*Ann. Zool. Fennici* 62: 71–77
Helsinki 9 June 2025
eISSN 1797-2450


# New information on the elusive *Helcostizus maculatus* (Woldstedt, 1874) (Hymenoptera, Ichneumonidae)

Juuso Paappanen

*Finnish Museum of Natural History Luomus, Zoology Unit, FI-00014 University of Helsinki, Helsinki, Finland (juuso.paappanen@helsinki.fi)*

*Received 20 Feb. 2025, final version received 13 May 2025, accepted 2 June 2025*

Paappanen J. 2025: New information on the elusive *Helcostizus maculatus* (Woldstedt, 1874) (Hymenoptera, Ichneumonidae). — *Ann. Zool. Fennici* 62: 71–77.

The poorly known species *Helcostizus maculatus* (Woldstedt, 1874) (Hymenoptera, Ichneumonidae, Cryptinae), originally described from Finland, has been nearly absent from literature during the 150 years following its description. Furthermore, the whereabouts of the type specimen has been uncertain and the male has been unknown. Here, the holotype of *H. maculatus* is illustrated, the male is newly described, an identification key to the two western Palearctic species is provided and *H. maculatus* is recorded for the first time from Sweden.

## Introduction

*Helcostizus* Förster, 1869 is a small genus of Darwin wasps (Ichneumonidae). Most species have been described from the Nearctic, while only two species are known from the Palearctic: the widespread *Helcostizus restaurator* (Fabricius, 1775) and the elusive *Helcostizus maculatus* (Woldstedt, 1874). The species of the genus are parasitoids of saproxylic Coleoptera under thin bark of trees (Townes & Townes 1962, Townes 1983).

*Helcostizus maculatus* was described based on one female from Finland in 1874, but the species was not included in the revision of the genus by Townes (1983), due to a missing type specimen, and there have been only a few mentions of this species in the literature since its description. Furthermore, only a handful of specimens are known to date. Even after Sawoniewicz (2003) gave clarifying notes on the identification of this species, no new specimens or information have emerged. Sawoniewicz (2003) based his description on a few female specimens in MZH (collected in Kolari, Finland, by J. Siitonen in 1988). He did not examine the type, which he pondered to be likely lost. I found the type specimen (slightly misplaced) in MZH, but not the specimens Sawoniewicz based his description on.

In this article, photographs and a redescription of the holotype are given, and the male is described for the first time. An identification key is also provided to separate the two western Palearctic species, and *H. maculatus* is reported for the first time from Sweden.

## Material and methods

The work is based on a small number of specimens in the Natural History Museum, Helsinki (MZH), and one specimen in the author's col-

lection (JP). Apart from the holotype of *Heterocryptus maculatus* Woldstedt, 1874, no further type material has been examined.

In the material examined section, the label data is presented *verbatim*, with each individual label inside separate quotation marks. Some additions have been made inside square brackets. All dates are in dd.mm.yyyy format.

Morphological terms follow Broad *et al.* (2018). The photographs are composites of several individual photographs, so-called *focus stacks*, taken with the OM System OM-5 camera and either the Olympus 60 mm macro lens (habitus photos) or the Lomo 3.7 × 0.11 lens (details).

## Results and discussion

### Systematics

#### ***Helcostizus maculatus*** (Woldstedt, 1874), (Figs. 1A–C, 2A–B, 3A, 3B and 3E)

*Heterocryptus maculatus* Woldstedt 1874: 73. **Holotype**: ♀ (examined). Finland, "Bothn or." [Ostrobothnia = Pohjanmaa], "Coll. Wasstj." [Wasastjerna], "Heterocryptus maculatus Woldst.", "Mus. Zool. H:fors spc. typ. no 5212 Heterocryptus maculatus Woldst", "http://id.luomus.fi/GQ.7764", "HOLOTYPE *Heterocryptus maculatus* ♀ Woldstedt, 1874 label by J. Paappanen", [MZH].

Additional specimens examined. **Finland**. ♀, "Ruovesi Mustajärvi", "13.6.1931 A. Saarinen", "ab. albitarsis m.", "COLL HELLÉN Helcostizus albator Thunberg", "http://id.luomus.fi/GQ.7765", [MZH]; ♂, "Thusby"[Tuusula], "Juslenius", "300", "COLL HELLÉN Helcostizus albator Thunberg", "http://id.luomus.fi/GQ.7766", [MZH]. **Sweden**. ♀, "SWE: Jokkmokk, Darregájsse 67.03563, 17.34111±1m 14.7.2024 (oro)arctic tundra 1834m rocky top of a mountain without vegetation Juuso Paappanen leg.", [JP].

