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A new species of *Micrepimera* Matile (Diptera: Keroplatidae) from Baltic Amber

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Abstract

A new species of *Micrepimera* Matile, 1990 (Diptera: Keroplatidae) from Baltic amber is described. Known species of *Macrocera* from Baltic amber are reviewed. *Macrocera elegantissima* Meunier, 1904 is transferred to *Micrepimera*; a lectotype is designated for this species.

Keywords: new taxon, new combination, fossil insects

Introduction

The fungus gnats of the subfamily Macrocerinae (Diptera: Keroplatidae) are usually easily recognizable because of their long and thin antennae and characteristic wing venation. Although not uncommon in the fossil record, only a few species of Macrocerinae have been described so far, from Cenomanian amber of Bézonna (Matile, 1981), Eocene Fushun amber (Hong, 1974), Oligocene of Rott (Statz, 1944), Miocene of Maar (Armbruster, 1938), and Eocene of Baltic amber (Meunier, 1899, 1904). Most of the species were attributed at the time of description or consequently to the genus *Macrocera* Meigen, 1803. The largest group of Keroplatidae, the cosmopolitan *Macrocera*, has never been revised, and it is no surprise that many fossil species were misattributed to it.

A male specimen of Macrocerinae embedded in a piece of Baltic amber acquired by the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, was initially identified as *Macrocera*, but careful examination revealed that it belongs to another Recent genus, *Micrepimera* Matile, 1990. Extant members of the genus occur in Madagascar, Christmas Island, and Vietnam. In the current paper we describe the new species and discuss its taxonomic position, and other species from the Baltic amber described in *Macrocera*.

Material and methods

Types of Macrocerinae described by F. Meunier are housed in Geologisches-Paläontologisches Institut, Göttingen University, Germany (GPIG). Morphological terms used in species descriptions follow Cumming & Wood (2017). Photographs of the specimen were taken with Leica M205C stereomicroscope with Canon 7D camera attached (*Micrepimera neli* Blagoderov & Skibińska sp. nov.) and Zeiss SteREO Discovery.V8 with Olympus SP-350 camera attached (*Macrocera elegantissima* Meunier, 1904).

Systematic palaeontology

Order Diptera Linnaeus, 1758

Superfamily Sciaroidea Billberg, 1820

Family Keroplatidae Rondani, 1856

Subfamily Macrocerinae Rondani, 1856

Tribe Robsonomyiini Matile, 1990

Genus *Micrepimera* Matile, 1990

Type species. *Micrepimera punctipennis* Matile, 1990: 180.

***Micrepimera neli* Blagoderov & Skibińska sp. nov.**
(Figs 1, 2)

Holotype. MP/3962; an almost complete male specimen in a clear piece of Baltic amber, 26×6×5 mm; left side of head and thorax and ventral side of abdomen obscured by cloudy coating (“Verlummung”). The holotype is deposited in the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Kraków, Poland.

Etymology. The species is named after Dr André Nel, prominent palaeoentomologist, in recognition of his outstanding contribution to the field.

