

NEW RECORDS AND DISTRIBUTION DATA OF STONEFLIES (INSECTA: PLECOPTERA) FROM THE WESTERN BALKANS

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The knowledge about stoneflies of the Balkan Peninsula is still not complete, with many areas poorly investigated. During this investigation, we collected adult stonefly specimens from Kosovo, Albania, North Macedonia, Serbia and Montenegro during the period 2014-2018. In total, we found 42 species belonging to 14 genera and 7 families. Five species are recorded for the first time for Kosovo (*Leuctra cingulata* Kempny, 1899, *Leuctra* cf. *olympia* Aubert, 1956 *Nemoura* cf. *lucana* Nicolai & Fochetti, 1991, *Nemoura uncinata* Despax, 1934 and *Brachyptera macedonica* Ikonov, 1983), one is recorded for the first time for Serbia (*Nemoura asceta* Murányi, 2007) and one for Albania (*Leuctra major* Brinck, 1949).

This investigation contributes to the knowledge of distribution patterns of stoneflies species in the Balkan Peninsula.

Key words: Plecoptera, diversity, distribution, new records, Western Balkans

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Poznavanje obalčara Balkanskog poluotoka još uvijek je nepotpuno i mnoga područja su slabo istražena. Tijekom ovog istraživanja u razdoblju 2014 - 2018 prikupljali smo odrasle primjerke obalčara na Kosovu, u Albaniji, Sjevernoj Makedoniji, Srbiji i Crnoj Gori. Ukupno su pronađene 42 vrste iz 14 rodova i 7 porodica. Pet vrsta zabilježeno je prvi put za Kosovo (*Leuctra cingulata* Kempny, 1899, *Leuctra* cf. *olympia* Aubert, 1956 *Nemoura* cf. *lucana* Nicolai & Fochetti, 1991, *Nemoura uncinata* Despax, 1934 i *Brachyptera macedonica* Ikonov, 1983), jedna prvi puta za Srbiju (*Nemoura asceta* Murányi, 2007) i jedna za Albaniju (*Leuctra major* Brinck, 1949).

Ovo istraživanje doprinosi poznavanju uzoraka rasprostranjenosti obalčara na zapadnom Balkanu.

Ključne riječi: Plecoptera, raznolikost, rasprostranjenost, novi nalazi, zapadni Balkan

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INTRODUCTION

Plecoptera are world-wide distributed order of aquatic insects which represents a significant ecological component of running water ecosystems (FOCHETTI & TIerno DE FIGUEROA, 2008) and are known to be intolerant to pollution and variation in their environmental conditions (FOCHETTI & TIerno DE FIGUEROA, 2006; ZWICK, 1980). They mostly live in cold regions and the distribution of most of the species is well defined, since nymphs prefer certain types of water and imagoes are usually short distance flyers (KRISKA, 2013). Many physical and chemical characteristics of the environment directly affect the distribution, abundance and behaviour of stoneflies, such as water temperature, oxygen content, current-substrate relationships, and nutrient composition and availability (GILLER & MALMQVIST, 1998; LAMBERTI & MOORE, 1984; MOOG, 2002; RIDL *et al.*, 2018; WARD & STANFORD, 1982).

Knowledge about the stoneflies fauna in Europe is not complete and until now 514 species are known, with 38 genera and 7 families (GRAF *et al.*, 2019). The knowledge about the stonefly fauna of the South-eastern Europe is fragmentary with many underinvestigated areas (e.g. DAUTI, 1986, 1897; DAUTI *et al.*, 2007; FILIPOVIĆ, 1954, 1968, 1969; KONTA, 1997; MARKOVIĆ 1995, 1998; MARKOVIĆ *et al.*, 1998; MURÁNYI, 2008; SIMIĆ, 1993, 1995; SIMIĆ & SIMIĆ, 1999, 2003; SIMIĆ, *et al.*, 2006; PAUNOVIĆ, *et al.*, 2006; PETROVIĆ, *et al.*, 2014; RAUŠER, 1963; SIVEC, 1980a, b; ŽIVIĆ *et al.*, 2001, 2005). The Plecoptera fauna of Macedonia is relatively well known among Balkan countries (IKONOMOV, 1969, 1970, 1971, 1972, 1973, 1974a, b, 1975, 1976a, b, 1977, 1978a, b, 1979, 1980a, b, 1981, 1982, 1983a, b, c, d, 1986a, b; MURÁNYI *et al.*, 2014b). In the Republic of Kosovo there have been only few taxonomic investigations in this regard (BILALLI, 2019; DAUTI, 1980, 1986, 1987; SIVEC, 1980b). Several other investigations include the usage of larval stage of this order of aquatic insects in the water quality assessment procedures (DAUTI *et al.*, 2007; GASHI, 1993, 2006; IBRAHIMI *et al.*, 2007; IBRAHIMI, 2007; SHUKRIU, 1979; ZHUSHI-ETEMI, 2005). The first data about the Plecoptera fauna of Albania were given by KLAPÁLEK (1906) in his key to the European Taeniopterygidae, then in PONGRÁCZ (1923), NAVÁS (1923), MOSELY (1932), RAUŠER (1963, 1965), MURÁNYI (2007, 2011), MURÁNYI *et al.*, (2014a, 2016) and GRAF *et al.* (2018). The stonefly fauna of Serbia is relatively well investigated (FILIPOVIĆ, 1954, 1968, 1969; KONTA, 1997; MARKOVIĆ, 1995; 1998; MARKOVIĆ *et al.*, 1998; SIMIĆ, 1993, 1995, 1999, 2003; PAUNOVIĆ *et al.*, 2006, 2012; PETROVIĆ *et al.*, 2014; ŽIVIĆ *et al.*, 2001, 2005). In Montenegro 57 stonefly species are reported (MURÁNYI, 2008).

