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ARTICLE



Two new weevil tribes (Coleoptera: Curculionoidea) from Burmese amber

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ABSTRACT

In this article, two new tribes, *Burmomaceratini* n. trib. with type genus *Burmomacer* n. gen. and *Burmocorynini* n. trib. with type genus *Burmocorynus* n. gen., two new genera, *Burmomacer* n. gen. with type species *Burmomacer kirejtshuki* n. sp. and *Burmocorynus* n. gen. with type species *Burmocorynus jarzembowskii* n. sp. and two new species, *Burmomacer kirejtshuki* n. sp. and *Burmocorynus jarzembowskii* n. sp. of the families Nemonychidae and Belidae from Cretaceous Burmese amber are described and illustrated. *Burmomaceratini* differ from all tribes of the subfamily Rhinorhynchinae in the widely separate procoxal cavities. *Burmocorynini* differ from the tribe Archicorynini in the loose club articles, long pronotum without lateral carinae, antennae inserted at base of rostrum, narrow forehead and large eyes. This is the first record of the family Belidae in the Burmese amber.

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KEYWORDS

Curculionoidea;
Nemonychidae; Belidae;
Rhinorhynchinae;
Oxycoryninae; new taxa;
Myanmar; Cretaceous;
Burmese amber

Introduction

The Cretaceous Curculionoidea are diverse and known from localities in Africa, Asia, Europe, North and South America (Legalov 2012, 2015). The weevil fauna of Burmese amber, dating to the mid-Cretaceous, is very important for understanding the formation of modern fauna, because it combines the finds of representatives of primitive and modern groups. Nine species from the families Nemonychidae, Ithyceridae, Curculionidae and Scolytidae have been described from this amber (Poinar 2006, 2009; Cognato and Grimaldi 2009; Poinar and Brown 2009; Davis and Engel 2014; Legalov and Poinar 2015; Poinar et al. 2016, 2017; Legalov 2018a).

The present paper describes two new species in two new genera belonging to two new tribes of the families Nemonychidae and Belidae.

Materials and methods

The amber pieces with the specimens described below were obtained from mines (Kania et al. 2015) in the Hukawng Valley in the state of Kachin in Myanmar. A probably early Cenomanian age of Burmese amber has been proposed (Smith and Ross 2018). Nuclear magnetic resonance spectra and the presence of araucaroid wood fibres in amber samples from the Noije Bum 2001 Summit site indicate an araucarian (possibly *Agathis*) tree source for the amber (Poinar et al. 2007). The holotypes are deposited in the Institute of Systematics and Ecology of Animals (Russia: Novosibirsk) – ISEA. Observations and photographs were taken with a Zeiss Stemi-2000 stereoscopic microscope. Terminology used in the descriptions is based on the study by Lawrence et al. (2010).

Systematic palaeontology

Order: Coleoptera Linnaeus 1758
Suborder: Polyphaga Emery 1886
Superfamily: curculionoidea Latreille 1802
Family: Nemonychidae Bedel 1882–1888
Subfamily: Rhinorhynchinae Voss 1922

Tribe: ***Burmomaceratini*** n. trib.

LSID Zoobank: 3A1CFFE3-BFA1-42EC-AAB3-9ABC5EC556D1

Type genus: *Burmomacer* n. gen.

Diagnosis

Labrum with two pairs of setae. Maxillary palpi short. Mandible not exodontous. Rostrum thick, flattened, shorter than pronotum. Antennae reaching pronotum. Antennal club loose, little shorter than previous antennomeres. Eyes rounded, coarsely faceted. Forehead wide. Pronotum subquadrate, with almost straight sides. Elytra with slightly smoothed humeri and distinct epipleura. Intervals wide. Precoxal portion of prosternum long. Pro- and mesocoxal cavities rounded, separated. Metaventrite quite short. Metanepisterna long and narrow. Ventrite 1 quite long. Ventrites 2–4 subequal in length. Pro- and mesocoxae hemispherical. Trochanters not separating femora and coxae. Tibiae almost straight. Tarsi quite long.

Included genera

Type genus only.

Comparison

The new tribe differs from all other tribes of Nemonychidae (excluding Cretaceous tribe Oropsini and Jurassic *Probeloides* Legalov 2009 of Eobelinae: Probelini) in having

widely separate procoxal cavities. From Oropsini of the subfamily Paleocartinae, they differ in the pronotum without lateral carina, round eyes, rounded procoxal cavities, trochanters not separating femora and coxae, short rostrum, loose antennal club, and short maxillary palpi. The new tribe is distinguished from *Probeloides* Legalov (2009) in the short rostrum with subapically inserted antennae, eyes protruding from the contour of the head, widely separated mesocoxal cavities and tibiae without mucros. *Burmomaceratini* differ from the tribe Rhinorhynchini in the hemispherical procoxae and flattened rostrum. From the tribe Argentinomacerini they are distinguished in the subapically inserted antennae, hemispherical procoxae, 3-articled antennal club and almost straight sides of the pronotum. The new tribe differs from the tribe Zimmiellini in the not exodontous mandibles, maxillary palpi distinctly extending beyond prementum and hemispherical procoxae. *Burmomaceratini* differ from the tribe Rhynchitomacerini in the hemispherical procoxae, rostrum weakly widened at apex, and coarsely faceted eyes. From the habitually close subtribe Bunyaena of the tribe Mecomacerini, they differ in the round eyes and short maxillary palpi. They differ from the subtribes Mecomacerina and Rhynchitoplesiina of the tribe Mecomacerini in the labrum with two pairs of setae, rounded eyes, hemispherical procoxae and short maxillary palpi. *Burmomaceratini* differ from the subtribe Brarina of the tribe Mecomacerini in the distinct rostrum, not widened and shortened tibiae, labrum with two pairs of setae and short maxillary palpi. The genus *Burmomacer* is distinguished from *Burminyx* Davis and Engel (2014) from Burmese amber, by the short thick flattened rostrum, and larger body size.

