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NEW RECORDS OF THE SUBFAMILIES CYLLOCERIINAE AND MICROLEPTINAE (HYMENOPTERA, ICHNEUMONIDAE) FROM EASTERN EUROPE

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New Records of the Subfamilies Cylloceriinae and Microleptinae (Hymenoptera, Ichneumonidae) from Eastern Europe. Varga, O., Kostro-Ambroziak, A. — The Ichneumonidae species belonging to the subfamilies Cylloceriinae Wahl, 1990 and Microleptinae Townes, 1958 collected in different parts of Poland and Ukrainian Carpathians are listed. *Allomacrus longecaudatus* (Strobl, 1903) and the genus *Rossemia* Humala, 1997 with a species, *R. longithorax* Humala, 1997, are recorded for the first time from Ukraine, representing the third records of species for a European country after the original description. The genus *Entypoma* Förster, 1869 with two species, *E. robustator* Aubert, 1968 and *E. suspiciosum* (Förster, 1871) is the first reliable modern record of the genus for Poland. The subfamily Microleptinae is reliably recorded for the first time from Ukraine. A key to European species of the genus *Allomacrus* Förster, 1869 is also provided.

Key words: Darwin wasps, parasitoids, Carpathians, Poland, Ukraine, key.

Introduction

The subfamily Cylloceriinae Wahl, 1990 is a small group of the Darwin wasps, numbering 54 species worldwide, of which 23 are distributed in Europe (Yu et al., 2016). Albeit, their taxonomic position within the family Ichneumonidae still remain very unclear. The genera *Allomacrus* Förster, 1869, *Cylloceria* Schiödte, 1838 and *Hyperacmus* Holmgren, 1858 were classically considered by Townes (1971) as members of the subfamily Microleptinae. The members of this group were subsequently assigned to different subfamilies (e. g., Quicke et al., 2009; Broad et al., 2018), with the genera *Cylloceria* and *Allomacrus* placed in their own subfamily, Cylloceriinae, which included also the later described genus *Rossemia* Humala, 1997 (Wahl, 1990; Wahl, Gauld, 1998). The genus *Hyperacmus* was then transferred to this subfamily, on the base of molecular and morphological analysis (Quicke et al., 2009). Humala (2007) questioned placing these genera into a separate subfamily, stating that nearly all autapomorphies typical for these genera are also found in members of the subfamily Orthocentrinae. He proposed to group *Allomacrus*, *Cylloceria*, *Rossemia* and *Hyperacmus* in a separate tribe, Cylloceriini, within Orthocentrinae. He also proposed to reduce the rank of Microleptinae to tribal level, transfer the genus *Eusterinx* Förster, 1869 to Helictini, and place there only genera *Microleptes* Gravenhorst, 1829 and *Cushmaniana* Humala, 2007. The latter is considered as a synonym of *Hyperacmus* by Broad (2004).

Humala (2007) proposed to transfer to the tribe Cylloceriini also Helictini genera *Apoclima* Förster, 1869 and *Entypoma* Förster, 1869, while later (Humala, 2019) he refused this conception. Recent molecular studies (Spasojevic et al., 2019) confirmed the close association of the Cylloceriinae with the subfamilies Diacritinae and Orthocentrinae, showing that these taxa constitute an entity which is difficult to subdivide based on both molecular and morphological evidence. Thus, the relationships between all these Ichenumonidae groups are still serve as a basis for discussion and no consensus have been reached yet. In this paper we follow the size and composition of the studied groups proposed by Humala (2007) but with the subfamily rank.

The Cylloceriinae genera are characterized by: the presence of glymmae on the first metasomal tergite; short sternite distinctly separated from the tergite, usually only reaching the level of spiracles; absence of the basal transverse carina on the propodeum; localization and specific shape of tyloids on male flagellomeres (starting from 3rd).

The microleptines can be separated from the other orthocentrines by the strongly projecting head on the level of antennal sockets; fore wing with vein *3rs-m* absent; propodeum with well defined carination; long metasomal sternite 1, reaching the level beyond spiracles; absent glymmae; and tyloids starting from the first male flagellomere.

