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Thomas Jessell

Thomas Jessell to Receive the $500,000 Gruber Neuroscience Prize for Groundbreaking Work on the Neural Networks of the Spinal Cord

June 3, 2014, New Haven, CT - Thomas Jessell, PhD, the Claire Tow Professor of Motor Neuron Disorders in the Departments of Neuroscience and of Biochemistry and Molecular Biophysics at Columbia University, is the recipient of the 2014 Neuroscience Prize of The Gruber Foundation. Jessell is being honored with this prestigious international award for his seminal work on the development and wiring of spinal cord neurons involved in the control of movement. He is also co-director of the Mortimer B. Zuckerman Mind Brain Behavior Institute, co-director of the Kavli Institute for Brain Science, and a Howard Hughes Medical Institute investigator, all at Columbia.

The award will be presented to Jessell in Washington, D.C., on Nov. 16 at the 44th annual meeting of the Society for Neuroscience.

"Tom Jessell is one of the world's leaders in the field of developmental neuroscience," says Ben Barres, a member of the Neuroscience Selection Advisory Board. "His research has completely changed our understanding of the mechanisms of neural circuit assembly and function, which, in turn, has helped create a blueprint for the development of potential treatments for a variety of neurodegenerative diseases."

When Jessell began his research more than three decades ago, very little was known about the movement-controlling neural circuitry of the spinal cord, one of the most evolutionarily conserved regions of the central nervous system (CNS). Through a groundbreaking series of studies, Jessell revealed how naïve neural cells develop into hundreds of distinct subtypes of motor neurons to form that remarkable circuitry. He was the first scientist to show, for example, that a specific signaling protein known as Sonic hedgehog (Shh) determines the "fate" (subtype identify and role in movement) of many of these cells.

Jessell has also described the precise way in which the distinct subtypes of spinal neurons are connected with each other and how they control the patterned activity of their muscle targets. In addition, he has led the way in demonstrating that Shh and other signaling pathways can be manipulated to influence the process by which stem cells mature into motor neurons. As a result, scientists now have a deeper

understanding of how stem cells might be used to treat degenerative spinal cord diseases, including amyotrophic lateral sclerosis (ALS).

Because of Jessell's research, the spinal cord is now considered a model system for studying neural development and is widely used by scientists to better understand the neural circuitry of other, more complex areas of the CNS.

His more recent studies have focused on the mechanisms that wire circuits for limb movement, with the premise that genetic manipulation of individual neuronal classes can begin to uncover principles of circuit function as well as organization. Through the application of molecular information about neuronal identity to monitor, manipulate, and model the activity of specific classes of neurons, his work has also provided systems- and circuit-level insights into the neural control of limb movement.

"Jessell's discoveries have had a profound effect on all areas of neuroscience, which is why it's so fitting that he is being acknowledged and honored with this award," says Carol Barnes, chair of the Selection Advisory Board to the Neuroscience Prize.

Additional Information

In addition to the cash award, the recipient will receive a gold laureate pin and a citation that reads:

The Gruber Foundation proudly presents the 2014 Neuroscience Prize to Thomas Jessell for his pioneering work on the differentiation of spinal cord neurons and their wiring into networks.

Jessell identified many of the key cellular and molecular components that control the development and function of the spinal cord. His work has characterized the fundamental mechanisms that govern the specification of neuronal subclasses and the formation of selective connections.

Thomas Jessell's work has forged a direct causal link between gene, neuron, circuit and motor behavior and has established the spinal cord as an exemplary model system for understanding neural development and synaptic connectivity throughout the central nervous system.

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Laureates of the Gruber Neuroscience Prize:

- **2013: Eve Marder,** for her contributions to understanding how circuit dynamics and behavior arise from the properties of component neurons and their synaptic connections
- **2012: Lily and Yuh Nung Jan,** for their fundamental contributions to molecular neurobiology
- **2011: Huda Y. Zoghbi,** for her pioneering work on revealing the genetic underpinnings of neurological disorders
- **2010: Robert H. Wurtz,** for pioneering work concerning the neural bases of visual processing in primates
- **2009: Jeffrey C. Hall, Michael Rosbash,** and **Michael Young,** for revealing the gene-driven mechanism that controls rhythm in the nervous system
- **2008: John O'Keefe,** for discovering place cells, which led to important findings in cognitive neuroscience

- **2007: Shigetada Nakanishi,** for pioneering research into communication between nerve cells in the brain
- **2006: Masao Ito** and **Roger Nicoll,** for work on the molecular and cellular bases of memory and learning
- **2005: Masakazu Konishi** and **Eric Knudsen,** for work on the neural basis of sound localization
- **2004: Seymour Benzer,** for applying the tools of molecular biology and genetics to the fruit fly, Drosophila, and linking individual genes to their behavioral phenotypes

The Prize recipients are chosen by the Neuroscience Selection Advisory Board. Its members are: **Carol A. Barnes,** University of Arizona (Chair); **Ben Barres,** Stanford University; **Martin Chalfie,** Columbia University; **David A. Lewis,** University of Pittsburgh; **Erin Schuman,** Max-Planck Institute for Brain Research; **Leslie Ungerleider,** National Institute for Mental Health; and **Robert Wurtz,** National Institutes of Health.

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By agreement made in the spring of 2011 The Gruber Foundation has now been established at Yale University.

The Gruber International Prize Program honors individuals in the fields of Cosmology, Genetics and Neuroscience, whose groundbreaking work provides new models that inspire and enable fundamental shifts in knowledge and culture. The Selection Advisory Boards choose individuals whose contributions in their respective fields advance our knowledge and potentially have a profound impact on our lives.

The Neuroscience Prize honors scientists for major discoveries that have advanced the understanding of the nervous system.

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For more information on the Gruber Prizes, visit www.gruber.yale.edu, e-mail info@gruber.yale.edu or contact A. Sarah Hreha at +1 (203) 432-6231. By mail: The Gruber Foundation, Yale University, Office of Development, PO Box 2038, New Haven, CT 06521.

Media materials and additional background information on the Gruber Prizes can be found at our online newsroom: http://gruber.yale.edu/news-media