The goal of this study was to contribute to the knowledge of distribution patterns of stonefly species in the Balkan Peninsula.

MATERIAL AND METHODS

Adult stonefly specimens were collected using entomological nets and hand picking. Collected samples were preserved in 80 % ethanol.

Sampling was carried out in forty localities in Kosovo, Albania, North Macedonia, Serbia and Montenegro over the years 2014, 2015, 2016, 2017 and 2018. The sampling stations are located in different habitats and altitudes, basically from 398 m to 1545 m above sea level. Twenty-four of the sampling stations are located in Kosovo, one in Albania, seven in North Macedonia, seven in Serbia and one in Montenegro (Tab. 1 and Fig. 1).

Tab. 1. Sampling stations: KS – Kosovo; AL – Albania; MK – North Macedonia; SRB – Serbia; MN – Montenegro

Code	Sampling Stations	Latitude °N	Longitude °E	Altitude m
S1	Berisha Mountain, KS	42.544168	20.876845	707
S2	Berisha Mountain, KS	42.523249	20.868111	837
S3	Duboçak, KS	42.846075	20.750462	712
S4	Qyqavicë, KS	42.734769	20.924591	940
S5	Blinajë, KS	42.5185	20.9788	721
S6	Siqevë, KS	42.7369	21.2343	798
S7	Radavc, KS	42.738350	20.30675	575
S8	Dërmjak, KS	42.17264	21.31582	615
S9	Binçë, KS	42.29476	21.37150	570
S10	Lugu i Kopilaqës, KS	42.24605	21.43110	1200
S11	Korbliq, KS	42.229795	21.336078	730
S12	Viti, KS	42.30628	21.36202	520
S13	Shushtë, KS	42.28113	21.35911	573
S14	Mjak, KS	42.25903	21.34335	625
S15	Dëbëlldëh, KS	42.25454	21.40008	982
S16	Letnicë, KS	42.28727	21.45736	625
S17	Samakovë, KS	42.25360	21.34762	660
S18	Llapushnicë, KS	42.42533	21.55426	475
S19	Stanqiq, KS	42.25506	21.55029	836
S20	Zheger, KS	42.31572	21.53148	640
S21	Rugovë (mbi kische) KS	42.660351	20.261235	550
S22	Haxhaj, KS	42.708320	20.042711	1254
S23	Keqekollë, KS	42.739779	21.333917	726
S24	Mbi Zhegër, KS	42.29519	21.54584	660
S25	Qafshatame, AL	41.524446	19.901321	1154
S26	Tanushë, MK	42.23356	21.42733	1358
S27	Brodec III, MK	42.160165	21.448974	1400
S28	Brodec II, MK	42.150596	21.455415	1362
S29	Brodec I, MK	42.130803	21.429318	625
S30	Kozhuf, MK	41.191013	22.200732	1545
S31	Sveta voda, MK	41.155704	21.172624	845
S32	Sello Orebovej, MK, Manastiri Sv. Dimitrje	41.892656	21.402238	398
S33	Jastrebc M. cesma, SRB	43.413384	21.405813	955
S34	Svodje-Crna Trava, SRB	42.88972	22.32446	712
S35	Vlasinska reka, SRB	42.796209	22.327014	1142
S36	Meqka Mahalla, (near Mosul), SRB	42.511615	22.249803	1282
S37	Villa Best (Vlasina lake), SRB	42.712575	22.325057	1237
S38	Çemernik, SRB	42.74115	22.29349	1445
S39	Tulare, SRB	42.79352	21.46824	535
S40	Çakorr, MN	42.684437	20.062970	1206

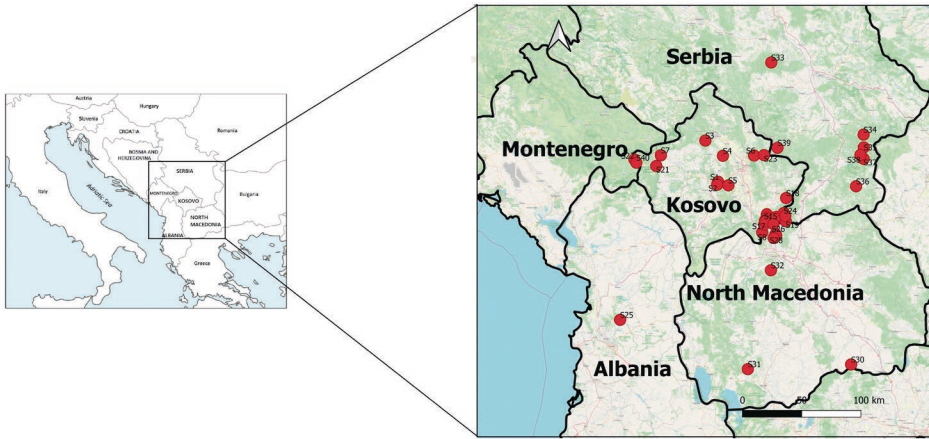


Fig. 1. Map of sampling stations in Kosovo, Albania, North Macedonia, Serbia and Montenegro. Details of sampling stations are in Tab. 1.

