VILCEK FOUNDATION

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Vilcek Prizes honor immigrant scientists for outstanding contributions to biomedical science

Lily and Yuh-Nung Jan receive $100,000 prize

Michaela Gack, Michael Halassa, and Ahmet Yildiz win $50,000 Vilcek Prizes for Creative Promise

New York, NY, February 1, 2017 — The Vilcek Foundation is proud to announce that the 2017 Vilcek Prize for Biomedical Science will be will be awarded jointly to Lily and Yuh-Nung Jan. The Vilcek Prizes recognize outstanding immigrant contributions to the arts and sciences, and include a $100,000 cash award. Drs. Lily and Yuh-Nung Jan, both researchers and professors of molecular physiology at the University of California, San Francisco, were selected for their many important discoveries made in the field of neuroscience over the course of a collaborative career spanning four decades. The Jans were born in China and raised in Taiwan.

"Lily and Yuh-Nung Jan are trailblazers in many ways," said Jan Vilcek, CEO and chairman of the Vilcek Foundation. "They arrived to the U.S. at a time when few of their compatriots were active in science here, and America has benefited greatly. The Jans' research has uncovered fundamental insights on the development and function of the nervous system, with far-reaching clinical implications for diseases such as epilepsy, autism, schizophrenia, and hypertension."

Among those insights are the Jans' discoveries on how neurons arise from their progenitors, acquire distinct identities and shapes, and establish baroque circuits in the brain and peripheral nervous system. Using fruit flies as their favored experimental model, the Jans' research demonstrated the steps, guided by a succession of genes, that influences the onset and course of neural development and wiring. For example, they found that the genes *cut* and *numb*, among others, influence the identity and type of neurons made by their progenitors, and that the fruit fly gene *atonal* is implicated in vision and hearing. Many of the genes and developmental programs, it turns out, are conserved in mammals, including humans. To wit, years after the Jans' report on *atonal*, the role of the gene's mammalian versions in human sight and hearing came to light. The Jans also uncovered the principles and the genes that control the process by which dendrites, the slender branches of neurons, grow into densely interlacing forests.

In another important research endeavor, the Jans turned their focus to efforts to isolate the genes for proteins that shuttle potassium ions in and out of cells. Known as potassium channels, these proteins, which control the flow of signals in the nervous system, are implicated in a breathtaking array of functions, such as heart rate maintenance, hormone release, and muscle movement.

For these and many other accomplishments, the Jans have been honored with membership in the United States National Academy of Sciences, as well as with Howard Hughes Medical Institute Investigator awards. Yuh-Nung Jan is the Jack and DeLoris Lange Professor of Molecular Physiology at the University of California, San Francisco, while Lily Jan is the Jack and DeLoris Lange Professor of Physiology and Biophysics, also at UCSF.

The Vilcek Foundation is also honoring three outstanding immigrant scientists—38 years of age or

younger—who have demonstrated evidence of creative promise with their scientific work in the United States. Each winner of the Vilcek Prizes for Creative Promise in Biomedical Science will receive a $50,000 cash award.

Michaela Gack has uncovered potential molecular targets for the design of antiviral drugs and vaccines for a range of infectious diseases. Early in her career, Gack identified the molecular mechanism by which a protein called RIG-I tips off the human immune system to lurking viruses and triggers a defensive response. The mechanism turns on an enzyme called TRIM25, which activates RIG-I by tagging it with proteins called ubiquitins. Following Gack's discovery, it was found that ubiquitin-tagging by TRIM enzymes is a common immune defense strategy. Because flu viruses block TRIM25 to sidestep the resulting immune response, her findings have yielded a potential target for designing antiviral drugs and vaccines. More recently, Gack has focused on mosquito-borne viruses such as dengue and West Nile virus, and her work could pave the way toward the rational design of vaccines against emerging infectious diseases. Gack, now an associate professor at the University of Chicago, was born in Bavaria, Germany.

Michael Halassa has illuminated how the brain filters sensory noise and sustains attention. By making mice a viable model for cognitive neuroscience, Halassa has probed aspects of attention and perception that have long eluded mechanistic study. His work revealed how the thalamus, a brain region primarily thought to be a sensory relay station, plays a broader role, contributing to cognition. Specifically, he found that thalamic circuits involved in sensory processing operate as tunable filters, enabling the brain to suppress sensory noise during selective attention. He also identified a form of autism in which this filtering process is deficient, paving a potential path to treatment. More recently, he has shown that the thalamus amplifies functional connectivity in the brain's cortex, sustaining attention and perception. His findings could help understand how the brain generates the mind. Halassa, an assistant professor at New York University, was born in Amman, Jordan.

Ahmet Yildiz has used his expertise in visualizing molecules found in living cells to uncover the precise mode of action of molecular motors, which are proteins that ferry cargo along the cellular backbone to support vital functions like neuronal development and cell division. Visualizing the stepwise movement of these motors—kinesins, myosins, and dyneins—along cellular scaffolding had long remained technically challenging. Yildiz developed a technique to localize fluorescent dyes within cells at 1 nanometer resolution, surmounting the challenge and imaging the march of molecular motors on cellular tracks. In related work, Yildiz used super-resolution microscopy techniques to suggest how a protein complex called shelterin protects the ends of chromosomes from the deleterious action of DNA repair enzymes. Because damage to chromosome ends has been tied to premature aging and cancer, Yildiz's findings may yield clinically relevant targets for the treatment of such diseases in the future. Yildiz, an associate professor at the University of California, Berkeley, was born near Istanbul, Turkey.

The prizewinners were selected by panels of experts in the field of biomedical science. All prizewinners will be honored at a ceremony in New York City in April 2017. In addition to prizes in biomedical science, the Vilcek Foundation also recognized immigrants in the arts with the 2017 Vilcek Prizes in Fine Arts. For more information about the prizes, please visit Vilcek.org.

The Vilcek Foundation was established in 2000 by Jan and Marica Vilcek, immigrants from the former Czechoslovakia. The mission of the foundation, to honor the contributions of immigrants to the United States and to foster appreciation of the arts and sciences, was inspired by the couple's respective careers in biomedical science and art history, as well as their personal experiences and appreciation for the opportunities they received as newcomers to this country. The foundation awards annual prizes to prominent immigrant biomedical scientists and artists, and manages the Vilcek Foundation Art Collections, a promised gift from its founders.

To learn more about the Vilcek Foundation, please visit Vilcek.org.

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