

First fossil Eccoptarthridae (Coleoptera: Curculionoidea) from the Mesozoic of China

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Abstract

In this paper a new species *Cretonanophyes zherikhini* sp. nov. and a new genus and species *Abrocar brachyorhinos* gen. et sp. nov., all placed within the family Eccoptarthridae, are described and illustrated. They pertain to the Late Jurassic Yixian Formation of the western Liaoning province, China. This finding represents the first record of fossil eccoptarthrids from China.

Key words: fossil, weevil, Eccoptarthridae, new taxa, Late Jurassic, Yixian Formation, Liaoning

Introduction

The family Eccoptarthridae is now a relict group comprising four extant genera occurring in Australia and South America (Kuschel 1992, Zimmerman 1994). However the fossils of this family are distributed worldwide and are represented by eleven species belonging to nine genera (Arnoldi 1977, Zherikhin 1977, Kuschel 1992, Gromov *et al.* 1993, Zherikhin & Gratshev 1997, Gratshev & Zherikhin 1999, Gratshev & Zherikhin 2000a, Gratshev & Zherikhin, 2000b, Zherikhin & Gratshev 2004). The earliest occurrence of eccoptarthrids has been assigned to the Late Jurassic, for which two species have been described: *Eccoptarthrus crassipes* Arnoldi, 1977 from the Karatau Range in South Kazakhstan, and *Gobicar ponomarenkoi* Gratshev & Zherikhin, 1999 from the Shar-Teg in Mongolia. The family underwent diversification in the Early Cretaceous. Seven species and five genera have so far been reported from the Early Cretaceous: two from the Trans-Baikal of Russia (Zherikhin 1977), one from the western Okhotsk region of Russia (Gromov *et al.* 1993), three from the Sierra del Montsec of Spain (Zherikhin & Gratshev 1997, Gratshev & Zherikhin 2000a), and one from the Santana Formation of Brazil (Zherikhin & Gratshev 2004). Besides, 25 specimens assigned to this family without description have been

reported from the Bon-Tsagaan of Mongolia (Zherikhin & Gratshev 2004). Records of Late Cretaceous and Cenozoic eccoptarthrids are rare, as only two genera and two species have been recorded: *Cretocar luzzii* Gratshev & Zherikhin, 2000b from the Late Cretaceous New Jersey amber, and *Baltocar succinicus* Voss, 1953 (Kuschel 1992) from the Oligocene Baltic amber.

Although the Mesozoic non-marine sedimentary strata from northern China provide a large amount of fossil insects, published information on weevils is rare. Only two belids and a nemonychid have been described (Hong 1984, Ren *et al.* 1995, Zhang 1997). Recently we discovered two fossil eccoptarthrids collected from the Yixian Formation of western Liaoning, China. Accordingly, this paper describes a new species in the genus *Cretonanophyes* Zherikhin, 1977 and a new genus including one new species assigned to the family Eccoptarthridae. Our findings represent the first record of fossil eccoptarthrids from China.

The age of the Yixian Formation is still controversial. Based on the biostratigraphical correlation and radiometric dating methods, three estimations were proposed: the Late Jurassic (Ren *et al.* 1997, Zheng *et al.* 2003), the transition from Late Jurassic to Early Cretaceous (Chen *et al.* 2004, Wang *et al.* 2004, Wang *et al.* 2005), and the Early Cretaceous (Swisher *et al.* 1999, Li *et al.* 2001, Pang *et al.* 2002, Zhou *et al.* 2003). At the present, we cannot draw a definite conclusion about its certain age solely based on our current weevil data because only one fossil weevil was reported from the Yixian Formation (Hong 1984). Here, we tentatively consider the age of the Yixian Formation as Late Jurassic.

Material and methods

The specimens were examined under a LEICA MZ12.5 dissecting microscope and illustrated with the aid of a camera lucida attached to the microscope. All the type specimens studied in this paper are housed in the Key Lab of Insect Evolution & Environmental Changes, the College of Life Sciences, Capital Normal University, Beijing, China (CNU; Ren Dong, Curator).

