



First record of *Glossosoma unguiculatum* Martynov, 1925 (Trichoptera, Glossosomatidae) from Iran

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ABSTRACT. Caddisfly sampling conducted during August 2021 from the Gurgur River in the Sabalan Mountains, Ardabil province, Iran, revealed the first record of *Glossosoma unguiculatum* Martynov, 1925 for Iran. Previously, this species had only been known from few localities in Turkey, the Caucasus and Kazakhstan. The morphology of male genitalia in the collected specimens generally corresponds to the described species, with the exception of a less incised ventral margin of the abdominal segment IX in ventral view, which may be attributed to geographical variability. This discovery marks the second species of the genus *Glossosoma* Curtis, 1834 found in Iran.

Key words: Aquatic biodiversity, caddisflies, Ardabil province, new records

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INTRODUCTION

Glossosomatidae family has a worldwide distribution with over 100 genera and more than 1,500 described species (Morse, 2023). Larvae of this family are commonly found in fast-flowing streams and rivers, where they construct cases made of sand grains or other materials. They are important components of freshwater ecosystems, serving as indicators of water quality and playing important roles in nutrient cycling and food webs (e.g., Holzenthal et al., 2007). The caddisfly fauna of Europe is relatively well-known, although new species are continuously being described from less investigated areas (e.g., Oláh et al., 2017; Ibrahim et al., 2021a, 2022; Valladolid et al., 2022). Areas adjacent to

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Europe, such as Asia Minor, are also well-known (e.g., Darilmaz & Salur, 2015; Sipahiler, 2004, 2010, 2014). However, some other areas, such as the North Africa, have been less investigated, with reported records and even new species being described from time to time (e.g., Ibrahimi et al., 2021b; Neu & Malicky, 2017; Mabrouki et al., 2023; Mey, 2018). Iranian caddisfly fauna has received limited attention over the years (e.g., Botosaneanu, 1998; Chvojka, 1999, 2006; Malicky, 1981, 1986, 1999; Mey, 2004; Mirmoayedi & Malicky, 2002; Oláh et al., 2017, 2020; Schmid, 1959). Recently new species belonging to the families Hydropsychidae and Leptoceridae, namely *Hydropsyche kurdistanica* Ibrahimi & Mohammadi, 2023 and *Athripsodes saral* Ibrahimi & Mohammadi, 2023 have been described from the Kurdistan province (Ibrahimi et al., 2023a, 2023b). Nevertheless, the majority of the aforementioned studies were limited in scope, focusing on a small area of Iran. Consequently, there are still many regions in Iran that remain largely unexplored with regards to caddisfly fauna. In this paper, we report the first record of *Glossosoma unguiculatum* Martynov, 1925 from Iran. The species is reported based on specimens collected during a limited sampling efforts conducted during 2021.

MATERIAL AND METHODS

Fieldwork, identification and taxonomic work. Adult caddisflies were collected using entomological net and handpicking during the daylight. The collected specimens were stored directly in 90% ethanol and are deposited at the Department of Biology, Faculty of Mathematics and Natural Sciences, University of Prishtina "Hasan Prishtina," Prishtinë, Kosovo. We identified the adult caddisflies using the key provided by Malicky (2004). Photographs of the specimens were taken using an Olympus SC53 camera attached to the Olympus SZX16 stereomicroscope and subsequently processed with Adobe Photoshop CC software.

Sampling area. Ardabil province, situated in northwest Iran, is characterized by a cold climate for five to eight months of the year, with temperatures averaging around 7°C annually. Rains are common throughout the year, with more intense precipitation during spring and autumn (Hemayati, 2009). This province is located east of Azerbaijan's plateau; about 75% of it has a mountainous texture with a large height difference, and the rest is plain and lowlands (Taosi & Del Ara, 2019). Most of the lands in the province are located at elevations ranging from 2,000 to 3,000 meters above sea level. The region's climate is influenced by the Sabalan, Talesh, and Bozghush Mountains, as well as by the Caspian Sea and cold winds blowing from the north and east. The impact of Sabalan volcano is also visible in the hot water mineral springs. The province also has several cold springs, one of them being the one feeding the Gurgur River where the caddisfly samples for this investigation were collected (Fig. 1). The sampling site is located approximately 15 km west of Sarein.

