

The Earliest Known Species of the Genus *Pleocoma* LeConte (Coleoptera, Scarabaeoidea, Pleocomidae) from the Mesozoic of China

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Abstract—*Pleocoma dolichophylla* sp. nov. is described from the Yixian Formation. The species is of special interest, since it represents an oligotypic recent genus currently living only in extreme western North America.

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INTRODUCTION

A well-preserved impression of a male beetle (Fig. 1a) has been discovered among materials collected near Chaomidian village, Liaoning Province, China; the combination of this specimen's characters allows unambiguously identifying it as a member of the superfamily Scarabaeoidea. This placement is evidenced by the antennae with a clearly impressed very long multiarticulate asymmetrical lamellate club, protibia with several large teeth along its anterior margin, and mesocoxae positioned at a right angle and very closely set (almost touching each other). The anterior margin of the beetle's head ends in two processes, which were initially erroneously identified as strongly elongate mandibles. Such a combination of characters as strongly elongate mandibles and antennae with a multiarticulate club only occurs in a number of taxa of the family Lucanidae Latreille, 1804, e.g., species of the genus *Syndesus* MacLeay, 1819. However, in lucanids, in those cases in which they have very long segments of the club and the club can even seem lamellate, the "lamellae" of the club cannot be tightly packed when folded. Therefore, the antennal club was truly lamellate, rather than pectinate, and it could open like a fan and had segments tightly packed when folded. A long lamellate club with a great number of segments occurs in a number of taxa of the family Scarabaeidae (some tribes of the subfamily Melolonthinae MacLeay, 1819) and species of the family Pleocomidae MacLeay, 1861. Detailed study of the procoxae revealed characters that allowed identifying the impression in question as a species of the family Pleocomidae. These characters include the procoxal cavities posteriorly open, with a large, clearly visible trochantin (the trochantin is more clearly visible on the right side of the beetle's body, while the posteriorly open procoxal cavity is more clearly visible on

the left side). It should be noted that a procoxal cavity with a clearly visible trochantin occurs in members of a number of taxa of the superfamily Scarabaeoidea, while the posteriorly open procoxal cavities are unique to the family Pleocomidae.

SYSTEMATIC PALEONTOLOGY

Family Pleocomidae LeConte, 1861

Subfamily Pleocominae LeConte, 1861

Genus *Pleocoma* LeConte, 1856

Pleocoma: LeConte, 1856, p. 24.

Type species. *P. fimbriata* LeConte, 1856; North America; Recent.

Diagnosis. Elongate oval, rather large beetles, displaying sexual dimorphism (males smaller, winged; females with reduced wings). Mandibles and labrum hidden under clypeus. Anterior margin of clypeus with high process directed dorsally or anterodorsally. Antennae 11-segmented, with 4–8-segmented lamellate club. Eye not divided by genal canthus. Procoxal cavity (with clearly visible trochantin, open posteriorly; mesocoxal cavities separated by very narrow process. Meso- and metatibia with one transverse carina externally.

Species composition. A little more than 30 species and subspecies in the recent fauna of North America (Hovore, 2002; Smith, 2009) and the species 1 described below from the Late Mesozoic of China.

Pleocoma dolichophylla Nikolajev et Ren, sp. nov.

Etymology. From the Greek *dolichos* (long) and *phyllon* (leaf).

Holotype. CNU-COL-LB2009725, almost complete impression of male beetle in ventral view, with indistinctly impressed apical abdominal seg-

