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A new spineless species of the genus *Myrmica* Latreille, 1804 (Hymenoptera: Formicidae: Myrmicinae) from late Eocene Baltic amber

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Abstract
A new species, †*Myrmica andryushchenkoi* **sp. nov.** is described and illustrated from late Eocene Baltic amber. This discovery represents the 10th species of the genus *Myrmica* described from Late Eocene ambers of Europe. The new species can be distinguished from †*Myrmica paradoxa* Radchenko, Dlussky & Elmes, 2007 by several distinct morphological features. In particular, †*M. andryushchenkoi* **sp. nov.** is characterised by smaller size, shorter scape, head longitudinally striate, femora strongly swollen, meso- and metatibiae without spurs. It is worth noting that this ant is only the fourth spineless species in the genus and the second within fossil *Myrmica* species.

Key words fossil, ants, Myrmicini, *Myrmica paradoxa*.

Introduction

The genus *Myrmica* Latreille, 1804 one of the most species-rich Myrmicinae genera in late Eocene European ambers (second only to †*Eotemnothorax* Radchenko, 2024). Currently nine fossil species of the genus *Myrmica* are considered valid (Radchenko 2023). For a detailed review of *Myrmica* fossils, see Radchenko *et al.* (2007) and Radchenko (2023).

Here we describe and illustrate a new species of *Myrmica* on the basis of two workers from late Eocene Baltic amber. The new ant is the fourth species of *Myrmica* with short denticles on the propodeum (both fossil and recent).

Materials and Methods

The fossil ant specimens examined (Figure 1) are from the Baltic amber, Priabonian age (Late Eocene, 37.8–33.9 Ma), the Prussian Formation, on the Sambia Peninsula near Kaliningrad, Kaliningrad region, Russia (Iakovleva *et al.* 2022). The holotype and paratype of the new species are kept in the collection of the Palaeontological Museum of the St. Petersburg State University, Russia, accessioned KA-122. The amber was hand processed for study (cut and polished) at the St. Petersburg State University (PaleoEcoAnt lab).

Photography and morphological analysis of sample was performed using a Leica M205C motorized stereomicroscope. The studies were performed using the equipment of the Research Park of St Petersburg State University (Resource Centre for Microscopy and Microanalysis). Subsequent image processing was carried out using the Helicon Focus Pro 8, Kritta 5.0.2 and Inkscape 1.2 software. All measurements of morphological structures were carried out in accordance with Zharkov *et al.* (2023, fig. 1).

The dimensional values of morphological structures are given in millimeters. The following designations are used in the text:

HL—head length, maximum length of the head, measured from the posterior margin of the head to the anterior-most extremity of the clypeus;

HW—head width, measured along the upper line of the eyes;

FW—the maximum width measured between the frontal lobes;

SL—the maximum straight-line length of the scape measured from antennal bulb to the apex;

PdL—pedicellum length;

FI1—the length of the first flagellomere;

FI2—the length of the second flagellomere;

OL—the maximum eye length measured by maximum diameter;

MdL—the length of the mandible, measured from the mandibular apex to the anterior clypeus margin, or to the transverse line connecting the anterior-most points in those taxa where the margin is concave medially;

WL—Weber's length, the diagonal length of the mesosoma in profile from the point at which the pronotum meets the cervical shield to the posterior basal angle of the metapleuron;

PNW—the maximum width of the pronotum in dorsal view;

ESL—maximum length of propodeal denticles (or spines) in profile, measured along the tubercle/spine from its tip to the deepest point of the propodeal constriction at its base;

ESD—distance between the tips of propodeal tubercles/spines in dorsal view;

PrdL—the maximum length of the propodeum in dorsal view;

PrdH—the height of the propodeum in profile, measured as the perpendicular distance from the ventral edge to the highest point of the propodeum;

PtL—the length of the petiolar node in profile, measured as the distance from the place of attachment to the propodeum to the place of attachment to the postpetiole;

PtH—the height of the petiolar node in profile, measured as the perpendicular distance from the ventral edge to the highest point of the petiolar node;

PtW—the maximum width of the petiolar node in dorsal view;

PPL—the length of the postpetiole in profile, measured as the distance from the place of attachment to the petiolar node to the place of attachment to the gaster;

PPH—the height of the postpetiole in profile, measured as the perpendicular distance from the ventral edge to the highest point of the postpetiole;

PPW—the maximum width of the postpetiole in dorsal view;

HFL—the maximum length of hind femur, measured in anterior view;

HTL—the maximum length of hind tibia, measured in anterior view;

GL—the length of the gaster, measured as the distance from the place of attachment of the postpetiole to the top of the gaster in ventral view;

TL—the total length of the ant (=HL + MdL + WL + PtL + PPL + GL).

