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# New records and list of non-biting midges (Chironomidae) from Montenegro

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**Summary.** The non-biting midges of Montenegro are poorly studied. Here we present results from a study of a collection of chironomid larvae from various water courses and lakes: 19 species, 12 morphotypes and 32 genera from Montenegro are recorded for the first time. One previously unidentified larva is described. With the addition of these results, the list of non-biting midges recorded in Montenegro now contains 47 genera, 29 species and 14 morphotypes. The zoogeographical and ecological significance of these new records is discussed.

**Keywords.** Chironomidae, faunistics, new records, Montenegro.

## Introduction

The fauna of non-biting midges of Montenegro is poorly understood. To date, only two faunistic contributions to Montenegrian chironomids have been published (Nedeljković 1959; Jacobi 1981). Both of these works deal with the ecology of Skadar Lake and are based on larval stages. So far, 15 genera, 9 species and 2 morphotypes have been recorded from Montenegro (Table 1). However, in Fauna Europaea (www.faunaeur.org), there is no separate species list for Montenegro, and the combined chironomid fauna of Serbia and Montenegro are represented by a 89 species list (Sæther and Spies 2012). More species of chironomids have been reported from neighbouring countries than from Montenegro (Albania: 36, Bosnia and Herzegovina: 24, Croatia: 56) (Tavčar 1993; Simić and Simić 1999; Sæther and Spies 2012; Płóciennik 2008); however, we presume that many species remain to be discovered.

In other, better studied areas of the Mediterranean region, the number of chironomid species and subspecies found is much higher (Italian mainland: 513, Spanish mainland: 12, Portuguese mainland: 215) (Sæther and Spies 2012). However, these countries are larger then Montenegro. Western Mediterranean freshwater fauna have also been more extensively studied. Phylogeographic studies have shown that the Balkan Peninsula (along with two other large peninsulas in Southern Europe – Iberian and Apennine) served as a refuge of biodiversity during the Pleistocene (Hewitt 1999). Thus, considering the geographical location of Montenegro and its diverse ecosystems, a rich fauna of non-biting midges may be expected.

The aim of the present study was to contribute to our knowledge of the diversity and distribution of non-biting midges from running and stagnant waters in Montenegro.

## Materials and methods

Data for the present study was gathered from unstudied materials of non-biting midges recently discovered in the collection of the Department of Bi-

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**Table 1.** List of currently known non-biting midges from Montenegro (data compiled from Jacobi 1981; Nedeljković 1959).

| Taxon | References |
|---|---|
| *Clinotanypus nervosus* (Meigen, 1818) | Nedeljković (1959), Jacobi (1981) |
| *Procladius* Skuse, 1889 | Nedeljković (1959), Jacobi (1981) |
| *Prodiamesa olivacea* (Meigen, 1818) | Nedeljković (1959) |
| *Microchironomus* Kieffe, 1918 | [as *Cript*. agg. *conjugens*] Nedeljković (1959) |
| *Hydrobaenus lugubris* Fries, 1830 | [as *Trissocladius griseipennis*] Nedeljković (1959) |
| *Chironomus* (Linnaeus, 1758) | [as *C. semireductus*] Nedeljković (1959), Jacobi (1981) |
| *Cryptochironomus* Kieffer, 1918 | *Cryptochironomus defectus* (Kieffer 1913) Nedeljković (1959) |
| *Dicrotendipes tritomus* Kieffer, 1916 | [as *Limnochironomus* agg. *tritomus*] Nedeljković (1959) |
| *Endochironomus tendens* (Fabricius, 1775) | [as *E.* agg. *signaticornis*; *E.* agg. *tendens*] Nedeljković (1959) |
| *Paracladopelma camptolabis* (Kieffer, 1913) | [as *Cryptochironomus* agg. *camptolabis*] Nedeljković (1959) |
| *Paralauterborniella nigrohalteralis* (Malloch, 1915) | [as *Lauterborniella brachylabis*] Nedeljković (1959) |
| *Polypedilum* agg. *nubeculosum* | Nedeljković (1959) |
| *Polypedilum scalaenum* (Schrank, 1803) | [as *P. breviantennatum*; *P*. agg. *scalenum*] Nedeljković (1959) |
| *Stictochironomus* Kieffer, 1919 | [as *Stictochironomus* agg. *histrio*] Nedeljković (1959) |
| *Cladotanytarsus* Kieffer, 1921 | [as *Tanytarsus* agg. *mancus*] Nedeljković (1959) |
| *Tanytarsus* agg. *gregarius* | Nedeljković (1959) |

ology-Podgorica, and recent sampling work made by the junior author of this work. Larvae were collected using either a hand-net or Surber sampler, from different standing and running water habitats throughout Montenegro.

The material was derived from a total of 45 samples from 32 localities collected from year1981 to 2006, and consisted of 1321 chironomid larvae (Table 2; Fig. 1). Slide-mounted specimens and material preserved in Euparal are kept in a collection at the Department of Invertebrate Zoology and Hydrobiology at the University of Lodz.

Larvae identification was conducted according to the keys of Klink and Moller Pillot (2003), Wiederholm (1983), and Brooks et al. (2007) keys. Bray-Curtis similarity on the presence-absence of transformed data was used to analyse the similarity of the assemblages from the studied sites. Non-Metric Multidimensional Scaling was used to perform assemblage ordination. Three samples were removed from our statistical analysis (Durmitor Mt. area, Vražje jezero-Lake; a small stream near Kolašin; and a small spring in the forest on the road to Bukumirsko Lake) because they differed considerably from the rest of the assemblages, and are located far from the ordination plot (Fig. 3).

# Results

## List of taxa recorded and comments

## Subfamily Tanypodinae

### Tribe Pentaneurini

**Remarks.** New tribe of midges in Montenegro.

**Genus *Ablabesmyia* Johannsen, 1905**

**Species *Ablabesmyia monilis* (Linnaeus, 1758)**

**Material.** 1 larva from Skadar Lake, Karuč sublacustrine spring.

**Remarks.** New genus and species for Montenegro. Recorded in Albania, Bosnia and Herzegovina, Croatia and Serbia (Sæther and Spies 2012). *Ablabesmyia* usually live in large stagnant waters with dense macrophyte vegetation (Vallenduuk and Moller Pillot 2007).