Comments

This new tribe is placed in the family Nemonychidae based on the free labrum, double gular suture, non-geniculate antennae, free abdominal ventrites and absence of pygidium. The pronotum lacking lateral carina, strongly convex eyes, claws with teeth, elytra with distinct striae, and antennae inserted subapically place it in the subfamily Rhinorhynchinae.

Burmomacer n. gen.

LSID Zoobank: B8BF9917-6B90-4092-A3BD-915271EF17DC

Type species: *Burmomacer kirejtshuki* n. sp.

Diagnosis

As for tribe.

Included species

Type species only.

Etymology

The generic name is derived from the country name, Burma (Myanmar), and nemonychid suffix ‘macer’.

Burmomacer kirejtshuki n. gen. et sp. (Figure 1–8)

LSID Zoobank: A6104E46-6D4D-4447-BD5F-A13083D6D42D

Etymology

The name is dedicated to Dr. Alexander G. Kirejtshuk (Saint Petersburg, Russia and Paris, France).

Type material

Holotype (No. MA2017/2) deposited in the ISEA.

Type locality

Hukawng Valley southwest of Maingkhwan in Kachin State (26°200N, 96°360E), Myanmar, early Cenomanian (mid-Cretaceous).

Description

Holotype. Length of body (without rostrum) 3.3 mm, length of rostrum 0.8 mm. Body brown, moderately sclerotized, subflattened dorsally, covered with dense decumbent hairs.



Figure 1. *Burmomacer kirejtshuki* n. gen. et sp., body, dorsal view. Scale bar 1.0 mm.

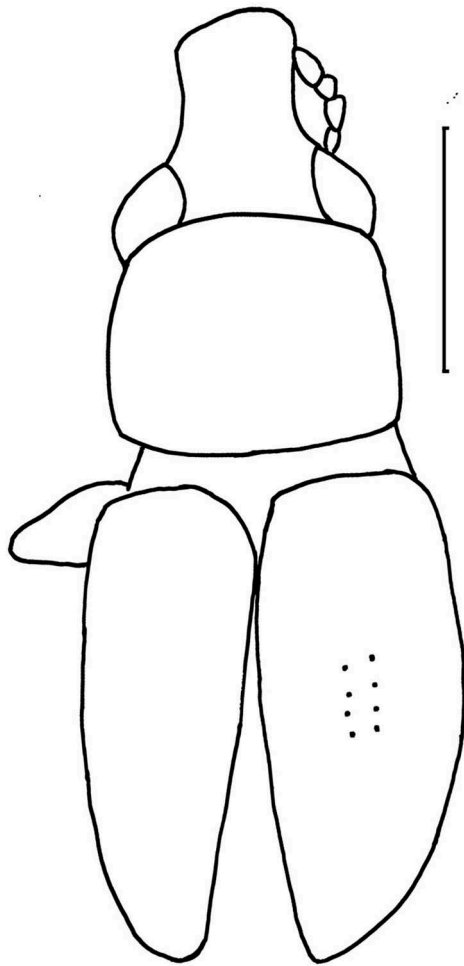


Figure 2. *Burmomacer kirejtshuki* n. gen. et sp., contour of body, dorsal view. Scale bar 1.0 mm.

Head

Head capsule not constricted behind eyes. Labrum well developed, with four setae, separated from rostrum, semi-oval, about 1.8x as wide as long. Mandibles large, without teeth. Rostrum quite short, weakly curved, flattened, densely punctate, about two times as long as wide in middle, somewhat shorter than pronotum; dorsal surface of rostrum with two clear longitudinal grooves. Place of antennal attachment weakly extended. Antennae long, non-geniculate, reaching pronotum, inserted at apex of rostrum. Antennomere 1 oval. Antennomeres 2–8 subconical; antennomere 2 subequal to antennomere 1; antennomere 3 shorter than antennomere 2; antennomere 4 narrower than antennomere 3; antennomere 5 shorter and narrower than antennomere 4; antennomere 6 shorter than antennomere 5; antennomere 7 subequal to antennomere 6; antennomere 8 wider than antennomere 7; club flattened, loose, little shorter than antennomeres 1–8 together taken; antennomere 9 1.8x long as wide, distinctly shorter and wider than antennomere 8; antennomere 10 subequal to antennomere 9; antennomere 11 narrower than antennomere 10, pointed at apex. Eyes round, large, strongly convex, protruding from head, coarsely faceted. Forehead wide, weakly convex, punctate. Gular suture double.



Figure 3. *Burmomacer kirejtshuki* n. gen. et sp., body, ventral view. Scale bar 1.0 mm.

Pronotum

Pronotum subquadrate, with almost straight sides, 0.8x as long as wide in middle; disc weakly flattened, densely punctate. Lateral carinae of pronotum absent.

Elytra

Elytra about 1.4x as long as wide at base, about 1.2x as long as wide in middle, about 1.8x as long as wide in apical fourth, about 1.9x as long as pronotum; with slightly smoothed humeri and distinct epipleura; intervals flat, about 5.0–6.0x as long as width of striae; punctate striae regular and distinct.

