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NOTES ON THE ABERRANT VENOM GLAND MORPHOLOGY OF SOME AUSTRALIAN DOLICHODERINE AND MYRMICINE ANTS (HYMENOPTERA, FORMICIDAE)

by

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SUMMARY

Two Australian species of *Dolichoderus* Lund, and one of *Leptomyrmex* Mayr (both subfamily Dolichoderinae), have venom glands with two long, slender secretory filaments. In this regard they resemble previously analysed ants of the subfamily Myrmicinae, rather than other dolichoderines. Alternatively, four *Meranoplus* Smith species (subfamily Myrmicinae) have short, knob-like filaments, like those of previously reported dolichoderines, and unlike other myrmicines. Features of venom gland morphology are thus less constant or diagnostically reliable for these subfamilies than was previously supposed.

Keywords : venom gland, morphology, *Dolichoderus, Leptomyrmex, Meranoplus.*

INTRODUCTION

The ant subfamily Dolichoderinae, with its apparent sister-group the Aneuretinae (TRANIELLO and JAYASURIYA, 1981), is characterized by the distinctive and peculiar configuration of its abdominal exocrine glandular system (BILLEN, 1986). These ants alone have a Pavan's gland, and their pygidial glands are so hypertrophied as to have been previously regarded as separate 'anal glands', which were thought uniquely to characterize them. The venom gland of these ants has also been considered unique in possessing two very short knob-like secretory filaments, which is considered to characterize the Dolichoderinae (HÖLLDOBLER and WILSON, 1990). Morphological descriptions of the dolichoderine venom gland are available for representatives of the genera *Azteca, Bothriomyrmex, Dolichoderus, Iridomyrmex, Liometopum* and *Tapinoma* (PAVAN, 1955 ; PAVAN and RONCHETTI, 1955 ; BLUM and HERMANN, 1978b ; BILLEN, 1986). Ants of other subfamilies have long, slender venom gland filaments, with only minor variations in structure, even across subfamilies (BLUM and HERMANN, 1978a). Long filaments have never been reported

from the Dolichoderinae, and dolichoderine-like short lobate filaments have not been recorded from the Myrmicinae, except for an unidentified Australian *Meranoplus* (HÖLLDOBLER, 1988).

MATERIAL AND METHODS

Foraging worker ants of the following relevant species were collected, and later dissected for gross examination of their exocrine glands. In this list bracketed specific names refer to species groups, rather than to a particular included species. The *Dolichoderus (scabridus)* group comprises the Australian species of the subgenus *Diceratoclinea* of WHEELER (1935), and the *D. (doriae)* group those of WHEELER's subgenus *Acanthoclinea*. Both subgenera were synonymized under *Dolichoderus* by BROWN (1973). The two series of the *Meranoplus (diversus)* group are probably conspecific. One-degree geographical coordinates and state codes are given for each locality, following TAYLOR (1987). At least 5 worker specimens were examined from each series, and dealate females in addition from series 4. Appropriately labelled voucher specimens, identified by R.W.T. are in the Australian National Insect Collection (ANIC), where those species believed to be undescribed are placed under the formal collection numbers indicated.

1. *Dolichoderus (scabridus)* Roger	Batemans Bay (35/151), NSW
2. *Dolichoderus (doriae)* Emery	Mongarlowe (35/149), NSW
3. *Leptomyrmex erythrocephalus* (F.)	Mongarlowe (35/149), NSW
4. *Meranoplus (diversus)* Smith	Darwin (12/130), NT
5. *Meranoplus (diversus)* Smith	Yulara (25/131), NT
6. *Meranoplus* sp. 11 (ANIC)	Poochera (32/134), SA
7. *Meranoplus* sp. 12 (ANIC)	Darwin (12/130), NT
8. *Meranoplus* sp. 13 (ANIC)	Darwin (12/130), NT

RESULTS AND DISCUSSION

All *Dolichoderus* and *Leptomyrmex* specimens were found to have venom glands with two long slender secretory filaments, each up to 2.5 mm in length, with a fairly constant diameter of around 40 µm. These open through the convoluted gland, in the mid-dorsal region of the gland reservoir, and their bases are approximated (Fig. 1A). The *scabridus* and *doriae* groups of *Dolichoderus* are apparently closely related lineages, which differ from 'mainline' *Dolichoderus* species (i.e. those of the erstwhile subgenus *Hypoclinea* Mayr) in possessing paired propodeal, or propodeal plus pronotal spines, respectively. The palearctic *D. quadripunctatus* (L.) is the type species of *Hypoclinea*. It has typically dolichoderine bulbous venom gland filaments (BILLEN, 1986). It is possible, therefore, that long filaments distinguish the Australian *(scabridus)/(doriae)* phylad, which could support reassessement of the status of *Diceratoclinea* and *Acanthoclinea*. Unfortunately we have been unable to study any Australian species of « *Hypoclinea* ».

