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Short communication

First fossil Coloninae from Upper Cretaceous Burmese amber (Coleoptera: Staphylinoidea: Leiodidae)

Chenyang Cai [a, *], Diying Huang [b]

[a] Key Laboratory of Economic Stratigraphy and Palaeogeography, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, 39 East Beijing Road, Nanjing 210008, China
[b] State Key Laboratory of Palaeobiology and Stratigraphy, Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China

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ABSTRACT

Fossil leiodids are sparse, and they are confined to the Cenozoic. Here we describe and illustrate the first definitive Mesozoic leiodid, *Colonellus burmiticus* sp. nov., based on two well-preserved adults from the Upper Cretaceous Burmese amber. The fossil is firmly placed in the extant Coloninae based on multiple synapomorphies, such as antennae with normal-sized antennomere 8 and abdominal intersegmental membranes with "brick-wall" pattern. It can be further assigned to the extant genus *Colonellus* (subgenus *Pentacolonellus*) by its five-segmented antennal club. The discovery suggests that *Colonellus* is an ancient group, originating no later than the mid-Cretaceous.

1. Introduction

With approximately 4135 described species placed in 6 subfamilies, the family Leiodidae (or round fungus beetles) is a worldwide, moderately large and diverse group of staphylinoid beetles (Newton, 2016). Among all extant subfamilies (Camiarinae, Catopocerinae, Cholevinae, Coloninae, Leiodinae and Platypsyllinae), Coloninae represent a distinctive and isolated lineage strongly supported as monophyletic by more than a dozen synapomorphies (Hansen, 1997; Newton, 1998), such as antenna with normal-sized antennomere 8 (antennomere 8 not reduced compared to antennomeres 7 and 9), cervical sclerites absent, abdominal intersegmental membranes with "brick-wall" pattern (similar to Silphidae and basal Staphylinidae), and female with only four visible abdominal sternites. Coloninae includes two extant genera, *Colon* Herbst and *Colonellus* Szymczakowski, and about 154 species worldwide (Szymczakowski, 1964; Peck and Stephan, 1996; Peck, 1997; Newton, 1998; Newton, 2016). *Colonellus* is very similar to *Colon* in superficial appearance, but *Colonellus* can be distinguished from the latter by having very slender parameres of male genitalia and apical sensory surface of antennal club segments with a spongy anastomosing surface (Peck, 1997). Recently, a DNA-based phylogeny of Staphyliniformia suggested that *Colon* (Coloninae) was sister to Hydraenidae + Ptiliidae, rather than nested within Leiodidae (McKenna et al., 2015). The systematic position of Coloninae within Staphylinoidea remains unsettled. The biology of modern Coloninae is not well known.

Fossil leiodids are rare, with all definitive leiodid species reported from the Cenozoic. Currently, only seven unquestionable fossil species are known: *Ptomaphagus germari* von Schlechtendal, 1888 (Cholevinae, Ptomaphagini), *Catops nathani* Perkovsky, 2001 (Cholevinae, Cholevini; Perreau and Perkovsky, 2014), *Nemadus microtomographicus* Perreau and Tafforeau, 2011 (Cholevinae, Andemadini), *Catops perkovskyi* Perreau, 2012 (Cholevinae, Cholevini) and *Tafforeus cainosternus* Perreau, 2012 (Leiodinae, Pseudoliodini) from the Eocene Baltic amber (ca. 45 Ma); *Aglyptinus poinari* Perkovsky, 2000 (Leiodinae, Scotocryptini) from the Miocene Dominican amber (ca. 19 Ma); and *Prionochaeta gratschevi* Perkovsky, 2009 (Cholevinae, Cholevini) from the Eocene Rovno amber (Ukraine). Additional plausible Cenozoic leiodids include *Leiodes sibylla* Wickham, 1913b, *Hydnobius tibialis* Wickham 1913a, and *Gurvanocoleus hirsutus* Ponomarenko, 1986 (Perkovsky, 2002). Perkovsky (1990) reported the first Mesozoic leiodid, *Nyujwa zherichini* Perkovsky, 1990 (Camiarinae, Agyrtodini), from the Lower Cretaceous of Baissa (Transbaikalia, Russia), but its systematic position was questioned and it was later transferred to the

* Corresponding author.
E-mail address: cycai@nigpas.ac.cn (C. Cai).

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unrelated cucujoid family Nitidulidae (Kirejtshuk, 2008). Perkovsky (1999) described another leiodid fossil, *Mesagyrtoides fulvus* Perkovsky, 1999 (Leiodinae), from the Upper Jurassic of Shar-Teg, Mongolia. The holotype of *M. fulvus* is poorly preserved, and there are no definite morphological characters supporting the familial placement. To date, no fossils belonging to the peculiar subfamily Coloninae are known. Here we report the first fossil of Coloninae and the earliest definitive leiodid from the Upper Cretaceous Burmese amber.

2. Material and methods

The new species is known based on two individuals preserved in two clear pieces of Burmese amber (ca. 99 Ma). Both specimens are derived from amber deposits in the Hukawng Valley of northern Myanmar. The type specimens are housed in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China. Observations and photographs were made using a Zeiss Discovery V20 stereo microscope and a Zeiss Axio Imager 2 light microscope with a digital camera attached respectively. Photomicrographs with green background are taken using green fluorescence as light source attached to a Zeiss Axio Imager 2 light microscope and using a confocal laser scanning microscopy (CLSM) Zeiss LSM 710 with ×10 objectives and using a laser at 488 nm. The nomenclatural acts established herein are registered under ZooBank LSID urn:lsid:zoobank.org:pub:3EF345BF-3456-4562-B150-83D41F4E279E.

