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Author(s): Alexander Radchenko and Gennady M. Dlussky
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BOLTONIDRIS GEN. NOV., THE FIRST EXTINCT STENAMMINI ANT GENUS (HYMENOPTERA, FORMICIDAE) FROM THE LATE EOCENE ROVNO AMBER

ALEXANDER RADCHENKO[1] and GENNADY M. DLUSSKY[2]

[1]*Museum and Institute of Zoology Polish Academy of Sciences, Wilcza 64, 00-679, Warszawa, Poland; e-mail: agradchenko@hotmail.com*
[2]*Moscow State University, Biological Faculty, Cathedra of the Theory of Evolution, Vorob'evy gory, 119899, Moscow, Russia; e-mail: dlusskye@mail.ru*

Abstract.— The new extinct ant genus and species, *Boltonidris mirabilis*, are described from the late Eocene Rovno Amber (Ukraine). This genus belongs to the tribe Stenammini of the subfamily Myrmicinae. It possesses the plesiomorphic characters of the tribe Stenammini, e.g. 12-segmented antennae with 3-segmented apical club, characteristic structure of the clypeus and frontal lobes, absence of gastral shoulder, but it has a series of autapomorphies, e.g. modified mandibles with the only two teeth on the masticatory margin, well developed longitudinal medial groove on the head dorsum, somewhat depressed areas lateral to the frontal carinae (like "vestigial" antennal scrobes), and finely swollen postero-lateral area of head, close to the occipital corners. Additionally, it has two short blunt teeth on the pronotum.

Key words.— *Boltonidris mirabilis*, ants, taxonomy, Formicidae, Myrmicinae, Stenammini, palaeontology, European ambers, Ukraine, late Eocene, new genus, new species.

INTRODUCTION

The ant fauna of the late Eocene European ambers (ca. 40 Mya) is the best studied among all fossil global myrmecofaunas. Up to now, more than 17,000 ant specimens have been examined in these ambers, and this material includes more than 170 species from 63 genera and 15 subfamilies (the subfamily concept is treated according to Bolton 2003). Material from the Baltic Amber is the richest and the best studied – it includes ca. 75% of all ant specimens found in the European late Eocene ambers. However, intensive accumulation and investigation of the ant material from the Rovno Amber (western Ukraine) was started in the last decade or so (see review of Perkovsky *et al*. 2007), and in total more than 60 species from about 30 genera have now been found in the Rovno Amber (Dlussky and Rasnitsyn 2009, our unpublished data).

At the same time, diversity of the subfamily Myrmicinae in all European ambers is low: only 12 genera, comprising just 20 species, are known (this total excludes *Agroecomyrmex* Wheeler, which was transferred to the subfamily Agroecomyrmecinae by Bolton 2003, 2011). Moreover, no new myrmicine genera or even species were described from the European late Eocene ambers between the time of Wheeler's (1915) monographic revision of the ants of Baltic Amber and the beginning of twenty-first century. However, in the last decade we were fortunate to gain access to the rich new amber collections from the Baltic, Bitterfeldian (= Saxonian), Scandinavian (= Danish), and Rovno ambers. As a result, we described several new species from the different ant subfamilies, including Myrmicinae, and even described four new myrmicine genera (Dlussky 2002a, 2002b, 2008a, 2008b, 2009, 2010, Dlussky and Perkovsky 2002, Dlussky and Radchenko

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2006a, 2006b, 2009, 2011, Radchenko *et al*. 2007, Radchenko and Perkovsky 2009). Consequently, 17 myrmicine genera are known nowadays from the late Eocene European ambers.

Below we describe one more new myrmicine genus, *Boltonidris*, and place it in the tribe Stenammini. This tribe contains 17 genera, most of which are distributed in the Old World tropics and partly subtropics, though three genera are Neotropical. Only *Stenamma* Westwood can be considered as the predominantly Holarctic genus, and while it penetrates to the Neotropical and Oriental Regions, it is absent in the Afrotropical Region and in Australia. Among Stenammini genera only species of *Stenamma* and *Vollenhovia* Mayr are found in the Baltic Amber, all other genera are represented by extant species. Thus, *Boltonidris* is the first known extinct genus of Stenammini.

