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Two new taxa of fossil Cantharidae from Baltic amber

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In this document, two new fossil soldier beetles (family Cantharidae) from the Baltic amber from Yantarny, Kaliningrad Region, Russia are described, illustrated and compared with all known fossil congeners: *Cacomorphocerus incurvus* sp. nov. and *Malthinus* (*Malthinus*) *amicitiae* sp. nov.

Key words: paleoentomology, resin, systematic, soldier beetles, Coleoptera

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INTRODUCTION

Baltic amber is a mine of new species and very useful for phylogenetic and biogeographical reconstructions. This fossil resin has already yielded many Cantharidae (also commonly called Soldier beetleas): over 100 species of 26 genera (*e.g.,* Kazantsev 2013, 2020, 2021; Fanti 2017; Fanti & Damgaard 2018; Parisi & Fanti 2020; Pankowski & Fanti 2022, 2023; Pankowski, 2023) and two peculiar tribes (Kazantsev 2013; Fanti & Kupryjanowicz 2018). Currently, it is the Fossil-Lagerstätte that has returned more Soldier beetles in the world.

In this paper, a new *Cacomorphocerus* Schaufuss, 1892 and a new *Malthinus* Latreille, 1806 are described. *Cacomorphocerus* is an extinct genus, found only in Eocene Baltic and Rovno amber (Fanti 2017; Kazantsev & Perkovsky 2020; Parisi & Fanti 2020). In contrast, *Malthinus* is today widely distributed in the Holarctic and Oriental regions with about 250-300 species (Delkeskamp 1977; Ramsdale 2002; Kazantsev & Brancucci 2007). Presently, it is also known at the fossil stage with few species (Kuśka & Kania 2010; Fanti & Damgaard 2018; Pankowski & Fanti 2022).

MATERIALS AND METHODS

The specimens are embedded in Baltic amber from the Yantarny mine, Kaliningrad Region, Russia. They were examined using a Carton stereomicroscope 0.8-40x and compared with all the related literature. The photographs were taken with a Canon EOS 70D camera and Canon MP-E 65 mm macro lens. The plates were processed using a Photo Impact Viewer SE program. Both types are preserved in the former author's collection.

SYSTEMATIC PALEOENTOMOLOGY

Order Coleoptera Linnaeus, 1758
Superfamily Elateroidea Leach, 1815
Family Cantharidae Imhoff, 1856
Subfamily Cantharinae Imhoff, 1856
Tribe †Cacomorphocerini Fanti & Kupryjanowicz, 2018
Genus †*Cacomorphocerus* Schaufuss, 1892

†*Cacomorphocerus incurvus* sp. nov.
(Fig. 1)

Holotype. Baltic amber, collection Fanti, access code BaA08RU (BaA = Baltic amber; 08 = sequential number; RU = Russia).

Type locality. Yantarny mine, Kaliningrad region, Russia.

Type horizon. Middle Eocene: Lutetian (47.8–41.2 Mya) to late Eocene: Priabonian (37.8–33.9 Mya).

Differential diagnosis. Compared to the new species described here, *Cacomorphocerus cerambyx* Schaufuss, 1892 shows a different pronotum, which is square, with narrower apical margin and a longitudinal impression on the disc (Schaufuss 1892; Fanti & Kupryjanowicz 2018). *Cacomorphocerus wiszniewskii* Fanti & Kupryjanowicz, 2018 differs from the new species in the subrectangular pronotum, with sides slightly concave from base to the apical third, where a very small denticle is present, and in the less saucer-shaped antennomeres IV-VI (Fanti & Kupryjanowicz 2018). *Cacomorphocerus jantaricus* (Kuśka & Kania, 2010) shows antennomeres differently shaped and pronotum more rectangular, with sides slightly protruding laterally near the apical margin (Kuśka & Kania 2010). The other taxa have very different shape or number of antennomeres.

