

Abstract*

The effects of age, training and enriched environment on the ontogeny of defense behaviour in juvenile workers of the red wood ant *Formica polyctena* FÖRST.

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The research devoted to the ontogeny of ant behaviour is focused mostly on behavioural modifications involved in the transition nurse-forager (LENOIR 1987, WAGNER-ZIEMKA *et al.* 2008, HÖLLOBLER and WILSON 2009). Behavioural effects of early experience were investigated mainly in the context of acquisition of chemical preferences and effects of social context on individual behaviour (LENOIR 1987, BLATRIX and SERMAGE 2005). We analysed the effects of age, training and enriched environment on the ontogeny of defense behaviour in juvenile workers of the red wood ant *Formica polyctena*. Newly hatched callows were kept in small groups ($n = 5$) and tested at the age of 1, 4, 7 or 10 days after eclosion. During the test, the ant was fixed by petiolus to a piece of styrofoam and the front part of its head was repeatedly stimulated by stroking with an entomological pin. We recorded the degree of mandible opening and the success of the attempts of the tested worker to grasp the pin with its mandibles. Four groups of ants were tested to assess the effect of (1) behavioural maturation, (2) training (tests repeated at three day intervals), (3) enriched environment (possibility to interact with fragments of pine needles in the home nest), and (4) training and enriched environment applied together. Altogether, 914 callows and 47 mature foragers were tested. In all tested groups defense behaviour showed significant improvement as a function of worker age. Maturation of defense behaviour was more rapid in ants reared in enriched environment. Surprisingly, training had an adverse effect on that process, leading also to more rapid habituation to aversive mechanical stimulation.

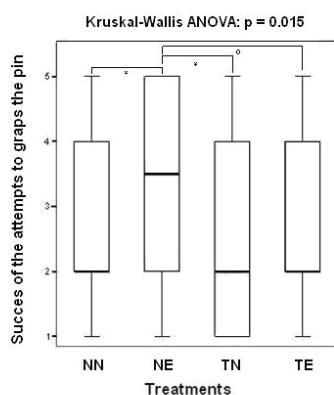


Fig. 1. Comparison of the values of the score quantifying the success of the attempts to grasp the pin used for head stimulation recorded in workers of *Formica polyctena* from various experimental groups on 10th day post eclosion. Box-and-whiskers graphs show medians, quartiles and ranges of that variable obtained for the second response of each tested individual. Experimental groups: NN - naive ants, no enriched environment ($n = 50$); NE - naive ants, enriched environment ($n = 49$); TN - trained ants, no enriched environment ($n = 55$); TE - trained ants, enriched environment ($n = 55$). Statistics: Kruskal-Wallis ANOVA + Siegel-Castellan post-hoc tests for pairwise comparisons of independent data taking into account the inherent error rates accompanying multiple comparisons. Probability level: ° $0.05 < p < 0.1$; * $p < 0.05$.

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