Our knowledge on the biology of the Cylloceriinae and Microleptinae as well as all orthocentrines is scarce. The members of the genus *Cylloceria* are known as endoparasitoids of crane flies (Diptera, Tipulidae) (Humala, 2002), while *Entypoma* species were reared from *Mycetophila* spp. (Diptera, Mycetophilidae) (Humala, 2003). The members of the subfamily Microleptinae (*Microleptes*) as well as the genus *Hyperacmus* are believed to be parasitoids of Stratiomyidae (Humala, 2003). The biology of the genera *Apoclima*, *Allomacrus* and *Rossemia* is still unknown (Yu et al., 2016).

Material and methods

The material used in this study was collected by different authors in various locations of Western Ukraine (Carpathians) and Poland (South and Northeastern parts). The specimens are deposited in the collection of the I. I. Schmalhausen Institute of Zoology, Kyiv, Ukraine (SIZK) and the Department of Biology, University of Bialystok, Poland (UwB). The specimens were collected by sweep netting, Malaise trapping (MT) or using yellow pan traps (YPT). Images of the specimens were taken with a Leica Z16 APO microscope equipped with Leica DFC 450 camera and processed by LAS Core software at SIZK. Scale bar for body parts = 0.2 mm and for habitus = 0.5 mm. General distribution follow Yu et al. (2016).

Results

Subfamily Cylloceriinae Wahl, 1990

Allomacrus arcticus (Holmgren, 1880) (figs 1–2)

Material. Ukraine: Transcarpathian Region: Svydovets, 2–3 km NW of Kvasy, 48.1447 N, 24.2708 E, 750 m, beech forest, MT, 07.05–05.06.2014, 1 ♀; same locality, 22.05–08.06.2015, 1 ♀; same locality, 13–29.06.2015, 2 ♀; 6.5 km N of Mala Ugolka, 48.2595 N, 23.6197 E, 600 m, primeval beech forest, MT, 20.04–12.05.2015, 1 ♂; same locality, 12–31.05.2015 1 ♀; Vynogradiv, oak forest, 280 m, 48.1383 N, 23.0737 E, MT No. 3, 07.06–03.07.2018, 1 ♀; Vynogradiv, beech forest, 48.138338 N, 23.073689 E, MT No. 2, 320 m, 26.07–18.08.2018, 1 ♀ (Varga) (SIZK).

Diagnosis. The species is characterized by the smooth face; relatively wide, more-or-less flat yellow clypeus; complete occipital carina; smooth mesoscutum; fore wing with vein *3rs-m* absent; propodeum with strong lateromedian longitudinal carinae reaching well defined area apicalis; orange hind tibiae; granulate metasomal tergites 1–2; weakly upcurved female ovipositor, about 1.8–2.0 times as long as the hind tibia length; male antenna lacking tyloids.

Distribution. Palearctic; Ukraine (Humala, 2002), Poland (Hedwig, 1962).

Allomacrus longicaudatus (Strobl, 1903) (figs 3–4)

Material. Ukraine: Transcarpathian Region: Chornogora, Sheshul 6–7 km NE of Kvasy, 48.1572 N, 24.3637 E, 1450 m, subalpine zone, sweeping, 16–18.06.2012, 1 ♀ (Varga) (SIZK).

Diagnosis. The species from Ukraine is characterized by the largely granulate body, including face, mesoscutum and metasomal tergites 1–2; relatively wide, more-or-less flat yellow clypeus; complete occipital carina; propodeum with strong lateromedian

