

The first fossil species of subfamily Piestinae (Coleoptera: Staphylinidae) from the Lower Cretaceous of China



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ARTICLE INFO

Article history:

Received 7 November 2015

Received in revised form

5 February 2016

Accepted in revised form 1 March 2016

Available online 3 March 2016

Keywords:

Staphylinidae

Piestinae

New genus and new species

Lower Cretaceous

China

ABSTRACT

Two new Early Cretaceous fossil rove beetle species, *Paleosiagonium brevelytratum* n. gen. n. sp. and *Paleosiagonium adaequatum* n. gen. n. sp. are described from the Lower Cretaceous Yixian Formation of Liaoning Province, China. They are clearly placed in the extant Piestinae according to the following characters: body elongate and flat; anterior coxae small and globose; abdomen long and parallel-sided, with six visible sterna and one pair of paratergites on segments III–VII. This is the first report on the occurrence of the coleopteran subfamily Piestinae in the fossil record. The new discoveries indicate that Piestinae have originated at least by the Early Cretaceous, at about 125–120 Ma.

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1. Introduction

Piestinae nowadays includes seven extant genera and about 109 described species: *Eupiestus* Kraatz, 1859, 21 species in the eastern Palearctic and Oriental regions; *Hypotelus* Erichson, 1839a, 8 species in the Nearctic and Neotropical regions; *Parasiagonum* Steel, 1950, one species from New Zealand; *Prognathoides* Steel, 1950, one species from Australia; *Piestoneus* Sharp, 1889, 5 species from the eastern Palearctic region; *Piestus* Gravenhorst, 1806, 49 species from the Nearctic and Neotropical regions; and *Siagonium* Kirby & Spence, 1815, 24 species in the Holarctic and Neotropical regions (Caron et al., 2012). The subfamily is not divided into tribes. Previously, it was subdivided into various tribes, subtribes and genera. Now, some of that diversity has been transferred to other staphylinid subfamilies, including Osoriinae, Micropeplinae, Pseudopsinae, Trigonurinae and Apateticinae. The seven genera included in the Piestinae are closely similar to members of Osoriinae, except for the fact that the former has abdominal paratergites (Newton et al., 2000). But no cladistic analysis has been presented for corroborating its monophyly, as well as the relationship with Osoriinae

(Caron et al., 2012). Adults of Piestinae are characterized by body relatively elongate and depressed; antennae inserted under shelf-like corners of frons; procoxae small, globose; protrochantin exposed; abdomen long and parallel-sided, with six visible sterna and one or two pairs of paratergites per segment; tarsi 5–5–5. Most species are saprophages or mycophages and they occur under bark of decaying trees (Thayer, 2005).

Until now, three fossil genera presumably related to Piestinae were reported: *Abolescus* Tichomirova, 1968, *Kovalevia* Ryvkin, 1990 and *Trigunda* Ryvkin, 1990. *Abolescus* was previously assigned to Piestini Erichson, 1839b before Grebennikov moved it to the Trigonurinae (Tichomirova, 1968; Grebennikov and Newton, 2012). In the original reference, *Kovalevia* Ryvkin, 1990 and *Trigunda* Ryvkin, 1990 were both placed in the tribe Trigonurini, which was attributed to Piestinae (Ryvkin, 1990), but was treated as a separate subfamily Trigonurinae (Newton and Thayer, 1992). In a restricted sense, the former tribe Trigonurini was excluded from Piestinae (Thayer, 2005). With removal of these three genera previously assigned to Piestinae, the subfamily lacks a fossil record. The origin and early evolution of this staphylinid subfamily remains a mystery. Recently, two well-preserved impression fossils have been collected from the Yixian Formation (Lower Cretaceous, Aptian, ca. 125–120 Ma) at Huangbanjigou, Chaomidian Village, Shangyuan Township, Beipiao City, Liaoning Province of north-eastern China

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(Fig. 1) (Yao et al., 2014; Ding et al., 2015; Shi et al., 2015; Wang et al., 2015; Labandeira et al., 2016). They represent one new genus with two new species belonging to the extant subfamily Piestinae. Here, we describe the new taxa and discuss their phylogenetic significance.

2. Material and methods

The type specimens described herein are housed in the Key Laboratory of Insect Evolution & Environmental Changes, Capital Normal University, Beijing, China. They were examined using an Olympus SZX16 dissecting microscope. Pencil drawings were inked with the Adobe Photoshop CS3 software. The specimens were photographed dry and wet (with 70% alcohol) with a digital camera attached to the Olympus SZX16 microscope. All taxonomic acts established in the present work have been registered in ZooBank LSID (see below), together with the electronic publication urn:lsid:zoobank.org:pub:6A79AD8A-1425-4E3C-A3DD-OEE6B624650A.

