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New genus and species of Cerophytidae (Insecta: Coleoptera) from the Lower Cretaceous of Baissa (Siberia)

Huali Chang^a, Alexander Kirejtshuk^{b,*}, Dong Ren^{a,*}

^a College of Life Science, Capital Normal University, Beijing 100048, China

^b Zoological Institute of the Russian Academy of Sciences, Universitetskaya nab., 1, St. Petersburg 199034, Russia

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ABSTRACT

One new genus and two new species of fossil Cerophytidae, *Baissophytum convexus* gen. et. sp. nov. and *Baissophytum amplius* sp. nov. are described and illustrated from Zaza Formation (Lower Cretaceous), Eravnensky (Bauntovsky) District, Buriatskay Autonomous Republic (Transbaikalia), Russia.

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1. Introduction

Recent studies of different Mesozoic fossil coleopterans from Asian outcrops showed that the family of Cerophytidae was much more diverse and common in the Mesozoic fauna than the recent one and Cerophytidae was one of dominating groups in some ecological systems of the Jurassic (Chang et al., in press). In this "in press" paper, a review of published data on fossils of this family is given with a preliminary taxonomic revision of its generic composition. However, current understanding of systematic and biotic significance of this group in the Mesozoic is still rather scanty. This paper is aimed to increase our knowledge of this family. The specimens described here share the following characters with most fossil members of the family, e.g. elongate and convex body shape, short and transverse head somewhat retracted into prothoracic segment, disposition of antennae, interlocking pro-mesocoxal mechanism with a deep median fossa on mesoventrite, oblique metacoxae with femoral plates etc. More detailed information on representation of this family in the fossil record can be obtained in the catalogue by Ponomarenko and Kirejtshuk (2009) and also in the upcoming review article (Chang et al., in press).

Abundant of fossil beetles are discovered from the Early Cretaceous Yixian Formation of China (Chang et al., 2009; Liu and Ren, 2006; Liu et al., 2006; Tan and Ren, 2007). The discovery of fossil Cerophytidae

from Early Cretaceous Baissa locality will supply more information about the evolution history of Early Cretaceous Coleoptera.

2. Material and methods

The specimens described in this paper were collected from the left bank of Vitim River 8 km below mouth of Baissa River, Eravnensky (Bauntovsky) District, Buriatskay Autonomous Republic (Transbaikalia), Russia; Lower Cretaceous, attributed to the Middle Neocomian (Zaza Formation). The specimens were examined using a Leica MZ12.5 and Leica MZ16 stereomicroscope, illustrated with the software Corel Draw 12.0 and Adobe Photoshop CS2. All photographs were taken with a Nikon DXM1200C Digital Camera. Body length was measured along the midline from the anterior margin of the mandibles to apex of the elytra or abdomen (depending on which of these sclerites is the longest), and width was measured across the broadest part of body; length of pronotum was measured along the midline. The holotypes are deposited in the Palaeontological Institute of the Russian Academy of Sciences (Moscow).

3. Systematic paleontology

Order Coleoptera Linnaeus, 1758
 Infraorder Elateriformia Crowson, 1960
 Superfamily Elateroidea Leach, 1815
 Family Cerophytidae Latreille, 1834

Baissophytum gen. nov.

* Corresponding authors. Tel.: +86 10 68901757; fax: +86 10 68980851.

E-mail addresses: kirejtshuk@gmail.com (A. Kirejtshuk), rendong@mail.cnu.edu.cn (D. Ren).

Type species. *Baissophytum convexus* sp. nov.

Derivation of name. The name of this new genus is derived from the locality of Baissa and last root of generic name “*Cerophytum*”.