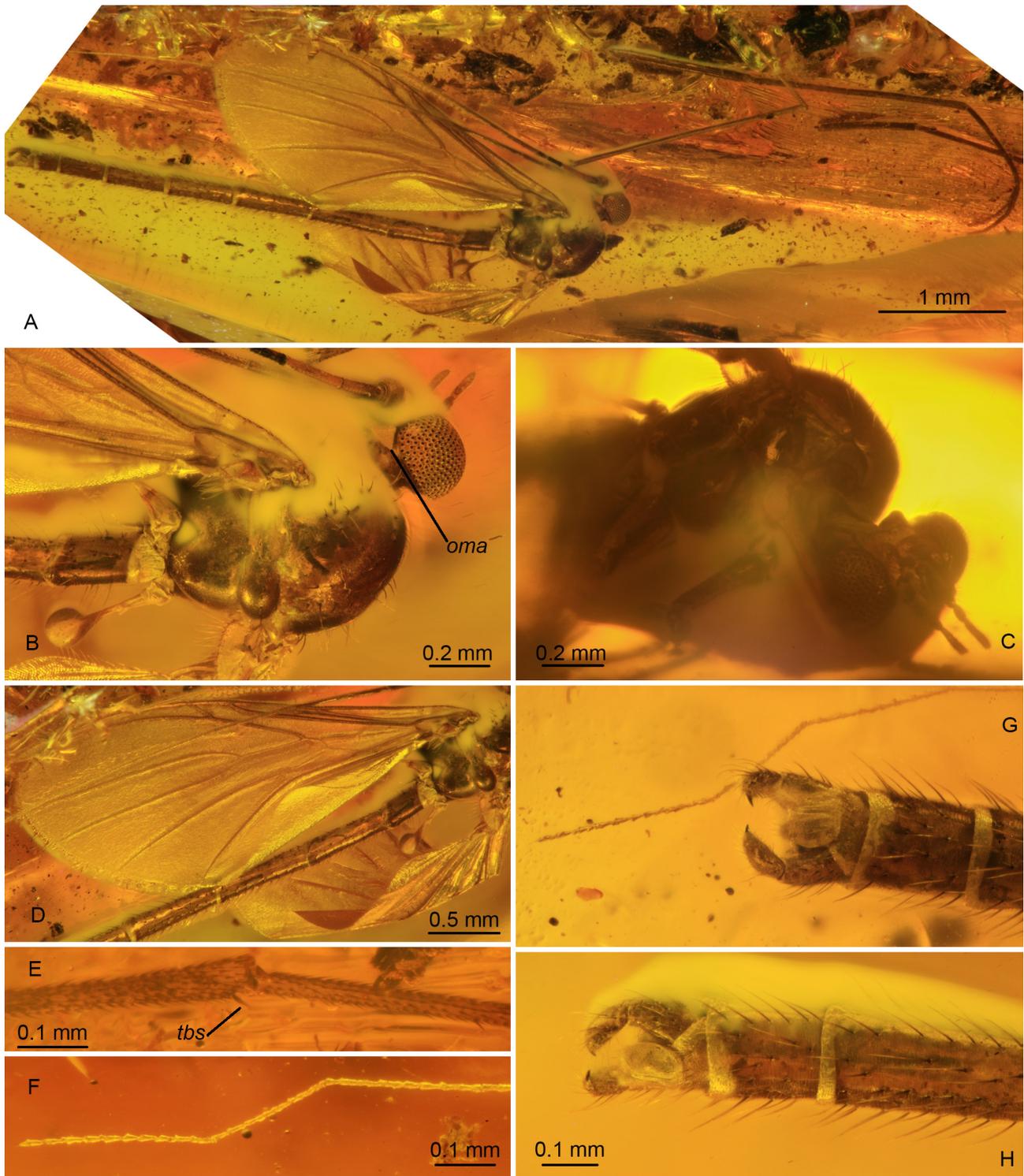


FIGURE 1. *Micrepimera neli* sp. nov., photographs of holotype. **A**, Habitus. **B**, Thorax, dorsal view. **C**, Thorax, lateral view. **D**, Wing. **E**, Fore tibia. **F**, Tip of antenna. **G**, Male terminalia, dorsal view. **H**, Male terminalia, lateral view. Abbreviations: *oma*, occipital; *tbs*, tibial spur.

Diagnosis. Apical flagellomere secondarily segmented into 10 parts, with rings of setae at apices of the parts; three basal palpomeres slightly longer than wide, apical palpomere three times as long as wide; A_1 long, reaching wing margin; proctiger bacilliform, sclerotised, as long as cerci.

Description. Male. Measurements in mm: body length 5.2; wing length 3; antenna length 4.5 (Fig. 1A).

Head. Dorsal and left part obscured by “Verlummung”. Distinct membranous area between compound eye, bases of antennae and cerebral sclerite. Three basal palpomeres slightly longer than wide, apical palpomere three times

