

TWO NEW FOSSIL SPECIES OF THE ANT GENUS *PRISTOMYRMEX* MAYR (HYMENOPTERA: FORMICIDAE) FROM THE ROVNO AND BITTERFELD AMBERS

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Abstract.— The ant genus *Pristomyrmex* Mayr (subfamily Myrmicinae) comprises about 60 extant species, distributed almost exceptionally throughout the tropics except for Central and South America. Single known fossil species from this genus, *P. rasnitsyni* Dlussky et Radchenko, was previously described from the Late Eocene Scandinavian amber. Here we described two new extinct species: *P. elmesi* sp. nov. (worker) from the Rovno amber, and *P. archaios* sp. nov. (male) from the Bitterfeld amber. *P. elmesi* differs from *P. rasnitsyni* by the somewhat smaller size (2.4 mm vs. 3 mm), by the slightly elongated, not transversal head (HL/HW 1.02 vs. 0.95), by the somewhat longer antennal scape (SL/HL 0.75 and SL/HW 0.77 vs. 0.72 and 0.68, respectively), by the much shorter, straight and thin propodeal spines (ESL/HW 0.12 vs. 0.25), by the absence of meadial tooth on the anterior cypeal margin, by the another type of mandibular dentation, and by the longer mesosoma. Male of *P. archaios* differs from all extant species by the presence of two closed cells, $1r+2r$ and m_{cu} , on the forewing, while forewing of the modern species has only one closed cell, $1r+2r$. We consider such kind of forewing venation as the plesiomorphy compare to extant *Pristomyrmex* species.



Key words.— Ants, palaeontology, Late Eocene, Rovno amber, Bitterfeld amber, *Pristomyrmex elmesi* sp. nov., *P. archaios* sp. nov., taxonomy

INTRODUCTION

The myrmicine ant genus *Pristomyrmex* Mayr comprises about 60 described extant species distributed mostly in the South-East Asia and New Guinea, while about 20 endemic species occur in Central and partly South Africa, Australia, and Indian and Pacific Oceans islands; one widely distributed species, *P. punctatus* (F. Smith), penetrates into Palaearctic Region far to the north, through temperate China, Korean Peninsula and Japan to the southern part of Isl. Hokkaido, though it is absent in the Russian

Far East (Wang 2003, Radchenko 2005, Zettell 2006, Terayama 2009, Bolton 2017). One fossil species, *P. rasnitsyni*, was recently described from the Late Eocene Scandinavian (=Danish) amber (Dlussky & Radchenko 2011).

Majority of *Pristomyrmex* species inhabit tropical rainforests, where they build nests in soil or in wood remnants and foraging as scavengers and predators in leaf litter, ground surface or on trees (Wang 2003).

Pristomyrmex workers clearly distinguish from other members of the tribe Myrmecini (sensu Bolton 2003, Ogata & Okido 2007) by the combination of

features, particularly: they are monomorphic; the antennae with 11 segments; the frontal lobes are absent or strongly reduced, vestigial and vertical, so that the antennal sockets are fully exposed; the propodeum, often also pronotum, with spines or at least long teeth (with the only one known exception); the petiole with long peduncle and quite big and high node with rounded dorsum. In contrary, workers of *Perissomyrmex* M. R. Smith are polymorphic, and those of *Acanthomyrmex* Emery are dimorphic; the antennae in *Myrmecina* Curtis and *Acanthomyrmex* are 12-segmented, and in *Perissomyrmex* – 9-segmented; the frontal lobes in *Myrmecina* well developed and at least partly cover the antennal sockets; the pronotum of *Myrmecina* and *Perissomyrmex* are always without spines or tooth; at last, the petiole in *Myrmecina* is sessile, without anterior peduncle and rounded node.

Males of extant *Pristomyrmex* species are characterized mainly by the strongly reduced, vestigial mandibles, by the 12-segmented antennae with short scape and filiform antennal funiculus lacking apical club, by the 5-segmented maxillary palps and 3-segmented labial ones, by the presence of Mayrian furrows, and usually by the lack of spur on middle and hind tibiae (sometimes could be very short, vestigial and barely defined simple spur), and the forewing is with only one closed cell $1r+2r$.

