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Letter

COLONY RECOGNITION OF LARVAE BY YOUNG WORKERS OF CATAGLYPHIS CURSOR (HYMENOPTERA, FORMICIDAE)

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ABSTRACT

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In an ant, C. cursor, colony recognition of larvae exists in callow workers 10 days or older, but the discrimination capacities of very young workers has not been investigated. We show that workers less than 24 h old are already able to discriminate homocolonial from alien larvae. This is an additional argument in favour of the existence of a learning period for colony recognition of larvae during the preimaginal life.

Key words : colony recognition, Formicidae, Cataglyphis, ontogenesis, brood

INTRODUCTION

Colony recognition is the rule amongst social Hymenoptera, especially in relations between adults (see reviews by Jaisson 1985, Isingrini and Lenoir 1986). Brood colony discrimination has also been demonstrated in ants (Meudec 1978, Lenoir 1981, Febway et al. 1984, Hare and Alloway 1987), wasps (Klahn and Gamboa 1983) and bees (Page and Erickson 1984, Visscher 1986). In Cataglyphis cursor colony-specific recognition of larvae exists (Lenoir 1984, Isingrini et al. 1985). Callow workers can be familiarized to foreign larvae but the preference for homocolonial larvae cannot be reversed. It was not known whether newly emerged ants less than 24h old are able to discriminate larvae. Results on this question are presented here.

MATERIAL AND METHODS

All experimental colonies were reared in the laboratory for at least one year with the same food to eliminate the possible effect of environmental factors on colonial odour. Small groups of ants were given a choice between larvae originating from two different colonies. Larvae were marked with a dot of non-toxic water-based paint. Control experiments showed that neither the paint nor the color had any effect. 11 experimental groups of 7 callow workers each less than 24 h old and 11 control groups 7 workers each older than one year were set up. The groups came from three separate colonies. Each

group was submitted to a choice test of 10 minutes with 4 homocolonial and 4 heterocolonial (alien) larvae. The behaviours observed were licking, seizing with the mandibles and contact. Licking towards larvae is frequently observed; even very young workers lick larvae. Each lick of at least one second was scored as one unit. Seizure of larvae is usually followed in old workers by displacement of the larvae; young workers frequently only lift up the larvae. Each seizure was counted. When a worker approaches a larva, it sometimes stays motionless above it or in contact with it. Contacts were counted if their duration exceeded 5 seconds. Only young ants did and this it seems to show an attraction to larvae. Behavioural frequency alone rather than duration reflected brood discrimination.

	CALLOW ANTS		MATURE ANTS	
BEHAVIOURS	HL	AL	HL	AL
LICKING	3.81 (1.08) **	1.27 (0.57)	22.36 (1.21) ***	11.81 (1.25)
TRANSPORT	2.54 (0.59) NS	1.36 (0.45)	8.18 (0.93) ***	4.63 (0.45)
CONTACT	5.63 (0.70) **	2.54 (0.41)		

TABLE 1 : Distribution of behaviours in young and mature ants in relation to the type of larvae (Mean and SE for 7 ants during 10 min)
HL: Homocolonial Larvae AL: Alien Larvae
Wilcoxon test for matched groups (** P<.05 ; *** P<.01)

RESULTS

Callow workers can direct some nursing behaviours toward larvae (Table 1). They also frequently stay in contact with brood; this behaviour disappears in older ants. Aged workers are more efficient in their nursing behaviour. Callows show only a low level of activity. Nursing behaviour is more frequently directed toward homocolonial larvae. Differences are significant only for licking and contact frequencies.

DISCUSSION

This experiment demonstrates that colony recognition of larvae exists early after the emergence of adult workers. This confirms that the learning period for this discrimination occurs during preimaginal life (Isingrini et al. 1985). However, callow workers were not tested during the first hours after emergence, when familarization to colonial odour could occur. Experiments during the first hours are very difficult because young workers are immobile. In Myrmica rubra Evesham (1985) failed to demonstrate recognition of young workers of their own queens.

Young workers do not show many brood-tending behaviours, but they are immediately able to lick and seize larvae. We hypothesize that, given that the patterns of tending behaviour are functional early after emergence, they could be the result of an internal developmental process, related to maturation. Individual experience may influence the frequency, the adjustment and probably the preferential orientation of the behaviour. In the context of maturational process brood tending behaviour can appear in ants reared in complete individual isolation, as in Lasius niger observed by Lenoir (1981) or in C. cursor by Isingrini et al. (1985). Champalbert (1986) obtained a different result with a primitive ponerine ant Ectatomma tuberculatum in which individual isolation during the first days of post-emergence led to a perturbation in social behaviour, particularly brood nursing. It would be very interesting to know whether preimaginal learning exists at all in E. tuberculatum.

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