2019 NSE Grantees Conference

Nanoscale Processes in Neural Systems

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Abstract: Lichtman's research focuses on the study of neural connectivity and how it changes as animals develop and age. With his colleagues he has developed a number of tools that permit synaptic level analysis of neural connections. These include activity dependent uptake of fluorescent dyes, transgenic approaches to label individual nerve cells, and "combinatoric" methods (e.g., DiOlistics, Brainbow, and NPS) to label many nerve cells in the same tissue. In addition, he has helped develop automated electron microscopy approaches for large scale neural circuit reconstruction. These connectomic methods seek to make it routine to acquire neural circuit data in any nervous system. The central focus of his work is to describe the ways in which developing nervous systems change to accommodate information that is acquired by experience.

Biosketch: Jeff W. Lichtman is Jeremy R. Knowles Professor of Molecular and Cellular Biology and the Ramón y Cajal Professor of the Faculty of Arts and Sciences at Harvard University. Lichtman is a developmental neurobiologist interested in the way in which experience alters nervous system organization in long lasting ways. He has participated in the development of a number of methods that describe neural connectivity at the level of individual synapses (connectomics) using fluorescence (e.g., Brainbow) and electron microscopical methods (e.g., ATUM). Lichtman graduated from Bowdoin College with a degree in Biology and from Washington University School of Medicine in 1980 with a Ph.D. in Neurobiology and a M.D. After postdoctoral work at Harvard Medical School, Lichtman joined the faculty of Washington University and remained there for twenty years before moving to his present position at Harvard in 2004. He is a member of the National Academy of Sciences.