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The first Cretaceous beetle from Azerbaijan: *Katyacantharis zherikhini* gen. et sp. n. (Coleoptera, Cantharidae) from Cenomanian Agdzhakend amber

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Cantharidae, or soldier-beetles, have so far been described from only two Cretaceous amber deposits. One genus and one species was reported from Spanish amber (El Soplao: Peris & Fanti, 2018) and six genera and seven species from Burmese amber (Hukawng Valley: Poinar & Fanti, 2016; Hsiao *et al*., 2017; Fanti & Ellenberger, 2017; 2018; Fanti at al., 2018). Other Cretaceous ambers, except for Lebanese amber (Kirejtshuk & Azar, 2013) seemed to lack soldier-beetles (Rasnitsyn *et al*., 2016).

The study of the Upper Cretaceous Agdzhakend amber material collected during the 1974 Azerbaijan expedition of the Paleontological Institute of the USSR Academy of Sciences yielded a positive result when one of the authors discovered an inclusion with a cantharid specimen [provisionally determined (Zherikhin, 1978) as ?Dascillidae (Ponomarenko, pers. comm., 2018)]. The specimen was found in a small amber piece, and, although not well preserved and partly destroyed, could be rather confidently referred to soldier-beetles, due to the characteristic shape and structure of the head and legs. Resembling some of the Burmite cantharid taxa in certain morphological characters, it could not be attributed to any of them and neither could it be referred to any of the extant or other extinct cantharid genera. This necessitates erection of a new genus, and a description of this new genus and a new species is presented below.

Material and methods

Ambers from Agdzhakend chemically belong to retinoids (Zherikhin, 1978). Unfortunately, there have been no studies on Cretaceous ambers of Transcaucasia after Zherikhin's paper (Rasnitsyn *et al.*, 2016). In the Goranboy District (it includes part of the former Shaumyan District), at the Tsimkhadzor site, near the Upper Agdzhakend village, 40°24'15"N, 46°29'37"E (Fig. 1), ambers occur in clay and sandstone of lagoon

FIGURE 1. Location of Agdzhakend amber site.

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and delta origins, mainly in the upper part of the outcrop, sometimes accumulated in the form of small pockets. Data on the amber was summarised in Rasnitsyn *et al.* (2016). The coal-bearing sequence is dated to the early Cenomanian (Aliev, 1977). The ambers of Agdzhakend are brownish, reddish, yellowish or whitish; their colouration often varies within a single piece; the vast majority of pieces are semi-transparent, with many small gas inclusions (Rasnitsyn *et al.*, 2016). The Agdzhakend amber contains many inclusions: 100 invertebrate fossils were found in 170 g of semi-transparent and transparent material, mostly Diptera; however, many of those fossils are too fragmentary for identification (Zherikhin, 1978; Zherikhin & Eskov, 1999). Up to the present day only the megalyrid parasitic wasp *Cretodinapsis caucasica* Rasnitsyn (Rasnitsyn, 1977; Perrichot, 2009; Vilhelmsen *et al*., 2010) has been named (Zherikhin & Eskov, 1999). For examination and photography a Leica M165C microscope with Leica DFC 420 camera and Zeiss AxioScope.A1 microscope with Canon EOS 6D camera were used. All studied material is housed in the Paleontological Institute of the Russian Academy of Sciences, Moscow (PIN).

Systematic palaeontology

Cantharidae Imhoff, 1856

Katyacantharis gen. n.

Type species: *Katyacantharis zherikhini* **sp. n.**

Description. Adult male. Alate, flattened, elongate. Head moderately large, transverse, noticeably narrowed behind eyes, exposed. Eyes relatively small, bulging.

