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New fossil *Malthodes* KIESENWETTER, 1852 of the subgenus *Libertimalthodes* KUPRYJANOWICZ & FANTI, 2019 from Baltic amber (Coleoptera: Cantharidae)

FABRIZIO FANTI

Abstract

A new species of soldier beetle of the genus *Malthodes* is described from Eocene Baltic amber of the Kaliningrad region, Russia. The new species is placed within the subgenus *Libertimalthodes* based on the long elytra covering the last abdominal segments, the last ventrite wide and little modified, and the markedly larger aedeagus. *Malthodes* (*Libertimalthodes*) *spaceae* sp. nov. is the third fossil species of the subgenus *Libertimalthodes* and is distinguished from congeners by the last ventrite narrower and not concave in the middle of the apex or by shorter last tergite and bigger aedeagus. The recent discovery of three specimens (including *M. spaceae* sp. nov.) with long elytra can shed light on the origin of the genus.

Key words: New species, Tertiary, Baltic amber, *Malthodes spaceae* sp. nov., *Libertimalthodes*.

1. Introduction

Malthodes KIESENWETTER, 1852 is a vast genus with hundreds of species of the nominotypical subgenus present in the Palaearctic and in North America (DELKESKAMP 1977). Fossil of the genus are known from the Eocene Baltic and Rovno ambers and from the Oligocene brown coals of Brunstatt, France (FANTI 2017). The nominotypical subgenus is characterized by the latest urites of the males strongly modified and the elytra short, leaving several abdominal segments uncovered. In North Africa (Morocco, Algeria and Tunisia) the genus is represented by seven species of the subgenus *Podistrina* FAIRMAIRE, 1875, which is little-known and in need of revision. Nevertheless, it has particularly short elytra, absence of wings, an elongate head and elongate pronotum (KOCHER 1956; BRANCUCCI 1980; KAZANTSEV & BRANCUCCI 2007); characters perhaps due to particular and extreme climatic conditions. Recently, KUPRYJANOWICZ & FANTI (2019) established the extinct subgenus *Libertimalthodes* to contain interesting fossil species from Eocene Baltic amber characterized by long elytra which cover and surpass the last urites, little-modified terminal abdominal segments and a very large aedeagus. This latter subgenus includes the new species described here (FANTI & MICHALSKI 2018; KUPRYJANOWICZ & FANTI 2019).

2. Material and methods

The amber piece with the new species comes from the Yantarny settlement, Kaliningrad region, Russia. It measures 17 x 9 x 3 mm, has a rectangular shape and weights 0.4 grams. The matrix is extremely transparent and the surface has some scratches. Baltic amber, also called succinite, is of Eocene age

and is considered to range between 47.8–41.2 Mya and 37.8–33.9 Mya (WOLFE ET AL. 2009; WEITSCHAT & WICHARD 2010), but is sometimes attributed to Oligocene (e.g., BURLEIGH & WHALLEY 1983; VITALI & DAMGAARD 2016). The specimen was re-polished in order to highlight the dorsal and ventral views and was later donated by me to the Illinois Natural History Survey, University of Illinois at Urbana-Champaign, USA. The photographs were taken by MARIUS VETA (Palanga, Lithuania) and ARTUR ROBERT MICHALSKI (Wrocław, Poland) with respectively a Canon 70D digital camera and Canon MPE-65mm macro lens and with a Canon EOS 600D digital camera mounted on a Bresser microscope, with the addition of focus stacking software. Figures were then produced using PhotoImpact Viewer SE.

3. Systematic palaeontology

Family Cantharidae IMHOFF, 1856

Subfamily Malthininae KIESENWETTER, 1852

Tribe Malthodini BÖVING & CRAIGHEAD, 1931

Genus *Malthodes* KIESENWETTER, 1852

Subgenus *Libertimalthodes* KUPRYJANOWICZ & FANTI, 2019

Malthodes (*Libertimalthodes*) *spaceae* sp. nov.

Figs. 1–3

Etymology: Named in honour of SIMONA SPAZIANI (Frosinone, Italy) as a sign of friendship and as appealing play of her surname Spaziani and the nickname “Space” I gave her (space = spazio, in Italian).

Holotype: Male, in Baltic amber, deposited at the Illinois Natural History Survey, accession No. INHSP-10327.