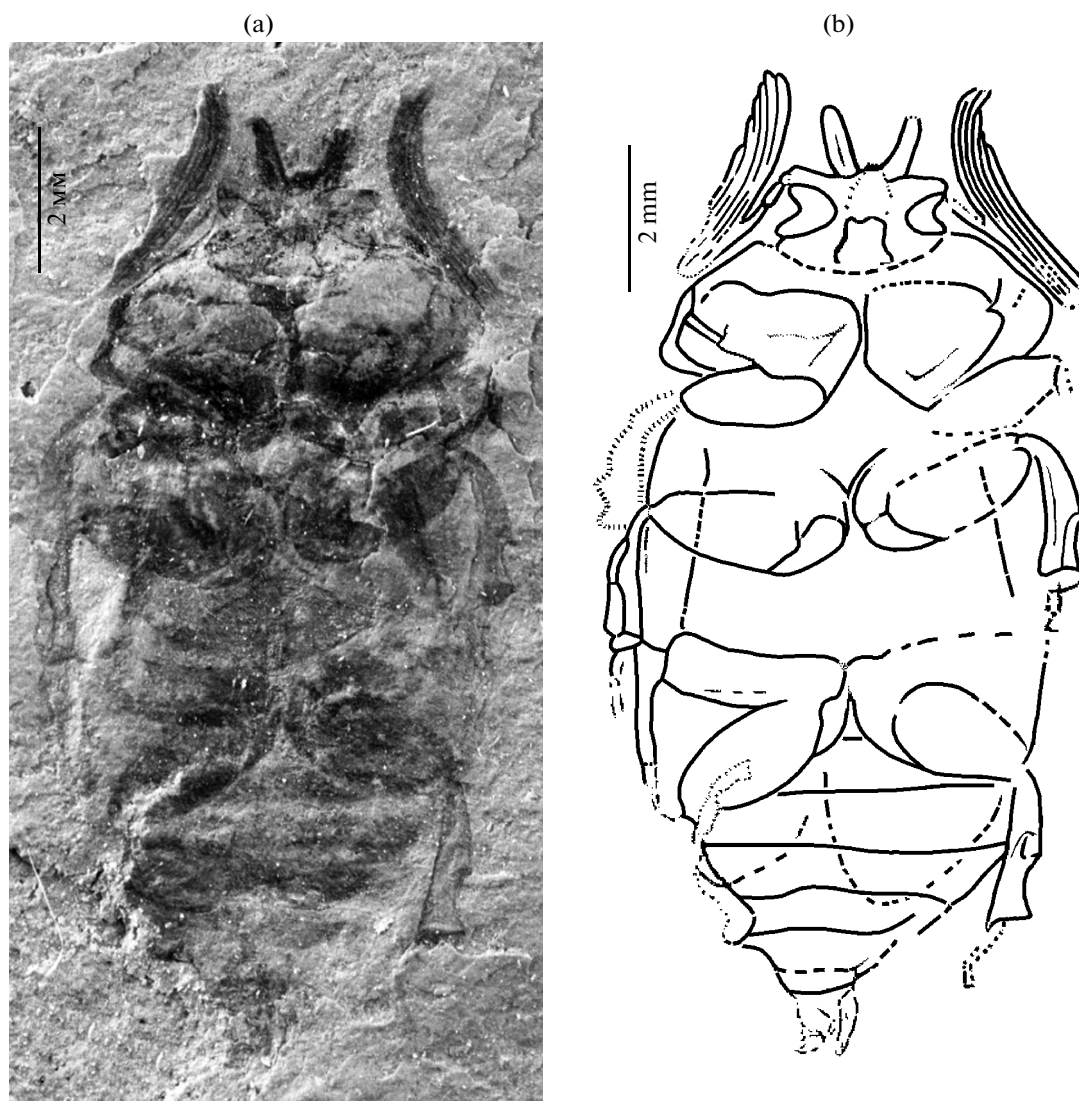


Fig. 1. *Pleocoma dolichophylla* sp. nov., holotype CNU-COL-LB2009725: (a) photograph of impression; (b) line drawing of morphological details.

ments. Meso- and metafemora and meso- and metatibiae on left side well-preserved. On right side, only midleg well-preserved; foreleg with tibia very poorly impressed; hindleg with tibia and tarsus very poorly impressed; People's Republic of China, Liaoning Province, environs of Chaomidian village; Lower Cretaceous, Yixian Formation.

Description (Fig. 1). The clypeus is long (only slightly shorter than the rest of the head); the middle portion of the anterior margin of the clypeus is deeply notched (almost to the base); the anterior angles are acute. The antennal club is multiarticulate (at least six-segmented); the segments of the club are very long, longer than the pronotum. The eye is large, not divided by genal canthus. The pronotum is somewhat wider than long, widest approximately in the middle; the anterior angles of the pronotum are blunt; the pos-

terior angles of the pronotum are broadly rounded. The meso- and metatibiae have one rather low transverse carina externally, somewhat lower than the middle of the tibiae's length.

Measurements, mm. Length of impression (from anterior angles of clypeus to elytral apex), 11.78; maximum width of pronotum, 5.4; length of antennal club, 3.4; distance between anterior angles of clypeus, 1.3; distance between external margins of genae, 2.36; length of mesothorax medially 1.95; width of procoxae, 1.47; length of mesofemur, 2.3; width of mesofemur, 0.9; length of mesotibia, 2.34; width of apical truncation of mesotibial apex, 0.87; length of metafemur, 1.97; width of metafemur, 1.18; length of metatibia, 2.23; width of apical truncation of metatibial apex, 0.69.

