

A New Species of the Genus *Protaneuretus* Wheeler (Hymenoptera, Formicidae) from Bitterfeld Amber (Late Eocene), with a Key to the Species of the Genus

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Abstract—A second species of the genus *Protaneuretus* Wheeler, 1915, *P. mirabilis* sp. nov., is described from the late Eocene Bitterfeld amber. The new species is compared with the type species of the genus and key to species of *Protaneuretus* is provided.

Keywords: late Eocene, Bitterfeld amber, fossil ants, *Protaneuretus*

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INTRODUCTION

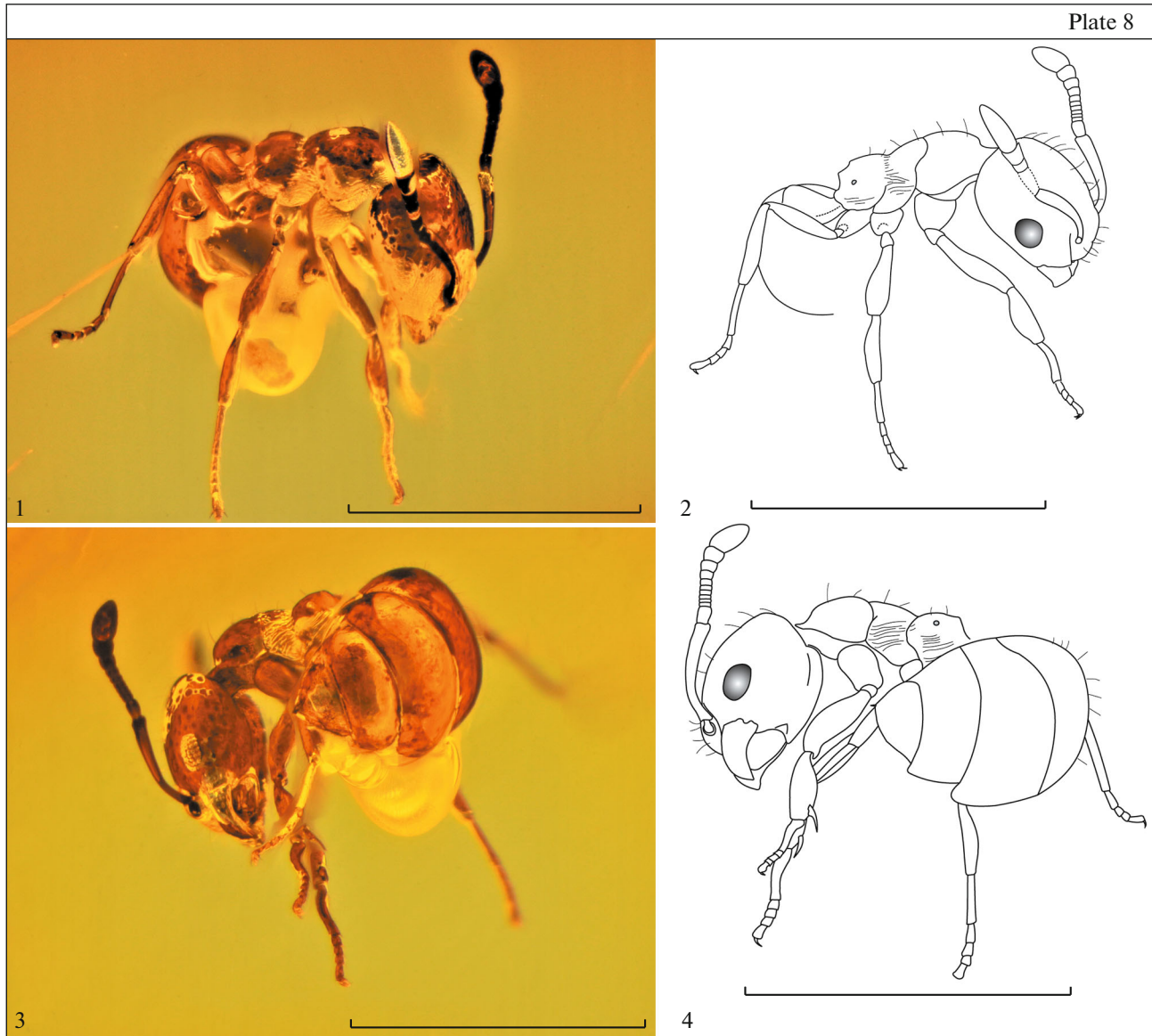
The subfamily Aneuretinae Emery, 1913 was proposed as a monotypic tribe in the subfamily Dolichoderinae Forel, 1878 for the extant species *Aneuretus simoni* Emery, 1893, described from Sri Lanka. The first fossil members of the subfamily (as a tribe) were described by Wheeler (1915) from the late Eocene Baltic amber (Perkovsky et al., 2007). He described the monotypic genus *Protaneuretus* Wheeler, 1915 and the genus *Paraneuretus* Wheeler, 1915 with two species (later a third species of the genus, *P. dubovikoffi* Dlussky et al., 2015 was described from the late Eocene deposits of the Russian Far East (Dlussky et al., 2015)). In the same paper Wheeler described the genus *Pityomyrmex* Wheeler, 1915, later included in the Aneuretinae (Dlussky and Rasnitsyn, 2009). At present only one extant species of the subfamily (*Aneuretus simoni*) and 13 fossil species (including one described below) of nine genera (Bolton, 2019) are known. Fossil representatives of Aneuretinae are known from the Cretaceous (Burmese amber) to the late Eocene (Baltic and Bitterfeld ambers). Unfortunately, the location of the types of the Aneuretinae described by Wheeler remain unknown. Based on a detailed description and drawing in Wheeler (1915), we describe the second species of the genus *Protaneuretus*.

