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## RESEARCH

# Trichoptera Biodiversity of the Aegean and Adriatic Sea Basins in the Republic of Kosovo

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**ABSTRACT.** We present the first preliminary inventory of Trichoptera taxa in the Aegean and Adriatic Sea basins in Kosovo that have previously received poor and fragmentary attention. Adult caddisflies were collected using ultraviolet (UV) light traps in 13 stations in areas of the Aegean Sea and Adriatic Sea drainage basins in Kosovo. Nineteen species out of 82, reported in this article, are first records for the Kosovo caddisfly fauna. Five genera are recorded for the first time in Kosovo: *Brachycentrus*, *Ecclisopteryx*, *Psilopteryx*, *Thremma*, and *Oecetis*. During this investigation, we found several Southeastern European endemic and rare species whose previous known distribution was limited to particular areas of this region, as well as other species whose distribution is considerably enlarged by this investigation: *Polycentropus ierapetra*, *Polycentropus irroratus*, *Chaetopteryx stankovici*, *Drusus schmidi*, *Drusus tenellus*, *Potamophylax gouladiourum*, *Oecetis notata*, and *Notidobia melanoptera*. Even though this article is a result of a limited sampling effort, it increases the number of Trichoptera taxa recorded for the Republic of Kosovo to 131.

**Key Words:** aquatic insect, Balkan Peninsula, Europe, Kosovo, Trichoptera

In the Republic of Kosovo, investigations of caddisfly fauna based on reliable adult specimens have until recently been fragmentary and unsystematic with only few recorded species (Pongrácz 1923; Marinković-Gospodnetić 1975, 1980; Malicky 1986, 1999; Oláh 2010). It is only during last years that specific areas in the Republic of Kosovo are being investigated in detail in regard to the caddisfly fauna (Ibrahim et al. 2012a,b, 2013; Oláh et al. 2013a,b). Sixty-five new records for the Kosovo caddisfly fauna have been observed during the last years from rivers and streams of the Black Sea water basin (Ibrahim et al. 2012a). In addition to this, two new species have been recently described from Kosovo: *Potamophylax fules* Oláh and Ibrahim, 2013 and *Chaetopteroidea kosovarorum* Ibrahim and Oláh, 2013.

All rivers in Kosovo belong to the drainage basins of three seas: the Black Sea, the Adriatic Sea, and the Aegean Sea. The biggest in area is the drainage basin of the Black Sea, covering 50.7% of the Kosovo territory. The drainage basin of the Aegean Sea covers about 5.8% while the rest (43.5%) belongs to the drainage basin of the Adriatic Sea. The Balkanic endemic species *Ernodes skipetarum* Malicky, 1986 and *Limnephilus petri* Marinković-Gospodnetić, 1966 are described from freshwater habitats belonging to the Adriatic Sea drainage basin in Kosovo.

Caddisfly larvae have frequently been used in freshwater quality assessment of streams and rivers in Kosovo (Ibrahim and Gashi 2008). Most of the applied indices for this purpose used family or species level of macroinvertebrates but due to difficulties in determination of larval stages, either as a result of the absence of proper literature or as a result of insufficient knowledge on faunistic distribution of given species, these studies are questionable from the taxonomic perspective. This study is the first systematic approach toward caddisfly inventory of this part of the Balkan Peninsula based on adult specimen collections. The main goal of this study is: 1) improvement of taxonomic knowledge of caddisfly fauna of Kosovo in function of proper use as biological indicators and 2) improvement of knowledge on geographic distribution of some rare species in this part of the Balkan Peninsula in function of future conservation measures.