Diagnosis. This new genus differs from most other genera of the family (Chang et al., in press) in the somewhat separated metacoxae. Besides, the metepisterna in species of the new genus are comparatively wider than those in all other known members of the family. Till now only one genus with separated metacoxae is known – *Lebanophytum* Kirejtshuk et Azar, 2008. However the new genus differs from it in the larger body, shorter transverse head, longitudinal rows of punctures on elytra, subcontiguous mesocoxae, oblique metacoxa and moderately short abdominal ventrite 1. Besides narrowly separated metacoxae, *Baissophytum* gen. nov. differs from the extinct *Necromera* Martynov, 1926 and recent genera (*Cerophytum* Latreille, 1806; *Phytocerum* Costa, Vanin, Lawrence et Ide, 2003 and *Brachycerophytum* Costa, Vanin, Lawrence et Ide, 2003) in wider metepisterna, slightly more widely separated antenna; insertions and apparently shorter trochanters. The new genus under consideration is quite distinct from fossil *Aphytocerus* Zherichin, 1880 in the much larger body, head of usual size and not so strongly retracted into prothoracic segment and moderately developed eyes, 11-segmented antennae, slightly reduced mouthparts without dolabriform ultimate maxillary palpomere, aedeagus with acute penis trunk apex. Finally, it can be also distinguished from the genus *Mercata* Lin, 1986 (with questionable attribution to the family Cerophytidae) at least in the distinctly separated metacoxae and subtriangularly transverse head.

Remarks. Because of the characters defined as “synapomorphies” of the family for recent species of Cerophytidae (Costa et al.,

2003) are mostly not presented in compression fossils, on the one hand, and Mesozoic faunas of both Elateridae and Cerophytidae include many palaeoendemic groups, the researchers are obliged to seek for other features for discrimination of these families. The most expressive differences of recent and fossil Cerophytidae from Elateridae are the followings: narrowly separated antennal insertions; rather convex pronotum with anterior angles not or scarcely projecting anteriorly and posterior ones with more or less distinct apex but not projecting posteriorly or lateroposteriorly; femoral plates of metacoxae raised at most at median part of coxae and with gently outlined along posterior edge; usually coarse and seriate puncturation on elytra. This complex of characters can be used as a reliable syndrome of this family quite constant in its Mesozoic groups. The metacoxae in species of *Baissophytum* are not so long as in the recent species, but in general comparably longer than in many Elateridae.

Description. Body suboval and rather convex as dorsally as ventrally. Head short and more or less retracted inside prothoracic segment, mandibles well raised and acute at apex. Antennae 11-segmented; scape comparatively small (more or less comparable with the rest antennomeres). Pronotum strongly vaulted and steeply sloping at sides, with gently convex anterior edge, more or less arcuate lateral edges, sharply pointed and somewhat projecting posterior angles. Scutellum subhemicircular, widely rounded at apex. Elytra moderately long, steeply sloping at sides, complete and at least 7 longitudinal furrows (striae), apices conjointly rounded. Procoxae rather small and seemingly suboval and moderately separated. Mesoventrite with a deep fossa in posterior part. Mesocoxae moderately large and somewhat transversely oblique, moderately separated. Metepisterna somewhat widened anteriorly and about

