Argonne NATIONAL LABORATORY

Avis Cohen

"Spinal Injury: Regeneration, Recovery and a Possible New Approach"

Spinal injury is most frequent in young healthy men, desperate to walk. Most treatments have focused on regeneration of the injured axons, but no one has as yet achieved success with this approach. However, in the lamprey, a primitive fish with a spinal cord having all the critical features of the human spinal cord, spinal injury is followed by complete regeneration of injured axons. Additionally, the animal recovers the ability to swim, and in many, the swimming is normal. Unfortunately, in most others, it is highly abnormal. This talk will review evidence from the abnormal regeneration, why it bespeaks difficulties heretofore not considered, and suggest an alternate approach for the near future. In so doing, the speaker will introduce the normal function of the spinal cord, what happens in normal and abnormal regeneration, and the new techniques that employ methods from "neuromorphic engineering," a synthesis of neuroscience and engineering to engineer smart devices.

Avis Cohen received her Ph.D. from Cornell University in 1977. She held post-doctoral positions at the Carolinska Institute in Sweden and Washington University in St. Louis before returning to Cornell University, where she had her own laboratory studying the organization of the lamprey spinal cord. At Cornell she began a collaboration with mathematicians (that continues today) to develop groundbreaking theoretical treatments of systems of coup-led non-linear oscillators. She also began exploring the process of spinal cord regeneration in lampreys. Cohen joined the University of Maryland Department of Biology (then Zoology) in 1990, where she established and directed the Program in Neuroscience and Cognitive Science, one of the few interdisciplinary graduate programs to combine training in cognitive and computational methods with traditional neuroscience. Cohen also worked with, and was a Director of, the Telluride Workshop in Neuromorphic Engineering. Cohen is working on a robot controller for legged robots that, it is hoped, will lead to a spinal cord prosthetic device for spinal cord-injury patients. This work continues her experimental studies of spinal control locomotion in lampreys with and without spinal cord injuries.

Illustration: http://www.pain-clinic.org

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3:00 p.m.

APS Colloquium

Bldg. 402 • APS Auditorium
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