

Short Communications

Queenlessness and reproductive differentiation in *Ophthalmopone hottentota*

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The reproductive activity of ants in two colonies of *Ophthalmopone hottentota* was determined by dissecting their ovaries and examining their spermathecae. Queens are absent. There are a number of inseminated workers in each colony, and all these had active ovaries. Thus, the strict association between ovarian activity and insemination was confirmed for this species.

Die voortplantingsaktiwiteit van miere in twee kolonies van *Ophthalmopone hottentota* is deur disseksie van ovaria en spermathecae bepaal. Koninginne is afwesig, en 'n aantal bevrugte werkers, almal met aktiewe ovaria, is in elke kolonie gevind. Die noue verwantskap tussen bevrugting en aktiewe ovaria is dus vir hierdie spesie bevestig.

Some ponerine ants do not have queens, and mated workers (=gamergates) lay all the eggs (Peeters & Crewe 1984). Queenlessness is a derived condition, and is found in different tribes and genera of the Ponerinae (Haskins & Whelden 1965; Haskins & Zahl 1971; Ward 1983; Peeters 1984). While queenless and queenright species may sometimes occur in the same genera, the characteristics of the fertile workers remained unclear until we reported a strict association between prior insemination and ovarian activity in *Ophthalmopone berthoudi* (Peeters & Crewe 1984, 1985). The suggestion that insemination and hence the period of male activity is the only control on the reproductive division of labour in queenless ants is a novel one; hence we wanted to verify whether this applied to the congeneric *O. hottentota* Emery, which occurs in a different habitat. This species occurs in semi-arid areas in the western half of southern Africa.

We excavated two nests of *O. hottentota* from Albany, eastern Cape, during May 1984. All the inhabitants were collected and were kept alive in the laboratory. Since laying workers cannot be recognized visually, we dissected the ovaries of a sample of individuals (Table 1) to find out which of them were reproductively active. The Table also indicates the number of gamergates and non-laying workers whose spermathecae were examined to establish the incidence of past mating. The dissection samples in both colonies were biased towards including laying workers, because they were mostly made up of individuals that were not active outside the confines of the laboratory nests. A previous study (Peeters 1984) had established that *O. berthoudi* gamergates are not active outside the nest.

Table 1 The reproductive status of workers collected from two colonies of *O. hottentota*. All workers with active ovaries were checked for sperm and were inseminated. All the non-laying workers checked had empty spermathecae

	Workers in the nests	Workers dissected	Workers with active ovaries (= gamergates)	Non-laying workers checked for sperm
Colony 1	102	29	6	16
Colony 2	150	53	12	25

We found no queens in the nests of *O. hottentota*. There were three ovarioles per ovary in all the individuals examined, as was found in *O. berthoudi* (Peeters & Crewe 1985). A number of the workers had active ovaries (Table 1), and all of these had been mated. A striking difference between the two species was that the ovaries of the gamergates of *O. hottentota* were not greatly enlarged. Enlarged oocytes were not found in the ovarioles, and no eggs were laid in the laboratory. Only the swollen bases of the ovarioles allowed us to distinguish these individuals from non-reproductive workers.

Although we have no evidence that these individuals lay all the eggs, they are likely to be the gamergates. This reproductive quiescence is not altogether anomalous, since no brood was found in either of the nests, suggesting that there may be a seasonal pattern in egg-laying in *O. hottentota*, which may be linked to seasonally favourable conditions in the eastern Cape.

These and other data collected during a comparative study of reproductive behaviour in ponerine ants confirm that mated workers have become the functional reproductives in various taxa of queenless ponerines, and that this rule holds for both species of *Ophthalmopone* studied.

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