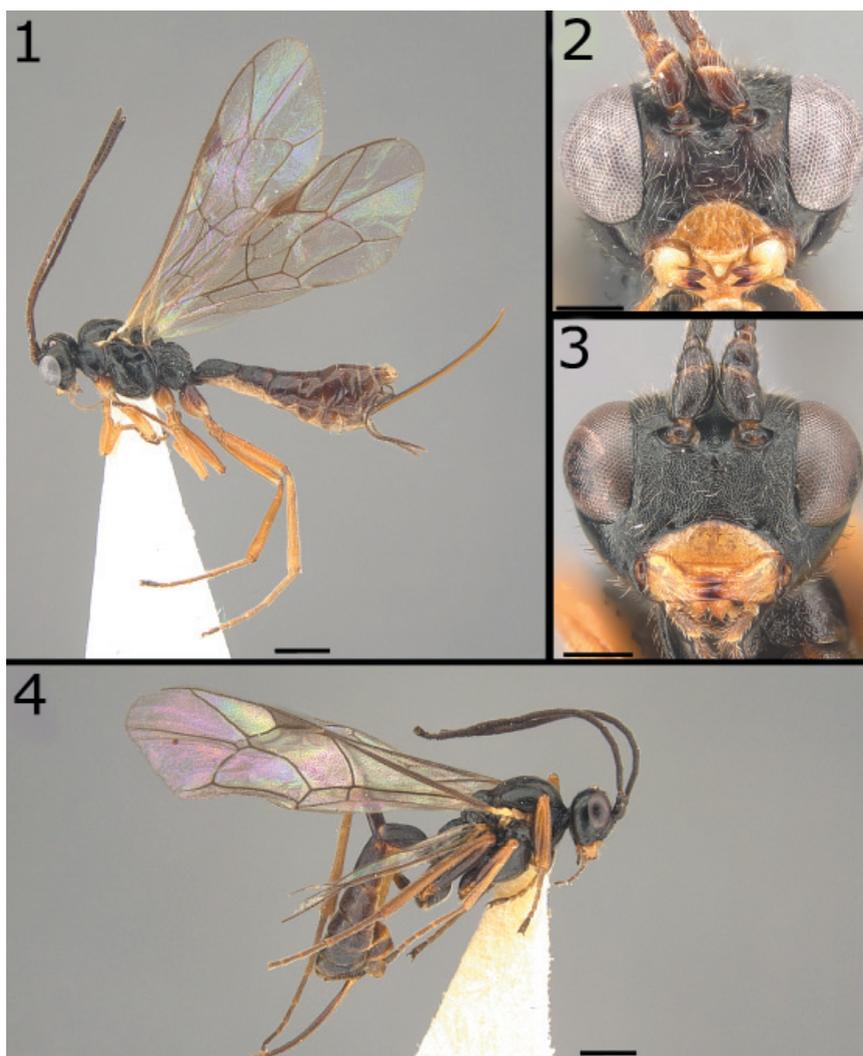
longitudinal carinae reaching well defined area apicalis; fore wing with vein *3rs-m* present; fuscous hind coxae, trochanters and femora; weakly upcurved female ovipositor, about 0.9 times as long as the hind tibia length.

Remarks. Schwarz (2003) also mentioned several collected *Allomacrus longicaudatus* specimens marked as variation of the nominal taxon. The status of these specimens is still unclear. The specimens have generally darker hind femora and black tegulae in combination with stronger sculptured propodeum and fore wing with vein *3rs-m* indistinct.

Distribution. Europe; previously recorded from Austrian Alps (Schwarz, 2003), Germany (Riedel et al., 2021), first record for Ukraine.

Key to European *Allomacrus* species (females only)

- 1 Face and mesoscutum granulate (fig. 3). Fore wing with vein *3rs-m* usually present. Hind coxa and femur fuscous (fig. 4). *A. longicaudatus*
- Face and mesoscutum smooth (fig. 2). Fore wing with vein *3rs-m* absent. 2
- 2 Ovipositor at most weakly longer than the hind tibia length. Hind femur fuscous. *A. subtilis*
- Ovipositor at least 1.8 times as long as the hind tibia length. Hind femur orange (fig. 1). *A. arcticus*



Figs 1–4. *Allomacrus* spp.: 1–2 — *A. arcticus*; 3–4 — *A. longicaudatus*; 1, 4 — habitus (lateral view); 2–3 — face (frontal view).