Phenology and distribution data refer to the regional European monographies (FOCETTI & TIerno DE FIGUEROA, 2008, GRAF, *et al.*, 2009; KIS, 1974; LUBINI *et al.*, 2012) and online databases (DEWALT *et al.*, 2022).

All specimens were identified up to the species level. The collection is deposited at the Laboratory of Zoology of the Faculty of Natural and Mathematics Sciences, University of Prishtina, Republic of Kosovo.

RESULTS AND DISCUSSION

During this investigation, we found 42 species belonging to 14 genera and 7 families of Plecoptera. The distribution of species within families is as follows: Nemouridae (16), Leuctridae (11), Perlodidae (5), Taeniopterygidae (4), Perlidae (3), Chloroperlidae (2), Capniidae (1).

The highest number of specimens belongs to the following species: *Leuctra hirsuta* Bogescu & Tabacaru, 1960 (232 specimens), *Zwickyia bifrons* (Newman, 1838) (152 specimens), *Leuctra fusca* (Linnaeus, 1758) (107 specimens), while all other species were collected with lower numbers of individuals. Twelve species were found during this investigation each with one specimen only: *Leuctra inermis* Kempny, 1899, *Leuctra cf. metsovonica* Aubert, 1956, *Leuctra prima* Kempny, 1899, *Leuctra cf. olympia* Aubert, 1956, *Nemoura asceta* Murányi, 2007, *Nemoura longicauda* Kis, 1964, *Nemoura marginata* Pictet, 1836, *Protonemura aestiva* Kis, 1965, *Protonemura nitida* (Pictet, 1836), *Protonemura praecox* (Morton, 1894), *Perlodes intricatus* (Pictet, 1841) and *Arcynopteryx dichroa* (McLachlan, 1872).

Systematic list with distributional data of described stoneflies collected in Kosovo, Albania, North Macedonia, Serbia and Montenegro.

Family: Capniidae, Banks, 1900

Genus: *Zwickyia* Murányi, 2014

***Zwickyia bifrons* (Newman, 1838)**

Material examined: KOSOVO: S2 Berisha Mountain. 28.1.2017. 46 ♂♂ 21 ♀♀; KOSOVO: S3 Dubočak. 9.4.2014. 1 ♀. KOSOVO: S23 Keqekollë. 27.1.2018. 9 ♂♂, 2 ♀♀; KOSOVO: S5 Blinajë. 1.2.2018. 29 ♂♂, 15 ♀♀; KOSOVO: S6 Siqevë. 27.1.2018. 24 ♂♂, 5 ♀♀.

Distribution: Austria, Baltic States, Belgium, Bulgaria, Czech Republic, Slovakia, Denmark, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kosovo, Netherlands, Norway, Poland, Portugal, Romania, Russia East, Russia North, Spain, Sweden, Switzerland, North Macedonia, Serbia, Ukraine (DEWALT *et al.*, 2022).

Family: Chloroperlidae, Okamoto, 1912

Genus: *Siphonoperla*, Zwick, 1967

***Siphonoperla neglecta* (Rostock, 1881)**

Material examined: SERBIA: S33 Jastrebc M. Cesma. 3.6.2016. 2 ♂♂; NORTH MACEDONIA: S30 Kozhuf. 23.6.2017. 2 ♂♂, 1 ♀.

Distribution: Austria, Balkans, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Krym, Poland, Romania, Slovakia, Turkey, Ukraine (DEWALT *et al.*, 2022).

Genus: *Chloroperla* Newman, 1836

***Chloroperla tripunctata* (Scopoli, 1763)**

Material examined: SERBIA: S33 Jastrebc M. Cesma. 3.6.2016. 4 ♂♂, 2 ♀♀.

Distribution: Austria, Belgium, Bulgaria, Czech Republic, Slovakia, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Switzerland, Ukraine, Bosnia and Herzegovina, Croatia, Kosovo, North Macedonia, Serbia, Slovenia, Wales (DEWALT *et al.*, 2022).

Family Leuctridae Klapálek, 1905

Genus: *Leuctra*, Stephens, 1836

***Leuctra bronislawi* Sowa, 1970**

Material examined: ALBANIA: S25 Qafeshtamë. 22.11.2016. 1 ♀; NORTH MACEDONIA: S29 Brodec I. 25.9.2016. 1 ♂, 2 ♀♀; KOSOVO: S8 Dërmjak. 2.10.2016. 1 ♀; 15.9.2017. 4 ♂♂, 4 ♀♀; 14.10.2017. 1 ♀. KOSOVO: S9 Binçë. 17.9.2017. 10 ♂♂, 5 ♀♀. KOSOVO: S10 Lugu i Kopilaqës. 17.9.2017. 2 ♀♀.

Distribution: Albania, Bulgaria (DEWALT *et al.*, 2022), Czech Republic (KROČA, 2010), Greece, Kosovo, North Macedonia, Poland, Serbia (DEWALT *et al.*, 2022), Slovakia (KRNO & HOLOVA, 2005).

