

# AQUATIC EMPIDIDAE (CLINOCERINAE AND HEMERODROMIINAE) OF THE UPPER COURSE OF THE NERETVA RIVER WITH UPDATED CHECKLIST FOR BOSNIA AND HERZEGOVINA

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**Ivković, M.: Aquatic Empididae (Clinocerinae and Hemerodromiinae) of the upper course of the Neretva River with updated checklist for Bosnia and Herzegovina. Nat. Croat., Vol. 32., No. 1, 149-157, 2023, Zagreb.**

Aquatic dance flies (Empididae) were collected during the "Neretva Science Week" in July 2022 along the upper course of the Neretva River in Bosnia and Herzegovina using sweep nets and an aspirator at 10 sampling sites. Of the 19 species recorded in this study, five species are new to the fauna of Bosnia and Herzegovina: *Clinocerella sorex* (Engel), *Wiedemannia angelieri* Vaillant, *Wiedemannia aquilex* (Loew), *Wiedemannia ariadne* Wagner and *Wiedemannia mikiana* (Bezzi). In total, 45 species from Bosnia and Herzegovina have now been recorded, belonging to 10 genera. This study represents an important contribution to the knowledge of the aquatic dance fly fauna of Bosnia and Herzegovina and is a significant addition to information about the species distribution in the Balkans.

**Key words:** aquatic dance flies, checklist, new records, *Wiedemannia microstigma*, Balkan endemics

**Ivković, M.: Vodene muhe plesačice (Clinocerinae i Hemerodromiinae) gornjeg toka rijeke Neretve s ažuriranim popisom vrsta za Bosnu i Hercegovinu. Nat. Croat., Vol. 32., No. 1, 149-157, 2023, Zagreb.**

Vodene muhe plesačice (Empididae) sakupljane su tijekom znanstvenog tjedna „Neretva Science Week“ u srpnju 2022. godine u gornjem toku rijeke Neretve u Bosni i Hercegovini entomološkom mrežicom i aspiratorom na 10 lokacija. Od 19 zabilježenih vrsta tijekom ovog istraživanja, pet vrsta su nove za faunu Bosne i Hercegovine: *Clinocerella sorex* (Engel), *Wiedemannia angelieri* Vaillant, *Wiedemannia aquilex* (Loew), *Wiedemannia ariadne* Wagner i *Wiedemannia mikiana* (Bezzi). Ukupno je u Bosni i Hercegovini zabilježeno 45 vrsta koje pripadaju u 10 rodova. Ovo istraživanje predstavlja važan doprinos poznavanju faune vodenih muha plesačica Bosne i Hercegovine i značajan je dodatak u poznavanju rasprostranjenosti vrsta na Balkanu.

**Ključne riječi:** vodene muhe plesačice, popis vrsta, novi podaci, *Wiedemannia microstigma*, Balkanski endemi

## INTRODUCTION

Aquatic dance flies (Empididae) are an ecological group comprising two subfamilies, Clinocerinae and Hemerodromiinae, both of which have aquatic immatures and terrestrial adults. Both adults and larvae are predators, primarily feeding on the larvae and adults of Simuliidae (VAILLANT, 1952, 1953; WERNER & PONT, 2003), Chironomidae (HARKRIDER, 2000; IVKOVIĆ *et al.*, 2010) and Psychodidae (IVKOVIĆ & PLANT, 2015). The representatives of adult Hemerodromiinae are relatively poor fliers, with raptorial

front legs (WAGNER, 1997). They mainly live and hunt in riparian vegetation, though adults have been reported at a distance from fresh water (PLANT *et al.*, 2011). In contrast, adult Clinocerinae are good and active fliers found only in very close proximity to water and are often observed walking over the surface of wet stones or moss mats (IVKOVIĆ *et al.*, 2007, 2012; SINCLAIR, 2008). Clinocerinae, especially the species-rich genus *Wiedemannia* Zetterstedt, can rarely be found on riparian vegetation and adults probably disperse along stream or river channels, so we may conjecture that dispersal is more limited than in Hemerodromiinae. The two subfamilies have different behavioural strategies and they utilise different microhabitats. Clinocerinae are generally confined to clean and cool running water (SINCLAIR, 2008) and while Hemerodromiinae may also be present in such habitats, they also inhabit warmer parts of streams and rivers (IVKOVIĆ *et al.*, 2013a).