Cylloceria caligata (Gravenhorst, 1829)

Material. **Ukraine:** Ivano-Frankivsk Region: Gorgany, 10–12 km SW of Stara Guta, 48.5589 N, 24.1967 E, 950 m, coniferous forest, sweeping, 13.07.2012, 2 ♀ (Varga) (SIZK).

Diagnosis. The species is characterized by the complete occipital carina; strongly swollen basally clypeus; fore wing with vein *3rs-m* absent; propodeum with strong lateromedian longitudinal carinae reaching well defined area apicalis; orange hind coxae; rugose metasomal tergites 1 and finely granulate tergite 2; weakly upcurved female ovipositor, about 1.8 times as long as the hind tibia length; and male tyloids on emarginated flagellomeres 3–4.

Distribution. Palaearctic; Ukraine (Humala, 2002), Poland (Sawoniewicz, 1982).

Cylloceria melancholica (Gravenhorst, 1820)

Material. **Poland:** Lesser Poland Voivodeship: Mochnaczka Niżna, forestation with *Larix*, 49.4333 N, 21.0333 E, sweeping, 30.05.2012, 2 ♂, 1 ♀; Kopciowa near Krynica Gorska, sweeping, forestation with *Larix*, 49.4333 N, 21.0333 E, 6.08.2011, 1 ♀ (A. Kostro-Ambroziak) (UwB). **Ukraine:** Ivano-Frankivsk Region: Mochary, 5 km NE of Bogorodchany, 48.8371 N, 24.5814 E, 315 m, mixed forest, MT No. 1, 08–14.06.2015, 1 ♂; same locality, 09.06–05.07.2018, 2 ♂, 2 ♀ (Varga); Chornogora, m. Goverla, 05.07.1969, 1 ♂ (Ermolenko); Rybne, 48.9399 N, 24.5829 E, MT No. 1, 16.06–06.07.2019, 1 ♂; same locality, MT No. 2, 16.06–06.07.2019, 18 ♂, 2 ♀ (Shparyk); Transcarpathian Region: Sydovets, 2–3 km NW of Kvasy, 48.1447 N, 24.2708 E, 750 m, beech forest, MT, 05–29.06.2014, 2 ♀; Chornogora, Sheshul 6–7 km NE of Kvasy, 48.1572 N, 24.3637 E, 1450 m, subalpine zone, MT, 10.08–01.09.2014, 1 ♂; Vynogradiv, beech forest, 48.1383 N, 23.0737 E, MT No. 2, 320 m, 20.05–07.06.2018, 2 ♂ (Varga) (SIZK).

Diagnosis. *Cylloceria melancholica* is similar to *C. caligata*, but it differs by the black coxae, trochanters and trochantelli.

Distribution. Palaearctic; Ukraine (Humala, 2002), Poland (Sawoniewicz, 1982).

Entypoma robustator Aubert, 1968 (figs 5–6)

Material. **Poland:** Podlasie Voivodeship: Biebrza National Park, Grobla Honczarowska, birch with alder, YPT, 24.09.2006, 1 ♂; 22.10.2006, 1 ♂, 2 ♀; 20.10.2007, 1 ♀; mineral island Pogorzały, oak-linden-hornbeam forest, YPT, 22.10.2006, 1 ♂; mineral island Pogorzały, oak-linden-hornbeam forest, MT, 22.10.2006, 2 ♀; YPT, 22.10.2006, 1 ♂; 'Zdroj', 2 km NE of Kostry-Litwa, YPT on picket (about 1 m) near small river, 15.10.2006, 1 ♂, 1 ♀ (A. Kostro-Ambroziak) (SIZK, UwB). **Ukraine:** Ivano-Frankivsk Region: Dibrova, 5 km SW of Bogorodchany, 48.7721 N, 24.5117 E, 310 m, oak forest, sweeping, 11.10.2013, 2 ♂ (Varga) (SIZK).

Diagnosis. The species is characterized by the complete occipital carina; strongly swollen basally dark brown clypeus; fore wing with vein *3rs-m* present; propodeum with strong lateromedian longitudinal carinae reaching well defined area apicalis; orange hind femora; granulate metasomal tergites 1–2; strongly upcurved female ovipositor, about as long as the hind tibia length; and widened tyloids on male flagellomeres 3–6.