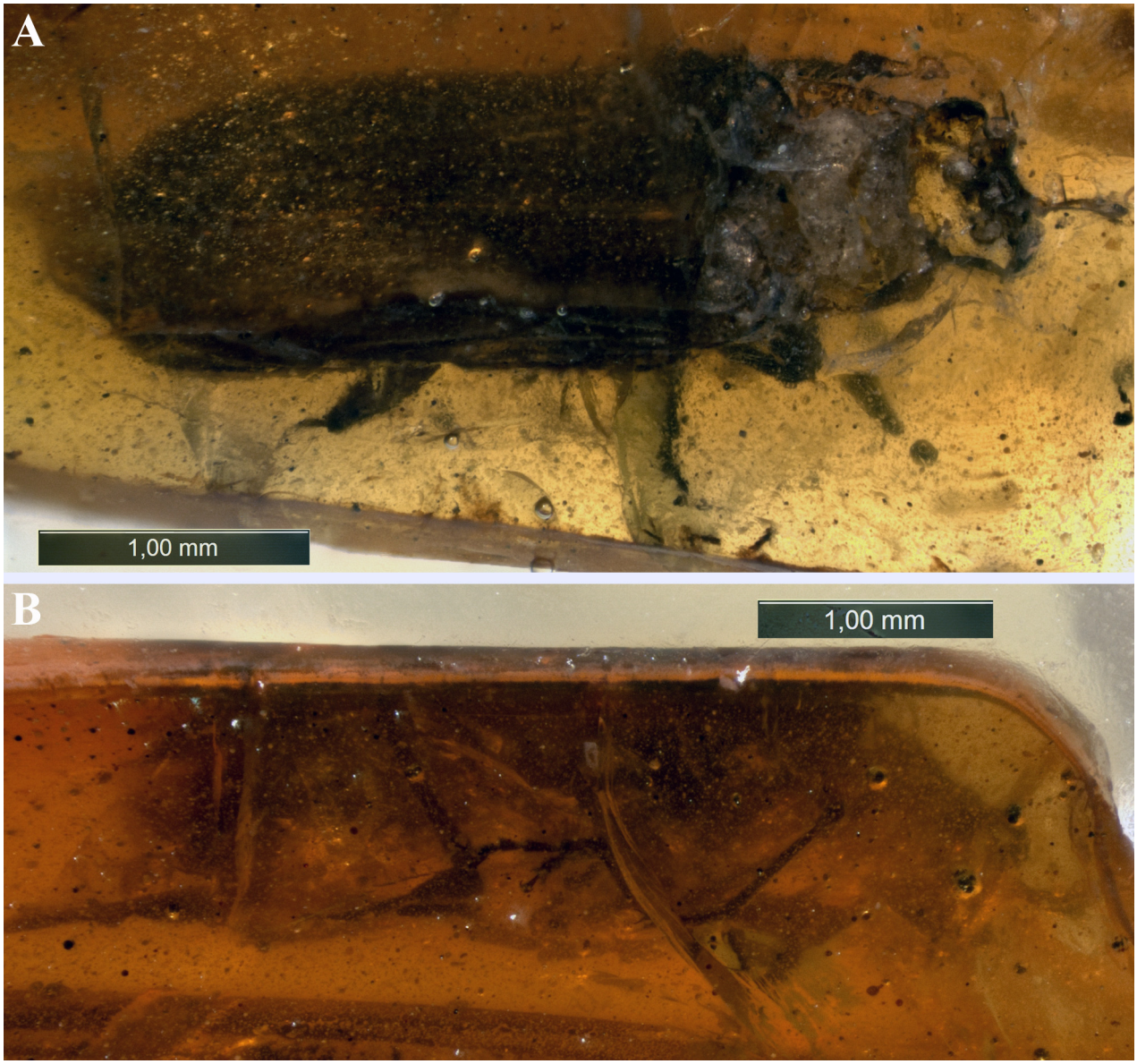

FIGURE 2. General view of *Katyacantharis zherikhini* **gen. n.**, **sp. n.,** holotype male. A. dorsal view; B. ventral view.