Although there have been some research on aquatic dance fly fauna of Bosnia and Herzegovina, starting with STROBL (1900), BEZZI (1904), ENGEL (1940) and WAGNER (1981), this is the first research into the aquatic dance fly fauna of the upper course of the Neretva River. More detailed studies were conducted by HORVAT (1990, 1993), with additional species of Clinocerinae listed by WAGNER (1995) and IVKOVIĆ *et al.* (2012, 2014a). Currently, 40 species have been reported from Bosnia and Herzegovina, while only one species, *Wiedemannia artemisa* Ivković & Plant, has been recorded from the Neretva River (IVKOVIĆ *et al.*, 2012).

## MATERIAL AND METHODS

Names of the taxa reflect current nomenclature and classifications (SINCLAIR, 1995; WAGNER & HORVAT, 1993; YANG *et al.*, 2007, IVKOVIĆ *et al.*, 2012, 2019, 2022). Locality records are given for each species. A list of locality names including latitude, longitude, and number codes (site ID) is presented in Table 1 and a map showing all the sites is provided (Fig. 1). Specimens were collected as part of the "Neretva Science Week" in July 2022 organized by the Scientists for Balkan Rivers Network, which is a part of the Blue Heart of Europe campaign. Specimens were collected using entomological sweep nets and aspirator. All the collected aquatic dance flies are preserved in 80% ethanol (EtOH). For the purpose of determination, male terminalia were dissected, boiled in 10% KOH and afterwards neutralized with acetic acid, rinsed in water and identified to species level; or they were macerated in hot 85% lactic acid and stored in 80% etha-

**Tab. 1.** List of sampling sites on the upper course of Neretva River.

Site ID	Site Name	Longitude	Latitude
1	Krupac confluence with Neretva	18.42894°E	43.33092°N
2	Krupac Stream	18.42574°E	43.32942°N
3	Old wooden bridge on Neretva	18.36999°E	43.36523°N
4	Cerova on Neretva	18.35621°E	43.37887°N
5	Uloški Buk on Neretva	18.32423°E	43.40467°N
6	Beach on Neretva, 2 km from Ulog	18.30837°E	43.42414°N
7	Nedavić on Neretva	18.32194°E	43.46047°N
8	Brijestov Bridge on Neretva	18.22665°E	43.48227°N
9	Tajoraft on Neretva	18.08061°E	43.52945°N
10	Rakitnica confluence with Neretva	18.07318°E	43.55408°N

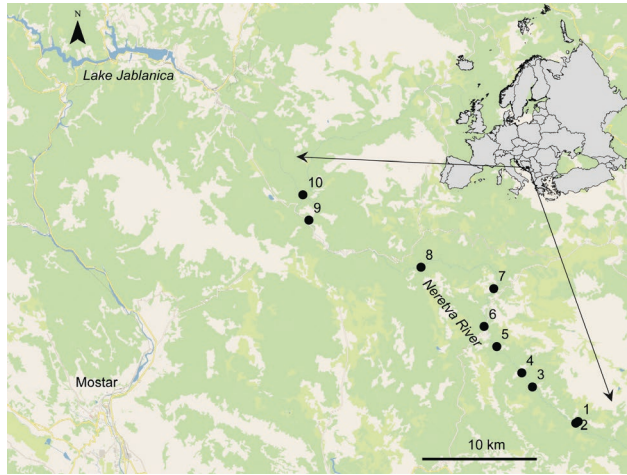


Fig. 1. Sampling sites on the upper course of the Neretva River at which aquatic Empididae were recorded.

nol along with the remaining body parts in the same tube. Taxonomic diversity is considered at the levels of subfamily, genus and species. The literature used for identifications included ENGEL (1939, 1940), VAILLANT (1967), WAGNER (1981), JOOST (1982), HORVAT (1993), WAGNER & HORVAT (1993) and IVKOVIĆ *et al.* (2012, 2022). All specimens listed in the results sections were collected by the author.