Distribution. Western Palaearctic; Ukraine: Kharkiv Region (Humala, 2003), first record for Poland.

Entypoma suspiciosum (Förster, 1871) (figs 7–8)

Material. **Poland:** Podlasie Voivodeship: Biebrza National Park, Grobla Honczarowska, birch with alder, YPT, 24.09.2006, 1 ♀; 22.10.2006, 1 ♂, 2 ♀; mineral island Pogorzały, oak-linden-hornbeam forest, MT, 22.10.2006, 3 ♀; YPT, 20.10.2007, 1 ♂, 2 ♀; Carska Droga, bridge, alder, YPT, 22.10.2006, 7 ♂, 1 ♀; "Bęben" 1 km S of Kostry-Litwa, birch, YPT, 19.09.2006, 2 ♂ (A. Kostro-Ambroziak) (SIZK, UwB).

Diagnosis. The species is characterized by the complete occipital carina; weakly and uniformly swollen orange-brown clypeus; propodeum with strong lateromedian longitudinal carinae reaching well defined area apicalis; fore wing with vein *3rs-m* absent; largely fuscous hind femora; granulate metasomal tergites 1–2; strongly upcurved

female ovipositor, about as long as the hind tibia length; and oblique tyloids on male flagellomeres 3–5.

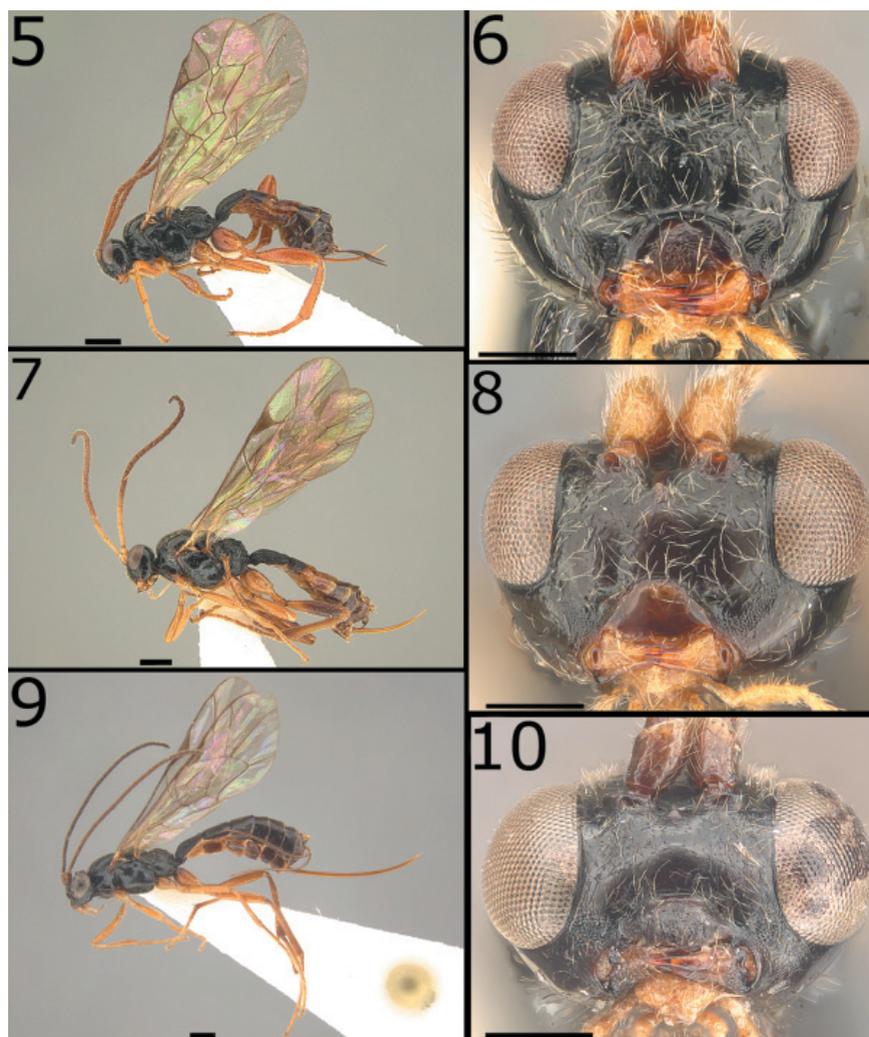
Distribution. Palearctic; Ukraine (Humala, 2007), **first record for Poland**.

