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First Records of Three Species of the Genus *Glossossoma* Curtis, 1834 (Insecta: Trichoptera) from the Republic of Kosovo

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ABSTRACT

In this paper we report first records of three species of the family Glossosomatidae (Insecta: Trichoptera) from the Republic of Kosovo: *Glossosoma intermedium* and *G. bifidum* from Sharr Mountains, and *G. klotho* from Sharr Mountains and Bjeshkët e Nemuna Mountains. *Glossosoma intermedium* has a disjunct distribution in Europe and according to the current knowledge is almost completely absent from the Southeastern Europe. *Glossosoma bifidum,* whose distribution range is widened by this investigation, has been rarely sampled in the Balkan Peninsula but is also known from Italy, Spain and Central Europe. A rare Balkan endemic species *Glossosoma klotho* is found again outside Greece. This investigation further highlights Sharr Mountains as an important area in Europe rich with species of the genus *Glossosoma.*

Key words: Balkan Peninsula, Kosovo, aquatic insects, endangered species.

INTRODUCTION

The Glossosomatidae is a cosmopolitan caddisfly family present in all continents with the world fauna of more than 600 species. It was established as a subfamily of Rhyacophilidae and erected at the family level by Ross (1956). Larvae of this family live in cold running waters of streams but are well adapted in lakes as well (Wiggins, 2004). Species of the family Glossosomatidae are scrapers of diatoms, algae, and organic ooze from the surfaces of submerged substrate (Holzenthal *et al*., 2007). The genus *Glossosoma* Curtis, 1834 has more than 120 species from Oriental and Holarctic regions. The European fauna comprises 14 species (Malicky, 2013), several of them endemics of particular regions in the continent and mostly in the Balkan Peninsula. Despite the long tradition of caddisfly researches in the European continent there are still insufficiently investigated territories. Kosovo, Macedonia and Albania are amongst the least explored parts of the European continent as are many high altitude mountains in the Balkan Peninsula.

Three species of the genus *Glossosoma* have wider distribution in Europe (*Glossosoma boltoni* Curtis, 1834, *G. conformis* Neboiss, 1963 and *G. intermedium* (Klapalek, 1892)) while all other species are restricted to either few countries or much smaller areas. In the Balkan Peninsula are known 11 species: *Glossosoma bifidum* McLachlan, 1879, *G. boltoni*, *G. bunae* Marinkovic, 1988, *G. capitatum* Martynov, 1913,

G. conformis, *G. discophorum* Klapalek, 1902, *G.intermedium*, *G. kirke* Malicky, 2003, *G. klotho* Malicky, 2003, *G. melikertes* Malicky, 2003 and *G. neretvae* Marinkovic, 1988. The knowledge of their distribution is still incomplete and also, habitat preferences and ecology are almost completely lacking.

This paper is a further contribution to the knowledge of the caddisfly fauna of Kosovo and it also gives further insight about the distribution patterns of the genus *Glossosoma* in the Balkan Peninsula.

MATERIAL AND METHODS

Data collection

Adult caddisfly specimens were collected by entomological net, handpicking and ultraviolet light trap. The ultraviolet light trap follows Malicky (2004). The sampling was carried out during 2012, 2013 and 2014. Collected samples were preserved in 80 % ethanol and were identified by the first author using determination keys from Malicky (2004) and Kumanski (1985; 1988). Specimens of *Glossosoma klotho* were verified by Professor Hans Malicky. The collection is deposited at the Laboratory of Zoology of the Faculty of Natural and Mathematical Sciences, University of Prishtina, Kosovo.

Study area

Adult caddisflies were collected in three localities belonging to the Adriatic and Aegean watersheds in Kosovo (Fig. 1).

Station 1 is located in a tributary of the Lepenc River, 50 meters inside the forest from the main road Prizren - Shtërpcë, (42.17506° N, 20.97593° E, 1410 m above sea level). 40-70% of the stream bed and lower banks are covered with a mix of substrata favorable for epifaunal colonization and fish cover. Gravel, cobble and boulder particles are 20-50% surrounded by fine sediment. 70-90% of the streambank surfaces are covered by native vegetation. Disruption is evident but not affecting full plant growth potential to a great extent; more than one half of the potential plant stubble height remaining.

Station 2 is located in the Brod River few kilometres above the Arxhena Hotel in the Brod village (41.956045° N, 20.715663° E, 1624 m above sea level). 40-70% of stream bed and lower banks covered with a mix of substrata favorable for epifaunal colonization and fish cover. Gravel, cobble and boulder particles are 20-50% surrounded by fine sediment. The streambank lower vegetation is present but the riparian vegetation is almost completely lacking.

Station 3 is located in the middle reach of the Lumbardhi i Pejës River close to the Orthodox Monastery at the foothills of the Rugova gorge (42.661613° N, 20.249713° E, 570 m above sea level). Less than 50% of the streambank surfaces are covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 cm or less in average stubble height.

Station 1 and station 2 belong to Sharr, a mountain range distributed almost equally between the Republic of Kosovo and Macedonia with a small portion extending to northeastern Albania. Station 3 belongs to the Bjeshkët e Nemuna mountain range, distributed between Kosovo, Montenegro and Albania.

