

Smith (Haskins and Whelden, 1954) and *M. brevinoda* (Crosland et al., 1988), but it appears not to occur in some *Myrmecia* species otherwise known to lay trophic eggs (Taylor, pers. obs.).

Guarding at the nest entrance appears to be the most specialized activity practiced by *Nothomyrmecia* workers. This is consistent with observations on primitively eusocial bees, where nest-guarding appears to be the first behavioral act to appear in the development and evolution of division of labour among workers. In fact, an important general step in any evolution towards hymenopterous eusociality could be *communal nesting with nest-guarding*, the latter serving to reduce access to brood by predators and parasites (Andersson, 1984; and see, for example, Sakagami and Maeta, 1977, for *Ceratina* bees).

We see no evidence of a dichotomy in *Nothomyrmecia* between in-nest specialist workers (*Innendienst*) and others (*Aussendienst*) dedicated to out-of-nest activities. The most important group of foragers in colony 1 (group 3, Fig. 2), for example, was also significantly involved with the care of larvae. Such specialization appears to provide the organizing structure on which division of labour is based in the ponerine ant species discussed above (Fresneau, 1984; Fresneau and Dupuy, 1988; Corbara et al., 1989) and in others belonging to the same subfamily (*Megaponera foetens* Fabr.: Villet, 1990 a; *Platythyrea lamellosa* Roger: Villet, 1990 b). This matter, again, could relate to the hypothesized basal position of the *Nothomyrmecia* lineage in formicid phylogeny.

Foraging activity was low in our laboratory cultures, and this might relate partly to the fact that foraging occurs preferentially at lower temperatures in the field (Hölldobler and Taylor, 1983). *Nothomyrmecia* foragers in nature are now known to return promptly to nests once prey has been secured (but otherwise to forage until near dawn). Colonies have been observed to forgo foraging on some nights (when other nests were active, confirming that microclimatic conditions were suitable), possibly when fresh food supplies are not a priority (Taylor, pers. obs.). The abundance of easily-secured *Drosophila* prey at short range in our foraging arenas could well have depressed the levels of foraging activity observed in our subject colonies.

*Nothomyrmecia* appears to be significantly more primitive than *Myrmecia* (see our second paper on social organization in primitive Australian ants, Fresneau et al., in preparation), in that the division of worker labour is much more evident in the *Myrmecia*, and social interactions between individuals much more frequent. *Nothomyrmecia* is here confirmed in our opinion to be a 'living fossil' ant of genuinely primitive eusocial status.

The experiment on brood recognition evidenced a tendency by workers to preferentially lick non-nestmate larvae. Such licking might facilitate transfer of the colony odour 'visa' to larvae. This could explain our observations, assuming that adult workers are able to sense visa deficiency in individual larvae, and to respond by actively licking them in order to redress the deficiency. The non-nestmate larvae might thus have been preferentially licked *simply because they evidenced visa deficiency relative to nestmate larvae* – their particular recognition as aliens by the workers might therefore never have occurred. In this case our data would not support a hypothesis that nestmate and non-nestmate brood are specifically recognised as