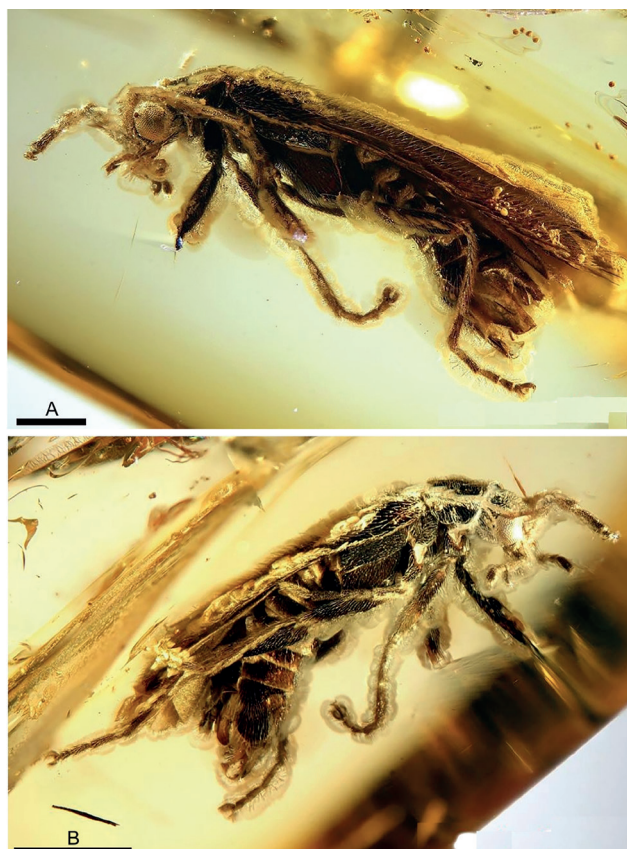


Fig. 1. *Malthodes (Libertimalthodes) spaceae* sp. nov., Baltic amber, holotype (INHSP-10327); A: dorso-lateral view. Bar = 0.5 mm; B: dorso-lateral view. Bar = 1.0 mm.

Type locality: Russia, Sambian Peninsula, Kalinin-grad region, Yantarny mine.

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

Diagnosis: The general appearance, the head, pronotal shape, and particularly the last maxillary palpomere globular and distally pointed, makes this species belongs to the genus *Malthodes*. This genus tendentially shows short elytra and in some rare cases these cover at most 85–90% of the abdomen (LeConte 1881; Brancucci 1980; Fanti & Michalski 2018). Only the subgenus *Libertimalthodes*, now known from three fossil species, has elytra which cover and surpass the last abdominal segments. In addition, to the elytral characters, the aedeagus in *Libertimalthodes* is larger (enormous) in comparison with other *Malthodes* species. *Malthodes (Libertimalthodes) spaceae* sp. nov. has the last ventrite narrower and not concave in the middle of the apex as in *Malthodes (Libertimalthodes) elytratus* Kupryjanowicz & Fanti, 2019, while *Malthodes (Libertimalthodes) aphidiphagus* Fanti & Michalski, 2018 is similar in size, but has a smaller aedeagus and the last tergite and sternite longer compared to *M. spaceae* sp. nov. (Fanti & Michalski 2018; Kupryjanowicz & Fanti 2019).

Description: Adult, winged, elongated, male defined on the basis of the visible aedeagus. Body length: about 3.9 mm,

elytra 2.9 mm, antennae 2.1 mm. Entirely dark brown–blackish without yellow spots at the apex of elytra. Head exposed, rounded, slightly granulous. Eyes large, rounded, inserted laterally and in the upper part of the head, interocular dorsal distance about 1.2 times greater than eye diameter. Mandibles not well visible. Maxillary palps 4-segmented, first palpomere short, second elongated, third subquadrate and shorter and more robust than second, fourth palpomere globular and distally pointed. Labial palps 3-segmented with the last palpomere globular and pointed. Antennae filiform, 11-segmented, reaching the half-length of elytra; antennomere I club-shaped, enlarged apically; antennomere II short, about 1.8–2.0 times shorter than scape; antennomeres III–X filiform, longer than II; antennomere XI elongated, robust, apically rounded; all antennomeres with long setae. Pronotum sub-quadrate, as wide as head, covered with short setae, surface slightly concave and with numerous and small punctation, anterior margin strongly bordered, posterior margin slightly bordered, sides straight, propleurs rounded with sinuous margin. Scutellum short, triangular-shaped, rounded at apex. Elytra elongate and surpassing the last abdominal segments, wider than pronotum, wide at the base and narrower after humeri, surface with scattered setae and without punctation, apex rounded. Posterior wings dark, almost completely covered by the elytra. Legs relative short, rather robust; coxae wide



