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The first species of *Cantharis* from Ukrainian Rovno amber (Coleoptera, Cantharidae)

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Abstract

Cantharis michaeli **sp. nov.** is described and illustrated from Upper Eocene Rovno amber from Ukraine. This is the first fossil *Cantharis* (soldier beetles, Cantharidae) from this deposit. The new species is compared with other fossil species of the genus *Cantharis*. It is similar to *C. raeorum* Fanti & M. G. Pankowski, 2020, but *C. michaeli* **sp. nov.** has a larger body, shorter antennae, and slight differences in both its antennae and pronotum. A review is provided of other soldier beetles found in Rovno amber, as well as a brief overview of the paleoenvironment where this amber formed—an area that included extensive forests, large rivers, and warm temperatures.

Key words: succinite, Eocene, paleoentomology, new taxon, soldier beetle

Introduction

Rovno amber, also known as Rivne amber or Ukrainian amber, is referred to the Priabonian stage, 33.9–37.71 Ma, and thus is coeval with the more well-known Baltic amber (Perkovsky *et al.* 2010). The major explorations and mining of Rovno amber began in the 1990s, even though it was known since the Palaeolithic and Neolithic (Perkovsky *et al.* 2010). Most amber from the Rovno region comes from the Klesiv (Klesov) deposit, where it is mined from the Pugach quarry, and also is found in the Dubrovitsa and Vladimirets deposits in Ukraine. A minor portion comes from the Volnoje area northwest of Klesiv, Zolotoje, Vyrka, and Kuchotskaya Volia in Ukraine (Perkovsky *et al.* 2003, 2010; Perkovsky 2017). Other pieces come from Olevsk, Barashi, and Gulyanka in the Zhitomir (Zhytomyr) region in Ukraine, and Rovno amber is also found in Rechitsa in the Gomel region of Belarus, 7 km from the Ukrainian border (Perkovsky *et al.* 2003; Perkovsky 2017).

Previously, only four species of soldier beetles (family Cantharidae) were known from Rovno amber: *Cacomorphocerus meridionalis* Kazantsev & Perkovsky, 2020; *Malthodes* (*Malthodes*) *perkovskyi* Kazantsev, 2010; *Malthodes* (*Malthodes*) *rovnoensis* Kazantsev & Perkovsky, 2014; and *Mimoplatycis notha* Kazantsev, 2013, a species originally described from Baltic amber (Kazantsev, 2013; Kazantsev 2010, 2013; Kazantsev & Perkovsky 2014, 2020). All three of these genera were also found in Baltic amber, with *Cacomorphocerus* Schaufuss, 1892 and *Mimoplatycis* Kazantsev, 2013 known only as fossils (Kazantsev & Perkovsky 2014, 2020; Fanti 2017; Fanti & Vitali 2017; Kazantsev 2013; Bukejs *et al.* 2019; Fanti & Pankowski 2019; Parisi & Fanti 2019; Poinar & Fanti 2019).

Here we describe the first species of the genus *Cantharis* Linnaeus, 1758 from Rovno amber.

Material and methods

The described specimen is embedded in a piece of greenish yellow amber from the Rovno (Rivne) region, Ukraine. Rovno amber is currently considered coeval with Baltic and Bitterfeld ambers. Our examination was made using

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a Carton stereomicroscope 0.8–40x. Photographs were taken with a Canon EOS 70D camera and Canon MP-E 65 mm macro lens. The plate was processed using a PhotoImpact Viewer SE program. The holotype is preserved in the Smithsonian National Museum of Natural History (USNM) in Washington, DC, USA.

Systematic paleontology

Family Cantharidae Imhoff, 1856

Subfamily Cantharinae Imhoff, 1856

Tribe Cantharini Imhoff, 1856

Genus *Cantharis* Linnaeus, 1758

Cantharis (*Cantharis*) *michaeli* FANTI & M. G. PANKOWSKI sp. nov.

(Fig. 1)

Description. Female, based on short antennae, penultimate sternite wide, and last sternite small and rounded. Body length: about 9 mm. Body entirely dark brown.