Cheeks noticeably shorter than eye diameter. Maxillary palps slender; ultimate palpomere securiform. Antennae presumably 14-segmented (while antennomeres 1–6 can be observed dorsally and antennomeres 8–14 ventrally, antennomere 7 can be seen from neither view—its presence may be presumed by extrapolating length of adjacent antennomeres; the separation between antennomeres 11 and 12 cannot be seen either), relatively long, feebly dentate in preapical part; antennomeres 2, 3 and 4 relatively short, subequal in length, antennomeres 2 and 4 noticeably widened distally; antennal pubescence long and erect (Figs 2A, 2B, 3A, 4A, 5A).

Pronotum transverse, slightly narrowing anteriorly, with straight sides, almost straight anteriorly and produced posteriorly, acute and rounded distally, posterior angles (due to destruction of the amber piece only contour of pronotum may be observed) (Figs 2A, 3A, 4B). Scutellum, small, triangular. Elytra elongate, parallel-sided, individually rounded, reticulate, with noticeable elevated costae and elongate cells in the interstices; elytral pubescence short and suberect. Metathoracic wings fully developed (Figs 2A, 3B, 5A).

Legs relatively long and slender, their vestiture relatively long and bristling; hind coxae contiguous; femora and tibiae straight, narrow; tarsomeres widened, tarsomere 4 incised and broadly bilobed; claws simple, not cleft (Figs 2B, 5A, 5B).

Abdomen reaching to elytral apices; exposed portion of ultimate ventrite elongate, triangular; penultimate ventrite broadly incised (the total number of ventrites may not be observed) (Fig. 2B).

Female. Unknown (the shape of the last abdominal segments, with elongate triangular ultimate and broad widely incised penultimate ventrites, undoubtedly testifies that the specimen is a male).

Diagnosis. *Katyacantharis* **gen. n.**, unlike all other extant or extinct cantharine genera, possesses alveolar elytra with elongate cells. It differs from the earliest Cenomanian Burmese amber *Ornatomalthinus* Poinar & Fanti, 2016, *Maymalycocerus* Fanti & Ellenberger, 2017, *Burmomiles* Fanti *et al*., 2018, and *Sanaungulus* Fanti *et al*., 2018 with reticulate or conspicuously punctuate elytra, by the elongate elytral cells (Fig. 3B) and the 14-segmented antennae; from the two latter taxa, also by the absence of antennal flabellae (Fig. 4A). It can be separated from *Molliberus* Perris & Fanti, 2018 from late Albian Spanish amber by the different elytral structure and the different number of antennomeres. It can be easily separated from *Hukawngichthyurus* Fanti & Ellenberger, 2018 by the small eyes and the shape of the ultimate abdominal segments. It is also easily differentiated from the Baltic amber cantharid genera with increased number of antennomeres (which have 12 or 15–19 antennal segments; Kazantsev, 2013; Fanti & Damgaard, 2018) by the elytral structure.

Etymology. The new genus is named after our colleague and friend, palaeoentomologist Dr. Ekaterina (Katya) A. Sidorchuk (Moscow), who passed away in a tragic accident while diving. Gender feminine.