† Deceased.

MATERIALS AND METHODS

A Leica M205C stereo microscope was used for photography and morphological analysis. Subsequent image processing was performed using Helicon Focus Pro 7 software. Drawings were made using Inkscape 0.92 software. The following abbreviations are used to indicate measurements and indices: HL—head length measured in a straight line from the mid-front margin of the clypeus to the mid-occipital margin; HW—maximum width of the head in full face, behind the eyes; EL—maximum eye length from above; SL—maximum scape length along the straight line excluding the base; VL (vertex length)—distance measured along the straight line from the mid-line connecting the upper margin of the eyes to the occipital margin of the head or to the mid-point of a transverse line connecting occipital angles if the occipital margin is concave; WL—Weber length, length of a mesosome in profile measured from the neck margin to the posterior edge of the propodeal lobes; PEL—petiole maximum lateral length; F3—hind femur length; GL—abdomen length measured laterally from the foremost point of the first abdominal segment to the most posterior point; TL (total length) = HL + WL + PEL + GL; CI (cephalic index) = HL/HW × 100; EI (eye index) = EL/HW × 100; SI (scape index) = SL/HL × 100. All measurements are given in millimeters and are accurate to 0.01 mm.

The holotype of the described species is housed in the Geowissenschaftliches Zentrum der Universität Göttingen (GZG), Germany.



Explanation of Plate 8

Figs. 1–4. *Protaneuretus mirabilis* sp. nov., holotype GZG.BST.27160, worker: (1, 2) right view; (3, 4) left view. Scale bar 1 mm.

SYSTEMATIC PALEONTOLOGY

Family Formicidae Latreille, 1809

Subfamily Aneuretinae Emery, 1913

Genus *Protaneuretus* Wheeler, 1915

Protaneuretus mirabilis Dubovikoff and Dlussky, sp. nov.

Plate 8, figs. 1–4

E t y m o l o g y. From the Latin *mirabilis* (amazing, wondrous, remarkable).

H o l o t y p e. GZG.BST.27160 (Kutscher-collection no. MKK F-160) worker; Bitterfeld (Saxonian) amber, late Eocene.

Description. Worker. The body length is 2 mm. The head is elongated (CI 160) with subparallel sides. The eyes are relatively large, convex; their pos-

terior margin is located on the center of the line, connected to the base of the mandible and the occipital angle. The ocelli are absent. The antennae are 12-segmented. The scape is relatively short (SI 64), exceeding the eye upper margin not more than by three times its maximum diameter. The first segment of the antennal flagellum is large, segments 2–8 are prominently transverse (their length is much smaller than their width), the club is 4-segmented. The mandibles are triangular, with punctured ornamentation, no denticles are visible. The palpal formula is 4 : 3 (poorly visible). The clypeus anterior margin is weakly convex. The head occipital margin is straight. The mesosome is compact, short, only slightly longer than the head. The mesonotal depression is distinct. The main and

sloping surface of the propodeum are of equal length. The propodeum spines are small, in the form of obtuse nodes; their apices are directed backwards. The sides of the mesopleura and propodeum are covered with longitudinal wrinkles. The remaining body is smooth. The petiole is high, with a relatively short cylindrical part. The abdomen is massive, with four visible segments. The sting is retracted within the abdomen, and only its tip is visible. A few adpressed hairs are present on the clypeus, forehead, and vertex, on the top of the mesosome (two pairs of long setae on the pro-, mesonotum, and one on the propodeum), and on the top of the first abdominal tergite. The limbs lack hairs.

M e a s u r e m e n t s in mm: HL 0.48, HW 0.30, EL 0.12, SL 0.35, VL 0.25, WL 0.58, PEL 0.21, F3 0.35, GL 0.68, TL 2, CI 160, EI 40, SI 64.

