

## Short communication

# First record of a fungus weevil (Coleoptera; Anthribidae) from the Upper Cretaceous Arzamazovskaya Formation, Primorsky Krai, Russian Far East

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## ARTICLE INFO

## Article history:

Received 13 May 2019

Received in revised form

8 August 2019

Accepted in revised form 9 September 2019

Available online 16 September 2019

## Keywords:

Curculionidea

Anthribinae

New taxa

Primorsky Krai

Late Cretaceous

Turonian – Coniacian

## ABSTRACT

A new fungus weevil, *Arzamazorhinus neli* gen. et sp. nov. belonging to the subfamily Anthribinae is described from Primorsky Krai, Upper Cretaceous, Turonian – Coniacian. The new genus differs from other genera of the tribe Ecelonerini in the ventral antennal scrobes and rather long rostrum. It is distinguished from the genus *Cretanthribus* Legalov, 2009 (tribe Cretanthribini) fungus weevil described from Cretaceous deposits of Khetana in the Russian Far East, by the pronotum possessing transverse carina, a rather long subparallel rostrum not sagittate at apex, and lacking transverse eyes. This is the first record of Anthribidae from the late Cretaceous and the first coleopteran described from the Arzamazovskaya Formation in the Russian Far East.

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## 1. Introduction

Fungus weevils (family Anthribidae Billberg, 1820) are a very diverse group of primitive weevils adapted for development in rotting wood or seeds (Mermudes and Leschen, 2014). The oldest Anthribidae from the extinct subfamilies Juranthribinae Legalov, 2011 and Protoscelinae Medvedev, 1968 were recorded from the border of the Middle and Upper Jurassic (Legalov, 2011, 2013b). The earliest record of the Choraginae Kirby, 1819 is from the Lower Cretaceous of Spain (Soriano et al., 2006). Most species and supraspecific taxa of Anthribidae belong to the subfamily Anthribinae, which is recorded from the Middle Cretaceous of the Russian Far East (Zherikhin, 1993; Legalov, 2015; Nadein and Perkovsky, 2018). Many species have been described from Eocene and Miocene amber (Gratshev and Zherikhin, 1995; Gratshev and Perkovsky, 2008; Legalov, 2012a, 2013a, 2015; Poinar and Legalov, 2016), while impression prints are rare (Legalov, 2015, 2018b).

In this paper a new genus and species of the family Anthribidae are described. It is a first record of fungus weevils from the Upper

Cretaceous and the first Coleoptera described from the Turonian – Coniacian of the Arzamazovskaya Formation (Russian Far East).

## 2. Material and methods

The impressions were obtained from deposits (Fig. 1) in the Arzamazov creek (tributary of Rudnaya river, near settlement Tayga (44°36'41" N; 135°26'09" E), Rudnitsky District, Primorsky Krai, Russian Far East). The material is from coarse-grained bluish-gray tuffs of the Arzamazovskaya Formation, which also contains plant remains (Zherikhin, 1978). The middle Turonian – early Coniacian age is determined by the composition of the fossil flora (Nevolina, 1984). Bersenev et al. (1969) suggested the age of the formation as 79–89 Ma.

The holotype is deposited in the Borissiak Paleontological Institute, Russian Academy of Sciences (Russia: Moscow) – PIN. Observations and photographs were made with a Zeiss Stemi-2000 stereoscopic microscope.

## 3. Systematic paleontology

Family Anthribidae Billberg, 1820

Subfamily Anthribinae Billberg, 1820

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Fig. 1. Location of deposits in the Arzamazov creek (Primorsky Krai, Russia).

#### Tribe ? Ecelonerini Lacordaire, 1866

Genus *Arzamazorhinus* Legalov, gen. nov.

urn:lsid:zoobank.org:act:13306039-6EBB-4C3B-BC70-83E4C7855903.

Type species: *Arzamazorhinus neli* sp. nov.

**Etymology.** The generic name is from the discovery location – “Arzamazov creek” and “rhinus”, a term used in Curculionoidea morphology.

