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Key to fossil Malthininae, with description of two new species in Baltic amber (Coleoptera Cantharidae)

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The soldier beetles *Malthodes caenozoicus* n. sp. and *Mimoplatycis bicolor* n. sp. are described from Baltic amber. *Malthodes caenozoicus* n. sp. is characterised by small size, short elytra, and peculiar terminalia. *Mimoplatycis bicolor* n. sp. is characterised by peculiar pronotal ridges and coloration. A key to the fossil Malthininae is provided.

Key words: *Malthodes*, *Mimoplatycis*, Baltic amber, key.

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INTRODUCTION

Fossil representatives of the subfamily Malthininae Kiesenwetter, 1852 have been recorded since the beginning of the 19th century by Hope (1836), Giebel (1852) and Motschulsky (1857), who recorded *Malthinus* Latreille, 1806 from Baltic amber. Förster (1891) described the first fossil species of the genus *Malthodes* Kiesenwetter, 1852 from Oligocene brown coals of Brunstatt (Alsace), while Klebs (1910) recorded the same genus from Baltic amber.

Only since the beginning of 21st century, have the first species from Baltic and Rovno amber been described, among which were the first fossil representatives of *Malthinus* and *Macrocerus* Motschulsky, 1845 (Kuśka & Kupryjanowicz 2005; Kazantsev 2010; Kuśka & Kania 2010; Kazantsev & Perkovsky 2014; Fanti 2017b). Kazantsev (2013) even described a new fossil tribe (Mimoplatycini) from Baltic amber, lately found also in Rovno amber (Kazantsev & Perkovsky 2014). Finally, Hsiao et al. (2016) described the new genus *Archaeomalthodes* from Cretaceous Burmese amber. The complete list of worldwide fossil

Cantharidae was recently published by the first author (Fanti 2017a).

Two new species described here increase the number of fossil Malthinae and a key to the fossil species is hereafter proposed.

MATERIALS AND METHODS

Observations on the fossils were made using a stereomicroscope Antares Geminar 3 with 20 - 40x eyepieces, equipped with a micrometer system. Pictures were taken using a Zeiss stereomicroscope with digital camera Canon EOS 450D and lenses Zeiss Luminar 100/63/ 40 mm. Drawings were obtained with a mixed traditional-computer graphic technique.

SYSTEMATIC PART

Cantharidae Imhoff, 1856
Malthininae Kiesenwetter, 1852
Malthodini Böving & Craighead, 1931
***Malthodes* Kiesenwetter, 1852**

***Malthodes caenozoicus* n. sp.**
(Figs. 1 - 3)

Holotype. Male. Baltic amber from Lithuania, ex coll. W. Lewita G109, coll. F. Vitali; age: Early Oligocene.

The specimen is included in a pentagonal piece of amber measuring approximately 1.5 cm at each side and 1 cm high. In addition to the beetle, the sample includes some "stellate hairs", usually identified as trichomes covering oak inflorescences. Considering the deformation of the holotype, the amber was evidently autoclaved (C. Gröhn *in litt*.).

Differential diagnosis. This new species is similar to the extant European *Malthodes brevicollis* (Paykull, 1798), which shows analogous small size, dark coloration, short antennae and similar terminalia. *Malthodes caenozoicus* n. sp. differs from *M. brevicollis* in the not-incised urosternite IX and in the shorter, trapezoidal, apically slightly incised and not-enlarged posteriorly urotergite X. Additionally, *M. brevicollis* shows longer elytra.

Description. Male. Body length: 1.8 mm; minute, elongated, entirely pitch black; antennae and elytra relatively short.

Head rounded, posteriorly moderately constricted; eyes prominent; temples twice as long as upper side of the eyes. Last maxillary palpomere globular and apically pointed.

Antennae 11-segmented, short, posteriorly hardly surpassing the metafemora, almost moniliform; scape elongate, surpassing the eyes for half of its length; antennomeres II-X subequal, one-half as long as scape; antennomere XI one-third longer than previous ones. Antennomere proportions according to the formula: 2.8: 1.4: 1.3: 1.4: 1.4: 1.4: 1.4: 1.4: 1.4: 1.4: 2.0.

