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Joshua Sanes

Neuroscientist Joshua Sanes Receives \$500,000 Gruber Neuroscience Prize for His Pioneering Work on the Formation and Specificity of Neural Synapses

May 17, 2017, New Haven, CT – Joshua R. Sanes, PhD, of Harvard University, is the recipient of the 2017 Gruber Neuroscience Prize for his seminal contributions regarding the mechanisms and molecules that drive the formation and specificity of neural connections within the nervous system. His work has fundamentally transformed the study of these connections, known as synapses, and has led to influential new ideas about how the brain processes information. Sanes has also helped to develop innovative technologies for marking and manipulating neurons and the synapses they form.

The award will be presented to Sanes in Washington, D.C., on Nov. 12 at the 47th annual meeting of the Society for Neuroscience.

“Through his elegant and groundbreaking work, Josh Sanes has altered our understanding of how synapses, the communications junctions between neurons, are formed,” says Dr. Robert Wurtz, NIH Distinguished Investigator and chair of the Selection Advisory Board to the Prize. “The significance of his work has been profound, for synapses play a critical role in every aspect of brain function, including learning, reasoning, and memory.”

Sanes began his career by identifying and describing the cellular and molecular mechanisms that direct the formation of the neuromuscular junction, the synapse at which motor neurons transmit signals to muscle fiber. Among his findings was the remarkable — and unexpected — discovery that the messages transmitted at the junction were contained in the extracellular matrix that surrounds the muscle fiber. He then went on to identify many of the molecular factors within that matrix that direct the formation of the neuromuscular junction. More recently, Sanes has turned to the issue of specificity — how does a neuron decide which of many potential partners it should choose to form information-processing circuits. For this work, he focused on the visual system, specifically the retina. His lab was the first to identify molecules that lead to neural circuit formation, findings that have shifted how scientists think about the creation of such circuits.

“In addition to his profound contributions to our current understanding of the mechanisms mediating neural circuit development, Dr. Sanes has also been a tireless and enthusiastic mentor, teacher and leader in the scientific community,” says Erin Schuman, Max Planck Institute for Brain Research and member of the Selection Advisory Board to the Prize. “We’re pleased to be awarding him the Gruber 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 2017 Neuroscience Prize to Joshua Sanes for his pioneering and inspiring work on synapse formation.

Josh Sanes has used both the neuromuscular junction and more recently the retina to provide fundamental insights into the mechanisms and molecules that drive synapse formation. In now classic experiments, he showed that regenerating muscle fibers can recognize molecules in the extracellular matrix to form synapses at pre-existing sites, even when the muscle is gone. In the retina, his studies have identified the synaptic organization of circuits that form the basis for visual processing.

Sanes’s elegant approaches and results have led to seminal and highly influential new ideas about synapse formation and the specificity of connections.

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Laureates of the Gruber Neuroscience Prize:

- **2016: Mu-Ming Poo** for his pioneering and inspiring work on synaptic plasticity
- **2015: Carla Shatz and Michael Greenberg**, for their elucidation of the molecular mechanisms through which neural activity controls wiring and plasticity of the brain
- **2014: Thomas Jessell**, for his pioneering work on the differentiation of spinal cord neurons and their wiring into networks
- **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:

Susan Amara, NIH/NIMH; **Tobias Bonhoeffer**, Max Planck Institute for Neurobiology; **Martin Chalfie**, Columbia University; **Frances Jensen**, University of Pennsylvania; **Tirin Moore**, Stanford University; **Erin Schuman**, Max-Planck Institute; and **Robert Wurtz**, National Institutes of Health (Chair).

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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: www.gruber.yale.edu/news-media

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