**Diagnosis.** Rostrum subparallel, slightly longer than pronotum, with middle carina and free labrum; antennal scrobes sulciform ventrally; antennae non-geniculate, inserted in middle of rostrum; pronotum transverse, with antebasal transverse carina; elytra suboval, with rounded humeri and large points in elytral striae; scutellar striole absent; abdominal ventrites almost coalesced; femora thickened; tibiae without mucro and spurs; tarsomere 2 bilobed, embracing tarsomere 3 laterally.

**Comparison.** The new genus differs from other genera of the tribe Ecelonerini in the ventral antennal scrobes and rather long rostrum. It is distinguished from the genus *Cretanthribus* Legalov, 2009 (tribe Cretanthribini) – another fungus weevil described from Cretaceous deposits of Khetana in the Russian Far East, by the pronotum possessing transverse carina, a rather long sub-parallel rostrum not sagittate at apex, and lacking transverse eyes.

**Composition.** Only type species.

**Notes.** Tarsomere 2 embracing tarsomere 3 laterally, free labrum and tibiae lacking spurs suggest placement of *Arzamazorhinus* gen. nov. in Anthribidae. The ventrally inserted antennae suggest placement in the subfamily Anthribinae. The position of the new genus among extant Anthribinae remains unclear. It is characterized by the sulciform antennal scrobes which are found in the tribes Sintorini Lacordaire, 1866, Ptychoderini Jekel, 1855, Tophoderini Lacordaire, 1866 and Ecelonerini Lacordaire, 1866. The antebasal transverse pronotal carina and medium-sized rostrum of *Arzamazorhinus* gen. nov. do not fit the diagnoses of the tribes Basitropidini Lacordaire, 1866 and Eugonini Lacordaire, 1866. Unconvergent antennal scrobes distinguish the new genus from representatives of

the tribe Sintorini. The rostrum not widened at the apex and with one carina, and the antennae inserted in the middle of the rostrum restrict placement of the new genus in the tribe Ptychoderini. *Arzamazorhinus* gen. nov. differs from the genera of the tribe Tophoderini in the antennal scrobes being invisible from above and not positioned dorso-lateral and the antennae not inserted at the apical third of the rostrum. The new genus is tentatively assigned to the tribe Ecelonerini because *Arzamazorhinus* gen. nov. has scrobes not visible from above and the antennae are inserted near the middle of the rostrum, but the new genus differs from other genera of the tribe by the ventral antennal scrobes and rather long rostrum.

***Arzamazorhinus neli* Legalov, sp. nov.**

urn:lsid:zoobank.org:act:FD64101-913A-4FB1-93BF-FE67227B0212.

Fig. 2.

Type species: Holotype, PIN, no. 3133/3, part and counterpart of beetle.

**Locality and strata.** Arzamazov creek, tributary of Rudnaya river, near Tayga settlement, Rudnitsky District, Primorsky Krai, Russian Far East, Arzamazovskaya Formation, Turonian–Coniacian, Upper Cretaceous.

**Etymology.** In honor of the paleontologist André Nel (Muséum National d'Histoire Naturelle, Paris, France) who has made a great contribution to the study of fossil insects.

**Description of holotype.** Body length (without rostrum) 6.2 mm, length of rostrum 1.2 mm.

Body black, distinctly sclerotized.

Head capsule not constricted behind eyes. Labrum free, almost rectangular. Mandibles large, with tooth on inner edge. Rostrum quite short and wide, almost straight, punctate, subparallel, slightly longer than pronotum, 2.3 times as long as wide at apex, 1.9 times as long as wide in middle, 1.6 times as long as wide at base; with medial carina dorsally; mesorostrum not dilated. Antennal scrobes sulciform, ventrally. Eyes elliptical, distinctly protruding from head outline. Forehead wider than width of rostrum base. Antennae non-geniculate, inserted in middle of rostrum. Antennomere 1, 3.3 times as long as wide.