We follow the systematic arrangement of the Eccoptarthridae proposed by Zherikhin & Gratshev (1995, 1997), thus considering Eccoptarthridae as a separate family, with Caridae Zimmerman (1994) being a synonym of this family.

Systematic paleontology

Order Coleoptera Linnaeus, 1758

Superfamily Curculionoidea Latreille, 1802

Family Eccoptarthridae Arnoldi, 1977

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Tribe Eccoptarthrini Arnoldi, 1977

Genus *Cretonanophyes* Zherikhin, 1977

Type species. *Cretonanophyes longirostris* Zherikhin, 1977, Lower Cretaceous, Trans-Baikal of Russia.

Species included

Three species: *C. longirostris* (type species, Lower Cretaceous, Trans-Baikal of Russia); *C. rugosithorax* Gratshev & Zherikhin, 2000a (Lower Cretaceous, Sierra del Montsec of Spain); the third is the new one described below.

Emended diagnosis

Body arched in lateral view. Rostrum convex, longer than head and pronotum together, nearly parallel-sided. Antennae inserted near base of rostrum; scape long, but not reaching base of rostrum; club distinct. Fore coxae reaching fore margin of prothorax. Legs long, slender; bases of tibiae curved distinctly; first tarsal joint large, nearly triangular; claws free, paired, without tooth.

Remarks

The diagnosis of this genus is emended on the basis of *C. rugosithorax* and the new one.

***Cretonanophyes zherikhini* sp. nov.**

Fig. 1A–C

Material

Holotype CNU-C-LB2005103, CNU-C-LB2005104, part and counterpart impression of complete weevil in ventrolateral position.

Locality and horizon

Yixian Formation, Upper Jurassic, Huangbanjigou, Chaomidian Village, Beipiao City, Liaoning Province, China.

Etymology. This species is named in honor of the distinguished Russian palaeoentomologist V. V. Zherikhin for his excellent work on fossil weevils.

Description

Length (excluding rostrum) 4.8 mm, rostrum length 2 mm. Body dark, arched in

lateral view. Rostrum convex, long, 1.5 times longer than head and pronotum together, nearly parallel-sided, gradually becoming thicker towards apex, 9 times longer than broad; mandibles small and shorter than apical width of rostrum.

Antennae inserted at 1/4 from base of rostrum, reaching mesothorax; scape long, but not nearly reaching base of rostrum; funicular joints longer than wide; club distinct, its joints nearly rounded. Frons narrow; eyes medium sized, longer than width of rostrum at its base, dorsolaterally positioned; gena longer than eyes.

Pronotum transverse, slightly convex, 2 times broader than long, its base 1.3 times as long as its apex; mesothorax combined with metathorax 2.4 times as long as pronotum and 0.8 times as long as abdomen.

Legs long, slender; fore femora intermediate in width; fore tibiae curved at base, 1.4 times longer than fore femora, gradually becoming thicker towards apex; fore tarsi 1.5 times shorter than tibiae, first tarsal joint large, nearly triangular, second tarsal joint half as long as first, third joint distinctly bilobate, fourth joint rectangle, as long as first but much thinner; claws free, paired and large, without tooth; bases of mid and hind tibiae curved distinctly; mid and hind tarsi similar to fore tarsi; hind femora inflated.

Abdomen with five sternites, with first and last sternites longest; elytra probably similar in length to abdomen, orientation convex as pronotum.

Remarks

The following features of this fossil indicate an affinity with the family E ccoptarthridae: the rostrum is distinctly longer than the head and pronotum combined, the antennae are inserted near the base of rostrum, first tarsal joint is inflated. Moreover, the long and basally distinctly curved tibiae justify a placement of this species within the genus *Cretonanophyes*. The new species can be distinguished from *C. longirostris* by its larger size, the less convex pronotum and elytra, smaller eyes, and longer gena. It closely resembles *C. rugosithorax*, however, its large size, the slightly widening apex of the rostrum, the long claws and the inflated hind femora indicate that it represents a new species.

Genus *Abrocar* gen. nov.

Type species. *Abrocar brachyorhinos* gen. et sp. nov., by present designation.

Etymology

The name is derived from the Greek prefix *abr* (meaning “elegant”) and the genus *Car* (the type genus of this family); gender masculine.

