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A NEW FOSSIL *SUCINORHAGONYCHA* (COLEOPTERA: CANTHARIDAE) FROM BALTIC AMBER WITH VISIBLE FEMALE GONOSTYLI

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Abstract: *Sucinorhagonycha carsteni* sp. nov. from the Baltic amber deposits of Yantarny, Kaliningrad Region, Russia, is described and diagnosed in this paper. It is the first confirmed species of Cantharidae Cantharinae with visible female gonostyli. Until now, gonostyli were visible only in the fossil material of a species from Cretaceous Burmese (Kachin) amber which was attributed, with doubts, to the subfamily Malthininae.

Key words: fossil resin, Eocene amber, soldier beetle, palaeoentomology, ovipositor

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Introduction

Sucinorhagonycha Kuśka, 1996 is a small Eocene genus known only in the fossil state from the Baltic amber deposits of the Yantarny mine, Kaliningrad Region, Russia, a horizon referred to the Lutetian-Priabonian stage. Only five species have been described so far (Kuśka 1996, Kubisz 2000, Kazantsev 2013, Fanti 2017, Fanti and Pankowski 2018, Kazantsev 2020, Pankowski 2023, Pankowski and Fanti 2023). The genus is characterized by filiform antennae with 12 antennomeres, the latter character present only in the related genus *Cacomorphocerus* Schaufuss, 1892 and in very few species of two extant genera (Fanti and Pankowski 2018). Furthermore, antennae with 12 antennomeres are visible in the fossil species *Chauliognathus pristinus* Scudder, 1876; however, this specimen is not well preserved and therefore doubts remain about the real number of antennomeres and the generic assignment (Carpenter 1992, Fanti 2017). The close phylogenetic relationships with the genus *Rhagonycha* Eschscholtz, 1830 are only apparent and probably not genuine, limited only to the third tarsomere being simple and not emarginated at the apex, to the insertion of the fourth tarsomere apical, and to the pronotum unrounded laterally and sometimes slightly anteriorly constricted. The Holarctic genus *Rhagonycha*, also known in the fossil stage (Kazantsev 2013, Fanti 2017), has bifid claws (Fitton 1973, Pelletier and Hébert 2014), while the claws of the genus *Sucinorhagonycha* are simple, without teeth or lobes (Pankowski and Fanti 2023).

The higher systematics of the family Cantharidae at genus level has relied heavily on claw structure and not enough on the aedeagical characters (Fanti 2022b), which in contrast can be decisive and diagnostic between related genera (Yang et al. 2022). The female reproductive system has been the subject of very few studies but has proven to be extremely important for the systematics of the family (Brancucci 1980). However recently we have relied mainly on studies of only the oviduct and spermatheca of the genus *Lycocerus* Gorham, 1889 (e.g., Wang et al. 2023, Yang et al. 2014).

Material and methods

The specimen is embedded in a piece of Baltic amber from the Sambian Peninsula, Kaliningrad region, Russia. The piece was cut and polished to provide a better view of the inclusion. Photographs were taken by Aleksej Damzen (Vilnius, Lithuania) with a Canon EOS 70D camera and Canon MP-E 65mm macro lens. The plate was processed using a PhotoImpact Viewer SE program. The following acronyms are used in this paper: GPIH — Geological-Paleontological Institute of Hamburg University; CCGG — Collection Carsten Gröhn, Glinde; JDC — Jonas Damzen Collection.

Systematic palaeontology

Family Cantharidae Imhoff, 1856
Subfamily Cantharinae Imhoff, 1856
Tribe Cacomorphocerini Fanti et Kupryjanowicz, 2018

Genus *Sucinorhagonycha* Kuśka, 1996

***Sucinorhagonycha carsteni* Fanti sp. nov.**
Text-fig. 1

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Holotype. Female, inclusion in Baltic amber, housed at the GPIH (Germany) with the identification number GPIH no. 5090, CCGG no. 8696 (ex Jonas Damzen Collection JDC12143), Text-fig. 1.

Etymology. Species named in honor of Carsten Gröhn, a well-known German amber collector.

Type locality. Amber mine near Yantarny settlement, Sambian Peninsula, Kaliningrad region, Russia.

Type horizon. Sediments containing Baltic amber.