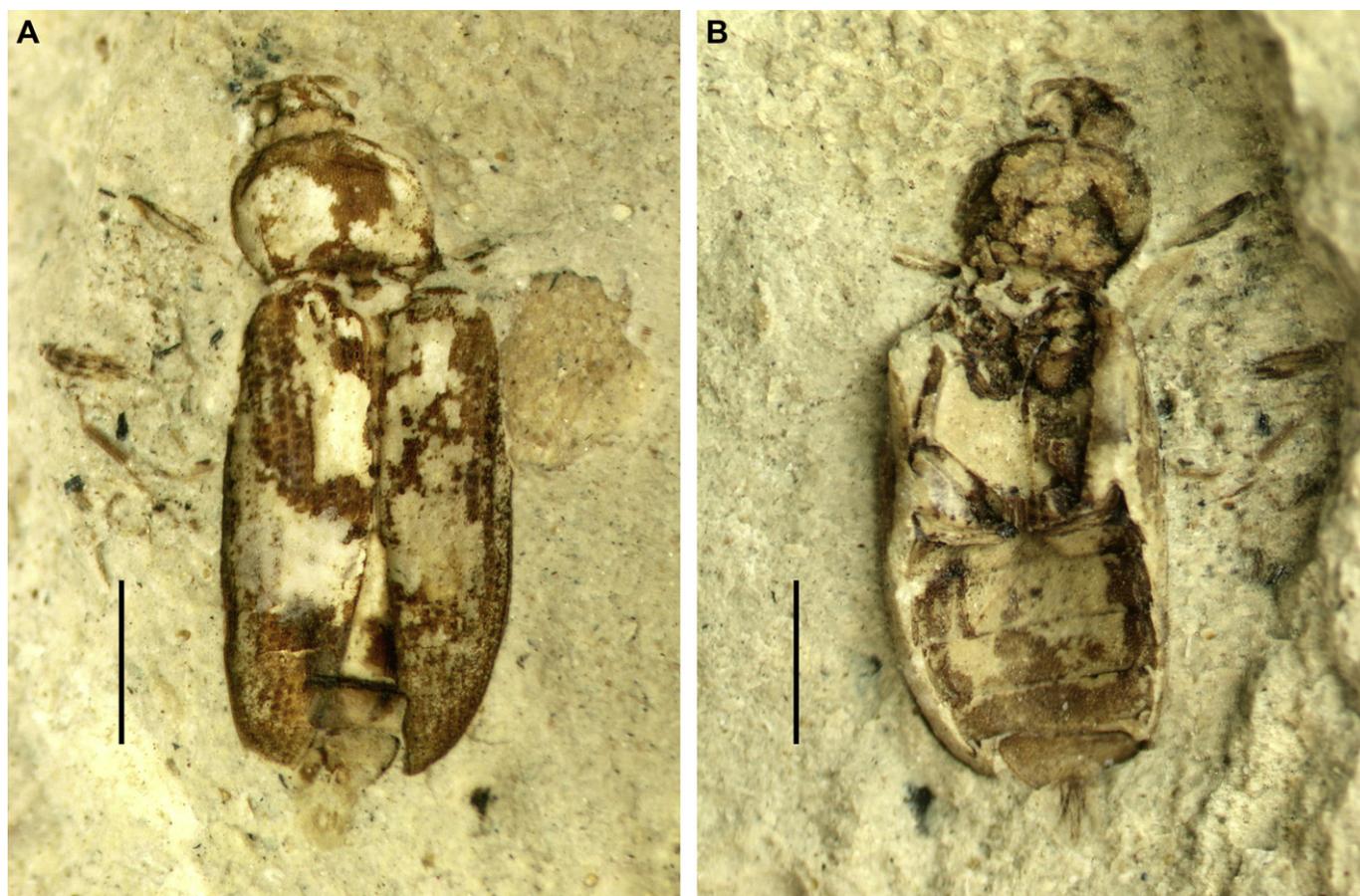


Fig. 1. *Baissophytum convexus* gen. et sp. nov., photographs of holotype. A, No. 4210/5481(P – part). B, No. 4210/5481(C – counterpart). Scale bar represents 1 mm.

3–4 times as long as wide. Metaventricle with excised posterior edge between coxae. Metacoxae comparatively short and transversely oblique. Visible ventrite 1 of the abdominal shortest; ventrites 2–4 subequal in length, hypopygidium comparable in length with previous ventrites. Legs moderately narrow.

Notes. Synonymy of generic names in the family Cerophytidae is grounded in Chang et al. (in press), in which an advisable usage of the names *Idiomerus* Dolin in Dolin, Panfilov, Ponomarenko et Pritykina, 1980 and *Leptocnemus* Hong et Wang, 1990 is considered.

Baissophytum convexus gen. et sp. nov

Figs. 1, 2

Derivation of name. The epithet of this new species refers to its strong convexity of body demonstrating in the holotype [Latin 'convexus' means 'convex'].

Holotype. 4210/5481(PC), male; part, negative imprint of underside, and counterpart, negative imprint of dorsum, with exposed basal antennomeres, profemora, left mesofemur and mesotibia, right metafemora, and exposed aedeagus.

Diagnosis. This new species differs from another congener in the more slender body, markedly smaller eyes, much narrower scape and antennomere 2, somewhat more narrowly separated mesocoxae and very narrow metepisterna. Also the striae of elytra of this new species, in contrast to those in another one, are not so deep and not so narrow and also with a row of punctures along their bottoms

and laterotergites of this new species are markedly narrower than those in another.

