

A new genus of Cantharidae from Eocene Baltic amber found in Poland, with phoretic mites

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Arturmiles pankowskiarum gen. et sp. nov. (Insecta, Coleoptera, Cantharidae) from Eocene Baltic amber is described and illustrated here. The new taxon, discovered in amber found in Poland, has intermediate characters between the Holarctic realm genera *Podistra* and *Rhagonycha*. In addition, some phoretic Acarina are present along the beetle's body — only the second time phoretic Acarina have been documented on a fossil soldier beetle.

Key words: resin, fossil, Tertiary, palaeontology, soldier beetle.

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INTRODUCTION

Baltic amber has revealed a new genus of soldier beetles that is intermediate between *Rhagonycha* and *Podistra*, both of which are Holarctic genera and already known from Baltic amber (Yablokov-Khnzorian 1960; Poinar & Fanti 2016; Fanti & Damgaard 2018, 2020; Fanti & Pankowski 2018; Fanti 2020; Kazantsev 2020).

The genus *Rhagonycha* is common and known from more than 300 taxa (Delkeskamp 1977; Kazantsev & Brancucci 2007), while *Podistra* has far fewer species with some considered *incertae sedis* (Ramsdale 2002; Kazantsev & Brancucci 2007; Fanti 2021). Baltic amber has yielded countless fossil soldier beetles (Cantharidae), often with new genera that are extinct, sometimes with new lineages (Kazantsev 2013; Fanti & Damgaard 2018; Fanti & Kupryjanowicz 2018).

The fossil soldier beetles found tend to be single individuals, and there are only a few cases where

two specimens have been discovered embedded in the same amber piece (Fanti & Kupryjanowicz 2017; Parisi & Fanti 2020). No traces of pollen or predation have so far been identified in the various specimens, and rarely have soldier beetles been found mating (Wichard & Weitschat 2004; Weitschat 2009; Wichard & Greven 2009). Only in one case has a single Acarina been found on a fossil soldier beetle — discovered on *Rhagonycha acarigera* Kazantsev, 2020, attached to one of its sternites (Kazantsev 2020). The new species has five mites that are here considered as phoretic.

MATERIAL AND METHODS

Baltic amber is currently referred to the Middle Eocene climatic optimum with sedimentation in two different stages: 1) the Bartonian (mostly) and Priabonian, about 45.0–38.0 Mya (Bukejs et al. 2019); and 2) traditionally referred to the Priabonian, Prussian Formation, “Blue Earth-

Blauer Erde" sediment, 38.0–35.6 Mya. The specimen studied here came from the Gdańsk Bay (Poland). The amber piece has been cut and polished, and then examined with a Carton stereomicroscope with $\times 8$ – $\times 40$ magnification range. Photographs were taken by Artur Michalski with a Canon EOS 600D digital camera mounted on a Bresser microscope, with the addition of focus stacking software. Tables have been processed with a PhotoImpact Viewer SE program. The specimen has been donated by the author and the Pankowski family to the Museum of Comparative Zoology at Harvard University in Cambridge, Massachusetts (USA).

SYSTEMATIC PALAEOLOGY

Order Coleoptera Linnaeus, 1758
Superfamily Elateroidea Leach, 1815
Family Cantharidae Imhoff, 1856
Subfamily Cantharinae Imhoff, 1856
Tribe Cantharini Imhoff, 1856

Genus *Arturmiles* gen. nov.

Type species: *Arturmiles pankowskiarum* Fanti sp. nov., by present designation. The genus is at present monotypic.

Etymology. Named in honor of the great amber collector and dear friend of the author Artur Robert Michalski, + the Latin noun *miles* = soldier (a classic ending to indicate the representatives of the family Cantharidae: Fanti et al. 2018; Fanti & Damgaard 2019, 2020). The gender is masculine.

Diagnosis. The third tarsomere is straight apically and not bilobed at the sides, head rounded behind the eyes, the last maxillary palpomere very elongated and slightly enlarged on the outside, and the claws simple with a small obtuse tooth at the base, all of which demonstrate that the specimen belongs to a new genus. It is very similar to the fossil genus *Juratelacrima* Fanti & Damgaard, 2018. However, the latter genus has its head slightly elongated behind its eyes, similar to the tribe Podabrini Gistel, 1856, its pronotum is gibbous, and it also has a differ-

ent last maxillary and labial palpomere (Fanti & Damgaard 2018). No extant genus of the tribe Cantharini has the combination of characters of the new genus, such as the third tarsomere straight at apex, claws simple with a small tooth, and a subsquare pronotum (like *Podistra*). For example, *Rhagonycha* Eschscholtz, 1830, has the third tarsomere straight and claws bifid, while *Podistra* Motschulsky, 1839 has claws simple with third tarsomere bilobed.

Distribution. Currently known only from Eocene Baltic amber found in Poland.

***Arturmiles pankowskiarum* sp. nov.**

(Figs. 1 - 2)

Holotype. Female, in Baltic amber, deposited in the Museum of Comparative Zoology (MCZ) at Harvard University, accession No. MCZ:Ent:PALE-43635.

Type locality. Poland, Baltic Sea coast, Gdańsk, Wisła River estuary area (Mikoszewo, Jantar, Stegna, Sztutowo, Katy Rybackie villages).

Type strata. Middle Eocene. Prussian Formation.

Differential diagnosis. Being a monotypic genus there are no species similar to *Arturmiles pankowskiarum* gen. et sp. nov. The most similar Eocene fossils are of the genera *Podistra* and *Lycocerus* (Fanti & Damgaard 2018, 2019, 2020; Kazantsev 2018, 2020; Fanti 2020, 2021). In particular, *Podistra (Absidia) jirii* Fanti, 2020 also differs in the maxillary and labial palps, and *Podistra (Absidia) mattheseni* Fanti & Damgaard, 2020 differs in the pronotum, maxillary palps and length of the antennomeres (Fanti 2020; Fanti & Damgaard 2020).

