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The oldest fossil Ochodaeidae (Coleoptera: Scarabaeoidea) from the Middle Jurassic of China

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The relatively small family Ochodaeidae Mulsant & Rey, 1871 of the superfamily Scarabaeoidea Latreille, 1802 includes 13 genera and about 100 extant species and subspecies belonging to two subfamilies (Scholtz *et al*. 1988, Paulsen 2007, Nikolajev 2009). One more subfamily, Cretochodaeinae Nikolajev, 1995, is known only from fossils (Nikolajev 1995). In total, there are four known fossil species of Ochodaeidae belonging to three genera in two different subfamilies (Nikolajev 2007, Krell 2007). The monotypic genus *Mioochodaeus* Nikolajev, 1995 has been described from Oligocene Rott (Germany). The genera *Cretochodaeus* Nikolajev, 1995 and *Lithochodaeus* Nikolajev, 2007 are known from the Lower Cretaceous Bon-Tsagan (Mongolia).

Among specimens from the Middle Jurassic Daohugou beds (Jiulongshan Formation, Ningcheng County, Inner Mongolia in China, about 165 Ma: Ren *et al*. 2002, Chen *et al*. 2004, Rasnitsyn and Zhang 2004, Gao and Ren 2006) one representative of this family was recently found. Its taxonomic placement is unambiguous due to the antennae with 3-antennomere club, mandibles produced beyond apex of labrum, labrum produced beyond apex of clypeus, and eyes not divided by canthus. The purpose of this paper is to describe this new fossil genus and species and document the oldest known record of the family Ochodaeidae dating from the Mesozoic.

Material and methods

Materials collected from the Middle Jurassic Daohugou beds, Jiulongshan Formation, Ningcheng County, Inner Mongolia in China. The specimens were examined using a Leica MZ12.5 stereomicroscope. All photographs were taken with a Nikon Digital Camera DXM1200C. The holotype of the new species is deposited in Capital Normal University, Beijing, China.

Systematic palaeontology

Mesochodaeus new genus

(Figs. 1, 2)

Higher taxon names: Coleoptera: Polyphaga: Staphyliniformia: Scarabaeoidea: Ochodaeidae.

Family Ochodaeidae Mulsant & Rey, 1871; subfamily incertae sedis.

Type species: *Mesochodaeus daohugouensis* **sp. nov.**; Middle Jurassic, Daohugou beds, Ningcheng County, Inner Mongolia in China. **Here designated.**

Etymology: The name of the new genus refers to the era of its origin and the generic name *Ochodaeus* Dejean, 1821 (the type genus of this family); gender masculine.

Diagnosis and description: In additional to the species description given below, this genus can be diagnosed by the mandibles externally rounded, visible beyond labrum in dorsal view; mesocoxae appear to be contiguous (but probably very narrowly separated in life); mesotibiae with 2 or 3 transverse carinae along outer edge.

Composition: The type species only.

Remarks: It is impossible to determine an exact position of the genus *Mesochodaeus* within the family, because the structure of the mesotibial and metatibial spurs, wing venation, and a number of other key taxonomic characters are unknown.

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***Mesochodaeus daohugouensis* sp. nov.**
(Figs. 1, 2)

Holotype: CNU-COL-NN2009728, imprint of dorsal view, with good visible antennal club and left middle leg.

Etymology: The name of the new species is given for the locality where the fossil was collected.

Description: Body length 11.05 mm (excluding the apex of pygidium). Labrum bilobed. Anterior margin of clypeus nearly straight. Head slightly wider than long. Frons with two tubercles at anterior margin. Pronotum emarginate laterally, with arcuate lateral edges. Scutellum triangular. Elytra with striae, slightly wider than prothorax. Mesotibia distinctly longer than mesotarsus. Mesotarsomere 1 somewhat longer than mesotarsomeres 2 and 3 combined.

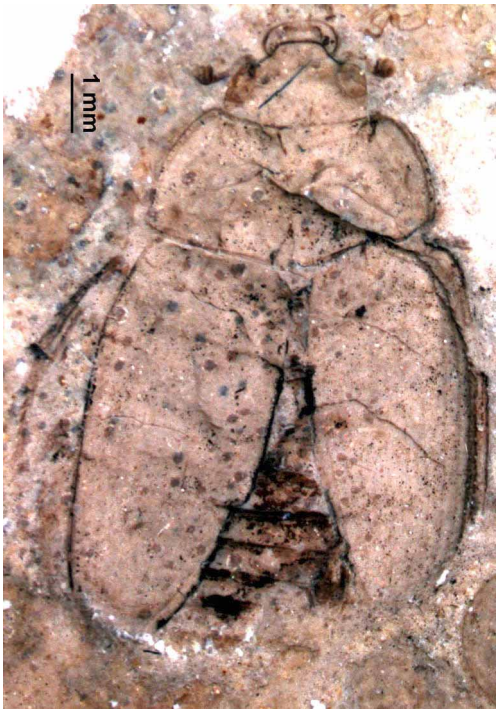


FIGURE 1. Photograph of the holotype of *Mesochodaeus daohugouensis*.

