



## **Formic acid improves nestmate recognition in carpenter ants**

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Social-insect workers release alarm pheromones to warn their conspecifics about a potential danger such as a predator or an intruder. Ants are no exception to this defensive strategy and several alarm pheromones have been identified in different ant species. Colonies of ants compete for resources with neighbours and this intra- and inter-specific competition affects colony fitness. Nestmate recognition allows discriminating between nestmates and non-nestmates, thus maintaining colony cohesiveness and preventing the exploitation of colony resources by non-nestmates. We hypothesized that alarm pheromones modulate nestmate recognition as it is crucial to identify correctly the targets of possible attacks. We focused on carpenter ants *Camponotus aethiops* and exposed them to formic acid, a substance that acts as a potential alarm pheromone in this species. We then measured aggressiveness towards nestmates or non-nestmates. We found that ants exposed to formic acid were more aggressive towards non-nestmates and less aggressive towards nestmates than control ants. Thus, formic acid made ants more accurate at discriminating nestmates from non-nestmates. These results show that nestmate recognition and discrimination are not static, unchangeable capacities but that they are plastic and can be modulated by a pheromone that is relevant in the context of colony defence against intruders. In this context, defensive attacks have to be accurate to eliminate the danger of hurting their own sisters, which would affect the fitness of the entire colony.