Pronotum cordiform, hardly as wide as the head, apically rounded; basal angles straight.

Elytra as wide as the head at base, short (1.75 times as long as wide at base), reaching the metafemora posteriorly, apically constricted, acute at apex. Hind wings fully developed.

Legs typical of the genus; tarsomere I as long as tarsomeres II - IV together; tarsomere IV bilobed (plantar pad); tarsomere V thin and longer than III - IV, claws simple.

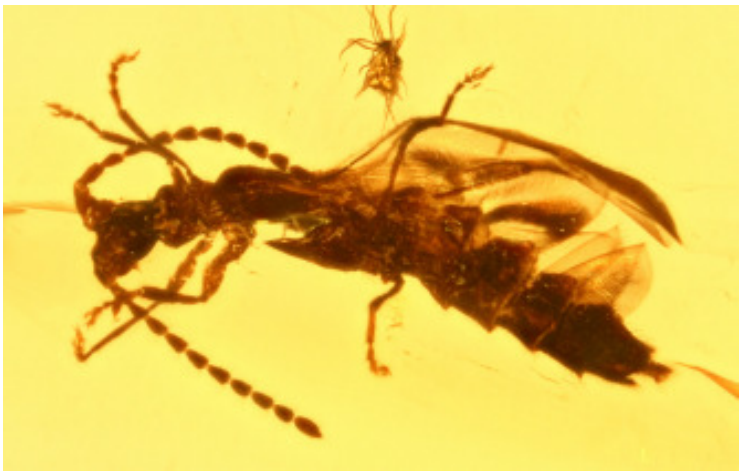

Fig. 1. *Malthodes caenozoicus* n. sp., Holotype, dorsal side.

Fig. 2. *Malthodes caenozoicus* n. sp., Holotype, dorsal side, real colours of the species.

Abdomen elongate; tergite VIII subcylindrical, one-third as wide and one-half as long as VII; tergite IX not clearly visible but elongate lobe-shaped; tergite X trapezoidal, posteriorly enlarged, covered with long pubescence; sternite IX barely elongate, large (lobe-shaped) and not apically incised, covered with long pubescence. A long and thin urophysis, covered with long pubescence, is present at each side of abdominal segment VIII, surpassing the tergite IX.

Etymology. The specific name is derived from Latin *"caenozoicus"* = Caenozoic, by reference to the age of the species.

Cantharidae Imhoff, 1856
Malthininae Kiesenwetter, 1852
Mimoplatycini Kazantsev, 2013
***Mimoplatycis* Kazantsev, 2013**

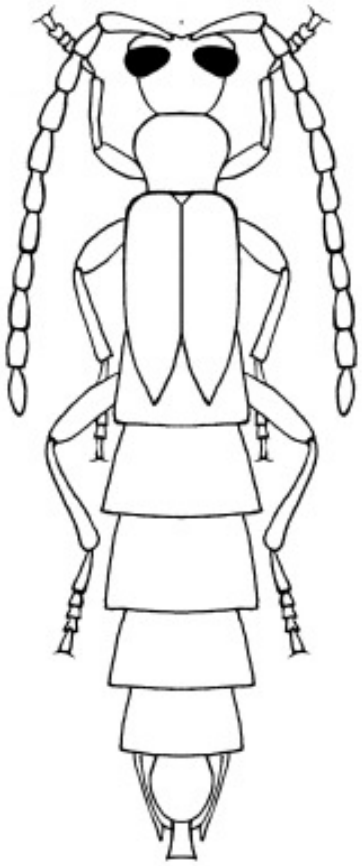

Fig. 3. *Malthodes caenozoicus* n. sp., reconstruction

***Mimoplatycis bicolor* n. sp.**
(Figs. 4 - 6)

Holotype. Male. Baltic amber, ex coll. C. Gröhn D1748, coll. F. Vitali; age: Early Oligocene. The specimen is included in a piece of drop-shaped amber measuring about 1 cm, without syninclusions. The right antenna is present only through antennomere IV.