Recently we've got material from the Rovno amber (Late Eocene, Priabonian stage, 33.4–37.8 Ma), containing *Pristomyrmex* worker that differs from the *P. rasnitsyni* from the contemporaneous Scandinavian amber, and describe it below as *Pristomyrmex elmesi* sp. nov. Additionally, we located two *Pristomyrmex* males in one piece of Bitterfeld amber. In principle, they may belong to both *P. rasnitsyni* and *P. elmesi*, as well as to a separate species. Anyway, we decided to describe them as a separate species, *Pristomyrmex archaios* sp. nov., and the final decision on the taxonomic status of these males can be made if male and worker are found in one piece of amber or at least in the same deposit.

MATERIAL AND METHODS

Totally we examined one specimen (holotype worker) of *P. elmesi* sp. nov., which is stored in the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine, Kiev (SIZK), and two males (holotype and paratype) of *P. archaios* sp. nov., which are stored in the Geowissenschaftlicher Zentrum der Georg-August-Universität Göttingen, Germany (GZG.BST).

The photographs of the specimens were made using a Leica Z16 APO microscope equipped with Leica DFC 450 camera and processed by LAS Core software, and figures were made based on original photographs using the computer program Corel-Draw 12.

Not all features of the examined specimens were properly visible and measurable, hence we measured only visible details (accurate to 0.01 mm), particularly:

- HL – maximum length of the head in dorsal view, measured in a straight line from the most anterior point of clypeus to the mid-point of occipital margin;
- HW – maximum width of head in full face view behind the eyes;
- SL – maximum straight-line length of the scape from its apex to the articulation with condylar bulb;
- OL – maximum diameter of the eye;
- ML – diagonal length of the mesosoma (seen in profile) from the anterior end of the neck shield to the posterior margin of the propodeal lobes (workers) or from the anterior-upper margin of pronotum to the posterior margin of propodeal lobes (males);
- MH – height of mesosoma, measured from the upper level of scutum perpendicularly to the level of lower margin of mesopleuron;
- ESL – maximum length of propodeal spine in profile, measured along the spine from its tip to the deepest point of the propodeal constriction at the base of the spine (worker);
- ScL – maximum length of scutum + scutellum from above (males);
- ScW – maximum width of scutum from above (males);
- PL – maximum length of the petiole, measured from the posterodorsal margin of petiole to the articulation with propodeum;
- PH – maximum height of the petiole in profile, measured from the uppermost point of the petiolar node perpendicularly to the imaginary line between the tip of subpetiolar process and posteroventral points of petiole;
- PPL – maximum length of the postpetiole between its visible anterior and posterior margins;
- PPH – maximal height of the postpetiole in profile;
- PPW – maximum width of postpetiole from above;
- HTL – maximum length of the hind tibia.

In this paper we do not abbreviate the various indices, simply using relations of various measurements (e.g. SL/HL instead of SI) what might be more convenient for readers.

RESULTS

Description of the new species

Pristomyrmex elmesi sp. nov.

Material examined. Holotype, worker, SIZK No. K-7248, Rovno amber, Late Eocene, Ukraine.

Etymology. The species is dedicated to the memory of well-known British myrmecologist and our friend, Dr. Graham Wakely Elmes (1943–2017).

Worker (Figs 1–2). Body length ca. 2.4 mm. Head somewhat longer than broad, with slightly convex sides, straight occipital margin and widely rounded occipital corners. Eyes well developed, strongly convex, almost rounded, situated at the midlength of sides of head. Anterior clypeal margin medially with two short lateral teeth and without central tooth. Frontal lobes vestigial, vertical, antennal sockets fully exposed, frons very narrow. Antennae 11-segmented, with distinct 3-segmented apical club; scape sharply angled at base, quite long, almost reaching occipital margin. Mandibles elongate-triangular, their masticatory margin with sharp and relatively long apical tooth, sharp but shorter preapical tooth, two blunt and minute denticles, long diastema, and triangular basal denticle. Palp formula seems 3, 2.

Mesosoma relatively long, 1.12 times longer than head and 2.28 times longer than height, promesonotum narrowed posteriorly, with narrowly rounded humeri and slightly convex anterior margin. Metanotal groove obscured, but most probably present.