Indices:

CI (cephalic index) = HL/HW;

SI_1 (scape length index) = SL/HL;

SI_2 (scape width index) = SL/HW;
FLI (frontal lobes index) = FW/HW;
OI_1 (eye length index) = OL/HL;
OI_2 (eye width index) = OL/HW;
MdI (mandible index) = MdL/HL;
PI_1 (petiole width index) = PtL/PtW;
PI_2 (petiole-cephalic index) = PtL/HW;
PPI_1 (postpetiole height index) = PPL/PPH;
PPI_2 (postpetiole width index) = PPH/PPW;
PPI_3 (postpetiole-petiole index) = PPW/PtW;
PPI_4 (postpetiole-cephalic index) = PPW/HW;
ESLI (propodeal spine length index) = ESL/HW;
ESDI (propodeal spine distance index) = ESD/ESL;
MI (mesosomal width index) = WL/PNW;
PRI (propodeal index) = PrdL/PrdH.

Results

Systematic palaeontology

Family Formicidae Latreille, 1809
Subfamily Myrmicinae Lepeletier de Saint-Fargeau, 1835

Genus *Myrmica* Latreille, 1804
Type species *Myrmica rubra* (Linnaeus, 1758)

†*Myrmica andryushchenkoi* Zharkov & Dubovikoff sp. nov. (Figure 1)
https://zoobank.org/urn:lsid:zoobank.org:act:D54F496D-FE89-4F5C-AE98-97111B2FC731

Etymology. After Konstantin Andryushchenko (Kalinigrad, Russia), our friend and Baltic amber enthusiast, who provide amber for this study and donated it to our Museum.

Type material. Holotype and paratype, workers (paratype without head), are found in a small piece of late Eocene Baltic amber. Types are stored in the collection of the Paleontological Museum of the St. Petersburg State University, St. Petersburg city, Russia, accessioned KA-122.

Type locality and age. The piece of amber is found by Konstantin Andryushchenko (https://paleoamber.ru) in Baltic amber. The material originated from Yantarny, on the Sambia Peninsula, Kaliningrad region, Russia. Late Eocene, Priabonian age (37.8–33.9 Ma), the Prussian Formation (Iakovleva *et al.* 2022).

Diagnosis (worker)**.** Anterior clypeal margin broadly rounded, not prominent, shallowly notched medially. Frontal carinae very weakly curved to merge with the rugae, which surround antennal sockets. Eyes of moderately small, weakly bulging, situated approximately at the midlength of lateral margins of head. Antennae 12-merous with distinct three-segmented club. Antennal scape relatively short, at least not reaching the occipital margin of head, gradually curved at the base. Propodeum with two short denticles, straight, sharp at the apex, directed backward. Petiole (abdominal segment II) with relatively short but distinct peduncle, forming a distinct triangular node. Meso- and metatibiae without spurs. Femora strongly swollen.

Measurements (in mm) and indices. Holotype: HL – 1.05; HW – 0.78; FW – 0.30; SL – 0.60; PdL – 0.10; Fl1 – 0.13; Fl2 – 0.14; OL – 0.18; MdL – 0.32; WL – 1.38; PnW – 0.45; ESL – 0.20; ESD – 0.07; PrdL – 0.33; PrdH – 0.45; PtL – 0.30; PtW – 0.25; PPL – 0.25; PPH – 0.24; PPW – 0.26; HFL – 0.85; HTL – 0.50; GL – 1.25; TL – 4.55.

CI – 1.35; SI_1 – 0.57; SI_2 – 0.77; FLI – 0.38; OI_1 – 0.17; OI_2 – 0.23; MdI – 0.30; PI_1 – 1.20; PI_2 – 0.32; PPI_1 – 1.04; PPI_2 – 0.92; PPI_3 – 1.04; PPI_4 – 0.33; ESLI – 0.26; ESDI – 0.35; MI – 3.07; PRI – 0.73.