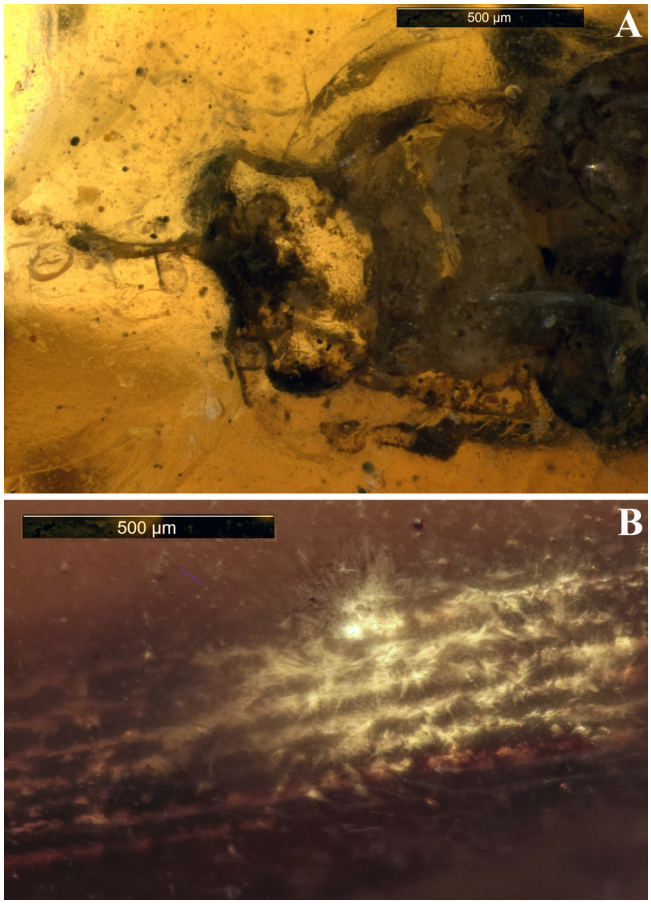

FIGURE 3. Details of *Katyacantharis zherikhini* **gen. n.**, **sp. n.,** holotype male. A. anterior part of body, dorsally; B. elytral detail, latero-dorsally.

Katyacantharis zherikhini sp. n.

(Figs 2–5)

Type material. Holotype, **AZERBAIJAN**: PIN 3517/18, 'Upper Agdzhakend, L. Cretaceous, Cenomanian, near Yukhary-Agdzhakend, Shaumyan distr., Azerbaijan, PIN 1974' (housed in PIN).

Syninclusions: PIN 3517/19 Diptera (?Rhagionidae), PIN 3517/20 Thysanoptera (Adiheterothripidae).

Diagnosis. *Katyacantharis zherikhini* **sp. n.** may be easily distinguished from the other cantharines by the generic characters.

Description. Adult male. Dark brown to black. Head ca. 1.7 times wider than long. Eye diameter ca. 1.7 times shorter than interocular distance. Ultimate maxillary palpomere ca. 1.8 times longer than wide, widest in the middle. Antennae attaining to three-fourths

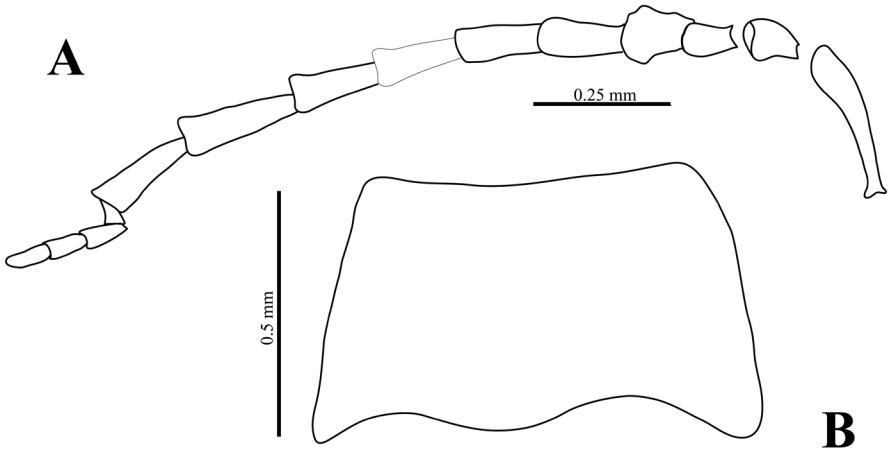

FIGURE 4. Details of *Katyacantharis zherikhini* **gen. n.**, **sp. n.,** holotype male. A. antenna; B. pronotum, contour.