**Genus *Conchapelopia* Fittkau, 1957**

**Material.** 3 larvae from the River Morača near

**Table 2.** List of collection localities.

| Code | Sampling localities | Latitude N | Longitude E | Altitude [m a.s.l | Date |
|---|---|---|---|---|---|
| BL | NP Biogradska Gora, Biogradsko Lake | 42° 53' 54'' | 19° 36' 02'' | 1070 | 10.09.1984 |
| JL | Jablan Lake | 43° 10' 01'' | 19° 03' 39'' | | 14.06.1985 |
| KLN | Nikšić, Krupačko Lake | 42° 45' 05'' | 18° 52' 58'' | 608 | 25.12.1985 |
| MMT | Skadar Lake area, mouth of river Morača near Manastirska Tapija, | 42° 16' 12'' | 19° 08' 48'' | 10 | 02.03.1984 |
| MSL | Malo Stabanjsko Lake | 43° 11' 10'' | 18° 43' 40'' | 1194 | 08.10.1983 |
| P | Plužine | 43° 09' 00'' | 18° 50' 24'' | ca. 900 | 18.07.1983 |
| PeL | Bjelasica Mt., Pešića Lake | 42° 51' 21'' | 19° 41' 20'' | 1842 | 23.05.1985<br>14.08., 31.10.1986 |
| PlL | Plavsko Lake | 42° 35' 46'' | 19° 55' 34'' | 904 | 12.08.1986<br>23.11.1986 |
| Pm | Skadar Lake area, river Plavnica before mouth into Skadar Lake | 42° 16' 20'' | 19° 12' 05'' | 9 | 05. 1983 |
| PoL | Durmitor Mt., area, ca. 10 km from Žabljak, Pošćensko Lake | 43° 05' 28'' | 19° 06' 34'' | 1487 | 18.06.1984 |
| RCK | Pljevlja, River Ćehotina near Krakalice | 19° 21' | 19° 21' | ca. 750 | 09.09.1983 |
| RCP | Pljevlja, River Ćehotina after the town | 43° 21' 36" | 19° 21' 36" | 810 | 14.06.1984 |
| RCPG | Pljevlja, River Ćehotina near Gradac (after depony) | 43° 21' | 19° 21' | ca. 750 | 14.06.1984 |
| RLnP | River Ljuča near Plav | 42° 36' 36" | 19° 57' 00" | 990 | 09.10.1985 |
| RMB | River Morača near Bioče | 42° 30' 31" | 19° 20' 59" | 86 | 06.07.1983 |
| RMDoP | River Morača, upper part near Donje Polje | 42° 52' | 19° 18' | 700 | 02.09.1983 |
| RMDrP | River Morača, upper part near Dragovića Polje | 42° 51' 42" | 19° 19' 12" | 546 | 23.06.1981 |
| RMK | River Morača, Koštanica | 43° 02' 49'' | 19° 51' 29'' | ca.500 | 23.09.1991 |
| RMM | River Morača, upper part near Medjurječje | 42° 44'37.12" | 19° 23'16.84" | 252 | 23.06.1981<br>02.09.1983 |
| RMMM | River Morača near Monastir Morača | 42°46'5.93" | 19°23'27.13" | 290 | 02.09.1983<br>23.06.1985 |
| RPV | River Piva near Vrbnice | 42°45'.05" | 18°52'58" | 667 | 16.07.1985 |
| RTZM | Bilećko jezero near Zorin Most | 42°44'.12.50" | 18°30'58" | ca.410 | 18.06.1983 |
| sBL | small spring in forest, on road to Bukumirsko Lake | 42°36'.12.50" | 19°33'34" | 1457 | 06.05.2000 |
| sK | small stream near Kolašin | 42° 49' 27'' | 19° 31' 21'' | 1016 | 06.05.2006 |
| SLP | Skadar Lake, Podhum | 42° 18' 30'' | 19° 20' 27'' | 11 | 14.08.1984 |
| SLsK | Skadar Lake, sublacustrine spring Karuč | 42° 21' 30" | 19° 06' 25" | 10 | 03.05., 21.06.,<br>02.08., 04.10.1985<br>07.08., 10.10. 1986 |
| SLVB | Skadar Lake, Vučko Blato | 42° 21' | 19° 06' | 10 | 22.02.1984 |
| sSBDV | Bar, village Dobre Vode, spring Škurta | 42° 02' 56'' | 19° 08' 38'' | 90 | 02.05.2005 |
| sSDMA | Durmitor Mt. area, mouth of the stream Sušica | 43° 05' | 19° 08' | ca.1400 | 18.06.1984 |
| VLDMA | Durmitor Mt. area, Vražje jezero-Lake | 43° 05' 02'' | 19° 08' 44'' | 1449 | 30.06.1981 |
| VSL | Veliko Stabanjsko Lake | 43° 11' 40'' | 18° 43' 35'' | 1319 | 08.10.1983 |
| VVsNV | Nikšić, spring "Vukovo vrelo" near village Vidrovan | 42° 51' 16" | 18° 56' 34" | 683 | 20.08.1999 |

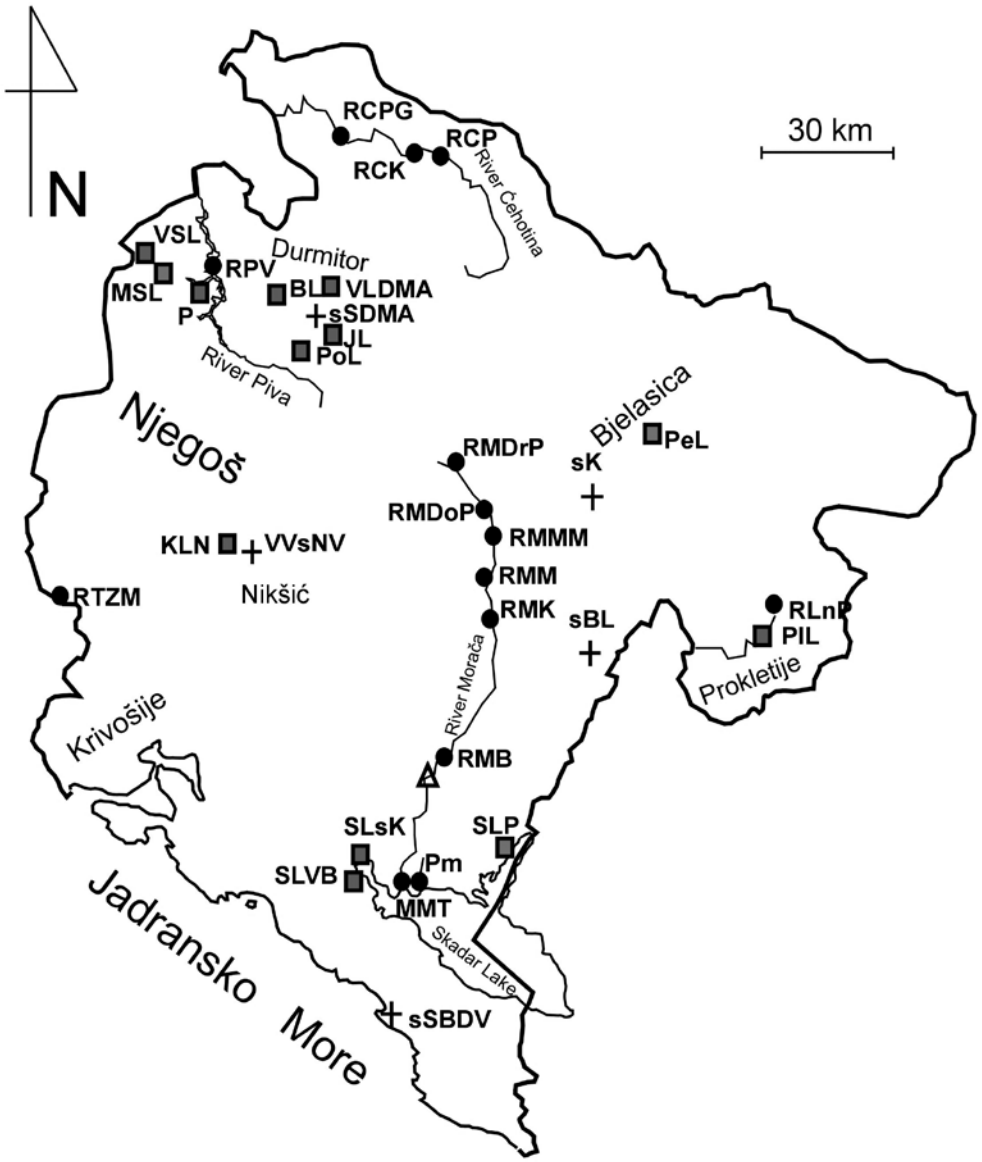


**Figure 1.** Map of the study area with marked sampling localities (abbreviations in Table 2). Triangle – locality where the unidentified larva of Orthocladiinae-type was collected.