Diagnosis. The female is distinguished by the short ovipositor (sheath about 0.7x hind tibia), dorsally granulate mesopleuron, absence of white colouration on the base of hind tibia, tegula and posterior corner of pronotum, white hind tarsal segments 2–4. Perhaps the most similar species is the Nearctic *Helcostizus yukonensis* Ashmead, 1890, but it has longer ovipositor and much more abundant white markings, including the posterior margins of tergites 2–7 and tegula.

The male is differentiated from most species of the genus by the low number of tyloids (5) that do not project triangularly; and by the lack of white colouration on pronotum, propleuron and base of hind tibia. The Nearctic *Helcostizus microdon* Townes, 1983 and *H. rufiscutum* Cushman, 1919 have rather similar tyloids, but both species have extensive white colouration on pronotum, propleuron and yellowish-red hind coxa.

Redescription of the holotype (features of examined non type material in square brackets): Female. In rather poor condition: antennae missing (except right scape and pedicel), left hind wing missing, right fore and hind wing detached and glued on a piece of paper, metasoma completely loose, but somehow still clinging to the mesosoma. Body length 9.1 mm, fore wing length 8.0 mm. Whole body, except speculum, covered with granulose, dull sculpture, legs and tergites progressively with weaker sculpture. Ocellar triangle very obtuse, distance of lateral ocelli from each other 1.3x their diameter, distance of lateral ocellus from compound eye 1.7x diameter of an ocellus. Fore tibia with distinct swollen subgenual organ. Propodeum with only one transverse carina present, angularly arched medially. 1st tergite 1.1x as long as wide, distinctly wider posteriorly than anteriorly. 2nd tergite as wide as long. Fore wing areolet small and pentagonal. Vein 2m-cu with one long bulla. Hind wing with nervellus distinctly inclivous, broken at posterior 0.35. Ovipositor sheath 0.7x as long as hind tibia, tip of ovipositor not visible [dorsal valve acute, without nodus, ventral valve with about 8 teeth, of which the proximal 3 are inclivous, the rest 5 vertical]. [Antenna with 22 flagellar segments and white annulus covering flagellar segments 5–8]. Tergites 1–2 red [1–3 variably marked with red], in addition propodeum posteriorly, head partly, pronotum ventrally and 3rd tergite anterolaterally obscurely suffused with reddish [all completely black]. Posterior corner of pronotum, tegula and pterostigma black, humeral plate yellow. Legs mainly red, except fore and mid coxae, tibiae and hind tarsal segments 1 and 5 more or less darkened [hind coxa and femur from red to marked with black; hind tarsal segments 2–4 white rather than reddish].

Description of the male. Body length 8.0 mm, fore wing length 7.7 mm. Much like holotype female with most of body covered in dull, granulate sculpture. Occiput, frons and