Thorax

Procoxal portion of prosternum long, as long as length of procoxal cavity. Procoxal cavities located near base of prosternum, rounded, widely separated. Prosternal process slightly shorter than width of procoxal cavity. Mesocoxal cavities rounded, separated. Metacoxal cavities transverse. Metaventrite short, 1.3x as long as metacoxal cavity. Metaepisterna about 8.0x as long as wide in middle.

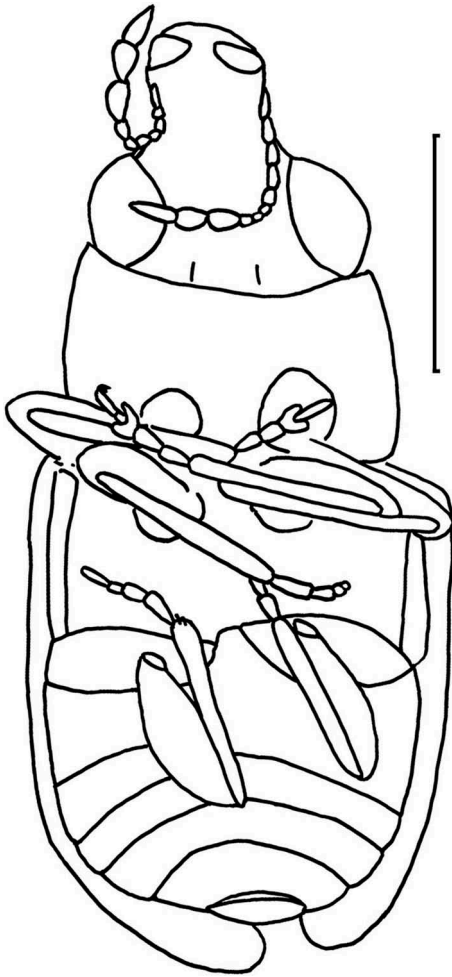


Figure 4. *Burmomacer kirejtshuki* n. gen. et sp., contour of body, ventral view. Scale bar 1.0 mm.

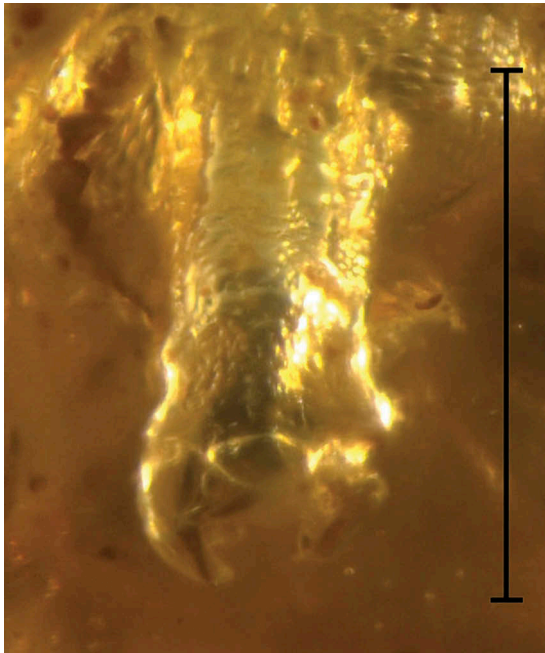


Figure 5. *Burmomacer kirejtshuki* n. gen. et sp., apex of rostrum, dorsal view. Scale bar 1.0 mm.

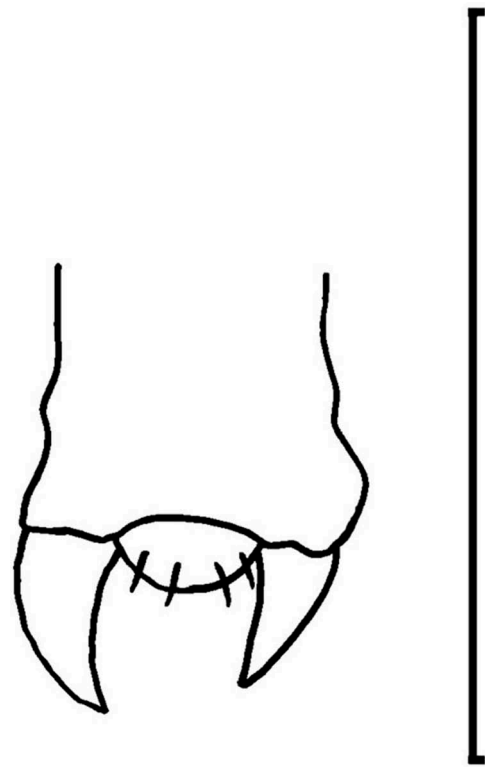


Figure 6. *Burmomacer kirejtshuki* n. gen. et sp., contour of apex of rostrum, dorsal view. Scale bar 1.0 mm.

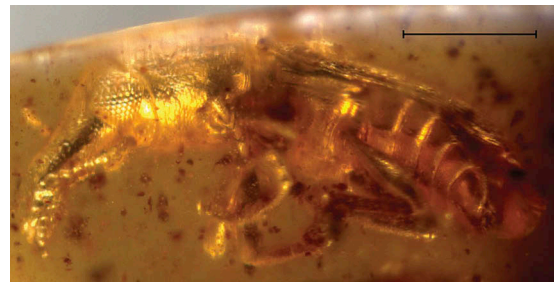


Figure 7. *Burmomacer kirejtshuki* n. gen. et sp., body, lateral view, left. Scale bar 1.0 mm.