Propodeum with rather short, straight, thin, acute spines directed rather upward than backward at an angle ca. 60°. Pronotum without spines or teeth. Petiole with long peduncle and strongly concave anterior surface, its node quite high, with rounded dorsum. Postpetiole higher than long, with rounded dorsum. Middle and hind tibiae without spur.

Head and mesosoma with very coarse reticulation. Central part of clypeus smooth. Petiole and postpetiole smooth. Head and mesosoma with sparse long thin hairs, anterior clypeal margin with eight long setae; petiole, postpetiole and gaster without hairs; femora and tibiae with short and not abundant subdecumbent hairs, tarsi with sparse and quite long hairs.

Measurements (in mm): HL 0.59, HW 0.57, FW 0.10, SL 0.44, OL 0.11, ML 0.66, MH 0.29, PL 0.24, PH 0.24, ESL 0.07, HTL 0.51.

Ratios: HL/HW 1.02, SL/HL 0.75, SL/HW 0.77, OL/HL 0.18, PL/PH 1.13, PL/HL 0.41, ESL/HW 0.12, ML/MH 2.28.

Queens and males unknown.

Comparative diagnosis. *P. elmesi* differs from another fossil species, *P. rasnitsyni*, by the somewhat smaller body (2.4 mm *vs.* 3 mm), by the slightly

elongated, not transversal head (HL/HW 1.02 *vs.* 0.95), by the somewhat longer antennal scape (SL/HL 0.75 and SL/HW 0.77 *vs.* 0.72 and 0.68, respectively), by the much shorter, straight and thin propodeal spines (ESL/HW 0.12 *vs.* 0.25), by the absence of medial tooth on the anterior clypeal margin, by the another type of mandibular dentation, and by the longer mesosoma that is longer than head (in contrary, the mesosoma in *P. rasnitsyni*, is shorter than head).

Pristomyrmex archaios sp. nov.

Material examined. Holotype and paratype in the same piece of amber, males, GZG.BST No. 27.041, Bitterfeld amber, Late Eocene, Germany.

Etymology. The species is named after Greek word αρχαιος – ancient, to stress more primitive character of the forewing venation compare to modern species.

Males (Figs 3–4). Total length: ca. 3.5 mm. Head slightly longer than width, gradually rounded above eyes. Eyes very big, their maximum diameter more than half of head length, genae very short; ocelli very big. Anterior clypeal margin straight, without notch or dents. Antennae 12-segmented, without club, scape short, somewhat shorter than second funicular segment; 2nd to 9th funicular segments subequal in length, terminal one the longest. Mandibles strongly reduced, vestigial, look like short triangles. Palp formula 5, 3.

Mesosoma relatively short and high, ca. 1.4 times longer than height, scutum convex, Mayrian furrows well developed, deep, Y-shaped; scutum not wide (seen from above). Propodeum rounded, without tubercles, its dorsal surface somewhat shorter than posterior one. Propodeal lobes widely rounded. Petiole with distinct peduncle, but not very long, its anterior surface somewhat concave, node narrowly rounded, subconical; postpetiole somewhat longer than height, with rounded dorsum. Forewing with closed cells $1r+2r$ and mcu , cell $3r$ open.

Middle and hind tibiae with barbulate spur, pretarsal claws simple.

Whole body with fine superficial micropunctures, appears dull. Head, mesosoma and waist with both long and short suberect hairs, without decumbent pubescence. All antennal segments with very dense, short subdecumbent pubescence.

Measurements (in mm): **holotype**: HL 0.59, HW 0.52, SL 0.16, OL 0.33, PL 0.37, PH 0.29, PPL 0.19, PPH 0.19, PPW 0.27, HTL 0.61, ScW 0.67, ScL 0.93; **paratype**: HW 0.51, SL 0.16, OL 0.32, ML 1.23, MH 0.88, ScW 0.67, ScL 0.91, HTL 0.64.

Ratios: **holotype**: HL/HW 1.13, SL/HL 0.27, SL/HW 0.31, OL/HL 0.57, PL/PH 1.27, PL/HL 0.64, PPL/PPH 0.78, PPL/HL 0.32, ScL/ScW 1.40; **paratype**: SL/HW 0.32, ML/MH 1.39, ScL/ScW 1.36.

