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Malthodes meriae sp. nov.: a new fossil *Malthodes* Kiesenwetter, 1852 from the Eocene Baltic forests (Coleoptera: Cantharidae)

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Abstract. The genus *Malthodes* Kiesenwetter, 1852 is very frequent in the Old World, in North America and in the Eocene forests. In the present article, I describe and illustrate the new species *Malthodes meriae* sp. nov. as inclusion upon one amber piece from Yantarny settlement (Kaliningrad Region, Russia). The last modified and very diversified male tergites and sternites allow an easy determination of the species of the genus and the new taxon described here shows the last sternite very narrow and elongate with the apex tightly and briefly forked, and last tergite narrowed lobe-shaped.

INTRODUCTION

Malthodes Kiesenwetter, 1852 is very frequent throughout the Palaearctic and Nearctic are found abundantly in forests or wooded environments, as well as in ecotonal areas rich in shrubs and ferns, especially in hilly areas and fresh temperate, even if they are well adapted to climates of more arid, lowland and dry Mediterranean type. Places where their favourite food, made of small insects, especially aphids (Fanti & Ghahari 2016, Fanti & Michalski 2018), is abundant. The Eocene forests therefore rich in arthropods and wooded areas with conifer as *Abies*, *Pinus*, *Pseudolari*x, with Cupressaceae as *Juniperus*, with Sciadopityaceae as *Sciadopitys* or angiosperm as Fagaceae - quercoid and castaneoid taxa (Wolfe et al. 2009, Sadowski 2017, Sadowski et al. 2017), which suggest an environment mosaic very diverse and heterogeneous and without orogenetic events (Sadowski 2017), should have been, as it is for today (Fender 1951, Ramsdale 2002), an environment particularly suited to the development of many forms and species. This aspect is already evident from the numerous species of *Malthodes* described for the fossil records (Fanti 2017, Fanti & Vitali 2017, Fanti & Damgaard 2018, Fanti & Michalski 2018, Fanti & Pankowski 2018). The aim of the present work is therefore to describe a new species from Baltic amber, thus increasing the number of known species and confirming the high variability of the genus, at least in the Baltic, also during the Eocene.

MATERIAL AND METHODS

The Baltic amber specimen originated from the Kaliningrad region in Russia. Baltic amber is considered to range between 47.8-41.2 Ma and 37.8-33.9 Ma. The specimen was re-polished in order to highlight the dorsal and ventral views and it is preserved at the Fabrizio Fanti amber collection housed at Piazze, Siena, Italy, with the access code BaA03RU (BaA =

Baltic amber; 03 = sequential number; RU = Russia). The excellent photographs were taken by Jonas Damzen (Vilnius, Lithuania) with a camera Canon EOS70D and macrolens Canon MPE-65mm, with the addition of focus stacking software Helicon Focus. The drawings were done hand-made and the pictures were elaborated with the program PhotoImpact Viewer SE. The abbreviations of the last abdominal segments follow Liberti (2011) and are: st8 = eighth (penultimate) sternite; st9 = ninth (last) sternite; tg9 = ninth tergite; tg10 = tenth (last) tergite.

RESULTS

Order Coleoptera Linnaeus, 1758
Family Cantharidae Imhoff, 1856
Subfamily Malthininae Kiesenwetter, 1852
Tribe Malthodini Böving & Craighead, 1931

Genus *Malthodes* Kiesenwetter, 1852
Subgenus *Malthodes* Kiesenwetter, 1852

Malthodes (*Malthodes*) *meriae* sp. nov.
(Figs. 1-3)

Type material. Holotype (♂): Baltic amber, deposited in Fabrizio Fanti (Piazze, Siena, Italy) amber collection, accession No. BaA03RU.

Type locality. Russia, Kaliningrad Oblast', Sambian (Samland) Peninsula, Baltic Sea coast, Yantarny/Jantarnyj/Янтарный.

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

Description. Adult, winged, slender. Male based on modified last abdominal segments. Body length: around 3.0 mm (the head is folded); antennae 2.8 mm; elytra: 2.1 mm. Entirely dark brown with head blackish and without yellow spots on the elytra.

Head completely exposed, rounded, slightly narrower than pronotum, equipped with shallow and wrinkled punctation. Eyes large, rounded, convex, interocular dorsal distance about 2.1-2.2 times greater than eye diameter. Mandibles short, falciform, considerably curved, robust, apparently with small denticles on the internal side. Maxillary palps 4-segmented, unequal in length, with the terminal palpomere globular and distally pointed. Labial palps 3-segmented. Antennae filiform, 11-segmented, long, almost reaching the apex of the last abdominal segment; antennomere I elongated, club-shaped, basally thin and with apex robust; antennomeres II-III filiform and approximately 1.4-1.5 times shorter than scape, with the second article more robust than third; antennomeres IV-IX elongated, filiform, subequal in length, slightly longer than antennomeres II-III; antennomere X filiform, longer than II, shorter than previous; antennomere XI filiform, rounded at apex; all antennomeres with setae on the margins.