3. Systematic palaeontology

Order Coleoptera Linnaeus, 1758

Family Leiodidae Fleming, 1821
Subfamily Coloninae Horn, 1880 (1859)

Genus *Colonellus* Szymczakowski, 1964
(Type species: *Colonellus fleischeri* Szymczakowski, 1964)

Colonellus burmiticus sp. nov.
Figs. 1–5

Etymology. The specific epithet *burmiticus* refers to the occurrence of the fossil in burmite (Burmese amber). The species is registered under LSID urn:lsid:zoobank.org:act:BDCA66F6-6492-4AAA-8839-B8F4CB40B05B.
Material. Holotype, NIGP165096, male (as evidenced by exposed aedeagus); paratype, NIGP165097, sex unknown; lowermost Cenomanian, Hukawng Valley, northern Myanmar; both deposited in the Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing, China.
Diagnosis. The new species differs from all known species of Coloninae by the following combination of characters: 1) comparatively small body size (ca. 1.5 mm long); 2) antenna with apical five antennomeres forming a distinct club; 3) mentum with slightly concave anterior margin; and 4) protibia distinctly expanded toward apex, bearing about six large spines at apical fourth of external margin.
Description (based on holotype). Male; body length 1.43 mm (measured from anterior margin of clypeus to elytral apex). Body (Fig. 1) oval, slightly convex; dark brown; dorsal surface with dense, short, and recumbent hairs; hairs on ventral side sparser than those on dorsal side.

Head (Figs 2A, 4A) strongly transverse, about 0.1 mm long and 0.32 mm wide, slightly wider than anterior pronotal width. Eye

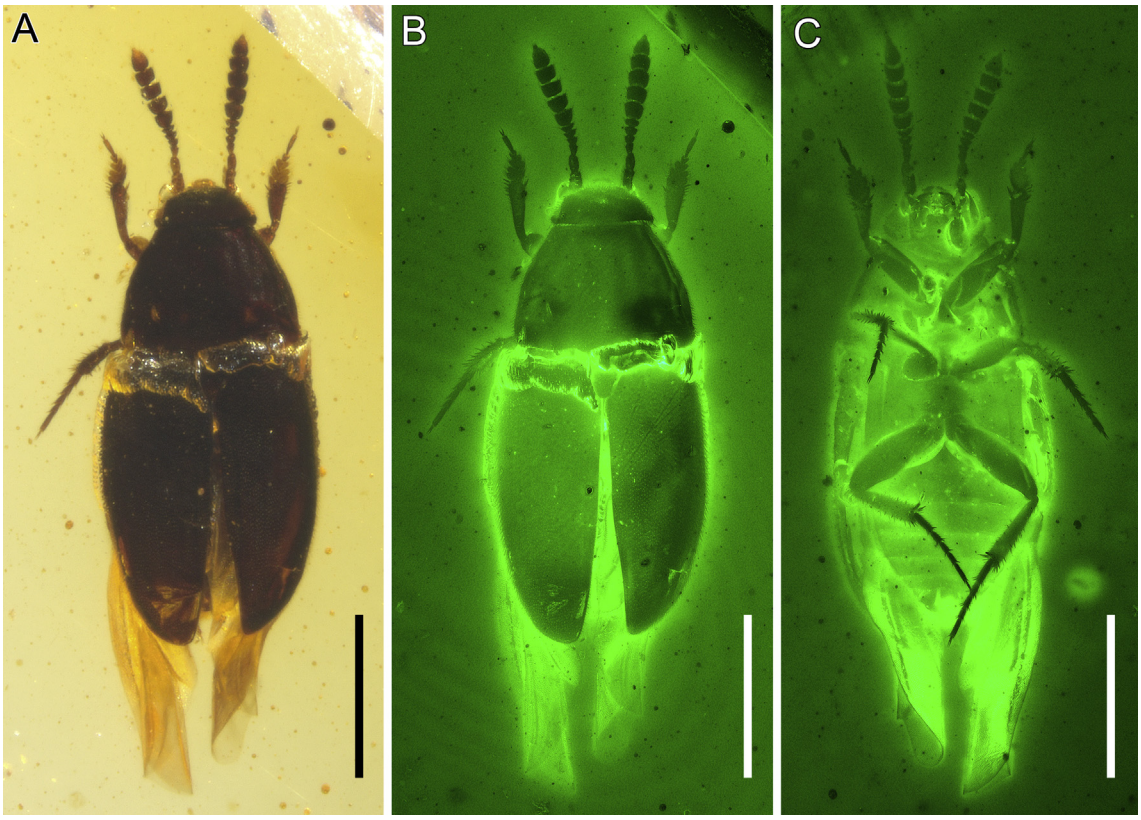

Fig. 1. Microphotographs of holotype (NIGP165096) of *Colonellus burmiticus* sp. nov. from Upper Cretaceous amber from northern Myanmar. A. dorsal view, under normal reflected light; B. dorsal view, under green fluorescence; C. ventral view, under green fluorescence. Scale bars: 500 μm. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)