Species included

Only the type species: *Abrocar brachyorhinos*.

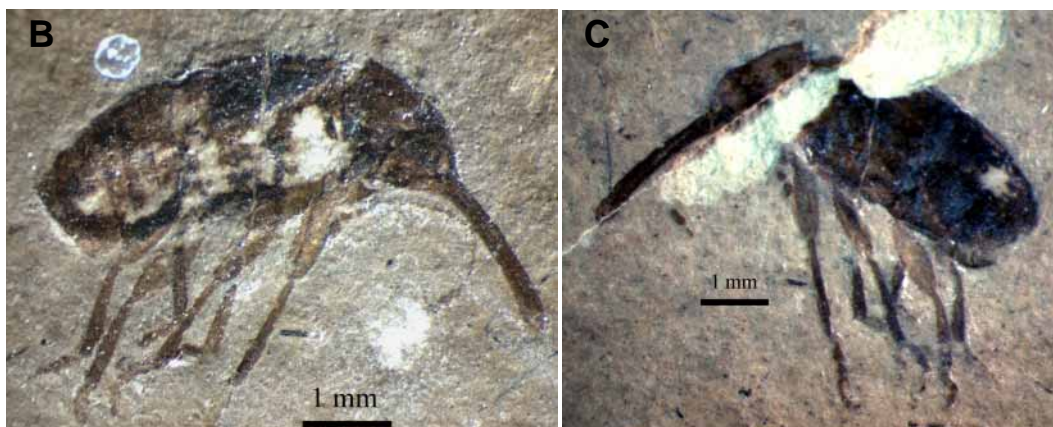
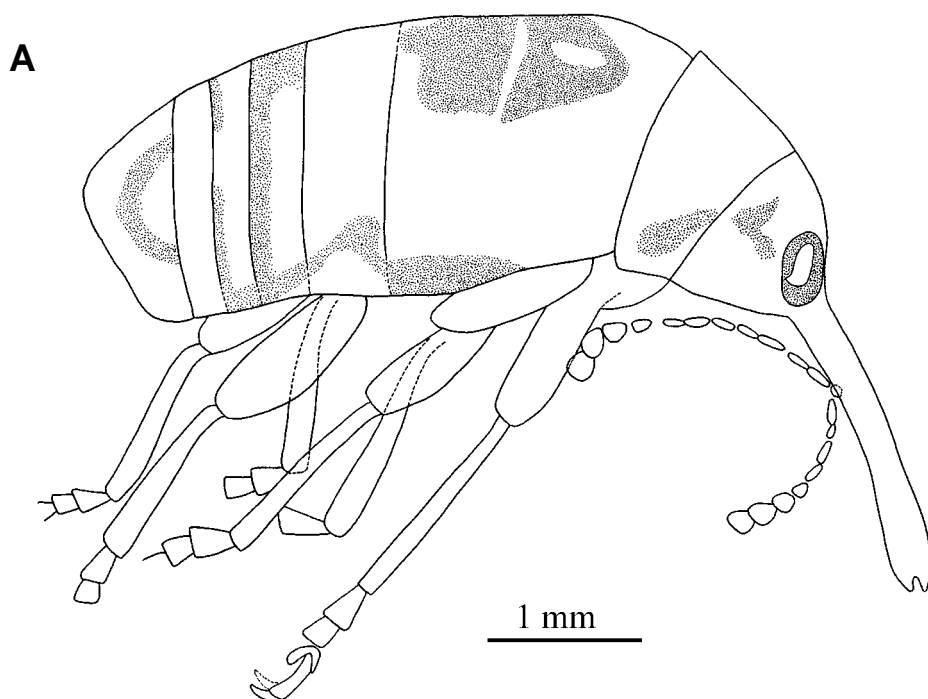


FIGURE 1. *Cretonanophyes zherikhini* sp. nov., holotype, habitus (lateral view): A, line drawing; B, photograph of part CNU-C-LB2005103; C, photograph of counterpart CNU-C-LB2005104.