Description. Body rather elongate oval to subcylindrical, with length 4.6 mm, width 1.8 mm, elytra length 3 mm; without visible pubescence. Integument with small and very dense punctures. Elytra, in addition to diffusely spread punctures, with at least 7 longitudinal striae forming by furrows with punctures along their bottom, which are somewhat larger than other punctures of integument.

Head subtriangularly transverse, obviously shorter than wide, convex; eyes comparatively small. Antennae incomplete, represented by three left basal and one right antennomeres; scape rather thin and long, antennomere 2 subcylindrical and somewhat longer. Pronotum somewhat wider than head; only slightly wider than long; anterior edge convex and arcuately continuing to rounded lateral edges, forming a shallow sinuation before pointed and somewhat projecting posterior angles, posterior edge shallowly emarginate at posterior angles and convex in the middle; disc very strongly convex. Scutellum short and strongly transverse. Elytra much wider than prothorax, 3.3 times as long as wide; disc strongly convex, widest along middle, apex of elytra slightly obtuse and together forming a join arc. Pygidium short and widely rounded at posterior edge.

Pronotosternal sutures not visible. Procoxae rather small and seemingly suboval, moderately separated. Mesoventrite deeply and subtriangularly excavated in posterior part. Mesocoxae moderately large and somewhat transversely oblong, about 1/3 as separated as