***Leuctra cingulata* Kempny, 1899**

Material examined: NORTH MACEDONIA: S29 Brodec I. 15.10.2017. 1 ♀. NORTH MACEDONIA S26 Tanushë, NM: 14.10.2017. 1 ♀. KOSOVO: S10 Lugu i Kopilaqës. 22.10.2017. 1 ♀.

Distribution: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Italy, Romania, Switzerland, North Macedonia, Serbia (DEWALT *et al.*, 2022).

Notes: Recorded for the first time from Kosovo.

***Leuctra fusca* (Linnaeus, 1758)**

Material examined: ALBANIA: S25 Qafeshtamë. 22.11.2016. 1 ♀. KOSOVO: S11 Korbliq. 30.10.2016. 1 ♂, 1 ♀; 5.11.2017. 4 ♂♂, 8 ♀♀. KOSOVO: S12 Viti. 2.10.2016. 3 ♂♂, 2 ♀♀; 3.9.2017. 3 ♂♂, 1 ♀. KOSOVO: S13 Shushtë. 30.10.2016. 3 ♀♀; 23.9.2017. 3 ♂♂, 1 ♀; 21.10.2017. 3 ♂♂, 4 ♀♀; KOSOVO: S14 Mjak. 31.10.2016. 2 ♀♀; 5.11.2017. 2 ♂♂, 4 ♀♀; 21.10.2017. 4 ♂♂, 3 ♀♀; 23.9.2017. 1 ♂. KOSOVO: S15 Dëbelldeh, KS: 27.11.2016. 2 ♂♂, 6 ♀♀. KOSOVO: S16 Letnicë. 4.11.2016. 2 ♂♂, 8 ♀♀. KOSOVO: S17 Samakovë. 21.10.2017. 6 ♂♂, 2 ♀♀; 5.11.2017. 2 ♀♀. KOSOVO: S8 Dërmjak. 14.10.2017. 2 ♀♀. KOSOVO: S9 Binçë. 22.10.2017. 2 ♂♂, 34 ♀♀.

Distribution: Europe: Austria, Baltic States, Bulgaria, Croatia, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Luxemburg, Netherlands, Norway, Poland, Romania, Russia East, Russia Far East, Russia North, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro (DEWALT *et al.*, 2022), Asia: Anatolia and Levant (DARILMAZ *et al.*, 2016) Caucasus, China, Iran, Korea, Mongolia, Siberia (Altai) (DEWALT *et al.*, 2022).

Leuctra hippopus Kempny, 1899

Material examined: KOSOVO: S13 Shushtë. 20.5.2017. 1 ♀. NORTH MACEDONIA: S29 Brodec. 4.6.2017. 1 ♀. KOSOVO: S10 Lugu i Kopilaqës, KS: 16.4.2017. 3 ♂♂; 16.4.2017. 7 ♂♂, 6 ♀♀. KOSOVO: S15 Dëbelldeh. 6.4.2017. 5 ♂♂, 2 ♀♀. KOSOVO: S18 Llapushnicë. 10.4.2017. 1 ♀. KOSOVO: S3 Dubočak. 9.4.2014. 1 ♀.

Distribution: Austria, Azerbaijan, Baltic States, Belgium, Belorussia, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kosovo, North Macedonia, Norway, Poland, Portugal, Caucasus, Russia East, Romania, Russia North, Serbia, Slovakia, Spain, Sweden, Switzerland, Turkey, Ukraine, (DEWALT *et al.*, 2022).

Leuctra hirsuta Bogescu & Tabacaru, 1960

Material examined: ALBANIA: S25 Qafështamë, AL: 22.11.2016. 4 ♂♂, 9 ♀♀. NORTH MACEDONIA: S26 Tanushë. 21.9.2016. 1 ♂, 9 ♀♀; 14.10.2017. 8 ♂♂, 4 ♀♀. NORTH MACEDONIA: S27 Brodec III. 21.9.2016. 16 ♂♂, 8 ♀♀; 15.10.2017. 2 ♂♂, 4 ♀♀; 9.9.2017. 2 ♀♀. NORTH MACEDONIA: S28 Brodec II. 25.9.2016. 25 ♂♂, 17 ♀♀; 15.10.2017. 15 ♂, 17 ♀. KOSOVO: S10 Lugu i Kopilaqës. 18.9.2016. 1 ♂, 5 ♀♀; 17.9.2017. 1 ♂; 24.11.2016. 1 ♂, 1 ♀; 22.10.2017. 1 ♂, 1 ♀; 17.9.2017. 13 ♂♂, 13 ♀♀. KOSOVO: S19 Stanqiq. 9.10.2016. 1 ♂. KOSOVO: S29 Brodec I. 25.9.2016. 7 ♂♂, 4 ♀♀; 15.10.2017. 9 ♂♂, 1 ♀; 9.9.2017. 8 ♂♂, 5 ♀♀. KOSOVO: S8 Dërmjak. 2.10.2016. 3 ♂♂, 2 ♀♀; 14.10.2017. 2 ♀♀. 15.9.2017. 12 ♂♂, 5 ♀♀. KOSOVO: S14 Mjak. 23.9.2017. 1 ♂. KOSOVO: S15 Dëbelldeh. 17.9.2017. 2 ♂♂, 5 ♀♀; 22.10.2017. 5 ♂♂, 4 ♀♀. KOSOVO: S4 Qyqavicë. 24.9.2016. 4 ♂♂, 9 ♀♀. SERBIA: S33 Jastrebc, M. česma. 21.11.2016. 1 ♀.