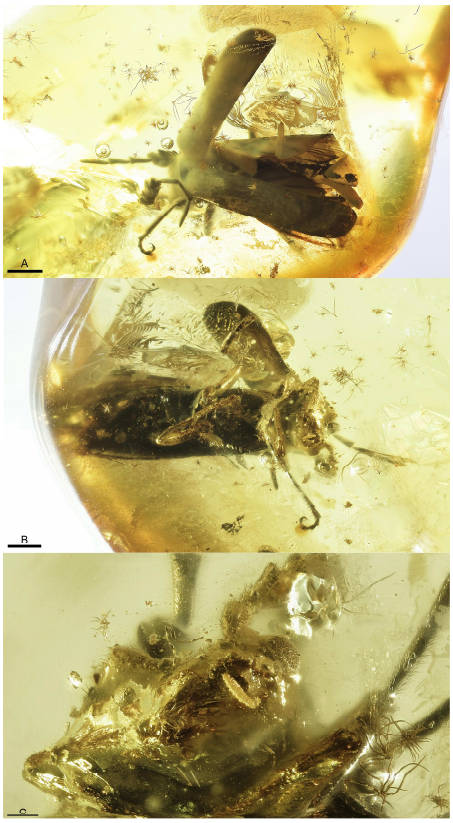

Fig. 1. *Cacomorphocerus incurvus* sp. nov. in Baltic amber (code BaA08RU). A: Holotype, dorsal view, scale bar = 1.0 mm; B: Holotype, ventral view, scale bar = 1.0 mm; C: Holotype, detail of head (ventral view), scale bar = 0.2 mm.

Description. Sex undefined, adult, robust, winged. Body length: about 7.3-7.5 mm (the specimen is folded), elytra 5-5.1 mm. Entirely blackish-dark brown.
Head elongated, rounded behind the eyes, covered with long setae and a shallow punctation. Eyes roundish, convex and prominent, inserted in the upper-lateral part of the head. Mandibles elongated, falciform. Maxillary palps 4-segmented;

last palpomere securiform. Labial palps 3-segmented.
Antennae 12-segmented, short, reaching about the elytral half, strongly pubescent; scape short, stout, club-shaped; antennomere II very short, globular, about 2.7 times shorter than scape; antennomeres III–VII saucer-shaped and asymmetrically inflated; antennomere VIII strongly saucer-shaped and asymmetrically dilated with apical lobes, sturdier than previous ones; antennomere IX squared, thinner than previous one; antennomeres X–XII elongated, filiform, rather robust, X-XI slightly enlarged apically, last antennomere thinner and rounded at apex.
Pronotum transverse, about as wide as head; apical and basal margins straight; sides straight, without denticles; surface without impressions, covered with shallow granules and several setae. Scutellum triangular, with pointed apex which is rounded at apex.
Elytra long, covering and surpassing the last abdominal segment, parallel-sided and with rounded apex, wider than pronotum; surface smooth and pubescent. Hind wings transparent, slightly longer than elytra.
Metasternum wide, short, robust, rounded apically and pubescent. Sternites transverse and pubescent. Legs slender and short; coxae very large; trochanters elongated, rounded apically; femora cylindrical, straight, more robust than tibiae; tibiae cylindrical, pro- and mesotibiae very slightly longer than pro- and mesofemora, metatibiae longer than metafemora.
Tarsi 5-segmented, short; tarsomere I elongated, tarsomeres II and III triangular and shorter than I, tarsomere IV bilobed, tarsomere V elongated but not extremely thin and enlarged apically; claws simple with a very small and obtuse tooth at base.

Etymology. The specific epithet derives from the Latin adjective "*incurvus*" = curved, in reference to the pronotum and head bent.

Syninclusions. Enhydro and air bubbles, botanical fragments, stellate hairs.

Remarks. The oblong reddish yellow amber piece measures approximately 41x20x10 mm. The inclusion is complete, with some folded parts and an open elytron showing the hind wing. Some parts of the body are slightly covered with white emulsion.

Subfamily Malthininae Kiesenwetter, 1852
Tribe Malthinini Kiesenwetter, 1852
Genus *Malthinus* Latreille, 1806

†*Malthinus* (*Malthinus*) *amicitiae* sp. nov. (Fig. 2)

Fig. 2. *Malthinus* (*Malthinus*) *amicitiae* sp. nov. in Baltic amber (code BaA09RU). Holotype, dorso-lateral view, scale bar = 1.0 mm.

Holotype. Baltic amber, collection Fanti, access code BaA09RU (BaA = Baltic amber; 09 = sequential number; RU = Russia).

Type locality. Yantarny mine, Kaliningrad region, Russia.

Type horizon. Middle Eocene: Lutetian (47.8–41.2 Mya) to late Eocene: Priabonian (37.8–33.9 Mya).

