NAT. CROAT. | VOL. 26 | No 2 | 197-204 | ZAGREB | DECEMBER 31, 2017

original scientific paper / izvorni znanstveni rad
DOI 10.20302/NC.2017.26.16

FIRST RECORD OF *TRIAENODES BICOLOR* (CURTIS, 1834) (INSECTA: TRICHOPTERA) FROM THE ECOREGION HELLENIC WESTERN BALKANS

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Ibrahimi, H., Kuçi, R., Bilalli, A. & Gashi, E.: First record of *Triaenodes bicolor* (Curtis, 1834) (Insecta: Trichoptera) from the Ecoregion Hellenic Western Balkans. Nat. Croat., Vol. 26, No. 2., 197-204, Zagreb, 2017.

We collected adult caddisfly specimens with entomological nets and ultraviolet light traps monthly from May to November 2012 in Brezne Lake situated in Dragash Municipality. During this investigation we found the Leptocerid species *Triaenodes bicolor* for the first time in Kosovo; it is also the first record for Ecoregion 6, Hellenic Western Balkans. Additionally, this is the first record of the genus *Triaenodes* from Kosovo. In total seven males and three females of this species were found. *Triaenodes bicolor* is present all over the European continent but has been rarely sampled in southeastern Europe. Other taxa sympatric with *Triaenodes bicolor* in the investigated locality are: *Hydropsyche instabilis*, *Hydropsyche* spp., *Plectrocnemia conspersa*, *Plectrocnemia* spp., *Micropterna nycterobia*, *Micropterna sequax*, *Limnephilus vittatus*, *Limnephilus auricula* and *Thremma anomalum*.

Keywords: *Triaenodes*, Kosovo, Trichoptera, Balkan Peninsula

Ibrahimi, H., Kuçi, R., Bilalli, A. & Gashi, E.: Prvi nalaz vrste *Triaenodes bicolor* (Curtis, 1834) (Insecta: Trichoptera) iz Ekoregije helenski zapadni Balkan. Nat. Croat., Vol. 26, No. 2., 197-204, Zagreb, 2017.

Odrasli oblici tulara su sakupljeni entomološkom mrežom i ultraljubičastom svjetlosnom klopkom od svibnja do studenog 2012. godine na jezeru Brezna u Općini Dragaš. Tijekom ovog istraživanja, vrsta iz porodice Leptoceridae *Triaenodes bicolor* nađena je po prvi puta na Kosovu i u Ekoregiji 6 (helenski zapadni Balkan). Istovremeno, ovo je prvi nalaz roda *Triaenodes* s Kosova. Ukupno je nađeno sedam mužjaka i tri ženke ove vrste. Vrsta *Triaenodes bicolor* rasprostranjena je na cijelom europskom kontinentu, ali je rijetko zabilježena u jugoistočnoj Europi. Ostale simpatrične vrste uz vrstu *Triaenodes bicolor* na istraživanom lokalitetu su: *Hydropsyche instabilis*, *Hydropsyche* spp., *Plectrocnemia conspersa*, *Plectrocnemia* spp., *Micropterna nycterobia*, *Micropterna sequax*, *Limnephilus vittatus*, *Limnephilus auricula* i *Thremma anomalum.*

Ključne riječi: *Triaenodes*, Kosovo, Trichoptera, Balkanski poluotok

INTRODUCTION

Leptoceridae is one of the largest caddisfly families, with more than 1,500 species in around 50 genera (Morse, 2016). Known otherwise as 'long horned caddisflies' because of their extraordinarily long antennae, they are present in a variety of habitats, from slow flowing rivers to cold and rapidly flowing streams, including temporary waters and even saline lakes (St. Clair, 1994). Most species

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of this family are univoltine but semivoltine and multivoltine cases have been registered within the family (Graf *et al.*, 2008).