Medjurječje (upper part) and 1 larva from Plavnice before the mouth.

**Remarks.** New genus from Montenegro. Genus recorded in Albania (Płóciennik 2008) and Croatia; so far not recorded in Bosnia and Herzegovina (Sæther and Spies 20011). In Serbia, *Conchapelopia melanops* has been recorded (Płóciennik et al., in preparation). Species from this genus inhabit small flowing waters and lakes (Vallenduuk and Moller Pillot 2007).

**Genus *Nilotanypus* Kieffer, 1923**

**Species *Nilotanypus dubius* (Meigen, 1804)**

**Material.** 1 larva from the river Morača, (upper part) near Dragovića Polje; 41 larvae from the river

Morača near Medjurječje (upper part);1 larva from the river Morača, upper part, Donje Polje and 2 larvae from Plavnice before the mouth.

**Remarks.** This represents a new genus and species for Montenegro. With the exception of Serbia (Płóciennik et al., unpub. data), this genus and species has not been recorded in any adjacent countries (Sæther and Spies 2012). Often found in mountain streams (Vallenduuk and Moller Pillot 2007).

**Genus *Zavrelimyia* Fittkau, 1962**

**Material.** 1 larva from Nikšić, vill.Vidrovan, spring Vukovo Vrelo and 3 larvae from Malo Stabanjsko Lake.

**Remarks.** New genus for Montenegro. Has not been recorded in any adjacent countries (Sæther and Spies 20011) other than Serbia (Płóciennik et al., unpub. data). *Zavrelimyia* inhabits streams and springs; and in colder regions is also found in the littoral zone of lakes (Wiederholm 1983).

### Tribe Macropelopiini

**Remarks.** New tribe of midges for Montenegro.

**Genus *Macropelopia* Thienemann, 1916**

**Material.** 1 larva from Biogradsko Lake.

**Remarks.** New genus for Montenegro. Has been recorded previously in Albania, Croatia and Serbia; to date has not been reported in Bosnia and Herzegovina (Simić and Simić 1999; Sæther and Spies 2012; Płóciennik 2008). *Macropelopia* species live in small streams, springs (also acidic), and are sometimes found near cold mountain lakes (Vallenduuk and Moller Pillot 2007).

### Tribe Procladiini

**Genus *Procladius* Skuse, 1889**

**Material.** 1 larva from Morača river, Koštanica; 11 larvae from the river Piva near Vrbnice; 5 larvae from Biogradsko Lake; 10 larvae from Jablaničko Lake; 3 larvae from Krupačko Lake; Nikšić; 1 larva from Malo Stabanjsko Lake; 2 larvae from Pešića Lake; 30 larvae from Plavsko Lake; 58 larvae from Skadar Lake, sublacustrine spring Karuč; 4 larvae from Veliko Stabanjsko Lake.

**Remarks.** Previously recorded in Albania (Płóciennik 2008), Croatia and Serbia, but has not been reported in Bosnia and Herzegovina (Sæther and Spies 2012; Płóciennik et al., unpub. data). Species of *Procladius* usually inhabit stagnant and slowly flowing waters (Vallenduuk and Moller Pillot 2007).

## Subfamily Diamesinae

**Remark.** New subfamily for Montenegro.

### Tribe Diamesini

**Genus *Diamesa* Meigen, 1835**

**Material.** 6 larvae from Pljevlja, Ćehotina river, Gradac, after depony; 1 larva from the upper part of the river Morača, near Dragovića Polje; 81 larvae from the river Morača near Medjurječje (upper part); 18 larvae from the river Morača near the Morača monastery; 8 larvae from Plavnice before the mouth of the river.

**Remarks.** The represents a new genus for Montenegro. This genus has been previously reported in Albania, Serbia and Croatia; but not in Bosnia and Herzegovina (Tavčar 1993; Sæther and Spies 2012). *Diamesa* larvae are found in flowing waters, the genus groups cold stenotherm taxa (Wiederholm 1983).

**Genus *Potthastia* Kieffer, 1922**

**Species *Potthastia gaedii* (Meigen, 1838)**

**Material.** 5 larvae from Pljevlja, Ćehotina river, Gradac, after depony; 1 larva from the river Morača, upper part near Dragovića Polje; 4 larvae from the river Morača near Medjurječje (upper part); 5 larvae from the river Morača near Morača monastery; 10 larvae from Plavnice before the mouth.

**Remarks.** This is a new genus and species for Montenegro. Previously recorded in Serbia (Płóciennik et al., unpub. data). Has not been found in Albania, Bosnia and Herzegovina or Croatia (Sæther and Spies 2012). Lives in large, hard-bottom, fast flowing rivers (Klink and Moller Pillot 2003).

**Genus *Pseudodiamesa* Goetghebuer, 1939**

**Material.** 2 larvae found in a stream near Kolašin.

**Remarks.** New genus for Montenegro. Not found in adjacent countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). *Pseudodiamesa* larvae live in springs, streams and oligotrophic lakes (Wiederholm 1983).

## Subfamily Prodiamesinae

**Genus *Prodiamesa* Kieffer, 1906**

**Species *Prodiamesa olivacea* (Meigen, 1818)**

**Material.** 5 larvae from Biogradsko Lake, 1 larva from Plavsko Lake; 36 larvae from Skadar Lake, sublacustrine spring Karuč.

This species has been found in Albania, Croatia and Serbia, but not Bosnia and Herzegovina (Sæther and Spies 2012, Płóciennik et al., unpub. data).

**Remarks.** Lives in springs, streams, rivers and the shallow littoral zone of lakes (Wiederholm 1983).

## Subfamily Orthocladiinae

**Genus *Brillia* Kieffer, 1913**

**Species *Brillia bifida* (Kieffer, 1909)**

**Material.** 1 larva from Bar, vill. Dobre Vode, spring Škurta and 1 larva from the river Morača near Medjurječje (upper part).

**Remarks.** New genus and species for Montenegro. Previously recorded in Albania, Serbia and Croatia; has not been reported in Bosnia and Herzegovina (Tavčar 1993; Sæther and Spies 2012; Płóciennik 2008, Płóciennik et al., unpub. data). Found in streams, springs and, sometimes, larger rivers (Klink and Moller Pillot 2003).

**Genus *Chaetocladius* Kieffer, 1911**

***Chaetocladius piger* agg. – sensu Moller Pillot (1984)**

**Material.** 1 larva found in a small spring in the forest on the road to Bukumirsko Lake.

**Remarks.** Genus and morphotype new for Montenegro. *Chaetocladius piger* (Goetghebuer, 1913) has not been found in neighbouring countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). Larvae from this morphotype are usually found in streams; the first larval stages are amphibiotic (Klink and Moller Pillot 2003).

**Genus *Corynoneura* Winnertz,1852**

***Corynoneura* cf. *celeripes* Winnertz, 1852**

**Material.** 1 larva from the river Morača near Medjurječje (upper part). Species determination was based on the key of Klink and Moller Pillot (2003), where *Corynoneura* cf. *antennalis* Kieffer, 1921 is mentioned; however, this is really a synonym of *Corynoneura celeripes* Winnertz, 1852.

