Hermaphrodite roundworm offspring yield evolutionary clues, researchers say

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(PhysOrg.com) -- A roundworm with a mix of male, female and hermaphrodite offspring is offering researchers at UT Arlington a look at a species in transition from one mode of reproduction to another.

In a paper to be published online Sept. 8 in *Current Biology*, Andre Pires da Silva, a UT Arlington assistant professor of biology, and his research team examined influences on the reproductive activity of the Rhabditis, a nematode worm about 1 mm long. They found that the worm's reproductive characteristics changed depending on environmental factors such as the availability of cholesterol.

The results add to the understanding of evolutional biology. They could also shed light on the complex mating systems of parasitic roundworms, some of which infect humans, livestock and plants. More knowledge about roundworm reproduction could lead to better methods of preventing and fighting infection.

The paper, "Regulation of Sexual Plasticity in a Nematode that Produces Males, Females and Hermaphrodites," is scheduled to be published Sept. 8. Graduate students Jyotiska Chaudhuri and Vikas Kache are coauthors.

"Our question is very basic: We know most roundworm species are male and female, but some are only hermaphrodite. We want to know how that change occurs," Pires da Silva said. "Here we have a group of worms that seem to be at the transition state between the two modes. They're almost like a living fossil."

Rhabditis feed on bacteria rich environments such as compost heaps.

When reproducing in optimal conditions, 45 percent of Rhabditis offspring are female, 10 percent are male and 45 percent are self-fertilizing hermaphrodites. When conditions aren't as good, all of the offspring become hermaphrodites by going through a process called a dauer stage, Pires da Silva said.

Pires da Silva's research team was able to manipulate the sex distribution of worm larvae by adding cholesterol or removing cholesterol from the environment. Cholesterol is an important precursor for dafachronic acid hormones, which are vital to worm development.

During the experiments, larvae that began as females would enter a form in which their development slows and they can withstand long periods of stressful conditions – called a dauer stage – if they were deprived of cholesterol. When they emerged from the dauer stage, they had transformed to hermaphrodites instead of females.

The study says dauer formation likely helps the larvae to travel on a host to a more friendly location. Developing as a hermaphrodite, rather than a female, means the worm "can colonize and reproduce in new habitats in the absence of a mating partner," it says.

Jon Campbell, chair of the biology department in UT Arlington's College of Science, said Pires da Silva's work "is a good example of using careful genetic sleuthing to uncover the unsuspected."

"Learning about this species can tell us more about the changes similar organisms may have undergone throughout their histories," he said.

The Current Biology publication is the second important recognition for Pires da Silva's laboratory this year. In January, he was the coauthor of a

paper published in the online journal *Nature Communications*. That paper also dealt with reproduction modes of the Rhabditis.

Provided by University of Texas at Arlington

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