The genus *Triaenodes* McLachlan, 1865 has a cosmopolitan distribution and contains nearly 300 species (Morse, 2016; Oláh, 2016). There are only four taxa present in Europe: *Triaenodes bicolor* (Curtis, 1834), *Triaenodes ochreellus ochreellus* McLachlan, 1877, *Triaenodes ochreellus lefkas* Malicky, 1974 and *Triaenodes unanimis* McLachlan, 1877. *Triaenodes unanimis* is mostly distributed in Western and Eastern Europe, *T. bicolor* is present in the whole continent, *T. ochreellus ochrellus* was so far only found in ecoregions 1, 2, 8 and 13 and *T. o. lefkas* in ecoregions 3, 5 and 6 (Graf *et al.*, 2008).

Larvae of species of the genus *Triaenodes* inhabit lentic and lotic waters, where they are closely associated with the aquatic vegetation. As in many other leptocerid species, the larvae of *Triaenodes bicolor* have extremely elongated posterior legs with concentrations of setae on the femur, tibia and tarsus, known as swimming hair. This modification in legs enables them to swim among aquatic plants in search of food (Gall *et al.*, 2011).

The goal of this paper was to study the diversity of the caddisfly fauna of Brezne Lake and consequently contribute to the faunistic list of the Republic of Kosovo. A specific goal of this investigation was also to contribute to the knowledge on the distribution of the genus *Triaenodes* in southeastern Europe, including some ecological notes and data on its habitat.

MATERIAL AND METHODS

Data sampling and processing

Adult caddisfly specimens were collected with entomological net and ultraviolet light trap. The sampling was carried out monthly from May to November 2012. Ultraviolet light was placed above a white pan of 60 cm in diameter, filled with water and a few drops of detergent. The light trap was placed on the stream bank and operated from dusk until next morning. Collected samples were preserved in 80 % ethanol. The specimens were identified under a stereomicroscope with determination keys from Malicky (2004) and Kumanski (1985, 1988). Female specimens of the genus *Hydropsyche* Pictet, 1834 are identified only up to the generic level due to the difficulties in identifying the species accurately. One female specimen of the genus *Plectrocnemia* Stephens, 1836 is also identified only to the generic level due to the slight damage of terminal part of genitalia. However, it does not belong to *Plectrocnemia conspersa* (Curtis, 1834) which was also collected at this locality.

The collection is deposited at the Laboratory of Zoology of the Faculty of Mathematics and Natural Sciences, University of Prishtina "Hasan Prishtina", Republic of Kosovo.

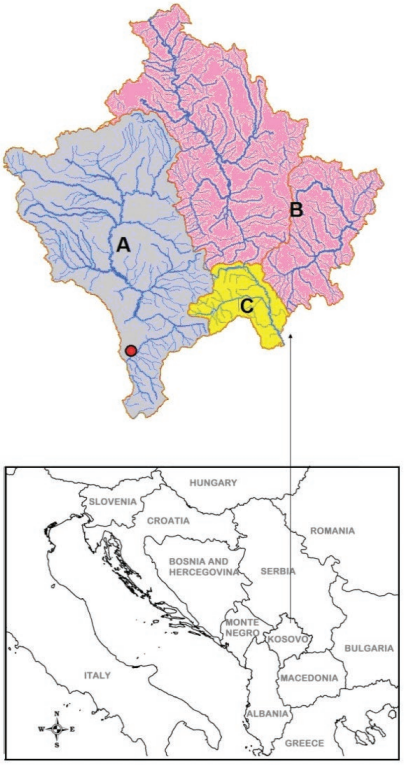
Study area

The sampling site is located at Brezne Lake in Brezne village of Dragash Municipality. The lake is located at the foothills of Koritnik Mountains and is a relic of a previously bigger lake that covered the Llapushnik valley. Its total length is about 250 m, width 100 m and maximal depth about 10 m. The lake is fed by surface and underground waters. A small stream coming from Plavë village also discharges into this lake. The substrate is mostly dominated by silt, but there are stones of different sizes as well, especially around the area of the streamlet.