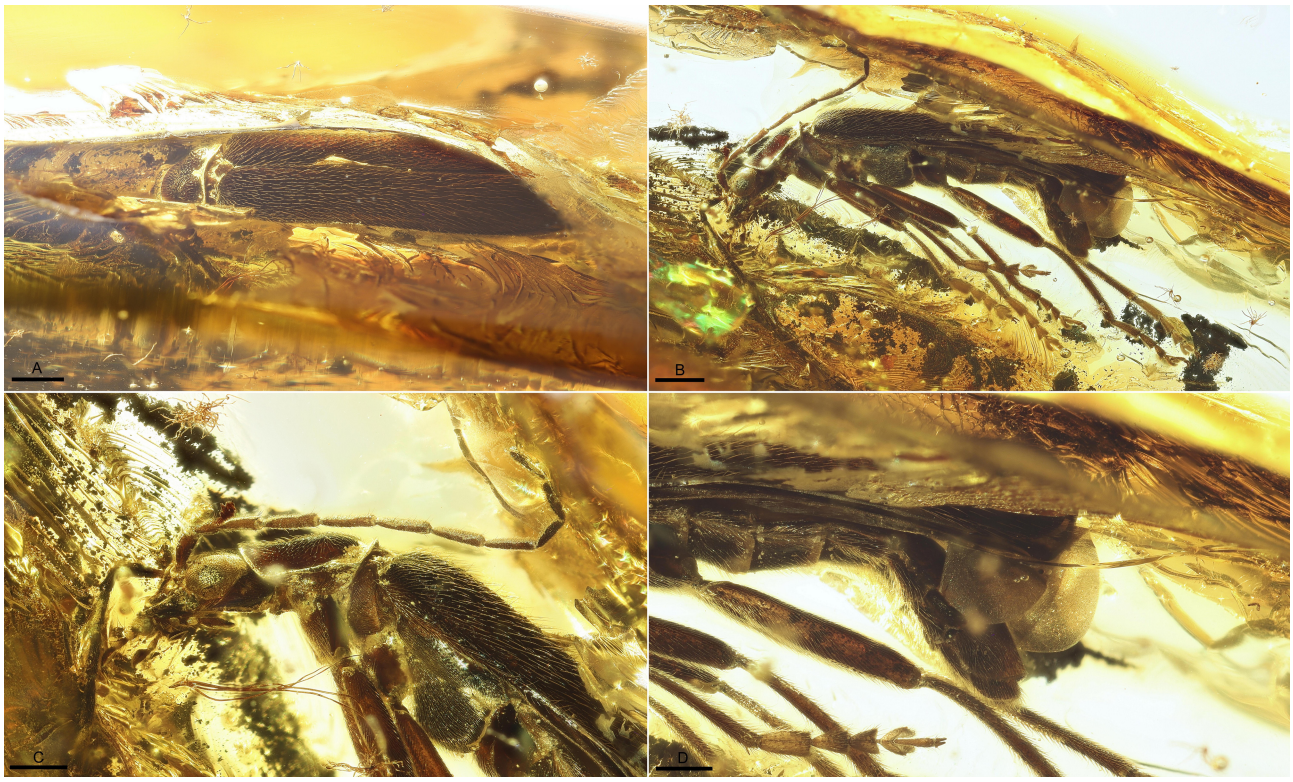

FIGURE 1. *Cantharis* (*Cantharis*) *michaeli* **sp. nov.** in Rovno amber (USNM PAL 787822). A: Holotype, dorsal view, scale bar = 1.0 mm; B: Holotype, lateral view, scale bar = 1.0 mm; C: Holotype, detail of head and pronotum (lateral view), scale bar = 0.5 mm; D: Holotype, detail of last abdominal segments (lateral view), scale bar = 0.5 mm.

Head partially covered by pronotum, wide, transverse, wrinkled, with shallow punctuation. Eyes large, convex, prominent, located in upper lateral part of the head. Mandibles elongate, robust, falciform, without any tooth. Maxillary palpi 4-segmented, with the last palpomere securiform. Labial palpi 3-segmented. Antennae 11-segmented, short, reaching to about half of elytra, filiform, pubescent and adorned with sparse setae; scape very robust, club-shaped; antennomere II short, about 1.2–1.3 times shorter than scape; antennomere III filiform,