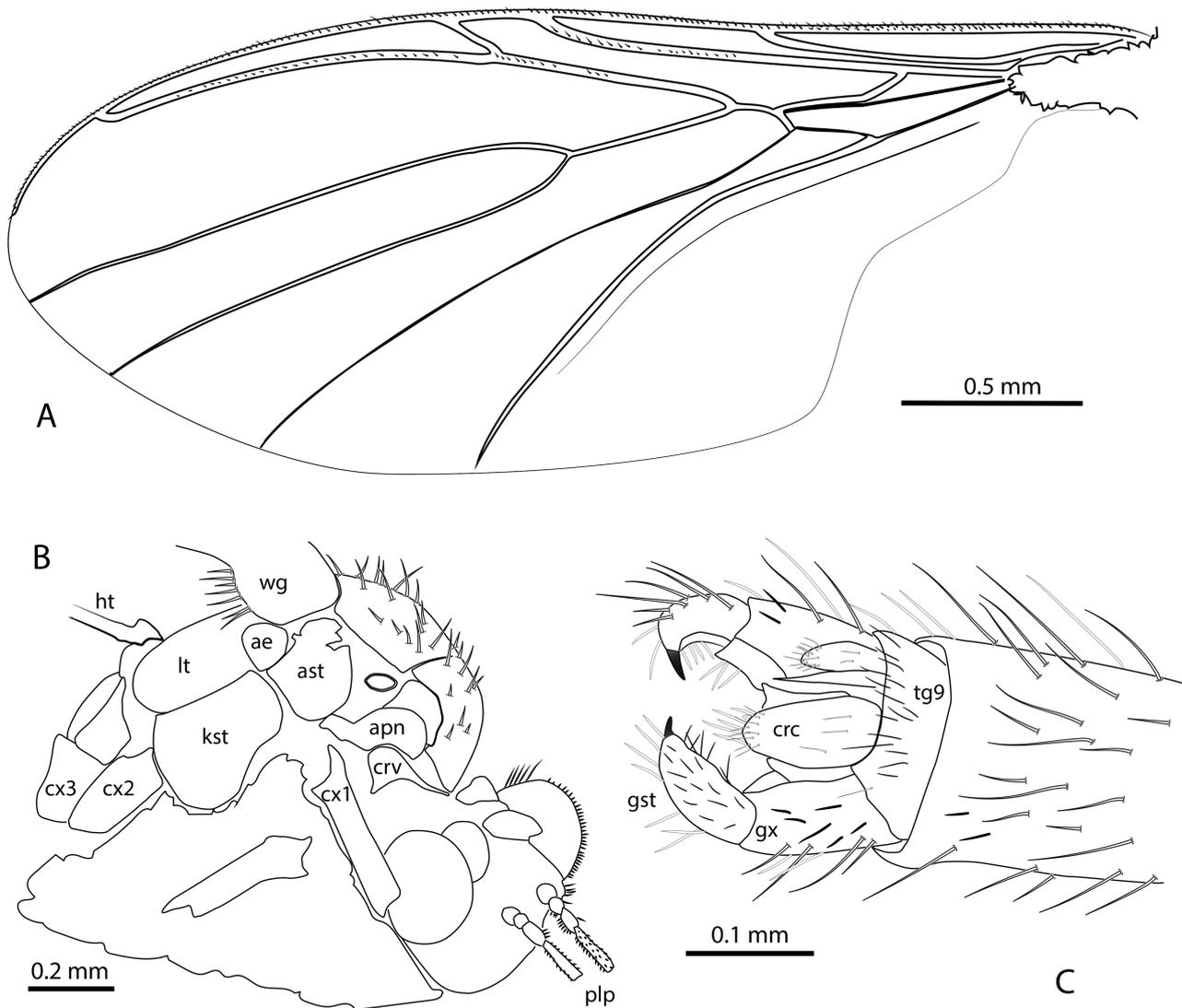


FIGURE 2. *Micrepimera neli* sp. nov., drawings. **A.** Wing; shape of anal lobe reconstructed. **B.** Thorax. **C.** Male genitalia. Abbreviations: *ae*, anepimeron; *apn*, antepronotum; *ast*, anepisternum; *crc*, cercus; *crv*, cervical sclerite; *cx1-3*, coxae 1-3; *gst*, gonostylus; *gx*, gonocoxite; *ht*, haltere; *kst*, katepisternum; *lt*, laterotergite; *plp*, palpi; *tg9*, tergite 9; *wg*, wing.

as long as wide. Interommatidial setae sparse, shorter than diameter of ommatidia. Antennae almost as long as body, with 14 segments, narrowing gradually towards apex, bare; scape globular, pedicel disc-shaped; apical flagellomeres secondarily segmented into 10 parts, with rings of setae at apices of the parts (Fig. 1A–C, F).

Thorax. Scutum with irregular rows of acrostichal and supraalar setae with wide bare areas between them. Scutellum with two posterior setae. Katepisternum almost twice as tall as anepisternum; anapleural suture horizontal. Anepisternum with a few short setae in anterodorsal corner. Anepimeron small, roughly triangular, ends ventrally at the level of anapleural suture. Laterotergites and mediotergite bare (Figs 1B, C, 2B).