The sampling site (Fig. 1, Fig. 2) is located at the western side of the lake, about 100m in distance from the brook (42.130913°N, 20.640791°E, and 947 m above sea level).

RESULTS AND DISCUSSION

During this investigation we employed two methods for collecting caddisflies: entomological nets and ultraviolet light traps. Several studies in the area (e.g. Ibrahimi *et al.*, 2014a, 2014b, 2015a, 2015b; Stanić-Koštroman, 2009) have emphasized the importance of using both methods in sampling caddisflies in order to get the real number of species present, due to the fact that within this order of aquatic insects there are species with different ecological habits and flight activity. This was borne out during this investigation, in which some species were sampled only with certain method. During the seven-month period of investigation, twelve taxa were collected in total (Tab. 1) with both methods; they belonged to the following five families: Hydropsychidae, Limnephilidae, Polycentropodidae, Leptoceridae and Uenoidae.



The highest number of species belongs to the family Limnephilidae, six in total. Species of this family are found to dominate in other lakes of similar size in Europe as well (e.g. Kıss *et al*., 2003). Other families found during this investigation are also common for standing waters. Most of the species found during this investigation are commonly found in southeastern Europe and Kosovo as well with the exception of all species of the genus *Limnephilus* Leach, 1815 which are quite rare in Kosovo according to the current knowledge. The only species of the family Uenoidae found during this investigation, *Thremma anomalum*, is not a species commonly found in lakes and we presume the habitat of larvae of this species is the nearby stream which discharges into the lake.

In total ten species belonging to all five families were collected with entomological nets during this investigation. In total ten species were also collected with ultraviolet light traps during the same period; they belonged to the following families: Hydropsychidae, Limnephilidae, Polycentropodidae and Uenoidae. However, *Limnephilus sparsus* Curtis, 1834 and *Limnephilus vittatus* Curtis, 1834 were collected only with the ultraviolet light trap. These two species are mostly active during the night, spending the day and especially the warm hours hidden within the leaves of quite high trees (e.g. Gashi, 2014).

Triaenodes bicolor was sampled twice during this period and only with an entomological net. The first sampling of this species was on 15th of July 2012 and

Fig. 1. Sampling site in Brezne Lake with indicated watersheds in the Republic of Kosovo: A – Adriatic Sea Basin, B – Black Sea Basin, C – Aegean Sea Basin.

Fig. 2. Sampling site at Brezne Lake.

the second and last one was on 3rd of August 2012. Apparently *T. bicolor* is active during the night as well although the number of sampled specimens with ultraviolet light traps in other similar studies is very low compared to some other species of the family Leptoceridae for example (Higler *et al.*, 2008). Since there are no comparable results for collecting caddisflies with both methods elsewhere and which include this species, we can only suppose that the reason why this species is sampled only with an entomological net during our investigation lies only on its low population density. This is supported by the low number of individuals sampled with an entomological net as well: only ten individuals during a one year sampling period.

This investigation shows that the application of different sampling techniques results in discovery of more species and especially those with small populations which are usually overlooked when only one particular method in collecting caddisflies is used.