**Remarks.** New genus and species for Montenegro. *Corynoneura celeripes* was previously recorded only in Croatia and Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Usually inhabits streams and springs (Klink and Moller Pillot 2003), but can also be found in bogs (Płóciennik unpublished observation).

**Genus *Cricotopus* van der Wulp, 1874**

**Species *Cricotopus bicinctus* (Meigen, 1818)**

**Material.** 5 larvae from Bilećko jezero, Zorin Most.

**Remarks.** New species for Montenegro. Previously reported in Albania, Bosnia and Herzegovina, Croatia and Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Lives in lowland streams and large standing waters (Klink and Moller Pillot 2003).

***Cricotopus* agg. *c*ylindraceus** – *Cricotopus* cylindraceus/*festivellus* sensu Moller Pillot 1984 (containing species *C.* cylindraceus (Kieffer in Kieffer and Thienemann 1908), *C. patens* Hirvenoja, 1973, *C. coronata* Hirvenoja, 1973, *C. festivellus* (Kieffer, 1906), *C. flavocinctus* (Kieffer, 1924), *C. albiforceps* (Kieffer in Kieffer and Thienemann 1916), *C. pulchripes* Verrall, 1912? (larva unknown)) and *Cricotopus vierriensis* Goetghebuer, 1935.

**Material.** 1 larva from the river Ćehotina, Krakalice; 117 larvae from Pljevlja, river Ćehotina, Gradac, after depony; 2 larvae from the river Morača near Bioče; 1 larva from Bilećko lake, Zorin Most; 1 larva from Bar, vill. Dobre Vode, spring Škurta.

**Remarks.** Morphotype new for Montenegro. In neighbouring countries, only *Cricotopus albiforceps* (Kieffer, 1916) has been previously recorded (in Bosnia and Herzegovina and in Serbia) (Sæther and Spies 2012, Płóciennik et al., unpub. data). This morphotype is found in stagnant waters and lowland streams (Klink and Moller Pillot 2003).

**Species *Cricotopus trifascia* Edwards, 1929**

**Material.** 1 larva was found on Pljevlja, Ćehotina river, Gradac, after depony.

**Remarks.** This species is new for Montenegro.

Previously recorded in Albania and Serbia; but has not been recorded in Bosnia and Herzegovina or Croatia (Sæther and Spies 2012; Płóciennik 2008, Płóciennik et al., unpub. data). Species has been found to occur in foothill rivers (Klink and Moller Pillot 2003).

**Genus *Eukiefferiella* Thienemann, 1926**

**Species *Eukiefferiella brevicalcar* (Kieffer, 1911)**

**Material.** 2 larvae from the river Morača near Medjurječje (upper part); 4 larvae from Plavnice before the mouth.

**Remarks.** New genus and species for Montenegro. Not found in Albania, Bosnia and Herzegovina or Croatia; previously recorded in Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Lives in foothill streams (Klink and Moller Pillot 2003).

**Species *Eukiefferiella clypeata* (Kieffer, 1923)**

**Material.** 5 larvae from the river Morača near Bioče and 8 larvae from the river Morača near Medjurječje (upper part).

**Remarks.** New species for Montenegro. Not recorded in neighbouring countries, other than Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Inhabits foothill streams (Klink and Moller Pillot 2003).

***Eukiefferiella* agg. *fittkaui*** – *Eukiefferiella gracei* (Edwards, 1929), *E. fittkaui* Lehmann, 1972 and *E. minor* sensu Schmid 1993. This determination follows Klink and Moller Pillot (2003).

**Material.** 5 larvae from the river Morača near Bioče; 1 larva from the river Morača, upper part near Dragovića Polje; 3 larvae from the river Morača near Medjurječje (upper part).

**Remarks.** Morphotype new for Montenegro. In neighbouring countries, *Eukiefferiella gracei* was reported in Croatia and Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). In addition, *Eukiefferiella minor* has been found in Serbia (Płóciennik et al., unpub. data). Larvae of this morphotype are found in mountain springs and streams (Klink and Moller Pillot 2003).

***Eukiefferiella ilkleyensis*-type**

**Material.** 2 larvae from the river Morača near Bioče; 1 larva from the river Morača, upper part, Donje Polje; 5 larvae from the river Morača near Morača monastery; 18 larvae from Plavnice before the mouth; 1 larva from Bar, vill. Dobre Vode, spring Škurta. The determination follows Klink and Moller Pillot (2003), however note that *Eukiefferiella ilkleyensis* cannot be separated in the larval stage from *Eukiefferiella devonica*-type sensu Brooks et al. 2007.

**Remarks.** New morphotype for Montenegro. Not recorded in neighbouring countries (Sæther and Spies 2012) other than Serbia (Płóciennik et al., unpub. data). Lives in flowing waters (Klink and Moller Pillot 2003).

**Genus *Georthocladius* Strenzke, 1941**

**Material.** 1 larva from the river Ćehotina, Krakalice.

**Remarks.** New genus for Montenegro. Not previously recorded in neighbouring countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). Live in bogs, helocrene springs and other lotic habitats (Wiederholm 1983).

**Genus *Heterotrissocladius* Spärck, 1923**

**Species *Heterotrissocladius marcidus* (Walker, 1856)**

**Material.** 7 larvae from Biogradsko Lake.

**Remarks.** New genus and species for Montenegro. Not recorded in neighbouring countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). Usually inhabits small streams; rarely found in larger rivers and stagnant waters (Klink and Moller Pillot 2003).

**Genus *Limnophyes* Eaton, 1875**

**Material.** 1 larva from the river Morača, upper part near Dragovića Polje.

**Remarks.** New genus for Montenegro. Not recorded in Albania; previously reported in Bosnia and Herzegovina, Croatia and Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Species lives in terrestrial as well as water habitats (Wiederholm 1983).

**Genus *Nanocladius* Kieffer, 1913**

**Species *Nanocladius rectinervis* (Kieffer, 1911)**

**Material.** 5 larvae from the river Morača near Medjurječje (upper part).

**Remarks.** New species for Montenegro. Not re-

corded in neighbouring countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). Inhabits lowland streams and rivers (Klink and Moller Pillot 2003).

***Nanocladius dichromus* agg.** – *Nanocladius dichromus* Kieffer 1906 and *N. distinctus* (Malloch, 1915). Determination based on Klink and Moller Pillot (2003), where *Nanocladius bicolor* agg. is mentioned; however, *N. bicolor* Zetterstedt 1838 is a synonym of *Nanocladius dichromus* (Kieffer 1906).

**Material.** 1 larva from the river Morača near Medjurječje (upper part).

**Remarks.** New genus and morphotype for Montenegro. Of the above species, *Nanocladius dichromus* has been recorded in Croatia and Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Larvae of this morphotype are found in large stagnant waters and rivers (Klink and Moller Pillot 2003).

**Genus *Orthocladius* (*Orthocladius*) van der Wulp, 1874**

**Material.** 16 larvae from Pljevlja, the river Ćehotina, Gradac, after depony.

**Remarks.** New genus for Montenegro. In neighbouring countries species from *Orthocladius* (*Orthocladius*) were recorded only in Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Found in running waters (Klink and Moller Pillot 2003).