Wings. Membrane hyaline, without microtrichia; no visible markings. C produced beyond R_5 to half the distance to the tips of R_5 and M_1 . Sc short, $\sim 0.35 \times$ wing

length, slightly expanded at apex, ends on C at the level of *r-m* fusion. R_1 and R_5 setose dorsally, rest of wings bare. R_1 ends distad of the level of M fork. R_4 present, slightly sinuous. Radio-medial fusion short; R_s , base of M_{3+4} , and *m-cu* weakened. M_2 and M_{3+4} divergent. A_1 long, weakened at apex, but reaching wing margin (Figs 1D, 2A).

Legs. Coxa 3 wide, extended posteriorly in the middle. Legs disarticulated at femora, fore tibia with very short apical spur, other legs have no tibial spurs (Fig. 1E).

Abdomen. Segments II–VII 4–5 \times as long as wide, segment VIII as long as wide.

Terminalia. Tergite IX short, transverse. Cercus one-segmented, ovoid, with a few apical setae. Proctiger bacilliform, sclerotised, as long as cerci. Gonostylus slightly curved medially, tapering, with a sharp apical tooth (Figs 1G, H, 2C).



FIGURE 3. *Micrepimera elegantissima* (Meunier, 1904), **comb. nov.** **A,** Habitus. **B,** Thorax. **C,** Wing. Abbreviation: *oma*, occipital membranous area.

Comparison. Two other genera of Robsonomyiini have a small anepimeron, *Langkawiana* Ševčík, 2009 and *Calusamyia* Coher, 2011; the former taxon also has long and thin apical flagellomeres, which are difficult to differentiate. However, *Langkawiana* differs from *Micrepimera neli* **sp. nov.** by the absence of ocelli and Sc ending free; *Calusamyia* has a full set of tibial spurs

(1:2:2); both *Langkawiana* and *Calusamyia* have patterned wings and base of M_4 reduced. *Micrepimera neli* **sp. nov.** differs from known Recent species of the genus in having a hyaline wing, but also in further morphological details. *Micrepimera pictipennis* Matile, 1990 (Christmas Island) has *r-m* fusion very short; R_1 relatively short and ending at the level of M fork; gonostyli with a short, sharp apical

tooth. *Micrepimera berentiana* Ševčík & Papp, 2011 (southern Madagascar) has apical flagellomeres short, not secondarily divided; C produced beyond R_5 to 3/5 of distance to M_1 ; Sc sort, ending before *r-m* fusion; R_1 ending proximad of the level of M fork; cerci short; gonostyli with blunt apex. *Micrepimera pandastica* Ševčík & Papp, 2011 (northern Vietnam) has apical flagellomere long and tapering, but not secondarily divided; C produced beyond R_5 to 3/5 of distance to M_1 ; R_1 ending at level of M fork; cerci short; gonostyli with blunt apex.

Remarks.

Micrepimera elegantissima (Meunier, 1904), comb. nov.

(Fig. 3A–C)

Taxonomic position of the new species

Although parts of the specimens are obscured, *Micrepimera neli* sp. nov. has undoubted synapomorphies of the tribe Robsonomyiini: (1) membranous area separating compound eyes and cerebral sclerite; (2) large mediotergite extending beyond scutellum (Fig. 1B); (3) coxae 3 without posterior setae; (3) R_{2+3} short; (4) base of M_{3+4} and *m-cu* weakened (Matile 1990). It fits perfectly with the emended diagnosis of *Micrepimera* (Ševčík & Papp 2011), with the exception of the wing pigmentation. Congeneric species in Sciaroidea may often have pigmented or clear wings, so this character should be excluded from the generic diagnosis. The apical flagellomeres of the new species are thin, long, and tapering, but not whip-like as in *M. pandastica* Ševčík & Papp, 2011. It is possible that modification of the apical flagellomere(s) is a reliable diagnostic character for the genus.

Notes on Meunier's Macrocera species in Baltic amber

Meunier (1899, 1904) described six species in the genus *Macrocera* from Baltic amber. Two more species, identified by Loew (1850), were named as *M. grandis* and *M. minuta* by Meunier (1899), who unfortunately failed to provide any descriptions; therefore, these names are *nomina nuda*.

Matile (1979) transferred *M. abundare* Meunier, 1904, *M. ciliata* Meunier, 1904, and *M. filiformis* Meunier, 1904 into his new genus *Kelneria* Matile, 1979, within the tribe Robsonomyiini.

