

Ant wars: flight and fight



The semi-arid saltbush plains around Deniliquin in south-western New South Wales seem an unlikely location for great battles. But, just under the surface of the soil there, dramatic episodes occur.

Entomologist Dr David Briese, now with the CSIRO Division of Entomology, observed the battles while researching seed-harvesting ants in the Deniliquin area for his doctoral thesis.

Ants are the most abundant insect group in the semi-arid region. The seed-harvesters, in particular, are important consumers that can remove as much plant biomass from an area of pasture as the sheep grazing above. Altogether, Dr Briese came across 37 ant species in 195 colonies in his 500-square-metre study area.

While observing a colony of the seed-harvesting ant *Chelaner* sp., he noticed that the workers were behaving strangely. They were carrying larvae and pupae away from the nest, and dumping the brood either at 'bivouacs' under nearby twigs or small bushes, or in cracks in the ground up to 3 m from the nest.

For 4 hours, Dr Briese watched as the brood was shifted progressively further away. Then, next day, he saw the workers ferry the larvae and pupae back to the nest, with a wingless queen in the convoy. He noticed the same behaviour in other *Chelaner* colonies, although he saw no

The protagonists seen under the electron microscope: the seed-harvester (*Chelaner* sp.), the scavenger (*Melophorus* sp.), and the predator (*Sphinctomyrmex* sp.).

sign of flooding or other physical disturbance. He concluded that some sort of underground predator was flushing the seed-harvesters — with brood in tow — onto the surface.

One very hot day, a month or so later, he was watching a colony of the scavenging ant *Melophorus* sp. These ants are normally only active at high temperatures; they emerge onto the soil surface when the temperature reaches about 40°C, when the other ants take a siesta. Dr Briese saw *Melophorus* workers enter an abandoned seed-harvester nest, from which they carried out dead bodies not only of *Chelaner* sp. but of another species. Some of the bodies of the dead combatants were still locked together.

The other species turned out to be the predatory ant *Sphinctomyrmex* sp. Dr Briese deduced that the predators had invaded the seed-harvester colony and had been attacked by the resident worker ants. Further proof of this appeared within 24 hours. While workers of one *Chelaner* sp. colony were evacuating their nest, large numbers of *Sphinctomyrmex* workers emerged briefly from the nest entrance behind them, holding aloft the prizes of battle — soft-bodied larvae and pupae, a delicacy for the predators.

Dr Briese noticed that, at this point, some of the *Chelaner* workers valiantly attacked the warring horde of *Sphinctomyrmex*.

Apparently, the underground predator was invading colonies of prey ants through the many fissures and cracks in the heavy clay soil of the area. The seed-harvesters evacuated larvae and pupae to temporary shelters, and waited until the attackers withdrew before returning to the nest.

During his 2 years of study at this site, Dr Briese had never previously managed to collect *Sphinctomyrmex* workers, and only ever saw them appear momentarily on the surface. However, his observations were of considerable interest in entomological circles — very few reports exist of the nest-defence responses of seed-harvesters to predators in Australia.

He noted that this response resembled the species' behaviour during colony fission, the process by which they found new nests. Here too workers set off with a nursery and queen in train. The only difference is that, in the case of colony fission, the ants don't return to the original nest site.

Another interesting aspect of ant behaviour is their opportunism. During his

studies, Dr Briese observed one colony of *Chelaner* sp. manage to make the most of an attack on a neighbouring colony. While the seed-harvesters from one nest had evacuated to temporary shelter after an attack by *Sphinctomyrmex* sp., those from another nest raided the unguarded seed stores.

As Dr Briese points out, ant scouts of many species are regularly patrolling the ground surface on the lookout for such windfalls. With their effective pheromones, they don't take long to conscript an army of workers to raid an available food supply.

A year after the nest-defence episodes that Dr Briese observed, the seed-harvester colonies were still active, suggesting that *Chelaner* colonies can survive predator raids through their 'retreat and retrieve' behaviour. Only in the case of the nest raided by fellow seed-harvesting ants did the colony abandon the nest and construct new ones.

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Physical structure of an ant community in semi-arid Australia. D.T. Briese and B.J. Macauley. *Australian Journal of Ecology*, 1977, 2, 107-20.

Interactions between a myrmecophilous ant and a prey species. D.T. Briese. *Journal of the Australian Entomological Society*, 1984, 23, 167-8.