**Species *Orthocladius (Euorthocladius) rivulorum* Kieffer, 1909**

**Material.** 1 larva from the river Ćehotina after Pljevlja; 1 larva from Pljevlja, Ćehotina river, Gradac, after depony; 1 larva from the river Morača near Medjurječje (upper part); 4 larvae from the river Morača near Morača monastery; 1 larva from Plavnice before the mouth.

**Remarks.** New species for Montenegro. Species has not been recorded in neighbouring countries (Sæther and Spies 2012) other than Serbia (Płóciennik et al., unpub. data). Inhabits streams with strong currents (Klink and Moller Pillot 2003).

***Orthocladius* type S – sensu Brooks et al. 2007**

**Material.** 28 larvae from Pljevlja, Ćehotina river, Gradac, after depony; 7 larvae from N Montenegro, River Ljuča near Plav; 6 larvae from the river Morača near Bioče; 2 larvae from the river Morača, upper part, Donje Polje; 8 larvae from the river Morača, upper part near Dragovića Polje; 1 larva from the river Morača, Koštanica; 6 larvae from the river Morača near Medjurječje (upper part); 4 larvae from the river Morača near Morača monastery; 6 larvae from Bilećko lake, Zorin Most; 1 larva from Bar, vill. Dobre Vode, spring Škurta; 11 larvae from Plavnice before the mouth; 2 larvae from Skadar Lake, suclacustrine spring Karuč.

**Remarks.** New morphotype for Montenegro. This morphotype groups many difficult to separate larval stages of *Orthocladius* and *Cricotopus* genera living in flowing and standing waters (Klink and Moller Pillot 2003; Brooks et al. 2007).

**Genus *Paracricotopus* Thienemann and Harnisch, 1932**

**Material.** 1 larva from the river Morača near Morača monastery.

**Remarks.** New genus for Montenegro. Not recorded in neighbouring countries (Sæther and Spies 2012) other than Serbia (Płóciennik et al., unpub. data). Species lives on mosses and algae in bogs, and in running waters (Wiederholm 1983)

**Genus *Parametriocnemus* Goetghebuer, 1932**

**Material.** 6 larvae from the river Ćehotina, Krakalice.

**Remarks.** New genus for Montenegro. In adjacent countries, it is found only in Albania (Sæther and Spies 2012; Płóciennik 2008, Płóciennik et al., unpub. data). Inhabits fast flowing, cold streams (Wiedeholm 1983).

**Genus *Paratrissocladius* Zavřel**, 1937

**Species *Paratrissocladius excerptus* (Walker, 1856)**

**Material.** 1 larva from N. Montenegro, Ljuča river, near Plav.

**Remarks.** New genus and species for Montenegro. Not recorded in neighbouring countries (Sæther and Spies 2012) other than Serbia (Płóciennik et al., unpub. data). Inhabits flowing waters (Klink and Moller Pillot 2003).

**Genus *Psectrocladius* Kieffer**, 1906

***Psectrocladius* agg. *sordidellus* (Zetterstedt, 1838) – sensu Moller Pillot 1984**

**Material.** 1 larva from Jablaničko Lake and 1 larva from Plužine.

**Remarks.** New genus and morphotype for Montenegro. Morphotype not recorded in Albania and Serbia; previously reported in Bosnia and Herzegovina and Croatia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Eurytopic morphotype, found in both stagnant and running waters (Klink and Moller Pillot 2003).

**Genus *Pseudorthocladius* Goetghebuer, 1932**

**Material.** 1 larva from the river Morača, Koštanica and 1 larva from the river Morača near Medjurječje (upper part).

**Remarks.** New genus for Montenegro, not recorded in neighbouring countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). Lives in damp soil, *Sphagnum* bogs, spring areas (Wiederholm 1983; Klink and Moller Pillot 2003).

**Genus *Rheocricotopus* Brundin, 1956**

**Species *Rheocricotopus* (*Psilocricotopus*) *chalybeatus* (Edwards, 1929)**

**Material.** 2 larvae from the river Ćehotina, Krakalice; 5 larvae from Pljevlja, Ćehotina river, Gradac, after depony; 1 larva from Plavsko Lake.

**Remarks.** New genus and species for Montenegro. Previously recorded in Albania and Serbia, but not found in other adjacent countries (Sæther and Spies 2012; Płóciennik 2008, Płóciennik et al., unpub. data). Lives in running waters (Klink and Moller Pillot 2003).

**Species *Rheocricotopus* (*Rheocricotopus*) cf. *effusus* (Walker, 1856)**

**Material.** 1 larva from Plavnice before the mouth.

**Remarks.** New species for Montenegro. In adjacent countries, this species has only been reported in Croatia and Serbia (Tavčar 1993; Sæther and Spies 2012, Płóciennik et al., unpub. data). Found in streams and springs (Klink and Moller Pillot 2003).

**Genus *Smittia* Holmgren, 1869**

**Material.** 2 larvae from the river Morača near Medjurječje (upper part).

**Remarks.** New genus for Montenegro. Recorded in Bosnia and Herzegovina, Croatia and Serbia, but not in Albania (Sæther and Spies 2012, Płóciennik et al., unpub. data). Most species of this genus are terrestrial (Wiederholm 1983).

**Genus *Synorthocladius* Thienemann, 1935**

**Species *Synorthocladius semivirens* (Kieffer, 1909)**

**Material.** 33 larvae from the river Morača near Bioče; 1 larva from the river Morača, upper part, Donje Polje; 2 larvae from the river Morača, upper part near Dragovića Polje; 1 larva from the river Morača near Medjurječje (upper part); 1 larva from the river Piva near Vrbnice.

**Remarks.** New genus and species for Montenegro. Not found in Albania, Bosnia and Herzegovina and Croatia; previously recorded in Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Present in rivers and streams (Klink and Moller Pillot 2003).

**Genus *Tvetenia* Kieffer, 1922**

**Material.** 14 larvae from the river Ćehotina, Krakalice; 11 larvae from the river Morača near Bioče; 1 larva from the river Morača, upper part, Donje Polje; 5 larvae from the river Morača near Medjurječje (upper part); 2 larvae from Plavnice before the mouth; 1 larva from Bar, vill. Dobre Vode, spring Škurta.

**Remarks.** New genus for Montenegro. Present in Albania and Serbia; but has not been recorded in Bosnia and Herzegovina and Croatia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Lives in running waters (Wiederholm 1983).

## Subfamily Chironominae
### Tribe Chironomini

**Genus *Chironomus* Meigen, 1803**

**Material.** 10 larvae from the river Piva near Vrbnice; 19 larvae from Nikšić, Vukovo hot spring near village Vidrovan; 131 larvae from Biogradko Lake; 4 larvae from Jablaničko Lake; 24 larvae from Krupačko Lake, Nikšić; 2 larvae from Plužine; 11 larvae from Plavsko Lakeč; 2 larvae from Pošćensko Lake; 709 larvae from Skadar Lake, sublacustrine spring Karuč; 8 larvae from Vučko Blato, Skadar Lake; 50 larvae from Veliko Stabanjsko Lake.

Previously recorded in all adjacent countries

(Sæther and Spies 2012, Płóciennik et al., unpub. data).

**Remarks.** The genus *Chironomus* groups many species with different habitat preferences. Although most of these are associated with standing waters, many are common in rivers and streams (Wiederholm 1983). Although theoretically, the key used in this study (Klink and Moller Pillot 2003) allows for Chironomus larvae identification; the authors are not experienced enough to reliably identify larvae from this genus, which is very difficult.