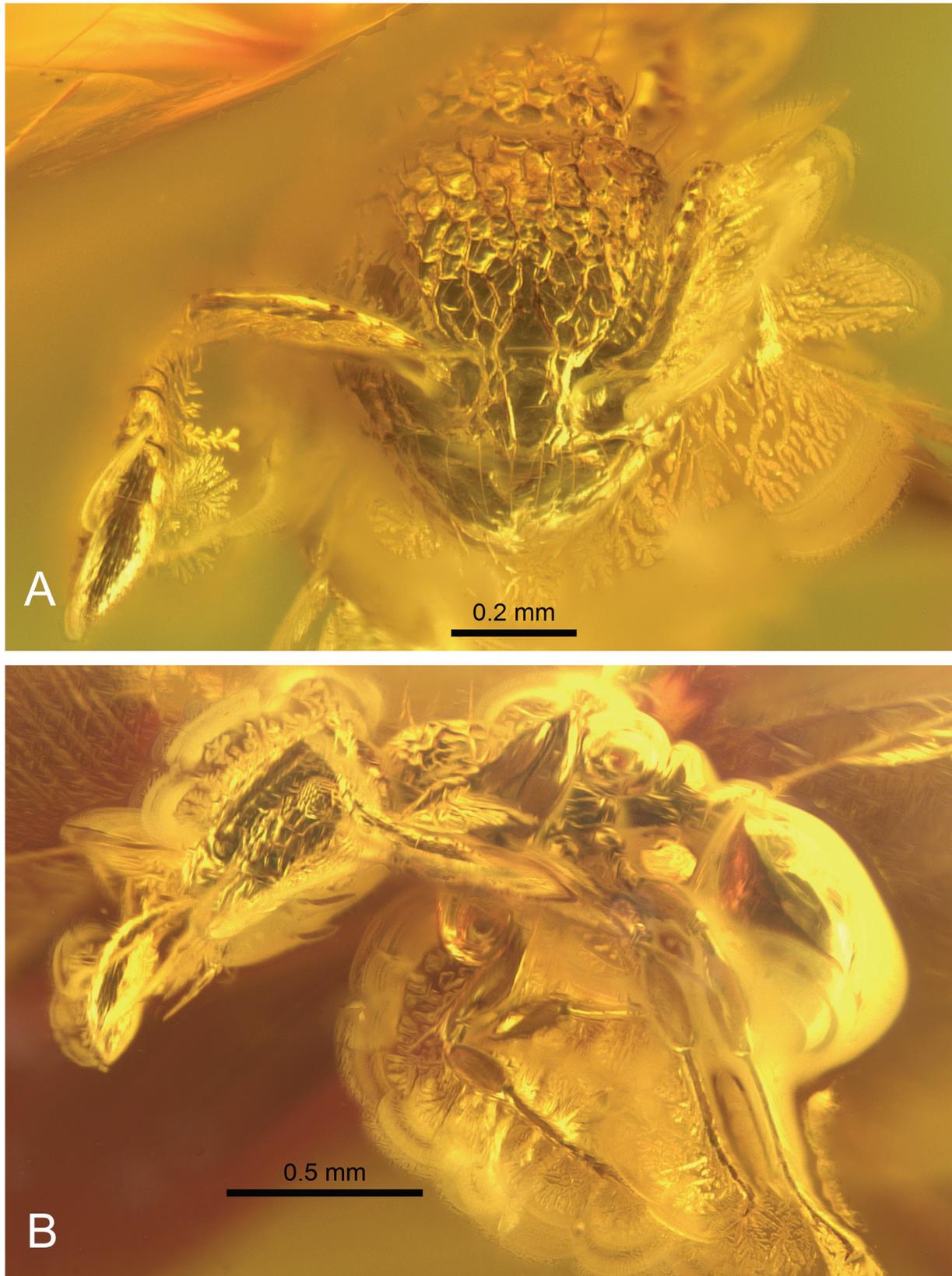


Figure 1. *Pristomyrmex elmesi* sp. nov., photos of the holotype worker: (A) head, dorsal view; (B) body, lateral view (photo by K. Martynova).

