

Description of the male of *Acropyga palearctica* MENOZZI, 1936 (Hymenoptera: Formicidae)

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Abstract

The male of the single known European *Acropyga*, *A. palearctica* MENOZZI, 1936, is described. With the discovery of the male of *A. palearctica*, a combination of worker and male morphological characters allows for the placement of the species within the *A. arnoldi* species group, which previously only contained a single species, *A. arnoldi* SANTSCHI, 1926. A number of similarities exist between workers of the two species among those being: a high maxillary palp number (up to 5 segments), a high number of mandibular teeth (6 - 8), and a similarly shaped pronotum. The following similarities exist between males of the two species: high number of mandibular teeth, similarly shaped parameres and penis valves, and similarly shaped 9th sternite (= subgenital plate). A sister taxa grouping of the species is interesting because the mealybugs utilized by both of them are also thought to be sister taxa.

Key words: Ant taxonomy, mealybugs, Palaearctic, trophobiosis, trophophoresis.

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Introduction

A single *Acropyga* species, *A. palearctica* MENOZZI, 1936 is known from Europe. It has been collected four times in Greece (SEIFERT & HELLER 1999, LAPOLLA 2004), though it is likely to have a wider distribution in the Mediterranean region than is currently known. Like all *Acropyga* species, *A. palearctica*, lives a subterranean existence, only coming to the surface for mating flights. Mating flights have been observed by BUSCHINGER & al. (1987), and in fact this species is a confirmed trophophoretic species (LAPOLLA 2004), with alate queens observed toting mealybugs in between their mandibles. Interestingly, an alate queen was discovered by SEIFERT & HELLER (1999) carrying an *Acropyga* worker pupa. The mealybug species, *Eumyrmococcus corinthiacus* WILLIAMS, 1993, is thought to live only in association with *A. palearctica* (WILLIAMS 1998).

LAPOLLA (2004) recently revised *Acropyga*. In the course of the revision, however, males of *A. palearctica* could not be located for study. The study of male *Acropyga* is important because males often reveal taxonomic and phylogenetic characters unavailable in workers and queens. After the *Acropyga* revision was completed, Alfred Buschinger fortuitously located a portion of the mating swarm he observed. This study describes the male of *A. palearctica* and discusses its implications for the phylogeny and taxonomy of the genus.

