

Ants show us how to make super-highways

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Army ants form living pothole plugs to speed up delivery

Certain army ants in the rainforests of Central and South America conduct spectacular predatory raids containing up to 200,000 foraging ants. Remarkably, some ants use their bodies to plug potholes in the trail leading back to the nest, making a flatter surface so that prey can be delivered to the developing young at maximum speed.

The raid always remains connected to the nest by a trail of forager traffic, along which prey-laden foragers run back to run back to the nest. This trail can be extremely uneven and full of 'pot holes' as it passes over leaves and branches on the forest floor.

The study, by Dr Scott Powell and Professor Nigel Franks at the University of Bristol, and reported in the June issue of *Animal Behaviour*, shows that these living 'plugs' improve the quality of the surface. This increases the overall speed of the traffic and results in an increase in the amount of prey delivered to the nest each day.

Professor Franks said: "I think every road user who has ever inwardly cursed as their vehicle bounced across a pothole – jarring every bone in their body – will identify with this story. When it comes to rapid road repairs, the ants have their own do-it-yourself highways agency."

"When the traffic has passed, the down-trodden ants climb out of the potholes and follow their nest mates home," added Powell. "Broadly, our research demonstrates that a simple but highly specialised behaviour performed by a minority of ant workers can improve the performance of

the majority, resulting in a clear benefit for the society as a whole."

Their experiments showed that individuals size-match to the hole they plug and cooperate to plug larger holes. "We did this by getting the ants to literally 'walk the plank', said Powell. "We inserted planks drilled with different sizes of hole into the army ants' trails to see how well different sizes of ant matched different sizes of pot hole. Indeed, they fit beautifully", explained Franks.

Overall, this behaviour results in an increase in the average speed of prey-laden traffic. Moreover, calculations suggest that under a range of realistic scenarios, plugging behaviour results in a clear increase in daily prey intake. In other words, the behaviour of the pothole pluggers more than compensates for them not carrying prey themselves.

This study provides rare quantitative evidence from animal societies that extreme specialisation by a minority can significantly improve the performance of a majority to benefit the group as a whole. It also suggests that these benefits are a consequence of the unusual and derived foraging strategy of the army ant (*Eciton burchellii*). This highlights the importance of considering ecology and evolutionary history in the study of social organisation in animal societies.

Source: University of Bristol

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