RESULTS

Taxonomic hierarchy

Class Insecta Linnaeus, 1758

Order Trichoptera Kirby, 1813

Family Glossosomatidae Wallengren, 1891

Genus *Glossosoma* Curtis, 1834

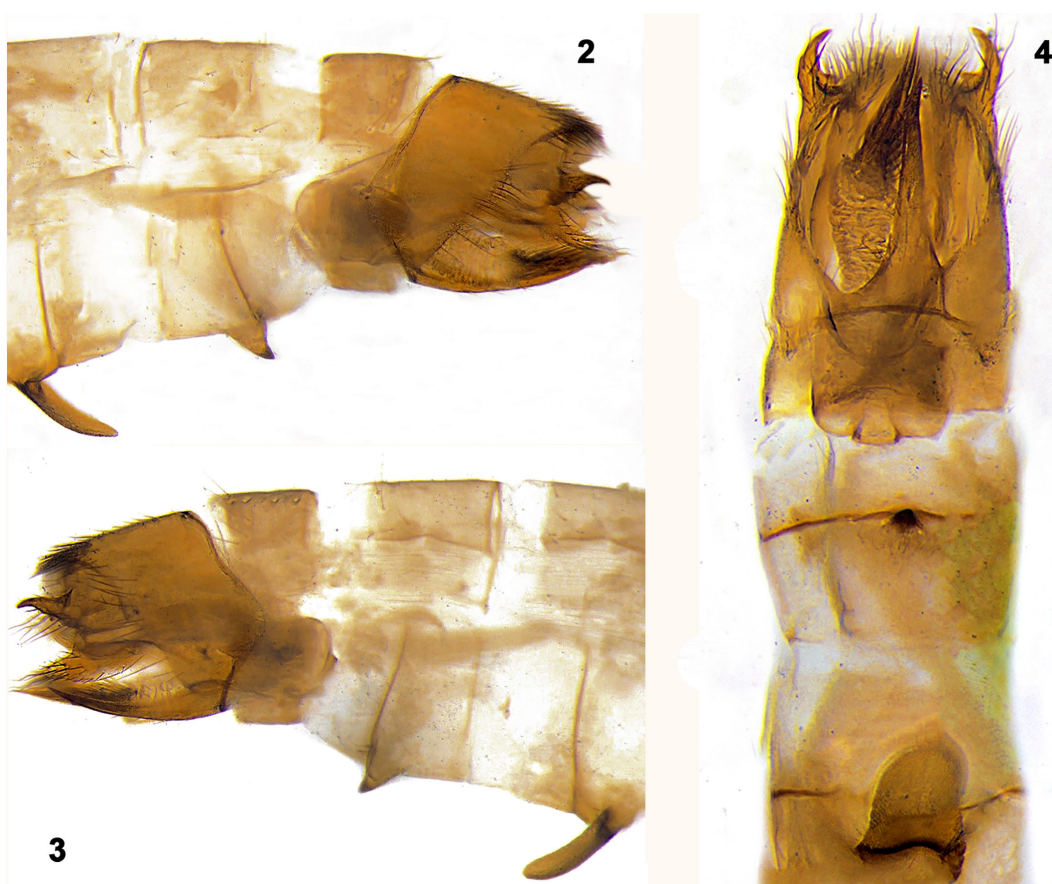
***Glossosoma unguiculatum* Martynov, 1925 (Figs 2–4)**

Material examined. 3 ♂♂, IRAN, Ardabil province (38°10'13.27404"N, 47°54'10.61208"E, 2443 m a.s.l.), 01.VIII.2021, leg. Halil Ibrahimi.

Distribution. The species is reported from Azerbaijan (Oláh et al., 2020), Georgia (Oláh et al., 2020), Kazakhstan (Smirnova et al., 2016), Russia (Ivanov, 2011) and Turkey (Darilmaz & Salur, 2015).



Figure 1. Sampling site in the Gurgur River, Ardabil province, Iran.



Figures 2–4. Male genitalia of *Glossosoma unguiculatum* Martynov, 1925, **2.** Left lateral; **3.** Right lateral view; **4.** Ventral view.

