Neuroscientists Friedrich Bonhoeffer, Corey Goodman and Marc Tessier-Lavigne Share $500,000 Gruber Neuroscience Prize for their Pioneering Work on the Molecular Mechanisms that Control Axon Guidance

| Friedrich Bonhoeffer | Corey Goodman | Marc Tessier-Lavigne |

June 11, 2020, New Haven, CT – The 2020 Gruber Neuroscience Prize is being awarded to Friedrich Bonhoeffer, of the Max Planck Institute for Developmental Biology, Corey Goodman, of venBio, and Marc Tessier-Lavigne, of Stanford University, for their groundbreaking work in elucidating the molecular mechanisms that guide developing axons to their targets, a key step in the formation of neural circuits.

The prize, which includes a $500,000 award, will be presented to Bonhoeffer, Goodman, and Tessier-Lavigne on Oct. 25 at the annual meeting of the Society for Neuroscience.

"All three of these neuroscientists were instrumental in breaking open the field of axon guidance," says Dr. Susan Amara, NIMH Scientific Director and chair of the Selection Advisory Board to the Prize. "Their discoveries have fundamentally changed our understanding of how neural circuits are formed and have led to greater insights into a wide range of neurological disorders and injuries."

Bonhoeffer developed innovative and elegant assays that made it possible to isolate the molecular cues that enable the development of an orderly projection from the eye into the brain, a so-called topographic map. Using these assays, he demonstrated – unexpectedly at the time – that guidance is driven not only by attractive but also repellent signals. He then went on to identify key repellent molecules and other guidance mechanisms. Using insects as models, Goodman pioneered the use of genetic screens, identifying different families of signals, their receptors, and regulators that guide growth cones across specific choice points and to their targets. In his groundbreaking research, Tessier-Lavigne identified multiple guidance mechanisms in mammals and showed how they collaborate to "wire up" the spinal cord. Together, the parallel and often collaborative work of Goodman and Tessier-Lavigne helped

underscore that the attractive and repellent molecules guiding axons during development are highly conserved throughout the animal kingdom, a transformative discovery at the time.

"Taken together, the work of these three scientists comprises one of the greatest success stories in developmental neuroscience," says Joshua Sanes, Professor of Molecular and Cellular Biology and Director of the Center for Brain Science, Harvard University and member of the Selection Advisory Board to the Prize. "It's a great honor to be awarding them the 2020 Gruber Neuroscience Prize."

Additional Information

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

The Gruber Foundation proudly presents the 2020 Neuroscience Prize to Friedrich Bonhoeffer, Corey Goodman and Marc Tessier-Lavigne for elucidating developmental mechanisms that guide axons to their targets, a key step in formation of neural circuits.

Bonhoeffer devised assays enabling isolation of guidance molecules. Using these assays, he discovered that guidance results from a balance between attractive and repellent signals; he then identified key repellent molecules.

Goodman pioneered the use of genetic screens in fruit flies to discover gene families controlling axon guidance. Many molecules that he discovered are evolutionarily conserved, all the way to humans.

Tessier-Lavigne combined evolutionary insights with incisive assays to identify mammalian guidance molecules. His analyses of these molecules and downstream signaling provided insights into how growing axons are steered to their targets.

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

Laureates of the Gruber Neuroscience Prize:
- **2019: Joseph S. Takahashi,** for pioneering work on the molecular and genetic basis of circadian rhythms in mammals
- **2018: Ann M. Graybiel, Okihide Hikosaka and Wolfram Schultz,** for pioneering work in the study of the structure, organization and functions of the basal ganglia
- **2017: Joshua Sanes,** for groundbreaking discoveries about synapses, transforming our understanding of how the human brain functions
- **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 on 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,** 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 (Chair); **Frances Jensen,** University of Pennsylvania; **Eric Nestler**, Icahn School of Medicine at Mount Sinai; **Anthony Phillips,** University of British Columbia; **Angela Roberts,** University of Cambridge; **Joshua Sanes,** Harvard University; and **Carla Shatz**, Stanford University.

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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 Gruber Foundation was established in 1993 by the late Peter Gruber and his wife Patricia Gruber. The Foundation began its International Prize Program in 2000, with the inaugural Cosmology Prize.

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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 are in our online newsroom: www.gruber.yale.edu/news-media