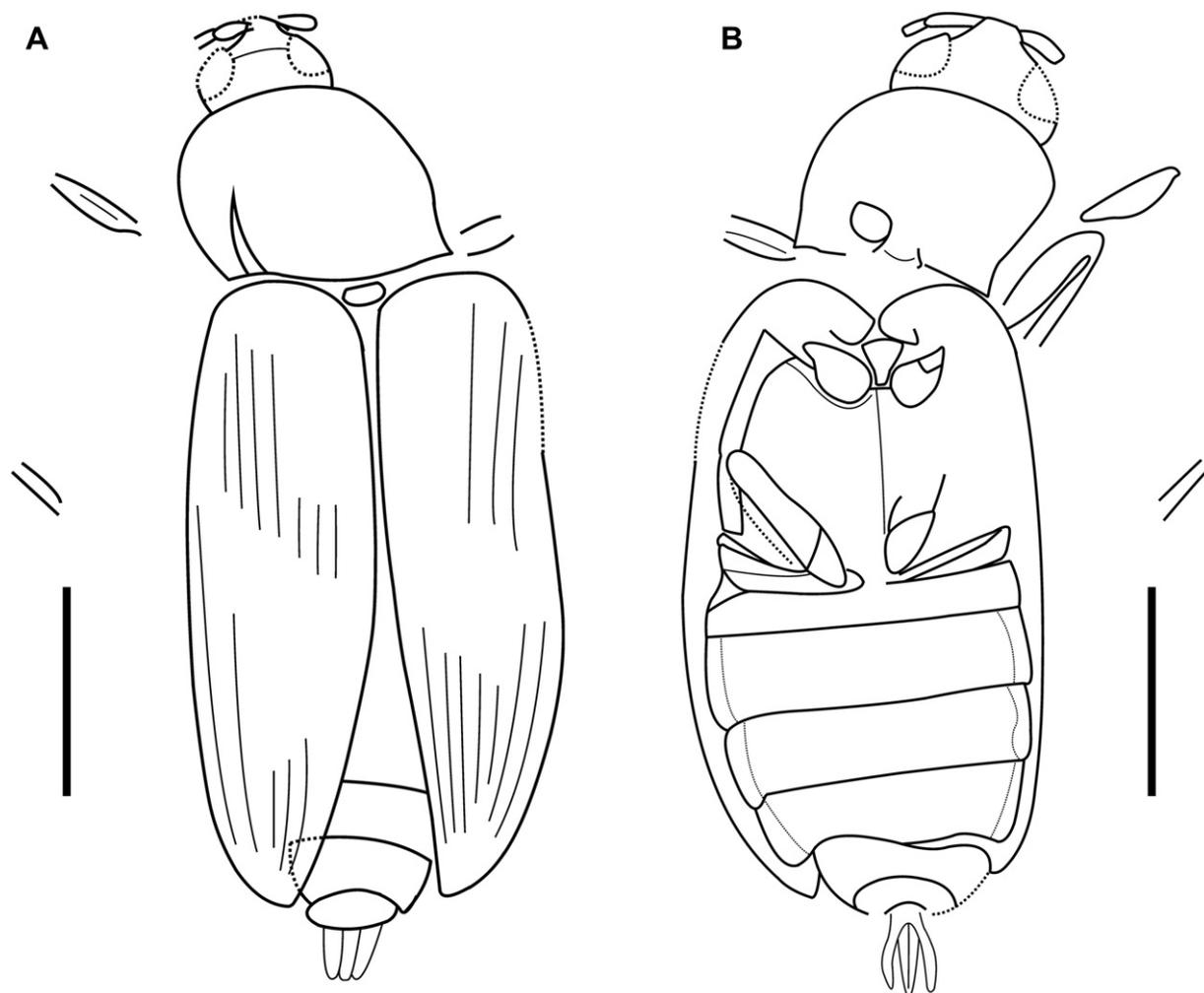


Fig. 2. *Baissophytum convexus* gen. et sp. nov., line drawings of holotype. A, No. 4210/5481(P – part). B, No. 4210/5481(C – counterpart). Scale bar represents 1 mm.

procoxae. Metepisterna slightly wider than usually in other members of the family and with curved outline of their inner edge in anterior part, about 4 times as long as wide. Metaventricle much less than twice as wide as long, strongly convex along the middle, with distinct longitudinal suture. Metacoxae comparatively short and transversely oblique. Laterotergites comparatively narrow (at least 4 times as long as wide). Hypopygidium about as long as each of ventrites 2–4 and widely excised at posterior edge.

Legs moderately narrow; femora apparently comparable in shape; mesotibia rather narrow and slightly thickened posteriorly, somewhat longer than mesofemur; metafemur slightly longer than other femora.

Aedeagus heavily sclerotized and of trilobate type. Penis trunk rather narrow and subacute at apex. Lateral lobes narrow and about as long as penis trunk.

Baissophytum amplus sp. nov

Figs. 3, 4

Derivation of name. The epithet of this new species refers to its larger body and more robust appearance demonstrating in the holotype [Latin 'amplus' means 'large', 'strong'].

Holotype. 4210/5915(PC), female; part, negative imprint of underside, and counterpart, negative imprint of dorsum, with exposed right antennae and some left antennomeres, profemora, right posterior leg and slightly sclerotized ovipositor.

Diagnosis. See the diagnosis of the above species.

Description. Body oval, apparently rather convex as dorsally as ventrally, with length 6.7 mm, width 3.0 mm, elytra length 4.2 mm; Body without visible pubescence. Integument with very small and very dense punctures. Elytra, in addition to dense and diffusely spread punctures, with at least 7 narrow longitudinal furrows, extremely narrow bottoms of which are without punctures.

Head subtriangularly transverse, obviously shorter than wide, convex; eyes rather large. Antennae demonstrating 11 segments and slightly extending behind prothoracic base, scape very slightly larger than the rest antennomeres, antennomere 2 small and subcylindrical, antennomeres 3–10 subequally subtriangular and dilated apically; antennomere 11 elongate oval and somewhat longer than all previous ones. Pronotum much wider than head; about 1.5 times as wide as long; anterior edge convex and arcuately continuing to rounded lateral edges, forming a shallow sinuation before pointed and somewhat projecting posterior angles, posterior edge shallowly emarginate at posterior angles and convex in the middle; disc very strongly convex. Scutellum slightly transverse. Elytra somewhat wider than prothorax, 2.6 times as long as wide; disc strongly convex, widest along middle, apex of elytra slightly obtuse and together forming a join arc. Pygidium very short and widely rounded at posterior edge.

