THE KAVLI PRIZE

THE KAVLI PRIZE IN NEUROSCIENCE 2008

The Norwegian Academy of Science and Letters has decided to award the Kavli Prize in Neuroscience for 2008 to

STEN GRILLNER
Professor, Department of Neuroscience, Karolinska Institute, Sweden

THOMAS JESSELL
Professor, Department of Biochemistry and Molecular Biophysics, Columbia University, USA

PASKO RAKIC
Professor of Neurobiology and Neurology, Yale University School of Medicine, USA

"for discoveries on the developmental and functional logic of neuronal circuits"

A major problem in modern brain science is understanding how the complex neuronal circuits of the adult brain and spinal cord are assembled during development and how they function in the adult organism. The human brain contains as many as 100 billion neurons, most of which make hundreds to thousands of synaptic connections with specific target cells. Even though each human brain is functionally unique, its basic circuitry appears to be constructed according to common principles. Neuroscientists are faced with the challenge of determining the rules that govern the formation of neural circuits and the mechanisms whereby they function. Central to this challenge are three questions:

(1) How do neurons in the embryo organize themselves during development into the highly ordered and complex circuitry of the adult brain?

(2) How do neurons acquire the distinct identities that allow them to connect to appropriate targets and acquire their unique functional properties?

(3) What patterns of signaling do neural circuits use to control specific behaviors?

Pasco Rakic has deciphered how neurons in the embryonic brain arrange themselves during development into the highly ordered, densely interconnected, and immensely complex circuitry of the adult cerebral cortex. His radial unit hypothesis has had a major impact on our understanding of how the three-dimensional organization of the mammalian brain into layers and modules arises from an initially two-dimensional structure.

Thomas Jessell has defined key cellular and molecular mechanisms that control the development and functional organization of the spinal cord. His work has delineated combinatorial arrangements of transcription factors and extracellular signals that generate different classes of motor-, sensory-, and inter-neurons as well as steps that drive their assembly into neural circuits that mediate reflex behavior and motor coordination.

Sten Grillner has elucidated basic principles of neural circuit organization and function that control vertebrate locomotion using lamprey as a model organism. By combining cell physiology with pharmacology, behavioral analysis, and computer modeling, he has deciphered the existence of a central pattern generator for locomotion in the spinal cord, thereby linking circuit function to behavior.

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See also:

The Kavli Prize
www.kavliprize.no

The Kavli Foundation
www.kavlifoundation.org