Hyperacmus crassicornis (Gravenhorst, 1829)

Material. **Poland**: Podlasie Voivodeship: Biebrza National Park, mineral island Pogorzały, oak-linden-hornbeam forest, MT, 6–20.07.2008, 1 ♀ (A. Kostro-Ambroziak) (SIZK).

Diagnosis. The species is characterized by the strongly projecting below antennal sockets head; dorsally absent occipital carina; not strongly twisted mandible, with both teeth visible; propodeum with distinct lateral and lateromedian longitudinal carinae reaching well defined area apicalis; fore wing with vein *3rs-m* absent; short metasomal sternite 1, not reaching the level of spiracles; rugose metasomal tergites 1 contrasting with smooth and glabrous rest of metasoma; short female ovipositor, about 0.4 times as long as the hind tibia length; and tyloids on male flagellomeres 4–5.

Distribution. Holarctic and Oriental regions; Ukraine: Carpathians and Kharkiv Region (Humala, 2003), Poland (Sawoniewicz, 2001).



Figs 5–10. Cylloceriinae spp. 5–6 — *Entypoma robustator*; 7–8 — *Entypoma suspiciosum*; 9–10 — *Rossemia longithorax*; 5, 7, 9 — habitus (lateral view); 6, 8, 10 — face (frontal view).



Figs 11–12. *Microleptes splendidulus*: 11 — habitus (lateral view); 12 — face (frontal view).

***Rossemia longithorax* Humala, 1997 (figs 9–10)**

Material. Ukraine: Transcarpathian Region: Svydovets, 2–3 km NW of Kvasy, 48.1447 N, 24.2708 E, 750 m, beech forest, MT, 15.07–10.08.2014, 1 ♂; same locality, 8.07–6.08.2015, 2 ♀ (Varga) (SIZK).

Diagnosis. The species is characterized by the dorsally absent occipital carina; strongly and uniformly swollen clypeus; strongly twisted mandible, with hardly visible lower tooth; propodeum with weak lateromedian longitudinal carinae reaching well defined area apicalis; fore wing with vein *3rs-m* absent; granulate metasomal tergites 1–2; weakly upcurved female ovipositor, about 1.9 times as long as the hind tibia length; and tyloids on male flagellomeres 5–9.

Distribution. Palaearctic; previously recorded from Russia, Japan (Humala, 2007, 2019; Wahl & Gauld, 1998), and Germany (Riedel et al., 2021), **first record for Ukraine.**

Subfamily Microleptinae Townes, 1958

***Microleptes splendidulus* Gravenhorst, 1829 (figs 11–12)**

Material. Poland: Podlasie Voivodeship: Biebrza National Park, ‘Zdroj’, 2 km NE of Kostry-Litwa, YPT on picket (about 1 m) near small river, 15.10.2006, 1 ♂ (A. Kostro-Ambroziak) (UwB). **Ukraine:** Transcarpathian Region: Vynogradiv, oak forest, 280 m, 48.1383 N, 23.0737 E, MT No. 2, 17.05–10.06.2017, 1 ♀ (Varga) (SIZK).

Diagnosis. The species is characterized by the weakly swollen and apically rounded clypeus; antenna with 14 flagellomeres, first flagellomere short, at most 3 times longer than width; propodeum with costulae present; stout legs with hind femora about 3.0–3.7 times longer than width, and smooth hind coxa; and tyloids on male flagellomeres 1–2(3).