Abdomen

Abdomen flattened; ventrites free; ventrite 1 quite long, about 1.1x as long as metacoxal cavity; ventrites 2–4 subequal in length; ventrite 2 0.6x as long as ventrite 1; ventrite 5 1.2x as long as ventrite 4. Pygidium absent.

Legs

Legs long. Pro- and mesocoxae hemispherical. Trochanters oblique, not separating femora and coxae. Femora weakly thickened, without teeth; Tibiae almost straight, weakly widened at apex, without mucro; with apical setae. Tarsi quite long, pseudoquadrisegmented; tarsomeres 1 and 2 long-conical; tarsomere 3 weakly bilobed; tarsomere 4 distinct, subquadrate; tarsomere 5 long and narrow. Claws with teeth.

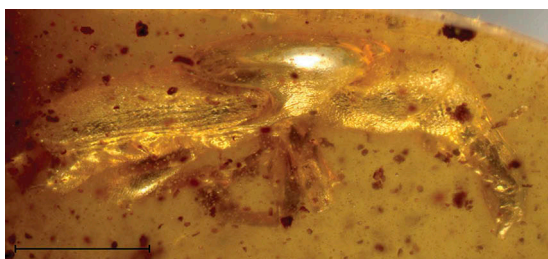


Figure 8. *Burmomacer kirejtshuki* n. gen. et sp., body, lateral view, right. Scale bar 1.0 mm.

Family: Belidae Schoenherr, 1826
Subfamily: Oxcoryninae Schoenherr 1840

Tribe: **Burmocorynini** n. trib.

LSID Zoobank: 201E3565-33CF-4E89-9F5A-8E650DA5D2B6

Type genus: *Burmocorynus* n. gen.

Diagnosis

Body strongly sclerotized, covered with dense hairs. Antennae non-geniculate, inserted at base of rostrum. Antennomeres 2–10 subconical. Club loose. Antennomeres free. Eyes large, weakly convex. Forehead narrow. Pronotum long-bell-shaped, with weakly curved sides, without lateral carinae. Elytra long, with smooth humeri. Intervals convex. Striae regular and distinct. Apices of elytra separately rounded. Scutellum narrow. Procoxal cavities located near middle of pronotum, rounded, widely separated. Mesocoxal cavities rounded, separated. Metaventricle long. Abdomen weakly convex. Ventrites 1, 2 and 5 subequal in length. Ventrites 1 and 2 fused. Pro- and mesocoxae hemispherical. Femora without teeth. Tibiae without spurs and mucro. Tarsomere 1 wide-conical. Tarsomeres 2 and 3 wide-bilobed. Claws free, strongly divergent, without teeth.

Included genera

Type genus only.

Comparison

The new tribe is similar to the Recent tribe Archicorynini from Central America but differs in the free club articles, long pronotum without lateral carinae, antennae inserted at base of rostrum, narrow forehead and large eyes. From Alloxocorynini with free club articles it is distinguished in the separated procoxal cavities, narrow body, long pronotum without lateral carinae, narrow forehead and large eyes, elytra without carinae and tibiae without long mucros. The new tribe is distinguish from the tribe Oxcorynini in the separated procoxal cavities, free club articles, and narrow body. It differs from the tribe Oxcraspedini in the tibiae lacking apical spurs, convex body, pronotum without lateral carina and free antennal club. It differs from the tribe Allocorynini in the double gular suture, striate elytra and profemora lacking teeth. Burmocorynini differ from the tribe Aglycyderini in the distinct gular suture, basally inserted antennae, and body convex and narrow.

Comments

This new tribe is placed in the family Belidae based on the protibiae with a wide apical groove and thick hairs on inner surface at point of tarsal attachment and double gular suture. The bilobed tarsomere 2, tibiae without apical spurs, flattened body and distinct antennal club indicate that belongs to the sub-family Oxcoryninae.

Burmocorynus n. gen.

LSID Zoobank: 7EF03557-354C-462E-94AE-D6EFF262F45C

Type species: *Burmocorynus jarzembowskii* n. sp.

Diagnosis

As for tribe.

Included species

Type species only.

Etymology

The generic name is derived from the country name, Burma (Myanmar) and belid suffix 'corynus'.

Burmocorynus jarzembowskii n. gen. et sp. (Figure 8–16)

LSID Zoobank: 5399DB10-3ABB-45D6-9D5B-

8E81D89A30DD

Etymology

The name is dedicated to Dr. Edmund A. Jarzembowski (London, UK).

Type material

Holotype (No. MA2018/1) deposited in the ISEA.

Type locality

Hukawng Valley southwest of Maingkhwan in Kachin State (26°200N, 96°360E), Myanmar, early Cenomanian (mid-Cretaceous).

Description

Holotype. Length of body (without rostrum) 6.8 mm. Body black, strongly sclerotized, flattened dorsally, covered with dense decumbent hairs.

Head

Head capsule not constricted behind eyes. Major part of rostrum absent. Antennae long, non-geniculate, reaching middle of pronotum, inserted at base of rostrum. Antennomeres 2–8 subconical; antennomere 2 about 1.9x as long as wide; antennomere 3 subequal to antennomere 2; antennomere 4 about 1.7x as long as wide, a little longer and about 1.3x as wide as antennomere 3; antennomere 5 about 1.5x as long as wide, a little longer and about 1.2x as wide as antennomere 4; antennomere 6 about 1.3x as long as wide, a little shorter and about 1.1x as wide as antennomere 5; antennomere 7 subequal to antennomere 6; antennomere 8 about 1.1x as long as wide, equal in length and about 1.3 x as wide as antennomere 7; club flattened,



Figure 9. *Burmocorynus jarzembowskii* n. gen. et sp., body, dorsal view. Scale bar 1.0 mm.

loose; antennomere 9 about 0.7x as long as wide, about 0.8x as long as and about 1.3x as wide as antennomere 8; antennomere 10 0.9x as long as wide, about 1.5x as long as and about 1.1x as wide as antennomere 9; antennomere 11 about 0.8x as long as wide, about 0.8x as long as and about 0.9x as wide as antennomere 10, pointed at apex. Eyes rounded, large, weakly convex, protruding from head, finely faceted. Forehead narrow with longitudinal sulcus in middle, punctate. Gular suture double.

