remained operational from dusk until the following morning. This method follows Malicky (2004). Additionally, entomological nets were employed to manually collect specimens from various freshwater habitats within the sampling sites.

Collected specimens were immediately preserved in 80% ethanol. Identification of the specimens was performed under a stereomicroscope using determination keys provided by Malicky (2004) and Kumanski (1985, 1988). The systematic nomenclature is according to Morse (2025). All collected material has been deposited at the Laboratory of Zoology, Faculty of Natural and Mathematical Sciences, University of Prishtina, Kosovo.

Study area

Sampling was conducted at two stations: Drenica River (S1 Baicë village) and Mirusha River (S2 Panorc village).

The Drenica River is a significant left-bank tributary of the Sitnica River with approximately 50 kilometers in length and originates in the Carraleva mountain range. The river's basin covers an area of about 1,166[2] km and has an average annual discharge of approximately 19.3[3] m/s. Flowing through the Drenas municipality, the Drenica River runs through a valley surrounded by several prominent mountain ranges, including Berisha, Qyqavica, Kosmaq, Golesh, and Blinajë. The first sampling station is located in the Baicë village (42°31'23" N, 20°54'36" E), at an elevation of 630 meters.

The Mirusha River is the second river where sampling took place, specifically in Panorc village (42°29'39" N, 20°37'7" E), at the point where it flows into the Drini i Bardhë River. The Mirusha River is located in the eastern part of the Dukagjin Plain and originates in the Bllaca mountains at an elevation of approximately 1,000 m asl. The river flows for 38 kilometers from its source to its confluence with the Drini i Bardhë River. The Mirusha River basin is a sub-basin of the Drini i Bardhë River basin. The first sampling station belongs to the Black Sea basin and the second one to the Adriatic Sea basin.

RESULTS

During this investigation, we found 17 species belonging to 7 families of caddisflies (Table 1). Family Hydropsychidae is represented with the highest number of species (5 in total), followed by family Limnephilidae (3 species). Families Philopotamidae and Leptoceridae are represented with two genera and two species each, while the remaining two families (Hydroptilidae and Sericostomatidae) are each represented by a single species.

The highest number of specimens was sampled in June, with a total of 110 specimens, while in August only 45 specimens. Twelve species were recorded in the Drenica River and ten in the Mirusha River, with five species shared between the two sampling stations.

Table 1. The composition of the caddisfly fauna in the two sampling stations: Drenica River (S1) and Mirusha River (S2) during June and August 2023.

Species/Months-sampling stations	June (S1)			August (S1)			June (S2)			August (S2)		
	♂	♀	∑	♂	♀	∑	♂	♀	∑	♂	♀	∑
Rhyacophilidae												
Rhyacophila macedonica Karaouzas, Valladolid & Ibrahimi, 2022		1	1				1	2	3			
Rhyacophila polonica McLachlan, 1879		1	1									
Hydroptilidae												
Hydroptila vectis Curtis, 1834	1		1				2		2			
Philopotamidae												
Philopotamus montanus Donovan, 1813		12	12				4	2	6	2	3	5
Wormaldia subnigra McLachlan, 1865	1	9	10									
Hydropsychidae												
Hydropsyche angustipennis (Curtis, 1834)							3		3	1		1
Hydropsyche bulbifera McLachlan, 1878	1		1									
Hydropsyche emarginata Navàs, 1923							2		2	2		1
Hydropsyche *saxonica* McLachlan, 1884	1		1				1		1	2		2
Hydropsyche modesta Navas, 1925	1		1									
Hydropsyche sp. females		35	35		5	5		15	15		7	7
Limnephilidae												
Grammotaulius nigropunctatus (Retzius, 1783)		4	4		2	2						
Limnephilus lunatus Curtis, 1834		1	1									
Micropterna caesareica Schmid, 1959				9	2	11						
Sericostomatidae												
Oecismus monedula (Hagen, 1859)							1	1	2	2	2	4
Leptoceridae												
Athripsodes bilineatus (Linnaeus, 1758)							1	2	3	2	1	3
Leptocerus interruptus (Fabricius, 1775)							3	2	5	3	1	4

DISCUSSION

The distribution areal of *Hydroptila vectis* (Fig. 1) spans along Europe, North Africa and some parts of Asia. It was reported from the following countries: Algeria, Austria, Bulgaria, Croatia, Czech Republic, England, Estonia, Finland France, Georgia, Germany, Greece, Hungary, Ireland, Israel, Italy, Kazakhstan, Lebanon, Luxembourg, Morocco, Netherlands, Pakistan, Portugal, Romania, Serbia, Russia, Scotland, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, Uzbekistan (Thomson, 2023). However, the records of this species in the Balkan Peninsula are very few, mostly from Greece and at a lesser degree from Bulgaria and Albania (Kumanski, 1985; Olah, 2010; Karaouzas & Malicky, 2015; Neu et al, 2018), and thus our finding of this species from Drenica and Mirusha rivers in Kosovo contributes greatly to the knowledge of its areal.

