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A new species of *Bezesporum* from mid-Cretaceous Kachin amber (Coleoptera: Myxophaga: Sphaeriusidae)

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Sphaeriusidae is a small but widespread family (Lawrence & Ślipiński, 2013; Hall, 2019). The family previously contained a single extant genus, *Sphaerius* Waltl. Recently, Fikáček *et al*. (2023) split *Sphaerius* into *Sphaerius s.s.* and *Bezesporum* Fikáček *et al*. However, some extant species of *Sphaerius* from Australia and South Africa, and particularly the fossil *S. martini*, exhibit a somewhat intermediate morphology between *Bezesporum* and typical *Sphaerius*, raising questions about the justification of this subdivision (Li *et al*., 2023). In the present study, we describe a new fossil from mid-Cretaceous Kachin amber, *Bezesporum huchengi* **sp. nov.**, which has a typical morphology of *Bezesporum*.

Materials and methods

The Kachin amber specimen studied herein (Figs 1–2) originated from an amber mine near Noije Bum (26°20' N, 96°36' E), Hukawng Valley, Kachin State, northern Myanmar. The amber specimen is deposited in the Nanjing Institute of Geology and Palaeontology (NIGP), Chinese Academy of Sciences, Nanjing, China. The amber piece was trimmed with a small table saw, ground with emery paper of different grit sizes, and finally polished with polishing powder.

Photographs under incident light were taken with a Zeiss Discovery V20 stereo microscope. Confocal images were obtained with a Zeiss LSM710 confocal laser scanning microscope, using the 488 nm Argon laser excitation line (Fu *et al*., 2021). Images were stacked in Helicon Focus 7.0.2 and Adobe Photoshop CC. Images were further processed in Adobe Photoshop CC to adjust brightness and contrast.

Systematic paleontology

Order Coleoptera Linnaeus, 1758
Suborder Myxophaga Crowson, 1955
Family Sphaeriusidae Erichson, 1845

Bezesporum huchengi sp. nov.

(Figs 1–2)

Material. Holotype, NIGP204941.

Etymology. The species is named after Mr. Cheng Hu, who kindly donated many fossils for our research.

Locality and horizon. Amber mine located near Noije Bum Village, Tanai Township, Myitkyina District, Kachin State, Myanmar; unnamed horizon, mid-Cretaceous, Upper Albian to Lower Cenomanian.

Diagnosis. The new species differs from other extant and extinct species of *Bezesporum* by the more elongate antennomere 6 (Fig. 2C). The biemarginate abdominal apex may also be a distinctive feature of the new species (Figs 1B, 2B). To our knowledge, this feature has not been reported in any other sphaeriusids, although the state of abdominal apex was not explicitly described or illustrated in many cases.

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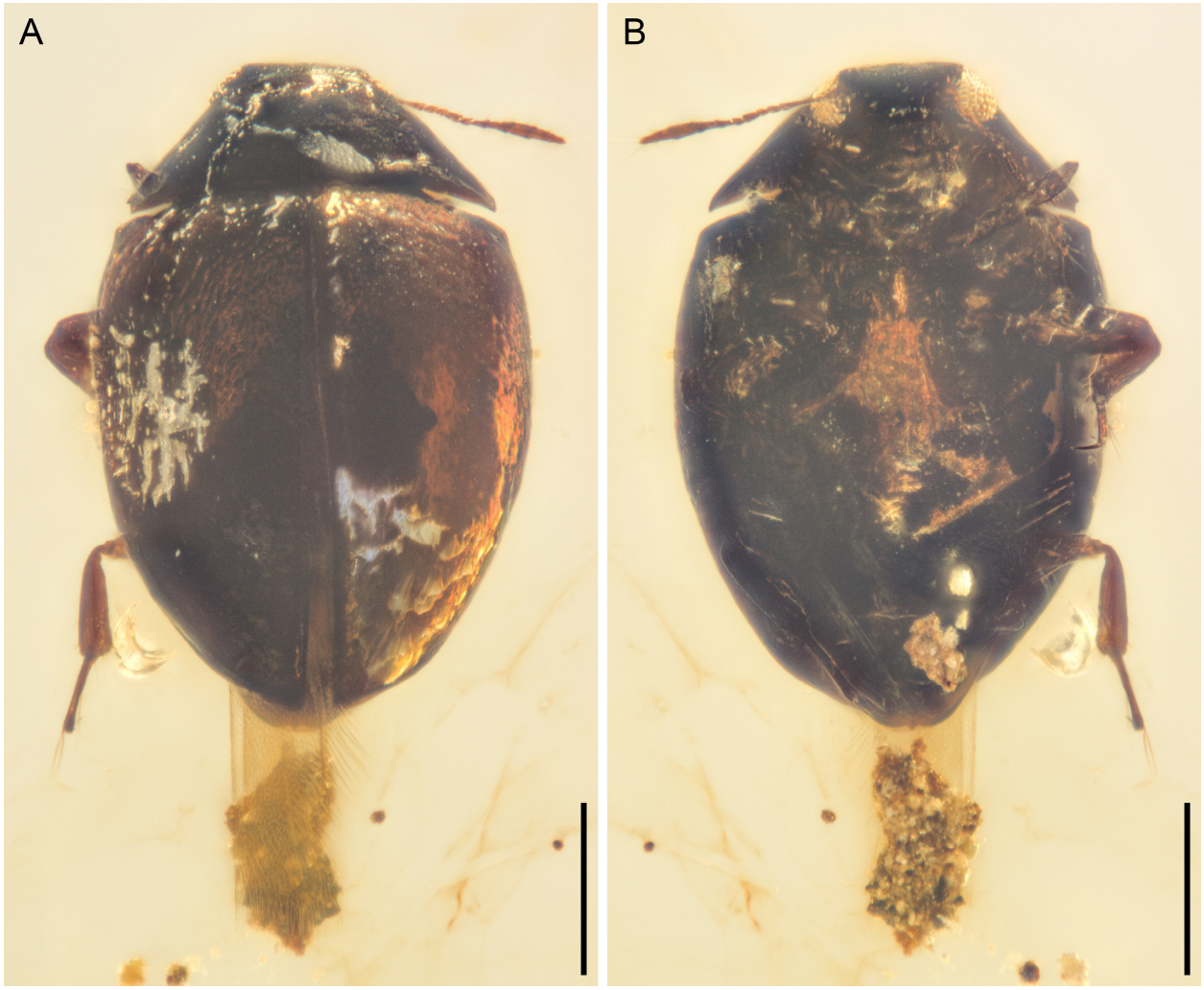