Pronotum strongly transverse, surface flat, posterior margin slightly sinuous and strongly bordered particularly on the corners, anterior margin straight, sides slightly bordered and

straight which shrink strongly shortly before the anterior margin. Scutellum triangular, short, with apex straight. Elytra wider than pronotum, short, parallel-sided, reaching until almost the apex of the sixth abdominal segment, apex rounded, surface smooth. Posterior wings long, transparent, surpassing the elytra and the abdominal segments.

Legs short and robust; coxae short and roundish; trochanters elongated, roundish at apex; femora enlarged, not curved, equipped with very short pubescence; pro- and mesotibiae shorter than pro- and mesofemora, metatibiae as long as metafemora, all the tibiae cylindrical equipped with setae. Tarsi 5-segmented; tarsomere I robust, slightly elongated; tarsomere II slightly shorter than first; tarsomere III triangular-shaped; tarsomere IV bilobed; tarsomere V slender; claws simple.

Penultimate tergite (tg9) robust, subquadrate, with margins equipped with setae; last tergite (tg10) very narrow, slightly elongated and lobe-shaped, at apex submillimetrically forked and equipped with long setae; last sternite (st9) elongated, narrow, not curved,

Fig. 1. *Malthodes meriae* sp. nov.: Holotype, dorsal view.

Fig. 2. *Malthodes meriae* sp. nov.: Holotype, ventral view.

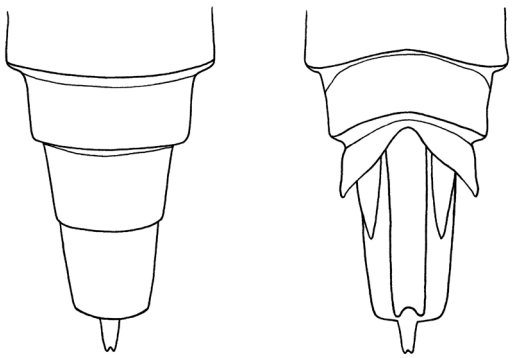

Fig. 3. *Malthodes meriae* sp. nov.: Reconstruction of the last abdominal segments; last tergites and ventrites, ventral view (right) and last tergites, dorsal view (left).

parallel-sided, apically forked with not deep incision (U-shaped); two urophysis elongated, each inserted on the side of the penultimate sternite (st8). Metasternum subtrapezoidal. Abdominal segments with pubescence.

Differential diagnosis. None of the fossil species of *Malthodes* known until now show the characteristics of the new taxon described here (Fanti & Vitali 2017, Fanti & Michalski 2018). Only *Malthodes perkovskyi* Kazantsev, 2010 from Rovno amber has the same similar last sternite (st9), but this apically is much more largely concave, and in particular has a completely different last tergite - tg10 (Kazantsev 2010). From a systematic point of view it is difficult to know the relationships with the living species, and *Malthodes meriae* sp. nov. appears to have no affinity, at least, with the species of the Alps and Central-Northern Europe. Only morphologically and based on the shape of the last abdominal segments, it could be poorly close to the species: *Malthodes fuscus* (Waltl, 1838) that has bigger size, spots yellow at elytral apex and the last tergite (tg10) wider (Liberti 2011); and *Malthodes kahleni* Wittmer, 1982 that is also larger and with yellow spots at elytral apex (Wittmer 1982, Liberti 2016).

Etymology. The new species is dedicated to Meri Gobbetti (Bellante, Abruzzo, Italy) as a sign of deep friendship.

Syninclusions. Many wood remains and botanical fragments, stellate hairs (trichomes covering oak inflorescences), and air bubbles.

Remarks. The yellow amber piece measures 33x10x5 mm and weighs 1.4 grams, the matrix is very transparent and the inclusion is complete and perfectly visible, with only the head slightly folded laterally and in part covered by white emulsion. There are also present four-five small lumps of oxidation-emulsion on the elytra and pronotum.

DISCUSSION

Paleobotanical inclusions in Baltic amber indicate the presence of coastal swamps and mesophytic forests with conifer and angiosperm (Sadowski et al. 2017) and also the numerous presence in this source of the representatives of the genus *Malthodes* confirms the evidence that the Eocene period in Baltic was characterized by warm temperature climate but not subtropical or tropical, as confirmed by study on molluscs in France (Andreasson & Schmitz 1996), since that this genus (*Malthodes*) is currently very rare or totally absent in several tropical areas and tends to be reduced in species as we move towards a greater thermal gradient. The presence of the genera of soldier beetles of relatively cool climate and considerable environmental diversity could also suggest a rapid, sudden and local temperature changes in the Baltic, as, indeed, appears to have also occurred in the Middle Eocene in North America (Methner et al. 2016). The lack of orogenetic events in the Baltic during the Eocene suggests that the high endemic nature and variability of the current *Malthodes* species in the mountain ranges (such as the Alps), is due to the effect of ecological barrier and environmental diversity that the mountains create.

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