Pronotum bell-shaped, with weakly arcuate sides, about 1.1 times as long as wide at apex, 0.7 times as long as wide in middle, 0.8 times as long as wide at base. Transverse carina antebasal, distinct. Scutellum large, sub rectangular, transverse.

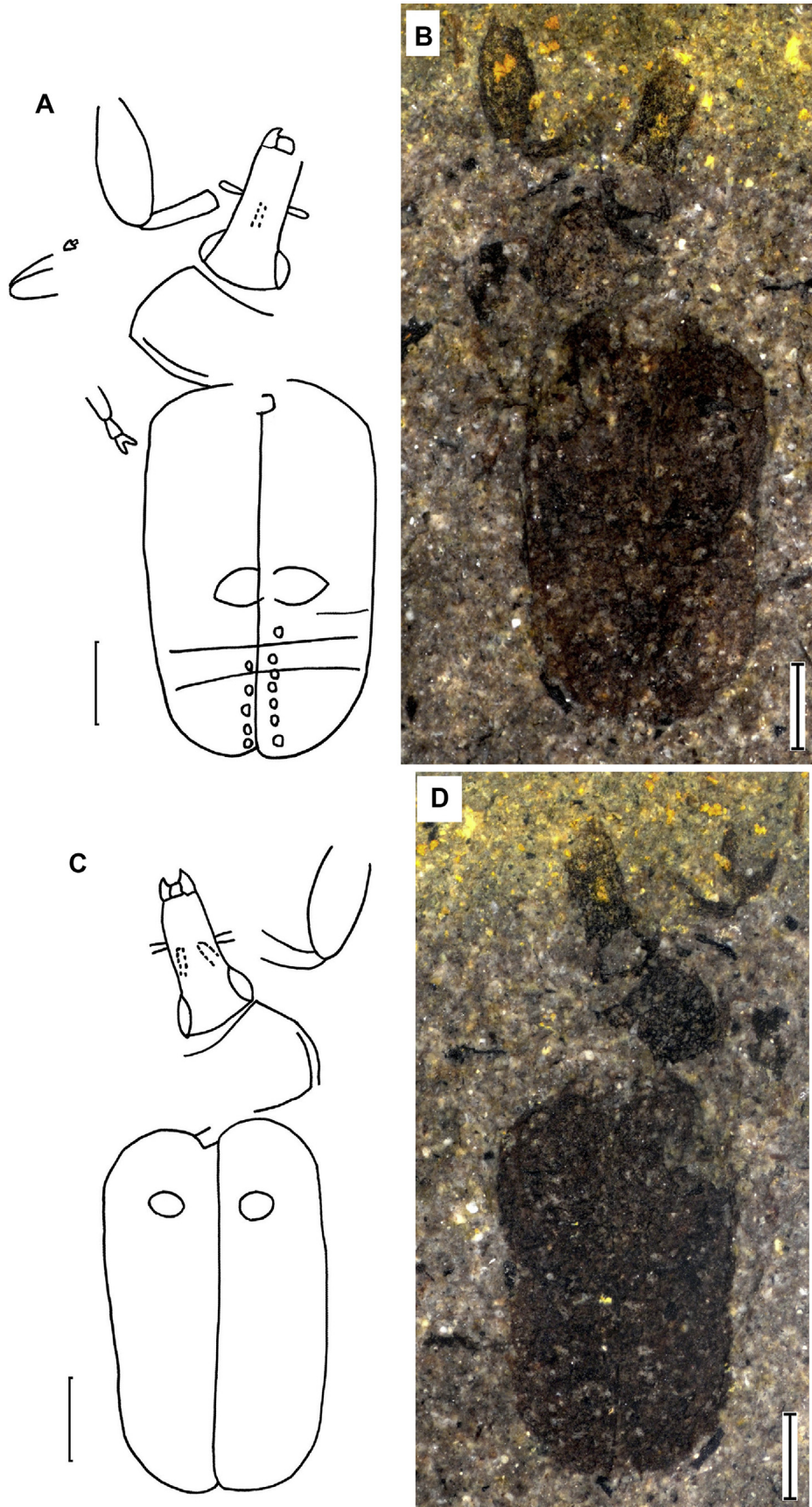
Elytra suboval, 1.9 times as long as wide at base, 1.7 times as long as wide in middle, 2.3 times as long as wide at apical fourth, 4.7 times as long as pronotum; humeri rounded; width of interstriae about as long as width of striae; punctate striae with large and dense punctures; scutellar striole absent.

