

# The first find of chrysomelids (Insecta: Coleoptera: Chrysomeloidea) from Callovian–Oxfordian Daohugou biota of China

## Première découverte de Chrysomélidés (Insecta : Coleoptera : Chrysomeloidea) dans le Callovien–Oxfordien de Daohugou (Chine)

Jun-Feng Zhang

*Nanjing Institute of Geology and Palaeontology, Chinese Academy of Sciences, Nanjing 210008, China*

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### Abstract

*Tarsomegamerus mesozoicus* nov. gen., nov. sp., an almost complete specimen of leaf beetle from the Callovian–Oxfordian of Daohugou Formation in Inner Mongolia, China is described. *Tarsomegamerus mesozoicus* is assigned to the Protoscelinae (Chrysomelidae, Coleoptera). This new leaf beetle represents the first record of chrysomeloids from Mesozoic of China and it extends the geographical distribution of Protoscelinae from central Asia into eastern Asia. This find provides new fossil material for studying the origin and evolution of Chrysomeloidea and by making a stratigraphic correlation of the correlative non-marine sedimentary rocks. Although the age of the Daohugou Formation is debatable it is most likely Callovian–Oxfordian (latest Middle Jurassic–earliest Late Jurassic) rather than early Middle Jurassic (late Aalenian–early Bajocian) or Early Cretaceous.

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### Résumé

*Tarsomegamerus mesozoicus* nov. gen. nov. sp., un spécimen presque complet de chrysomélidé du Callovien–Oxfordien de la formation de Daohugou en Mongolie intérieure, Chine, est décrit sous le nom de *Tarsomegamerus mesozoicus*. L'insecte est assigné à la sous-famille Protoscelinae (Chrysomelidae, Coleoptera). Le nouveau chrysomélidé représente la première découverte de chrysoméloïdés dans le Mésozoïque de Chine. Il étend la distribution géographique des Protoscelinae de l'Asie Centrale jusqu'à l'Asie Orientale à cette époque. Cette découverte fournit ainsi du matériel fossile nouveau pour étudier l'origine et l'évolution des Chrysomélidés, et pour établir aussi une corrélation stratigraphique entre roches sédimentaires terrestres apparentées. Bien que l'âge de la formation Daohugou soit discuté, celle-ci est très probablement d'âge Callovien–Oxfordien (Jurassique moyen tardif–début Jurassique supérieur), plutôt que Jurassique moyen (Aalénien tardif–début Bajocien) ou début Crétacé.

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**Keywords:** Insecta; Coleoptera; Chrysomelidae; Protoscelinae; *Tarsomegamerus mesozoicus* nov. gen., nov. sp.; Jurassic; China

**Mots clés :** Insectes ; Coléoptères ; Chrysomelidae ; Protoscelinae ; *Tarsomegamerus mesozoicus* nov. gen., nov. sp. ; Jurassique ; Chine

### 1. Introduction

The Chrysomelidae (Chrysomeloidea, Coleoptera) is one of the most abundant and diverse subfamilies of living insects. While it constitutes more than 50,000 extant species worldwide (Lopatin, 1984), extrapolation of the number of species

is difficult (May, 1990). Among them, about 1500 Chinese species placed in 200 genera have been recorded (Yang, 1999). However, hypotheses on the relationships among the families of Chrysomeloidea and chrysomelid subfamilies vary considerably (Crowson, 1981; Seeno and Wilcox, 1982; Suzuki, 1985, 1996; Chen, 1985; Chen et al., 1986; Lawrence and Britton, 1991; Schmitt, 1996; Santiago-Blay, 2004a etc.). Additionally, alone extinct subfamily Protoscelinae was proposed and arranged to Chrysomelidae (Medvedev, 1968).

*E-mail address:* [jfzhang@nigpas.ac.cn](mailto:jfzhang@nigpas.ac.cn) (J.-F. Zhang).

There are, at least, 35 species, 19 genera, and nine subfamilies of leaf beetles reported from the Mesozoic (Santiago-Blay, 1994, 2004b). Although in earlier works some taxa were identified as chrysomeloids (Chrysomelidae or Cerambycidae), such as *Chrysomelites* Heer, 1865, *Meseumolpites jurassicus* (Martynov, 1926) (originally *Eumolpites jurassicus* Martynov, 1926) *Mesosagrites multipunctatus* Martynov, 1935, *Parandrexia parvula* Martynov, 1926, *P. beipiaoensis* Hong, 1983 (Heer, 1865; Martynov, 1926, 1935; Ponomarenko, 1962; Hong, 1983), etc., many other researchers have argued that the taxonomic position of at least some of the species is questionable or incorrect at familial, or even superfamilial, level (Medvedev, 1968; Crowson, 1981; Carpenter, 1992; Kirejtshuk, 1994; Santiago-Blay, 1994, 2004b). The reason is that these Mesozoic species are based on ill-preserved specimens or beetle fragments. In one case, a supposed chrysomelid turned out to be a piece of plant material (Santiago-Blay, 1994).