Macrocera soccata Meunier, 1899 should be considered a *nomen dubium*. Meunier established the species by reference to a drawing (Meunier, 1899: fig. 7) in his paper that re-examined Loew's Diptera types from Baltic amber. Although some of Loew's material might be in the Natural History Museum, London or Museum für Naturkunde, Berlin, none of the specimens examined

in those two collections could be unambiguously related to Meunier's drawing, thus we conclude that the type is probably lost.

Macrocera electricornis Evenhuis, 2006 (= *Macrocera longicornis* Meunier, 1904, preoccupied by Fabricius, 1781) was described after a single male (mislabelled as female) specimen, #8194 (GPIG BST03064, old collection number Z8194). This might be the only *Macrocera* species known from Baltic amber so far. The following characters corroborate its generic placement: long antennae; flagellomeres with dorsal macrosetae longer than ventral macrosetae and microsetae; tibial spurs present, slightly longer than tibia diameter.

Macrocera elegantissima Meunier, 1904 was described based on three syntypes: a male (#244) and two females (#3002 and #5721). The male specimen is lost, but the females are stored in the collection of Göttingen University. Female specimen Z3002 (Meunier's #3002, new collection number BST03065) definitely belongs to the genus *Kelneria*, although species determination cannot be achieved with certainty at the moment; it may be conspecific with one of the four known species of this genus. Female specimen Z5721 (Meunier's #5721, new collection number BST03066) belongs to *Micrepimera*: small anepimeron, not reaching ventrally of anapleural suture; only one very short tibial spur on each tibia (Fig. 3A); membranous area between cerebral sclerite and compound eyes present (Fig. 3B); flagellomeres long and thin and apical one seemingly secondarily divided as in *M. neli* sp. nov. In order to provide nomenclatural stability, we are designating a lectotype for the species.

Macrocera elegantissima Meunier, 1904: 94.

Lectotype. Female BST03066 (old collection number Z5721), in GPIG, here designated.

Diagnosis. Differs from *Micrepimera neli* sp. nov. in Costa extending beyond R_5 to 3/4 distance to M_1 , shorter Sc, ending proximad of *r-m* fusion, M_2 and M_{3+4} parallel (Fig. 3C).

Discussion

Macrocerinae in the Cretaceous

A macrocerine fossil has been reported from the Lower Cretaceous of Santana (Grimaldi, 1990), but its poor state of preservation does not allow its exact determination. The oldest described Macrocerinae, *Hegalaria antzinako* Blagoderov & Arillo, 2002 and *H. minor* Blagoderov & Arillo, 2002, are known from the upper Albian amber of Alava, Spain. *Schlueteromyia cenomanica* Matile, 1981 was described from the Upper Cretaceous fossil resin of France. Both these genera are probably related and

represent the Macrocerinae stem-group (Blagoderov & Arillo, 2002). A rich fauna of Keroplatidae, including Macrocerinae, albeit still to be described, is known from the Cenomanian ambers of Myanmar (Blagoderov & Grimaldi, 2004).

Biogeographic implications

Based on the distribution of Recent and fossil Macrocerinae, Matile (1990) suggested a divergence time for the subfamily and minimal ages for the tribes Macrocerini and Robsonomyiini as early as the Middle Cretaceous. It should be noted that, despite the excellent fossil record of Jurassic and Cretaceous Sciaroidea, at least in Eurasia, there are no fossils before the Lowermost Cretaceous that can be attributed to Recent families of fungus gnats. The very rich fauna of Keroplatidae from Burmese amber (*ca.* 99 mya) does not include taxa that can be unequivocally attributed to modern genera, and most probably includes taxa from stem-group Macrocerinae; a similar situation can be observed in Lygistorrhinae (Blagoderov & Grimaldi, 2004). Moreover, Matile suggested that *Kelneria* belonged to an extinct European basal lineage of Robsonomyiini, and that the rest of the group was distributed in Asia and dispersed to North America during the Miocene; or, alternatively, that both lineages diverged in the Cretaceous. The discovery of *Micrepimera neli* refutes both hypotheses. It is more parsimonious to suggest that Recent Robsonomyiini are descendants of Eocene relicts rather than products of Cretaceous vicariance. Matile's divergence times and minimal taxon ages are grossly overestimated.

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