3. Systematic palaeontology

Order Coleoptera [Linnaeus, 1758](#)
 Family Staphylinidae [Latreille, 1802](#)
 Subfamily Piestinae [Erichson, 1839b](#)

Genus *Paleosiagonium* gen. nov.
 (urn:lsid:zoobank.org:act:3909DEF7-CCAC-49DB-A09F-7685E4B57673)

Type species: *Paleosiagonium adaequatum* sp. nov.

Etymology. The name of the new genus is composed of the Latin prefix paleo- and the extant genus name *Siagonium*, with which it has an affinity; it is neuter in gender, like the base name.

Diagnosis. Antennae short; tempora longer than eyes; gular sutures very narrowly separated, distinctly diverging anteriorly and posteriorly; protibia without thick spines along outside edge; elytra short, without row of fused punctures; abdomen with elongate longitudinal median carina on abdominal sternite III, tergites III–VII each with one pair of curved basolateral ridges and two basal carinae.

Key to the species of *Paleosiagonium* gen. nov.

1. Head parallel-sided along most of its length, antennomeres 1 and 2 elongate, 1 longer than 2, mandibles smoothly sharp towards apex, with two teeth each side, the tooth near apex as the same size as the one near base.....*P. adaequatum*

– Head narrower in front of attachment to prothorax, antennomere 1 elongate, about as long as 2–4 combined; mandibles abruptly tapered toward pointed apices, with two teeth on inner margin each side, the tooth near apex much smaller than the one near base.....*P. brevelytratum*

***Paleosiagonium adaequatum* gen. et sp. nov.**

(Fig. 2)

(urn:lsid:zoobank.org:act:384EF897-2813-4AED-B6EA-C28025ECB903)

Diagnosis. Head parallel-sided along most of its length, antennomeres 1 and 2 elongate, 1 longer than 2, mandibles with two teeth each side, the tooth near apex as the same size as the one near

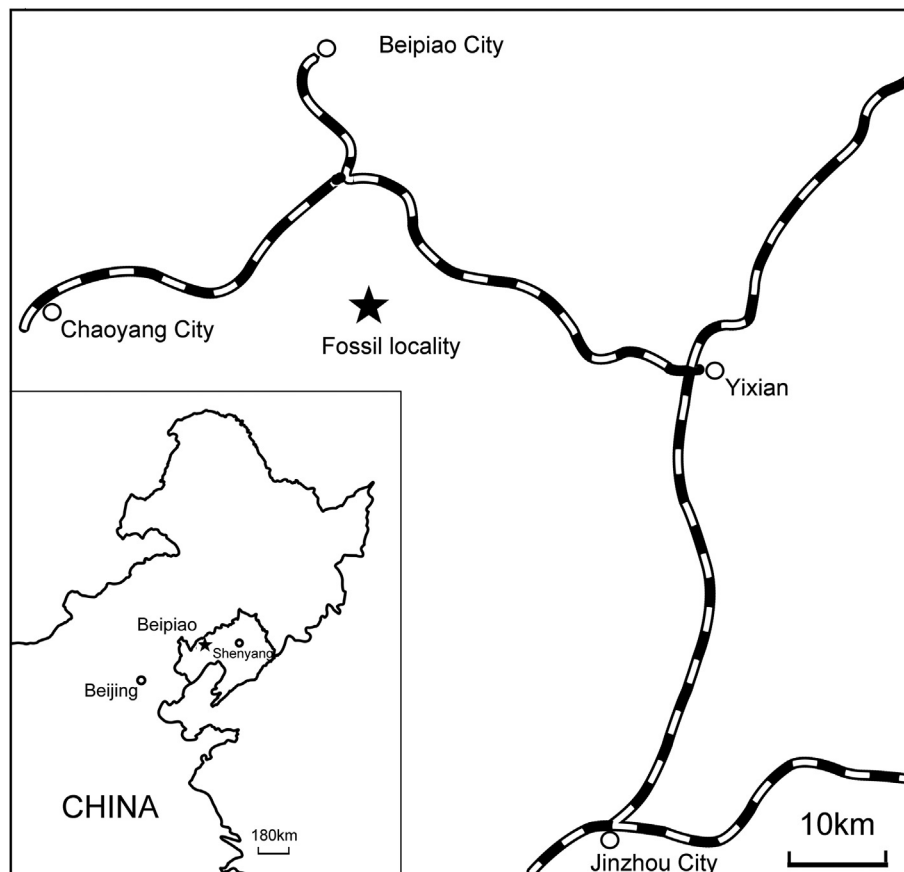


Fig. 1. Map of the fossil locality, with the solid star indicating the fossil site (120°50'E, 41°37'N).

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