## RESULTS

A total of 725 specimens (332♂♂, 393♀♀) were collected and 19 species were identified. The species were classified in two subfamilies and six genera. Among the species identified, 16 belong to the subfamily Clinocerinae and three to the subfamily Hemerodromiinae.

The following format is used for the distributional data: New records: name of the site and in brackets the site ID, followed by sampling date and the number of sampled specimens and sex. All the sites and their numbers are listed in Tab. 1. Species with an asterisk are new records for Bosnia and Herzegovina.

### Subfamily Clinocerinae

#### \**Clinocerella sorex* (Engel, 1918)

**New record:** Brijestov Bridge on Neretva (8), 02.vii.2022, 3♂♂, 10♀♀.

#### *Kowarzia barbatula* (Mik, 1880)

**New records:** Krupac Stream (2), 29.vi.2022, 5♂♂, 6♀♀; Old wooden bridge on Neretva (3), 30.vi.2022, 1♂; Brijestov bridge on Neretva (8), 02.vii.2022, 1♂.

#### *Roederiodes macedonicus* Wagner & Horvat, 1993

**New record:** Krupac Stream (2), 29.vi.2022, 1♂.

**Remarks:** This species only occurs in North Macedonia, Montenegro and Bosnia and Herzegovina.

***Wiedemannia andreevi* Joost, 1982**

**New records:** Krupac confluence with Neretva (1), 29.vi.2022, 3♂♂, 11♀♀; Cerova on Neretva (4), 30.vi.2022, 1♂; Uloški Buk on Neretva (5), 01.vii.2022, 1♂, 1♀; beach on Neretva, 2 km from Ulog (6), 01.vii.2022, 4♂♂; Nedavić on Neretva (7), 01.vii.2022, 2♂♂, 1♀; Brijestov bridge on Neretva (8), 02.vii.2022, 1♂; Tajoraft on Neretva (9), 03.vii.2022, 2♂♂, 3♀♀; Rakitnica confluence with Neretva (10), 03.vii.2022, 14♂♂, 8♀♀.

**\**Wiedemannia angelieri* Vaillant, 1967**

**New record:** Krupac Stream (2), 29.vi.2022, 4♂♂, 10♀♀.

**\**Wiedemannia aquilex* (Loew, 1869)**

**New record:** Krupac Stream (2), 29.vi.2022, 3♂♂, 3♀♀.

**\**Wiedemannia Ariadne* Wagner, 1981**

**New records:** Brijestov Bridge on Neretva (8), 02.vii.2022, 8♂♂, 8♀♀; Tajoraft on Neretva (9), 03.vii.2022, 5♂♂, 6♀♀.

**Remarks:** This species is only present in the western Balkans.

***Wiedemannia artemisa* Ivković & Plant, 2012**

**New records:** Krupac confluence with Neretva (1), 29.vi.2022, 2♂♂, 9♀♀; Old wooden bridge on Neretva (3), 30.vi.2022, 1♂; Uloški Buk on Neretva (5), 01.vii.2022, 1♂; beach on Neretva, 2 km from Ulog (6), 01.vii.2022, 3♂♂, 5♀♀; Nedavić on Neretva (7), 01.vii.2022, 4♂♂, 4♀♀; Brijestov bridge on Neretva (8), 02.vii.2022, 31♂♂, 55♀♀; Tajoraft on Neretva (9), 03.vii.2022, 1♂, 2♀♀.