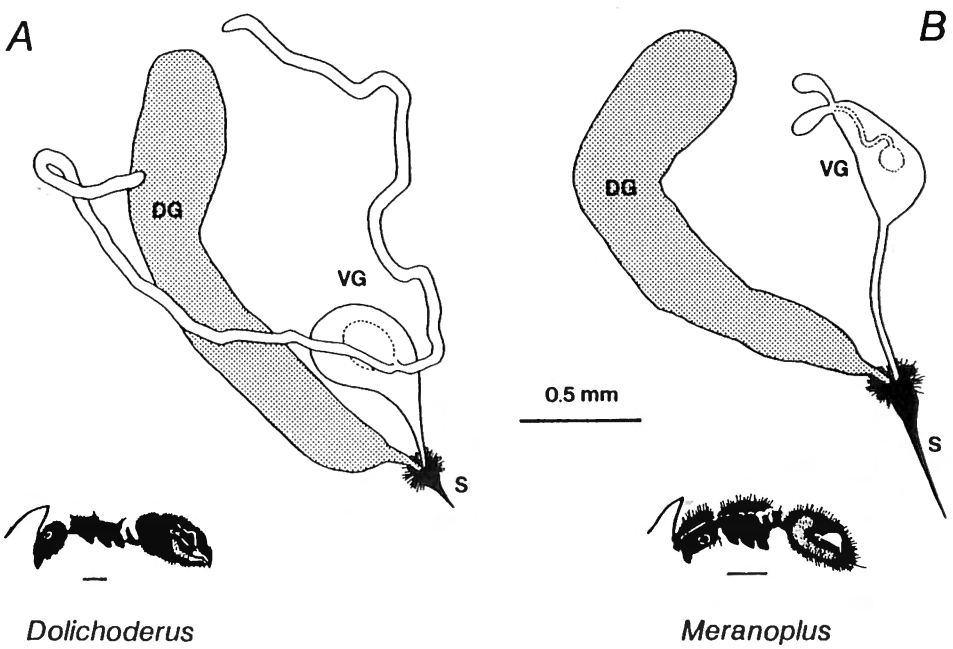

Fig. 1. — General morphology of the sting shaft (S), venom gland filaments and reservoir (VG), and Dufour's gland (DG) in representative Australian *Dolichoderus* (A) and *Meranoplus* (B) species. The stippled outline in the venom gland reservoir indicates the position of the convoluted gland (scale bar for ant profiles = 1 mm).

The four *Meranoplus* species examined differ greatly in size and habitus. All possessed venom glands with a pair of almost bulbous filaments, the largest 0.2 mm long. All bulbs were more or less similar in diameter, measuring 40 to 50 µm. They also open through the convoluted gland, but do so at the apex of the reservoir sac (Fig. 1B). The tubiform Dufour's gland is extremely large in all these *Meranoplus* specimens, where it is by far the most voluminous gastral organ. Behavioural observations revealed it to be the source of long-lasting trail orienting pheromones after the ants have been stimulated by the short-living venom gland secretion, while the Dufour gland in addition elicits a strong repellent effect in other ant species (HÖLLDOBLER, 1988). Despite the voluminous size of the Dufour gland, no associated volatile materials like those found in other ants could be detected in these *Meranoplus* species (MORGAN and BILLEN, unpubl.). Although only a few species have been formally named (TAYLOR, 1987), *Meranoplus* is very species rich, diverse and common in Australia, especially in arid and semi-arid areas, where most species appear to harvest seeds. The glandular morphology presumably relates to these characteristics of distribution and habit.

The very long venom gland filaments in *Dolichoderus* and *Leptomyrmex* are markedly unlike the short, bulbous organs found in all previously examined

Dolichoderinae and, until now, thought to characterize the subfamily (PAVAN, 1955 ; HÖLLDOBLER and WILSON, 1990). The reverse is true of the *Meranoplus* venom glands. Here the short, knob-like filaments are quite unlike the long, slender organs previously reported from other myrmicine ants (BLUM and HERMANN, 1978a), and resemble those of most dolichoderines. The occurrence of lobate venom gland filaments was also noticed for an undescribed Australian *Meranoplus* species (HÖLLDOBLER, 1988), but without any further comments on this aberrant morphology for a myrmicine ant.

These observations by no means challenge the classification of the genera involved, since they otherwise conform fully to the diagnoses of their subfamilies. The similarities involved may well be due to homoplasy. Nonetheless they do demonstrate that venom gland morphology is much less consistent in these ants than was previously supposed.

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