Mesocoxal cavities rounded, separated. Metacoxal cavities transverse. Metaventrite long. Abdomen with almost homogeneous ventrites.

Legs long. Femora greatly thickened, without teeth. Tibiae quite wide, without mucro and spurs. Tarsi pseudoquadrisegmented; tarsomere 1 conical, about 1.8 times as long as wide; tarsomere 2 bilobed, embracing tarsomere 3 laterally, about equal in length and wide; tarsomere 3 bilobed, narrower than tarsomere 3.

#### 4. Discussion

Curculionid beetles of the Late Cretaceous are much less studied than those of the Early Cretaceous (Kirejtshuk et al., 2010; Legalov, 2012b; etc.). The Cretaceous weevil fauna of Burmese amber is rich, but Anthribidae is not represented (Legalov, 2018a; Clarke et al.,



**Fig. 2.** *Arzamazorhinus neli* gen. et sp. nov., holotype, PIN, no. 3133/3: A. Body outline of part of beetle; B. Body of part of beetle; C. Counterpart outline of part of beetle. D. Body of counterpart of beetle. Scale bar = 1.0 mm.

2019). Most Curculionoidea are known from Cenomanian and Turonian deposits (Kuschel et al., 1994; Gratshev and Zherikhin, 2000; Gratshev, 2008; Legalov, 2014, 2015). Several elytra of weevils are described from Maastrichtian (Legalov, 2015). Curculionoidea from Coniacian to Campanian is not known.

The material from the location “Arzamazov creek” is not abundant. About 30 specimens of Insecta were collected (Zherikhin, 1978). Most of them are caddisfly cases of *Folindusia Vialov et Sukatsheva* (1976) known only from this location (Sukatsheva, 1982). An undescribed cupedid is also recorded (Zherikhin, 1978). *Arzamazorhinus neli* gen. et sp. nov. is the first described beetle from the Arzamazovskaya Formation and the first weevil from the interval of the Coniacian to Campanian.

## Acknowledgements

The author thanks A.G. Ponomarenko, I.D. Sukatsheva and A.P. Rasnitsyn (Moscow) for the opportunity to study material from the Paleontological Institute RAS, Dr. George O. Poinar, Jr. (USA: Corvallis) for improving the manuscript and two reviewers for providing important comments on this manuscript.

