Male Insects Rule in a Tropical Society

Who says that males can't amount to much, that they're Nature's weaklings, destined to be bullied and bitten, fed only scraps, and quickly chased out of their mother's home by their sisters?

Now, Sean O'Donnell of the University of Washington in Seattle provides what he says is the first report of a social insect species in which guys rule.

The two forms of this Costa Rican male wasp bully their mom and sisters.

Males of the Costa Rican wasp *Mischocyttarus mastigophorus* pounce on the queen in their nest and attack female workers, who curl into a submissive crouch or flee, reports O'Donnell. He describes this behavior in an upcoming ETHOLOGY.

"Male social insects have gotten short shrift" by researchers, laments O'Donnell. "The prevailing idea has been that they're not very interesting."

Among most of the wasp species studied so far, the males' lives are nasty, beleaguered, and short. Philip T. Starks of Cornell University has even described "male stuffing" among paper wasps in the United States. When a worker brings food to the nest, other females jam their brothers headfirst into empty nest cells. "This behavior precludes the rather lazy males from consuming food" needed by the larvae, Starks says.

There's none of this indignity among *M. mastigophorus*. O'Donnell and his colleagues perched on scaffolding or ladders for hours to watch 6 nests and counted males at 32 others.

"It was strikingly obvious that males were dominating," O'Donnell says. They grabbed more food from returning foragers than workers did. Males even snatched food from their mom, the queen.

The females didn't give up the food because the males are such handy guys to have around, O'Donnell notes. He acknowledges that males of this species "actually did a little bit of work." They helped fan an overheated nest, bailed out a flood, and sometimes chewed food for the larvae. However, he says, "your anthropomorphic reaction is that they're not really very good at it."

O'Donnell proposes that male power relates to climate. Wasp colonies in temperate zones synchronize reproduction with the seasons and can wait until the end of the summer to raise males. Starting earlier just drains resources.

O'Donnell's wasps, however, live in a cloud forest where colonies do not synchronize mating times. The males, he finds, remain in their home colony for an unusually long period. They can father a new colony—and thus prove useful—just about any time. As people check for male dominance in other tropical species, "I believe we'll find more," O'Donnell predicts.

Starks raises the possibility that it's not just males who take advantage of workers, but all future players in reproduction, including females who will grow into queens. O'Donnell did see sisters tussle but couldn't tell the princesses from the proletariat. "Without that information, it cannot be conclusively shown that males, as opposed to all reproductives, are treated especially well," Starks says.

Male dominance in the tropics sounds like a reasonable idea to Robert Jeanne of the University of Wisconsin-Madison. He has seen rough males in another tropical wasp species. Mary Jane West-Eberhard of the Smithsonian Tropical Research Institute, who is currently working in San José, Costa Rica, also has described a tropical male paper wasp that holds its own with its sisters.

O'Donnell's report "is the first in the sense he's recognized it as dominance," Jeanne says. "The rest of us said, 'Wow, the males are aggressive.'" —*S. Milius*

Enzyme erases DNA's molecular coating

For reasons that still perplex scientists, clusters of atoms called methyl groups blanket much of the DNA in humans and other vertebrates. Several years ago, investigators uncovered enzymes that could attach these methyl groups to DNA, a process known as methylation. Now, a Canadian research group reports identifying a demethylase, an enzyme able to strip those methyl groups from DNA.

The discovery has attracted considerable attention because shifting patterns in methylation seem to regulate the activity of genes, particularly during the growth of embryos. Furthermore, the genomes of cancer cells exhibit abnormal methylation, an anomaly that may fuel the runaway growth of the cells.

Moshe Szyf of McGill University in Montreal and his colleagues reasoned that any demethylating enzyme would contain an amino acid sequence capable of binding methylated DNA. By scanning a database for gene fragments encoding such a sequence, the researchers identified several candidate human demethylase genes.

As hoped, the protein encoded by one of those genes proved able in test-tube experiments to detach methyl groups from DNA. Moreover, when the gene was slipped into cells, demethylation occurred in several stretches of DNA, the team reports in the Feb. 18 NATURE.

"We have shown by a number of different assays that [the DNA] gets demethylated," says Szyf. Additional experiments by his group suggest that the enzyme produces a reaction between methylated DNA and water that results in unmethylated DNA and methanol.

Several other research groups have reported discovering enzymes with demethylation activity, but the claims haven't proved compelling to many scientists. The latest announcement has also drawn some skepticism.

"They have to have genetic evidence that this [enzyme] is involved in reshaping methylating patterns," says Timothy H. Bestor of Columbia-Presbyterian Medical Center in New York. To do that, he says, Szyf's team should create mice that have a mutation in the gene for the putative demethylase and observe whether that mutation alters methylation in the animal.

"Is it involved in generating methylation patterns in real life? We don't know yet, but God doesn't put these things here for fun," counters Szyf, who has started to generate mice lacking the enzyme.

The researchers have some evidence suggesting that the protein plays a role in cancer. Its gene is active in tumor cells. When the scientists used so-called antisense technology (SN: 8/6/94, p. 88) to thwart the gene's activity, they produced a dramatic result. "If you knock [the gene] out, cancer cells don't grow anymore," says Szyf. —*J. Travis*