Pronotum

Pronotum long-bell-shaped, with weakly curved sides, 2.4x as long as wide at apex, 1.4x as long as wide in middle, 1.7x as long as wide at base. Disc weakly flattened, densely punctate. Lateral carinae of pronotum absent.

Elytra

Elytra long, 3.4x as long as wide at base, 2.6x as long as wide in middle, 4.3x as long as wide in apical fourth, 2.2x as long as pronotum; with distinctly smoothed humeri; intervals weakly

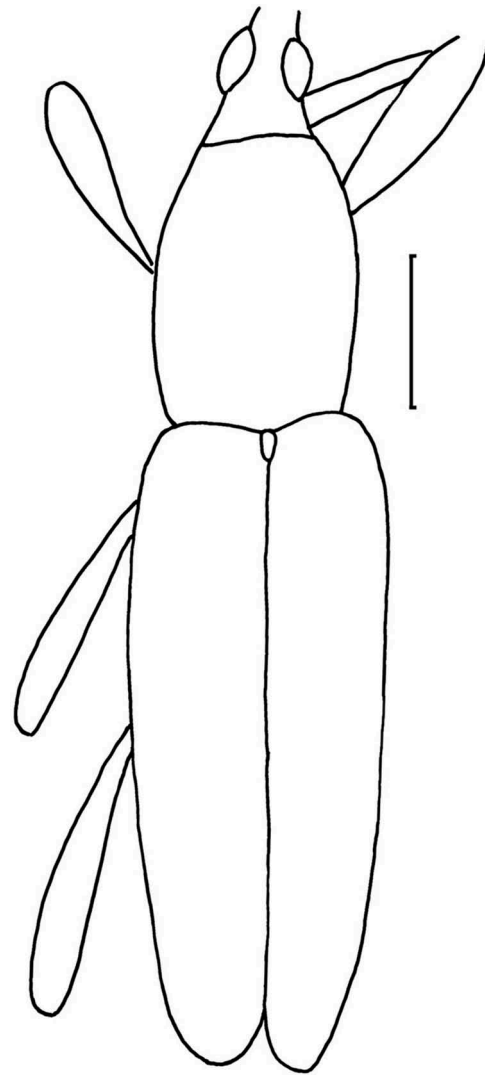


Figure 10. *Burmocorynus jarzembowskii* n. gen. et sp., contour of body, dorsal view. Scale bar 1.0 mm.

convex, about 2.2–2.5x as long as wide of striae. Punctate striae regular and distinct. Apices of elytra separately rounded. Scutellum long-conical, narrow.

Thorax

Precoxal portion of prosternum long, 2.0x as long as procoxal cavity. Procoxal cavities located near middle of prosternum, rounded, widely separated. Length of postcoxal portion equal to length of precoxal portion. Prosternal process wider than width of procoxal cavity. Mesocoxal cavities rounded, separated. Metaventricle long, 2.5x as long as metacoxal cavity. Metanepisterna narrow. Metacoxal cavities transverse.

Abdomen

Abdomen weakly convex; ventrite 1 as long as metacoxal cavity; ventrites 1, 2 and 5 subequal in length; ventrite 3 0.4x as long as ventrite 2; ventrites 3–5 free; ventrites 3 and 4 subequal in length; ventrite 5 1.7x as long as ventrite 4. Pygidium covered by elytra.

Legs. Legs long. Pro- and mesocoxae hemispherical. Trochanters oblique, not separating femora and coxae.

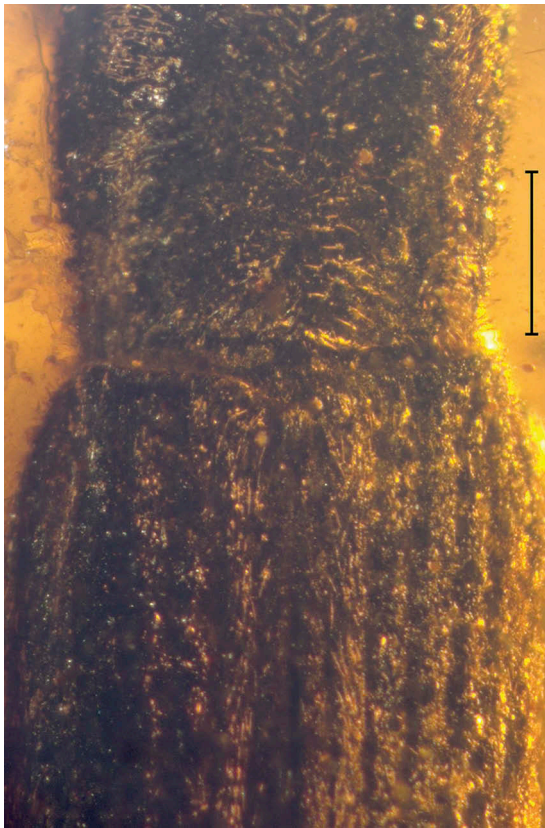


Figure 11. *Burmocorynus jarzembowskii* n. gen. et sp., base of pronotum, scutellum and base of elytra, dorsal view. Scale bar 0.5 mm.

