

Predator pressures maintain bees' social life

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Honeybee. Credit: James Ward

The complex organisation of some insect societies is thought to have developed to such a level that these animals can no longer survive on their own. Research published in the online open access journal *BMC Evolutionary Biology* suggests that rather than organisational, genetic, or biological complexity defining a 'point of no return' for social living, pressures of predation create advantages to not living alone.

The ancient systems of sociality in bees, wasps, termites, and ants seem to have become an obligatory way of life for these organisms as there are almost no examples of species reverting to solitary lifestyles.

"This has prompted the notion of a 'point of no return' whereby evolutionary changes in behaviour, genetics, and shape in adaptation to a social lifestyle prohibit the insects from living without their society — a

queen bee losing her workers would be like a human being losing a vital organ", explains Luke Chenoweth of Flinders University, Australia.

Most social insects have developed a system in which there is a division of labour between castes of related individuals. Reproductive queens rely on sterile workers, usually their daughters, to feed them and nurture their young, but in a few examples of social bees all females in a colony retain the ability to breed but some do not, a phenomenon known as totipotency.

Chenoweth and colleagues investigated *Halterapis nigrinervis*, an African species thought to provide a rare example of a bee with totipotent social ancestors that has reverted to a solitary lifestyle. By investigating this species the researchers hoped to reveal the factors that allow or prevent reversion to a solitary lifestyle.

The researchers collected nests from various habitats. Surprisingly they found that over half contained multiple females and those containing multiple females were more likely to have bee larvae in them. "The results mean that *H. nigrinervis* is social and that there are consequently no known losses of sociality in this group of bees." As these bees lack the social and behavioural complexity of honeybees and many other social insects, the fact that they do not seem to live solitarily in any circumstances suggests that ecological pressures rather than biological factors maintain sociality.

The researchers hypothesise that sociality in *H. nigrinervis* is maintained by predation: multiple females not only offer greater protection to the brood in the nest but also should an adult fall foul of predators, nest-mates will raise their young. While many social insects might retain the potential to raise young alone, the benefits of protection against predation result in sociality being maintained.

Source: BioMed Central

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