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## No Reproductive Rights in Insect "Police States", Study Finds

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for [National Geographic News](#)  
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Coercion—not altruism—is what keeps worker insects from reproducing, a new study suggests.

The finding paints a more complex and somewhat darker picture of insect behavior than scientists had previously suspected.



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Worker bees, ants, wasps, and termites share food with their nest-mates and collectively raise their colonies' young. Rank-and-file workers, who are the queen's daughters, usually don't lay eggs, even though they have ovaries.

Scientists have sought for decades to account for the workers' self-denying behavior. They originally suspected that workers freely choose to help their mother with her other offspring, because compared to reproducing on their own, it's a more efficient way of propagating their genes.

But the new study suggests that a typical insect society is not an obliging commune, as that theory might imply. On the contrary, says Tom Wenseleers of the Catholic University of Leuven in Belgium, it resembles a miniature dictatorship. Outside the royal chamber, reproduction is *verboden*. Unauthorized eggs get terminated.

"It's kind of a police state, really," he said.

### Sisters and Daughters

In 1989 Francis Ratnieks of the University of Sheffield in England discovered that [honeybee](#) workers eat each others' eggs. Since then, scientists have observed such egg-killing behavior, called policing, in numerous other insect societies. Ratnieks and Wenseleers, his former postdoctoral student, recently examined policing patterns in ten insect species.

In some, such as the Asian paper wasp, the queen personally kills and consumes eggs that her daughters lay. In other species, including honeybees, loyal workers assist the queen by eating their insubordinate sisters' spawn. (See related [photo: "Oldest-Ever Bee Found in Amber"](#) [October 25, 2006].)

As many as one-third of Asian paper wasps—but fewer than one honeybee in a thousand—lay eggs, the researchers report in the November 2 issue of the journal *Nature*. While most worker-laid eggs survive in Asian paper wasp colonies, nearly all get killed in honeybee hives, the researchers found.

"Egg-killing helps to retain the reproductive monopoly of the queen," Wenseleers said. "If there is a very high probability of [workers' eggs] being killed," he said, "then there's not much point in them laying the eggs in the first place."

In effect, insect colonies enforce a sort of zero-offspring diktat that makes China's one-child policy look lenient.

That manipulation explains why most honeybee workers essentially abandon any design on bearing offspring, Wenseleers says. "Their seeming altruism is not really voluntary."

### Family Ties

If voluntary altruism drove workers to favor their kin's welfare over their own propagation, then closely related workers would be more cooperative than ones who weren't related.

"We actually find the reverse," Wenseleers said. "The less closely related, the more cooperative they are."

Asian paper wasp workers, for instance, share 75 percent of their genes with each of their nest-mates, but they lay more eggs. The more altruistic honeybees are only about 30 percent related to one another. This suggests that "altruism is not based on family ties," Wenseleers said. "It's based on social coercion."

"Some individuals are manipulating the options that other individuals have," commented David Queller, an evolutionary biologist at Rice University in Houston. For workers deprived of the chance to reproduce, helping their mother and sisters is their best shot at perpetuating their genes, he says.

This lesson might have implications for human societies, Wenseleers adds. "Cooperation is possible even among genetically unrelated strangers," he said.

On the other hand, the lesson shouldn't be taken too literally, he says. "A society where everyone is very cooperative out of fear for being punished is not the sort of society you would want to live in."

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