Fig. 2. *Malthodes (Libertimalthodes) spaceae* sp. nov., Baltic amber, holotype (INHSP-10327); A: detail of palps, head and pronotum. Bar = 0.5 mm; B: detail of last abdominal segments and aedeagus. Bar = 0.5 mm.



Fig. 3. *Malthodes (Libertimalthodes) spaceae* sp. nov., Baltic amber, holotype (INHSP-10327); A: detail of aedeagus. Bar = 0.1 mm; B: detail of last ventrites. Bar = 0.1 mm.

and rounded; trochanters elongated and curved; femora robust, subcylindrical and equipped with many setae; tibiae slightly longer than femora, cylindrical, thin, without spurs at apex and equipped with setae. Tarsal formula 5-5-5; tarsomeres robust and with long setae; tarsomere I elongated; tarsomere II about 1.2 times shorter than first and 1.5 times longer than third; tarsomere IV strongly bilobed with lobes curved; tarsomere V elongated and flat; claws simple without lobes or teeth. Metasternum with pubescence and very thin punctation. Abdominal segments transverse and with sparse setae. Penultimate sternite concave in the middle with sides lobated; last sternite wide, elongated in a kind of robust lobe, and wide and apically rounded, equipped with long setae; last tergite in shape of two elongated and thin lobes. Aedeagus almost completely extruded, huge, wide at the base and with sides slightly bent, parameres–laterophyses elongated and thin.

Syninclusions: Many stellate hairs, wood remains, botanical fragments of unclear origin and air bubbles (gas vesicles). No accompanied fauna.

Remarks: Female of this new species is unknown. The inclusion is complete except for the front legs and a median leg that are broken (tendentially preserved up to the femur or part of the tibia). Instead the antennae are present but not clearly visible in some parts because they are aligned and bent along the body. The aedeagus is almost completely extruded.

4. Discussion

Malthininae KIESENWETTER, 1852 were considered a subfamily evolved rather recently with respect to the other subfamilies of soldier beetles (BRANCUCCI 1980). A representative, related to *Malthodes* KIESENWETTER, 1852, named *Archaeomalthodes rosetta* HSIAO, ŚLIPINSKI & PANG, 2016 was recently found in the Cretaceous Burmese amber (HSIAO et al. 2016) with an age of ca. 99 Mya (SHI et al. 2012). The recent discovery of specimens of *Malthodes* with long elytra covering the last abdominal segments in contrast to the short elytra more typical of *Malthodes* suggests that this latter character is derived and therefore likely an apomorphy of extant *Malthodes*. This hypothesis is further strengthened by the fact that the antennae are often filiform and members of the subfamily are purely predators and, at least extant *Malthodes* do not feed (or feed only little) on nectar and pollen (GOIDANICH 1954). A predatory lifestyle compared to phytophagy is considered a primitive character even in other ancient subfamilies. For example, the Chauliognathinae LECONTE, 1861 and its type genus *Chauliognathus* HENTZ, 1830 of Australia and New Guinea, compared to the species of South and Central America, which are apparently more evolved and modern (MISKIMEN 1961). Also, the aedeagus of the subgenus *Libertimalthodes* KUPRYJANOWICZ & FANTI, 2019 is very distinctive among *Malthodes*, being very large and robust, and in many aspects similar to the representatives of the subfamily Cantharinae IMHOFF, 1856 (KUPRYJANOWICZ & FANTI 2019). It may also be speculated that the attachment of the aedeagus with the body may be much more robust than in the other known species of *Malthodes*. Indeed, tendentially it is attached to the abdomen with a long and thin peduncle and thus unlikely that is so slender in species with robust and large aedeagus as in the subgenus *Libertimalthodes*.

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