THE EFFECT OF SOCIAL ISOLATION ON ANT PHYSIOLOGY AND BEHAVIOUR

Summary

This paper provides a review of classical and recent studies dealing with the effects of social isolation on ant physiology and behaviour, including the newest findings obtained by our team from Laboratory of Ethology of the Nencki Institute of Experimental Biology in Warsaw. We first discuss several theoretical notions used in the research dealing with that question, such as group effect, mass effect, worker-worker interactions and social context. Then we describe the effects of social context on behavioural ontogeny of workers of social Hymenoptera and on the expression/suppression of single behaviour patterns. We also describe some methods of identification of exact factors underlying these effects and the mode of action of primer and releaser pheromones. We provide a detailed description of various types of social contacts encountered in ant colonies, including trophallaxis, allogrooming, antennal contacts, nestmate transport, passive body friction and various forms of agonistic behaviour. We then discuss in detail various effects of social isolation on ant survivorship, general activity level, activity rhythms, oxygen consumption, ontogeny and physiology of ovarian functioning, and ontogeny of social behaviour. Our discussion of the effects of social isolation on ant social behaviour is focused on the functions fulfilled by the so called trophallaxis induced by social isolation. In particular, we discuss the role of that phenomenon in the homogenization of cuticular hydrocarbon profiles involved in nestmate recognition and its possible link with the hypothetical phenomenon of social reward. We also describe the results of experiments investigating the effect of octopamine and other biogenic amines on behaviour of ants during dyadic nestmate reunion tests carried out after a period of social isolation. We also describe the effects of social isolation on social behaviour of ants belonging to the species that do not engage in trophallaxis.