Diagnosis

Small, shorter than 5 mm; arched in lateral view. Rostrum convex, parallel-sided, slightly shorter than head and pronotum together; mandibles small. Antennae inserted laterally near base of rostrum, not exceeding hind margin of head; scape longer and thicker than first funicular joint; club distinct. Head large; frons broad; eyes rounded, intermediate in size, dorsolaterally positioned; gena not shorter than eyes. Pronotum transverse, slightly convex, its base wider than its apex. Legs long, slender; fore coxae large and prominent, originating in the antemedial region of prothorax; femora intermediate in size; tibiae

straight, longer than femora, hind tibiae gradually becoming thicker towards apex; tarsi long; first tarsal joint not inflated. Elytra not shorter than abdomen, broadly rounded at apex, with rows of distinct rounded punctuation.

Remarks

The following features of this fossil weevil place it in the family Eccoptarthridae: a small and convex body, the antennae are inserted near the base of the rostrum, a distinct club, and long and slender legs. Moreover, its rostrum is a little shorter than the head and pronotum combined, thereby differing from other eight genera in the family except *Gobicar*. The new genus can be distinguished from the genus *Gobicar* in more convex pronotum and elytra, the distinct antennal club, the antemedial position of the fore coxae, and the distinct punctuation on elytra. Also, the new genus resembles the genus *Cretonanophyes*, however, relatively short rostrum, the short antennal scape, the straight tibiae, and the unmodified first tarsal joint indicate that our fossil represents a new genus.

***Abrocar brachyorhinos* sp. nov.**

Fig. 2 A–B

Material

Holotype CNU-C-LB2005105, an impression of the complete weevil in ventrolateral position.

Locality and horizon

Yixian Formation, Upper Jurassic, Huangbanjigou, Chaomidian Village, Beipiao City, Liaoning Province, China.

Etymology

The name is derived from the Greek prefix *brachy* (meaning “short”) and *rhinos* (meaning “nose”), in reference to its relatively short rostrum.

Description

Length (excluding rostrum) 2.5 mm, rostrum length 0.8 mm. Body pale, arched in lateral view. Rostrum long, a little shorter than head and pronotum together, parallel-sided, 6 times longer than broad; mandibles small.

Antennae inserted laterally on rostrum, at 1/3 from base of rostrum, nearly reaching hind margin of head; scape thick, 2.8 times as long as wide, 2 times as long as first funicular joint; basal three funicular joints longer than wide, apical four funicular joints nearly as long as broad; club distinct, joints nearly rounded. Head large; frons broad; eyes intermediate in size, width similar to base of rostrum, dorsolaterally positioned; gena as long as eyes.