**Genus *Cryptochironomus* Kieffer, 1918**

**Material.** 1 larva found in Skadar Lake, sublacustrine spring Karuč.

Genus recorded from Albania, Croatia and Serbia; not found in Bosnia and Herzegovina (Sæther and Spies 2012, Płóciennik et al., unpub. data).

**Remarks.** *Cryptochironomus* larvae live in standing and flowing waters (Wiederholm 1983).

**Genus *Endochironomus* Kieffer, 1918**

**Species *Endochironomus albipennis* (Meigen, 1830)**

**Material.** 2 larvae from Vučko Blato, Skadar Lake.

**Remarks.** New species for Montenegro. Not found in adjacent countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). It lives on vegetation in standing and large running waters (Klink and Moller Pillot 2003).

**Genus *Microtendipes* Kieffer, 1915**

***Microtendipes pedellus* agg. – sensu Moller Pillot 1984**

**Material.** 2 larva from Plavsko Lake; 20 larvae from Skadar Lake, Podhum; 24 larvae from Skadar Lake, sublacustrine spring Karuč.

**Remarks.** New genus and morphotype for Montenegro. *Microtendipes pedellus* is widespread in Europe. Previously recorded in Bosnia and Herzegovina and Croatia, but not found in Albania nor Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Inhabits its lowland streams (Klink and Moller Pillot 2003).

**Genus *Paratendipes* Kieffer, 1911**

**Species *Paratendipes albimanus* (Meigen, 1818)**

**Material.** 2 larvae from the mouth of the river Morača, Manastirska Tapija; 1 larva from Skadar Lake, sublacustrine spring Karuč; 1 larva from Skadar Lake, Podhum.

**Remarks.** New genus and species for Montenegro. Recorded in Albania, Croatia and Serbia; but not found in Bosnia and Herzegovina (Sæther and Spies 2012, Płóciennik et al., unpub. data). Usually found in streams and rivers, rarely in standing waters (Klink and Moller Pillot 2003).

**Genus *Polypedilum* Kieffer, 1912**

**Species *Polypedilum convictum* (Walker, 1856)**

**Material.** 2 larvae from the river Morača near Bioče; 31 larvae from the river Morača near Medjurječje (upper part); 5 larvae from Plavnice before the mouth.

**Remarks.** Lives on vegetation in streams (Klink and Moller Pillot 2003).

Recorded in Croatia, Albania and Serbia. Not found in Bosnia and Herzegovina (Sæther and Spies 2012, Płóciennik et al., unpub. data)

***Polypedilum nubeculosum*-type sensu Brooks et al. 2007**

**Material.** 2 larvae from the mouth of Sušica stream, Mt. Durmitor; 8 larvae from Jablaničko Lake; 19 larvae from Skadar Lake, sublacustrine spring Karuč; 2 larvae from Vučko Blato, Skadar Lake.

**Remarks.** *Polypedilum nubeculosum*-type occurs in lake littoral zones and in running waters (Klink and Moller Pillot 2003; Brooks et al. 2007).

**Genus *Stictochironomus* Kieffer, 1919**

**Material.** 2 larvae from the river Piva near Vrbnice.

Recorded in Albania, Croatia and Serbia. Not found in Bosnia and Herzegovina (Sæther and Spies 2012, Płóciennik et al., unpub. data).

**Remarks.** Occurs in lake profundal zones, as well as in sandy streams and rivers (Wiederholm 1983).

**Tribe Tanytarsini**

**Genus *Cladotanytarsus* Kieffer, 1921**

***Cladotanytarsus* agg. *mancus* – sensu Wiederholm 1983**

**Material.** 1 larva from Plavsko Lake.

**Remarks.** *Cladotanytarsus mancus* was recorded

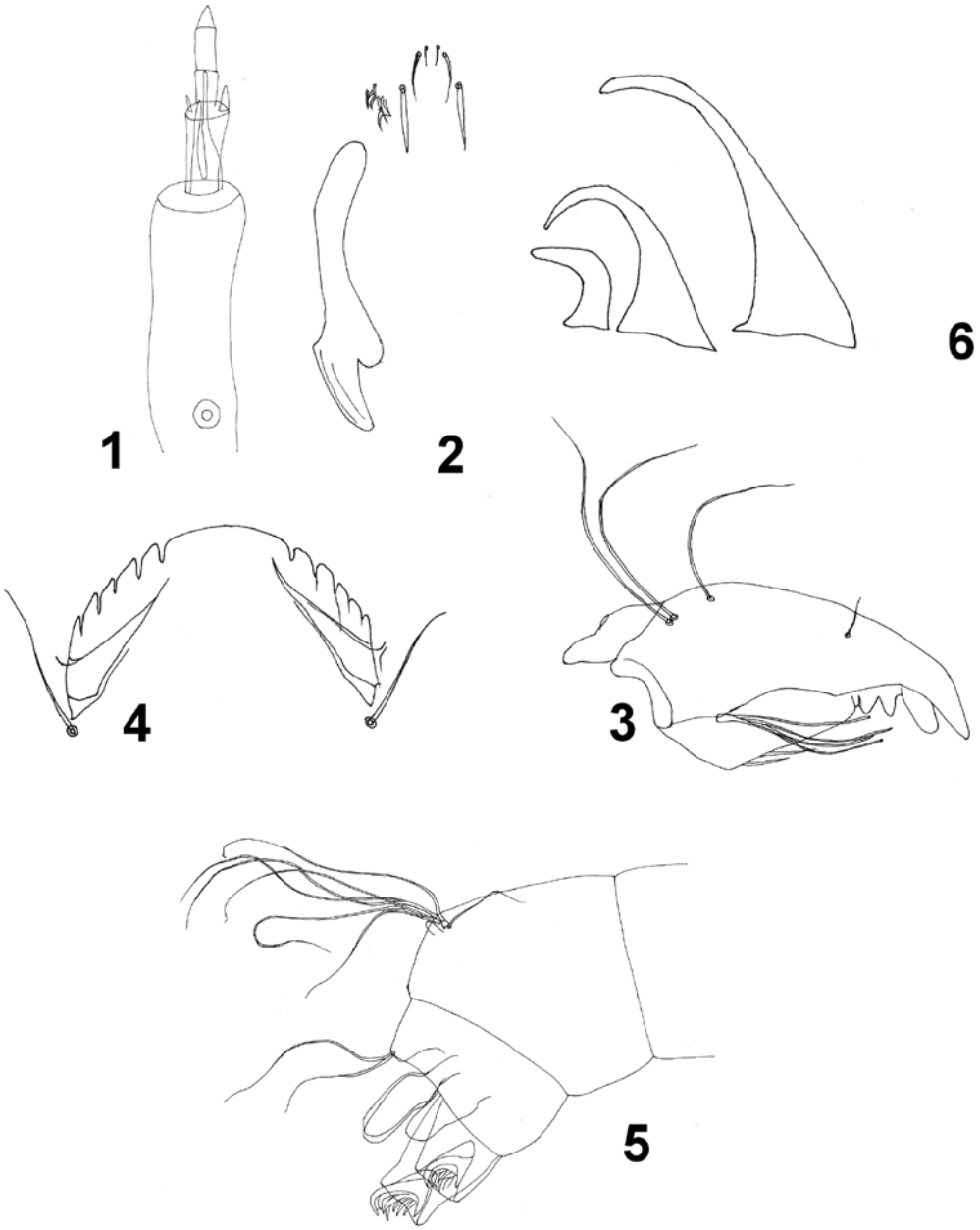


**Figure 2.** Orthocladiinae-type, larva: **1** = antenna, **2** = labrum, **3** = mandibla, **4** = mentum, **5** = anal segments, **6** = claws of posterior parapods.

in Albania, Croatia and Serbia. Not found in Bosnia and Herzegovina (Sæther and Spies 2012, Płóciennik et al., unpub. data).

