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In Focus

Featured Articles in This Month's *Animal Behaviour*

Jump-starting Drones

Male social insects, including honeybee drones, have a bad image. Regarded as slothful and only good for mating, drones are generally viewed as drains on colony resources, eating but otherwise remaining invisible within their colonies' social structure. This unfortunate image problem has resulted in a paucity of information on the social interactions of males within social insect colonies.

This view of males as unproductive members of society isn't entirely true, of course, as males contribute half of the genes to the next generation, and selection should favour colonies that foster the growth and development of males. Because males compete for mating opportunities, colonies that produce stronger males are at an evolutionary advantage. Males need to be fed to ensure their growth and development but are they brought into the communication network of the colony in other ways?

In this issue, Boucher and Schneider (pp. 27–34) pose the question of whether drone honeybees are plugged into communication with the workers. They focus on two behaviours, piping and vibration signals, which are well known from studies of honeybee workers and queens. These are signals involving movement pulses transmitted through the comb or that combine physical contact and oscillations. Vibration and contact are particularly effective conduits for communication in the dark confines of the honeybee nest.

Honeybees produce two types of piping signals, which to a human sound like short blasts from a horn or whistle. Long high-pitched queen vibrations function in competition among virgin queens or between virgin and mated queens. Short pipes, or 'stop signals', from workers within colonies to dancing bees signal dancers to stop dancing, perhaps because the colony is receiving more nectar than it can handle. Boucher and Schneider found virtually no evidence of piping between workers and drones.

Vibration signals proved more interesting. When workers grasp queens they produce a short burst of vibrations. Vibration signals function in preparing swarms for take-off. Boucher and Schneider discovered that workers also direct vibration signals to drones (Fig. 1).

Sexually immature drones were more likely to be targeted by vibration signals than sexually mature drones. Drones became more active in response to vibration signals, and were more likely to engage in trophallaxis (social feeding) and grooming than drones that did not receive the signals. Vibration signals, however, were not related to drone flight activity.

These results suggest that honeybee drones are more connected to social communication within the colony than previously suspected. Boucher and Schneider hypothesize that vibration signals from workers to drones ultimately improve the reproductive chances of the colony. This happens because the signals stimulate feeding and sexual maturation of the drones.

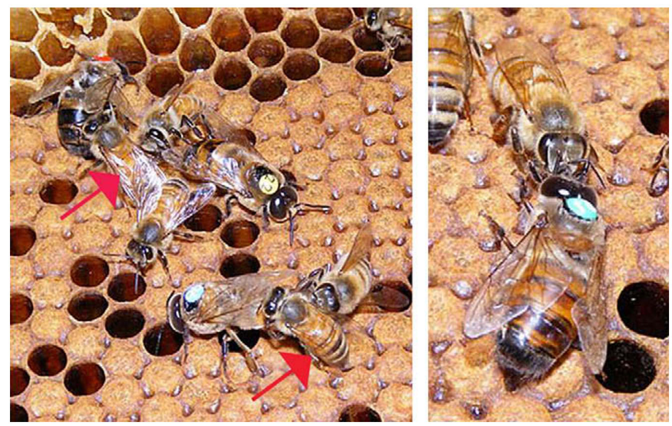

Figure 1. Interactions between worker and drone honeybees. Left: worker bees vibrating drones (red arrows indicate vibrating workers). Right: worker feeding drone by trophallaxis. Photos: David Gray and Stan Schneider.

Boucher and Schneider's findings suggest that a broader search in social insects for worker—male communication might prove fruitful. The workers' reproductive stake in the males makes it advantageous for them to provide information, and possibly social stimulation, that promotes male growth and development. These results do not dispel the image of social insect males having a minimal role in the day-to-day work within a colony, but they do remind us that males are important enough, ultimately, to be included in the social network of the colony.

Michael Breed
Executive Editor

Meerkat Manners or How Scrounging Can Lead to Success

When U.K. cookery expert Delia Smith demonstrated the culinary possibilities of cranberries to the nation, the nation didn't hesitate; within days, the shops were bare and not a cranberry was to be had in the whole of the British Isles. Alex Thornton and Aurore Malapert wondered whether similar demonstrations of food-related know-how could be found in other animals too. In this month's issue (pp. 35–44), they report the findings of their experiments on wild meerkats, based around the meerkats' ability to deal with 'The Box' (Fig. 2).

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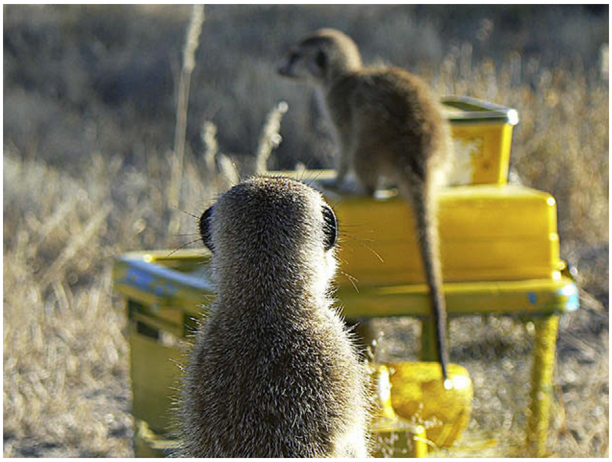

Figure 2. Meerkat observing another on the Box apparatus. Photo: Dave Bell.

The Box was designed to provide the meerkats with two ways of obtaining food. It consisted of a tower of plastic boxes decreasing in size. The meerkats could climb up the set of 'stairs' created by mounting the boxes in this way, and retrieve food from a small box at the very top by ripping open a paper covering. Alternatively, the meerkats could enter the box at the bottom, via a cat-flap, and retrieve food from a container inside (which they could see as the sides of the box were made of chicken wire). In each of their study groups, Thornton and Malapert trained a single 'demonstrator' meerkat to use either the stairs method or the flap method to reach food. They ensured that no other meerkats were around to observe the training by targeting 'babysitters': meerkats left at the burrow to guard the pups while the adults were away foraging.

Once training was complete, Thornton and Malapert then presented the Box to each of their study groups as they groomed and sunned themselves around the burrow in the early morning. In this way, they could test whether animals would adopt the same technique as the demonstrator. Previous studies of natural behaviour have suggested that animals can learn different kinds of foraging tricks from each other in this kind of 'cultural' fashion, and laboratory experiments have identified the mechanisms underpinning this behaviour, but the meerkat Box provides the first experimental test for such an effect in completely wild animals. In addition to the experimental groups, Thornton and Malapert also presented the Box to a series of control groups in which no demonstrators had been trained to see whether the animals could discover the different feeding techniques for themselves.

Meerkats were more likely to approach the Box and get food if there was a demonstrator in their group and they also tended to adopt the same technique as their demonstrator. Knowledge of the techniques did not spread evenly throughout the groups, however; young meerkats paid more attention to demonstrators than adults, and were more likely to learn. In particular, youngsters would often follow the demonstrator as they went about getting food from the Box, in effect 'scrounging' from the demonstrator. This rewarding experience apparently increased their tendency to perform the same technique again by themselves.

Some meerkats also learned a different technique to the one they had seen demonstrated, and this technique also spread throughout the group. These findings are particularly intriguing because they suggest that the spread of socially acquired information need not result in everyone learning exactly the same things to create a uniform tradition within a group, as has sometimes been supposed.

Thornton and Malapert's study demonstrates beautifully how field experimentation can complement observational and laboratory studies of social learning, and give us an insight into certain processes that, as yet, have not been captured by either of these more traditional approaches.

Louise Barrett
Executive Editor