Distribution: Albania (MURÁNYI *et al.*, 2016), Bulgaria, Greece, Bosnia and Herzegovina, Croatia, Kosovo, North Macedonia, Montenegro, Serbia, Slovenia, Romania (DEWALT *et al.*, 2022).

Leuctra inermis Kempny, 1899

Material examined: NORTH MACEDONIA: S30 Kozhuf. 23.6.2017. 1 ♀.

Distribution: Austria, Belgium, Bulgaria, Bosnia and Herzegovina, Croatia, Czech Republic, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kosovo, North Macedonia, Montenegro, Poland, Portugal, Romania, Slovakia, Spain, Switzerland, Ukraine, Serbia, Slovenia, Wales (DEWALT *et al.*, 2022).

***Leuctra cf. metsovonica* Aubert, 1956**

Material examined: NORTH MACEDONIA: S26 Tanushë. 22.6.2017. 1 ♀.

Distribution: Albania, Greece, North Macedonia (DEWALT *et al.*, 2022).

***Leuctra major* Brinck, 1949**

Material examined: KOSOVO: S20 Zhegër. 30.10.2016. 1 ♀. ALBANIA: S25 Qafësh-tamë. 22.11.2016. 2 ♂♂, 1 ♀. KOSOVO: S10 Lugu i Kopilaqës. 17.9.2017. 1 ♂; 22.10.2017. 1 ♀.

Distribution: Austria, Balears, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Greece, Hungary, Italy, Kosovo, North Macedonia, Montenegro, Poland, Portugal, Romania, Serbia, Slovenia, Spain, Switzerland, Ukraine (DEWALT *et al.*, 2022).

Notes: Recorded for the first time from Albania.

***Leuctra nigra* (Olivier, 1811)**

Material examined: KOSOVO: S10 Lugu i Kopilaqës. 16.4.2017. 2 ♂♂, 1 ♀. NORTH MACEDONIA: S26 Tanushë. 22.6.2017. 1 ♀. SERBIA: S33 Jastrebc M. Cesma. 3.6.2016. 2 ♂♂, 6 ♀♀.

Distribution: Austria, Baltic States, Belgium, Belorussia, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Netherlands, Italy, Kosovo, Norway, North Macedonia, Montenegro, Poland, Romania, Russia East, Russia North, Serbia, Slovenia, Slovakia, Sweden, Switzerland, Ukraine, Wales (DEWALT *et al.*, 2022).

***Leuctra prima* Kempny, 1899**

Material examined: NORTH MACEDONIA: S27 Brodec III. 25.3.2017. 1 ♀.

Distribution: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, France, Germany, Hungary, Italy, Netherlands, North Macedonia, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Switzerland, Ukraine (DEWALT *et al.*, 2022).

***Leuctra cf. olympia* Aubert, 1956**

Material examined: KOSOVO: S21 Rugovë (mbi kishë). 1.5.2017. 1 ♂.

Distribution: Greece, North Macedonia (DEWALT *et al.*, 2022), Bosnia and Herzegovina, Montenegro, Serbia (SIVEC, 1980a, b).

Notes: Recorded for the first time from Kosovo.

Family Nemouridae Billberg, 1820**Genus: *Amphinemura*, Ris, 1902*****Amphinemura triangularis* (Ris, 1902)**

Material examined: KOSOVO: S11 Korbliq. 20.5.2017. 1 ♂, 2 ♀♀. NORTH MACEDONIA: S29 Brodec I. 25.3.2017. 1 ♀. KOSOVO: S20 Zhegër. 6.5.2017. 1 ♀.

Distribution: Austria, Baltic States, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, France, Germany, Greece, Italy, Kosovo, Poland, Romania, North Macedonia, Montenegro, Serbia, Slovenia, Slovakia, Spain, Switzerland, Ukraine (DEWALT *et al.*, 2022).

***Amphinemura sulcicollis* (Stephens, 1836)**

Material examined: KOSOVO: S3 Dubočak. 9.4.2014. 1 ♀.

Distribution: Austria, Bosnia and Herzegovina, Baltic States, Belgium, Croatia, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Luxemburg, Netherlands, Norway, Poland, Portugal, Romania, Russia North, Serbia, Slovenia, Slovakia, Spain, Sweden, Switzerland, Ukraine, Kosovo, North Macedonia, Montenegro, Wales (DEWALT *et al.*, 2022).

Genus: *Nemoura* Latreille, 1796***Nemoura asceta* Murányi, 2007**

Material examined: SERBIA: S33 Jastrebc, M. Cesma. 3.6.2016. 1 ♂.

Distribution: Albania, Turkey, Kosovo (DEWALT *et al.*, 2022; BILALLI *et al.*, 2020).

Notes: Recorded for the first time from Serbia.

Is described from Albania. Is a rare species were only found at two small karst torrents after the melting of snow, at the elevation 1600 m at the end of May and at 270 m at the end of April (MURÁNYI, 2007) also is found in Turkey (DARILMAZ *et al.*, 2016). We found near the source of a stream, 955 m a.s.l.

