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**CONFIRMED IDENTITY OF *HEBRUS MONTANUS* KOLENATI, 1857
(HEMIPTERA: HEBRIDAE) BASED ON TYPES**

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Summary. The current interpretation of the West Palaearctic species *Hebrus montanus* Kolenati, 1857 is confirmed by morphological studies of the five syntypes housed in the Natural History Museum Vienna. The single male is designated as the lectotype and described in detail.

Key words: Hebridae, *Hebrus montanus*, taxonomy, lectotype designation.

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Резюме. Современная интерпретация западно-палеарктического вида *Hebrus montanus* Kolenati, 1857 подтверждена изучением морфологии 5 синтипов, хранящихся в Музее Естественной Истории в Вене. Один самец обозначен в качестве лектотипа и детально описан.

INTRODUCTION

The species of *Hebrus* Curtis, 1933 occurring in the Palaearctic region are not numerous but taxonomically challenging, as most of them are extremely similar, and only few possess a set of “easy” morphological characteristics. Colour is highly variable in some species (see, e. g., Kanyukova, 1997), genitalia of males are reduced to a small size, and the effect of wing development on thoracic structures (most importantly, on the shape of the metanotal plate) is poorly understood. Kment *et al.* (2016) reviewed the Hebridae of the West Palaearctic Region including *Hebrus montanus* Kolenati, 1857 and gave numerous distributional records, mostly from Europe. According to their results, *H. montanus* occurs in Southern Europe, North Africa, Asia Minor, Southern European Russia, and eastwards to Iran (Kment *et al.*, 2016: fig. 68). Regarding *Hebrus montanus*, Kment *et al.* (2016) “follow the concept of the species as redescribed and illustrated by Kanyukova (1997)” and have recognized “potential problems concerning taxonomy and identification of the species”.

The contribution by Elena V. Kanyukova (1997) was a great progress in the understanding of the taxonomy of *Hebrus* in the treated area (= former Soviet Union). She recognized that in males of *Hebrus pusillus* (Fallén, 1807) and closely related taxa, including *H. montanus*, the shape of the hind femora and the arrangement of bristles on the hind tibia are species-specific.

In 1996, Izyaslav M. Kerzhner visited the Natural History Museum Vienna to carry out heteropterological research, chiefly on Miridae and Kolenati's types. In the course of this study, he carefully examined two female syntypes of *H. montanus* to yield information on external characters for Kanyukova's revision. He also labelled one specimen as lectotype, which remained unpublished, and the other one as paralectotype. However, it is not advisable to base a *Hebrus* species – especially of the *H. pusillus* group – on female characters. Unfortunately, three further syntypes of *H. montanus* were on loan during Kerzhner's visit. Fortunately, the loan included one male specimen.

This study redescribes the types of *H. montanus*, fixes the single male of the type series as the lectotype, and confirms the present interpretation of the taxon (comp. Kanyukova, 1997; Kment *et al.*, 2016).

MATERIAL AND METHODS

We examined five macropterous syntype specimens and seven non-type specimens housed in the Natural History Museum Vienna. There is no evidence for further syntypes in other collections.

Measurements were performed at magnifications from 51.2× up to 128× with a Nikon SMZ1500 binocular microscope and are given in millimetres. They refer to the maximum length or width of the respective structure. Measurements of body length and width were taken in dorsal view of specimens. Synthlipsis is the dorsal minimum eye distance. Acronyms for measurements and indices follow Zettel (2011).

The stacked digital image (Fig. 1) was taken with a Leica DFC450 camera attached to a Leica Z16APO optics carrier, using Leica Application Suite V3.8. Images were stacked with ZereneStacker 64-bit and processed with Adobe Photoshop 7.0.

Images of genitalia (Figs 3, 4) were taken with a Nikon DS-Fi1 camera attached to a Nikon Eclipse 80i compound microscope using a Nikon Plan Fluor 20×/0.50 lens. Images were stacked with NIS Elements Imaging Software 4.51.01 (Build 1146) LO, 64-bit and processed with Adobe Photoshop Elements 8.0.