Description. Adult, winged, slender. Female, defined on the basis of the short antennae and robust abdomen. Body length 5.6 mm; elytra 3.3 mm. Dark brown with blackish pronotum.

Head almost completely exposed, as wide as pronotum, very elongated, surface strongly wrin-

kled and with punctuation and setae, frons flat. Eyes exceptionally wide, inserted in the upper part of the head, rounded-elongated, strongly convex, covering almost the entire lateral part starting almost from the center of the head and leaving only a small portion of the head uncovered behind the eyes themselves. Mandibles very robust, slightly falciform, slightly enlarged at base, and apparently without teeth. Maxillary palps unequal, 4-segmented, palpomere I very elongated; palpomere II slightly shorter than first; palpomere III shorter than second and over three times shorter than the first palpomere; last palpomere very elongated, filiform, slightly enlarged on the outside. Labial palps 3-segmented, with the last palpomere securiform. Antennae 11-segmented, filiform, rather short, not reaching to

the midway point of the elytra, inserted in the frons and far from the eyes; scape elongated, robust, curved, club-shaped; pedicel short, about 2.8 times shorter than the scape; antennomere III filiform, elongated and about 1.4 times longer than pedicel; antennomeres IV-IX filiform, subequal, elongated; antennomere X filiform, slightly longer than previous ones; antennomere XI thin, rounded at apex, as long as X; antennomeres pubescent. Pronotum subsquare, lateral margins parallel, surface equipped with a few long setae and rather flat with a thin transverse depression at the posterior margin, anterior margin almost straight (only slightly protruding in the middle) and strongly bordered, posterior margin bordered and slightly roundish, corners rounded. Scutellum triangu-



Fig. 1. *Arturmiles pankowskjarum* gen. et sp. nov. in Baltic amber. A: Holotype, ventro-lateral view, bar = 1.0 mm; B: Holotype, dorso-lateral view, bar = 1.0 mm; C: Holotype, detail of last abdominal tergites, bar = 0.1 mm.



Fig. 2. *Arturmiles pankowskiarum* gen. et sp. nov. in Baltic amber. A: Holotype, detail of head, pronotum, and humeral zone of elytra, bar = 0.5 mm; B: Holotype, same photograph with arrows showing the phoretic Acarina, bar = 0.5 mm.

lar-shaped. Elytra elongated, wider than pronotum, covering the last abdominal segments except the last one, parallel-sided; apex rounded; surface with scattered long setae and smooth with only few shallow punctation. Posterior wings almost completely covered by elytra. Sternum and abdominal segments with long pubescence; last tergite small, narrower than penultimate tergite, like a roundish lobe; last sternite deformed and probably similar to the last tergite. Legs elongated, covered with setae; coxae massive, elongated; trochanters small; femora cylindrical, slightly enlarged, straight; tibiae thin, cylindrical, enlarged and flat at apex, equipped with a spur at apex, pro- and mesotibiae shorter than pro- and mesofemora, metatibiae longer than metafemora. Tarsi 5-segmented; first metatarsomere elongated, about 1.6 times longer than the second metatarsomere; second tarsomere straight at margin; third tarsomere shorter than the second, straight at margin and not bilobed at sides; fourth short, bilobed; fifth elongated, thinner than others, curved; claws simple with a very small and obtuse lobe at base.

Male unknown.

Etymology. Named in honor of the mother and daughters of the Pankowski family: Mary and Madeline and their mother Karen + the Latin -

arum. The Pankowskis are a great American family who have kindly assisted me in several of my research projects.

Syninclusions. A few botanical remains and big air bubbles, five Acarina.

Remarks. The piece is extremely transparent and allows a perfect view of the inclusion. It measures approximately 24x13-14 mm. The inclusion is almost complete with the right mesothoracic leg preserved up to part of the third tarsomere, and the right antenna preserved up to the fifth antennomere plus three others that have been crushed.

DISCUSSION

Reconstructing the phylogenetic relationships between fossil and living species is often difficult. The new species, in fact, appears intermediate between *Rhagonycha* and *Podistra*. However, although these genera appear similar, they could be phylogenetically distant from the new taxon. *Arturmiles* gen. nov. also has the last maxillary palpomere elongated, filiform, and enlarged on the outside. This is not typical of other groups of Cantharidae, which possess a maxillary palpomere that is securiform, globular, and globu-

lar-pointed or ax-blade elongated (Brancucci 1980). Discovering new specimens would help clarify the evolution of this new genus.

While it is not so rare to find mites embedded in the same piece of amber together with a soldier beetle, is interesting that only one other specimen has been documented with a phoretic mite attached to the body (Kazantsev 2020; present work). This kind of phoresy is present but uncommon in other groups such as spiders (Dunlop et al. 2011, 2014). The lack or rarity in the representatives of the family Cantharidae could be the result of soldier beetles' life cycle, as they are mainly predators and largely hunt small arthropods on the trees at the edges of the forests (Grandi 1951). The rarity of specimens found with phoretic mites could indicate sometimes occurs in some modern taxa — with soldier beetles supplementing their diet with pollen (Grandi 1951) and staying for several days on the same flowers or in the same limited area, and therefore being more easily attacked while visiting these flowers. Baltic amber has now revealed that Cantharidae during the Eocene were more diverse than today in the same places, with diversity probably comparable to today's tropical areas (Parisi & Fanti 2020). Furthermore, it also appears (even though behaviors of fossil beetles are mainly hypothetical) that their life cycles and habits have not particularly changed over the past 40 million years.

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