

Ants in their plants

Nigel Raine has been finding out how *Acacia* plants control their insect security forces.

If you think all insects do is damage your vegetable patch, think again. Insects and plants can help each other – and their interactions can be quite complex. We've been studying *Pseudomyrmex* ants and the *Acacia* plants they live on. These aggressive ants guard the *Acacia*, in return for which the plant provides them with food and lodging. But the ants can be a bit over-protective. I wanted to know how this affected their relationship with the *Acacia*.

The foliage of *Acacia hindsii* plants swarm with ants all year round, providing a flexible defence force against all comers who interfere with their *Acacia* home. Regular ant patrols find and quickly remove insects feeding in the canopy, and raise the alarm to major disturbances. In this way the biting and stinging ants can respond *en masse* to repel the leathery lips and tongue of a giraffe bent on devouring the tastiest young leaves, or hapless ecologists accidentally brushing against the tree.

The mutual benefits of such an insect-plant association are obvious. But during flowering, the same aggressive ants that scare off herbivores so effectively might also attack useful insects, such as pollinators. *Acacia* plants need pollinators to visit their flowers to produce seeds. Over-zealous ant guards attacking them or stopping them pollinate could spell disaster for the plant. To avoid disaster the *Acacia* tree takes drastic action: its flowers produce an ant-repellent chemical. We found that the ants, that normally patrol everywhere, don't in fact go near flowers, even when the tree is covered in thousands of them for many weeks each year. In our study, ants avoided areas of the stem we had wiped flowers against. Newly opened flowers are the most repellent to ants, and are also the most attractive to pollinators. And as flowers age, the strength of their deterrent effect fades, allowing ants to resume their

“Newly opened flowers are the most repellent to ants.”

protective role as the seeds grow inside. So the tree keeps the aggressive ants off its flowers only for the crucial period when they need to be pollinated.

This research, conducted in Mexico, confirms previous findings from Africa and raises interesting questions about the evolutionary origins of ant-repellents in flowers. The data also showed that flowers of some closely related plant species also repelled ants, although less effectively than plant species inhabited by ants. This suggests that floral ant-repellents could be relatively common, perhaps representing an evolutionary response to stop ants raiding flowers.

Nigel Raine (left) and Graham Stone.



Nigel Raine is a postdoctoral researcher working on the behavioural ecology of bumblebees at the School of Biological Sciences, Queen Mary, University of London, Mile End Road, London, E1 4NS, tel: 020 7882 3293 email: n.e.raine@qmul.ac.uk. This work was carried out with Graham Stone (University of Edinburgh) and Pat Willmer (University of St Andrews) and part-funded by NERC. You can read more about it in *Ecology*, vol. 83 pages 3086-3096.