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ON THE OCCURRENCE OF AROLIA IN ANT FEET

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Abstract

Female ants of the genus *Rhytidoponera* Mayr lack pretarsal arolia, but their brothers possess arolia. A brief survey indicates that arolia are universally present in ants outside the subfamilies Ponerinae and Leptanillinae. Some ponerine groups possess arolia, while others do not. We briefly discuss the evolutionary functional, behavioural and systematic implications of these findings.

Introduction

Ants of the genus *Rhytidoponera* are some of the most abundant insects in Australia, and occur in all major habitat types. This large genus, of well over 50 species, also exhibits a gradient of social structure, from species with the usual ant reliance on differentiated queens as reproductives to species in which mated workers fulfil the egg-laying role (Haskins and Whelden 1965; Crozier 1977).

Given the ecological significance, species richness and sociobiological characteristics of *Rhytidoponera*, it is not surprising that species in this genus have been the subjects of a number of recent studies (Imai *et al.* 1977; Hölldobler and Haskins 1977; Ward 1978, 1980; Crozier 1981). The ants are easy to keep and study in the laboratory because the females, unlike those of most ants, cannot easily climb glass or plastic. *Rhytidoponera* males, however, climb these substances with the ease normal for ants. We were struck by this lack of an apparently universal ant ability in *Rhytidoponera* females, and we here provide a proximate explanation for it and briefly discuss the functional and systematic significance of our findings.

Techniques and findings

Grip marks

If a drop of 1 M sucrose solution, or other bait, is suspended over a slide coated with carbon using Hangartner's (1969) technique, ants will tug at it, attempting to grip the slide surface. When the slide is placed in a photographic enlarger, reverse prints can be made of the grip marks made by the ants' feet; when the ants lay trails, traces of these are also left.

We elicited grip marks (Figs 1-5) from workers of *Camponotus discors*, *Dolichoderus scabridus*, *Podomyrma gratiosa*, and *Rhytidoponera metallica*, and from *R. metallica* males. All these ants were collected in the Sydney region, and all except the *Rhytidoponera* workers yielded three-groove grip marks. Marks made by *Rhytidoponera* workers lack the third, inner, groove probably made by the arolium. These results are consistent with an arolium being absent from the pretarsi of *Rhytidoponera* workers.

Microscopy

Examination under a dissecting microscope confirmed that *Rhytidoponera* workers, but not males, lack an arolium. We next killed ants of various species using 2% acetic acid in 70% ethanol, air-dried them, and mounted whole ants or isolated legs on stubs for sputter-coating with gold. We examined and photographed the legs using a Stereoscan S4-10 scanning electron microscope in the UNSW Electron Microscope Unit.

Workers of *Podomyrma gratiosa* (Fig. 8), *Camponotus discors* (Fig. 6), and *Dolichoderus scabridus* (Fig. 7) clearly possess an arolium, whereas those of *Rhytidoponera metallica* (Fig. 9) lack a functional arolium, although there is an indeterminate structure between the claws that might represent a vestigial arolium. Males of *R. metallica*, unlike the workers, have an arolium in the pretarsus (Fig. 10).

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