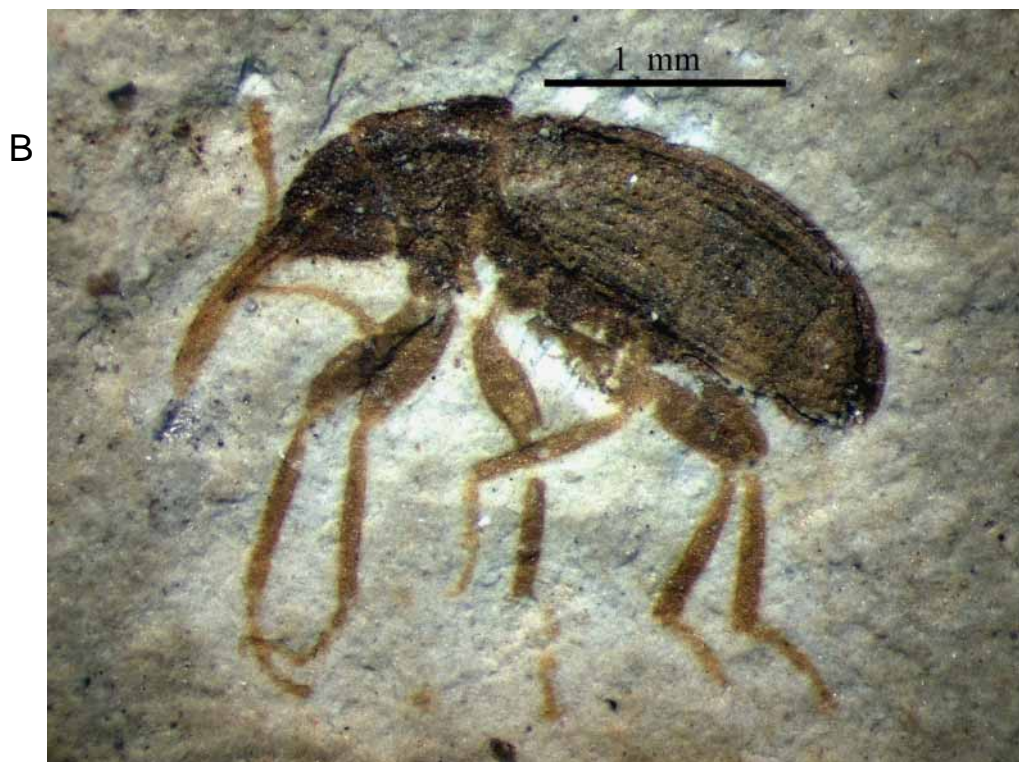
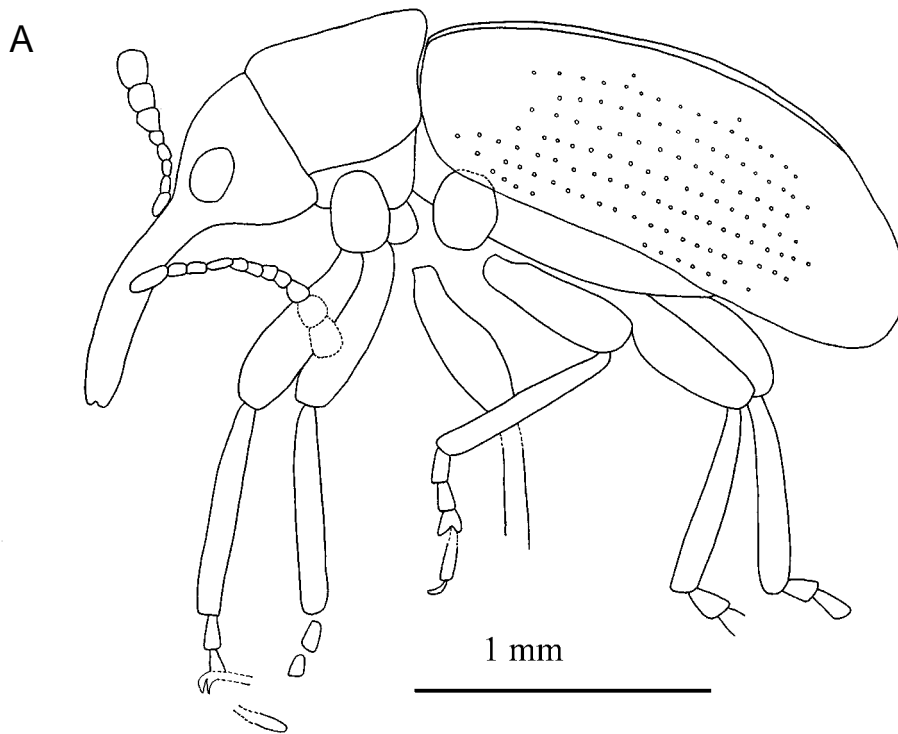


FIGURE 2. *Abrocar brachyorhinos* gen. et sp. nov., holotype, habitus (lateral view), CNU-C-LB2005105: A, line drawing; B, photograph.

Pronotum gently convex, 1.7 times longer than head, its base 1.3 times as long as its apex. Fore coxae large and prominent, originating before mid section of prothorax; femora intermediate in width; fore tibiae straight, parallel-sided, 1.2 times longer than femora; first joint of fore tarsi not inflated, nearly 2 times longer than wide; middle tibiae shorter than fore tibiae; middle tarsi long, about 1.3 times shorter than middle tibiae, claw free and long; hind tibiae as long as middle tibiae, gradually becoming thicker towards apex, first tarsal joint thicker than those of fore and middle tarsi.

Elytra not shorter than abdomen, 2.8 times longer than pronotum, convex with pronotum, broadly rounded at apex, with rows of distinct rounded punctation, distance between impressions 6 times longer than their diameter and slightly shorter than intervals between longitudinal striae.

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