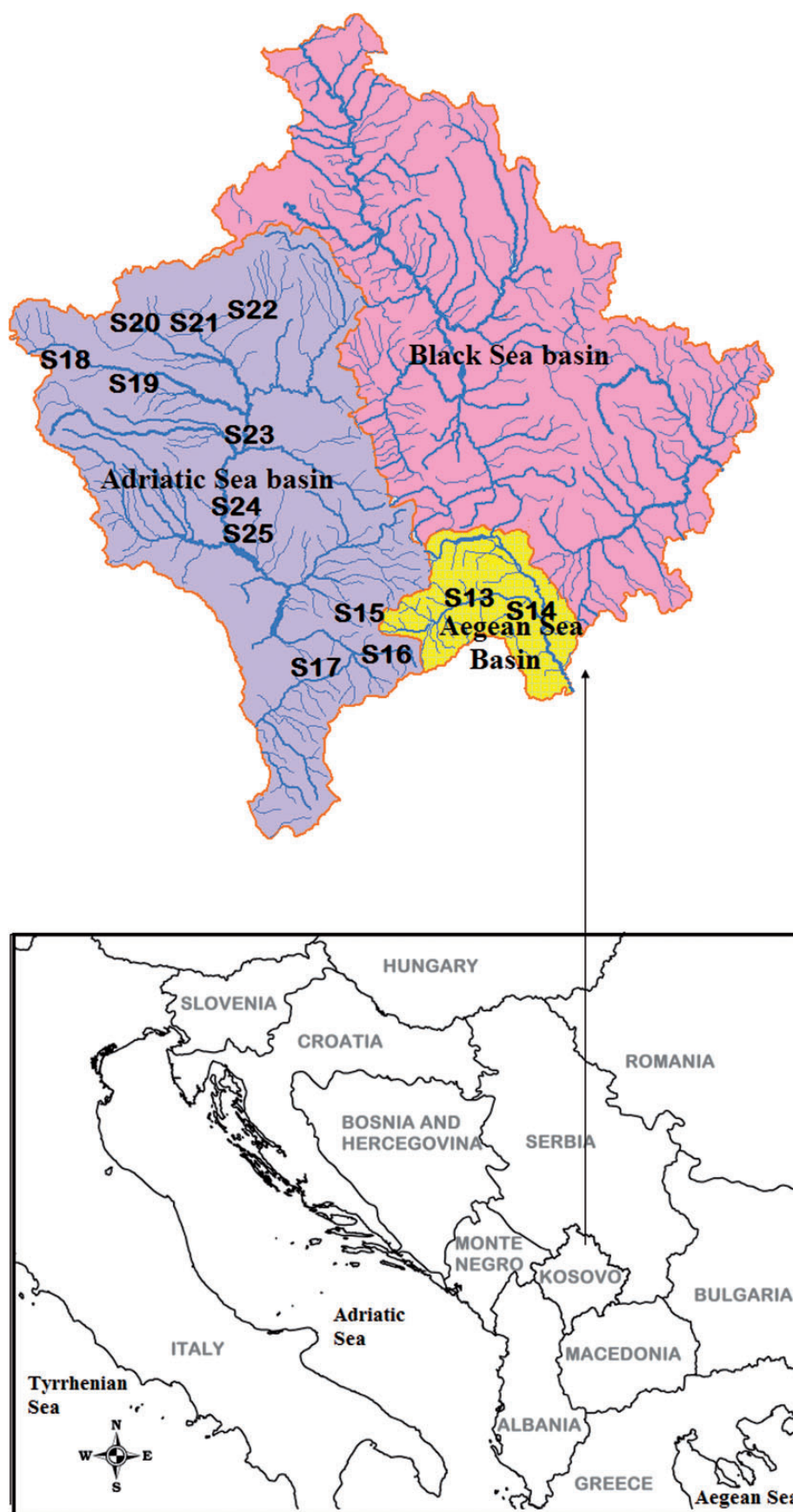
## Materials and Methods

Adult caddisfly specimens were collected using UV pyramid-type light trap with white sheet at two stations, which belong to the Aegean Sea drainage basin (S13 and S14), and at 11 stations, which belong to the Adriatic Sea drainage basin (S15–S25) in Kosovo (Fig. 1; Table 1). All stations are located at the upper reaches of the rivers, except station S20, which is located at the spring area of the river and stations S23, S24, and S25, which are located at the middle reaches of the rivers. The sampling was performed between March 2009 and November 2010, once per month at every sampling station. Light traps were placed on stream banks and operated for 1 h and 15 min immediately after dusk. Collected samples were preserved in 80% ethanol. The specimens were identified under a stereomicroscope with determination keys from Malicky (2004) and Kumanski (1985, 1988). Specimens were collected by Halil Ibrahim and were determined by Halil Ibrahim and Mladen Kućinić unless noted otherwise. All specimens were identified up to the species level with the exception of *Hydropsyche* females, which are identified only up to the genus level. The collection is deposited at the Laboratory of Zoology of the Faculty of Natural and Mathematical Sciences, University of Prishtina, Republic of Kosovo. Systematic presentation was done according to (Oláh et al. 2013a,b; Morse 2014).

## Results

During this investigation, a total of 82 species are reported. The distribution of species per families is as follows: Rhyacophilidae 15, Glossosomatidae 4, Philopotamidae 4, Hydropsychidae 9, Polycentropodidae 5, Psychomyiidae 5, Brachycentridae 3, Limnephilidae 17, Uenoidae 1, Goeridae 3, Lepidostomatidae 1, Leptoceridae 7, Sericosomatidae 4, and Beraeidae 3.

The family Uenoidae is recorded for the first time in Kosovo. In addition, five genera are recorded for the first time in Kosovo based on reliable identification of adult caddisflies: *Brachycentrus* Curtis, 1834, *Ecclisopteryx* Kolenati, 1848, *Psilopteryx* Stein, 1874, *Thremma* McLachlan, 1876, and *Oecetis* McLachlan, 1877. Nineteen species are



**Fig. 1.** Location of the sampling sites: S13 Lepenc Iartë, S14 Brod, S15 Sredskë, S16 Prevallë, S17 Zaplluxhe, S18 Kuqishte, S19 Pejë, S20 Vrellë e Istogut, S21 Istog, S22 Kujavçe, S23 Klinë, S24 Mirushë, and S25 Mrasor.

**Table 1. Locality data for the 13 sampling stations**

| Code | Sampling Stations | River/stream          | Latitude (°N) | Longitude (°E) | Altitude (m) |
|------|-------------------|-----------------------|---------------|----------------|--------------|
| S13  | Lepenc lartë      | Lepenc River          | 42.1813       | 20.9781        | 1465         |
| S14  | Brod              | Lepenc River          | 42.2694       | 21.1261        | 702          |
| S15  | Sredskë           | Lumbardhi i Prizrenit | 42.1708       | 20.8623        | 820          |
| S16  | Prevallë          | Lumbardhi i Prizrenit | 42.161        | 20.9533        | 1664         |
| S17  | Zaplluxhë         | Stream                | 42.1295       | 20.7488        | 1194         |
| S18  | Kuqishte          | Lumbardhi i Pejës     | 42.9679       | 20.0718        | 1218         |
| S19  | Pejë              | Lumbardhi i Pejës     | 42.6612       | 20.2595        | 587          |
| S20  | Vrellë e Istogut  | Stream                | 42.7739       | 20.4011        | 543          |
| S21  | Istog             | Istog River           | 42.7875       | 20.4822        | 536          |
| S22  | Kujavqe           | Stream                | 42.8322       | 20.6528        | 746          |
| S23  | Klinë             | Klina River           | 42.6235       | 20.6002        | 430          |
| S24  | Mirushë           | Mirusha River         | 42.5217       | 20.5644        | 386          |
| S25  | Mrasor            | Drini i Bardhë River  | 42.5168       | 20.5545        | 400          |

first records for the Kosovo caddisfly fauna (species indicated with an \* in the list). The highest number of newly recorded species belongs to the family Limnephilidae (9) while a lower number of newly recorded species was found for six other families: Polycentropodidae (3), Glossosomatidae (2), Sericostomatidae (2), Brachycentridae (1), Psychomyiidae (1), and Uenoidae (1).

**Systematic List of Caddisflies Collected in the Aegean Sea and Adriatic Sea Basins in Kosovo From 2009 to 2010. Species New to the Fauna of Kosovo Are Indicated by an Asterisk.**

*Family Rhyacophilidae.*

*Rhyacophila armeniaca* Guerin—Meneville, 1843

S13 Lepenc lartë: 19.07.2010. 4 ♂♂; S18 Kuqishte: 19.06.2009. 4 ♂♂, 15.08.2009. 8 ♀♀, 3 ♂♂, 16.09.2009. 8 ♀♀, 21 ♂♂; S19 Pejë: 16.07.2009. 2 ♂♂.