Differential diagnosis. The new species is ventrally covered by a gelatinous substance hiding in particular the sternum and the sides, but the last globular maxillary palpomere attributes it clearly to Malthininae, while the number of abdominal segments and the pronotal structure belong to the genus *Mimoplatycis* Kazantsev, 2013.

Mimoplatycis bicolor n. sp. differs from the only known species - *M. notha* Kazantsev, 2013 from Baltic and Rovno amber - in the pronotum with rounded basal angles (prominent in *M. notha*) and with different discal ridges: more enlarged apically and delimiting a very small smooth area before the base.

Furthermore, *Mimoplatycis bicolor* n. sp. shows reddish elytra with a triangular black spot at base, while *M. notha* shows elytra completely dark or obscured at apex.

Description. Male. Body length: 3.6 mm; elongate; head, pronotum and a posteriorly concave band on each elytral base blackish; elytra reddish brown; limbs dark brownish.

Head wide, as wide as the pronotum, rounded, with large and very prominent eyes, temples feebly narrowed backwards posteriorly.

Last palpomere of maxillary and labial palps strongly globular and not apically not pointed, other articles not visible.

Antennae, 11-segmented, filiform, long, posteriorly reaching half of the elytral length; scape dorsally convex, not surpassing the eyes and thickened particularly in the apical half; pedicel short and cylindrical, antennomeres III-XI elongated, about 1.3 times length of antennomere II. Antennomere proportions according to the formula: 2.0: 1.9: 2.4: 2.5: 2.3: 2.4: 2.1: 2.1: 2.0: 2.0: 2.1.

Fig. 4. *Mimoplatycis bicolor* n. sp., Holotype, dorsal side.

Fig. 5. *Mimoplatycis bicolor* n. sp., Holotype, dorsal side, real colours of the species

Pronotum, trapezoidal, apically narrowed, apex about one-fifth narrower than base, finely furrowed; base as wide as the elytra, finely furrowed; basal angles slightly rounded; disc slightly convex, but flat and depressed near the four corners and in two areas along the middle to form an evident H-shaped raised surface; lateral margins indistinct. Scutellum triangular, transverse, large, rounded at apex.

Elytra long, 3.4 times as long as wide at base, surpassing the abdomen, almost parallel, constricted before the middle, regularly convex afterwards; apex rounded; surface

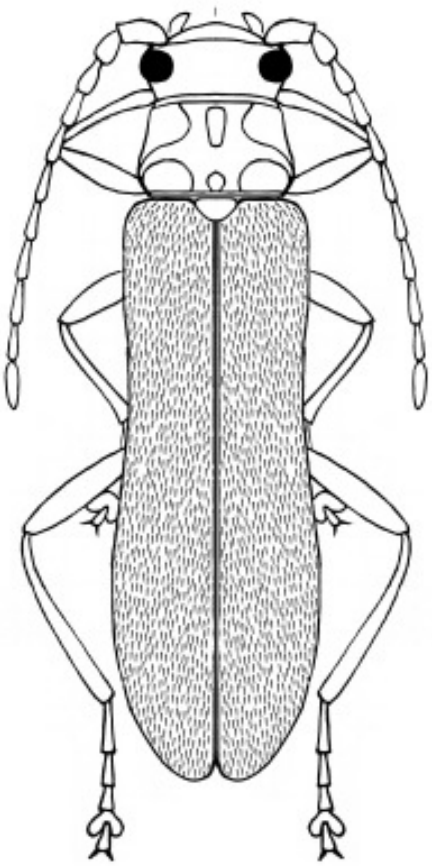

Fig. 6. *Mimoplatycis bicolor* n. sp., reconstruction

covered with short and thin recumbent pubescence and dense fine punctures. Hind wings present, partially visible.