C o m p a r i s o n. The new species differs from the recent species of the genus in its small size (the male body length of the recent species ranges from 16.5 to 29.0 mm (Hovore, 2002; Scholtz and Grebennikov, 2005); very long, longer than the pronotum, segments of the antennal club; and very long clypeus, the anterior margin of which is directed anteriorly, rather than dorsally, as in most recent species. Recent species of the *Pleocoma* have processes directed dorsally and only slightly anteriorly at the angles of the anterior margin of the clypeus, although in *Pleocoma hoppingi* Fall, 1906 (Hovore, 1977, text-fig. 6) the processes are directed anteriorly. However, in *P. hoppingi* the clypeal processes are considerably shorter.

R e m a r k s. The long processes on the anterior margin of the clypeus were initially identified as mandibles protruding beyond it. In the fossil genus *Archescarabaeus* Nikolajev, 2010 mandibles are visible in dorsal view of the beetle's head. Based on this shape of the mouthparts, the genus was placed in a new subfamily. However, in the only species placed in the genus *Archescarabaeus*, the mandibles are rather small and do not protrude far beyond the anterior margin of the clypeus. More careful examination of this beetle's "mandibles" has shown that actually those are just processes developed on the anterior margin of the clypeus and characteristic precisely of recent species. Therefore, all identified morphological features of the beetle described do not "go" beyond the variation limits of the "generic" characters of *Pleocoma* and allow placing the new species in this genus.

M a t e r i a l. Holotype.

DISCUSSION

The Pleocomidae are represented in the recent fauna by a single genus, *Pleocoma* LeConte, 1856, known exclusively from the extreme western North America. The fossil taxa currently placed in this family are known from the Mesozoic of Asia (Nikolajev, 1992, 1996, 2002, 2007, 2010b; Krell, 2007). They have all been described from fossils far more poorly preserved than the specimen described in this study. Thus, the beetle described here differs from recent species only in quantitative characteristics: its smaller body, less protruding anterior margin of the clypeus, and very long antennal club. These characteristics unmistakably distinguish the specimen from all recent species of the genus. No characters contradicting the placement of the species in the genus *Pleocoma* have been found in this impression.

Not only does the record of the new species undoubtedly confirm the presence of pleocomids in the fauna of the Mesozoic, it is also interesting for revealing in the fossil fauna of the Eastern Hemisphere yet another taxon that remains extant only in the fauna of America. Interestingly, this is not the only family-group taxon that lived in the Mesozoic of the Eastern Hemisphere but has been recorded in the recent fauna

only in the Western Hemisphere. Over the last few years, several species of the family Hybosoridae (representing the subfamily Anaidinae Nikolajev, 1996 and the tribe Ivieolini Howden et Gill, 2000 of the subfamily Ceratocanthinae Martínez, 1968), the recent members of which currently live exclusively in South America (Nikolajev, 1996, 2010a; Nikolajev et al., 2010), have been described from the Mesozoic of Siberia and China. Another remarkable feature of the Mesozoic fauna revealed by investigators over the last few years is the presence in the Early Cretaceous not only of members of extant family-group taxa (subfamilies and tribes), but also of extant genera of several families. These include, above all, the type genera of the families Trogidae (Nikolajev, 2007, 2008a), Glaresidae (Nikolajev, 2007; Bai et al., 2010), and Glaphyridae (Nikolajev and Ren, 2011), as well as members of the genus *Trypocopriss* Motsch., 1860 of the family Geotrupidae (Nikolajev, 2008b) and the genus *Penichrolucanus* Deyrolle, 1863 of the family Lucanidae (Nikolajev, 2010c). The excellent preservation quality of several impressions of Mesozoic species allowed not only placing them in extant genera, but also finding their differences from all currently known species of the recent fauna. If such species were found in the recent fauna, it would probably "force" taxonomists to establish for them separate genus-group taxa (genera or subgenera), instead of placing them in nominal genera. However, even this possibility does not raise any doubts about the close relatedness between the above-mentioned extant genus-group taxa and the Mesozoic ones. In our opinion, findings of extant genera in the Mesozoic give evidence of an earlier age for many taxa of scarabaeoid beetles than was previously assumed a priori.

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