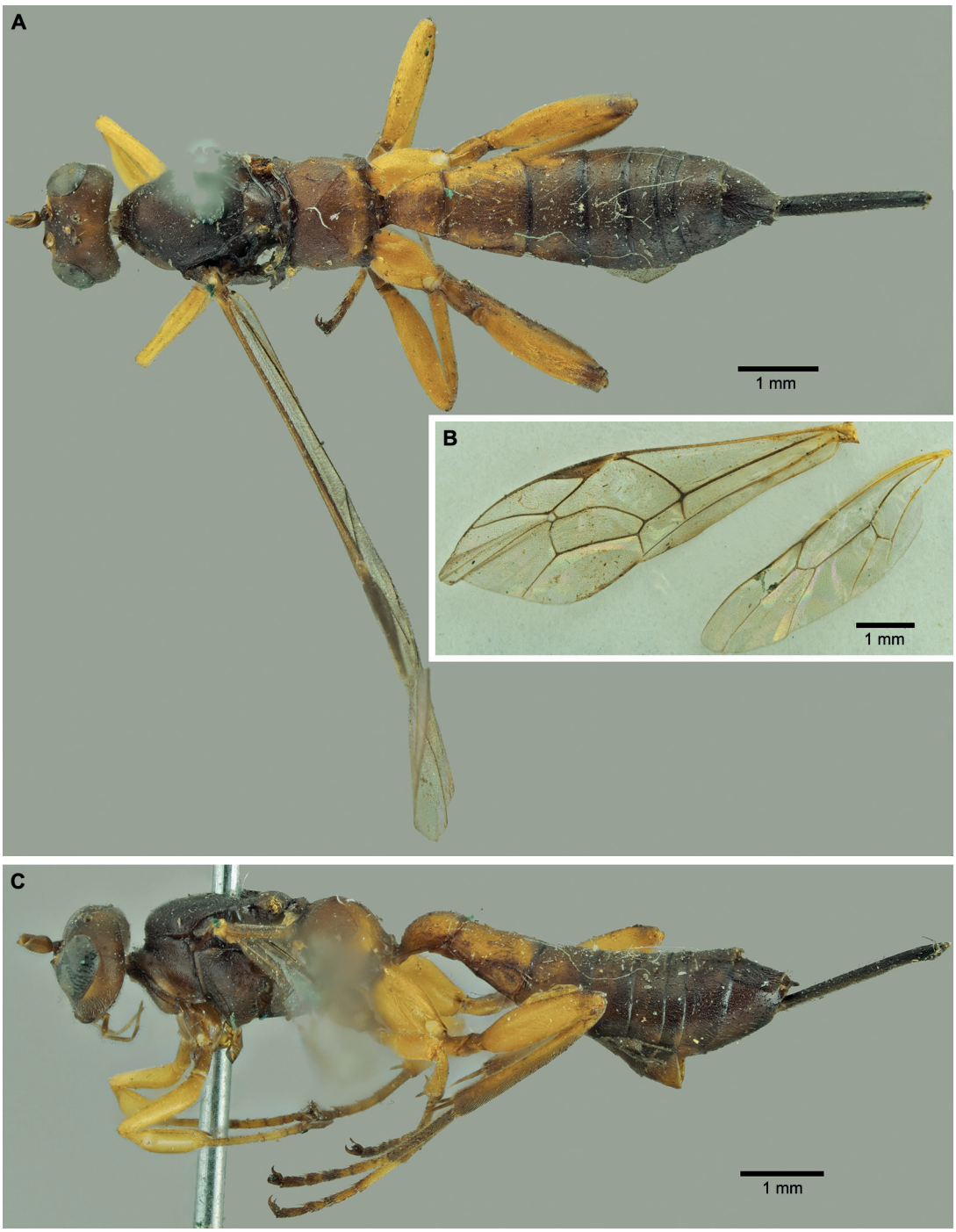


**Fig. 1.** Holotype of *Helcostizus maculatus*. — **A**: Dorsal habitus. — **B**: Wings. — **C**: Lateral habitus.

temples rather shiny, with only weak granulation and small punctures. Mesopleuron also shinier than in female. 33 flagellar segments, 14–18 with distinct black tyloids, linear to sinuate, not distinctly protruding, most of them about half the length of the segment. Ocellar triangle very obtuse, distance of lateral ocelli from each other 1.4x their diameter, distance of lateral ocellus