Legs fairly long, thin; femora very feebly club-shaped, tibiae sub-linear; tarsi elongate, tarsomeres I - III sub-cylindrical, tarsomere IV strongly bilobed, much wider than previous ones (plantar pad); tarsomere I as long as II - III together; tarsomere V short, as long as tarsomere II or III; claws simple.
Aedeagus almost completely extruded.

Etymology. The specific name is derived from Latin *"bi-color"* = of two colours.

DISCUSSION

The genus *Malthodes* and other Malthininae are generally characterised by short elytra, which in *M. caenozoicus* n. sp. appears more reduced, while the hind wings are normal. In extant species, i.e. in *M. lobatus* Kiesenwetter, 1852, the brachelytry is limited to female, not to male as in the present case. Generally, Cantharidae tend to show brachypterous species in response to particular ecological conditions, e.g. high mountains, as it occurs to *Autosilis nitidula* (Fabricius, 1792), *Podistra rupicola* Kiesenwetter, 1863, *Rhagonycha alagoesa* (Reitter, 1893), *Lycocerus michiakii* Okushima & Brancucci, 2008 and *L. strictipennis* Y. Yang & X. Yang, 2011 (Okushima & Brancucci 2008). This corresponds to a mountain habitat assumed for some species found in Baltic amber, such as most Trichoptera (Ulmer 1912), the termite *Archotermopsis* (Rosen 1913) or the longhorn beetle *Nothorhina granulicollis* Zang, 1905 and other species (Vitali 2014, 2016, Vitali & Damgaard 2016).

Mimoplatycis shows a ridged pronotum that might mimic the family Lycidae. *Mimoplatycis bicolor* n. sp. supports this hypothesis showing an aposematic black-red coloration shared by many families of the Holocene (Lycidae, Elateridae, Tenebrionidae Alleculinae, Meloidae, Cerambycidae). As for the living species, it is possible to hypothesize a Müllerian-Batesian mimicry complex, whose members are still to be all recognised. In fact, exudates have been known in fossil Cantharidae since the Cretaceous (Poinar et al. 2007; Poinar & Fanti 2016) and they can be assumed toxic as diterpenes, acids and alkaloids present in extant species (Meinwald et al. 1968; Moore & Brown 1978; Eisner et al. 1981; Durvaux et al. 2007; Haritos et al. 2012).

Key to fossil Malthininae included in amber

1. Pronotum with H-shaped raised surface; male abdomen 6-segmented.....2.
-. Pronotum smooth; male with more abdominal segments.....3.
2. Body completely dark or with pronotal sides and elytra yellowish brown with black apex; basal angles of the pronotum prominent; 2.9 - 3.6 mm (Baltic and Rovno)..... .....*Mimoplatycis notha* Kazantsev, 2013
-. Head, pronotum and elytral base blackish, elytra reddish brown; basal angles of the pronotum rounded; 3.6 mm (Baltic)..... .....*Mimoplatycis bicolor* n. sp.
3. Elytra as long as abdomen or slightly shortened; antennae long; terminal urites little modified.....4.
-. Elytra shorter than abdomen; terminal urites modified (*).....5.
4. Pronotum rectangular, with distinct margins and slightly truncated apical angles; 2.4 mm (Baltic).....

.....*Macrocerus sucinopenninus* (Kuśka & Kania, 2010)

-. Pronotum cylindrical anteriorly narrowed; 3.2 mm (Baltic)..... .....*Malthinus danieli* Kuśka & Kania, 2010

5. Pronotum trapezoidal transverse, with pointed basal angles; elytra abbreviated, with caudal abdominal segments exposed; 2.5 mm (Burmese)..... ...*Archaeomalthodes rosetta* Hsiao, Slipiński & Pang, 2016

-. Pronotum without pointed posterior corners; elytra more abbreviated (*Malthodes*).....6.

6. Elytra short, not reaching the metatibiae; urotergite X trapezoidal, posteriorly enlarged; urosternite IX shortly elongated, large lobe-shaped, not-incised apically; 1.8 mm (Baltic).....*Malthodes caenozoicus* n. sp.