Femora thickened, without teeth. Tibiae almost straight, weakly widened at apex, without spurs and mucro; with apical setae. Protibiae with wide apical groove and thick hairs on inner surface at point of tarsal attachment. Tarsi quite long, pseudoquadrisegmented; tarsomere 1 wide-conical; tarsomeres 2 and 3 wide-bilobed; tarsomere 4 small; tarsomere 5 long and narrow. Claws free, strongly divergent, without teeth. Protarsi: tarsomere 1 subequal in length and width; tarsomere 2 about 0.6x as long as wide, about 0.9x as long as and about 1.4x as wide as tarsomere 1; tarsomere 3 about 0.7x as long as wide, about 1.1x as long as and about 1.1x as wide as tarsomere 2; tarsomere 5 about 3.8x as long as wide, about 1.2x as long as and about 0.2x as wide as tarsomere 1. Mesotarsi: tarsomere 1 about 0.8x as long as wide; tarsomere 2 subequal to tarsomere 1; tarsomere 3 about 0.9x as long as wide, about 1.2x as long as and about 1.1x as wide as tarsomere 2; tarsomere 5 about 4.2x as long as wide, about 1.1x as long as and about 0.3x as wide as tarsomere 1.

Discussion

The weevil family Nemonychidae was abundant in the Mesozoic when about 50% as the known Curculionioidea belonged to this group (Gratshev and Legalov 2014; Legalov 2015; Kirejtshuk et al. 2018). The earliest and most numerous Mesozoic assemblage of this family is from the Middle-Upper Jurassic of Karatau (Gratshev and Legalov 2014; Legalov 2018b). More than 30 species in 25 genera were described from Lower Cretaceous deposits (Davis et al. 2013; Gratshev

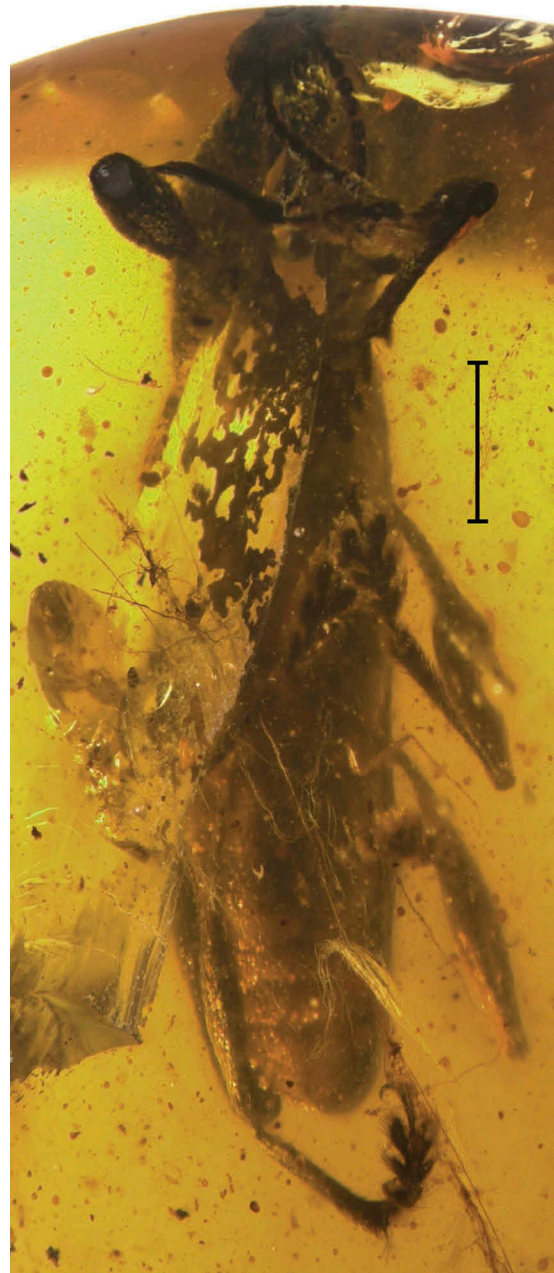


Figure 12. *Burmocorynus jarzembowskii* n. gen. et sp., body, ventral view. Scale bar 1.0 mm.

and Legalov 2014; Peris et al. 2014; Legalov 2015; Legalov et al. 2017; Poinar et al. 2017; Legalov and Jarzembowski 2018). Nemonychidae is known from the Cretaceous Lebanese, Spanish and Burmese ambers (Kuschel and Poinar 1993; Davis and Engel 2014; Peris et al. 2014; Legalov et al. 2017; Poinar et al. 2017). One species from the subfamily Rhinorhynchinae which lives in the Southern Hemisphere (Kuschel and Leschen 2011; Legalov 2017) and one species from the endemic subfamily Aepyceratinae are described from Burmese amber (Davis and Engel 2014; Poinar et al. 2017). Now another species from a unique new tribe is described from this amber.

Belidae is a rather small family, including more than 140 Recent species distributed mostly in the Southern Hemisphere (Legalov 2009). Few fossil forms are known.