TAXONOMY

Hebrus montanus Kolenati, 1857

Figs 1–4

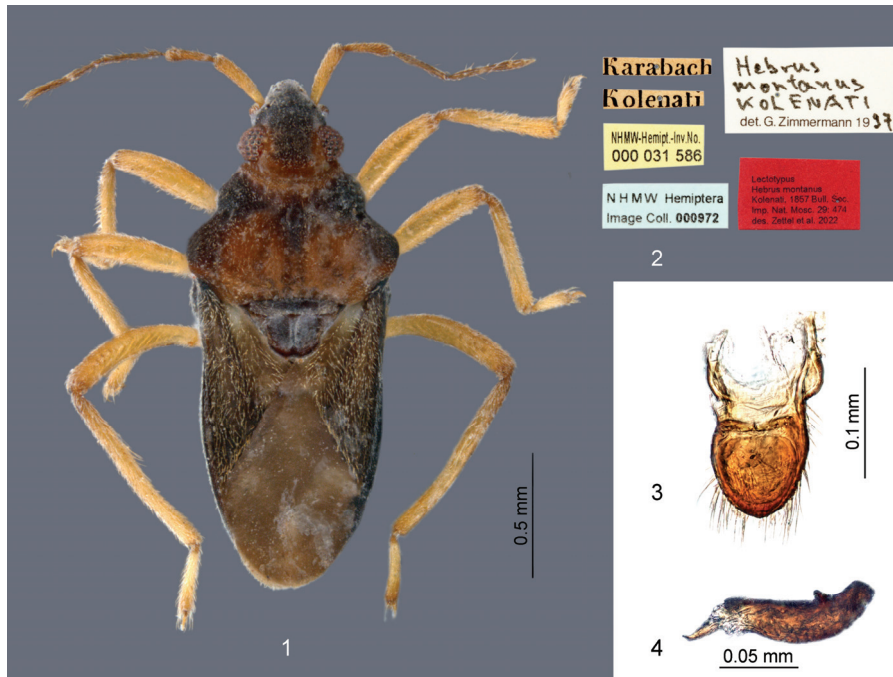
Hebrus montanus Kolenati, 1857: 474 (syntypes: Armenia, Mountain Karabagh Republic, Kopetdag Mountains, Lake “Sullü-ghöll”); Kanyukova, 1997: 229.

Hebrus (Hebrus) montanus: Poisson, 1957: 184; Andersen, 1995: 80; Kment *et al.*, 2016: 212.

TYPE MATERIAL. **Lectotype** (macropterous male, present designation): “Karabach”, “Kolenati”, “Hebrus\ montanus\ KOLENATI\ det. G. Zimmermann 1997”, “NHMW-Hemipt.-Inv.No.\ 000 031 586”, “NHMW Hemiptera\ Image Coll. 000972”, “Lectotypus\ Hebrus montanus\ Kolenati, 1857 Bull. Soc.\ Imp. Nat. Mosc. 29: 474\ des. Zettel et al. 2022”. **Paralectotype** (macropterous female): “Karabach”, “Kolenati”, “pusillus\ det. Fieber”, “Hebrus\ montanus\ KOLENATI\ det. G. Zimmermann 1997”, “NHMW-Hemipt.-Inv.No.\ 000 031 588”, “Paralectotypus\ Hebrus montanus\ Kolenati, 1857 Bull. Soc.\ Imp. Nat. Mosc. 29: 474”. **Paralectotype** (macropterous female): “Karabach”, “Kolenati”, “Hebrus\ montanus\ KOLENATI\ det. G. Zimmermann 1997”, “NHMW-Hemipt.-Inv.No.\ 000 031 589”, “Paralectotypus\ Hebrus montanus\ Kolenati, 1857 Bull. Soc.\ Imp. Nat. Mosc. 29: 474”.