-. Elytra long, evidently surpassing the metatibiae.....7.

7. Urotergite X not incised apically..... 8.

-. Urotergite X slightly incised apically.....12.

8. Urosternite IX apically forked (Baltic).....9.

-. Urosternite IX widened at apex or emarginated 11.

9. Urotergite X in small lobe; urosternite IX elongated, not-curved; 2.7 mm..... …*Malthodes ceranowiczae* Kuśka & Kupryjanowicz, 2005

-. Urosternite IX elongated and curved.....10.

10. Urotergite X in elongated lobe; urosternite IX deeply forked; 2.8 mm..... .....*Malthodes sucini* Kuśka & Kania, 2010

-. Urotergite X in square-shaped lobe, urosternite IX less forked; 2.3/2.5 mm..... .....*Malthodes michalskii* Fanti, 2017

11. Urotergite X small and shallowly emarginated; urosternite IX slightly concave at sides, shallowly and broadly emarginated at apex; 2.5 mm (Rovno)..... …*Malthodes rovnoensis* Kazantsev & Perkovsky, 2014

-. Urotergite X long, blunt, slightly widened at apex; urosternite IX strongly elongated, widened at end; 3.4 mm (Baltic)..... …*Malthodes kotejai* Kuśka & Kupryjanowicz, 2005

12. Urotergite X elongated, parallel-sided with a triangular distal incision; urosternite IX very wide, with a broad rectangular distal incision; 3.4 mm (Rovno)..... .....*Malthodes perkovskyi* Kazantsev, 2010

Urotergite X twice as long as wide, with a shallow apical fork; urosternite IX the basal half arching towards the back, and apically strongly forked; 1.9 mm (Baltic)..... …*Malthodes serafini* Kuśka & Kupryjanowicz, 2005

*Light brown, abdomen and terminalia not visible..... …*Malthodes obtusus* Förster (Brunstatt brown coals)

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REFERENCES

Durvaux C., Laurent P., Daloze D., Braekman J.-C., Lupoli R., Dimarcq J.-L., Pasteels J. 2007. A new diterpene enone from the soldier beetle *Cantharis livida* (Coleoptera: Cantharidae). Arkivoc 10: 5-9.

Eisner T., Hill D., Goetz M., Jain S., Alsop D., Camazine S., Meinwad J. 1981. Antifeedant action of Z-dihydromatricaria acid from soldier beetles (*Chauliognathus* ssp.). Journal of Chemical Ecology 7 (6): 1149-1158.

Fanti F. 2017a. Catalogo Cantharidae fossili del mondo. Fossils & Minerals Review 2: 1-18.

Fanti F. 2017b. *Malthodes michalskii*: a new species of Cantharidae from Baltic amber (Coleoptera). Giornale italiano di Entomologia 14 (62): 685-690.

Förster B. 1891. Die Insekten des "Plattigen Steinmergels" von Brunstatt. Abhandlungen zur Geologischen Specialkarte von Elsass-Lothringen 3 (5): 335-593 + Tab. XI-XVI.

Giebel C.G.A. 1852. Deutschlands Petrefacten. Ein systematisches Verzeichniss aller in Deutschland und den angrenzenden Ländern vorkommenden Petrefacten nebst Angabe der Synonymen und Fundorte. Abel A. Verlag, Leipzig, XIII + 706 pp.

Haritos V.S., Horne I., Damcevski K., Glover K., Gibb N., Okada S., Hamberg M. 2012. The convergent evolution of defensive polyacetylenic fatty acid biosynthesis genes in soldier beetles. Nature Communications 3 (1150), DOI: 10.1038/ncomms2147.

Hsiao Y., Ślipiński A., Deng C., Pang H. 2016. A new genus and species of soldier beetle from Upper Cretaceous Burmese amber (Coleoptera, Cantharidae, Malthininae). Cretaceous Research 69 (2017): 119-123.