***Nemoura anas* Murányi, 2007**

Material examined: ALBANIA: S25 Qafështamë. 22.11.2016. 2 ♂♂, 1 ♀.

Distribution: Albania, Montenegro, North Macedonia (DEWALT *et al.*, 2022) and Kosovo (BILALLI *et al.*, 2020).

***Nemoura cinerea* (Retzius, 1783)**

Material examined: KOSOVO: S19 Stanqiq. 6.5.2017. 16 ♂♂, 16 ♀♀.

Distribution: Europe: Austria, Baltic States, Bosnia and Herzegovina, Belgium, Byelorussia, Bulgaria, Croatia, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Portugal, Romania, Russia East, Russia North, Ukraine, Slovakia, Spain, Sweden, Switzerland, Kosovo, North Macedonia, Montenegro, Serbia, Slovenia, Caucasus, Siberia, Mongolia, Middle Asia (DEWALT *et al.*, 2022).

***Nemoura flexuosa* Aubert, 1949**

Material examined: NORTH MACEDONIA: S29 Brodec I. 4.6.2017. 1 ♂, 8 ♀♀.

Distribution: Austria, Baltic States, Bosnia and Herzegovina, Belorussia, Bulgaria, Croatia, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Hungary, Italy, Norway, Poland, Romania, Russia East, Russia North, Serbia, Slovenia, Slovakia, Switzerland, Sweden, Turkey, Ukraine, Kosovo, North Macedonia, Montenegro (DEWALT *et al.*, 2022).

***Nemoura longicauda* Kis, 1964**

Material examined: NORTH MACEDONIA: S26 Tanushë. 14.10.2017. 1 ♀.

Distribution: Bulgaria, Czech, Slovakia, Hungary, North Macedonia, Romania (DEWALT *et al.*, 2022).

***Nemoura cf. lucana* Nicolai & Fochetti, 1991**

Material examined: KOSOVO: S15 Dëbëlldëh, KS: 6.4.2017. 1 ♂, 2 ♀♀.

Distribution: Italy (NICOLAI & FOCHETTI, 1991).

Notes: Based on a single male specimen, it resembles in a way *Nemoura lucana*, species known only from Italy (NICOLAI & FOCHETTI, 1991). However, considering the recent redescription of *N. lucana* and also new species described from this group (VINCON & RUFFONI, 2021), it is possible that our specimen represents a new species. More male specimens are needed in order to determine the final taxonomic status.

***Nemoura marginata* Pictet, 1836**

Material examined: SERBIA: S31 Svodje-Crna Trava 1.6.2016. 1 ♂.

Distribution: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Romania, Switzerland, Ukraine, Kosovo, North Macedonia, Montenegro, Serbia, Slovenia (DEWALT *et al.*, 2022).

***Nemoura uncinata* Despax, 1934**

Material examined: KOSOVO: S10 Lugu i Kopilaqës. 16.4.2017. 2 ♂♂.

Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Greece, Italy, Poland, Romania, Slovakia, Spain, Switzerland, Turkey, Ukraine, North Macedonia, Montenegro, Serbia, Slovenia (DEWALT *et al.*, 2022).

Notes: Recorded for the first time from Kosovo.

It is a species of the spring flight period: April-May (AUBERT, 1963). It lives in water courses of different sizes (AUBERT, 1963).

Genus: *Nemurella*, Kempny, 1898

***Nemurella pictetii* (Klapálek, 1900)**

Material examined: KOSOVO: S10 Lugu i Kopilaqës. 18.9.2016. 1 ♀. NORTH MACEDONIA: S30 Kozhuf. 23.6.2017. 1 ♀

Distribution: Austria, Baltic States, Belgium, Belorussia, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Kosovo, Mongolia, Netherlands, Norway, Poland, Romania, Russia East, Russia North, Serbia, Slovenia, Slovakia, Spain, Sweden, Switzerland, Ukraine, North Macedonia, Montenegro (DEWALT *et al.*, 2022).

Genus: *Protonemura*, Kempny, 1898

***Protonemura aestiva* Kis, 1965**

Material examined: NORTH MACEDONIA: S28 Brodec II. 6.8.2017. 1 ♂.

Distribution: Czech Republic, Slovakia, Hungary, North Macedonia, Poland, Romania (DEWALT *et al.*, 2022), Montenegro (KACANSKI & BAUMANN 1981), Serbia (PETROVIC *et al.*, 2014)

***Protonemura hrabei* Raušer, 1956**

Material examined: NORTH MACEDONIA: S26 Tanushë. 25.9.2016. 2 ♂♂, 1 ♀. ALBANIA: S25 Qafështamë. 22.11.2016. 1 ♀. KOSOVO: S15 Dëbelldeh. 22.10.2017. 1 ♀; 21.11.2016. 1 ♀. KOSOVO: S10 Lugu i Kopilaqës. 24.11.2016. 6 ♀♀. KOSOVO: S22 Haxhaj. 20.10.2016. 1 ♀.

Distribution: Austria, Baltic States, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Italy, Poland, Serbia, Slovenia, Slovakia, Kosovo, North Macedonia, Montenegro (DEWALT *et al.*, 2022).

***Protonemura intricata* (Ris, 1902)**

Material examined: KOSOVO: S20 Zhegër. 6.5.2017. 1 ♂. KOSOVO: S24 Mbi Zhegër. 6.5.2017. 1 ♂, 2 ♀♀. NORTH MACEDONIA: S31 Sveta voda. 22.6.2017. 1 ♀.