Eurytopic genus found in diverse running and standing water bodies (Wiederholm 1983).

**Genus *Micropsectra* Kieffer, 1909**

***Micropsectra* type A – sensu Brooks et al. 2007**

**Material.** 2 larvae from the river Ćehotina, Krakalice; 1 larva from the river Ljuča near Plav; 1 larva from the river Piva near Vrbnice; 2 larvae from Plavnice before the mouth; 3 larvae from Bar, vill. Dobre Vode, spring Škurta; 7 larvae from Biogradko Lake; 22 larvae from Plavsko Lake.

**Remarks.** New genus and morphotype for Montenegro. Genus present in Albania, Croatia, Serbia; not recorded in Bosnia and Herzegovina (Simić and

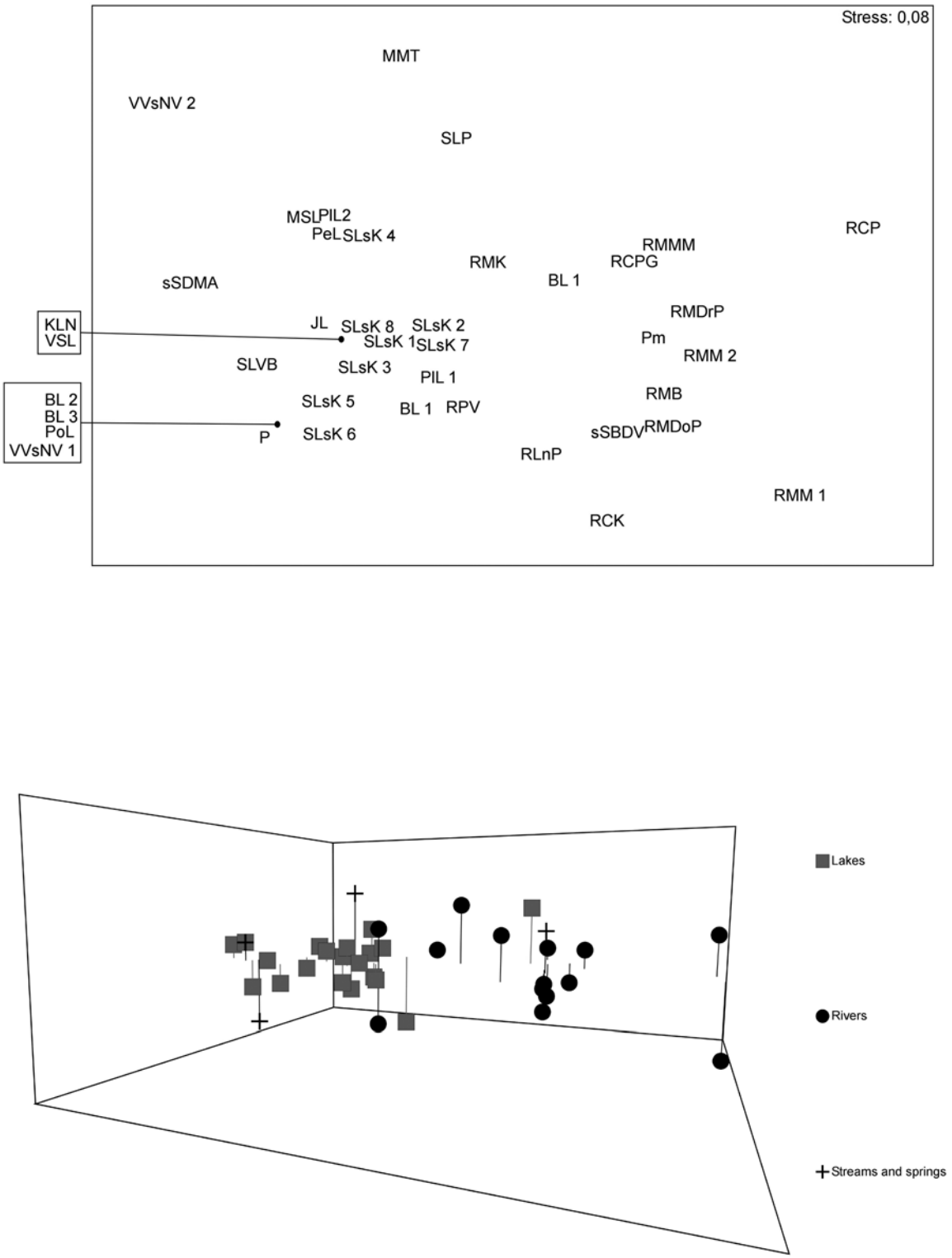


**Figure 3.** Ordination (MDS analysis) of the sampling localities of chironomid larvae in Montenegro. **A**) general ordination, **B**) macrohabitat differentiation. For abbreviations of sampling localities-see Table 2.

Simić 1999; Sæther and Spies 2012, Płóciennik et al., unpub. data). *Micropsectra* is often found in streams and small rivers, as well as in mesotrophic and oligotrophic lakes, many species are cold stenothermic (Wiederholm 1983; Brooks et. al. 2007).

***Micropsectra junci*-type – sensu Brooks et al. 2007**

**Material.** 9 larvae from Bar, vill. Dobre Vode, spring Škurta.

**Remarks.** New morphotype for Montenegro. Many species from the *Micropsectra* genus are cold-stenotherms, which is typical for oligotrophic-mesotrophic conditions (Wiederholm 1983). One of these, *Micropsectra junci*, lives in springs with moderate current (Klink and Moller Pillot 2003).

***Micropsectra pallidula*-type – sensu Brooks et al. 2007**

**Material.** 1 larva from Bilećko jezero, Zorin Most.

**Remarks.** New morphotype for Montenegro. *Micropsectra pallidula*-type is found in lakes with higher trophy than those inhabited by other types in this genus (Brooks et al. 2007).

**Genus *Neozavrelia* Goetghebuer, 1941**

**Material.** 3 larvae from Skadar Lake, sublacustrine spring Karuč.

**Remarks.** New genus for Montenegro. Not recorded in adjacent countries (Sæther and Spies 2012, Płóciennik et al., unpub. data). *Neozavrelia* is a cold stenothermic taxon, and lives in limestone areas, lakes and rivers (Wiederholm 1983).

**Genus *Paratanytarsus* Thienemann and Bause, 1913**

**Species *Paratanytarsus lauterborni* (Kieffer, 1909)**

**Material.** 4 larvae from Skadar Lake, sublacustrine spring Karuč.

**Remarks.** New genus and species for Montenegro. Not recorded in Albania nor Bosnia and Herzegovina; found in Croatia and Serbia (Sæther and Spies 2012, Płóciennik et al., unpub. data). Inhabits small standing water bodies, lake littoral zones and streams (Klink and Moller Pillot 2003).

**Genus *Rheotanytarsus* Thienemann and Bause, 1913**

**Material.** 2 larvae from the river Morača, upper part near Dragovića Polje; 14 larvae from the river Morača near Medjurječje (upper part).