This is the first record of *Triaenodes bicolor* for the Republic of Kosovo and Ecoregion 6, Hellenic Western Balkans (Illies, 1967). This is at the same time the first country record of the genus *Triaenodes*. Previously this species has been recorded across most of Europe, except in the southern ecoregions ER1, 2, 6 (Iberic-Macaronesian ecoregion, the Pyrenees, Hellenic Western Balkans) and Iceland (ER19) (Graf *et al.*, 2008). The species seems to be very rare in Kosovo. More than 200 localities in lakes, streams and rivers all over Kosovo were surveyed during the nine year period (2008 – 2016) for Trichoptera (e.g. Gashi *et al.*, 2015; Gashi & Ibrahimi, 2008; Ibrahimi *et al.*, 2014a, 2014b, 2015a, 2015b, 2016a, 2016b; Oláh *et al.*, 2014, 2015) and Brezne Lake is the only locality where this species has been found so far. Notwithstanding a few records in Slovenia (Urbanič, 2001) and Bulgaria (Kumanski, 1985), the species seems to be almost completely absent from southeastern Europe according to the current knowledge (Daet, 2017; Fig. 3). Despite several earlier investigations in Greece, Bosnia and Herzegovina, Croatia, Montenegro and Serbia, it has not been found so far in these countries (e.g. Marinković-Gospodnetić, 1966, 1970, 1971, 1975, 1978, 1980; Kučinić *et al.*, 2012, 2015; Malicky, 2005; Stanić-Koštroman, 2009; Živič *et al.*, 2006). It is highly probable that the species is present elsewhere in southeastern Europe, but with a limited distribution, reflecting the preferred habitats of this species in this part of Europe. *Triaenodes bicolor* is a phytal habitat specialist and warm water stenotherm. In addition to this, most of the studies investigating caddisflies of this part of Europe are focused on streams and rivers, while standing waters are only rarely investigated. In neighbouring Albania another species of *Triaenodes* has been found, *Triaenodes ochreellus* with subspecies

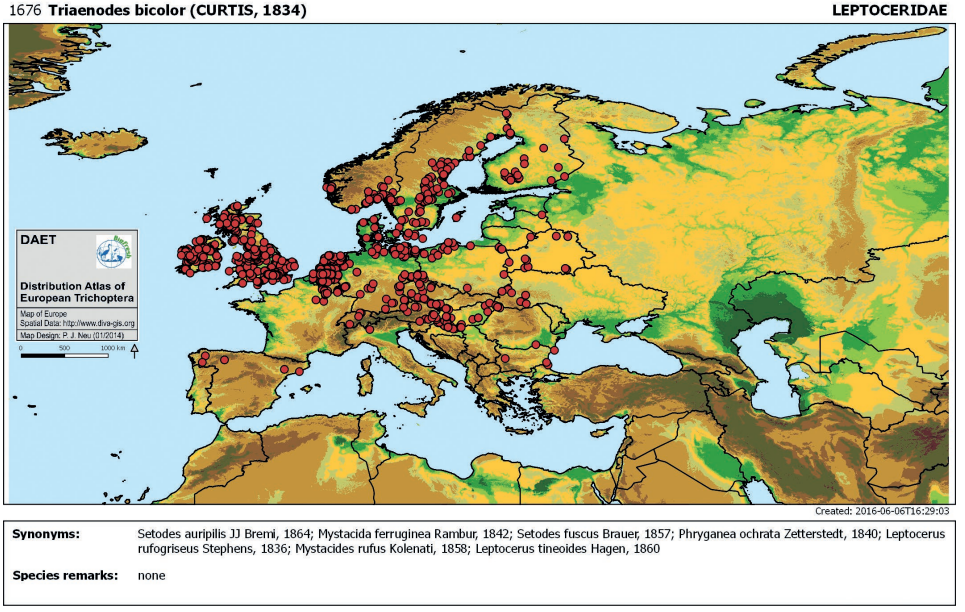


Fig. 3. Distribution of *Triaenodes bicolor* in Europe, prior to the current investigation, according to the Distribution Atlas of European Trichoptera (DAET, 2017).

Tab. 1. The list of species collected with entomological net (E) and ultraviolet light trap (U) in Brezne Lake during the period May – November 2012.