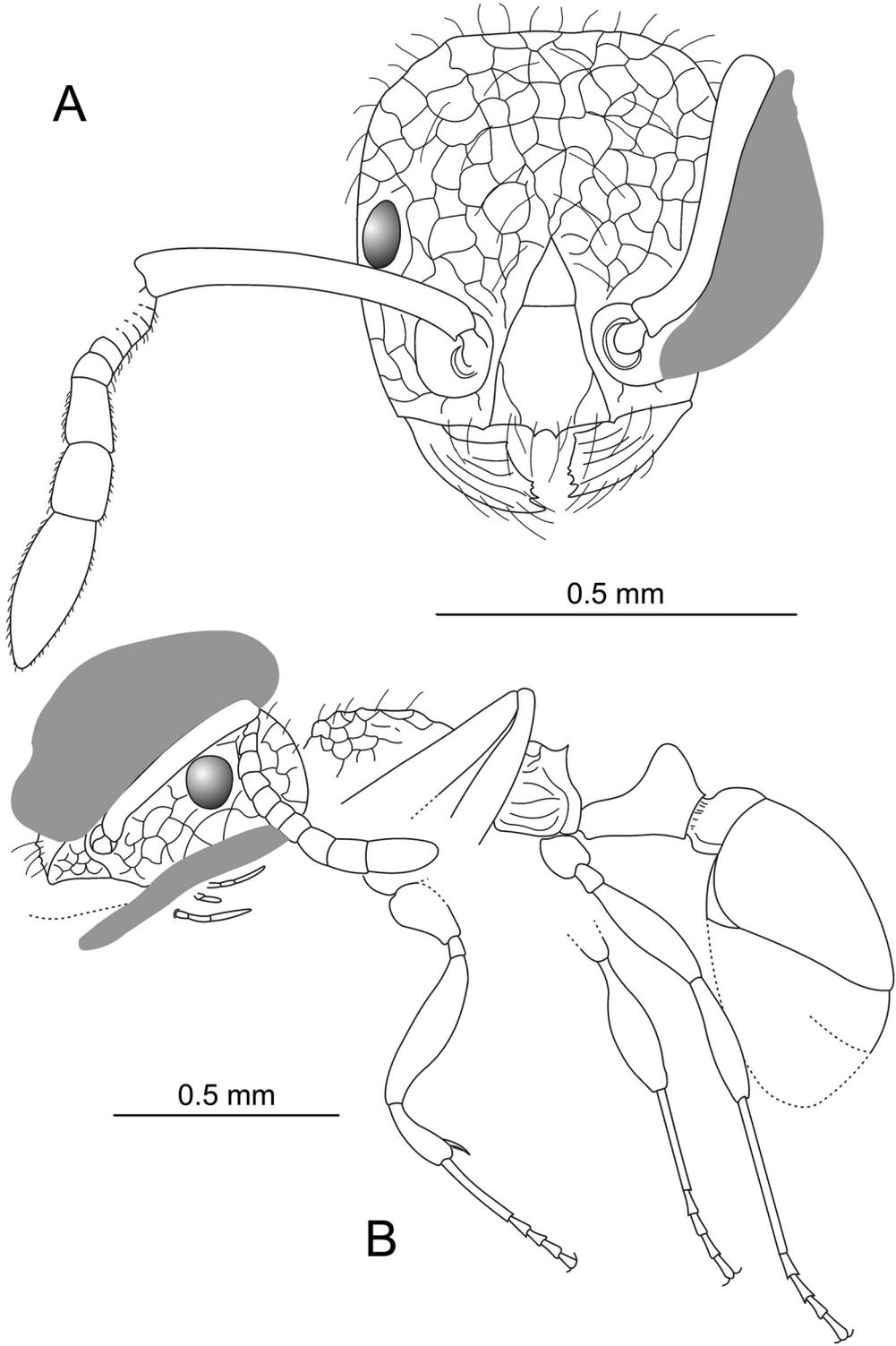


Figure 2. *Pristomyrmex elmesi* sp. nov., line drawings of the holotype worker made based on photos: (A) head, dorsal view; (B) body, lateral view.