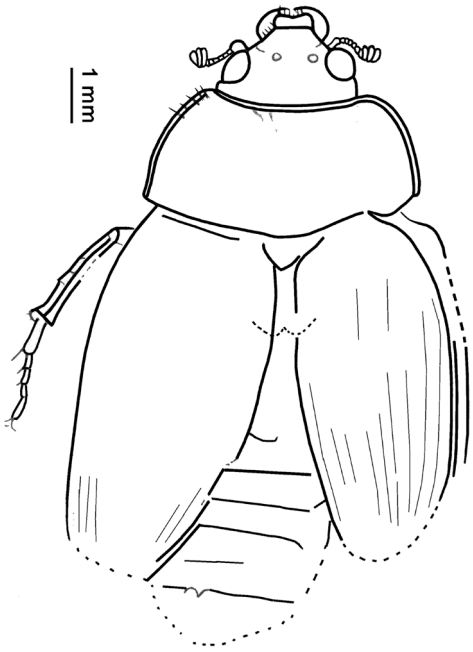
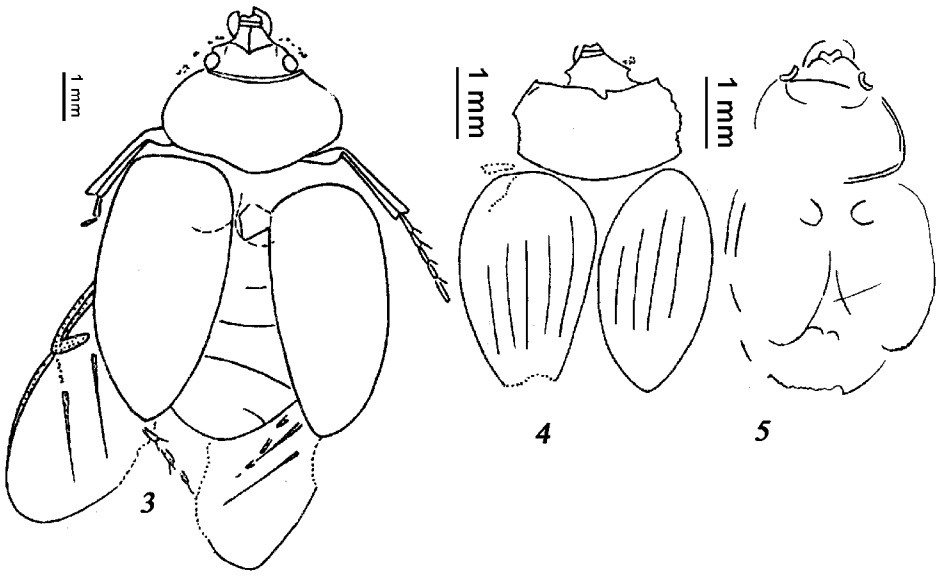


FIGURE 2. *Mesochodaeus daohugouensis* holotype, dorsal view.



FIGURES 3–5. Mesozoic (Lower Cretaceous) Ochodaeidae: 3—*Cretochodaeus mongolicus*; 4— *C. striatus*; 5—*Lithochodaeus cretaceus*.

Measurements: Body length 11.05 mm (excluding the apex of pygidium); width of head 2.5 mm; median length of pronotum 2.5 mm, width 4.7 mm; elytron length at least 7.1 mm, width 3.4 mm; mesotibia length 2.3 mm; mesotarsus length 1.9 mm.

Remark: A comparison and diagnosis of the new species with other Mesozoic Ochodaeidae is given in the key below.

Key to the known Mesozoic species of Ochodaeidae

1. Body small (about 6 mm) 2
- Body large (10–12 mm) 3
2. Elytron with striae well defined (Fig. 4) ..... *Cretochodaeus striatus* Nikolajev
- Elytron without obvious striae (Fig. 5) ..... *Lithochodaeus cretaceus* Nikolajev
3. Mesotibiae without transverse carinae along outer edge (Fig. 3) ..... *Cretochodaeus mongolicus* Nikolajev
- Mesotibiae with transverse carinae along outer edge (Fig. 1–2) ..... *Mesochodaeus daohugouensis* **sp. nov.**

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