MATERIAL AND METHODS

We examined one worker (holotype) in a piece of Rovno amber that is preserved in the Shmalhausen Institute of Zoology of the Ukrainian National Academy of Sciences, Kiev (SIZK).

The figures are based on the photographs made using an Olympus Camedia C-3030 digital camera fitted to an Olympus SZX9 microscope in conjunction with the computer program CorelDraw 8.

Not all features were easily visible and measurable on the examined specimen; hence we measured only visible details (accurate to 0.01 mm).

Measurements:

HL – length of head in dorsal view, measured in a straight line from the anterior point of median clypeal margin to mid-point of the occipital margin,
HW – maximum width of head in dorsal view,
FW – minimal distance between frontal carinae,
FLW – maximal distance between outer borders of frontal lobes,
OL – maximal diameter of eye,
SL – maximum straight-line length of antennal scape seen in profile,
AL – diagonal length of the alitrunk seen in profile, from the neck shield to the posterior margin of metapleural lobes,
PNW – maximal width of pronotum,
ESL – length of propodeal spine,
HTL – length of tibia of hind leg,
PL – maximum length of petiole from above,
PH – maximum height of petiole in profile,
PPL – maximum length of postpetiole from above,
PPH – maximum height of postpetiole in profile,
GL – length of gaster.

Indices:

CI = HL/HW,
FI = FW/HW,
FLI = FLW/FW,
SI_1 = SL/HL,
SI_2 = SL/HW,
PI = PL/PH,
PPI = PPL/PPH;
ESLI = ESL/HW;
OI = OL/HW.

TAXONOMY

Boltonidris gen. nov.

Type species. *Boltonidris mirabilis* sp. nov., by monotypy.

Etymology. Dedicated to the distinguished British ant taxonomist, Dr. Barry Bolton.

Differential diagnosis. We place *Boltonidris* in the tribe Stenammini (*sensu* Bolton, 2003). It differs distinctly from the Stenammini genera that have no antennal scrobes (e.g. *Stenamma*, *Rogeria* Emery, *Vollenhovia* Mayr, etc.) by the structure of the mandibles, by the presence of the blunt horn-like teeth on pronotum, and by the presence of a distinct longitudinal medial groove on head dorsum.

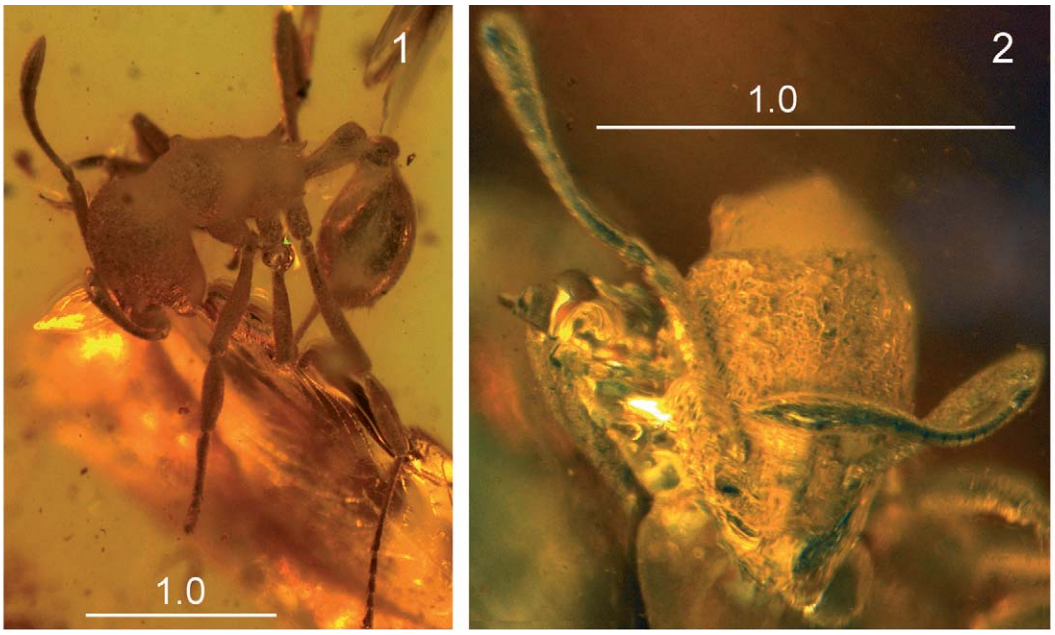
Description. Head slightly widened posteriorly, with very weakly convex sides, occipital margin slightly concave medially; head dorsum with distinct longitudinal medial groove running from occipital margin to frontal triangle; antennae 12-segmented, with distinct 3-segmented club; median portion of clypeus narrowed from side to side and elevated; this elevated part with two lateral longitudinal carinae; frontal lobes narrow, sub-vertical, partly cover antennal sockets; frons narrow, antennal sockets quite closely approximated; antennal scrobes absent; eyes present, but small; mandibles triangular, quite stout, with well developed masticatory margin, which possesses a relatively long apical tooth and single very small triangular preapical denticle only; propodeum with sharp spines, pronotum with short, blunt horn-like teeth.