FIGURE 1. General habitus of *Bezesporum huchengi* **sp. nov.**, holotype, NIGP204941, under incident light. **A**, Dorsal view. **B**, Ventral view. Scale bars: 200 μm.

Description. Body broadly oval, strongly convex, about 0.78 mm long, 0.52 mm wide.

Head prognathous, short and broad. Antennae 11-segmented, with 4-segmented club; antennomeres 1 and 2 robust; antennomere 3 strongly elongate (more than three times as long as 4); antennomeres 4, 5 and 7 submoniliform; antennomere 6 elongate; antennomeres 8–11 forming elongate club, with distinct setae. Clypeus converging anteriad. Mandibles small, obliquely bidentate. Maxillary palps probably 4-segmented; apical palpomere distinctly shortened.

Pronotal disc convex, widest at hind angles. Scutellar shield small, triangular, posteriorly acute. Elytra complete, covering all abdominal segments. Hind wing with long fringe hairs. Prosternum subtriangular, narrowing posteriad. Mesoventrite relatively long, on the same plane with metaventrite, fused with the latter. Mesocoxae widely separated. Metaventrite broad, transverse. Metacoxae contiguous, extending laterally to elytra; metacoxal plates gradually narrowed laterally in outer half. Legs short. Mesotrochanter fused with femur; anterior margin of mesotrochanterofemur sinuate. Tibiae and tarsi setose; metatarsus with very long setae. Pretarsal claws simple, unequal.

Abdomen with apex biemarginate.

Remarks. Fikáček *et al*. (2023) proposed a series of characters to define *Bezesporum*. Among these, the 4-segmented antennal club and T-shaped prosternum may be found in some extant *Sphaerius* (Kamezawa & Matsubara, 2012; Fikáček *et al*., 2023), and the sinuate anterior margin of mesotrochanterofemur and the presence of long setae on metatarsus are known in the fossil *S. martini* (Li *et al*., 2023). Nevertheless, the anteriad converging clypeus and relatively long mesoventrite are, to date, exclusively known in *Bezesporum*. The new species exhibits a 4-segmented antennal club, a T-shaped prosternum, a sinuate anterior margin of mesotrochanterofemur, long setae on metatarsus, and particularly, an anteriad converging clypeus and a relatively long mesoventrite. Therefore, the new species fits perfectly within the genus *Bezesporum*.