*Rhyacophila balcanica* Radovanović, 1953

S16 Prevallë: 21.07.2009. 5 ♀♀, 8 ♂♂, 20.08.2009. 4 ♀♀, 7 ♂♂, 18.09.2009. 6 ♀♀, 5 ♂♂.

*Rhyacophila bosnica* Schmid, 1970

S13 Lepenc lartë: 09.03.2010. 2 ♂♂, 08.04.2010. 4 ♀♀, 21 ♂♂, 07.05.2010. 6 ♀♀, 12 ♂♂, 07.06.2010. 2 ♀♀, 5 ♂♂; S16 Prevallë: 20.04.2009. 21 ♂♂, 20.05.2009. 12 ♀♀, 33 ♂♂; S18 Kuqishte: 16.07.2009. 3 ♀♀, 12 ♂♂.

*Rhyacophila fasciata* Hagen, 1859

S14 Brod: 07.06.2010. 9 ♀♀, 13 ♂♂, 13.07.2010. 9 ♀♀; S17 Zaplluxhë: 23.09.2010. 3 ♂♂, 26.10.2010. 2 ♂♂; S21 Istog: 08.05.2009. 1 ♀, 4 ♂♂, S23 Klinë: 15.04.2009. 3 ♀♀, 7 ♂♂, 12.07.2009. 4 ♀♀, 2 ♀♀, 11.09.2009. 21 ♀♀, 21 ♂♂; S24 Mirushë: 30.07.2009. 11 ♂♂.

*Rhyacophila fischeri* Botosaneanu, 1957

S13 Lepenc lartë: 07.06.2010. 1 ♀, 7 ♂; S16 Prevallë: 18.06.2009. 8 ♀♀, 21 ♂♂, 22.07.2009. 8 ♀♀, 16 ♂♂; S17 Zaplluxhë: 25.05.2010. 4 ♂♂, 23.07.2010. 7 ♂♂.

*Rhyacophila laevis* Pictet, 1834

S18 Kuqishte: 19.06.2009. 11 ♀♀, 12 ♂♂.

*Rhyacophila loxias* Schmid, 1970

S13 Lepenc lartë: 13.07.2010. 23 ♀♀, 45 ♂♂, 17.08.2010. 8 ♀♀, 19 ♂♂, 17.09.2010. 8 ♂♂, 18.10.2010. 2 ♀♀, 21 ♂♂; S16 Prevallë: 22.07.2009. 7 ♀♀, 15 ♂♂, 21.08.2009. 8 ♀♀, 23 ♂♂, 20.09.2009. 8 ♀♀, 21 ♂♂; S17 Zaplluxhë: 24.06.2010. 5 ♂♂; S18 Kuqishte: 15.06.2009. 8 ♀♀, 12 ♂♂, 15.08.2009. 7 ♀♀, 13 ♂♂; S19 Pejë: 16.07.2009. 6 ♀♀, 4 ♂♂, 15.08.2009. 10 ♂♂.

*Rhyacophila mocsaryi* Klapalek, 1898

S13 Lepenc lartë: 13.07.2010. 23 ♀♀, 45 ♂♂, 17.08.2010. 8 ♀♀, 19 ♂♂, 17.09.2010. 8 ♂♂, 18.10.2010. 2 ♀♀, 21 ♂♂; S18 Kuqishte: 19.06.2009. 2 ♂♂.

*Rhyacophila nubila* Zetterstedt, 1840

S14 Brod: 08.04.2010. 4 ♀♀, 07.05.2010. 6 ♀♀, 1 ♂♂, 07.06.2010. 6 ♀♀, 18 ♂♂, 13.07.2010. 9 ♂♂, 17.08.2010. 9 ♀♀, 12 ♂♂, 17.09.2010. 12 ♀♀, 11 ♂♂.

*Rhyacophila oblitterata* McLachlan, 1863

S13 Lepenc lartë: 17.09.2010. 1 ♂♂, 18.10.2010. 2 ♀♀, 11 ♂♂; S15 Sredskë: 18.06.2009. 3 ♀♀, 6 ♂♂, 21.09.2009. 8 ♀♀, 12 ♂; S18 Kuqishte: 19.06.2009. 3 ♀♀, 8 ♂♂.

*Rhyacophila obtusa* Klapalek, 1894

S13 Lepenc lartë: 07.05.2010. 1 ♀, 2 ♂♂, 07.06.2010. 14 ♀♀, 29 ♂♂, 17.08.2010. 21 ♀♀, 1 ♂; S16 Prevallë: 20.05.2009. 3 ♂♂, 22.07.2010. 5 ♀♀, 4 ♂♂.

*Rhyacophila palmeni* McLachlan, 1879

S15 Sredskë: 22.07.2009. 12 ♀♀, 18 ♂♂; S18 Kuqishte: 19.06.2009. 3 ♀♀, 8 ♂♂.

*Rhyacophila polonica* McLachlan, 1879

S17 Zaplluxhë: 12.05.2010. 2 ♀♀, 26 ♂♂; S21 Istog: 23.06.2009. 3 ♂♂; S22 Kujavqe: 20.06.2009. 2 ♀♀, 18 ♂♂, 12.07.2009. 15 ♀♀, 29 ♂♂, 12.08.2009. 3 ♀♀, 7 ♂♂, 11.09.2009. 12 ♀♀, 8 ♂♂, 23.10.2009. 10 ♂♂.

*Rhyacophila trescaviscensis* Botosaneanu, 1960

S20 Vrellë: 07.06.2009. 4 ♂♂ (1 ♂ det. H. Malicky).

*Rhyacophila tristis* Pictet, 1834

S13 Lepenc lartë: 07.06.2010. 3 ♂♂, 13.07.2010. 3 ♀♀, 6 ♂♂; S17 Zaplluxhë: 25.05.2010. 4 ♀♀, 17 ♂♂, 23.07.2010. 12 ♀♀, 32 ♂♂; S22 Kujavqe: 12.07.2009. 2 ♀♀, 4 ♂♂, 12.08.2009. 4 ♀♀, 7 ♂♂; S25 Mrasor: 27.04.2009. 1 ♂.

*Family Glossosomatidae.*

*Agapetus laniger* Pictet, 1834 \*

S24 Mirushë: 27.04.2009. 1 ♂; S25 Mrasor: 30.07.2009. 5 ♂♂.