Materials and methods

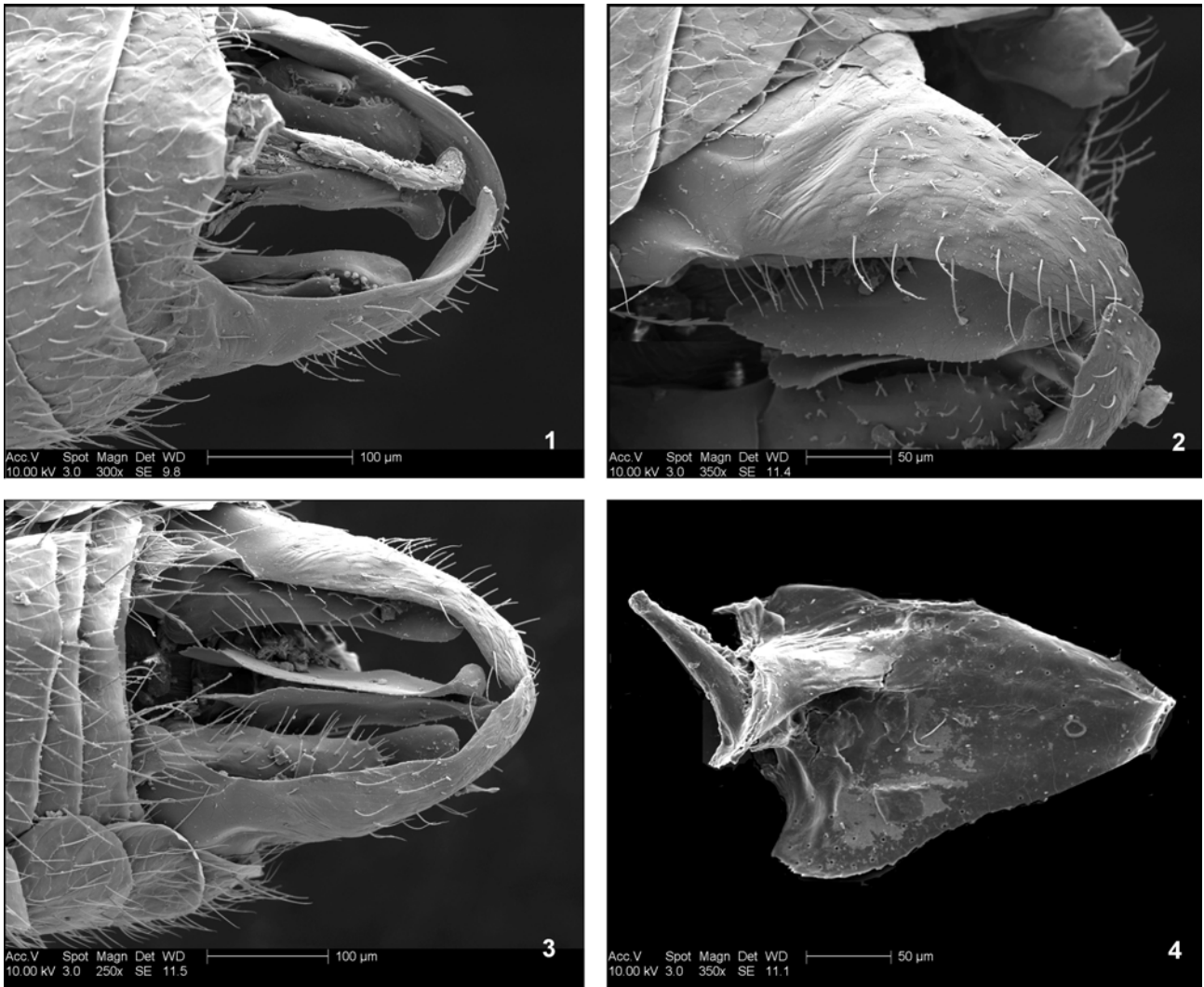
Male specimens were obtained from the personal collection of Alfred Buschinger (Darmstadt, Germany). Specimens are from two localities in Greece: from near Perachora (close to Corinth, north of the Channel of Corinth), leg. A. Buschinger, 1 female and 6 males (personal collection John S. LaPolla); Greece: from Aigos Nikolaos, Metetora (c. 250 km NW of Perachora), leg. B. Seeger, 1 female and 1 male (personal collection John S. LaPolla).

Examination and measurement of specimens were completed at magnifications 50 - 100 × using a light stereomicroscope (Leica Wild M10) and were recorded to the nearest 0.001 mm. All measurements are given in millimeters. Morphological terminology employed throughout follows BOLTON (1994), with modifications where noted for the species being described. Anatomical abbreviations are elaborated as follows:

- CI Cephalic Index: $(HW / HL) * 100$.
- GL Gaster Length: length of gaster in lateral view from anteriormost point of first gastral segment (third abdominal segment) to base of paramere.
- HL Head Length: maximum length of head proper in median line, excluding mandibles; measured in full-face view from midpoint of anterior clypeal margin to a line drawn across posterior margin from its highest points.
- HW Head Width: maximum width of head in full-face view (excluding portion of eyes that extends past lateral margins of head).
- ML Mesosoma Length: length of mesosoma (= alitrunk) in lateral view from anteriormost point of pronotum to posteriormost point of metapleuron.
- SI Scape Index: $(SL / HW) * 100$.
- SL Scape Length: maximum length of antennal scape excluding condylar bulb.
- TL Total Length: $HL + ML + GL$.

Description of the male of *Acropyga palearctica*

Head: brownish-yellow becoming darker around three prominent ocelli; head slightly longer than broad; covered in a layer of short, appressed hairs; eyes large, taking up most of lateral sides of head; 12-segmented, incrassate antennae; apical segment about as long as segments 2 - 5 combined; scape long, surpassing by about length of 1st funi-



Figs. 1 - 4: *A. paleartica* genitalia; (1) in dorsal view; (2) in lateral view; (3) in ventral view; (4) penis valve.

cular segment; clypeus broad, slightly convex, with many short erect hairs on surface; mandible broad, with 6 - 8 uneven teeth; apical tooth about $3 \times$ longer than other teeth; 4th and 6th (teeth counted with apical as 1st) also longer than other teeth (about $1/2 \times$ longer); basal teeth set slightly back from masticatory margin.