Distribution: Europe: Austria, Baltic States, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, North Macedonia, Montenegro Poland, Portugal, Kosovo, Romania, Serbia, Slovenia, Slovakia, Spain, Switzerland (DEWALT *et al.*, 2022).

***Protonemura nitida* (Pictet, 1836)**

Material examined: NORTH MACEDONIA: S26 Tanushë. 21.9.2016. 1 ♂.

Distribution: Albania, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Hungary, Italy, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Switzerland, Ukraine (DEWALT *et al.*, 2022).

***Protonemura praecox* (Morton, 1894)**

Material examined: KOSOVO: S15 Dëbëlldeh. 4.3.2017. 1 ♀.

Distribution: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kosovo, Netherlands, North Macedonia, Montenegro, Poland, Romania, Serbia, Slovenia, Slovakia, Spain, Switzerland, Ukraine (DEWALT *et al.*, 2022).

Family Perlidae, Latreille, 1802

Genus: *Perla*, Geoffroy, 1762

***Perla abdominalis* Burmeister, 1839**

Material examined: KOSOVO: S11 Korbliq. 20.5.2017. 2 ♂♂, 6 ♀♀.

Distribution: Austria, Belgium, Bulgaria, Czech Republic, Slovakia, France, Germany, Hungary, Italy, Netherlands, Poland, North Macedonia, Romania, Slovakia, Spain, Switzerland, Ukraine, Bosnia and Herzegovina, Kosovo, Montenegro, Serbia, Slovenia (DEWALT *et al.*, 2022).

***Perla marginata* (Panzer, 1799)**

Material examined: MONTENEGRO: S40 Çakorr. 29.6.2017. 1 ♂. SERBIA: S35 Vlasinska reka. 27.6.2016. 1 ♂.

Distribution: Western Europe ranging from Spain to Holland to Italy and western Poland. Earlier records from North Africa, Iran and South Balkans apparently pertain to *P. pallida*. Confirmed specimens from Austria, Czech Republic, Germany, Italy, Montenegro, Poland, Serbia, Slovakia, Slovenia, and Spain (DEWALT *et al.*, 2022).

***Perla pallida* Guérin-Méneville, 1843**

Material examined: KOSOVO: S18 Llapushnicë. 8.7.2017. 1 ♀. MONTENEGRO: S40 Çakorr. 29.6.2017. 1 ♀. NORTH MACEDONIA: S26 Tanushë. 22.6.2017. 1 ♀.

Distribution: Africa: Algeria, Caucasus, Morocco, Tunisia (DEWALT *et al.*, 2022), Azerbaijan and Georgia (MURÁNYI *et al.*, 2021); Europe: Austria, Bulgaria, Czech Republic, Slovakia, Greece, Hungary, Kosovo, North Macedonia, Poland, Romania, Turkey, Ukraine, Serbia (DEWALT *et al.*, 2022).

Family Perlodidae, Klapálek, 1909

Genus: *Isoperla*, Banks, 1906

***Isoperla albanica* Auberti, 1964**

Material examined: MONTENEGRO: S40 Çakorr. 29.6.2017. 1 ♂. SERBIA: S36 Meqka Mahalla, (near Mosul). 28.6.2016. 3 ♂♂, 5 ♀♀. SERBIA: S37 Villa Best. 1.6.2015. 1 ♂. SERBIA: S33 Jastrebc M. Cesma. 3.6.2016. 2 ♂♂, 2 ♀♀. SERBIA: S38 Čemernik. 2.6.2016. 1 ♂.

Distribution: Austria (GRAF, 1999), Albania, Slovakia, Germany, Bosnia and Herzegovina, Kosovo, North Macedonia, Montenegro, Serbia (DEWALT *et al.*, 2022).

***Isoperla belai* Illies, 1963**

Material examined: KOSOVO: S11 Korbliq. 20.5.2017. 2 ♂♂.

Distribution: Bulgaria, Romania, Kosovo, Serbia, North Macedonia (DEWALT *et al.*, 2022).

***Isoperla tripartita* Illies, 1954**

Material examined: KOSOVO: S13 Shushtë. 21.5.2017. 2 ♂♂. NORTH MACEDONIA: S26 Tanushë. 22.6.2017. 3 ♂♂, 3 ♀♀. SERBIA: S39 Tulare. 1.6.2016. 3 ♂♂, 1 ♀. SERBIA: S34 Svodje-Crna Trava. 1.6.2016. 1 ♂, 1 ♀. KOSOVO: S22 Haxhaj. 29.6.2017. 1 ♂. NORTH MACEDONIA: S30 Kozhuf. 23.6.2017. 2 ♂, 1 ♀. NORTH MACEDONIA: S32 Sello Orebobej, Manastiri Sv. Dimitrje. 26.6.2015. 1 ♀.

Distribution: Albania, Austria, Bosnia and Herzegovina, Bulgaria, Czech Republic, Slovakia, Greece, Hungary, Romania, Kosovo, North Macedonia, Montenegro, Serbia, Slovenia (DEWALT *et al.*, 2022).

Genus: *Perlodes* Banks, 1903***Perlodes intricatus* (Pictet, 1841)**

Material examined: MONTENEGRO: S40 Çakorr. 29.6.2017. 1 ♀.

