

Discovering How a Small Brain Works



Damon Clark

Assistant Professor, Molecular, Cellular, and Developmental Biology

CURRENT RESEARCH

Understanding how brains compute by looking into a fly's eye

The neurons in our brain perform intricate computations to process information and generate behavior. Their activity can often be described mathematically: neural circuits can add, subtract, divide, and multiply, as well as perform a host of more complex computations. However, we still only poorly understand how individual neurons contribute to the complex operations in real neural circuits. Dr. Damon Clark, Assistant Professor of Molecular, Cellular, and Developmental Biology at Yale University, believes that we must understand the principles and mechanisms by which small neural circuits compute, and that understanding will be central to the more complex computations associated with human brain function.

To investigate these principles, Dr. Clark has focused on understanding the interactions of neurons in the tiny brain of the fruit fly. His lab measures behavior in the fly (see video of the fly walking on the ball), which allows them to test hypotheses quickly and iteratively. Advanced microscopes in lab allow researchers to measure the activity of individual neurons within the brain, while the fly watches movies and behaves. In addition to these experimental tools, the lab also creates and tests mathematical models of circuits within the fly's brain. Some of the projects Dr. Clark's lab is researching are:

- Dr. Clark's research focuses on the small network of visual neurons in the eye of the fruit fly in order to understand how individual neurons contribute to broader algorithms within neural circuits. The fly's visual circuits offer several advantages for answering computational questions: a relatively small number of neurons are involved; the neurons are accessible and it is possible to...

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AFFILIATION



Yale University

EDUCATION

- Postdoctoral in Neurobiology 2012, Stanford University
- Ph.D. in Physics 2007, Harvard University
- A.B. in Physics 2001, Princeton University

AWARDS

- Alfred P. Sloan Fellowship in Neuroscience, 2015
- Searle Scholar Award, 2014
- Smith Family Award for Excellence in Biomedical Research, 2013
- Jane Coffin Childs Postdoctoral Fellowship, 2008-2011
- NSF Graduate Research Fellowship, 2002-2005

RESEARCH AREAS

Life Science, Neurological / Cognitive, Neurological / Cognitive

FUNDING REQUEST

Dr. Clark's lab is uniquely positioned to combine tools from computational neuroscience with tools from fly genetics in order to dissect computations in the fly's small brain. With your donations Dr. Clark can support researchers in his group and purchase supplies and equipment for experiments. Dr. Clark would also like to expand his research into interesting "high-risk, high-reward" experiments that compare motion perception algorithms across different species.