



Give and take.

Parasites keep these pollinator wasps from killing too many fig seeds.

Credit: James Cook

How to Keep a Wasp From Cheating

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It would be easy for fig wasps to cheat. These tiny insects pollinate figs in exchange for a share of the tree's seeds--and theoretically, the wasps could lay claim to more seeds than they deserve. But they don't, and now biologists know why. Parasitic wasps, usually thought of as the bad guys, keep the pollinators honest.

Figs and their wasps depend upon each other to reproduce. The fig "fruit" actually holds hundreds of tiny flowers and seeds, and it sports a small hole through which fig wasps enter. When inside, the wasps lay their eggs in the fig's ovules, the flower part where seeds normally develop. Thus, each maturing larva costs the fig a seed. When adult wasps finally emerge from the fig, they pick up pollen and take it to another tree. This mutually beneficial arrangement has been around for more than 60 million years, and the wasps never seem to break the contract by using too many ovules.

A team of researchers led by evolutionary ecologist James Cook of the University of Reading, U.K., thought a group of parasitic wasps might explain why. These species also depend on the fig fruit to nurture their larvae, but they show up after the fig wasps have already laid their eggs. Rather than enter the inside of the fig, the parasitic wasps drill in from the outside and lay their eggs only in ovules that already house pollinator larvae, killing the original occupants. But the parasites can't reach all the way into the fig, so if the fig wasps aren't greedy and only use the seeds closest to the center of the fruit, their larvae are safe from the parasites.

To test the idea, Cook and his team plucked 64 grape-sized figs from the tree *Ficus rubiginosa* at six locations in Queensland, Australia. Back in the lab, the researchers sliced open the figs and put them under a microscope. As predicted, developing fig wasps were present mostly in the inner ovules of the fig. Even though the fig wasps could lay eggs in the outer ovules, larvae growing there had an 80% chance of being killed by the parasitic wasps, the team reports today in *PLoS Biology*.

The parasitic wasps have generally been regarded as bad for both figs and fig wasps: They don't pollinate the trees, and they kill the wasps that do. But think of them, perhaps, as insect lawyers. "They actually play a beneficial role to the mutualism, brokering the conflict of interest between the two mutualistic species," says Derek Dunn, an evolutionary ecologist at the University of Reading and first author of the study.

Evolutionary biologist Olle Pellmyr of the University of Idaho in Moscow congratulates the authors for completing a "devilish amount of work." And it's paid off, he says: "This is the first rigorous study to show there's some meat to the idea" that parasitic wasps are key to the long-term survival of the fig system. In fact, Pellmyr says, the parasites may be important for hundreds of fig species worldwide.