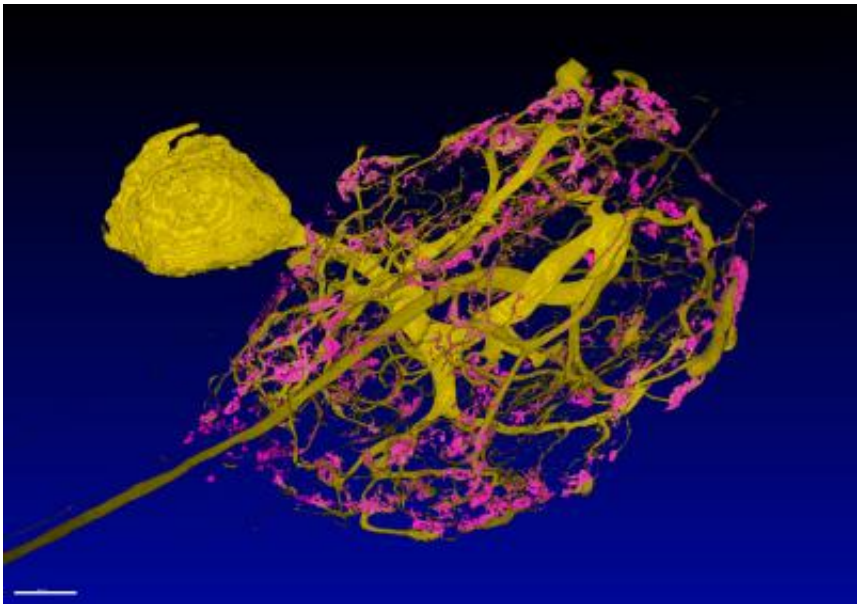
Brandeis scientist wins 2013 Gruber Foundation Neuroscience Prize

June 10 2013



Motor neurons found in the crab *Cancer borealis*, underlie the walking, swimming, breathing, flying and other rhythmic behaviors found in most creatures, including humans. Credit: Marie Goeritz

The Gruber Foundation today awarded its 2013 neuroscience prize to Brandeis professor Eve Marder, a pioneering researcher who has dedicated her career to understanding the nervous system's basic functions. Marder studies a relatively simple network of some 30 large neurons found in the gut of lobsters and crabs—a small yet elegant window into humans' unfathomably rich nervous system, home to billions of neurons and trillions of interconnections.

The $500,000 prize recognizes and rewards "the best [neuroscience] work being done anywhere in the world," according to the Gruber Foundation website.

Marder's singular contributions to neuroscience through her use of crustaceans—in a field heavily dominated by scientists using vertebrate model organisms, chiefly rodents—have helped define how we think about neurons and their astounding capabilities.

Despite not practicing "consensus" science—Marder avoids the well-trodden path of established modes of inquiry, such as working in vertebrates—she has received numerous accolades, including election to the National Academy of Sciences and to the helm of the Society for Neuroscience, both in 2007.

"I'm a maverick within a conservative framework—I obey carefully the rules of scientific rigor and discipline," says Marder, who began her freshman year at Brandeis thinking she would major in politics. By her senior year, enthralled with the emerging field of neuroscience, she applied to graduate school while some of her friends made their plans to join the counterculture.

As a graduate student at the University of California, San Diego, in the early 1970s, Marder began studying the stomatogastric nervous system of the West Coast spiny lobster, Panulirus interruptus. The stomatogastric nervous system, which controls the motion of the gut, is an example of a central pattern generator. These circuits generate organized and repetitive motor patterns that also underlie walking, swimming, flying, breathing and many other rhythmic behaviors that creatures from earthworms to humans take for granted.

The big questions Marder has asked throughout her career attempt to understand the fundamental nature of neuronal circuit operation. In a

Brandeis lab staffed by post-docs, graduate students and undergraduates, she's helped advance basic tenets of neuroscience while continuing to refine several related lines of inquiry.

Early in Marder's Brandeis career, her lab demonstrated that neuromodulatory substances such as dopamine, serotonin and neuropeptides can alter circuit performance so that the same group of neurons can produce a variety of behaviors. Her research has helped reshape the way scientists think about conditions like depression, now believed to stem from imbalances in neuromodulation.

Later, her lab studied how neurons and networks maintain stable network performance despite the ongoing turnover of the membrane proteins that give neurons their characteristic electrical properties. Most recently, her lab is studying animal-to-animal variability in neuronal properties. How much variability in circuit function is there between animals even as they respond similarly to changes in hormones or temperature?

"I'm always looking for the things we can study more effectively than someone working in a large nervous system," explains Marder. "I don't want to work on problems that someone else can do better."

Awarded by a distinguished panel of experts following an international nomination process, the Gruber Foundation neuroscience prize is a humbling honor, says Marder. It is also recognition that great science requires both intellectual risk-taking and persistence.

Marder plans to celebrate, just not over a fancy lobster dinner. She gave up eating crustaceans long ago.

Provided by Brandeis University