**Remark:** This species is only present in the western Balkans.

***Wiedemannia dinarica* Engel, 1940**

**New records:** Brijestov bridge on Neretva (8), 02.vii.2022, 26♂♂, 32♀♀; Tajoraft on Neretva (9), 03.vii.2022, 23♂♂, 36♀♀; Rakitnica confluence with Neretva (10), 03.vii.2022, 5♂♂, 8♀♀.

**Remarks:** This species is only present in the western Balkans.

***Wiedemannia fallaciosa* (Loew, 1873)**

**New record:** Brijestov Bridge on Neretva (8), 02.vii.2022, 2♂♂, 2♀♀.

***Wiedemannia kacanskae* Horvat, 1993**

**New record:** Krupac Stream (2), 29.vi.2022, 1♂.

**Remarks:** Endemic species of the Dinaric Mountains and occurs only in Croatia, Bosnia and Herzegovina and Montenegro.

***Wiedemannia lamellate* (Loew, 1869)**

**New record:** Nedavić on Neretva (7), 01.vii.2022, 3♂♂, 2♀♀.

***Wiedemannia longipennis* (Mik, 1880)**

**New records:** Krupac confluence to Neretva (1), 29.vi.2022, 1♂; Krupac Stream (2), 29.vi.2022, 15♂♂, 18♀♀; Old wooden bridge on Neretva (3), 30.vi.2022, 3♂♂, 1♀; Swimming beach on Neretva, 2 km from Ulog (6), 01.vii.2022, 3♂♂, 1♀; Nedavić on Neretva (7), 01.vii.2022, 8♂♂, 14♀♀; Tajoraft on Neretva (9), 03.vii.2022, 3♂♂; Rakitnica confluence with Neretva (10), 03.vii.2022, 1♀.

***Wiedemannia microstigma* (Bezzi, 1904)**

**New records:** Krupac confluence to Neretva (1), 29.vi.2022, 5♂♂; Krupac Stream (2), 29.vi.2022, 1♂, 2♀♀; Old wooden bridge on Neretva (3), 30.vi.2022, 10♂♂, 15♀♀; Cerova on Neretva (4), 30.vi.2022, 6♂♂, 17♀♀; Uloški Buk on Neretva (5), 01.vii.2022, 19♂♂,

31♀♀; beach on Neretva, 2 km from Ulog (6), 01.vii.2022, 17♂♂, 24♀♀; Nedavić on Neretva (7), 01.vii.2022, 4♂♂, 1♀; Brijestov Bridge on Neretva (8), 02.vii.2022, 9♂♂, 3♀♀; Tajoraft on Neretva (9), 03.vii.2022, 1♂; Rakitnica confluence with Neretva (10), 03.vii.2022, 1♂.

**\*Wiedemannia mikiana (Bezzi, 1899)**

**New records:** Krupac Stream (2), 29.vi.2022, 11♂♂, 3♀♀; Brijestov Bridge on Neretva (8), 02.vii.2022, 30♂♂, 20♀♀; Tajoraft on Neretva (9), 03.vii.2022, 3♂♂, 5♀♀.

**Wiedemannia tricuspadata (Bezzi, 1905)**

**New record:** Rakitnica confluence with Neretva (10), 03.vii.2022, 1♂, 2♀♀.

## Subfamily Hemerodromiinae

**Chelifera stigmatica (Schiner, 1860)**

**New record:** Uloški Buk on Neretva (5), 01.vii.2022, 1♂.

**Chelifera trapezina (Zetterstedt, 1838)**

**New record:** Uloški Buk on Neretva (5), 01.vii.2022, 1♀.

**Hemerodromia oratoria Fallén, 1816**

**New record:** Uloški Buk on Neretva (5), 01.vii.2022, 18♂♂, 12♀♀.

An updated checklist of the aquatic dance flies for Bosnia and Herzegovina is provided in Tab. 2.