*Glossosoma conforme* Neboiss, 1963

S13 Lepenc lartë: 13.07.2010. 6 ♂♂; S17 Zaplluxhë: 23.07.2010. 9 ♀♀, 5 ♂♂.

*Glossosoma discophorum* Klapalek, 1902 \*

S16 Prevallë: 22.07.2009. 2 ♂♂.

*Synagapetus iridipennis* McLachlan, 1879

S13 Lepenc lartë: 07.06.2010. 2 ♂♂; S15 Sredskë: 20.04.2009. 3 ♀♀, 24 ♂♂, 20.05.2009. 8 ♀♀, 11 ♂♂, S22 Kujavqe: 13.06.2009. 4 ♂♂.

*Family Philopotamidae.**Philopotamus montanus* (Donovan, 1813)

S13 Lepenc lartë: 08.04.2010. 15 ♂♂, 07.05.2010. 7 ♀♀, 9 ♂♂, 13.07.2010. 6 ♂♂, 17.08.2010. 12 ♀♀, 11 ♂♂; S14 Brod: 09.03.2010. 7 ♂♂, 08.04.2010. 6 ♂♂; 07.05.2010. 19 ♀♀, 9 ♂♂; S15 Sredskë: 21.03.2009. 10 ♂♂, 20.04.2009. 11 ♂♂, 20.05.2009. 18 ♀♀, 23 ♂♂, 18.06.2009. 11 ♀♀, 28 ♂♂, 20.08.2009. 6 ♀♀, 9 ♂♂; S16 Prevallë: 20.04.2009. 11 ♂♂, 20.05.2009. 6 ♀♀, 13 ♂♂, 18.06.2009. 19 ♀♀, 31 ♂♂, 22.07.2009. 6 ♀♀, 9 ♂♂; S17 Zaplluxhë: 7 ♂♂, 26.04.2010. 10 ♂♂, 25.05.2010. 7 ♀♀, 18 ♂♂, 24.06.2010. 9 ♀♀, 17 ♂♂, 23.07.2010. 6 ♀♀, 12 ♂♂, 21.08.2010. 6 ♂♂; S18 Kuqishte: 24.04.2009. 31 ♂♂, 24.05.2009. 18 ♀♀, 12 ♂♂; S19 Pejë: 19.06.2009. 4 ♀♀, 3 ♂♂; S21 Istog: 05.03.2009. 3 ♂♂, 04.04.2009. 3 ♂♂, 08.05.2009. 11 ♀♀, 8 ♂♂, 07.06.2009. 7 ♀♀, 13 ♂♂, 07.07.2009. 9 ♀♀, 1 ♂♂, 06.08.2009. 6 ♀♀, 1 ♂♂, 08.09.2009. 3 ♀♀, 4 ♂♂; S22 Kujavqe: 14.03.2009. 3 ♂♂, 15.04.2009. 20 ♂♂, 13.06.2009. 7 ♀♀, 6 ♂♂, 12.07.2009. 11 ♀♀, 13 ♂♂.

*Philopotamus variegatus* (Scopoli, 1763)

S16 Prevallë: 18.06.2009. 2 ♀♀, 4 ♂♂; S18 Kuqishte: 19.06.2009. 9 ♂♂; S22 Kujavqe: 19.05.2009. 2 ♂♂.

*Wormaldia occipitalis* (Pictet, 1834)

S13 Lepenc lartë: 07.05.2010. 3 ♀, 8 ♂♂, 13.07.2010. 5 ♀, 8 ♂♂; S15 Sredskë: 18.06.2009. 4 ♀♀, 7 ♂♂, 22.07.2009. 8 ♀♀, 23 ♂♂, 21.09.2009. 3 ♂♂; S16 Prevallë: 18.06.2009. 8 ♀♀, 16 ♂♂, 22.07.2009. 2 ♀♀, 4 ♂♂, 20.08.2009. 1 ♀, 4 ♂♂; S17 Zaplluxhë: 23.07.2010. 18 ♀♀, 8 ♂♂; S21 Istog: 04.04.2009. 1 ♀, 5 ♂♂, 08.05.2009. 1 ♀, 2 ♂♂; S22 Kujavqe: 13.06.2009. 5 ♂♂.

*Wormaldia subnigra* McLachlan, 1865

S24 Mirushë: 30.06.2009. 13 ♀♀, 12 ♂♂, 30.07.2009. 19 ♂♂, 23.08.2009. 3 ♂♂, 24.09.2009. 5 ♂♂.

*Family Hydropsychidae.**Cheumatopsyche lepida* (Pictet, 1834)

S24 Mirushë: 30.06.2009. 5 ♀♀, 2 ♂♂, 30.07.2009. 42 ♂♂; S25 Mrasor: 30.07.2009. 4 ♀♀, 13 ♂♂.

*Hydropsyche angustipennis* (Curtis, 1834)

S23 Klinë: 19.05.2009. 2 ♂♂, 12.08.2009. 5 ♂♂.

*Hydropsyche bulbifera* McLachlan, 1878

S24 Mirushë: 28.05.2009. 4 ♂♂, 23.08.2009. 8 ♂♂; S25 Mrasor: 30.07.2009. 3 ♂♂.

*Hydropsyche fulvipes* (Curtis, 1834)

S21 Istog: 07.07.2009. 6 ♂♂.

*Hydropsyche incognita* Pitsch, 1993

S14 Brod: 07.06.2010. 3 ♂♂, 18.10.2010. 2 ♂♂; S24 Mirushë: 28.05.2009. 5 ♂♂, 30.06.2009. 2 ♂♂, 30.07.2009. 14 ♂♂, 23.08.2009. 4 ♂♂, 24.09.2009. 2 ♂♂; S25 Mrasor: 30.07.2009. 4 ♂♂.

*Hydropsyche instabilis* (Curtis, 1834)

S14 Brod: 18.10.2010. 1 ♂; S18 Kuqishte: 28.05.2009. 5 ♂♂; S19 Pejë: 19.06.2009. 4 ♂♂.

