How to Look Inside the Brain

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ABSTRACT

In the brain, less is more. Many of the most successful methods in neuroscience research draw their power from stripping away all but the structures or phenomena relevant to a particular experimental question--focusing on the problem at hand, and cutting out the distractions. The birth of the modern field one century ago is due to the discovery of a tissue staining protocol, the 'Golgi Stain', that marks only a small percentage of neurons in nervous tissue, but leaves the vast majority of them invisible, permitting visualization under the microscope of individual trees in what would otherwise have been an impenetrable forest.

Today, with the advent of modern genetics and molecular biology, this same principle has been applied across countless brain areas and a broad set of questions about the anatomical configuration, function, development, and plasticity of the nervous system. Many of the most powerful and commonly employed tools--like Green Fluorescence Protein, Channelrhodopsin, and virus-mediated tracing of neuronal projections--are actually biological solutions to completely unrelated problems, such as how to get a jellyfish to glow green, how to convey photosensitivity to a unicellular organism, or how to spread the Rabies virus across an entire nervous system. These research tools, the product of millions of years of evolution (and a few years of human tinkering) yield datasets whose explanatory power draws from the fact that they, like the Golgi Stain, allow researchers to focus on the question at hand and filter out the surrounding noise.

Categories and Subject Descriptors

A.1 [Introduction and Survey]

Author Keywords

Measurement

GECCO'12 Companion, July 7–11, 2012, Philadelphia, PA, USA.
ACM 978-1-4503-1178-6/12/07.