Paralectotype (macropterous female): “Karabach”, “Kolenati”, “Lectotypus *Hebrus montanus* Kol.\ design. Kerzhner 2000” [unpublished], “NHMW-Hemipt.-Inv.No.\ 000 022 793”, “NHMW Hemiptera\ Image Coll. 000368”, “Paralectotypus\ *Hebrus montanus*\ Kolenati, 1857 Bull. Soc.\ Imp. Nat. Mosc. 29: 474”. **Paralectotype** (macropterous female): “Kasbek.”, “Kolenati”, “Paralectotypus *Hebrus montanus* Kol.” [label by I. Kerzhner, unpublished], “NHMW-Hemipt.-Inv.No.\ 000 031 587”, “Paralectotypus\ *Hebrus montanus*\ Kolenati, 1857 Bull. Soc.\ Imp. Nat. Mosc. 29: 474”.

ADDITIONAL SPECIMENS EXAMINED (all macropterous, identified by E.V. Kanyukova 1997, if not mentioned otherwise). 1 male, 1 female: “Armenia: Yerevan, \ Zanga river,\ 1.IV.1936\ leg. Rikhter”; 1 male, 1 female: “Georgia: S Abastumani\ lower reaches of\ Kurtskha-na river\ 21.VI.1949\ leg. A.N. Kiritshenko”; 1 male: “Azerbaijan (S): Lenkoran\ Distr., Razi\ 30.IV. 1909\ leg. Kirichenko”; 1 female: “mont. Talysh\ Astanlù\ Kreis Lenkoran\ 27/09. V.”; 1 male, “GR – Peloponnes (1)\ 2,5km S Diakfto\ 20.9.1994, ca. 30m\ leg. M. & E. Jäch” (det. H. Zettel 2003).



Figs 1–4: *Hebrus montanus*, male, lectotype. 1 – habitus, dorsal view; 2 – labels, not to scale; 3 – proctiger, dorsal view; 4 – left paramere, lateral view.

DESCRIPTION OF LECTOTYPE (macropterous male).

Measurements: BL 2.05, HL 0.59, HW 0.42, A₂L 0.15, PL 0.50, PW 0.84, MtL 0.82, AW 0.74. Indices: HI 138, AtI 76, EI 76, AnI 46, PHI 197, PnI 167, MMI 46, MtI 98, AbI 148. Relative lengths of antennomeres 1 – 4 (in % of antennomere 2): 150 : 100 : 167 : 200. Relative lengths of leg segments (in % of metatibia): profemur 59, protibia 62, protarsus 23, mesofemur 62, mesotibia 62, mesotarsus 23, metafemur 70, metatibia 100, metatarsus 33.

Colour. Head orange brown, dorsoanteriorly blackish; bucculae yellow. Pronotum light to medium brown, anterolateral gibbositities and humeri blackish. Mesoscutellum, metanotal elevation, sides and venter of body blackish. Forewing dark brown; veins blackish; medial (posterior) cell of corium with whitish base, gradually brownish towards apex; membrane with small, indistinct whitish marks. Antennomere 1 yellow, 2 yellowish brown, 3–4 brown. Rostrum and legs entirely yellow.

Pilosity. Scales on head, pronotum mesoscutellum, and metanotal elevation elongated, scattered, and indistinct, only cells of corium with more, pale scales. Entire body without long standing setae. Very short, oblique, brownish setae present on head and anterior part on pronotum; similar subdecumbent setae on veins of forewing. Sterna with thin, whitish appressed pilosity. Metatibia with characteristic single row of long setae along middle part of posterior face.

Structures. Body stout. Head moderately long, 1.4 times longer than wide; with moderately large eyes, normal-sized ocelli, and small, roundish ocular tubercles. Head sides straightly diverging from ocular tubercles to small, laterally rounded antennal tubercles. Buccula high, with two small, round impressions; posterior process wide, and apically slightly rounded. Pronotum large, wide, sides with deep concavity in front of strongly developed humeri; surface with numerous round impressions and with deeply impressed anterior section of midline. Metanotal elevation large, trapezoidal, its hind margin weakly concave in middle. Macropterous; forewings reaching apex of abdomen. Abdomen widest in front of middle, posteriorly rounded. Profemur hardly wider than meso- and metafemur; metafemur distinctly, evenly curved; metatibia straight at base, slightly curved in distal half.

