

How cheating ants give themselves away

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In ant society, workers normally give up reproducing themselves to care for their queen's offspring, who are their brothers and sisters. When workers try to cheat and have their own kids in the queen's presence, their peers swiftly attack and physically restrain them from reproducing.

Now, a new study published online on January 8th in *Current Biology*, a Cell Press publication, explains just how the cheaters get caught red-handed. Experimental evidence shows that chemical hydrocarbons produced by those sneaky sorts are a dead giveaway of their fertility status.

The findings represent the first direct evidence that cuticular hydrocarbons are the informational basis for the ants' reproductive policing, said Jürgen Liebig of Arizona State University.

Earlier studies had suggested that other aspects of reproduction in insect societies are regulated through cuticular hydrocarbon signals. Liebig's team and others showed that the chemical profiles are correlated with fertility in queens and workers in many species of ants, some wasps, and bees. They also found that workers use hydrocarbons to discriminate between eggs laid by workers and queens. The chemicals are used in other contexts as well, including nestmate recognition and sexual attraction.

Given all the evidence that hydrocarbon profiles play important roles in communication, Liebig and colleagues had a strong suspicion that they would also help catch reproductive cheaters.

To test the idea in one ant species (*Aphaenogaster cockerelli*), Liebig and Adrian Smith, also at Arizona State, mimicked reproductive cheaters by applying a synthetic compound typical of fertile individuals on non-reproductive workers. That treatment attracted nestmate aggression in colonies where a queen was present, they report. As expected, it failed to do so in colonies without a queen where workers had begun to reproduce.

Liebig thinks the cuticular hydrocarbons are an "inherently reliable signal" because the ants can't separate their own hydrocarbons from those of their eggs. Masking their own fertility would mean displaying the chemicals of a worker, but their eggs are best hidden if they seem like those of the queen. But they can't have it both ways, he says.

This system for catching cheaters plays an important role in maintaining harmony in the ant world, Liebig said, and it sets an example that we might learn from ourselves.

"The idea that social harmony is dependent on strict systems to prevent and punish cheating individuals seems to apply to most successful societies," he said.

Source: Cell Press

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