*Hydropsyche peristerica* Botosaneanu and Marinković-Gospodnetić, 1968

S15 Sredskë: 20.05.2009. 14 ♂♂, 22.07.2009. 7 ♂♂; S16 Prevallë: 22.07.2009. 8 ♂♂; S17 Zaplluxhë: 23.07.2010. 3 ♂♂; S18 Kuqishte:

16.07.2009. 13 ♂♂, 15.08.2009. 4 ♂♂; S21 Istog: 07.06.2009. 4 ♂♂; S24 Mirushë: 30.06.2009. 1 ♂.

*Hydropsyche saxonica* McLachlan, 1884

S17 Zaplluxhë: 24.06.2010. 6 ♂♂; S23 Klinë: 19.05.2009. 19 ♂♂, 12.07.2009. 4 ♂♂, 12.08.2009. 5 ♂♂; S25 Mrasor: 23.08.2009. 1 ♂.

*Hydropsyche tabacarii* Botosaneanu, 1960

S17 Zaplluxhë: 16.05.2010. 4 ♂♂.

*Hydropsyche* sp. ♀

S13 Lepenc lartë: 13.07.2010. 8 ♀♀, 17.08.2010. 6 ♀♀; S14 Brod: 07.06.2010. 38 ♀♀, 13.07.2010. 13 ♀♀, 17.08.2010. 8 ♀♀; S15 Sredskë: 22.07.2009. 14 ♀♀; S16 Prevallë: 22.07.2009. 13 ♀♀; S17 Zaplluxhë: 23.07.2010. 23 ♀♀, 21.08.2010. 12 ♀♀; S18 Kuqishte: 28.05.2009. 21 ♀♀, 19.06.2009. 13 ♀♀, 23.07.2009. 44 ♀♀; S19 Pejë: 19.06.2009. 13 ♀♀; 07.06.2009. 11 ♀, 07.07.2009. 1 ♀; S22 Kujavqe: 12.07.2009. 23 ♀, 12.08.2009. 15 ♀; S23 Klinë: 15.04.2009. 21 ♀♀, 19.05.2009. 34 ♀♀, 13.06.2009. 23 ♀♀, 12.07.2009. 43 ♀♀, 12.08.2009. 21 ♀♀, 11.09.2009. 11 ♀♀; S24 Mirushë: 28.05.2009. 12 ♀♀, 30.07.2009. 34 ♀♀, 23.08.2009. 33 ♀♀, 24.09.2009. 12 ♀♀; S25 Mrasor: 28.05.2009. 13 ♀♀, 30.06.2009. 21 ♀♀, 30.07.2009. 7 ♀♀, 23.08.2009. 23 ♀♀.

*Family Polycentropodidae.**Cyrnus trimaculatus* (Curtis, 1834)

S23 Klinë: 19.05.2009. 5 ♀♀, 8 ♂♂, 13.06.2009. 12 ♀♀, 2 ♂♂, 12.07.2009. 21 ♀♀, 34 ♂♂, 12.08.2009. 2 ♀♀, 4 ♂♂.

*Polycentropus flavomaculatus* (Pictet, 1834)

S25 Mrasor: 28.06.2010. 1 ♂ (det. H. Malicky).

*Polycentropus ierapetra* Malicky, 1972 \*

S18 Kuqishte: 16.07.2009. 1 ♀ (det. H. Malicky).

*Polycentropus irroratus* Curtis, 1835 \*

S24 Mirushë: 27.04.2009. 1 ♂ (det. H. Malicky), 30.06.2009. 1 ♂.

*Plectrocnemia brevis* McLachlan, 1871 \*

S16 Prevallë: 22.07.2009. 2 ♂♂.

*Family Psychomyiidae.**Lype reducta* (Hagen, 1868)

S15 Sredskë: 20.04.2009. 1 ♂; S18 Kuqishte: 19.06.2009. 7 ♂♂; S24 Mirushë: 27.04.2009. 1 ♀, 4 ♂♂.

*Psychomyia pusilla* (Fabricius, 1781)

S13 Lepenc lartë: 13.07.2010. 2 ♀♀, 1 ♂; S14 Brod: 13.07.2010. 18 ♀♀, 3 ♂♂, 17.08.2010. 8 ♀♀, 2 ♂♂, 17.09.2010. 9 ♂♂; S23 Klinë: 13.06.2009. 32 ♀♀, 12.07.2009. 34 ♀♀, 1 ♂, 12.08.2009. 23 ♀♀, 11.09.2009. 54 ♀♀, 4 ♂♂; S24 Mirushë: 30.07.2009. 32 ♀♀, 1 ♂, 23.08.2009. 24 ♀♀, 4 ♂♂; S25 Mrasor: 28.05.2009. 35 ♀♀, 3 ♂♂, 30.06.2009. 176 ♀♀, 1 ♂, 30.07.2009. 87 ♀, 6 ♂♂, 23.08.2009. 129 ♀♀, 2 ♂♂.

*Tinodes pallidulus* McLachlan, 1878 \*

S19 Pejë: 19.06.2009. 3 ♀♀, 6 ♂♂; S23 Klinë: 13.06.2009. 8 ♀♀, 21 ♂♂.

*Tinodes rostocki* McLachlan, 1878

S15 Sredskë: 21.09.2009. 13 ♀♀, 23 ♂♂; S21 Istog: 07.06.2009. 4 ♀♀, 6 ♂♂, 07.07.2009. 12 ♀♀, 25 ♂♂, 06.08.2009. 5 ♀♀.

*Tinodes unicolor* (Pictet, 1834)

S20 Vrellë: 07.06.2009. 12 ♀♀, 15 ♂♂.

### Family Brachycentridae.

#### *Brachycentrus maculatus* (Fourcroy, 1785) \*

S25 Mrasor: 30.07.3009. 5 ♀♀, 23 ♂♂, 23.07.2009. 4 ♀♀, 5 ♂♂.

#### *Micrasema minimum* McLachlan, 1876

S13 Lepenc lartë: 1 ♀, 1 ♂; S18 Kuqishte: 19.06.2009. 6 ♂♂, 15.08.2009. 4 ♂♂, S19 Pejë: 16.07.2009. 12 ♀♀, 13 ♂♂, 15.08.2009. 10 ♂♂; S19 Pejë: 16.07.2009. 12 ♀♀, 13 ♂♂, 15.08.2009. 10 ♂♂,

#### *Micrasema sericeum* Klapalek, 1902

S18 Kuqishte: 19.06.2009. 4 ♂♂; S19 Pejë: 19.06.2009. 9 ♀♀, 11 ♂♂.