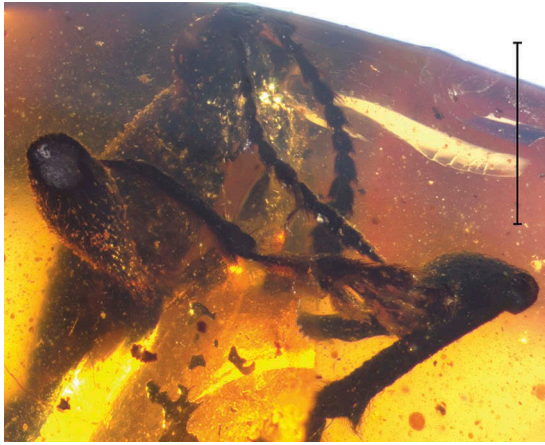


Figure 13. *Burmocorynus jarzembowskii* n. gen. et sp., antennae, head and prosternum, ventral view. Scale bar 1.0 mm.

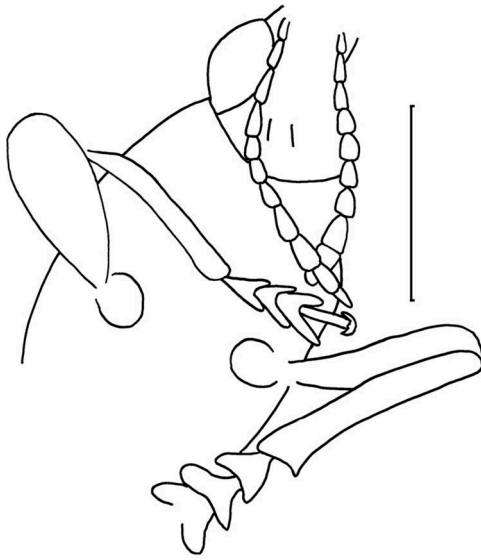


Figure 14. *Burmocorynus jarzembowskii* n. gen. et sp., contour of antennae, head and prosternum, ventral view. Scale bar 1.0 mm.

Two members of the subfamily Belinae have been described from the Lower Cretaceous (Whalley and Jarzembowski 1985; Zherikhin and Gratshev 2004). The oldest Oxycoryninae have been recorded in the middle Albian of the Russian Far East (Zherikhin 1993). The tribe Distenorrhinoidini from the Berriasian–Barremian of Spain was transferred from Oxycoryninae to the family Nemonychidae (Legalov 2018b). Different genera of the Oxycoryninae were common in the Eocene (Legalov 2015). This is the first record of the subfamily Oxycoryninae (Belidae) in Burmese amber.

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The author thanks Dr. G.O. Poinar, Jr (USA: Corvallis) for improving the manuscript.

Disclosure statement

No potential conflict of interest was reported by the author.



Figure 15. *Burmocorynus jarzembowskii* n. gen. et sp., mesotibiae and mesotarsi, dorsal view. Scale bar 1.0 mm.



Figure 16. *Burmocorynus jarzembowskii* n. gen. et sp., abdomen and mesotibiae and hind leg. Scale bar 1.0 mm.

References

- Bedel L. 1882–1888. Faune des Coléoptères du Bassin de la Seine. Rhynchophora Ann Soc Entomol France. 6:1–442.
- Cognato AI, Grimaldi D. 2009. 100 million years of morphological conservation in bark beetles (Coleoptera: Curculionidae: Scolytinae). Syst Entomol. 34(1):93–100.
- Davis SR, Engel MS. 2014. A new genus of nemonychid weevil from Burmese amber (Coleoptera, Curculionoidea). ZooKeys. 405:127–138.

