# Sex and lifespan linked in worms: A family of sugar-like molecules controls both

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A group of scientists who set out to study sex pheromones in a tiny worm found that the same family of pheromones also controls a stage in the worms' life cycle, the long-lived dauer larva.

The findings, published in *Nature* online on July 23, represent the first time that reproduction and lifespan have been linked through so-called small molecules.

Where scientists once focused on DNA and proteins as the major players in an organism's biology, they are now realizing that smaller, but more structurally diverse chemicals - simply called "small molecules" - are a significant part of a living thing's biology. "They're as important to biology as the genes are," says Frank Schroeder, last author of the paper and a scientist at the Boyce Thompson Institute.

The researchers set out to identify the sex pheromone that attracts male *C. elegans* worms to the more common hermaphrodites (this worm species has no females). *C. elegans*, a tiny nematode, is a model organism often used to study development and reproduction.

To identify the sex pheromone, the researchers tested mixtures of chemicals produced by the worms, narrowing down the possibilities until only a few remained. They discovered that a handful of sugar-like chemicals called ascarosides worked together to attract males.

"One interesting aspect is that a whole family of compounds is necessary to elicit a biological response. One by itself doesn't do much, but two or three together give a strong response," says Schroeder.

Surprisingly, the same group of compounds can also trigger young worms to enter the long-lived dauer stage.

When food is scarce or colonies become crowded, young worms stop developing normally and enter the dauer stage. In this form they can live, without eating or reproducing, for months - about ten times longer than the worm's normal lifespan. When the dauer finds greener pastures, it finally develops into an adult and resumes its normal aging process.

"We usually think of aging as a process of decay," says Schroeder, "but evidence is accumulating that aging is a stage of development like anything else." The researchers speculate that the dauer pheromone may also increase the lifespan of adult worms.

"The next question is how these compounds influence mating behavior and developmental timing on the molecular level," says Schroeder, and whether a similar effect is possible in other animals. "We're looking at genetic pathways that could potentially play a role in delayed aging."

Why would the same chemicals control both sexual attraction and lifespan? The way these chemicals work isn't fully understood yet, but scientists have long known that reproduction and lifespan are related - if an organism can be made to live longer, it usually reproduces less. "How these compounds fit into this picture remains to be clarified, but they provide one of the first direct links between these two life functions," says Schroeder.

Source: Boyce Thompson Institute for Plant Research

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