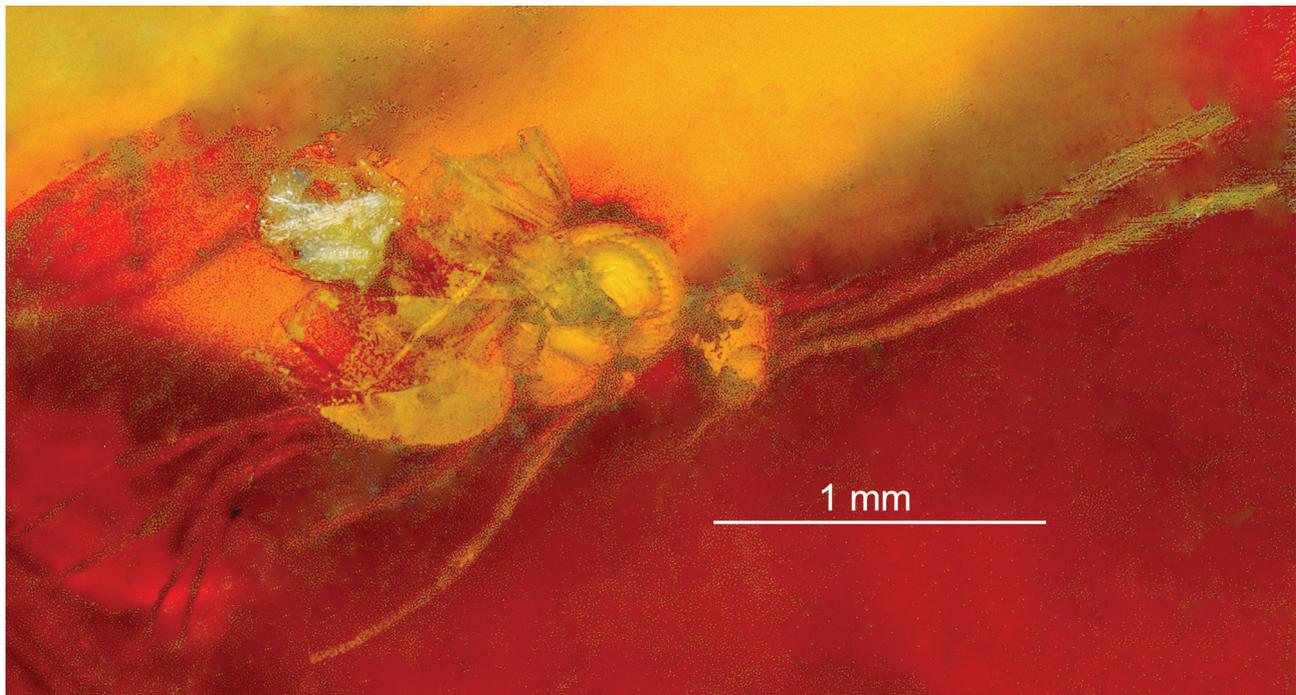


Figure 3. *Pristomyrmex archaios* sp. nov., photo of the holotype male, body, lateral view.

DISCUSSION

By the character of mandibular dentation *P. elmesii* resembles modern *P. bispinosus* (Donisthorpe) and *P. trispinosus* (Donisthorpe) from Mauritius, by the absence of median tooth on the anterior clypeal margin it is similar to the species from *P. levigatus*-group, and by the absence of frontal lobes it resembles species from *P. punctatus*-group.

Anyway, based on the combination of characters of both *P. elmesii* and *P. rasnitsyni* it is impossible to say anything about their relationship with the any extant species or species-group of *Pristomyrmex*, but they do not seem more primitive compare to many modern species.

On the other hand, male of *P. archaios* by the most of its characteristic features undoubtedly belongs to the genus *Pristomyrmex*, but its forewing venation is somewhat different. Particularly, the forewing in extant species of this genus has only one closed cell, $1r+2r$, while the cell *mcu* in *P. archaios* is also closed. As process of reduction of the wing venation in ants is well known evolutionary trend, we believe that the forewing venation in *P. archaios* is more primitive compare to modern species.