Mesosoma and gaster: yellow to brownish-yellow; pronotum collar-like with rounded mesonotum overarching; covered in thick layer of appressed hairs; mesonotum higher than propodeum; declivity slopes (c. 45°) toward petiole; petiole short and erect not reaching the height of the propodeum; gaster yellow to brownish-yellow, covered in dense layer of appressed hairs.

Genitalia (Figs. 1 - 4): in lateral view, parameres rounded to pointed apices, sparsely covered in erect hairs; cuspi shorter than digiti; cuspi with peg-like teeth at apices; digiti with peg-like teeth placed laterally and toward apex; penis valves roughly triangular, with poorly defined teeth ventrally.

Measurements (n = 2): TL: 2.14; HW: 0.423 - 0.501; HL: 0.470 - 0.548; SL: 0.439 - 0.470; ML: 0.782 - 0.923; GL: 0.892 - 0.939; CI: 90 - 91; SI: 94 - 104.

Discussion

LAPOLLA (2004) left *A. paleartica* unplaced in a species group and did not include it in a phylogeny of the genus because the male of the species was unknown. However, there were several morphological characteristics of the worker caste that suggested a close relationship with *A. arnoldi* SANTSCHI, 1926 (a species known from southern Africa). Among those characters are: a high maxillary palp number (up to 5 segments), a high number of mandibular teeth (6 - 8), a broad mandible and a similarly shaped pronotum (LAPOLLA 2004). Despite the fact a reanalysis of *Acropyga* phylogeny is outside the scope of this paper, it was thought that examination of key morphological characters of the *A. paleartica* male would suggest a phylogenetic placement for the species.

There are several male characters which place *A. paleartica* with *A. arnoldi*. Among those are: high number of mandibular teeth; similarly shaped parameres and penis valves, and similarly shaped 9th sternite (= subgenital plate). It is possible that this suite of morphological characters represent symplesiomorphies rather than synapomorphies,

but for now it is proposed that *A. palearctica* be placed in the *A. arnoldi* species group, a group that previously only contained *A. arnoldi*. The combination of worker and male characters corroborates placement within the species group. As more males from species where they are presently unknown are discovered, perhaps more phylogenetic characters will be discovered and/or current characters can be further refined, thus providing the opportunity for a reanalysis of *Acropyga* phylogeny.

A sister taxa grouping of *A. palearctica* and *A. arnoldi* is interesting because data from the mealybugs they utilize suggest that the mealybugs are each other's closest relatives. WILLIAMS (1998) speculated that *Eumyrmococcus corinthiacus* (utilized by *A. palearctica*) was the sister species to *Eumyrmococcus scorpoides* DE LOTTO, 1977 (utilized by *A. arnoldi*). More study is much needed to understand this potentially fascinating relationship between the ants and the mealybugs.

Acknowledgements

I thank Alfred Buschinger for kindly sending me *A. palearctica* males and gynes for study. Scott Whittaker (National Museum of Natural History, Washington, D.C.) provided assistance with the scanning electron microscope. I dedicate this study to Stefan Schödl who kindly provided me with specimens while I was completing my revision of *Acropyga*.

Zusammenfassung

Das Männchen der einzigen aus Europa bekannten *Acropyga* Art, *A. palearctica* MENOZZI, 1936, wird beschrieben. Durch die Entdeckung des Männchens von *A. palearctica* und die Kombination von morphologischen Merk-

malen der Arbeiterinnen und Männchen ist es möglich, die Art der *A. arnoldi*-Artengruppe zuzuordnen, welche bisher nur eine einzige Art, *A. arnoldi* SANTSCHI, 1926, enthalten hat. Die Ähnlichkeit der Arbeiterinnen der zwei Arten bezieht sich unter anderem auf eine hohe Maxillarpalpengliederzahl (bis zu 5 Glieder), eine hohe Mandibelzähnenzahl (6 - 8) und die Pronotumform. Die Ähnlichkeiten der Männchen der beiden Arten betreffen eine hohe Mandibelzähnenzahl sowie die Formen der Parameren, der Penisvalven und des neunten Sternits (= Subgenitalplatte). Die Gruppierung der beiden Arten als Schwestertaxa ist auch insofern interessant, als die von den beiden Ameisen gehaltenen Schildläuse ebenfalls für Schwestertaxa gehalten werden.

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