Differential diagnosis. The new species is easily recognizable by its neck gradually

constricted posteriorly. It is similar only to the extinct *M. danieli* Kuśka & Kania, 2010, from which it differs in the pronotum not narrower anteriorly, the elytra without impressed punctuation and the different colour (Kuśka & Kania 2010). The other fossil *Malthinus* species show head strongly restricted behind eyes and dotted elytra (Fanti & Damgaard 2018; Pankowski & Fanti 2022).

Description. Female, adult, robust, winged. Body length: about 6.0-6.2 mm. Entirely blackish.
Head almost completely exposed, neck gradually constricted posteriorly, equipped with several long setae and impressed small punctation. Eyes large, convex, rounded, inserted in the lateral-upper part of head. Mandibles falciform. Maxillary palps 4-segmented; last palpomere globular-elongated and apically pointed. Labial palps 3-segmented; last palpomere globular and apically pointed.
Antennae 11-segmented, filiform, relatively short, surpassing the elytral half, covered with several setae; scape elongated, club-shaped; antennomere II short; antennomeres III-IV sub-equal, elongated, rather robust; antennomeres V-VII sub-equal, slightly longer than previous ones; antennomere VIII longer and thinner than previous ones; antennomeres IX-X sub-equal, shorter and very slightly sturdier than previous one; antennomere XI elongated, rounded at apex.
Pronotum rectangular, slightly longer than wide, slightly narrower than head; apical margin very slightly rounded and not bordered; anterior corners rounded; sides straight and strongly bordered; basal margin straight and strongly bordered; posterior corners almost acute; surface irregular, gibbous on the basal part and concave near the apical margin, equipped with some long setae, without punctation. Scutellum triangular, wide at base, pointed apically, with rounded apex.
Elytra not particularly short, revealing the last abdominal segment uncovered, slightly wider than pronotum, parallel-sided, not dehiscent, rounded at apex; surface rather wrinkled, covered with several long setae and without punctation. Hind wings as long as elytra.
Metasternum with slightly rounded posterior margin, covered with dispersed short setae and very shallow punctation. Sternites transverse, wide, pubescent. Last tergite and last sternite wide and rounded. Legs robust, pubescent; coxae elongated, stout, enlarged at base; trochanters elongated, rounded at apex; femora enlarged, curved in the middle; tibiae cylindrical and thin, equipped with an apical spur, protibiae shorter than profemora, meso- and metatibiae longer than meso- and metafemora.
Tarsi 5-segmented, pubescent; tarsomere I elongated; tarsomere II about 1.4 times shorter than tarsomere I; tarsomere III shorter than previous one; tarsomere IV bilobed; tarsomere V short, thin, curved; claws simple, robust, without tooth.

Etymology. The specific epithet derives from the Latin noun "*ămīcĭtĭa*" = friendship, in reference to the friendship that binds the two co-authors.

Syninclusions. Botanical fragments, air bubbles, stellate hair.

Remarks. The oblong yellow amber piece measures approximately 30x20x9 mm. The inclusion is complete and clearly visible on one side, while it has shows some oxidations on the other one.

DISCUSSION

The entire tribe Cacomorphocerini is extinct and known only for the Eocene with species from Baltic and Rovno amber. The genus *Cacomorphocerus* was initially

associated with *Dysmorphocerus* Solier, 1849 (Dysmorphocerinae) due to the modified antennae (Schaufuss 1892; Kazantsev 2013); however, no relationship with this South American (Chilean) genus (Delkeskamp 1977) is real (Fanti & Kupryjanowicz 2018), and the antennal shape appears to be just a homoplasy. Baltic amber has so far returned over 90 species of Cantharidae; therefore, a much greater number than those currently present in Lithuania or in wider territories such as Germany, which host 57 and 86 species respectively (Köhler & Klausnitzer 1998; Köhler 2000, 2011; Bretzendorfer 2001, 2002a, 2002b, 2006; Ferenca et al. 2011; Tamutis et al. 2011). This fact is probably due, at least in part, to the greater thermal gradient present in the Eocene (Erwin 2009; Parisi & Fanti 2020; Pankowski & Fanti 2022) given that the environment, although very varied, did not have mountains (Sadowski 2017; Sadowski et al. 2017) which, as we know, can act as an ecological barrier and force and / or favour specific evolution.

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