### Family Limnephilidae.

#### *Anabolia furcata* Brauer, 1857

S23 Klinë: 12.08.2009. 13 ♀♀, 21 ♂♂, 11.09.2009. 6 ♀♀, 14 ♂♂.

#### *Chaetopteryx stankovici* Marinković-Gospodnetić, 1966 \*

S17 Zaplluxhë: 23.10.2009. 9 ♀♀, 8 ♂♂, 25.11.2010. 5 ♂♂.

#### *Drusus* cf. *bigguttatus* (Pictet, 1834)

S18 Kuqishte: 19.06.2009. 3 ♀♀.

#### *Drusus botosaneanui* Kumanski, 1968

S15 Sredskë: 20.08.2009. 5 ♀♀, 7 ♂♂, 21.09.2009. 8 ♀♀, 3 ♂♂, 20.11.2009. 3 ♀♀, 3 ♂♂; S17 Zaplluxhë: 21.08.2009. 12 ♀♀, 14 ♂♂.

#### *Drusus discolor* (Rambur, 1842)

S13 Lepenc lartë: 17.08.2010. 4 ♀♀, 11 ♂♂; S16 Prevallë: 22.07.2009. 16 ♀♀, 23 ♂♂, 20.08.2009. 5 ♀♀, 9 ♂♂.

#### *Drusus krusniki* Malicky, 1981

S18 Kuqishte: 19.06.2009. 4 ♀♀, 12 ♂♂; S19 Pejë: 24.04.2009. 34 ♀♀, 25 ♂♂; S20 Vrellë: 05.03.2009. 4 ♂♂, 04.04.2009. 3 ♀♀, 17 ♂♂, 08.05.2009. 3 ♀♀, 49 ♂♂, 07.06.2009. 4 ♀♀, 28 ♂♂, 07.07.2009. 19 ♀♀, 31 ♂♂, 06.08.2009. 12 ♀♀, 32 ♂♂, 08.09.2009. 3 ♀♀, 13 ♂♂.

#### *Drusus schmidi* Botosaneanu, 1960 \*

S18 Kuqishte: 19.06.2009. 1 ♂♂.

#### *Drusus tenellus* (Klapalek, 1898) \*

S18 Kuqishte: 16.07.2009. 1 ♀, 4 ♂♂, 15.08.2009. 19 ♂♂.

#### *Ecclisopteryx* cf. *dalecarlica* Kolenati, 1848 \*

S19 Pejë: 19.06.2009. 6 ♀♀, 2 ♂♂.

#### *Limnephilus affinis* Curtis, 1834

S16 Prevallë: 22.07.2010. 2 ♂♂, 20.08.2009. 1 ♂; S17 Zaplluxhë: 21.08.2010. 2 ♂♂.

#### *Limnephilus auricula* Curtis, 1834 \*

S13 Lepenc lartë: 07.06.2010. 4 ♂♂.

#### *Limnephilus sparsus* Curtis, 1834 \*

S13 Lepenc lartë: 07.06.2010. 4 ♀♀; S17 Zaplluxhë: 21.08.2010. 4 ♂♂.

#### *Potamophylax cingulatus* (Stephens, 1837) \*

S14 Brod: 07.06.2010. 1 ♂, 13.07.2010. 4 ♀♀, 6 ♂♂.

#### *Potamophylax cingulatus/lattipenis*

S21 Istog: 07.06.2009. 1 ♀; S16 Prevallë: 18.06.2009. 3 ♀♀, 22.07.2009. 7 ♀♀.

#### *Potamophylax goulandrionum* Malicky, 1974 \*

S13 Lepenc lartë: 17.09.2010. 1 ♀, 1 ♂.

#### *Potamophylax luctuosus* (Piller and Mitterpacher, 1783)

S14 Brod: 07.06.2010. 2 ♂♂, 13.07.2010. 4 ♀, 6 ♂♂; S17 Zaplluxhë: 23.07.2010. 1 ♂; S21 Istog: 07.06.2009. 1 ♂.

#### *Potamophylax pallidus* Klapalek, 1899

S13 Lepenc lartë: 18.10.2010. 2 ♂♂; S20 Vrellë: 08.05.2009. 9 ♀♀, 1 ♂, 07.06.2009. 11 ♀♀, 6 ♂♂, 07.07.2009. 21 ♀♀, 6 ♂♂; 06.08.2009. 4 ♀♀, 4 ♂♂, 08.09.2009. 2 ♂♂.

#### *Psilopteryx montanus* Kumanski, 1968 \*

S13 Lepenc lartë: 19.11.2010. 5 ♀♀, 18 ♂♂; S16 Prevallë: 21.09.2009. 4 ♀♀, 7 ♂♂.

### Family Uenoidae.

#### *Thremma anomalum* McLachlan, 1876 \*

S13 Lepenc lartë: 07.06.2010. 6 ♀♀, 8 ♂♂; S14 Brod: 07.05.2010. 6 ♂♂; S15 Sredskë: 20.04.2009. 5 ♀♀, 16 ♂♂, 18.06.2009. 22 ♀♀, 43 ♂♂, 22.07.2009. 2 ♀♀, 6 ♂♂, 20.08.2009. 13 ♀♀, 33 ♂♂; S20 Vrellë: 08.05.2009. 4 ♀♀, 12 ♂♂, 07.06.2009. 4 ♀♀, 7 ♂♂, 07.07.2009. 21 ♀♀, 32 ♂♂, 06.08.2009. 1 ♀, 5 ♂♂, 08.09.2009. 4 ♀♀, 5 ♂♂; S21 Istog: 04.04.2009. 2 ♀♀, 9 ♂♂, 08.05.2009. 4 ♀♀, 23 ♂♂, 07.06.2009. 3 ♀♀, 7 ♂♂, 07.07.2009. 5 ♀♀, 13 ♂♂.

### Family Goeridae.

#### *Goera pilosa* (Fabricius, 1775)

S23 Klinë: 15.04.2009. 1 ♀, 3 ♂, 19.05.2009. 2 ♀♀, 7 ♂♂; S24 Mirushë: 27.04.2009. 8 ♀♀, 13 ♂♂, 30.06.2009. 24 ♀♀, 39 ♂♂; S25 Mrasor: 28.05.2009. 12 ♀♀, 24 ♂♂, 30.06.2009. 31 ♀♀, 12 ♂♂.

