44th ANNUAL ROCKEFELLER UNIVERSITY
HOLIDAY LECTURES ON SCIENCE
ESTABLISHED BY ALFRED E. MIRSKY

Glia

"The nervous system of *C. elegans* consists of only 302 neurons and 56 glial cells. In some cases, *C. elegans* may be the best chance we have at understanding how a given gene works in the brain."

Shai Shaham
Strang Assistant Professor and this year's lecturer

More than just brain glue.

MONDAY, DECEMBER 22, 2003
10:30 A.M. – 2:30 P.M.

LUNCH SERVED FROM
12:00 P.M. – 1:00 P.M.

LECTURE WILL BE HELD
IN **CASPARY AUDITORIUM**

THE ROCKEFELLER UNIVERSITY
1230 YORK AVENUE (AT EAST 66TH ST.)
NEW YORK, NY 10021

Glial cells have nothing on perennial stand-up comic Rodney Dangerfield, famous for his grammatically challenged signature tagline, "I don't get no respect." Despite comprising 90 percent of the human brain, glial cells, whose name is derived from the Greek word for glue, were considered just that: supporting structures for the "important" components of the brain, cells called neurons. But glial cells just may help scientists understand one of neurobiology's biggest questions: how does the brain work?

Rockefeller University's Shai Shaham tries to answer this question by studying the roundworm, *C. elegans*. Shaham, who heads the only laboratory in the world that studies glial cells in the roundworm's nervous system, will take students on a tour of the nematode's 56 glial cells and 302 neurons to explain how scientists can explore the workings of more complex brains by studying a simple model organism.

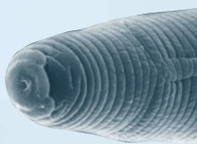
The remarkable *C. elegans* offers other practical advantages for scientists. For example, it has many cell types that also are present in vertebrates, but its DNA code, or genome, is not as large as that of vertebrates. Its physical transparency allows researchers to watch its cells divide, and it has a short generation time.

In addition, the roundworm is "freezable" for dozens of years; when thawed, it lives. The worm also reproduces sexually with both a male and a hermaphrodite sex, the latter of which can self-propagate. In fact, nearly every *C. elegans* researcher in the world uses worms that are descended from a single *C. elegans* from Bristol, England.

In the brain, glia are a major organizing force. These cells undergo elaborate structural changes to create boundaries and compartments that organize the brain. At a large scale, they determine the paths along which neurons will migrate, and at a small scale they isolate regions of individual neurons and create local environments.

Scientists are beginning to understand the crucial role glia play in spinal cord regeneration and such neurodegenerative diseases as Alzheimer's. Recently scientists have shown that glia respond to neuronal activity and send signals to neurons that induce long-term changes in synapse strength. Thus, through their interactions with neurons, glia also may play a role in learning and memory.

Glial Cell



C. elegans tail

The nematode *Caenorhabditis elegans*.

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