Pronotosternal sutures not visible. Procoxae rather small and seemingly suboval, moderately separated. Mesoventricle deeply and ovally excavated in posterior part. Mesocoxae moderately large and somewhat transversely oblong, apparently about as separated as procoxae. Metepisterna rather wide and with

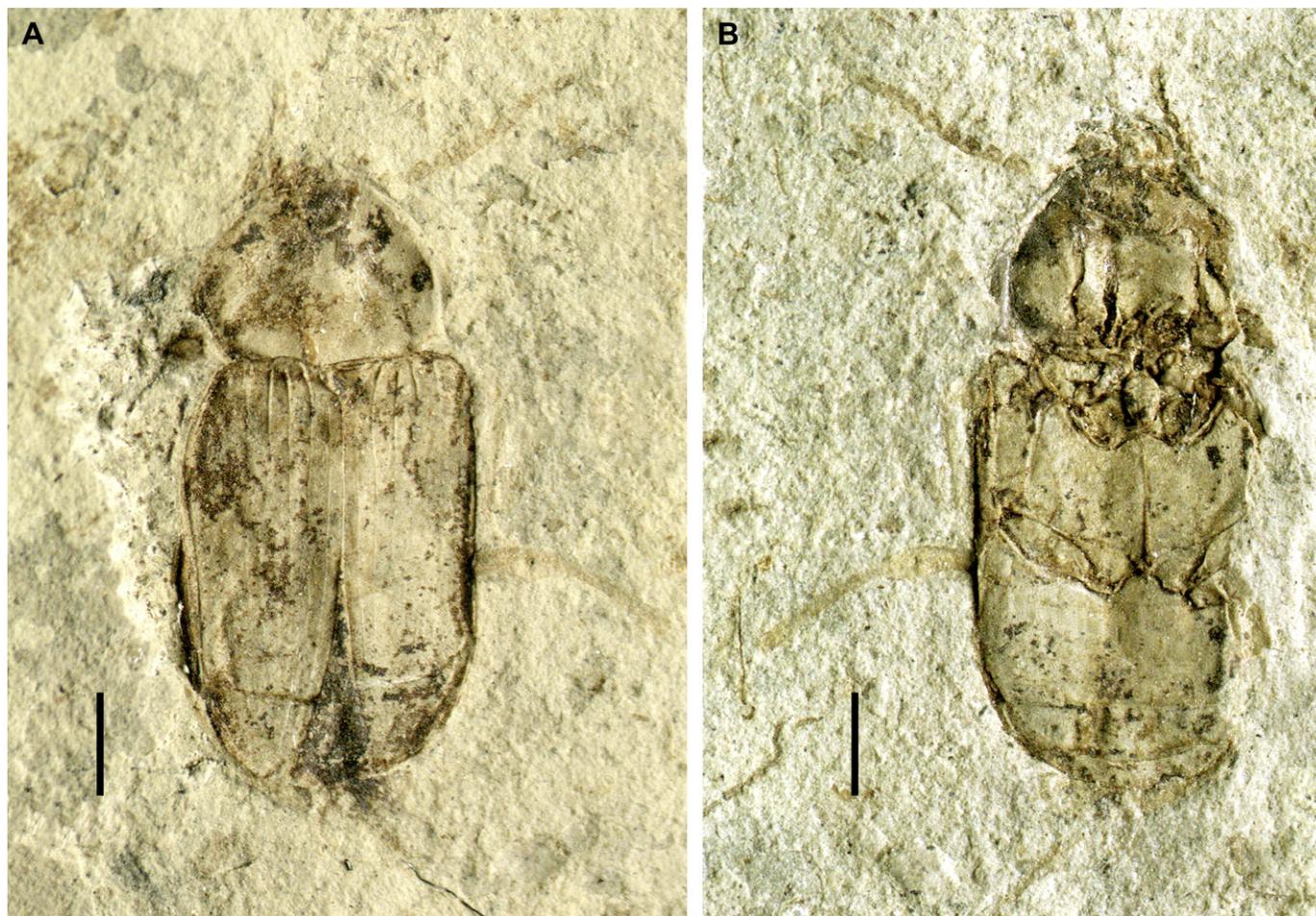


Fig. 3. *Baissophytum amplus* sp. nov., photographs of holotype. A, No. 4210/5915 (P - part). B, No. 4210/5915 (C - counterpart). Scale bar represents 1 mm.