Boltonidris mirabilis sp. nov.
(Figs 1–4)

Etymology. From Latin "*mirabilis*" – wonderful, extraordinary.

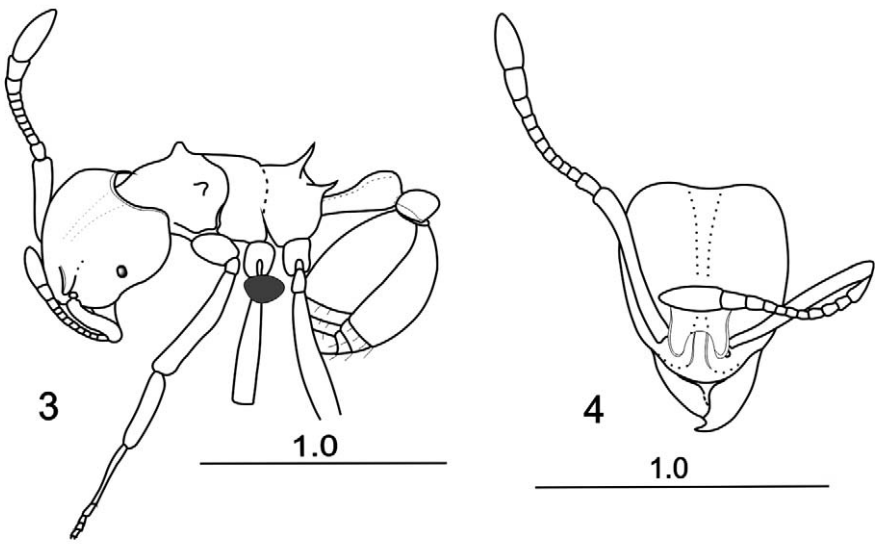
Material examined. Holotype worker, Rovno Amber, late Eocene, complete specimen, No. K-3581 (SIZK).

Description. **Worker**. Head somewhat longer than broad, slightly widened posteriorly, with very feebly



Figures 1–2. Photographs of the holotype worker of *Boltonidris mirabilis*. (1) body, dorso-lateral view; (2) head, dorsal view. Scale bars – in mm.

convex sides, very shallowly concave occipital margin and rounded occipital corners. Head dorsum flattened and with a well developed median longitudinal groove. Frontal lobes slightly extended, sub-vertical, quite closely approximated, partly covering antennal sockets. Antennal scrobes absent, though area lateral to frontal carinae somewhat depressed, appearing as a "vestigial" scrobe. Medial longitudinal groove on head dorsum well developed; consequently, postero-lateral parts of head dorsum seem slightly swollen. Eyes small, with ca. 15 ommatidia, situated distinctly in front of the mid-length of head. Scape relatively long, almost reaching occipital margin, gradually but strongly curved at the base, without any trace of additional structures on the bend. Anterior clypeal margin gradually convex, without notch or teeth, without any seta; medial clypeal portion elevated and laterally bicarinate, quite narrowly inserted between frontal carinae. Mandibles longitudinally rugulose, its masticatory margin with only two teeth, without defined basal



Figures 3–4. Line drawings of the holotype worker of *Boltonidris mirabilis*, made based on the original photographs. (3) body, dorso-lateral view; (4) head, dorsal view. Scale bars – in mm.

angle, which is widely rounded, but edentate part of masticatory margin with sharp cutting edge. Maxillary and labial palps are invisible in the specimen.