Diagnosis. The collected specimens (Figs 2–4) generally correspond with the originally described species (Martynov, 1934). The head and thorax are yellowish-brown, lighter ventrally; the abdomen is generally brown; the antennae are yellowish; the legs are pale yellow. The forewings are yellowish. In lateral view, segment IX wide dorsally and medially, narrow ventrally; tergite IX forms a median projection rounded at the end and covered with bristles; the ventral unpaired process of segment IX broadly triangular and elongated. Segment X in lateral view, basally wide, narrowing distally, ending with two pointed triangularly shaped processes, the dorsal one larger, the ventral one quite small. The median appendage of the 6th sternite is shovel-shaped, while the median appendage of the 7th sternite is small and triangularly shaped.

DISCUSSION

Currently, knowledge about the genus *Glossosoma* in Iran is limited, with only one species reported prior to this investigation, namely *Glossosoma agarenorum* Schmid, 1959. This species is currently known only from Iran, specifically from a few localities in the Mazandaran and Alborz provinces (Schmid, 1959). The finding of *Glossosoma unguiculatum* in Iran was somewhat expected and corresponds to the distribution of this species in neighboring countries. Our findings greatly expand the known distribution of this species towards the south and represent the southeasternmost area of its range. This suggests that the distribution of this rare species may be wider than currently recognized.

As noted in some other species of the genus *Glossosoma* (Malicky, 2004), we found that the male genitalia of *Glossosoma unguiculatum* are not completely similar in left lateral and right lateral view, as is the case with other caddisfly species. In the right lateral view, the median projection of segment IX is wider than in the left lateral view. This must be taken into consideration when identifying specimens of this species. We also found in our specimens a less incised ventral margin of segment IX in ventral view as compared to the specimens from the Caucasus (Malicky, 2004), which may be attributed to the geographical variability. We hypothesize that the number of *Glossosoma* species in Iran may be higher than currently known, considering the number of known species of this genus in adjacent areas, such as Turkey, for example (Darilmaz & Salur, 2015).

Currently 18 families of caddisflies and 46 genera are known from Iran. There is an urgent need for a revised checklist of Iranian caddisflies, considering recent trends in Trichoptera taxonomy and including verification of several dubious species currently presented as being from Iran.

AUTHOR'S CONTRIBUTION

The authors confirm their contribution in the paper as follows: H.I., H.M., E.G. & E.K.: Fieldwork, identification of specimens, writing, and reviewing; R.Z. & L.P.: Photography and writing. All authors read and approved the final version of the manuscript.

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AVAILABILITY OF DATA AND MATERIAL

The specimens listed in this study are deposited in the Department of Biology, Faculty of Mathematics and Natural Sciences, University of Prishtina "Hasan Prishtina", Prishtinë, Kosovo under the collection named 'Iran, 2021' and are available, upon request.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest regarding the publication of this paper.

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اولین گزارش *Glossosoma unguiculatum* Martynov, 1925 (Trichoptera, Glossosomatidae) از ایران

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چکیده: طی برنامه نمونه‌برداری از حشرات راسته بال‌موداران در مسیر رودخانه گورگور منطقه کوهستانی سیلان، استان اردبیل در آگوست ۲۰۲۱ گونه *Glossosoma unguiculatum* Martynov, 1925 برای اولین بار از ایران جمع‌آوری و شناسایی شد. انتشار این گونه پیش از این تنها در نواحی محدودی از کشور ترکیه، منطقه قفقاز و قزاقستان ثبت شده بود. ریخت‌شناسی جنیتالیایی حشره در نمونه‌های جمع‌آوری شده به طور عمده منطبق بر توصیف اصلی این گونه بود. با این وجود تفاوت جزئی شامل شکاف ضعیف‌تر بخش زیرین بند نهم شکم دیده شد که ممکن است ناشی از تنوع جغرافیایی باشد. با ثبت این گزارش جدید تعداد گونه‌های جنس *Glossosoma* Curtis, 1834 در ایران به دو عدد می‌رسد.

واژگان کلیدی: تنوع زیستی آبزیان، بال‌موداران، اردبیل، گزارش جدید