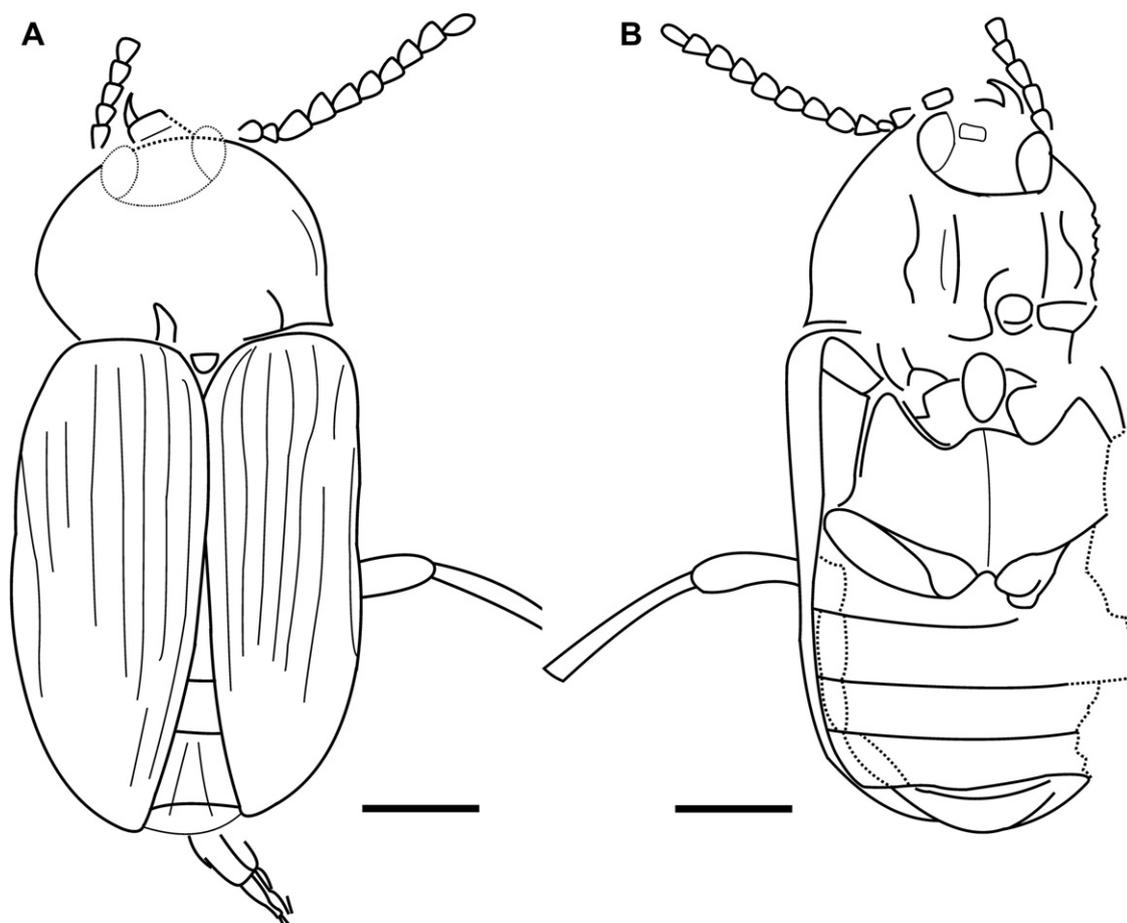


Fig. 4. *Baissophytum amplus* sp. nov., line drawings of holotype. A, No. 4210/5915 (P – part). B, No. 4210/5915 (C – counterpart). Scale bar represents 1 mm.

straight outline of their inner edge in anterior part, about 3 times as long as wide. Metaventricle about twice as wide as long, strongly convex along the middle, with distinct longitudinal suture. Metacoxae comparatively short and transversely oblique. Laterotergites comparatively wide (about 2.5–4.0 times as long as wide). Hypopygidium somewhat shorter than each of previous ventrites and widely rounded at posterior edge.

Legs apparently rather narrow; metafemur at least much more than 3 times as long as wide; metatibia very narrow and slightly dilated posteriorly.

Ovipositor with slightly sclerotized gonocoxites.

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