

The parameters of division of labour among ants are generally considered to reflect reliably their level of social evolution, with workers of advanced species being the more specialized ergonomically (Wilson, 1971; Hölldobler and Wilson, 1990). For example, Traniello's (1978) observations that worker age-based polyethism was absent in *Amblyopone pallipes* Haldeman (Ponerinae: Amblyoponini), at least under his experimental conditions, is held to reflect the primitive status traditionally accorded to *Amblyopone* by taxonomists.

We have investigated division of labour in *Nothomyrmecia* and in several *Myrmecia* species by observing colonies containing workers artificially marked to facilitate individual recognition. The first of these studies, covering *N. macrops*, is presented here. In addition we report an experiment exploring aspects of putative colony-brood recognition in *Nothomyrmecia*.

Materials and methods

Social organization

Two colony series from nests about 17 m apart were excavated at Poochera on November 29th and December 2nd, 1988. Colony 1 included a queen, 42 workers, 2 small larvae, 20 large larvae and 5 cocoon-enclosed pupae. Colony 2 comprised a queen, a male, 35 workers, an egg, 9 small larvae, 31 large larvae and 15 pupae. The colonies were installed several days later in artificial plaster nests, maintained at a constant 20 °C, at the CSIRO Division of Entomology, Canberra. All workers were marked with minute, photographically prepared identification labels (as used by Fresneau and Charpin, 1977). The nests, covered with a sheet of red perspex, were built using the same mould, and comprised an entrance tunnel 3 cm long, two small chambers (diameter = 5.5 cm) and one large terminal chamber (diameter = 11.5 cm) placed linearly and linked by two 3.5 cm-long tunnels. The entrance opened to a plastic box (26 × 19 cm), which provided a foraging arena. Living *Drosophila* flies were deposited daily in the foraging arena, and honey was permanently available in the second nest chamber. Systematic scanned observations (see Jaisson et al., 1988 for details) were carried out from December 7th to 15th on colony 1 (53 observations), and from December 13th to December 20th on colony 2 (68 observations), at times scattered throughout the 24-hour day. Each scan record noted the behavioural act and location of identified individuals ants. A total of 1692 such individual observations were obtained for colony 1 and 2310 for colony 2. *Immobility* was recorded as a specific behavioural act.

The data were analysed by summing the behavioural items recorded for individual ants, as noted in a matrix where the frequency of each elementary act was recorded for each individual. The frequencies were then totalled to obtain a social ethogram for the whole colony. The resulting ethograms are comparable to those previously presented by other authors (e.g. Wilson, 1976) using different data collection methods. Individual behavioural profiles were then determined using multivariate correspondence analysis. This permitted the regrouping of elementary acts in nine main categories corresponding to social functions.