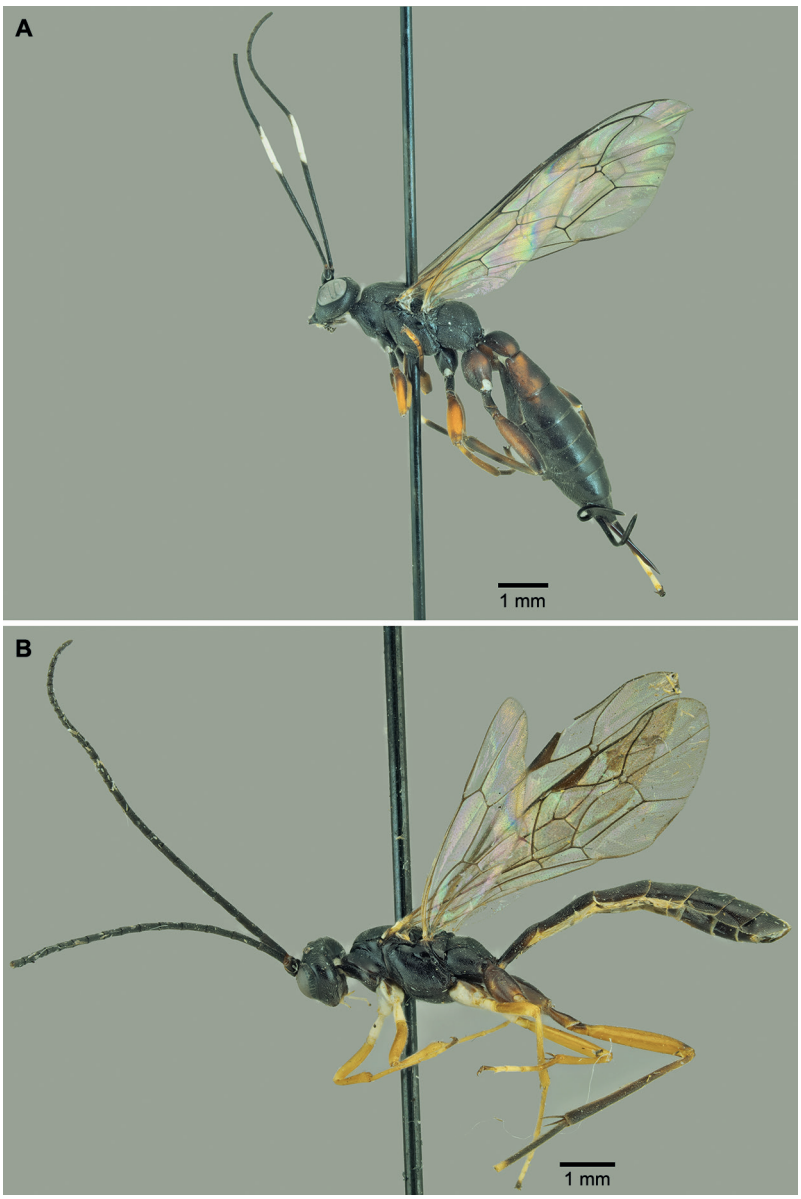


**Fig. 2.** *Helcostizus maculatus*. — **A**: ♀ from Jokkmokk Sweden, lateral habitus. — **B**: ♂ specimen http://id.luomus.fi/GQ.7766, lateral habitus.

from compound eye 1.6x diameter of lateral ocellus. 1st tergite much longer and narrower than in female, about 2.2x as long as wide (wings and mesosoma obscure the measurement). Wing as in female. Genitalia not visible. Head, mesosoma and metasoma black, except face, clypeus, labrum, mandible (mostly), palpi, spot on scape, and tegula (except posteriorly) whitish yellow. Indistinct reddish tinge present laterally on 1st tergite. The following parts of legs mainly white: fore and mid trochanters, trochantelli, tarsal segments 2–4 and fore and mid coxae (all with some black markings); following black: hind coxae, hind trochanter and trochantelli (both suffused with reddish), hind and mid tibia and tarsus (except for segments 2–4); the following red: all femora, mid and fore tibiae and fore and mid tarsi (except for segments 2–4).

Remarks. The holotype originates from the collection of Wasastjerna, which is known to include erroneously labelled specimens that originate outside Finland (Juho Paukkunen, pers.

