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Research Success Stories

SEVENTH FRAMEWORK PROGRAMME

June 2014

Facing a new challenge thanks to an ERC-starting grant

How does the brain work? This fascinating question has always attracted the attention of numerous scientists. Professor Simon Sprecher is making an excellent contribution by reconstructing the visual system of the Drosophila larvae: the first complete visual network that can be fully characterized.

Understanding how the brain works is one of the most outstanding scientific challenges. The most reliable approach would be to combine realtime imaging of a working brain with a precise connectivity map. Thanks to the recent development of electron microscopy techniques and activity recording imaging it has becoming possible to visualize the brain activities at cellular level. Essentially it means that nowadays it is possible to make a realtime image of a simple brain, while the human brain, with its several hundred billion of neurons, is still too complicated.

Prof. Simon Sprecher
Departement of Biology and Zoology
University of Fribourg

"The human brain is still too complicated for the investigation techniques available today, but we are ready to solve the puzzle of the fly's brain which is a complete neurological system."

Part of an international network

With his extraordinary ERC-project, Professor Simon Sprecher joined an international network, counting 17 laboratories in the World, whose aim is to reconstruct the full connectome of the Drosophila larvae brain (coordinated by Albert Cardona, HHMI). Each laboratory targets a specific system: visual system, olfactive system, center of coordination, learning center, etc. They are all working on the same larvae dataset profiting from a sort of devoted "googlemap" of Drosophila larvae brain research.

FACTS AND FIGURES

Project Name:	PHOTONAVINET Photoreception in Drosophila larvae: Information coding in a simple neuronal circuit
Research Area:	Neurosciences and neural disorders
Coordinator:	Prof. Simon Sprecher
Organization:	University of Fribourg
Start Date - End Date:	2013/01/01 - 2018/12/31
Duration:	60 months
Project Cost:	1.49 million Euro
Project Funding:	1.49 million Euro
Contract Type:	ERC Starting Grant
FP7 Reference Number:	309832

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ABOUT THE PROJECT

PHOTONAVINAT aims to understand how the connectivity of the brain works, how neurons receive the information, and how they use them to lead the various activities. The brain of Drosophila (fruit fly) larvae offers the perfect sample because research in genetics is sufficiently advanced to allow researchers to produce the larvae sample in the laboratory, and to manipulate the larvae brain cell-by-cell. In PHOTONAVINAT Prof. Sprecher focuses his attention on the visual system. Drosophila larvae eyes have only 12 photo-receptors. By applying different imaging techniques, it is possible to monitor the activity and function of each photoreceptor or downstream neuron when it transfers the information to the brain neurons coordinating the behaviour of the larvae.

Beyond genetics

Prof. Sprecher said "the ERC-starting grant is a very attractive funding instrument because it of course provides a lot of money, but beyond that, it gives the chance to do something crazy". The first time he submitted the proposal, it was rejected because it was judged not to be feasible. Prof. Sprecher strongly believed that, with his excellent basis in development biology and genetics, he could give a fundamental contribution to the dream to decipher a complete functional map of a brain. For one year he worked to prove the feasibility of his project, until he then re-submitted it, strengthened by the preliminary results on the visual system of the Drosophila larvae brain. Now PHOTONAVINET represents one tier of his laboratory activities. It allows Prof. Sprecher to extend his research beyond genetics, and in addition to have a lot of fun working on the visual system: a puzzle whose bricks are 12 eyes' photo-receptors, 2'000 neurons, and all connections transferring information through the larvae brain.

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