C o m p a r i s o n. The described species is distinguished from the type species of the genus (*P. succineus* Wheeler, 1915) by the smaller size (in the latter species, the body length of the workers is from 5.5 to 7 mm, whereas in the described species it is ca. 2 mm) and sparse adpressed pubescence (hairs are absent on the limbs, petiole, and abdominal tergites, except from the apex of the first one). The main surface of the propodeum is practically equal to the sloping surface, whereas in the type species it is considerably larger. In *P. mirabilis*, ornamentation in the form of wrinkles is present only on the mesopleura and sides of the propodeum, whereas in the type species, also on the main surface of the propodeum. The spines of the propodeum of the type species are sharper and directed upwards.

M a t e r i a l. Holotype.

Key to Protaneuretus Species

1. Size greater than 5 mm. Pubescence abundant (including on limbs). Main surface of propodeum noticeably longer than the sloping surface. Propodeum spines acute and directed upward
.....*P. succineus*
2. Size smaller. Pubescence sparse, absent on scape and limbs. Main surface of propodeum the same size as sloping surface. Propodeum spines obtuse, node-shaped, directed backwards.....
.....*P. mirabilis* sp. nov.

Taking into account *P. mirabilis* and *Eldermyrmex exectus* that we described from the Bitterfeld amber (Dubovikoff et al., 2019), only 15 of 65 described species of the Bitterfeld ants (23%) are unknown north of the Subparatethys (from Baltic amber) (Dlussky and Rasnitsyn, 2009; Perkovsky, 2016; Radchenko and Dlussky, 2017, 2018a, 2018b); even taking into account a new species of *Zherichinius* and several other undescribed species of Dolichoderinae and Myrmicinae from Bitterfeld (Perkovsky, 2016) the proportion of Bitterfeld ants unknown north of the Subparatethys is considerably lower than in the Rovno amber: 26 of 71 (37%) of such species are present among the already described ant species from the Rovno amber (Perkovsky, 2018; Radchenko and Perkovsky, 2020).

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REFERENCES

- Bolton, B. An online catalog of the ants of the world, Available from <http://antcat.org>, 2019, [accessed January 2019].
- Dlussky, G.M. and Rasnitsyn, A.P., Ants (Insecta: Vespida: Formicidae) in the Upper Eocene amber of Central and Eastern Europe, *Paleontol. J.*, 2009, vol. 43, no. 9, pp. 1024–1042.
- Dlussky, G.M., Rasnitsyn, A.P., and Perfilieva, K.S., The ants (Hymenoptera: Formicidae) of Bol'shaya Svetlovodnaya (Late Eocene of Sikhote-Alin, Russian Far East), *Caucasian Entomol. Bull.*, 2015, vol. 11, no. 1, pp. 131–152.
- Dubovikoff, D.A., Dlussky, G.M., Perkovsky, E.E., and Abakumov, E.V., A new species of the genus *Eldermyrmex* Shattuck, 2011 (Hymenoptera, Formicidae) from Bitterfeld amber (late Eocene) with species key of the genus, *Paleontol. J.*, 2019, vol. 53, no. 10, pp. 994–997.
- Perkovsky, E.E., Tropical and Holarctic ants in late Eocene ambers, *Vestn. Zool.*, 2016, vol. 50, no. 2, pp. 111–122.
- Perkovsky, E.E., Only a half of species of Hymenoptera in Rovno amber is common with Baltic amber, *Vestn. Zool.*, 2018, vol. 52, no. 5, pp. 353–360.
- Perkovsky, E.E., Rasnitsyn, A.P., Vlaskin, A.P., and Taraschuk, M.V., A comparative analysis of the Baltic and Rovno amber arthropod faunas: representative samples, *Afr. Invertebr.*, 2007, vol. 48, no. 1, pp. 229–245.
- Radchenko, A.G. and Dlussky, G.M., New species of the extinct ant genus *Stigmomyrmex* Mayr and designation of the neotype of *Stiphromyrmex robustus* (Mayr) (Hymenoptera: Formicidae: Myrmicinae), *Ann. Zool.*, 2017, vol. 67, no. 4, pp. 773–780.
- Radchenko, A.G. and Dlussky G.M., A new species of the extinct ant genus *Electromyrmex* (Hymenoptera, Formicidae), *Vestn. Zool.*, 2018a, vol. 52, no. 5, pp. 361–366.
- Radchenko, A.G. and Dlussky G.M., Two new fossil species of the ant genus *Pristomyrmex* Mayr (Hymenoptera: Formicidae) from the Rovno and Bitterfeld ambers, *Ann. Zool.*, 2018b, vol. 68, no. 2, pp. 251–258.
- Radchenko, A.G. and Perkovsky, E.E., New finds of the fossil ant species *Prionomyrmex* Mayr (Hymenoptera, Formicidae, Myrmecinae) in the late Eocene amber of Europe, *Paleontol. J.*, 2020, vol. 54, no. 6.
- Wheeler, W.M., The Ants of the Baltic Amber, *Schrift. Phys.-Ökon. Ges. Königsberg*, 1915, no. 55, pp. 1–142.

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