## References

- Bersenev, I.I., Vereshagin, V.N., Konovalov, V.P., Bur'yanova, I.Z., 1969. Cretaceous system. Upper Section. Geologiya SSSR. Primorsky Krai vol. 1. Moscow: Nedra, pp. 283–312.
- Billberg, G.J., 1820. Enumeratio Insectorum in Museo Gust. Joh. Billberg. Gadel, Stockholm, p. 138. <https://doi.org/10.5962/bhl.title.49763>.
- Clarke, D.J., Limaye, A., McKenna, D.D., Oberprieler, R.G., 2019. The weevil fauna preserved in Burmese amber—snapshot of a unique, extinct lineage (Coleoptera: Curculionoidea). *Diversity* 11 (1), 1. <https://doi.org/10.3390/d11010001>.
- Gratshev, V.G., Zherikhin, V.V., 1995. A new anthribid genus from the Baltic amber (Insecta: Coleoptera: Anthribidae). *Mitteilungen aus dem Geologisch-Paläontologischen Institut der Universität Hamburg* 78, 149–157.
- Gratshev, V.G., Zherikhin, V.V., 2000. The weevils from the Late Cretaceous New Jersey amber (Coleoptera, Curculionoidea). *Studies on fossils in amber, with particular reference to the Cretaceous of New Jersey*. Backhuys Publ., Leiden, pp. 241–254. <https://doi.org/10.1086/377944>.
- Gratshev, V.G., Perkovsky, E.E., 2008. New species of the genus *Glaesotropis* (Insecta: Coleoptera: Anthribidae) from Rovno amber. *Paleontological Journal* 42, 60–63.
- Gratshev, V.G., Anisyutkin, L.N., Gratshev, V.G., Ponomarenko, A.G., Rasnitsyn, A.P., Vršanský, P., 2008. In: Krassilov, V., Rasnitsyn, A. (Eds.), Part II. Fossil insects in the Cretaceous Mangrove Facies of southern Negev, Israel, in Plant–Arthropod Interactions in the Early Angiosperm History: Evidence from the Cretaceous of Israel. Pensoft Publ. and BRILL, Sofia–Moscow and Leiden–Boston, pp. 189–223. <https://doi.org/10.1163/ej.97890004170711.1-229>.
- Jekel, H., 1855. Coleoptera. Fam. Curculionides. *Insecta Saundersiana: or characters of undescribed insects in the collection of William Wilson Saunders*, vol. 2, pp. 1–153.
- Kirby, W., 1819. A century of Insects, including several new genera described from his cabinet. *Transactions of the Linnean Society of London* 12, 375–453. XXI–XXII. <https://doi.org/10.1111/j.1095-8339.1817.tb00239.x>.
- Kirejtshuk, A.G., Ponomarenko, A.G., Prokin, A.A., Chang, H., Nikolajev, G.V., Ren, D., 2010. Current knowledge on Mesozoic Coleoptera from Daohugou and Liaoning (North East China). *Acta Geologica Sinica* 84, 783–792. <https://doi.org/10.1111/j.1755-6724.2010.00253.x>.
- Kuschel, G., Oberprieler, R.G., Rayner, R.J., 1994. Cretaceous weevils from southern Africa, with description of a new genus and species and phylogenetic and zoogeographical comments (Coleoptera: Curculionoidea). *Entomologica Scandinavica* 25, 137–149. <https://doi.org/10.1163/187631294x00261>.
- Lacordaire, T., 1866. *Histoire Naturelle des Insectes. Genères des Coléoptères ou exposé méthododique et critique de tous les genres proposés jusqu'ici dans cet ordre d'insectes*, vol. 7. Roret, Paris, p. 620.
- Legalov, A.A., 2009. Contribution to the knowledge of the Mesozoic Curculionoidea. *Amurskij Zoologicheskij Zhurnal* 1 (4), 283–295 (I–IV).
- Legalov, A.A., 2011. First record of Anthribid beetles from the Jurassic of Kazakhstan (Coleoptera: Anthribidae). *Paleontological Journal* 45, 629–633. <https://doi.org/10.1134/S0031030111060074>.
- Legalov, A.A., 2012a. New curculionoid beetles (Coleoptera: Curculionoidea) from the Baltic amber. *Paleontological Journal* 46, 262–272. <https://doi.org/10.1134/S0031030112030094>.
- Legalov, A.A., 2012b. Fossil history of Mesozoic weevils (Coleoptera: Curculionoidea). *Insect Science* 19 (6), 683–698. <https://doi.org/10.1111/j.1744-7917.2012.01508.x>.