Mesosoma relatively short, stout, with well developed promesonotal suture and distinct metanotal groove. Pronotum with two short, blunt horn-like teeth; propodeal spines not very long, sharp, somewhat curved up at tips, slightly widened at the base, directed backward and upward, divergent when seen from above. Petiole much longer than height, with long anterior peduncle; node well developed, with rounded dorsum; dorsal surface of petiole delineated by a pair of fine while distinct longitudinal rims. Postpetiole subglobular, small, somewhat shorter than height, lower than petiole. Middle and hind tibiae without spur. Gaster relatively small, not specialized, as in most Myrmicinae genera; gastral shoulder absent.

Head and mesosoma with dense while not coarse foveolate sculpture, integument additionally densely punctated. Petiole with much finer reticulate-foveolate sculpture, node also with fine longitudinal rugulosity; postpetiole and gaster smooth.

Body almost hairless, suberect hairs visible only on posterior margins of gastral tergites and sternites from second to apex of gaster. Antennae and legs have no hairs.

Body and appendages reddish, gaster somewhat darker (note that the colour in amber specimens can be artificial, not corresponding with that of living ants).

Body length ca. 2.7 mm.

Gynes and males unknown.

Measurements (in mm) and indices: HL 0.69, HW 0.61, FW 0.15, FLW 0.23, OL 0.08, SL 0.53, AL 0.85, PNW 0.37, ESL 0.13, HTL 0.40, PL 0.35, PH 0.19, PPL 0.13, PPH 0.16, GL 0.69 mm; CI 1.13, FI 0.37, FLI 1.55, SI_1 0.77, SI_2 0.87, PI 1.86, PPI 0.83, ESLI 0.22, OI 0.13.

DISCUSSION

Based on the several important diagnostic features of the described genus (e.g. 12-segmented antennae with 3-segmented apical club, structure of clypeus and frontal lobes, absence of gastral shoulder), as well as on the general appearance of the specimen, including character of body sculpture, we place *Boltonidris* in the tribe Stenammini (*sensu* Bolton 2003). It does not seem to be a highly specialized genus when compared to many Stenammini genera that have, for example, well developed antennal scrobes (e.g. *Lachnomyrmex* Wheeler, *Lordomyrma* Emery, *Dacetinops* Brown et Wilson), sometimes combining with unusual shape of body hairs (e.g. *Calyptomyrmex* Emery), or multituberculate head and mesosoma (*Proatta* Forel). On the other hand, *Boltonidris* is superficially similar to some of the non-specialized Stenammini genera, such as *Stenamma*, *Rogeria* or *Tetheamyrma* Bolton, but it possesses several autapomorphies.

To our mind, the most evolutionary important are modifications of the cranio-mandibular system. First of all, mandibles of *Boltonidris* are widely triangular, rather stout, with quite long masticatory margin with only two teeth, the longer apical and a very short preapical. At the same time, the edentate part of the masticatory margin has a sharp cutting edge, so that the mandibles seems to be adapted to cutting rather than to crushing or squashing something. Additionally, the shape of the head also demonstrates some trend to specialization: the head dorsum has a well developed longitudinal medial groove, with the somewhat depressed areas lateral to the frontal carinae (that resemble incipient or vestigial antennal scrobes), and with the finely swollen postero-lateral parts of head close to the occipital corners. Such specialization of the head leads to increasing the capacity of the head capsule and reflects stronger development of the mandibular muscles that are distally articulated to the inner surface of the head capsule near the occipital corners. Similar variant of the cranio-mandibular system was called by Dlussky and Fedoseeva (1988) the "cutting type". The extreme development of such a system is characteristic of leaf-cutting ants (tribe Attini).

The less evolutionary significant autapomorphy of *Boltonidris* is the presence of the pair of short and blunt horn-like teeth on the pronotum – a feature not found in any other Stenammini genera (except for the multiple tubercles seen in *Proatta*).

If our placement *Boltonidris* in the tribe Stenammini is correct, this is the third known member of the tribe in the late Eocene European ambers (together with *Stenamma* and *Vollenhovia*). *Boltonidris* certainly cannot be considered as the ancestral genus for the tribe since it has the many specialized morphological features mentioned above. Thus, we may only expect that ancestral Stenammini are much older than late Eocene time (ca. 40 Mya), and probably arose at least in the middle or even early Eocene.

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