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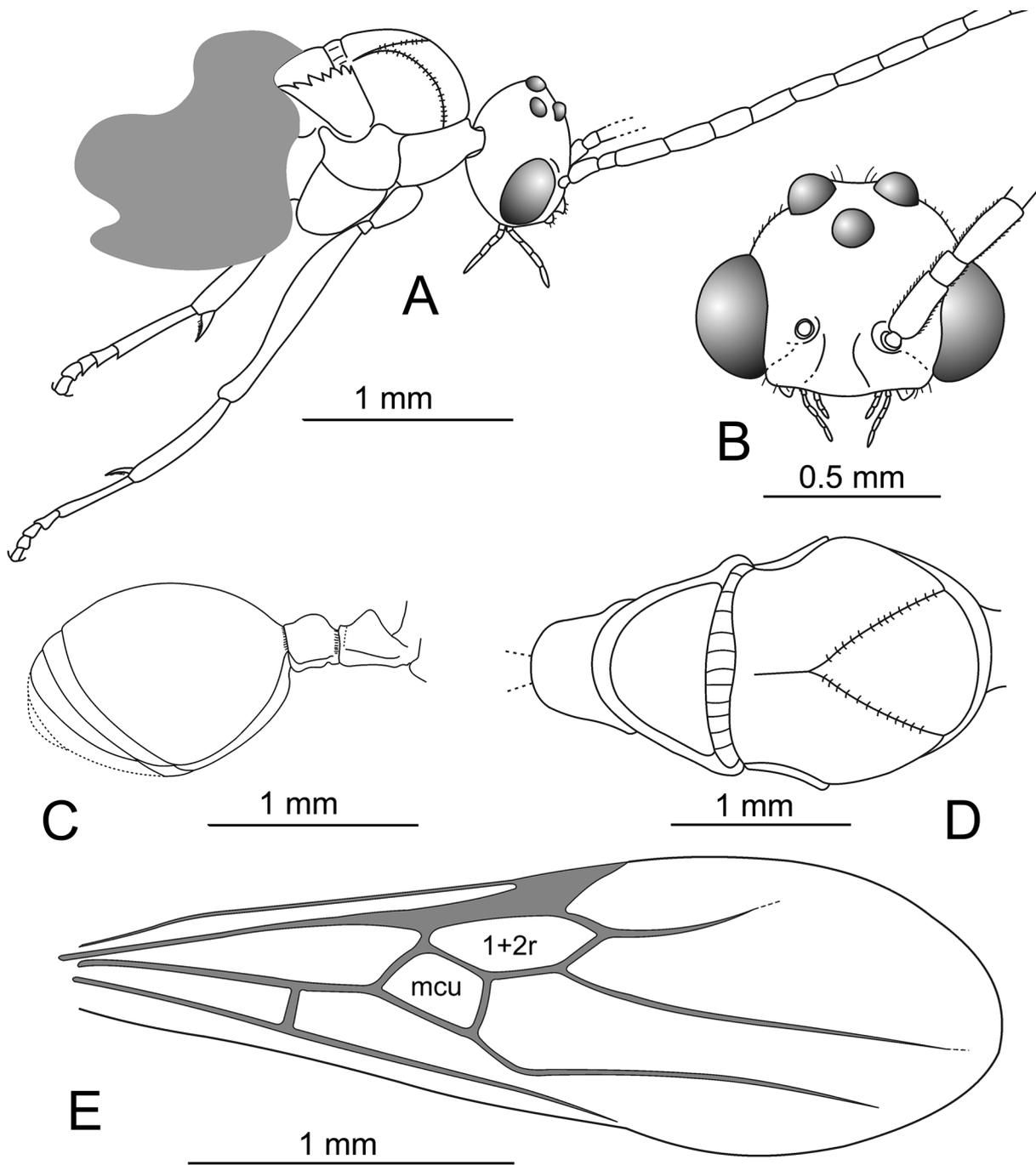


Figure 4. *Pristomyrmex archaios* sp. nov., line drawings of the holotype male made based on photos: (A) mesosoma and head, lateral view; (B) head, frontal view; (C) waist and gaster, lateral view; (D) mesosoma, dorsal view; (E) forewing.

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