

## 2017 Belmont Undergraduate Research Symposium

### Biology II

Moderator: Chris Barton, Ph.D.

April 20, 2017, 7:00-8:15 p.m.  
JAAC 2092

7:00 p.m. – 7:15 p.m.

#### **Examining the Biodiversity of Soil Microbiota, Arthropods and Green Roof Flora on Established and Newly Created Green Roofs**

Kelsey Saint Clair

Faculty Advisor: Darlene Panvini, Ph.D. & Chris Barton, Ph.D.

Green roofs enhance urban diversity by creating green spaces in metropolitan settings. Little research has examined the relationship between soil microbiota, arthropods and plant diversity on green roofs. We compared diversity on two green roofs at different stages: established versus newly-created. We predicted that the older green roof would have more species diversity. DNA barcoding was used to identify plants to genus level, pitfall traps and sweep nets were used to determine arthropod diversity, and Biolog EcoPlates™ were used to assess microbial functional diversity. The newly-created green roof exhibited more species of plants per area, more plant structural complexity, and greater diversity of arthropods. Bacterial functional diversity was greatest on the established, older green roof. The intermediate disturbance hypothesis could explain the greater diversity on the new green roof. If we know how diversity changes over time, this research can provide insight into how green roofs can be managed to enhance urban biodiversity.

7:15 p.m. – 7:30 p.m.

#### **Caffeine's Effect on the Chemotaxis of *C. elegans* after a Short Exposure Time**

Madeline Johnson

Faculty Advisor: Robert Grammer, Ph.D.

*Caenorhabditis elegans* is a small nematode that is found worldwide and its sequenced genome, short life span, transparent anatomy, and inexpensive cost make it efficient for experimental purposes. One of the most significant traits of the *C. elegans* organism is its ability to perform chemosensation, which is a physiological response to a chemical stimulus. In this experiment, caffeine was used as the chemical stimulus to *C. elegans*. Widely consumed in foods and beverages, caffeine is a psycho-stimulant, meaning it temporarily induces improvements in both mental and physical functions. Recently, a study performed at Belmont University suggested that the concentration of caffeine that *C. elegans* are exposed to had an effect on the locomotion toward an attractant - with an increased concentration of caffeine, a stronger chemotaxis index (CI) was displayed. The purpose of this study was to determine if the various concentrations of caffeine could affect the chemotaxis of *C. elegans* even after a short exposure time of three minutes. This study concluded that the nematode shows an insignificant chemotaxis when treated

with dosages of 1mM, 10mM, and 20mM caffeine. However, the plate set-up used is sensitive to small movements. Thus, both the set-up and counting method used may account for the insignificance and the large standard deviations that were obtained.

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

### **Examining Behavior Syndromes in *Orconectes dorelli* Crayfish**

W. Kody Muhic

Faculty Advisor: John Niedzwiecki, Ph.D.

In order to explain seemingly non-adaptive behavior in animals, researchers often look to suites of correlated behaviors called syndromes. Aggressive behavior in crayfish may be beneficial in scaling conspecific dominance hierarchies, but traits of high aggression could be linked to other novel traits, such as high levels of boldness, which could be detrimental in the presence of a predator. We studied individual performances of *Orconectes dorelli* crayfish in a series of tests, interpreting boldness as a latency to emerge from shelter following a simulated attack, and scoring aggression based on competitive interactions between size-matched crayfish. We suspected the bolder crayfish of each matched pair to have the higher aggression score. A chi-squared analysis of the test results shows Marginal significance that supports our hypothesis, suggesting that aggressive traits are linked with bold traits. We are running more trials and, if confirmed, our study suggests a potential example of a behavioral syndrome in *Orconectes dorelli*.

7:45 p.m. – 8:00 p.m.

### **Treatment Effects of Emetine on HCT-116 Cells**

Kerry Sommers

Faculty Advisor: Chris Barton, Ph.D.

Emetine, a natural compound originating from ipecac roots, has been utilized as a chemotherapeutic agent due to its apoptosis-inducing effects. Emetine has been used primarily for the treatment of lung and blood borne cancers, however there is little research on emetine's effects on colon cancer. This study addresses the effect of emetine on the proliferation and death of HCT-116 colorectal cancer cells. The cells were treated with three different concentrations of emetine over three time points. After determining that emetine had the capacity to kill the colon cancer cells, fluorescent microscopy was used to determine the mode of cellular death. The results of the microscopy analysis revealed that emetine inhibited proliferation and induced apoptotic cell death in the HCT-116 cells.

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

### **The Response of Naive and Experienced Snails to a Predator Cue**

Shirley Kyere

Faculty Advisor: John Niedzwiecki, Ph.D.

Prey have the ability to receive and interpret information about their environment through chemosensory information. Prey detect predators through chemical cues called kairomones and these kairomones affect prey behavior. Since *Orconectes dorelli* crayfish and *Elimia laqueta* snails live in the same environment, our goal was to determine if snails habituate to the crayfish. To test this, snails were exposed for 3 and 6 days in a pre-treatment and were then divided equally into cups for predator or control treatments. We then compared the anti-predator reaction of snails to kairomones or controlled water, based on previous exposure. Although snails from both treatments were very active, there was no significant difference based on prior experience with or presence of kairomones in either anti-predator behavior or movement. We have no support for habituation, however without a significant anti-predator response no conclusions can be made.