Distribution. Holarctic; **first record for Poland and Ukraine.**

Discussion

The Cyloceriinae fauna of Europe contains 23 species belonging to six genera (Humala, 2007; Yu et al., 2016), of them almost half of the species (11) are members of the genus *Cyloceria*. Seven species of this genus have been recorded from Poland, of which only 3 seem to be valid records: *Cyloceria caligata*, *C. melancholica* (Sawoniewicz, 1982) and *C. sylvestris* (Gravenhorst, 1829) (van Rossem, 1987). Another four, *C. alpigena* (Strobl, 1902), *C. impersiqua* Rossem, 1987, *C. occupator* (Gravenhorst, 1829), and *C. fusciventris* (Hellén, 1940) are rare European species with questionable taxonomic status, listed in the Polish checklist of Kazmierczak (2004) without any mention of label data or voucher specimens. It seems that Kazmierczak prepared his catalogue (2004) largely based on records

from bordering countries, so that we assume that he has included these four *Cylloceria* species to the fauna of Poland without attesting to their actual presence in the country. It is also supported by the fact that these four species were not included in the recent Polish Ichneumonidae checklist provided by Bogdanowicz and co-authors (2007). The Ukrainian *Cylloceria* fauna contains only two common and widely distributed species, *C. caligata* and *C. melancholica*, recorded by Humala (2002) and both collected during this study in the Ukrainian Carpathians. *C. melancholica* seems to be the most common species, having been found in different forest types at different altitudes, while *C. caligata* was collected only in the coniferous forests of the Gorgany massif. Kazmierczak (2004) also listed two *Apoclima* species from Poland, *A. haeselbarthi* Rossem, 1987 and *A. signaticorne* Förster, 1881, but, given the above, the presence of this genus in both Poland and Ukraine should be regarded as doubtful. The genus *Allomacrus* is represented by 3 species in Europe, of which only *A. arcticus* is common and widely distributed. This species was recorded from Western Ukraine by Humala (2002), while its presence in Poland remains questionable as based only on an old paper of Hedwig (1962). Unexpectedly, we collected in the Ukrainian Carpathians another species of this genus, *A. longicaudatus*, which is known only from Austria and Germany (Yu et al., 2016; Riedel et al., 2021). We can therefore assume that this species is characteristic of high altitude insect communities in mountain systems within the whole Europe. Until this study, the distribution of the genus *Entypoma* in Poland was based only on an old record of *E. robustum* Förster, 1871 by Hedwig (1962), while Ukrainian list contains all European species (Humala, 2007). The newly collected *E. robustator* and *E. suspiciosum* in Polish Biebrza National Park can be treated as the first reliable modern records of the genus for the country. The genus *Hyperacmus* contains 5 described species (Yu et al., 2016), of which only the cosmopolitan *H. crassicornis* is known from Poland (Sawoniewicz, 2001) and Ukraine (Humala, 2007). Lastly, the monotypic genus *Rossemia*, with the Palearctic species *R. longithorax*, was recorded from Japan, Russia (Russian Far East, Karelia, Leningrad Province) and Germany. In this paper, we provide the new European record of the genus, expanding its known distribution southward. All the three Carpathian specimens of this species were collected near old dead beech trunks infected by numerous saproxylic dipterans. We hope that further studies on this locality will shed light on the biology of this genus, as well as that of other genera collected there, such as the genus *Allomacrus*.

The European microleptines belong to the genus *Microleptes* with 5 species in the region (Humala, 2007; Yu et al., 2016). Of them, *Microleptes aquisgranensis* (Förster, 1871) is reported from Poland (Bogdanowicz et al., 2007). During this study we collected an additional species, *Microleptes splendidulus* Gravenhorst, 1829, in both, Poland (Biebrza National Park) and Ukraine (Carpathian Biosphere Reserve). This species was reported from Ukraine by Meyer (1936). This record should be re-checked as this paper is outdated and containing numerous incorrect data (Humala, 2003). Unfortunately, the collection of Meyer was lost during the Second World War and none of these records can be considered valid as there are no voucher specimens available. Thus, here we provide the first reliable record of the subfamily Microleptinae in the fauna of Ukraine.

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