Small Brains, Big Ideas:
The value of model organisms to science
Dr. Yuly Fuentes-Medel
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Introduction

Model organism systems amenable to genetic manipulation have made seminal contributions to many aspects of modern science. These organisms with small brains have inspired the discoveries of big ideas in such complex problems as cell death, ion channel function, and pattern formation during development. In this lecture you will learn what a model organism is and see some examples, with a focus on the research done by Dr. Fuentes’ thesis work on synaptic plasticity using Drosophila as a model. Her work shines light upon the molecular pathway important for the maintenance of dynamic structures at neuronal connections. Furthermore, the use and maintenance of model organisms are relatively inexpensive and straightforward compared to mammalian models. These features make invertebrate model systems ideal subjects for research in areas of the world such as Latin America where limited resources are available for scientific research. We will hear some stories from outreach effort in her native Chile.

About the speaker

Dr. Yuly Fuentes-Medel is a catalyst of creative ideas. She believes that connecting science to society is critical to open opportunities for people and organizations. She is currently the Executive Director of Descience, a project that is using science to inspire fashion innovation. She graduated from the University of Massachusetts Medical School with a PhD in biomedical sciences. Her thesis work focused on neuronal synaptic plasticity. As a postdoctoral associate at the MIT Sloan School she studied funding for life sciences innovation. Yuly is an active member of Women Entrepreneurs in Science and Technology (WEST) and received a Volunteer Giving Back award. During her time as a PhD student, she pioneered the co-organization of the international workshop called “Small Brains, Big Ideas” held in Santiago, Chile. This initiative has so far successfully trained 60 Latin-American students. Trained as a biochemist at University of Concepcion in her native Chile, she is constantly in the search for opportunities to support young talent.

Glossary of important terms

model organism: experimental system used to study a fundamental problem, such as a disease

cell death: normal degeneration and death of living cells

homologous gene: gene related to a second gene by descent from a common ancestral DNA sequence

mutant: alteration of specific gene information in the genome of an organism

(glossary continued on the next page)
tuberous sclerosis: genetic disorder characterized by abnormalities of the skin, brain, kidney, and heart

synapse: structure that permits a neuron (or nerve cell) to pass an electrical or chemical signal to another cell (neural or otherwise)

ghost bouton: synapse without response of postsynaptic specialization

neuromuscular junction: synapse between a motorneuron and muscle

Resources to learn more

Video: Seeding the Future of Science
http://www.youtube.com/watch?v=QpRg_tNIs4I

Small Brains, Big Ideas Workshop, Chile
www.smallbrains.org

DESCIENCE | Research in the Runway
www.fashiondescience.com

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