Families/Species	May			June			July			August			September			October			November		
	♀	♂	Σ	♀	♂	Σ	♀	♂	Σ	♀	♂	Σ	♀	♂	Σ	♀	♂	Σ	♀	♂	Σ
Hydropsychidae																					
Hydropsyche spp.	5 U		5				4 E 2 U		6												
Hydropsyche instabilis (Curtis, 1834)					2 U	2		1 E	1												
Polycentropodidae																					
Plectrocnemia spp.										2 E		2									
Plectrocnemia conspersa (Curtis, 1834)				1 U	1 E 4 U	6					1 E	1									
Limnephilidae																					
Limnephilus auricula (Curtis, 1834)								1 E	1		1 E	1		2 U	2						
Limnephilus bipunctatus Curtis, 1834										3 U		3	1 E 3 U	1 E 4 U	9	1 U	2 E 3 U	6		1 E	1
Limnephilus sparsus Curtis, 1834														3 U	3		4 U	4			
Limnephilus vittatus (Fabricius, 1798)																	1 U	1			
Micropterna nycterobia McLachlan, 1875				1 U	2 U	3		1 E	1	2 U	5 U	7	3 U	2 U	5	5 E 5 U	2 E 7 U	19	2 E 5 U	6 U	13
Micropterna sequax McLachlan, 1875							1 U	1 E	2				1 U	2 U	3		1 E	1		2 E	2
Leptoceridae																					
Triaenodes bicolor (Curtis, 1834)								2 E	2	3 E	5	8									
Uenonidae																					
Thremma anomalum McLachlan, 1876		1 E	1					1 E 1 U	2					2 E	2						

ochreellus (Oláh & Kovacs, 2014). According to Fauna Europaea (Malicky, 2013) *T. ochreellus* is present, as well as in Albania, in Croatia, Montenegro and Serbia. However data for Montenegro and Serbia are not backed by any literature records dealing with the caddisflies of these two countries. Brackish habitats of Croatia are recorded as being inhabited by *T. ochreellus lefkas* (Kučinić *et al.*, 2015).

Even though *Triaenodes bicolor* has been reported to emerge from spring to autumn (Graf *et al.*, 2008), during our investigation we found it only at the end of July and in early August although we sampled monthly at Brezne Lake. The reason for this could be the low population density of this species in this area.

This record is a further contribution to the inventory of the caddisfly fauna of the Republic of Kosovo, which is one of the poorest-investigated areas in Europe. This research shows that poorly investigated areas in the Balkan Peninsula will clarify the distribution patterns of rare and less known species of this order of aquatic insects in this area.

ACKNOWLEDGEMENT

We would like to thank Peter Neu from the Project 'Distributional Atlas of European Trichoptera' (DAET) for providing the map of distribution of *Triaenodes bicolor* in Europe. We also want to thank two reviewers, Wolfram Graf and Ana Previšić, whose comments significantly improved this manuscript.

Received February 9, 2017

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SUMMARY

First record of *Triaenodes bicolor* (Curtis, 1834) (Insecta: Trichoptera) from the Ecoregion Hellenic Western Balkans

H. Ibrahimi, R. Kuçi, A. Bilalli & E. Gashi

The genus *Triaenodes* contains nearly 300 species with larvae inhabiting lentic and lotic waters where they are closely associated with the aquatic vegetation. In this paper we report the first record of the genus *Triaenodes* with the species *Triaenodes bicolor* from the Republic of Kosovo. This species is reported for the first time from Ecoregion 6, Hellenic Western Balkans, as well. Adult males and females of this species were sampled with entomological net on two occasions, during July and August, in Brezne Lake in Dragash Municipality. No specimen of *Triaenodes bicolor* was collected with the ultraviolet light trap. In other countries in Europe it has been reported to emerge from spring to autumn. In this locality adult caddisflies were collected monthly with entomological nets and ultraviolet light traps from May to November 2012. Other caddisfly taxa sympatric with *Triaenodes bicolor* in the investigated locality are: *Hydropsyche instabilis, Hydropsyche* spp., *Plectrocnemia conspersa*, *Plectrocnemia* spp., *Micropterna nycterobia*, *Micropterna sequax*, *Limnephilus vittatus*, *Limnephilus auricula* and *Thremma anomalum*.