#### *Silo graellsii* Pictet, 1865

S22 Kujavqe: 19.05.2009. 4 ♀♀, 17 ♂♂, 13.06.2009. 12 ♀♀, 21 ♂♂, 12.07.2009. 2 ♀♀, 5 ♂♂; S24 Mirushë: 27.04.2009. 27.04.2009. 1 ♂.

#### *Silo piceus* (Brauer, 1857)

S23 Klinë: 19.05.2009. 3 ♀♀, 7 ♂♂; S25 Mrasor: 28.05.2009. 7 ♀♀, 8 ♂♂.

### Family Lepidostomatidae.

#### *Lepidostoma basale* (Kolenati, 1848)

S14 Brod: 13.07.2009. 21 ♀♀, 23 ♂♂; S18 Kuqishte: 19.06.2009. 32 ♀♀, 15.08.2009. 19 ♀♀, 33 ♂♂, 16.09.2009. 44 ♀♀, 27 ♂♂, 28.10.2009. 5 ♂♂; S19 Pejë: 16.07.2009. 21 ♀♀, 22 ♂♂, 18.09.2009. 4 ♂♂, 28.10.2009. 10 ♂♂.

### Family Leptoceridae.

#### *Adicella filicornis* (Pictet, 1834)

S20 Vrellë: 07.07.2009. 2 ♂♂, 06.08.2009. 11 ♂♂.

#### *Adicella syriaca* Ulmer, 1907

S23 Klinë: 19.05.2009. 5 ♂♂.

#### *Athripsodes bilineatus* (Linnaeus, 1758)

S24 Mirushë: 30.06.2009. 1 ♂.

#### *Athripsodes cinereus* (Curtis, 1834)

S23 Klinë: 13.06.2009. 8 ♀♀, 29 ♂♂, 12.08.2009. 6 ♀♀, 13 ♂♂; S24 Mirushë: 30.06.3009. 12 ♀♀, 24 ♂♂.

#### *Leptocerus interruptus* (Fabricius, 1775)

S16 Prevallë: 22.07.2009. 5 ♀♀, 9 ♂♂; S23 Klinë: 13.06.2009. 9 ♀♀, 21 ♂♂; S24 Mirushë: 30.06.2009. 32 ♀♀, 21 ♂♂, 30.07.2009. 34 ♀♀, 12 ♂♂.

#### *Mystacides azureus* (Linnaeus, 1761)

S23 Klinë: 12.07.2009. 6 ♂♂; S24 Mirushë: 30.06.2009. 21 ♀♀, 8 ♂♂; S25 Mrasor: 30.06.2009. 12 ♀♀, 31 ♂♂.

*Mystacides niger* (Linnaeus, 1758)

S23 Klinë: 19.05.2009. 4 ♀♀, 2 ♂♂, 13.06.2009. 21 ♀♀, 11 ♂♂, 12.07.2009. 13 ♀♀, 4 ♂♂, 12.08.2009. 6 ♀♀, 9 ♂♂.

#### Family Sericostomatidae.

*Oecetis notata* (Rambur, 1842) \*

S25 Mrasor: 30.07.2009. 5 ♂♂.

*Notidobia ciliaris* (Linnaeus, 1761)

S24 Mirushë: 27.04.2009. 1 ♀, 4 ♂, 24.09.30009. 3 ♂♂.

*Notidobia melanoptera* Stein, 1863 \*

S13 Lepenc lartë: 07.06.2010. 2 ♀♀, 1 ♂.

*Oecismus monedula* (Hagen, 1859)

S15 Sredskë: 20.05.2009. 5 ♀♀, 8 ♂♂, 18.06.2009. 2 ♀♀, 7 ♂♂, 22.07.2009. 5 ♂♂; S22 Kujavqe: 12.07.2009. 1 ♀, 2 ♂♂.

#### Family Beraeidae.

*Beraea maurus* (Curtis, 1834)

S22 Kujavqe: 13.06.2009. 1 ♂.

*Beraemyia hrabei* Mayer, 1937

Kujavqe: 13.06.2009. 1 ♂.

*Ernodes articularis* (Pictet, 1834)

S17 Zaplluxhë: 24.06.2010. 2 ♂♂.

## Discussion

In this article, results of the caddisfly investigation from the Adriatic Sea and Aegean Sea drainage basins in Kosovo are given. Division of the territory of the Republic of Kosovo in three drainage basins is mostly done for technical purposes. Future additional and more extensive investigations of caddisflies and aquatic fauna in general must reveal if this division uses significant faunistic differences as well and if not, other geographical arrangements may be used in terms of biogeographical importance of caddisflies species distribution in Kosovo.

Although Southeastern Europe is known for intensive caddisfly investigations throughout the years in particular areas (e.g., Klapálek 1899, 1902; Radovanović 1931, 1935, 1953; Marinković-Gospodnetić 1966, 1975, 1980; Obr 1969; Kumanski 1985, 1988; Krušnik 1987; Chvojka 1997; Kumanski and Malicky 1999; Krušnik and Urbanič 2002; Malicky 2005, 2009; Živić et al. 2006; Previšić et al. 2007; Graf et al. 2008; Kučinić et al. 2008, 2011a, b, 2013; Ćuk and Vučković 2009; Waringer et al. 2009; Oláh 2010; Oláh et al. 2011; Vučković et al. 2011; Ibrahimović et al. 2012a, b, 2013; Oláh et al. 2013a, b) there are still poorly investigated countries, such as Kosovo and Albania, and many other regions even within the best studied countries. Thorough caddisfly investigations in these areas are important to understand the distribution range, conservation categorization, and endemism occurrence of less known species. In addition to this, caddisfly studies based on reliable adult specimens produce sound taxonomic data, which are an invaluable aid to water quality monitoring where caddisflies are one of the main bioindicators. Species-level identification improves resolution and precision of water quality assessment (Waringer et al. 2013). Due to erroneous identifications, many caddisfly species not typical for the area has been registered in previous macroinvertebrate studies based on larval stadium, while many other species to be expected in Kosovo have been neglected. This was proven by comparing results produced based on larval stadium (e.g., Gashi 2006; Zhushi-Etemi 2006; Ibrahimović 2007; Muja 2009) with investigations based on adult caddisflies (e.g., Ibrahimović et al. 2012a,b) including this study. For example, frequently reported species such as *Anabolia laevis* Zetterstedt, 1840, *Rhyacophila dorsalis* (Curtis, 1834), *Rhyacophila vulgaris* Pictet,