- Legalov, A.A., 2013a. New and little known weevils (Coleoptera: Curculionoidea) from the Paleogene and Neogene. *Historical Biology* 25, 59–80. <https://doi.org/10.1080/08912963.2012.692681>.
- Legalov, A.A., 2013b. Review of the family Anthribidae (Coleoptera) from the Jurassic of Karatau: subfamily Protoscelinae. Genus *Protoscelis* Medvedev. *Paleontological Journal* 47, 292–302. <https://doi.org/10.1134/S0031030113030064>.
- Legalov, A.A., 2014. New Nemonychidae, Brentidae and Curculionidae (Coleoptera: Curculionoidea) from the Turonian of Kzyl-Dzhar (Kazakhstan). *Historical Biology* 26 (5), 675–689. <https://doi.org/10.1080/08912963.2013.829826>.
- Legalov, A.A., 2015. Fossil Mesozoic and Cenozoic weevils (Coleoptera, Obrienoidea, Curculionoidea). *Paleontological Journal* 49 (13), 1442–1513. <https://doi.org/10.1134/S0031030115130067>.
- Legalov, A.A., 2018a. A new weevil, *Burmorhinus georgei* gen. et sp. nov. (Coleoptera; Curculionidae) from the Cretaceous Burmese amber. *Cretaceous Research* 84, 13–17. <https://doi.org/10.1016/j.cretres.2017.11.002>.
- Legalov, A.A., 2018b. New weevils (Coleoptera, Curculionoidea) from the Eocene of the Green River, United States: Part 1. *Paleontological Journal* 52, 294–302. <https://doi.org/10.1134/S0031030118030061>.
- Medvedev, L.N., 1968. In: Rohdendorf, B.B. (Ed.), *Leaf-beetles of the Jurassic of the Karatau* (Coleoptera, Chrysomelidae). Yurskie nasekomye Karatau [Jurassic Insects of the Karatau]. Nauka, Moscow, pp. 155–165 [In Russian].
- Mermudes, J.R.M., Leschen, R.A.B., 2014. 3.2 Anthribidae Billberg, 1820, *Handbook of Zoology, Arthropoda: Insecta*, Tb. 40: Coleoptera (Beetles). Morphology and Systematics (Phytophaga) 3, 309–315.
- Nadein, K.S., Perkovsky, E.E., 2018. A new tribe of Galerucinae leaf beetle (Insecta: Coleoptera: Chrysomelidae) from the Upper Cretaceous Taimyr amber. *Cretaceous Research* 84, 97–106. <https://doi.org/10.1016/j.cretres.2017.10.023>.
- Nevolina, S.I., 1984. Late Cretaceous flora of Primorye (Partisan flora of A. N. Krishtofovich). *Ezhegodnik Vsesoyuznogo Paleontologicheskogo Obshchestva* 27, 219–235 [In Russian].
- Poinar Jr., G., Legalov, A.A., 2016. New Anthribidae (Coleoptera: Curculionoidea) in Dominican and Mexican ambers. *Palaeontologia Electronica* 19, 1–38. <https://doi.org/10.26879/635>.
- Soriano, C., Gratshev, V.G., Delclos, X., 2006. New Early Cretaceous weevils (Insecta, Coleoptera, Curculionoidea) from El Montsec, Spain. *Cretaceous Research* 27, 555–564. <https://doi.org/10.1016/j.cretres.2005.10.015>.
- Sukatsheva, I.D., 1982. Historical development of the order Trichoptera. *Trudy Paleontologicheskogo Instituta Akademiyi Nauk SSSR* 197, 1–112 [In Russian].
- Vialov, O.S., Sukatsheva, I.D., 1976. Fossil caddisfly cases (Insecta, Trichoptera) and their stratigraphical value. *Paleontology and biostratigraphy of Mongolia*. Moscow, pp. 169–230 [In Russian].
- Zherikhin, V.V., 1978. Development and changes of the Cretaceous and Cenozoic faunal assemblages (Tracheata and Chelicerata). *Trudy Paleontologicheskogo Instituta Akademiyi Nauk SSSR* 165, 1–198 [In Russian].
- Zherikhin, V.V., 1993. Family Nemonychidae Bedel, 1882, Family Ulyanidae Zherikhin, fam. Nov., Family Anthribidae Billberg, 1829, Family Attelebidae Billberg, 1820. In: Gromov, V.V., Dmitriev, V.Yu., Zherikhin, V.V., Lebedev, E.L., Ponomarenko, A.G., Rasnitsyn, A.P., Sukatsheva, I.D. (Eds.), *Cretaceous insect faunas of the Ulya River basin, West Okhotsk Region. Mesozoic insects and ostracods from Asia*. Nauka Press, Moscow, pp. 20–33.