Not much is known about the ecology of *H*. vectis. Interestingly, according to some authors (Gullefors, 2016) in Norway, the adult flight activity is mostly during daytime (06:00-18:00 hours). We have, however registered it during the nighttime with ultraviolet lamp. Nevertheless, the number collected during the nighttime was very low, suggesting that sampling during daytime may have yielded more specimens. Probably the asynchrony between the flight period and sampling efforts is one of the

reasons why this species was not recorded before, despite very intensive samplings. Most of these recent trichoperological investigations in Kosovo generally included sampling with ultraviolet lamp trap.

Adults of *Hydroptila vectis* can be found on the wing from June to September (Barnard & Ross, 2012; Graf et al, 2008; O'Connor, 2019). In our study, we recorded this species during the months of June and August. *Hydroptila vectis* has been observed at various altitudes. In Italy, Cianficconi et al, (2016) reported its presence at lower altitudes in Puglia (200 m a.s.l.) and Marche (300 m a.s.l.), as well as at higher altitudes in Valle d'Aosta (1700 m a.s.l.), Trentino Alto Adige, and Piemonte (1200 m a.s.l.). During our research in Kosovo, *H. vectis* was recorded in the Drenica River at an altitude of 630 m a.s.l. and in the Mirusha River at 531 m a.s.l. These findings provide valuable insights into the altitudinal distribution of this species, particularly within the context of Kosovo.

According to Cianficconi et al, (2016), *Hydroptila vectis* inhabits lotic waters and is euryoecious, meaning it can tolerate higher levels of organic matter, H_2S, and NO_3^-. In our research in Kosovo, *H. vectis* was found near stagnant waters, in the Mirusha River being close to Panorc Lake and the Drenica River near a small accumulation of water by a thermal spring in Baicë. These findings align with the species' tolerance to slightly more enriched environments and contribute to understanding its ecological preferences in Kosovo.

During this study, we also found the endemic species *Rhyacophila macedonica*, which is distributed in North Macedonia, Albania, Kosovo, Serbia, and Greece. This species was described several years ago by Valladolid et al, (2022) in relation to the *Rhyacophila fasciata* species complex (Ibrahimi et al, 2012; Valladolid et al, 2021). The findings from our study expand the knowledge of its distribution, particularly within Kosovo (e.g., Musliu, Bilalli, Geci, & Ibrahimi, 2024; Salihu et al, 2023). By reporting its presence in new locations along the Drenica and Mirusha rivers, this research contributes to a better understanding of the distribution of this endemic species in the region, further enriching the ecological data for the freshwater habitats of Kosovo.

All species of the Hydropsychidae family found during this investigation are rarely encountered in Kosovo, but also in the Western Balkans, and thus this study contributes to range extension of the known areal of these species. The distribution of *Hydropsyche* species in Kosovo spans various localities and basins. *H. angustipennis* has been recorded in Blinajë, while *H. bulbifera* is found in Siqevë, Orllan, and Grabofc. Similarly, *H. emarginata* is present in Llukar, Marefc, and Grabofc, whereas *H. saxonica* occurs in Kaqandoll, Orllan, and Blinajë. These four species are associated with the Black Sea Basin (Ibrahimi et al, 2018). In contrast, *H. modesta* has been recorded in Lukinë (Drini i Bardhë River), representing the Adriatic Sea Basin, as documented by *I*brahimi et al, (2014). This distribution underscores the ecological diversity of *Hydropsyche* species within Kosovo's freshwater systems.

Species of the Limnephilidae, Sericostomatidae and Leptoceridae families found during this investigation belong to the rarely encountered species in Kosovo (Ibrahimi, Kuçi, Bilalli, & Gashi, 2017; Ibrahimi et al, 2016) and thus this study contributes to

range extension of their known distribution. Especially species of family Leptoceridae have not been frequently reported from Kosovo.

This study contributes significantly to understanding the distribution and diversity of Trichoptera, and especially the Hydroptilidae family, within the Balkan Peninsula and Kosovo. Moreover, the findings provide valuable data to enhance our knowledge of the ecological roles and interactions of hydroptilids in freshwater ecosystems.

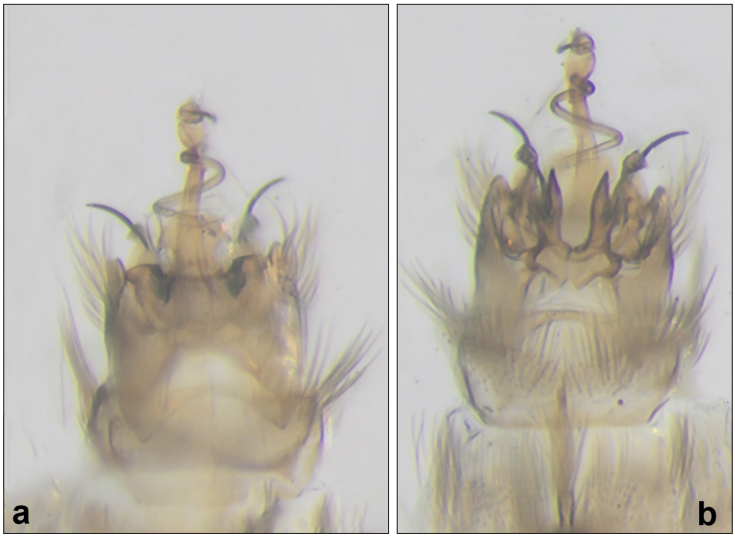

Figure 1. Male genitalia of *Hydroptila vectis*: a) dorsal view, b) ventral view.

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