Highly diverse cuticular hydrocarbon profiles but no evidence for social closure in the ambrosia beetle Xyleborinus saxesenii

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Abstract

Animal societies use nestmate recognition to protect against social cheaters and parasites. In most social insect societies individuals recognize and exclude any non-nestmates and the roles of cuticular hydrocarbons as recognition cues are well documented. Some ambrosia beetles live in cooperatively breeding societies with farmed fungus cultures that are challenging to establish, but of very high value once established. Hence, social cheaters that sneak into a nest without paying the costs of nest foundation may be selected. Therefore, nestmate recognition is also expected to exist in ambrosia beetles, but so far nobody has investigated this behavior and its underlying mechanisms. Here we studied the ability for nestmate recognition in the cooperatively breeding ambrosia beetle Xyleborinus saxesenii, combining behavioural observations and cuticular hydrocarbon analyses. Laboratory nests of X. saxesenii were exposed to foreign adult females from the same population, another population and another species. Survival as well as behaviours of the foreign female were observed. Behaviours of the receiving individuals were also observed. We expected that increasing genetic distance would cause increasing distance in chemical profiles and increasing levels of behavioural exclusion and possibly mortality. Chemical profiles differed between populations and appeared as variable as in other highly social insects. However, we found only very little evidence for behavioural exclusion of foreign individuals. Interpopulation donors left nests at a higher rate than control donors, but neither their behaviours nor the behaviours of receiver individuals within the nest showed any response to the foreign individual in either of the treatments. These results suggest that cuticular hydrocarbon profiles might be used for communication and nestmate recognition, but that behavioural exclusion of non-nestmates is either absent in X. saxesenii or agonistic encounters are so rare or subtle that they could not be detected by our method. Additional studies are needed to investigate this further.

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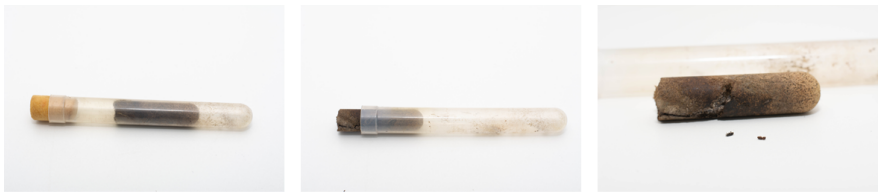

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