Distribution: Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Slovakia, France, Germany, Italy, Montenegro, North-western European Russia, Poland, Romania, Slovakia, Spain, Switzerland, Ukraine, Kosovo, North Macedonia, Montenegro, Serbia, Slovenia (DEWALT *et al.*, 2022).

Genus: *Arcynopteryx*, Klapálek, 1904***Arcynopteryx dichroa* (McLachlan, 1872)**

Material examined: KOSOVO: S7 Radavc. 18.11.2016. 1 ♂, 1 ♀.

Distribution: Andorra, Austria, Bosnia and Herzegovina, Bulgaria, Czech Republic, East European Russia, Finland, French mainland, Germany, Kosovo, Mongolia, Montenegro, Nearctic (US and Canada), North Macedonia, North European Russia, Norwegian mainland, Poland, Romania, Serbia, Slovakia, Spanish mainland, Sweden, Ukraine (DEWALT *et al.*, 2022; DE JONG, *et al.*, 2014).

Family: Taeniopterygidae, Klapálek, 1905**Genus: *Brachyptera*, Newport, 1848*****Brachyptera macedonica* Ikononov, 1983**

Material examined: KOSOVO: S15 Dëbelldeh. 6.4.2017. 1 ♂, 1 ♀. KOSOVO: S1 Berisha Mountain. 3.5.2015. 2 ♀♀. KOSOVO: S2 Berisha Mountain. 10.5.2015. 2 ♀♀.

Distribution: North Macedonia (DEWALT *et al.*, 2022).

Notes: Recorded for the first time from Kosovo.

Currently known only from North Macedonia, it is located in small and medium habitats of running waters up to 300 m in areas covered with broadleaf trees and temperatures above 10° C (IKONOMOV, 1983). We found this species at an altitude of 700 m to above 1000 m a.s.l., during this investigation in Kosovo (S1, S2 and S15).

***Brachyptera risi* (Morton, 1896)**

Material examined: KOSOVO: S8 Dërmjak. 2.4.2017. 5 ♂♂, 7 ♀♀. NORTH MACEDONIA: S29 Brodec I. 4.6.2017. 2 ♀♀. NORTH MACEDONIA: S31 Sveta voda, NM: 22.6.2017. 1 ♂.

Distribution: Austria, Baltic States, Belgium, Croatia, Czech Republic, Slovakia, Denmark, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Romania, Russia, Slovakia, North Spain, Sweden, Switzerland, Turkey, Ukraine, North Macedonia (DEWALT *et al.*, 2022).

***Brachyptera seticornis* (Klapálek, 1902)**

Material examined: KOSOVO: S10 Lugu i Kopilaqës. 16.4.2017. 1 ♂, 1 ♀; 16.4.2017. 8 ♂♂, 7 ♀♀. MONTENEGRO: S40 Çakorr. 15.5.2017. 1 ♀; 29.6.2017. 2 ♀♀; 17.5.2017. 1 ♀. NORTH MACEDONIA: S26 Tanushë. 22.6.2017. 1 ♀. KOSOVO: S8 Dërmjak. 2.4.2017. 2 ♂♂, 1 ♀. KOSOVO: S21 Rugovë (Mbi Kishë). 1.5.2017. 6 ♀♀.

Distribution: Austria, Belgium, Bulgaria, Czech Republic, Slovakia, France, Germany, Hungary, Italy, Poland, Romania, Slovakia, Spain, Switzerland, Ukraine, North Macedonia (DEWALT *et al.*, 2022).

Genus: *Taeniopteryx*, Pictet, 1841

***Taeniopteryx schoenemundi* Mertens, 1923**

Material examined: KOSOVO: S23 Keqekollë. 27.1.2018. 1 ♂. KOSOVO: S6 Siqevë. 27.1.2018. 3 ♂♂, 2 ♀♀.

Distribution: Austria, Belgium, Bulgaria, Czech Republic, Slovakia, France, Germany, Hungary, Italy, Kosovo, North Macedonia, Poland, Portugal, Romania, Serbia, Spain, Switzerland, Ukraine (DEWALT *et al.*, 2022).

This investigation contributes to the knowledge of the diversity, ecology and distribution of stoneflies in the Western Balkans.

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SUMMARY

New distribution data of the stonefly fauna (Insecta: Plecoptera) of the Western Balkans

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In this paper we present new distribution data of the stonefly fauna of the Western Balkans with new records for Kosovo, Serbia and Albania. Stonefly specimens were collected from Kosovo, Albania, North Macedonia, Serbia and Montenegro during period of 2014 – 2018. We found 42 species belonging to 14 genera and 7 families. Five species are recorded for the first time from Kosovo (*Leuctra cingulata* Kempny, 1899, *Leuctra* cf. *olympia* Aubert, 1956 *Nemoura* cf. *lucana* Nicolai & Fochetti, 1991, *Nemoura uncinata* Despax, 1934 and *Brachyptera macedonica* Ikonov, 1983), one is recorded for the first time from Serbia (*Nemoura asceta* Murányi, 2007) and one from Albania (*Leuctra major* Brinck, 1949).

This investigation contributes to the faunistic and distribution of stonefly fauna in Kosovo, Albania, North Macedonia, Serbia and Montenegro.