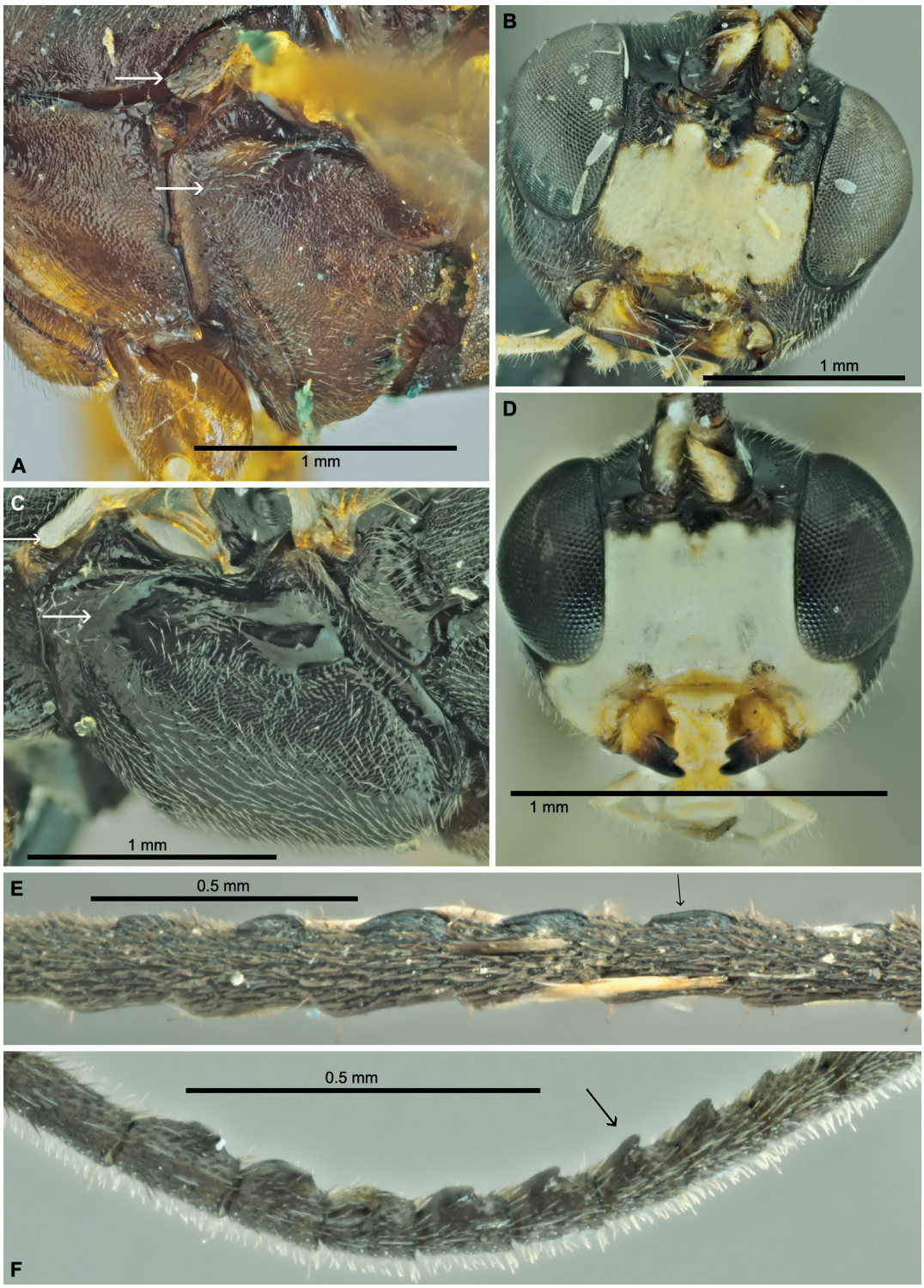


**Fig. 3.** *Helcostizus maculatus* and *H. restaurator*. — **A**: *H. maculatus* mesopleuron of the holotype, lateral. — **B**: *H. maculatus* ♂ head, anterior. — **C**: *Helcostizus restaurator* ♀ mesopleuron, lateral. — **D**: *H. restaurator* ♂ head, anterior. — **E**: *H. maculatus* ♂ antennal segments with tyloids. — **F**: *H. restaurator* ♂ antennal segments with tyloids. Arrows point to some characters mentioned in the identification key.

comm.). Thus, it is possible the holotype originates elsewhere, but it seems very likely to be of Finnish origin, since most observations of this species are from Finland or neighbouring areas.

Hellén had labelled one of the examined *H. maculatus* specimens as "ab. albitarsis m.", which is a name he also used in a checklist of Finnish Hymenoptera (as *Helcostizus albator* v. *albitarsis* Hellén) (Hellén 1940), but he never published a description of this taxon, so this name remains a *nomen nudum*.

In his revision of the genus, Townes (1983) did not treat this species, since he could not locate the type or examine any specimens. He concluded that the species probably does not belong to *Helcostizus*.

The coupling of the female and the newly described single male specimen has been done purely based on the shared morphological features (size, number of flagellar segments, colour). Given that only two species occur in the Palearctic and that the sexes share multiple features, it is rather safe to assume that the coupling is correct. However, future studies should aim to confirm the pairing with molecular methods or concurrently collected specimens.

Distribution. Finland (Woldstedt 1874, Sawoniewicz 2003, this study), Sweden (this study) as well as both western (Meyer 1934) and eastern Palearctic Russia (Sawoniewicz 2003).

