WINTER PROJECTS 2014

Julia Adelman  
Research Advisor: Siobhan Robinson  
Winter Term 2014  
Title: Don't Forget the Cerebellum: Visualizing Connections within the Motor System.

For my winter term project, I designed a neuroanatomical tracing study to visualize the efferents from a key, but understudied region of the rodent brain, the cerebellum. Even though the cerebellum is vital for many behaviors such as generating accurate movements, maintaining balance and learning motor skills, it is largely ignored. An avenue to investigate the cerebellum is to examine its connections to other brain regions that are central to the control of movement. To achieve this, my winter term project involves injecting neuroanatomical tracers into two motor-related regions (the red nucleus and the dorsal caudate) in the rat brain. This study will allow me to visualize the connections between these various regions and permit me to further explore the anatomical features of the cerebellum. If this study is successful, it has the potential to be incorporated into the Neuroanatomy laboratory class so that future Oberlin students will have the opportunity to familiarize themselves with these critical brain regions.

Christopher Bell  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging project  
The goal of my current Winter Term project is to create a descriptive model of the male hypothalamic-pituitary-gonadal (HPG) axis as an emergent system. Using methods learned from Professor Downing's course, I have explained the male HPG axis as a complex adaptive system that displays multiple aspects of emergence, such as autopoiesis and dissipation. Moreover, I have utilized the model created in order to elucidate the importance of understanding the HPG system in clinical applications.

Elizabeth Bentivegna  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging project  
I studied memetics and cultural information transmission, analyzing the complexity found in the spread of ideas. Memes, or units of culture, travel and grow in observable patterns. Though this field is very new and mostly theory-based, I found it interesting to study the complex emergent behavior exhibited even within the most intangible of subjects.

Nate Bohm-Levine  
Research Advisor: Jan Thornton  
Winter Term 2014
"Neuroendocrine Research. Effects of estrogen on recovery of brain function in an animal model of schizophrenia."

Ari Schaler  
Research Advisor: Jan Thornton  
Winter Term 2014  
"Neuroendocrine Research. Development of a western assay to determine the effects of estrogen on GABA synthesis in an animal model of schizophrenia"

Lucas Burns  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging Project

Kai Drumm  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging Project

Peter D'Auria  
Research Advisor: Siobhan Robinson  
Winter Term 2014  
Fluorescent Detection of Amygdalar and Prefrontal Cortical Pathways in the Rat Brain  
I'm conducting a follow-up study from a project I completed during my spring semester neuroanatomy laboratory class. My winter term project is best described as a neuroanatomical project that aims to visualize direct connections between brain regions. The data I generate has the potential to be incorporated into the neuroanatomy lab in future terms and to lay the groundwork for future studies intent on examining how these particular pathways may contribute to behavior. To accomplish this, I will inject two different retrograde tracers into two different regions in the rat brain, the amygdala and the prefrontal cortex. The tracers will travel in the opposite direction of electrical signals and into cells that are "upriver" from the injection site. Once I have removed and sectioned the brain, I will perform neurochemical assays to visualize neurons that have "taken up" the tracer. Depending on which tracer is being examined, the retrogradely labeled neurons will appear bright green or red when viewed under a fluorescent microscope. If all goes according to plan, I will be able to visualize neuroanatomical structures that project to the amygdala and the prefrontal cortex.

Andrew Eckel  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging project  
I explored the complex behaviors of 1-dimensional cellular automata. Specifically, I worked with elementary CA's, stochastic CA's, and continuous state CA's.
Jarrett Fastman  
Research Advisor: Tracie Paine  
Winter Term 2014  
This winter term Jarrett and Ted gained Neuropharmacology research experience by working on a variety of projects aimed at understanding the manner in which cortical GABA transmission affects cognitive behavior. As part of their experience, they learned histological techniques (brain tissue sectioning, cresyl violet staining), molecular biological techniques (immunohistochemistry) and how to deliver drugs through different systemic routes of administration.

Ted Hunter  
Research Advisor: Tracie Paine  
Winter Term 2014  
This winter term Jarrett and Ted gained Neuropharmacology research experience by working on a variety of projects aimed at understanding the manner in which cortical GABA transmission affects cognitive behavior. As part of their experience, they learned histological techniques (brain tissue sectioning, cresyl violet staining), molecular biological techniques (immunohistochemistry) and how to deliver drugs through different systemic routes of administration.

Hannah Galaxy, Sky Kalfus  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging project

Omar Hurtado  
Benjamin Rempel  
Amanda Strominger  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging project

Michael Kemp  
Research Advisor: Keith Downing  
Winter Term 2014  
Intelligence Emerging project  
I worked with Keith Downing’s group this Winter Term. We were looking at complex/emergent systems that arise from local interactions of unintelligent/simple actors. My particular research was into Artificial Immune Systems, and how the traits the body uses to select lymphocytes can be applied to optimization and categorization problems in mathematics.

Aakash Patel, Tyler Robertson, Eli Rose  
Research Advisor: Keith Downing
Winter Term 2014
Intelligence Emerging project

Einav Silverstein, Lucien Swetschinski
Research Advisor: Jan Thornton
Winter Term 2014
"Neuroendocrine Research. Studies on the effect of a Luteinizing Hormone antagonist infused into the hippocampus on spatial memory in rats".