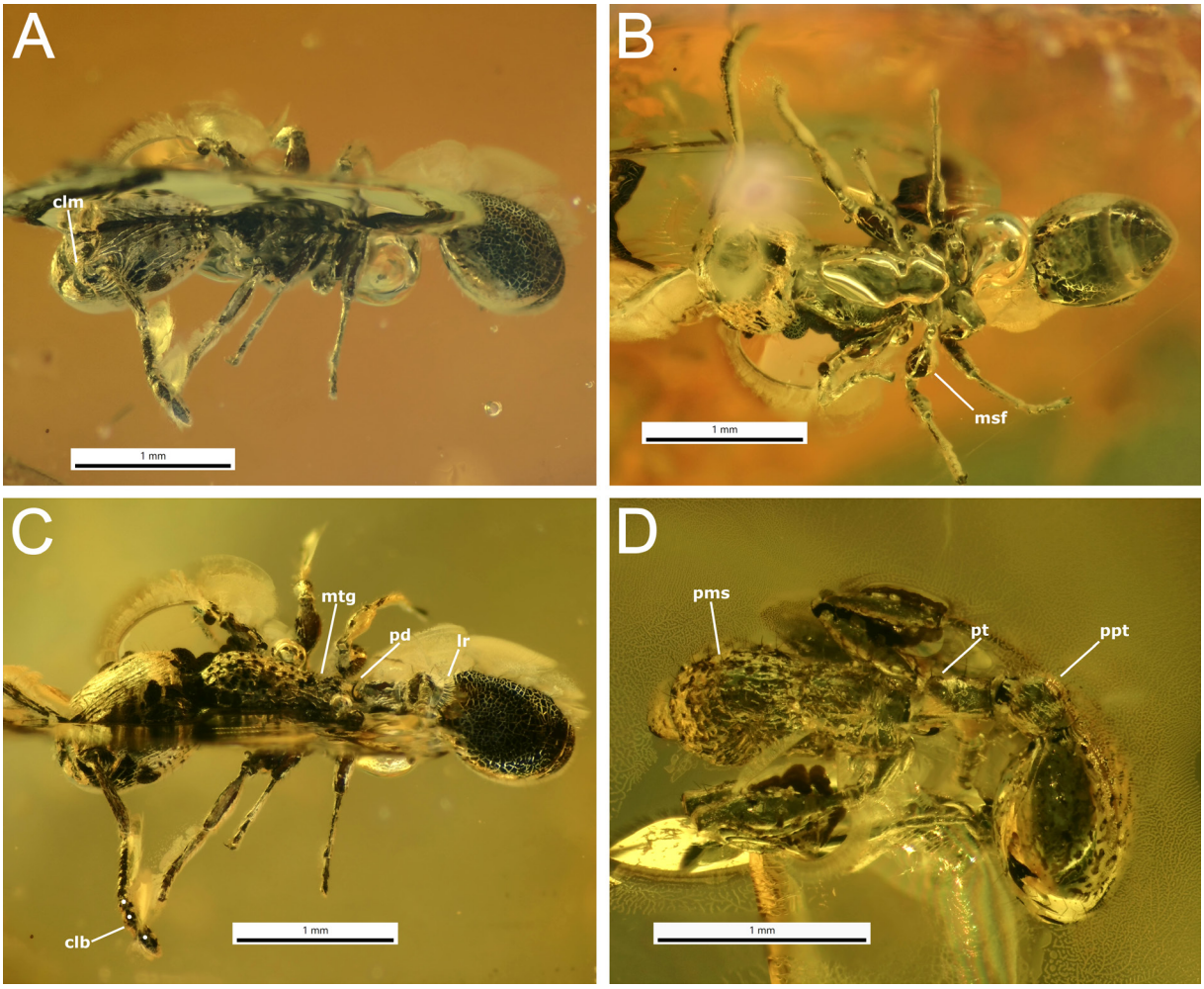

Figure 1. †*Myrmica andryushchenkoi* **sp. nov.,** photomicrographs showing certain key features. Worker KA-122a (holotype): A— dorsolateral oblique view; B— ventrolateral oblique view; C— dorsolateral oblique view. Worker KA-122b (paratype): D— dorsal view. Abbreviations: antennal club (clb), clypeal margin (clm), longitudinal rugae (lr), mesofemur (msf), metanotal groove (mtg), petiole (pt), postpetiole (ppt), promesonotal suture (pms), propodeum denticle (pd).

