

## 2017 Belmont Undergraduate Research Symposium

### Biology III

Moderator: Darlene Panvini, Ph.D.

April 20, 2017, 7:00-8:15 p.m.  
JAAC 2096

7:00 p.m. – 7:15 p.m.

#### **The Response of a Native and Exotic Snails to a Native Crayfish Predator**

Jasmine Conyers

Faculty Advisor: John Niedzwiecki, Ph.D.

Predator kairomones have a big influence on prey behavior. Kairomones may be specific to a certain predator. Past studies have shown that our native snail reacted differently to native and exotic predators. In this experiment the antipredator responses of our native *Elimia laqueta* and exotic Nerite snail behaviors were compared in response to our native predator, *Orconectes durrelli*. A two way ANOVA revealed no difference in prey species in regards to the native predator, in activity or crawl out behavior. Since we failed to get a significant antipredator behavior in our native prey, as expected, we cannot draw definitive conclusions. However, the exotic Nerite snail species spent more time out of water, in all conditions, than the native *Elimia* species. Crawl out behavior is the expected response of *Elimia* to predator kairomones.

7:15 p.m. – 7:30 p.m.

#### **Expansion on the Nematode Scent Detection Test: Evaluating *C. elegans* Attraction to Non-Small Cell Lung Cancer**

Brian R. Song

Faculty Advisor: Robert Grammer, Ph.D.

*Caenorhabditis elegans* (*C. elegans*) have shown positive chemotaxis towards cancer cell secretions. By applying this behavior clinically, a cancer screening system has been devised and has shown effectiveness for breast, gastric, and colorectal cancers. Prior research has shown that the nematode is also attracted to cervical cancer, specifically HeLa cells. It has not been assessed whether the screening system would be useful for lung cancer. The objective of this project is to evaluate if *C. elegans* displays attraction to A549 cells, a cell line derived from non-small cell lung cancer, when WI-38 (normal human lung fibroblast tissue) is used as a control. It has been observed previously that dilutions to the millionth and ten millionth have garnered positive chemotaxis. Results have shown positive and negative chemotaxis regarding specific dilutions of conditioned A549 medium with fresh medium as the control, and negative chemotaxis with all dilutions of WI-38 with the aforementioned control. With A549 confirmed as the positive control and WI-38 as the negative control, a choice assay was carried out between the two. The attractant used was A549 medium and the control was used WI-38 medium. Results showed positive chemotaxis to the millionth and ten millionth dilutions of used media.

7:30 p.m. - 7:45 p.m.

### **Decomposition Rates of *Acer saccharum* and *Lonicera maackii* in Mixed Litter Bags**

Anna Anderson

Faculty Advisor: Darlene Panvini, Ph.D.

Invasion of exotic species can influence decomposition rates and nutrient cycling in a forest. Leaves of exotic species have been shown to decompose faster than native species. This study evaluated decomposition rates of litterbags containing native *Acer saccharum*, exotic *Lonicera maackii*, and both species (mixed species bags). Litterbags were weighed and placed throughout an urban deciduous forest in Nashville, Tennessee at sites that contained canopies of *A. saccharum*, *L. maackii*, or both species. Litterbags were collected over six months and reweighed to determine mass lost. There was a significant difference between the percent mass remaining at the mixed and exotic sites, but not at the native site. The implications of this research will add to the knowledge of changing forests and the effects of exotic species on nutrient cycling.

7:45 p.m. – 8:00 p.m.

### **Effect of Sodium Chloride Levels on Anxiety in Zebrafish (*Danio rerio*)**

Austin DeMaagd

Faculty Advisor: Lori McGrew, Ph.D.

Studies indicate that electrolyte levels have clinical implications for health and wellness. In model organisms, electrolyte imbalance has been linked to a number of physiological disorders, including anxiety. With this evidence, it was asked whether sodium chloride levels dictate anxiety levels of organisms. The zebrafish (*Danio rerio*) was used to evaluate this relationship, due to the fish's capacity to react to environmental factors, and its testability using a novel dive tank. Three groups were tested: a control group with standard conditions, a group with exposure to 0.3 M sodium chloride for three days, and an identical group exposed for twenty-one days. Data was analyzed using a One-Way ANOVA test. The fish exposed to salt for three days appeared to show signs of increased anxiety. They avoided the upper zones of the dive tank, which is an indicator for stress in the fish. The benefits of this study could have clinical significance, specifically for diagnosis and treatment of anxiety relating to electrolyte imbalance. There is also significance for the scientific community, as more is understood about the neurophysiology of zebrafish.

8:00 p.m. - 8:15 p.m.

### **Seeking Behaviors of Nicotine**

AJ Arnold

Faculty Advisor: Robert Grammer, Ph.D.

Nicotine is one of the most heavily used addictive drugs in the United States. Nicotine travels to the brain and binds to receptors where the neurotransmitter acetylcholine would normally dock. *Caenorhabditis elegans* exhibit seeking behaviors parallel to mammals when exposed to nicotine. In this experiment, nicotine and *Escherichia coli* tested the seeking behaviors of *C. elegans*. In these experiments, *C. elegans* were placed onto a chemotaxis plate with *E. coli* on one end and nicotine on the other. The nicotine concentration was 3 mmol or 30 mmol. Prior to the chemotaxis assay, the nicotine was left on the plate over time to diffuse. Gradually, most of the *C. elegans* started crawling towards the nicotine and only a few to *E. coli*. Changing the concentration levels of the nicotine better explained the seeking behaviors of the organism. There was statistical significance indicating that the *C. elegans* were attracted to the nicotine.