

New fossil Malthodes Kiesenwetter, 1852 of the subgenus Libertimalthodes Kupryjanowicz & Fanti, 2019 from Baltic amber (Coleoptera: Cantharidae)

Author: Fanti, Fabrizio

Source: Palaeodiversity, 12(1): 65-68

Published By: Stuttgart State Museum of Natural History

URL: https://doi.org/10.18476/pale.v12.a5

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at <u>www.bioone.org/terms-of-use</u>.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

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.

K e y w o r d s : 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 elvtra, 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 $17 \times 9 \times 3 \text{ mm}$, 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 (Wrocłav, 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).

H o l o t y p e : Male, in Baltic amber, deposited at the Illinois Natural History Survey, accession No. INHSP-10327.

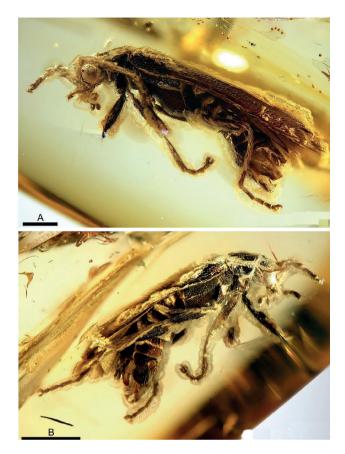


Fig. 1. *Malthodes (Libertimalthodes) spaceae* sp. nov., Baltic amber, holotype (INHSP-10327); A: dorso-lateral view. Bar = 0.5 mm; B: dorso-lateral view. Bar = 1.0 mm.

Type locality: Russia, Sambian Peninsula, Kaliningrad 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 elvtral 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, elvtra 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 halflength of elvtra; 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 sparce 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.

S y n i n c l u s i o n s : Many stellate hairs, wood remains, botanical fragments of unclear origin and air bubbles (gas vesicles). No accompanied fauna.

R e m a r k s: 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, ŚLIPIŃSKI & 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 elvtra 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.

Acknowledgements

I am grateful to MARIUS VETA (Palanga, Lithuania) and ARTUR R. MICHALSKI (Wrocław, Poland) for the photographs and for having found the specimen. Special thanks to SIMONA SPAZIANI for suggestions, and to SAM W. HEADS, M. JARED THOMAS and the Illinois Natural History Survey for advice and taking into custody the Holotype. My heartfelt thanks also go to the reviewers SAM W. HEADS (University of Illinois at Urbana-Champaign) and VITALII I. ALEKSEEV (Kaliningrad State Technical University).

5. References

- BÖVING, A. G. & CRAIGHEAD, F. C. (1931): An illustrated synopsis of the principal larval forms of the order Coleoptera. Entomologica Americana, new series, 11 [1930] (1), 1–80, (2), 81–160, (3), 161–256, (4), 257–351. [(1): publ. 14 Nov. 1931; (2): 7 Dec.; (3): 9 Dec.; (4): 21 Dec. 1931 (wrappers)].
- BRANCUCCI, M. (1980): Morphologie comparée, évolution et systématique des Cantharidae (Insecta: Coleoptera). – Entomologica Basiliensia, 5: 215–388.

- BURLEIGH, R. & WHALLEY, P. (1983): On the relative geological ages of amber and copal. Journal of Natural History, **17** (6): 919–921.
- DELKESKAMP, K. (1977): Coleopterorum Catalogus Supplementa. Pars 165 (Fasc. I), Cantharidae: 485 pp.; The Hague (W. Junk).
- FAIRMAIRE, L. (1875): Coléoptères de la Tunisie Récoltés par M.^r Abdul Kerim. – Annali del Museo Civico di Storia Naturale di Genova, 7: 475–540.
- FANTI, F. (2017): Catalogo Cantharidae fossili del mondo. Fossils & Minerals Review, 2: 1–18 [abbreviated Italian version, available: 12 March 2017] / World catalog of fossil Cantharidae. Fossils & Minerals Review, 2 (Special Issue): 1–52 [extended English version, available: 25 May 2017].
- FANTI, F. & MICHALSKI, A. R. (2018): An unusual fossil Malthodes with long elytra (Insecta Coleoptera Cantharidae). – Giornale italiano di Entomologia, 15 (63): 127–132.
- GOIDANICH, A. (1954): Cantaridi (Cantharidae o Telephoridae). Enciclopedia Agraria Italiana, 2: 85.
- HENTZ, N. M. (1830): Remarks on the use of the Maxillae in Coleopterous Insects, with an Account of two Species of the Family Telephoridae, and of three of the Family Mordellidae, which ought to be the Type of two distinct Genera. – Transactions of the American Philosophical Society, New Series, 3: 458–463.
- 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. [http://dx.doi. org/10.1016/j.cretres.2016.09.002].
- IMHOFF, L. (1856): Versuch einer Einführung in das Studium der Koleoptern. xxxi + [2] + 114 + [2] + 272 pp.; Basel (Schweighauser).
- KAZANTSEV, S. V. & BRANCUCCI, M. (2007): Cantharidae. In: LÖBL, I. & SMETANA, A. (eds.): Catalogue of Palaearctic Coleoptera. Vol. 4, Elateroidea, Derodontoidea, Bostrichoidea, Lymexyloidea, Cleroidea, Cucujoidea: 234–298; Stenstrup (Apollo Books).

- KIESENWETTER, E. A. H. v. (1852): Beiträge zu einer Monographie der Malthinen. Linnaea entomologica, 7: 239–324.
- KOCHER, L. (1956): Catalogue commenté des Coléoptères du Maroc. Fascicule III Malacodermes – Serricornes. – Travaux de l'Institut Scientifique Chérifien, Série Zoologie, 8: 153 pp.
- KUPRYJANOWICZ, J. & FANTI, F. (2019): New subgenus and three new species of soldier beetles from the Eocene of Baltic amber. – Palaeontologia Electronica, 22.2.22A: 1–13. [https://doi.org/10.26879/895].
- LECONTE, J. L. (1861): Classification of the Coleoptera of North America. Prepared for the Smithsonian Institution. Part I. – Smithsonian Miscellaneous Collections, **136**: xxiv + 1–214 + 209–286.
- LECONTE, J. L. (1881): Synopsis of the Lampyridae of the United States. Transactions of the American Entomological Society, **9**: 15–72.
- MISKIMEN, G. W. (1961): A new family of beetles found in the Cantharoidea. The Coleopterists' Bulletin, **15** (1): 17–25.
- SHI, G., GRIMALDI, D. A., HARLOW, G. E., WANG, J., YANG, M., LEI, W., LI, Q. & LI, X. (2012): Age constraint on Burmese amber based on U-Pb dating of zircons. – Cretaceous Research, 37: 155–163. [doi:10.1016/j.cretres. 2012.03.014].
- 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.
- WEITSCHAT, W. & WICHARD, W. (2010): Baltic amber. In: PENNEY, D. (ed.): Biodiversity of fossils in Amber from the major world deposits: 80–115; Manchester (Siri Scientific Press).
- WOLFE, A. P., TAPPERT, R., MUEHENBACHS, K., BOUDREAU, M., MCKELLAR, R. C., BASINGER, J. F. & GARRETT, A. (2009): A new proposal concerning the botanical origin of Baltic amber. – Proceedings of the Royal Society of London, (B), 276 (1672): 3403–3412.

Address of the author

FABRIZIO FANTI, Via del Tamburino 69, I-53040 Piazze (SI), Italy; e-mail: fantifab@alice.it

Manuscript received: 7 January 2019, revised version accepted: 6 May 2019.