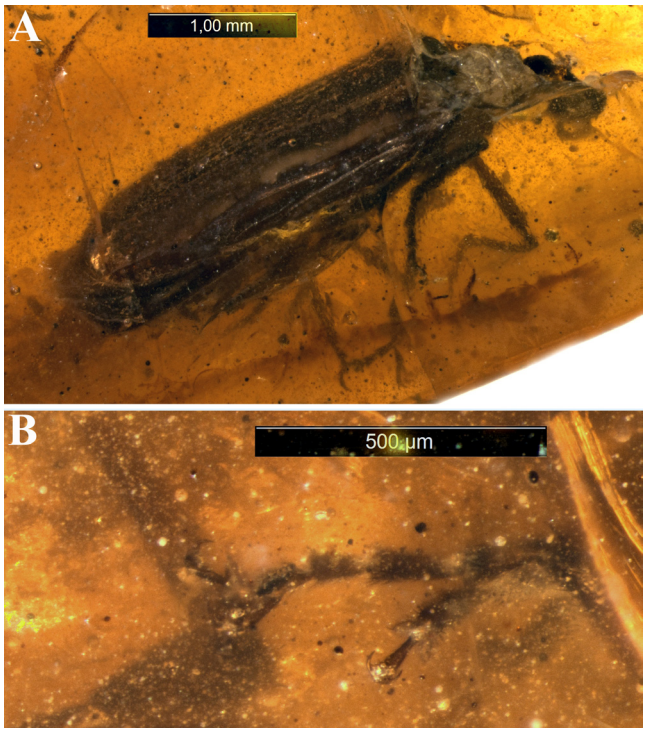

FIGURE 5. A. General view of *Katyacantharis zherikhini* **gen. n.**, **sp. n.,** holotype male, latero-dorsal view. B. Tarsi of *Katyacantharis zherikhini* **gen. n.**, **sp. n.,** holotype male.

of elytral length, antennomere 4 ca. 1.2 times longer than antennomere 2 and 3, and 1.4 times shorter than antennomere 5 (Figs 2A, 2B, 3A, 4A, 5A).

Pronotum ca. 1.8 times wider than long, trapezoidal, conspicuously bisinuate posteriorly (Figs 2A, 3A, 4B). Elytra ca. 2.7 times longer than wide, parallel-sided, reticulate, elytral cells ca. 2.5 times longer than wide (Figs 2A, 3B, 5A).

Length ratio of tarsomeres 2 : 1.8 : 1 : 1.7 : 1 (Figs 2B, 5A, 5B).

Body length: 3.6 mm. Width (at elytral humeri): 1.0 mm.

Female. Unknown.

Etymology. The new species is named after one of the collectors of the Agdzhakend amber material, the late Prof. Vladimir V. Zherikhin.

Discussion

Although the thoracic segments (the structure of which is often used to differentiate between lineages of the 'Cantharoidea' group of families) in the studied specimen are not observable, the new taxon may still be definitely excluded both from Omethidae, characterized by the partly concealed head (Ramsdale, 2010), and from Omalisidae, characterized by the narrow and not bilobed tarsal segments (e.g., Kazantsev, 2007, 2010; Bocák & Bocáková, 2010). It is also very different from Lycidae, characterized by the mostly concealed and roundish or subquadrate head (e.g., Kazantsev, 2005).

Placement of the new cantharid taxon in its subfamily is more challenging, especially without study of such aspects of its morphology, as the structure of wing venation and genitalia (e.g., Brancucci, 1980). However, as the shape of ultimate palpomeres does not allow placing *Katyacantharis* **gen. n.** in Malthininae, the shape of the ultimate abdominal segments preclude attributing the taxon to Silinae or Chauliognathinae, and the triangular head gives evidence that it is not a dysmorphocerine, we consider *Katyacantharis* **gen. n.** to belong to the subfamily Cantharinae.

Including the material in this study, there now seem to be eight Cretaceous amber cantharid genera, of which six represent Burmese amber, one is from Spanish amber, and

one is from Agdzhakend amber. Seven genera, including five from Burmese amber, one from Spanish and one from Agdzhakend amber, belong in the subfamily Cantharinae, and one genus belongs in Malthininae. It is interesting that all Cretaceous cantharid amber fossils originate from the "Isoptera realm" sensu Gumovsky *et al*. (2018).

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