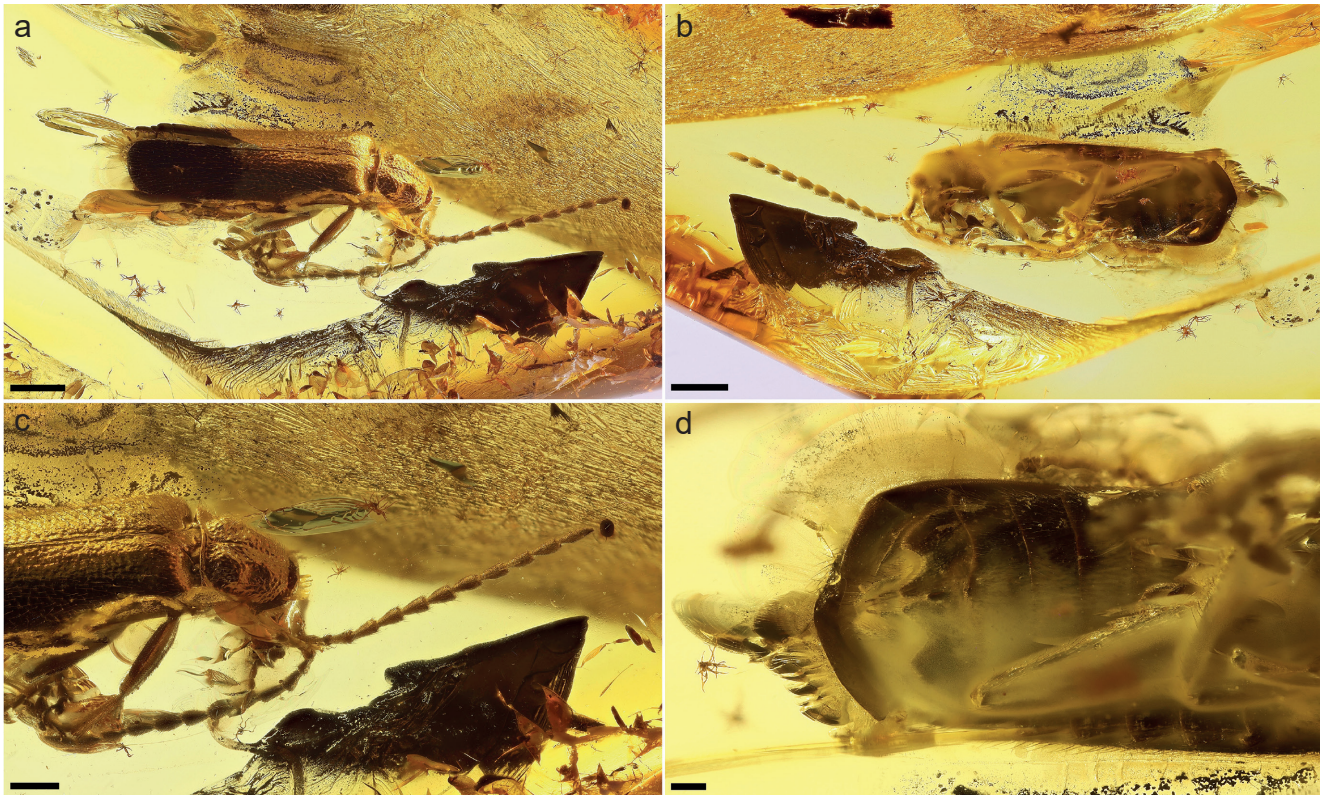
Age. Middle Eocene (Lutetian) (47.8–41.2 Ma) to late Eocene (Priabonian) (37.8–33.9 Ma).

Diagnosis. Soft bodied soldier beetle with prognathous head, last maxillary palpomere securiform, 12-segmented antennae that are filiform without modified antennomeres and without rami, pronotum elongated without lobes on the sides, long smooth elytra without costae, tarsal formula 5-5-5, and simple claws without lobes or denticles.

Comparison. *Sucinorhagonycha maryae* M.G. Pankowski et Fanti, 2023 has a flat and transverse pronotum (Pankowski and Fanti 2023); the pronotum of *S. samsockorum* Fanti et M.K. Pankowski, 2018 has a clearly raised area in the center (Fanti and Pankowski 2018); *S. groehni* Kazantsev, 2020 has a pronotum with somewhat produced anterior margin and prominent posterior bulges (Kazantsev 2020); and in *S. kulickae* Kuśka, 1996 the pronotum has a conspicuous central linear depression extending from anterior to posterior margin and distinct protuberances on both sides (Kuśka 1996, Kubisz 2000). *S. fabrizioi* M.G. Pankowski, 2023 presents a pronotum with a clearly bulged area near the middle (Pankowski 2023). The new species *S. carsteni* is therefore well differentiated because it does not have any of these combinations of characters.

Description. Adult, winged, elongated. Female, defined on the basis of its rounded last sternite and visible ovipositor (gonostyli). Body length 5.7 mm: abdomen (elytra) 3.9 mm; thorax 1.1 mm; head 0.7 mm. Antenna 3.4 mm. Body entirely dark brown.