Ecology. The species seems to be very rare with only about a dozen specimens known. The species of *Helcostizus* are expected to be parasitoids of saproxylic Coleoptera, although the hosts and habitats used by *H. maculatus* are unknown. The Swedish specimen was hand-picked walking on a rock on the top of a mountain at 1800 m, which is 1200 m above the tree-line. I find it likely that this specimen had been transported from the *Betula pubescens* subsp. *czerepanovii* forests down in the valleys, perhaps via a thermal column. Given the short ovipositor, it is likely that hosts living under thin bark of trees, possibly at least *Betula*, are utilised.

**Identification key to the western Palearctic** *Helcostizus*

The key is based on the work by Sawoniewicz (2003), which should be consulted for additional characters. Only the most distinct characters are included in the following key. See also the diagnosis section of the redescription above for comparisons to the Nearctic species. Regarding the male, and to a lesser extent the female, of *H. maculatus*, the characters are still based on a very small (a single male) and geographically restricted sample, so these characters should be regarded as somewhat provisional.

1. ♀♀. With ovipositor, face black, antenna without tyloids . ..... **2**
1. ♂♂. Without ovipositor, face whitish, antenna with distinct tyloids ..... **3**
2. Mesopleuron ventrad to subtegular ridge shiny, areas without granulation (Fig. 3C). Smaller (less than 9 mm), with 18–20 flagellar segments. Tegula yellow (Fig. 3C). Hind tarsal segments black. Metasoma black ..... ..... ***H. restaurator***
2. Mesopleuron ventrad to subtegular ridge granulate and dull (Fig. 3A). Larger (more than 9 mm), with 22–23 flagellar segments. Tegula black (Fig. 3A). Hind tarsal segments 2–4 mostly white (Figs. 1C, 2A). Tergites 1–3 of the metasoma marked with red in all examined specimens (Figs. 1A, 2A) ..... ***H. maculatus***
3. Tarsal segments black. 23–25 flagellar segments. Tyloids on 8 segments (on flagellar segments 10–17), apical-most strongly protruding and triangular or hook-like (Fig. 3F). Malar space (in addition to the face) (Fig. 3D) and posterior corner of pronotum whitish ..... ***H. restaurator***
3. Tarsal segments 2–4 white. 33 flagellar segments. Tyloids on 5 segments (on flagellar segments 14–18), distinct, but less protruding, not triangular or hook-like in profile (Fig. 3E). Malar space (Fig. 3B) and posterior corner of pronotum black ..... ***H. maculatus***

## Acknowledgments

I thank Juho Paukkunen for the access to the specimens in MZH. The reviewers Mark Shaw and Gergely Várkonyi gave valuable corrections and suggestions that immensely improved the manuscript. Gergely Várkonyi also shared a crucial piece of literature.

## References

Broad, G., Shaw, M. & Fitton, M. 2018: *Ichneumonid wasps (Hymenoptera: Ichneumonidae): their classification and biology*. — Handbooks for the Identification of British Insects 7(12), Royal Entomological Society, London.

Hellén, W. 1940: *Enumeratio Insectorum Fenniae II. Hymenoptera 2. Terebrantia*. — Helsingin hyönteisvaihtoyhdistys r.y., Helsinki.

Meyer, N. 1934: [Parasitic Hymenoptera in the family Ichneumonidae of the USSR and adjacent countries. Keys

to the fauna of the USSR. Vol. 3. Pimplinae.] — *Opredeliteli Faune SSSR*. 15(3):1–271 [in Russian].

Sawoniewicz, J. 2003: Zur Systematik und Faunistik europaeischer Ichneumonidae II (Hymenoptera, Ichneumonidae). — *Entomofauna* 24: 209–227.

Townes, H. 1983: *Revisions of twenty genera of Gelini (Ichneumonidae)*. — Memoirs of the American Entomological Institute 35, The American Entomological Institute, Michigan.

Townes, H. & Townes, M. 1962: Ichneumon-flies of America North of Mexico: 3. subfamily Gelinae, tribe Mesostenini. — *Bulletin of the United States National Museum* 216(3): 1–602.

Woldstedt, F. 1874: Materialier till en Ichneumonlogia Fennica. — *Bidräg till kännedom af Finlands Natur och Folk* 21: 61–92.