Up to date, five species in four genera have been recorded and assigned to Protoscelinae. All of them are based on relatively well-preserved specimens and, known from the late Callovian–Kimmeridgian Karabastau Formation in Karatau of Kazakhstan (Medvedev, 1968). They may constitute the first good evidence of leaf beetles. Nevertheless, some coleopterists have noted that, among the Protoscelinae, some taxa have long antennae and other cerambycid-like features (Crowson, 1975, 1981; Santiago-Blay, 1994, 2004b). In addition, although *Protoscelis tuanwangensis* Hong and Wang, 1990 from the uppermost Jurassic–lowest Cretaceous Laiyang Formation, Shandong, China has been assigned into Protoscelinae (Hong and Wang, 1990) I consider it to be a poorly preserved specimen of beetle and its familial position is uncertain.

On the basis of an almost complete fossil leaf beetle from the Daohugou Formation near village of Daohugou in Shantou Town of Ningcheng Area (Chifeng City, Inner Mongolia, China), a new species and a new genus, *Tarsomegamerus mesozoicus* nov. gen., nov. sp., that I assign to the Protoscelinae is described in the present paper. It is the first find of chrysomeloids from the Mesozoic of China, and then, the Daohugou Formation becomes the second protosceline-bearing locality. Thus, the geographical distribution of the Protoscelinae is extended from central Asia into eastern Asia during the Jurassic. This find provides new fossil material for studying the origin and evolution of the Chrysomeloidea, and by making a stratigraphic correlation of the correlative non-marine sedimentary rocks as well. Detail discussion is proposed below. Nomenclature of hind wing venation in the description follows Lawrence and Britton (1991).

## 2. Systematic paleontology

Class INSECTA Linnaeus, 1758.

Order COLEOPETRA Linnaeus, 1758.

Suborder POLYPHAGA Emery, 1886.

Superfamily CHRYSOMELOIDEA Latreille, 1802.

Family CHRYSOMELIDAE Latreille, 1802.

Subfamily PROTOSCELINAE Medvedev, 1968.

Genus *Tarsomegamerus* nov. gen.

**Type Species:** *Tarsomegamerus mesozoicus* Zhang, nov. sp.

**Derivation of name:** The “tarso” refers to “tarsus”, and “megamerus” to the Recent genus “*Megamerus*”.

**Diagnosis:** Moderately large beetles (body length ca. 15 mm, width ca. 6 mm). Body clearly convex and somewhat elongated. Head short and wide, distinctly transverse, and a little narrowed beyond eyes. Occiput strongly convex. Postoccipital region (between occiput and pronotum) relatively constricted. Clypeus much wider than long. Eyes moderately large, ovate, without excisions in their inner edges. Antennae short, less than one-third of length of body (e.g. shorter than length of head and pronotum combined), filiform, with scape and pedicel slightly short and thick, each of flagellomere subequal in length, nearly oblong, slightly wider apically than basally. Pronotum large, distinctly longer than head and, about quarter of length of elytrum, slightly narrower than elytra, with its anterior margin a little concave medially, posterolateral angles rounded, and median longitudinal furrow present. Scutellum small, semicircular. Metasternum with median longitudinal furrow. Elytral epipleura narrow. Elytra with puncta arranged in nine striae. The r cell of hind wing large and elongate. Legs short. Front and mid coxae ovate, and separated from each other, hind coxae elongate-triangular, running somewhat oblique. Tibiae of all legs armed with median carinae, and spurs invisible (probably absent). First three tarsal segments short, with lobes beneath them which are covered with short setae, each of two to four tarsal segments arising, respectively, from median of preceding segment, fourth tarsal segment minute and concealed at middle of preceding segment (pseudotetramerous), fifth tarsal segment clavate (widened apically), and longer than first three segments. Claws simple, thick and long, obviously divergent. Abdomen with five ventrites, first four ventrites subequal in length, with fifth ventrite slightly longer than others.

**Distribution and Geological age:** Inner Mongolia (= Nei Monggol Autonomous Region), China; Callovian–Oxfordian, approximately 164–156 Ma.

*Tarsomegamerus mesozoicus* Zhang nov. sp.

Figs. 1 and 2.

**Material:** Specimen DHG200031, holotype, a nearly complete adult of leaf beetles, dorso-ventral aspect. Coll. J. Zhang, housed in the Nanjing Institute of Geology and Paleontology, Chinese Academy of Sciences, Nanjing, China.

**Derivation of name:** The “mesozoicus” refers to “Mesozoic”.

**Type locality:** Holotype: Daohugou Formation outcrop, Village of Daohugou in Shantou Town, Chifeng City, Inner Mongolia (= Nei Monggol Autonomous Region), China.

**Stratum typicum:** Lacustrine shale from the Daohugou Formation of Callovian–Oxfordian, approximately 164–156 Ma.

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