- Davis SR, Engel MS, Legalov AA, Ren D. 2013. Weevils of the Yixian Formation, China (Coleoptera: Curculionoidea): phylogenetic considerations and comparison with other Mesozoic faunas. *J Syst Palaeontol.* 11(4):399–429.
- Emery C. 1886. Über Phylogenie und Systematik der Insekten. *Biologisches Centralblatt.* 5:648–656.
- Gratshchikov VG, Legalov AA. 2014. The Mesozoic stage of evolution of the family Nemonychidae (Coleoptera, Curculionoidea). *Paleontol J.* 48(8):851–944.
- Kania I, Wang B, Szewo J. 2015. *Dicranoptycha* Osten Sacken, 1860 (Diptera, Limoniidae) from the earliest Cenomanian Burmese amber. *Cretac Res.* 52(B):522–530.
- Kirejtshuk AG, Ponomarenko AG, Zherichin VV. 2018. Catalogue of fossil Coleoptera. Beetles (Coleoptera) and Coleopterists. St. Petersburg: Zoological Institute of the Russian Academy of Sciences; [accessed 2018 Mar]. <https://www.zin.ru/Animalia/Coleoptera/rus/paleosy3.htm>
- Kuschel G, Leschen RAB. 2011. Phylogeny and taxonomy of the Rhinorhynchinae (Coleoptera: Nemonychidae). *Invertebrate Syst.* 24:573–615.
- Kuschel G, Poinar G. 1993. *Libanorhinus succinus* gen. & sp. n. (Coleoptera: Nemonychidae) from Lebanese amber. *Entomol Scandinavica.* 24:143–146.
- Latreille PA. 1802. Histoire Naturelle, Générale et Particulière, des Crustacés et des Insectes. Ouvrage faisant suite aux Oeuvres de Leclercq de Buffon, et partie du Cours complet d'Histoire naturelle rédigé par C. S. Sonnini, membre de plusieurs Sociétés Savantes. 3. Paris: Dufart; p. xii + 467.
- Lawrence JF, Beutel RG, Leschen RAB, Ślipiński SA. 2010. Chapter 2. Glossary of morphological terms. *Handbook of Zoology. Arthropoda: insecta.* Tb. 40: Coleoptera (Beetles). 2: morphology and systematics (Elateroidea, Bostrichiformia, Cucujiformia partim):9–20.
- Legalov AA. 2009. Annotated checklist of fossil and recent species of the family Belidae (Coleoptera) from the world fauna. *Amur Zool Zhurn.* 1(4):296–324.
- Legalov AA. 2012. Fossil history of Mesozoic weevils (Coleoptera: Curculionoidea). *Insect Science.* 19(6):683–698.
- Legalov AA. 2015. Fossil Mesozoic and Cenozoic weevils (Coleoptera, Obrienoidea, Curculionoidea). *Paleontol J.* 49(13):1442–1513.
- Legalov AA. 2017. Contribution to the knowledge of the family Nemonychidae (Coleoptera) with descriptions of new taxa. *Ukrainian Ecol.* 7(2):64–87.
- Legalov AA. 2018a. A new weevil, *Burmorhinus georgei* gen. et sp. nov. (Coleoptera; Curculionidae) from the Cretaceous Burmese amber. *Cretac Res.* 84:13–17.
- Legalov AA. 2018b. Annotated key to weevils of the world. Part 1. Families Nemonychidae, Anthribidae, Belidae, Ithyceridae, Rhynchitidae, Brachyceridae and Brentidae. *Ukrainian Ecol.* 8(1): 780–831.
- Legalov AA, Azar D, Kirejtshuk AG. 2017. A new weevil (Coleoptera; Nemonychidae; Oropsini trib. nov.) from Lower Cretaceous Lebanese amber. *Cretac Res.* 70:111–116.
- Legalov AA, Jarzembowski EA. 2018. First record of a weevil (Coleoptera: Nemonychidae) from the Lower Cretaceous (Wealden) of southern England. *Cretac Res.* 82:104–108.
- Legalov AA, Poinar G. 2015. New tribes of the superfamily Curculionoidea (Coleoptera) in Burmese amber. *Hist Biol.* 27(5):558–564.
- Linnaeus C. 1758. *Systema Naturae per regna tria naturae, secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis.* 10 (1). Holmiae: L. Salvii; p. 824.
- Peris D, Davis SR, Delclos X. 2014. An evolutionary history embedded in amber: reflection of the Mesozoic shift in weevil-dominated (Coleoptera: curculionoidea) faunas. *Zoolog J Linnean Soc.* 171:534–553.
- Poinar G. 2006. *Mesophyletis calhouni* (Mesophyletinae), a new genus, species, and subfamily of Early Cretaceous weevils (Coleoptera: Curculionoidea: Eccoptarthridae) in Burmese amber. *Proc Entomol Soc Washington.* 108(4):878–884.
- Poinar G. 2009. *Paleocryptorhynchus burmanus*, a new genus and species of Early Cretaceous weevils (Coleoptera: Curculionidae) in Burmese amber. *Cretac Res.* 30(3):587–591.
- Poinar G, Brown AE. 2009. *Anchineus dolichobothris*, a new genus and species of Early Cretaceous weevils (Curculionoidea: Coleoptera) in Burmese amber. *Proc Entomol Soc Washington.* 111(1):263–270.
- Poinar G, Brown AE, Legalov AA. 2016. A new weevil tribe, Mekorhamphini trib. nov. (Coleoptera, Ithyceridae) with two new genera in Burmese amber. *Biol Bull Bogdan Chmelniitskiy Melitopol State Pedagog Univ.* 6(3):157–163.
- Poinar G, Brown AE, Legalov AA. 2017. A new weevil, *Aepyceratus hyperochus* gen. et sp. nov., Aepyceratinae subfam. nov., (Coleoptera; Nemonychidae) in Burmese amber. *Cretac Res.* 77:75–78.
- Poinar G, Lambert JB, Wu Y. 2007. Araucarian source of fossiliferous Burmese amber: spectroscopic and anatomical evidence. *J Botan Res Inst Texas.* 1:449–455.
- Schoenherr CJ. 1826. *Curculionidum dispositio methodica cum generum characteribus, descriptionibus atque observationibus variis seu prodromus ad synonymiae insectorum, partem IV.* Lipsiae (Fleischer), X + 338 pp.
- Schoenherr CJ. 1840. *Genera et species curculionidum, cum synonymia hujus familiae. Species novae aut hactenus minus cognitae, descriptionibus: a Dom. Leonardo Gyllenhal, C. H. Boheman, et entomologis alas illustratae.* Paris (Roret). 5(2):465–970.
- Smith RDA, Ross AJ. 2018. Amber ground pholadid bivalve borings and inclusions in Burmese amber: implications for proximity of resin-producing forests to brackish waters, and the age of the amber. *Earth Environmental Sci Trans Royal Soc Edinburgh.* 107:239–247.
- Voss E. 1922. *Monographische Bearbeitung der Unterfamilie Rhynchitinae (Curc.). I. Teil: nemonychini-Auletini (5. Beitrag zur Kenntnis der Curculioniden).* Archiv Naturgeschichte. Ab A(88) (8). 1–113.
- Whalley P, Jarzembowski EA. 1985. Fossil insects from the Lithographic Limestone of Montsech (Late Jurassic - Early Cretaceous), Lerida Province, Spain. *Bull British Museum (Natural History).* Geology. 38:381–412.
- Zherikhin VV. 1993. Suborder polyphaga. *Trudy Paleontologicheskogo Instituta Akademii Nauk SSSR.* 252:20–37. [In Russian].
- Zherikhin VV, Gratshev VG. 2004. Fossil curculionid beetles (Coleoptera, Curculionoidea) from the Lower Cretaceous of north-eastern Brazil. *Paleontol J.* 38(5):528–537.