**Remarks.** New genus for Montenegro. Not recorded in Bosnia and Herzegovina; found in Albania, Croatia and Serbia (Sæther and Spies 2012; Płóciennik 2008, Płóciennik et al., unpub. data). Larvae live in running waters (Wiederholm 1983).

**Genus *Tanytarsus* van der Wulp, 1874**

***Tanytarsus* agg. *brundini*** – *Tanytarsus brundini* Lindeberg, 1963, *T. curticornis* Kieffer, 1911 and *T. chinyensis*-type sensu Brooks et al. 2007 fit this morphotype.

**Material.** 1 larva from the river Ljuča near Plav; 5 larvae from the river Piva near Vrbnice.

**Remarks.** New morphotype for Montenegro. Species from *Tanytarsus* agg. *brundini* are found in lakes and rivers (Klink and Moller Pillot 2003), T. *chinyensis* has been described as a cold-stenotherm and is found in oligotrophic lakes (Brooks et al. 2007).

***Tanytarsus* agg. *sylvaticus* –** *T. sylvaticus* (Van der Wulp, 1858) and *T. lugens*-type sensu Brooks et al. 2007 fit this morphotype.

**Material.** 13 larvae from Plavsko Lake.

**Remarks.** New morphotype for Montenegro. *T. sylvaticus* lives in the littoral zones of lakes and ponds (Klink and Moller Pillot 2003). Species from *T. lugens*-type are cold-stenotherms and inhabit littoral and profundal zones of cold, oligotrophic lakes (Brooks et al. 2007).

## Description of undetermined morphotypes

**Orthocladiinae-type**

**Material.** 1 larva from the Morača river near Dajbabe (Podgorica) 42° 24' 34" N, 19° 13' 25" E, 45 m asl., 08.06.1990.

**Description.** Head capsule about 400 μm long, 320 μm wide, strongly sclerotized, brownish yellow with yellow brown mandibulae and occipital margin. Antenna (Fig. 2.1) 5 segmented. Segments I to III are consecutively shorter, segment IV is 1.5x longer then seg. III (I – 50 μm, II – 13 μm, III – 4 μm, IV – 6 μm, V – 3 μm). Ring organ is in the basal ¼ of the 1st segment.

Antennal blade reaching the end of the 3rd segment. Lauterborn organs and style are hardly visible. Labrum (Fig. 2.2) with all S setae simple. SI strong, 13 µm long. Premadibulae 75 µm long, with one apical tooth, rounded inner tooth and brush absent. Other elements of labrum indistinct in the preparate. Mandible (Fig. 2.3) about 130 µm long with apical tooth shorter than combined width of 3 inner teeth. Seta subdentalis absent. Seta interna with short unbranched basal part and 4 simple branches. Inner margin with 2 long spines. Mentum (Fig. 2.4) 110 µm wide, with single median tooth 5 times as wide as first lateral tooth. There are 5 pairs of lateral teeth decreasing in size. Ventromental plates are broad and triangular, beard is absent. Seta submenti below end of ventromental plates. Body (Fig. 2.5, 6) with well-developed parapods. Anterior parapods are partly fused at the base with separate crowns of claws, posterior parapods are separate. Claws of posterior parapods are as in Fig 2.6. Anal segment is not reduced (Fig. 2.5), normally developed. Procercus with 6 anal setae. Supraanal setae well-developed. Two pairs of anal tubules shorter than parapodes.

**Remarks.** The above described larva closely resembles (Wiederholm 1983; Klink and Moller Pillot 2003): *Cardiocladius* - especially mentum with 5 pairs of lateral teeth and weak ventromental plates. SI is simple. However, the mandible have only three inner teeth and the anal segment is well-developed. Supraanal setae are present, procercus with subapical setae, IV segment of the antenna is longer than III, seta interna has a short unbranched basal part and 4 branches. This differs from the presented specimen from *Cardiocladius*. The mentum does not appear to be worn, which often happens in Orthocladiinae, but the first lateral teeth may be fused with the midmental tooth. Only one specimen is available. It is possible that the above described features represent intraspecific variability of some species from the *Cricotopus-Orthocladius* group.

## Assemblage analysis

MDS analysis (Fig. 3) shows a clear distinction of fauna from river macrohabitats (Morača and Ćehotina) and lakes. Assemblages of the Morača and Ćehotina rivers are formed from taxa typical for cold, rocky bottomed, fast flowing streams (Klink and Moller Pillot 2003): mainly with Orthocladiinae from the *Cricotopus* and *Orthocladius* group, and also with *Synorthocladius semivirens* and Eukiefferilla ikleyensis-type. *Nilotanypus dubius*, *Diamesa* and *Polypedilum convictum* were also abundant taxa. The occurrence of amphibiotic taxa in these water bodies may be associated with a temporary decrease in water level and the presence of semi-terrestrial habitats. The second group (Fig. 3) aggregate assemblages of standing water bodies. The fauna of the investigated lakes appear to be dominated by Chironominae (e.g. *Chironomus*, *Microtendipes pedellus* agg., *Tanytarsus*, *Micropsectra* A-type). *Procladius* and *Prodiamesa olivacea* are also important components of the assemblages. Most of these taxa assemble many species with diverse preferences, although the *Micropsectra* abundant in Plavsko Lake usually inhabit cold, oligotrophic lakes (Brooks et al. 2007; Klink and Moller Pillot 2003). The material obtained in the present study from springs and streams is too small for interpretation.

# Discussion

Based on results from the present study, the updated list of non-biting midges from Montenegro now contains 47 genera, 29 species and 14 morphotypes. However, even with this updated list, Montenegro remains one of the least studied regions of the Balkan Peninsula with respect to Chironomidae. In the group of new taxa, 41 were recorded earlier from all adjacent countries: one from Albania (*Parametriocnemus*), and eleven from Serbia (*Nilotanypus dubius, Zavrelimyia, Potthastia gaedii, Eukiefferiella brevicalcar, Eukiefferiella clypeata, Eukiefferiella ilkleyensis*-type, *Orthocladius (Orthocladius), Orthocladius (Euorthocladius) rivulorum, Paracricotopus, Paratrissocladius excerptus, Synorthocladius semivirens*) (Sæther and Spies 2012, Płóciennik et al., unpub. data). The following seven taxa, which are new for Montenegro, have not been recorded in any adjacent countries: *Pseudodiamesa*, *Georthocladius*, *Heterotrissocladius marcidus*, *Nanocladius rectinervis*, *Pseudorthocladius*, *Endochironomus albipennis*, *Neozavrelia*. Thus, the present study represents the first recording of these taxa in the entire region (Sæther and Spies 2012, Płóciennik et al., unpub. data). However, note that the above records

are based on the larval life stage, which can be usually determined only to the genus level. An investigation based on pupal exuviae or adult males would certainly reveal higher diversity in such a collection. Obviously the number of recorded species is far from a reliable estimation. However, the analyzed material was collected from nearly all types of water bodies present in Montenegro, and was collected over a period of many years, enabling interesting insight into the chironomid fauna of the studied area.

Results from the present study are preliminary, and the assemblage classifications presented here are only the first such analysis of chironomid fauna in the Montenegro. Further studies to improve our knowledge of Montenegrin non-biting midges should focus on collecting specimens from little known areas. Studying material consisting of adults and filling the large gaps in our knowledge regarding the diversity of non-biting midges in specific habitats, such as mountains springs and streams, is also necessary.

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