Head slightly elongated, prognathous, not completely exposed, transverse, with shallow punctation and short setae. Eyes rounded, small, convex, inserted in the lateral part of the head. Mandibles robust, elongated, falciform. Maxillary palps 4-segmented and segments unequal in length; last palpomere securiform, elongated, rounded apically. Labial palps 3-segmented; last palpomere elongated, securiform. Antennae 12-segmented, filiform, inserted dorsally and between eyes, relatively short, extending beyond half of the elytra, all segments pubescent; antennomere I (scape) robust, elongated, slightly club-shaped; antennomere II robust, short; antennomere III robust, sturdier and about 1.4 times longer than the second; antennomere IV slightly thinner and slightly longer than antennomere III; antennomeres V–X subequal, slightly shorter than previous one, enlarged at external margin; antennomere XI elongated-rounded; antennomere XII elongated, rounded at apex. Pronotum longer than wide, very slightly wider than the head, corners rounded, posterior margin almost straight and with prominent border, anterior margin rounded and with delicate border, surface rather flat and with very small bulged areas in the posterior part, and



Text-fig. 1. ***Sucinorhagonycha carsteni*** **Fanti sp. nov., Baltic amber, holotype (GPIH no. 5090, CCGG no. 8696). a: Dorsal view, scale bar 1.0 mm. b: Ventral view, scale bar 1.0 mm. c: Detail of antennae, scale bar 0.5 mm. d: Detail of last sternites with gonostyli, scale bar 0.3 mm (© Jonas & Aleksej Damzen).**

with a transverse depression following the bulged areas and reaching the posterior margin, surface with punctation and strongly pubescent. Scutellar shield triangular-shaped, wide basally with rounded apex. Elytra very elongated, slender, parallel-sided, completely covering the last abdominal segments, wider than pronotum, apex rounded, surface equipped with long setae and slightly wrinkled. Posterior wings completely covered by elytra. Metasternum elongated, posteriorly slightly rounded; sternites and tergites wide, narrow, slightly punctate, pubescent; last sternite wide, narrow and strongly transverse, with apical margin undulate, equipped with two short central lobes, very robust and obtuse apically; ovipositor with two visible very thin, long and well-developed gonostyli. Legs short, massive, strongly pubescent; coxae massive; trochanters elongated; femora cylindrical, enlarged and slightly curved; tibiae shorter than femora, cylindrical, thin. Tarsi 5-segmented and with setae; first tarsomere elongated and very robust, about 2.0 times longer than second; second tarsomere short and robust; third tarsomere shorter than second; fourth tarsomere strongly bilobed at sides with the lobes very long and obtuse apically; fifth tarsomere very elongated, thin, strongly curved; claws simple, long, curved, and without lobes or denticles. Male unknown.

Remarks. The yellow amber piece measures approximately 41 × 20 × 8 mm. The inclusion is complete and clearly visible. It has white emulsion only on the ventral side.

Syninclusions. Air bubbles, plant remains, stellate hairs, *Trichoneura* sp. (Diptera Limoniidae).

Discussion

The reproductive systems — the male's aedeagus and the female's ovipositor — are rarely found in fossil beetles of the family Cantharidae (soldier beetles) preserved as inclusions in amber or adpressions / compressions in rocks (Fanti 2019, Fanti and Walker 2019). The ovipositor, in particular, is extremely rarely found. In fact, until now only one specimen was known to have the ovipositor with long gonostyli clearly visible (Li et al. 2022), the species *Nothotytthonyx serratus* Li, Biffi, Kundrata et Cai, 2022 was recently recovered from a Cretaceous Burmese (Kachin) amber piece and attributed to the subfamily Malthininae Kiesenwetter, 1852 (Li et al. 2022), and more recently to the new tribe Nothotytthonychini Fanti, 2022 (Fanti 2022a). This specimen of *Nothotytthonyx serratus* has a long gonostyli, a relatively aberrant feature in the subfamily Malthininae (Li et al. 2022) but typical in the subfamily Cantharinae (Brancucci 1980), suggesting an uncertainty in the taxonomic attribution of this fossil. Another specimen belonging to the genus *Sucinorhagonycha* Kuśka, 1996, once thought to be the female of *Sucinorhagonycha kulickae* Kuśka, 1996 (Kubisz 2000) but according to Pankowski and Fanti (2023) is actually a different species, has its ovipositor partially visible in an incision in the last abdominal segments (Kubisz 2000). *Sucinorhagonycha carsteni* sp. nov. is therefore the first unquestionable species of the subfamily Cantharinae found in any amber with the gonostyli clearly visible and well developed, suggesting and confirming the correct attribution of *Sucinorhagonycha* and other related genera to the subfamily Cantharinae (Kuśka 1996, Kazantsev 2013, 2018, 2020, Fanti 2017, Fanti and Kupryjanowicz 2018, Fanti and Pankowski 2019, Pankowski 2023).

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