**Tab. 2.** Checklist of aquatic Empididae (Clinocerinae and Hemerodromiinae) in Bosnia and Herzegovina.

<b>Empididae</b>
<b>Clinocerinae</b>
<i>Clinocera appendiculata</i> (Zetterstedt, 1838)
<i>Clinocera nigra</i> Meigen, 1804
<i>Clinocera stagnalis</i> (Haliday, 1833)
<i>Clinocera wesmaeli</i> (Macquart, 1835)
<i>Clinocerella sorex</i> (Engel, 1918)
<i>Dolichocephala guttata</i> (Haliday, 1833)
<i>Dolichocephala ocellata</i> (Costa, 1854)
<i>Kowarzia barbatula</i> (Mik, 1880)
<i>Kowarzia madicola</i> Vaillant, 1965
<i>Kowarzia plectrum</i> Mik, 1880
<i>Kowarzia tenella</i> (Wahlberg, 1844)
<i>Roederiodes macedonicus</i> Wagner & Horvat, 1993
<i>Wiedemannia aequilobata</i> Mandaron, 1964
<i>Wiedemannia andreevi</i> Joost, 1982
<i>Wiedemannia angelieri</i> Vaillant, 1967
<i>Wiedemannia aquilex</i> (Loew, 1869)
<i>Wiedemannia ariadne</i> Wagner, 1981
<i>Wiedemannia artemisa</i> Ivković & Plant, 2012
<i>Wiedemannia balkanica</i> Wagner, 1981
<i>Wiedemannia beckeri</i> (Mik, 1889)
<i>Wiedemannia bistigma</i> (Curtis, 1834)
<i>Wiedemannia braueri</i> (Mik, 1880)

<i>Wiedemannia dinarica</i> Engel, 1940
<i>Wiedemannia fallaciosa</i> (Loew, 1873)
<i>Wiedemannia kacanskae</i> Horvat, 1993
<i>Wiedemannia lamellata</i> (Loew, 1869)
<i>Wiedemannia longipennis</i> (Mik, 1880)
<i>Wiedemannia microstigma</i> (Bezzi, 1904)
<i>Wiedemannia mikiana</i> (Bezzi, 1899)
<i>Wiedemannia queyrasiana</i> Vaillant, 1956
<i>Wiedemannia thienemanni</i> Wagner, 1982
<i>Wiedemannia tricuspadata</i> (Bezzi, 1905)
<i>Wiedemannia wachtli</i> (Mik, 1880)
<i>Wiedemannia zetterstedti</i> (Fallén, 1826)
<b>Hemerodromiinae</b>
<i>Chelifera flavella</i> (Zetterstedt, 1838)
<i>Chelifera precabunda</i> Collin, 1961
<i>Chelifera precatoria</i> (Fallén, 1816)
<i>Chelifera pyrenaica</i> Vaillant, 1981
<i>Chelifera siveci</i> Wagner, 1984
<i>Chelifera stigmatica</i> (Schiner, 1860)
<i>Chelifera trapezina</i> (Zetterstedt, 1838)
<i>Chelipoda albisetia</i> (Zetterstedt, 1838)
<i>Chelipoda vocatoria</i> (Fallén, 1816)
<i>Hemerodromia oratoria</i> Fallén, 1816
<i>Phyllodromia melanocephala</i> (Fabricius, 1794)

The subfamily Clinocerinae is represented by 34 species in six genera: *Clinocera* Meigen (4 species), *Clinocerella* Engel (1 species), *Dolichocephala* Macquart (2 species), *Kowarzia* Mik (4 species), *Roederiodes* Coquillett (1 species) and *Wiedemannia* Zetterstedt (22 species). The subfamily Hemerodromiinae is represented with 11 species in four genera: *Chelifera* Macquart (7 species), *Chelipoda* Macquart (2 species), *Hemerodromia* Meigen (1 species) and *Phyllodromia* Zetterstedt (1 species). The Clinocerinae genus *Wiedemannia* is the most species rich (49%), followed by the Hemerodromiinae genus *Chelifera* (15.5%).