Description. *Head*: Mandibles with a small striped sculpture, six sharp teeth. Anterior clypeal margin broadly rounded, not prominent, shallowly notched medially, with pair of long median setae and fringe of shorter setae on the anterior margin. Clypeus with a few straight longitudinal rugae. Palp formula – 6:4 (partially concealed). Frontal carinae feebly curved outward, merging with the rugae surrounding the antennal sockets that not reach to middle of head. Head longer than broad, with convex sides and occipital margin, and broadly rounded, barely marked occipital corners. Head longitudinally striate. Eyes of moderately small, weakly bulging, situated approximately at the midlength of lateral margins of head. Antennae 12-merous with distinct three-segmented club, second to ninth funicular joints distinctly longer than broad. Antennal scape relatively short, at least not reaching the occipital margin of head, gradually curved at the base. Sparse suberect setae mostly occur dorsally over the head. Antennal scape with subdecumbent to suberect hairs.

Mesosoma: Mesosoma relatively short and robust. Promesonotum feebly convex (in lateral view) and in dorsal view with broadly rounded anterior-lateral corners, distinctly narrowing posteriorly (approximately twice wider anteriorly than posteriorly) and with trace of promesonotal suture (in dorsal view). Metanotal groove distinct, but not very deep. Dorsal surface of propodeum with reticulate sculpture, longer than posterior one. Propodeum bearing two short denticles, straight, sharp at the apex, directed backward. Whole mesosoma with coarse reticulation.

Metasoma: Petiole (abdominal segment II) with relatively short but distinct peduncle, forming a distinct triangular node. Its dorsum also with moderate (not coarse) reticulation. Postpetiole

(abdominal segment III) subglobular, in dorsal view with longitudinal rugae. Proximal part of abdominal tergum IV with numerous longitudinal striae. Gaster ovoid, the first tergite much larger than following one. Gaster smooth and shiny, covered with long, erect hairs, the distance between the hairs is approximately equal to their length.

Legs: Legs relatively short and robust. Metacoxa not distinctly larger than pro- and mesocoxae. Femora strongly swollen. Meso- and metatibiae without spurs.

Notes. †*Myrmica andryushchenkoi* **sp. nov.** is well distinguished from all other fossil *Myrmica* species by short propodeal denticles (instead of spines), and a three-segmented funicular club. However, these features combine the new ant with the species †*Myrmica paradoxa* Radchenko, Dlussky & Elmes, 2007, which was described from the late Eocene Bitterfeld amber. †*Myrmica andryushchenkoi* **sp. nov.** differs from †*M. paradoxa* in the following features: smaller size, shorter scape, head longitudinally striate, femora and tibiae strongly swollen, meso- and metatibiae without spurs.

Discussion

†*Myrmica andryushchenkoi* **sp. nov.** is the fourth species known to have very short denticles on the propodeum among the more than 200 described species of genus (Bolton 2025). Two recent species are described from mountain China: *Myrmica inermis* Zhong et al., 2024 and *Myrmica shanyii* (He et al., 2024) (Zhong *et al.* 2024; He *et al.* 2024). Notably, *M. shanyii* was initially misclassified under the sister genus *Manica* Jurine, 1807, but has since been transfered to *Myrmica* (for details, see Zharkov *et al.* 2024). But those extant species clearly belong to different groups of species. The late Eocene fossil species of *Myrmica* represent yet another evolutionary lineage. It is interesting to note that extant species of of the genus with basal morphological features are often found mainly in mountainous systems. Among these, the Himalayas and Tibet stand out as a hotspot for unusual and endemic *Myrmica* species, including forms that are presumed to be evolutionarily basal (Radchenko *et al.* 2007). This biogeographic pattern aligns with previous studies suggesting a close relationship between the Indomalayan and Australasian myrmecofaunas and the extinct late Eocene Western Palaearctic fauna (Dubovikoff 2012; Guénard *et al.* 2015).

†*Myrmica paradoxa* was described from Bitterfeld amber and was named paradoxical, among other things, because of the short denticles on the propodeum, which at that time were not found in any recent or fossil species. However, the new ant differs from the †*M. paradoxa* in many other features (see notes). †*Myrmica andryushchenkoi* **sp. nov.** highlights the extremely wide diversity of the genus *Myrmica* in the late Eocene of Europe.

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Conflicts of Interest

The authors declare no conflict of interest.

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