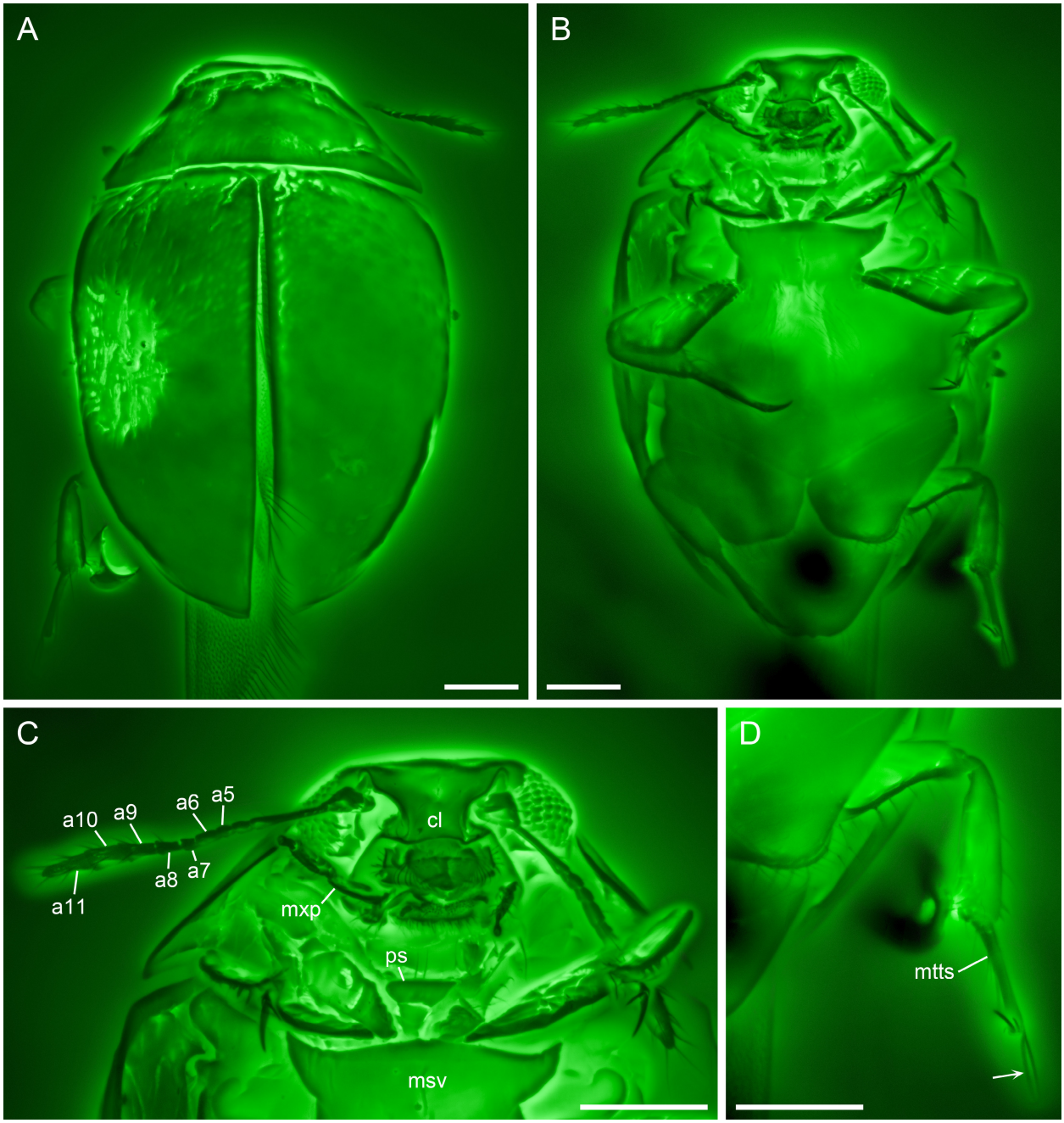

FIGURE 2. *Bezesporum huchengi* **sp. nov.**, holotype, NIGP204941, under confocal microscopy. **A**, Habitus, dorsal view. **B**, Habitus, ventral view. **C**, Head and prothorax, ventral view. **D**, Hind leg, with arrow indicating long setae on metatarsus. Abbreviations: a5–11, antennomeres 5–11; cl, clypeus; msv, mesoventrite; mtts, metatarsus; mxp, maxillary palp; ps, prosternum. Scale bars: 100 mm.

The elongate antennomere 6 is diagnostic of the new species. According to the drawing by Fikáček *et al*. (2023), the antennomere 6 of the fossil *B. burmiticum* is not clearly longer than the antennomere 5. In extant *B. minutum* (Liang & Jia), the antennomere 6 is no longer than 1.4× the length of antennomere 5 (Liang & Jia, 2018: fig. 8). By contrast, the antennomere 6 of *B. huchengi* **sp. nov.** is relatively elongate, being 1.7–1.9× as long as antennomere 5 (based on measurements from both antennae) (Fig. 2C). The relative length of antennomere 6 of the extant species *B. papulosum* (Lesne) was not explicitly described by Lesne (1940), but since Liang & Jia (2018) stated *B. papulosum* closely resembles *B. minutum*, it might also have a relatively short antennomere 6. Besides, Lesne (1940) reported that antennomere 3 in *B. papulosum* is much longer than antennomeres 4–8 combined (possibly also implying a short

antennomere 6), whereas the antennomere 3 is clearly shorter than antennomeres 4–8 combined in *B. huchengi*. Our discovery of a new species from the Kachin amber underscores the rich paleodiversity of Sphaeriusidae in the late Mesozoic.

Data availability

The original confocal data are available in the Zenodo repository (https://doi.org/10.5281/zenodo.13797025).

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