Genitalia of male small. Pygophore subovate, without special modification. Paramere (Fig. 3) black, heavily sclerotized, but very small, relatively broad, distally with some long hairs, with dorsally curved, acute apex. Proctiger very small, roundish, without special modification.

DESCRIPTION OF PARALECTOTYPES (macropterous females). As all females of the *H. pusillus* group are very similar, the conspecificity of the females is uncertain.

Measurements (n = 4). BL 2.11–2.25, HL 0.57–0.61, HW 0.45–0.46, A₂L 0.12–0.14, PL 0.54–0.57, PW 0.87–0.96, MtL 0.72–0.79, AW 0.80–0.89.

Colour and pilosity similar as in male. However, colour with some variation. In two specimens like in the lectotype. In the other two specimens darker, body almost entirely black, whitish marks on corium and membrane more distinct; legs unicolourous, but with a slight hint of brown. Metatibia without row of setae.

Structures similar as in male. In one female buccula process slightly narrower. Profemur not wider than other femora. Metafemur only weakly curved. Metatibia straight. Gonocoxa plate-like, without modification.

DISCUSSION

The first author has shown in his studies on Oriental species of *Hebrus* (e. g., Zettel, 2004a, 2006), which external characters are useful to distinguish *Hebrus* species and to associate males and females (e. g., morphometry of head and thoracic structures, pilosity, head structures like antennal tubercles and shape of buccula). Genitalia of males (parameres, pygophore, proctiger) are species-specific and useful, too, but in a good number of species they are reduced to minute size and their examination requires advanced skills in dissecting and microscopy. It has also been shown that wing development strongly influences size and shape of the metanotal elevation (e. g., Zettel, 2006; Kment *et al.*, 2016). Unfortunately, this character and the problematic character of gradual subdivision of antennal segment 4 were

used in the past for the definition of subgenera (Poisson, 1944, 1952). Furthermore, the shape of the metanotal elevation can differ strongly between species which seem to be closely related in respect to other characters (Zettel, 2004b, 2006). In Hebridae, wing development is also correlated with the presence or size of ocelli (e. g., Zettel, 2004b; Kment *et al.*, 2016). The unclear division of *Hebrus* into subgenera was followed until recently by some authors (e. g., Andersen, 1995; Kment *et al.*, 2016). A phylogeny of *Hebrus* – and Hebridae genera – that includes molecular results, is still not available.

Kanyukova (1997), in her study on *Hebrus* of the former Soviet Union, recognized the *Hebrus pusillus* group based on the presence of a tooth on the mesal (“inner”) surface of the paramere. This group contains (sensu Kanyukova, 1997) *Hebrus hissarensis* Kanyukova, 1997, *H. montanus*, *H. oxianus* Kanyukova, 1997, *H. pilipes* Kanyukova, 1997, *H. pilosellus*, Kanyukova, 1997, and *H. pusillus*. Several further taxa from the West Palaearctic Region may belong to this group as well (e. g., taxa presently ranked as subspecies of *H. pusillus*). Species of the *Hebrus pusillus* group share the following characters: buccula process broad and blunt or truncated; metanotal elevation relatively large, truncated or medially shallowly emarginated (macropterous morph!), parameres small, but well sclerotized and with distinct apical hook; hind leg with distinct sexual dimorphism. In males the metafemur is distinctly curved (very strongly in some species) and the metatibia bears species-specific rows of long setae.

Hebrus montanus is clearly a member of the *Hebrus pusillus* group, as shown above by its character set. It can be easily identified by the key presented by Kanyukova (1997). To distinguish *H. montanus* from *H. pusillus*, the difference in the extension of the setal row on the male’s metatibia is – besides leg colour – the most useful character (comp. Kanyukova, 1997: figs 10 and 11).

Taxonomic progress should be made by type studies on some further West Palaearctic taxa.

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