1834, *Hydropsyche guttata* Pictet, 1834, *Chaetopteryx major* McLachlan, 1876 among many others, has never been found during the investigations based on adult caddisflies and are not to be expected in this area knowing the allopatric factors, limited distribution ranges and biology of these species. On the other hand, the vast majority of the species reported from investigations based on adult stadium of caddisflies, especially those described during the last decades and those with unknown larval stadium have never been reported in studies based on larval stadium of caddisflies. Consequently, studies based only on larval stadium did not produce reliable data on systematics, taxonomy, and biology of caddisfly taxa.

Besides the widespread species found in the Balkan Peninsula and Southeastern Europe, during this investigation, we found several endemic and rare species whose previously known distribution was limited to particular areas of Southeastern Europe, as well as other species whose distribution is considerably enlarged by this investigation: *Polycentropus ierapetra*, *Chaetopteryx stankovici*, *Drusus schmidt*, *Drusus tenellus*, *Potamophylax goulandriourum*, *Oecetis notata*, and *Notidobia melanoptera*.

The species *Polycentropus ierapetra* has a limited distribution in Greece, Turkey, Bosnia and Herzegovina, Slovenia, and Italy (Malicky 2004). A single female specimen found during this investigation in station S18 Kuqishte greatly enlarges its previously known disjunct distribution area and fills the gap in the central part of the Balkan Peninsula where it was not recorded before. The known distribution of *P. ierapetra* subspecies is as follows: for Italy, Slovenia, and Bosnia and Herzegovina the subspecies *Polycentropus ierapetra slovenica* Malicky, 1998; for Greece the subspecies: *Polycentropus ierapetra ierapetra*, *Polycentropus ierapetra ikaria* Malicky, 1974, *Polycentropus ierapetra dirfis* Malicky, 1974 and *Polycentropus ierapetra kalliope* Malicky, 1976; for Bulgaria the subspecies *Polycentropus ierapetra septentrionalis* Kumanski, 1986; for Turkey the subspecies: *Polycentropus ierapetra anatolica* Sipahiler, 1989, *Polycentropus ierapetra isparta* Sipahiler, 1996, *Polycentropus ierapetra adana* Sipahiler, 1996, *Polycentropus ierapetra milikuri* Malicky, 1975 and *Polycentropus ierapetra baroukus* Botosaneanu and Dia 1983 (Malicky 2004). Since females of these subspecies are not known, it is difficult to assess if the female found in Kosovo belongs to any of these subspecies or it represents a new subspecies. Collection of male specimens from this locality is necessary in order to clearly resolve this issue.

Four of the six species of the genus *Drusus* (*D. botosaneanui*, *D. krusniki*, *D. schmidt*, and *D. tenellus*) found during this investigation in Kosovo were considered to have a limited distribution in the Balkan Peninsula. *Drusus botosaneanui*, whose area of distribution goes up to Asia Minor, was previously found in Kosovo in rivers belonging to the Black Sea drainage basin (Ibrahimović et al. 2012a). It is now found in two stations that belong to the Adriatic Sea drainage basin, and because of this its distribution area in Kosovo and the Balkan Peninsula in general is considerably enlarged. The species *D. krusniki* was previously found in Montenegro, Albania and in the spring area of the Drini i Bardhë River in Kosovo which belongs to the Adriatic Sea basin (Oláh 2010). The present finding in Kosovo remarkably enlarges its distribution area. Two other rare species of this genus: *D. schmidt* and *D. tenellus* are found in limited numbers in a single locality (S18, Kuqishte) that belongs to the Adriatic Sea drainage basin and by this their distribution area in Southeastern Europe is considerably enlarged. *D. schmidt*, beside Bosnia and Herzegovina (Botosaneanui, 1960), has recently been found in Croatia as well (Previšić et al. 2013). Its finding in Kosovo represents the northernmost point of its known distribution range. Distribution of *D. tenellus* seems to be wider than previously thought. It extends up to Romania in Ecoregion 10 according to Illies (Malicky 2013) and beside this finding in Kosovo new distribution data for Macedonia has been recorded recently as well (Oláh and Kovács 2013). A recent study has shown a significant genetic divergence within populations of *D. schmidt* and

*D. krusniki* in the Balkan Peninsula regardless of area of distribution (Previšić et al. 2014).

The species *Notidobia melanoptera*, which is found in station S13 of the Aegean Sea drainage basin, was previously known only from several localities in mainland Greece (Malicky 2005). For now, this is the first and the only record of this species outside of Greece and its distribution range is greatly expanded toward the southern part of the Balkan Peninsula. The typical habitats for larvae of this species in Greece are mountain meadow marshes (Malicky 2005) in contrast to Kosovo where this species was found close to a typical mountain stream without wetlands in the vicinity. This suggests some differences in biological characteristics between populations of this species in Greece and Kosovo.

The species *Potamophylax goulandriourum* was also found only in the upper reach of Lepenc River (station S13) in limited numbers. The species was so far known from Greece, Bulgaria, and Macedonia (Kumanski and Malicky 1999). The place where it was found in Kosovo in current study represents the northernmost point of its currently known distribution.

Our find of *Chaetopteryx stankovici* and *Oecetis notata* in Kosovo also enlarges their known distributions in Southeastern Europe (Malicky 2013). Even though this article is a result of a limited sampling efforts it increases the number of Trichoptera taxa recorded for the Republic of Kosovo (Ibrahimi et al. 2012a, b, 2013; Oláh et al. 2013a, b) to 131. It is in line with recent caddisfly studies in the Balkan Peninsula that has taken place considerably during the last years adding to the previously known data from one of the most poorly known areas in Europe. These results demonstrate the necessity of new and systematic caddisfly surveys in the area in order to assess the overall biodiversity of this group of aquatic insects and enable better practical approaches in water quality assessment, conservation plans, and protection efforts.

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