Hope F.W. 1836. Observations on Succinic Insects. The Transactions of the Entomological Society of London 1: 133-147.

Kazantsev S.V. 2010. New *Malthodes* (Insecta: Cantharidae: Coleoptera) from the Rovno amber (Upper Eocene of Ukraine). Russian Entomological Journal 19: 105-107.

Kazantsev S.V. 2013. New taxa of Baltic amber soldier beetles (Insecta: Coleoptera: Cantharidae) with synonymic and taxonomic notes. Russian Entomological Journal 22: 283-291.

Kazantsev S.V., Perkovsky E.E. 2014. A new *Malthodes* and some other interesting soldier beetles (Coleoptera: Cantharidae) from Late Eocene Rovno amber. Russian Entomological Journal 23: 113-116.

Klebs R. 1910. Über Bernsteineinschlüsse im Allgemeinen und die Coleopteren meiner Bersteinsammlung. Schriften der Physikalisch ökonomischen Gesellschaft zu Königsberg 51: 217-242.

Kuśka A., Kania I. 2010. New soldier beetles (Coleoptera, Cantharidae) from the Eocene Baltic amber. Zootaxa 2400: 49-56.

Kuśka A., Kupryjanowicz J. 2005. Soldier beetles (Coleoptera: Cantharidae) from Baltic amber. Polskie Pismo Entomologiczne 74: 309-316.

Meinwald J., Meinwald Y.C., Chalmers A.M., Eisner T. 1968. Dihydromatricaria acid: acetylenic acid secreted by soldier beetle. Science 160: 890-892.

Moore B.P., Brown W.V. 1978. Precoccinelline and related alkaloids in the Australian soldier beetle, *Chauliognathus pulchellus* (Coleoptera: Cantharidae). Insect Biochemistry, 8 (5): 393-395.

Motschulsky V.I. 1857. Voyages. Lettre de M. de Motschulsky ą M. Ménétriés. N. 4. Études Entomologiques, V année, Imprimerie de la Société de Littérature Finnoise, Helsingfors, pp. 21-38.

Okushima Y., Brancucci M. 2008. A remarkable new species of the genus *Lycocerus* Gorham, 1889 from Laos and Vietnam (Coleoptera, Cantharidae). Entomologica Basiliensia et Collectionis Frey 30: 41-47.

Poinar Jr. G.O., Fanti F. 2016. New fossil soldier beetles (Coleoptera: Cantharidae) in Burmese, Baltic and Dominican amber. Palaeodiversity 9: 1-7.

Poinar Jr. G.O., Marshall C.J., Buckley R. 2007. One Hundred Million Years of Chemical Warfare by Insects. Journal of Chemical Ecology 33 (9): 1663-1669.

Rosen K. von. 1913. Die fossilen Termiten: Eine kurze Zusammenfassung der bis jetzt bekannten Funde. In: Jordan K., Eltringham H. (eds.): Transactions of the 2nd International Congress of Entomology, Oxford, August 1912. Vol. 2. Hazell, Watson & Viney, London & Aylesbury, pp. 318-335 + Tab. XXVI-XXXI.

Ulmer G. 1912. Die Trichopteren des baltischen Bernsteins. Beiträge zur Naturkunde Preussens 10: 1-380.

Vitali F. 2014. New fossil cerambycids (Coleoptera: Cerambycidae) from Baltic amber belonging to the collection Hoffeins. Baltic Journal of Coleopterology 14 (1): 103-112.

Vitali F. 2016. *Eurapatophysis groehni* n. gen. and n. sp. (Coleoptera: Cerambycidae) from Baltic amber: the first fossil member of the tribe Apatophyseini Lacordaire, 1869. Baltic Journal of Coleopterology 16 (2): 117-122.

Vitali F., Damgaard A.L. 2016. *Dicentrus mehli* sp. n. (Coleoptera: Cerambycidae) implies close trophic association between Opsimini and *Calocedrus*, dating the Baltic amber back to the Early Oligocene. Baltic Journal of Coleopterology 16 (1): 37-43.

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