## DISCUSSION

During a short survey of the upper course of the Neretva River, 19 species were recorded, of which five are new to the Bosnia and Herzegovina fauna: *Clinocerella sores* (Engel), *Wiedemannia angelieri* Vaillant, *W. aquilex* (Loew), *W. ariadne* Wagner and *W. mikiana* (Bezzi). The most abundant species was *Wiedemannia microstigma* (Bezzi) with a total of 160 specimens collected, which is similar to the study of the Montenegrin fauna (Ivković *et al.*, 2013b). Overall, 45 species have now been recorded for Bosnia and Herzegovina.

Mos of the species collected in the present study are also present over most of Europe (PAPE & BEUK, 2012), but there are some Balkan endemics, such as *Roederiodes macedonicus* Wagner & Horvat, *Wiedemannia ariadne*, *W. artemisa* Ivković & Plant, *W. dinarica* Engel, *W. kacanskae* Horvat and *W. microstigma*, that previously had smaller reported areas of distribution. Additionally, *Wiedemannia angelieri* was reported again from the Balkans, already being known from Montenegro and Greece (Ivković *et al.*



2013b, 2017). Until recently, this species was known only from its type locality in the Pyrenees Mountains (VAILLANT, 1967) and from the Sierra Nevada Mountains in Andalusia, Spain (IVKOVIĆ *et al.*, 2014b).

This study provides more data on the species diversity of Bosnia and Herzegovina. There are still some genera, such as *Hemerodromia* (1 species) with a very few species compared to surrounding countries where the number of species is much higher, for example in Croatia (6 species) (IVKOVIĆ *et al.*, 2013a). It is likely that with sampling efforts focused not just in summer but also during springtime and in the lower parts of the rivers and streams additional species will be found.

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## SAŽETAK

**Vodene muhe plesačice (Clinocerinae i Hemerodromiinae) gornjeg toka rijeke Neretve s ažuriranim popisom vrsta za Bosnu i Hercegovinu**

M. Ivković

Istraživanje vodenih muha plesačica u gornjem toku rijeke Neretve provedeno je po prvi put. u srpnju 2022. godine u sklopu znanstvenog tjedna „Neretva Science Week“. Vodene muhe plesačice su sakupljane entomološkom mrežicom i aspiratorom. Uzorkovanje je provedeno na 10 lokacija. Od 19 zabilježenih vrsta u ovom istraživanju, pet vrsta predstavljaju nove nalaze za faunu Bosne i Hercegovine: *Clinocera sorex* (Engel), *Wiedemannia angelieri* Vaillant, *Wiedemannia aquilex* (Loew), *Wiedemannia ariadne* Wagner i *Wiedemannia mikiana* (Bezzi). Vrsta s najviše uhvaćenih jedinki je *Wiedemannia microstigma* (Bezzi). Ukupno je za Bosnu i Hercegovinu do sada zabilježeno 45 vrsta vodenih muha plesačica koji pripadaju u 10 rodova. Najviše vrsta je zabilježeno za rod *Wiedemannia* i to 22 vrste, a odmah iza njega je rod *Chelifera* sa 7 vrsta. Većina vrsta prikupljenih u ovom istraživanju dolazi u većem dijelu Europe, no zabilježeni su također i balkanski endemi: *Roederiodes macedonicus* Wagner & Horvat, *Wiedemannia ariadne*, *W. artemisa* Ivković & Plant, *W. dinarica* Engel, *W. kacanskae* Horvat i *W. microstigma*, čija su se područja rasprostranjenosti proširila. Ovo istraživanje pridonijet će boljem poznavanju faune vodenih muha plesačica Bosne i Hercegovine, ali i poznavanju njihove rasprostranjenosti na području Balkana.