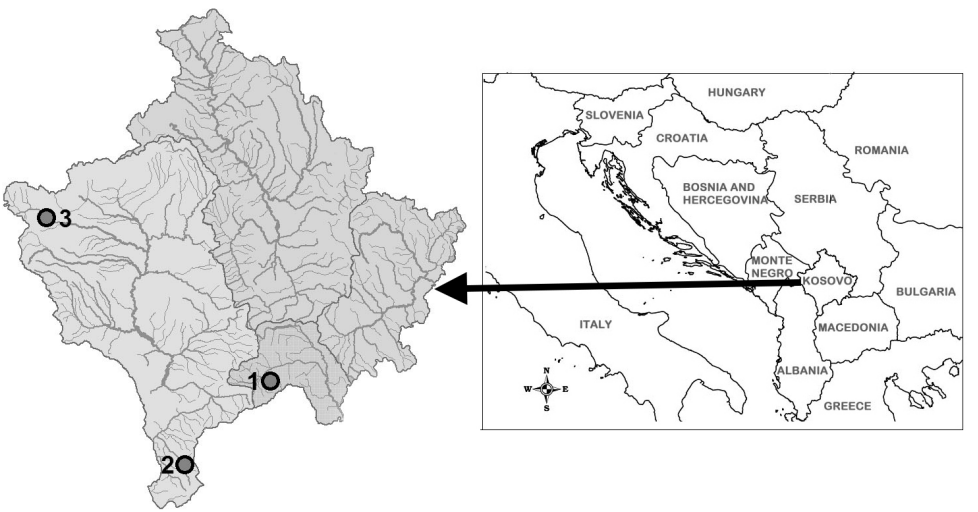

Fig. 1. Locations of the sampling sites: 1-Station 1 Lepenc River, 2-Station 2 Brod River, 3-Station 3 Lumbardhi i Pejës River.

RESULTS

Material examined:

Glossosoma bifidum McLachlan, 1879

Station 1 (31.05.2012), 2♂♂, UV light trap.

Glossosoma intermedium (Klapalek, 1892)

Station 1 (31.05.2012), 1♂, UV light trap.

Species associated with *Glossosoma bifidum* and *G. intermedium* in this sample: *Rhyacophila bosnica* Schmid, 1970 (2♂♂), *Philopotamus montanus* (Donovan, 1813) (2♂♂, 1♀), *Rhyacophila loxias* Schmid, 1970 (3♂♂) and *Wormaldia* sp. (1♀).

Glossosoma klotho Malicky, 2003

Station 3 (16.10.2013),1♂, entomological net.

Species associated with *Glossosoma klotho* in this sample: *Rhyacophila palmeni* McLachlan, 1879 (1♂), *Rhyacophila loxias* (2♂♂, 1♀) and *Limnephilus* sp. (1♀).

Station 2 (19.10.2014), 2♂♂, handpicking.

Species associated with *Glossosoma klotho* in this sample: *Drusus botosaneanui* Kumanski, 1968 (1♂, 2♀♀), *Potamophylax cingulatus* (Stephens, 1837) or *Potamophylax latipennis* (Curtis, 1834) (1♀) and *Rhyacophila loxias* (1♂, 1♀).

DISCUSSION

This investigation has contributed to the knowledge of the distribution of *Glossosoma bifidum* in the Balkan Peninsula. In Europe this species is also known from Italy, Spain and Central Europe (Malicky, 2013). According to the current knowledge its known distribution range in the Balkans does not go beyond Kosovo and Macedonia (Malicky, 2013). Despite a long tradition of caddisfly investigations in Greece it hasn't been reported yet (Malicky, 2005). It hasn't been found in recent caddisfly investigations in Albania either (e.g. Olah, 2010).

Glossosoma intermedium has a disjunct distribution in Europe (Malicky, 2013) and according to the current knowledge is absent from large part of the Southeastern Europe. Beside our find during this investigation it is only known from Bulgaria (Kumanski, 1988) in the region. By this investigation its known distribution range widens in the Balkan Peninsula. This species is listed as threatened in the Red List of the German federal unit Thuringen and Bayern (Weinzierl, 2003) and rare in United Kingdom (Wallace, 2011).

During this investigation *Glossosoma klotho* is found again outside Greece, from where it was described. It has also been reported from single localities in Albania (Delvinë district) (Olah, 2010), Macedonia (Radika River) and Montenegro (Durdevica Tara) (Malicky, 2003). Our finding in two localities in Kosovo widens its known distribution range. For this species it is interesting that it can be found at quite variable altitudes, starting from 155 m asl as it is the case in Albania (Olah, 2010). The locality in Brod River (1624 m) where this species was found during this investigation is currently the highest altitude where this species is known to live.

During this investigation all three species of the genus *Glossosoma* were found in undisturbed freshwater environments rich in oxygen and outside the anthropogenic impact. All three species seem to be very rare in Kosovo similar to other parts of the Balkan Peninsula, in terms of geographic records and abundance. Out of hundreds of investigated sites in Kosovo during the last years these species are found only in a limited number of streams, as reported in this paper. Prior to this investigation, two other species of the genus *Glossosoma* were known from Kosovo: *G. discophorum* from a single locality in Lumbardhi i Prizrenit River and *G. conformis* from several localities belonging to the Black Sea and Adriatic Sea watersheds in Kosovo (Ibrahimi *et al*., 2012; 2014). It is interesting to mention that in the spring area and upper reach of Lumbardhi i Prizrenit River and Lepenc River in Sharr Mountains within an area of less than 10^2 km, together are found four species of the genus *Glossosoma*: *G. bifidum, G. conformis, G. discophorum* and *G.intermedium.* At a distance of about 30 km in the Sharr Mountains is found also *G. klotho*. This highlights the Sharr Mountains as a very rich area with species of this genus, most of them extremely rare in the region.

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