elongate, about 1.1–1.2 times longer than second; antennomeres IV–VII subequal, slightly longer than antennomere III; antennomere VIII very slightly shorter and more slender than previous ones; antennomeres IX–X subequal, slightly shorter than previous one; antennomere XI long, slender, rounded at apex. Pronotum transverse, wider than head, equipped with scattered and long setae, anterior margin rounded slightly bordered, sides straight and bordered, posterior margin almost straight and strongly bordered, surface not flat and convex in the middle, anterior corners rounded, posterior corners very slightly pointed. Scutellar shield triangular with rounded apex, slightly pubescent. Elytra wider than pronotum, elongate, not covering the last abdominal segment, parallel-sided, equipped with sparse and very long setae, rounded at apex, surface smooth. Hind wings longer than elytra, infuscate. Sternum elongate, convex posteriorly, with pubescence. Abdominal ventrites transverse, equipped with very sparse and rather long setae, penultimate sternite wide and rounded, ultimate sternite and tergite very small and rounded. Legs covered with long pubescence, rather long and robust; coxae robust and rounded; trochanters very small, pointed apically; femora cylindrical and slightly compressed, rather straight; pro- and mesotibiae shorter than pro- and mesofemora, metatibiae as long as metafemora, tibiae curved and cylindrical with an evident spur at apex that is thin, pointed, and slightly curved. Tarsi 5-segmented, equipped with long setae; first tarsomere elongate, very robust; second tarsomere shorter than first tarsomere; tarsomere III slightly shorter than second, rather lobed at sides; tarsomere IV strongly bilobed; tarsomere V thin and elongate; claws simple with a small and obtuse basal tooth.

Etymology. Species named in honor of Michael Pankowski, older brother of the second author who inspired him to improve each day in mind, body, and spirit.

Holotype. Female, inclusion in Rovno amber, housed at the Smithsonian National Museum of Natural History, USNM PAL 787822.

Type locality. Ukraine, Rivne Oblast (Rovno province), mine unknown.

Type horizon. Upper Eocene, Priabonian stage (33.9–37.71 Mya).

Syninclusions. Air bubbles, stellate hairs, and botanical remains.

Systematic placement. The securiform last maxillary palpomere, filiform 11-segmented antennae, the pronotum without lateral lobes or teeth, third bilobed tarsomere, and the claws simple with a basal obtuse tooth reliably place the new species in the genus *Cantharis* and its nominotypical subgenus (Brancucci 1980; Constantin 2014).

Differential diagnosis. No *Cantharis* has been documented from Rovno amber until this discovery. Ten species of *Cantharis* are known from Baltic amber (Fanti 2017; Fanti & Pankowski 2020), two as compression fossils from the Oligocene of Enspel, Germany (Fanti & Poschmann 2019), and seven from the Oligocene of Rott, Germany (Heyden & Heyden 1866; Fanti 2017; Fanti & Walker 2019). Furthermore, two species from the Miocene deposit of Oeningen, Germany, and one taxon from the Miocene deposit of Radoboj, Croatia (Heer 1847, 1865; Fanti 2017), are known.

Among all these, the species most similar to *Cantharis michaeli* **sp. nov.** is *Cantharis raeorum* Fanti & M. G. Pankowski, 2020. *C. raeorum* differs based on its smaller size at 5.8 mm, longer antennae, the second antennomere shorter and more globular, and its pronotum that is less convex in the middle (Fanti & Pankowski 2020).

Remarks. The piece of greenish yellow amber, shaped like a drop, measures approximately 40x22x8 mm. The inclusion is complete. The surface of the piece has some oxidation.

Discussion

Rovno amber is currently considered coeval (Eocene) with Baltic and Bitterfeld ambers. Although the three types of amber have different geological origins, compositions, and paleogeographic provenances (Perkovsky *et al.* 2010; Wolfe *et al.* 2015), it is possible to find extremely similar fauna and flora among them (Alekseev 2017), and sometimes even the same taxa. The family Cantharidae certainly confirms this trend, with at least one extant genus, *Malthodes* Kiesenwetter, 1852, present in all three types of amber (Kazantsev 2010; Kazantsev & Perkovsky 2014; Fanti 2017, 2019); and one extinct genus, *Cacomorphocerus* Schaufuss, 1892, and one fossil species, *Mimoplatycis notha* Kazantsev, 2013, known from both Baltic and Rovno ambers (Kazantsev 2013; Kazantsev & Perkovsky 2014; Fanti 2017). Based on these finds, it is evident that environmental conditions were fairly uniform during the Eocene in most of Northern Europe, with extensive forests, large rivers, and warm temperatures (Fuhrmann 2005, 2008; Standke 2008; Perkovsky *et al.* 2010; Alekseev 2017; Sadowski 2017). As Alekseev (2017) noted, the presence of climate-restricted genera can be considered of primary importance for a paleoreconstruction. However,

Cantharis Linnaeus, 1758 and *Malthodes* Kiesenwetter, 1852, the two living genera found in Rovno amber, are ubiquitous and euryecious. Their species are found in warm areas as well as at high altitudes and in colder climates, demonstrating that they are capable of living and thriving in the most disparate and varied ecological conditions. It is therefore important to consider all species known, not just a sample, to create the most accurate paleoreconstruction possible.

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