

Colony foundation in the ponerine ant, *Mesoponera caffraria* (F. Smith) (Hymenoptera: Formicidae)

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In the laboratory six queens of *Mesoponera caffraria* excavated new nests and raised their first brood alone by hunting small arthropods to feed the larvae (semiclaustral haplometrotic colony foundation). The nests consisted of two chambers. The structure of the entrance of the inner chamber, in which the brood was raised, helped to prevent other insects from entering it. Egg production followed a cyclic pattern that was co-ordinated with the periods when larvae did not require care.

In die laboratorium het ses koninginne van *Mesoponera caffraria* nuwe neste gegrawe en hulle eerste broeisel alleen grootgemaak. Hulle het klein insekte gejaag om die larwes te voer. Die neste het uit twee kamers bestaan. Die struktuur van die ingang van die binnekamer, waarin die broeisel grootgemaak is, het gehelp om ander insekte buite te hou. Die lê van eiers het 'n sikliese patroon gevolg, wat saamgeval het met periodes waarin larwes geen sorg nodig gehad het nie.

Ponerine ant queens characteristically found new colonies alone and in unsealed nests (Haskins 1970), a habit termed semiclaustral haplometrosis (Hölldobler & Wilson 1977). Recently an opportunity arose to investigate colony foundation in *Mesoponera caffraria*, a ponerine species which has a queen caste.

M. caffraria was found in Mkuzi Game Reserve (26°39'S/32°10'E), Natal, in late September, and Dunstable Farm (24°28'S/30°43'E), Transvaal, South Africa, in early October, 1987. Voucher specimens have been housed in the South African Museum (Accession numbers C741 [Mkuzi] and C742-C743 [Dunstable Farm]). Three dealated queens were collected at each site from beneath logs and stones on clear, sunny days following heavy rains. Some had dug a single small chamber at the end of a very short entrance tunnel, but none had laid eggs. All six were moved to the laboratory and kept at a constant temperature of 22°C, and 40% RH, in plastic arenas 200 × 310 × 70 mm, covered by a sheet of glass and with a thin layer of sand on the floor. Lubbock nests (90 × 74 × 5 mm) filled with sandy soil from their habitat were provided. Live *Drosophila* flies or workers of *Trinervitermes* termites were released into the cages every two days. Drinking water was placed in a shallow dish. Water was also sprayed over arenas using an atomizer whenever they appeared dry. The quantity of each brood stage in each nest was recorded daily for 90 days after the first egg was laid.

Queens soon occupied the Lubbock nests. Initially they dug a single chamber adjacent to the entrance and laid their first eggs there. Four queens dug secondary tunnels deeper into the Lubbock nests. Later these tunnels were abandoned and the nests were modified so that there were two interleading chambers. Brood was kept in the inner of these, which had a short tunnel suspended from the roof of, and projecting into, the outer chamber, rather like the entrance to a greater striped swallow's nest. This arrangement seemed to keep intruders out of the inner chamber, because when termites invaded a nest, they remained in the outer

chamber, where they were eventually killed by the queen.

Fifteen eggs averaged 1,66 (± 0,04) mm in length, and were an elongated pear shape. They adhered together, and were kept stacked against the side of the chamber. Young larvae also adhered to one another, but were kept separate from the eggs. Older larvae lay singly and on their sides. All larval stages had elongated thoracic segments and tubercles on their dorsal surfaces (see Wheeler & Wheeler [1952] for a fuller description). Queens caught and killed prey in the arenas and carried it back to the nest. To feed, larvae lay on their dorsal surfaces and their mother placed a lump of macerated prey on their smooth ventral abdominal surfaces where they could reach it with their elongated thoracic 'necks'. Similar 'feeding tray' behaviour has been reported in other ponerine larvae (Petralia & Vinson 1979), but in these species surrounding tubercles help to hold the food in place. Queens continued to forage for about 12 days after the first workers emerged, after which the latter took over the role. These workers were no smaller than workers from established colonies (*t* test on head width; *t* = 0,28; *n* = 17; *p* < 0,05).

The brood was produced in two phases (Figure 1). Initially the queens, which had three ovariole per ovary, each laid a clutch of 7–10 eggs at a rate of 0,4–0,8 eggs/day and ceased laying when the first larvae hatched. Laying recommenced at the same rate at about the time that the last larvae of the first clutches began to spin their cocoons, and continued unabated during the rest of the study. The first workers emerged from the first batch of cocoons as the second clutch of eggs began hatching. The durations of the stages for 23 individuals were: egg 17–21 days; larva 10–12 days; cocoon 26–28 days. The duration of the egg stage is longer and the larval and cocoon stages shorter than those reported for other ponerines (Wheeler & Wheeler 1976).

Brood production during colony foundation was integrated with the durations of the brood stages in such a way that queens were either laying eggs or foraging,

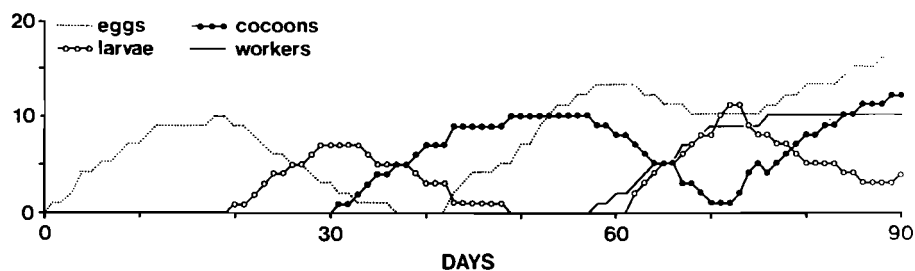


Figure 1 Brood production in a representative nest of *Mesoponera caffraria* during the first 90 days of colony foundation under laboratory conditions.

but not both. The second batch of larvae hatched only after the first workers had eclosed. Since these workers are soon able to forage, there is no need for queens to cease laying a second time, and colony growth proceeds quickly.

Queens of *M. caffraria* are capable of lone (haplometrotic) colony foundation in the laboratory and very probably in the field too. They also need to hunt prey to feed their first brood (semiclaustral foundation) and thus conform to the pattern described from other ponerine species (Haskins 1970).

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