Welcome to the 9th Annual P.U.R.E. Symposium!

Spring Session

Thursday Apr 17, 2014

LSF 102

3:45– 3:57pm: "First Report of a Microsporidian in the Freshwater Polychaete, *Manayunkia speciosa*."

Student Researcher: Emory Altman; Faculty Mentor: Dr. David Malakauskas

The Microsporidia are parasites that infect a wide variety of organisms. To date, most research on microsporidians has focused on those that infect terrestrial organisms. Therefore, research on Microsporidia that infect aquatic hosts will further our understanding of the evolutionary history of these parasites. Previous work has found evidence of microsporian infections in a population of Manayunkia speciosa, a freshwater polychaete found in western Lake Erie, MI. Our objectives are 1) to use a PCR-based assay to estimate prevalence of microsporidian infection in a population of M. speciosa from western Lake Erie and 2) obtain ribosomal sequence data of the parasite do a preliminary phylogenic analysis. Our results will expand our knowledge on Microsporidia, offering evolutionary insights on freshwater Microsporidia and their hosts.

3:57 – 4:09pm: "Empathy in Familiar Rats."

Student Researcher: Chris Donaldson; Faculty Mentor: Dr. Shayna Wrighten

It is already known that some mammals, such as rats, express some level of empathy, which is observable by behavioral mapping and histology. The research performed aimed to provide further insight into empathy with rats based on the hypothesis that two familiar rats will express greater empathy when one rat is isolated within a restrainer compared to being free. During the experiment, one rat was placed within a restrainer with a door and lever on the outside. The other rat was free to roam the testing area with the option of pressing the lever to open the restrainer door for the trapped rat. Throughout the experiment several behaviors of the free rat were monitored and recorded. Upon completion of the experiment, the positions of the rats were reversed (reversal) and testing continued as previously explained. The amount of boli, which signifies stress, remained extremely low throughout the experiment, with the exception of one rat. On average, the reversed rat had a quicker latency to open the door compared to the initial rat. The contacts with the empty restrainer were consistently higher with the reversed rats compared to the initial condition. Additionally, the amount of contacts between rats was much higher with the reversal rat than the initial condition. Pro-social behaviors were expected to be more prominent due to the exposure of the stress factor for the initial rat before the reversal. However, the restrainer didn't appear to be stressful to the rats. In fact, the rats seem to prefer being inside the restrainer with makes interpretation of the data a bit ambiguous.

4:09 – 4:21: "Research in the Idea of Empathy in Rodents."

Student Researcher: Carli Mapes; Faculty Mentor: Dr. Shayna Wrighten

In humans, empathy is sympathetic feelings toward another human going through an ordeal. In rodents, it is questioned whether the same behavior occurs. We tested empathy in rats by using two female rats that were cage mates. By placing one rat in a restrainer and the other rat in the arena surrounding it, we observed the behavioral characteristics (i.e. rears, grooms, and boli) that are attributed to exploratory behavior and stress in the free rat. We also observed the number of times the free rat came into contact with the restrainer and whether or not the free rat would release the restrained rat. After twenty consecutive days, the roles of each rat were reversed, with the free rat now restrained and vice versa. Based on the data collected, the latency to approach restrainer did not change significantly over time, but instead remained the same for both the initial and reversal conditions. The number of contacts with the newly freed rat increased over time in both conditions. The number of rears overall stayed the same in both conditions. Overall, there were no significant changes over time in any of the behaviors. Additionally, the behaviors were not significantly different in the initial and reversal conditions.

4:21 – 4:33: "Changes in Community Structure of Two Exotic Invasive Bivalves in Lake Erie."

Student Researcher: Sarah Rawlins; Faculty Mentors: Dr. Ann Stoeckmann, & Dr. Jeff Steinmetz

The invasive mussels, Zebra (*Dreissena polymorpha*) and Quagga (*Dreissena bugensis*), have had devastating economic and ecological impacts. In addition, Quaggas are replacing zebra mussels as the dominant species in western basin of Lake Erie. This experiment tracked population characteristics (density, species proportions, size-frequency). We also measured the effects of predation on mussels' population by an invasive fish (Round Goby). Gobys eat smaller, newly settled mussels. If predation is changing mussel populations then in subsequent years, the number of young mussel offspring in the ecosystem should decrease. To determine if population characteristics of mussels have changed, benthic samples were collected from rocks (2008 and 2010). To test the effects of predation by the Goby, lines holding settlement plates (3 x 5 cm2) protected by cages were suspended 2 meters above the bottom by a buoy (May-August 2010). Species were separated and shell lengths were measured. Preliminary results show that density has declined and Quaggas were the dominant species in 2008 making up 71% of the benthic population and 62% of the settlers and 81% and 65%, respectively, in 2010. Gobies appear to be limiting mussel recruitment thereby reducing the impact these mussels have on the ecosystem.

4:33 – 4:45: "Monitoring Activity Patterns of the American Crow (*Corvus brachyrhynchos*) Population on the Campus of Francis Marion University."

Student Researcher: Morgan Soulantikas; Research Mentors: Dr. Jeff Steinmetz, Dr. Paul Zwiers, & Travis Knowles

The American Crow (*Corvus brachyrhynchos*) also known as the "Common Crow", is a medium-sized, stocky, black, perching bird of the Corvidae family. American Crows mainly reside in woodland, farmland, and also suburban areas. They require open spaces for ground feeding, but scattered trees, woodlots, and forest edges must be present in order for the birds to have a safe place to nest and roost. The campus of Francis Marion University provides a sufficient habitat in which American Crows can thrive.

In this study, bioacoustic monitoring equipment was used to collect data on the population of American Crows living in the campus area during the months of August through March. A double-microphone recording unit was placed in several wooded regions across FMU's campus for the span of three to five days at a time. The device recorded any sound and stored it as a file to a memory card. These files were then analyzed by using Song Scope Bioacoustics Software where audial activity was displayed as a sound spectrogram. From this format, the distinctive "caw-caw" call of the American Crow could be easily identified and used to determine the exact hours throughout the day when the birds are most active. Preliminary data suggests that the population of American Crows residing in the area is most active and produce the highest number of vocalizations during the hours of 10:00am to 11:00am and 4:00pm to 6:00pm. Also, seasonal changes and several weather factors were discovered to have significant effects on the overall activity of this population.

4:45 – 4:57: "Effects of ACTH on AC Expression in Adrenal Carcinoma Cells."

Student researcher: Kayla Stevenson; Research Mentor: Dr. Lori Turner

Cortisol is a steroid hormone that is produced by the adrenal cortex as a result of the secretion of corticotropin-releasing hormone (CRH) and adrenocorticotropic hormone (ACTH) from the hypothalamus and the pituitary gland, respectively. These hormones are released in response to biological stressors, such as low levels of blood glucocorticoids and psychological stress. In addition to stimulating the production of cortisol in the adrenal cortex, ACTH has recently been shown up-regulate the expression of the enzyme acid ceramidase (AC), which functions in the conversion of ceramide to sphingosine. The result of AC overexpression is resistance to ceramide-induced apoptosis, which can be initiated in response to cellular stress. The implications of this research focuses on the effects of psychological stress on progression to cancerous phenotypes and if it is possible to undo these effects. We treated H295R adrenal carcinoma cells with ACTH and later resumed media treatment on select cells. We found that once the ACTH was removed, the overexpression of AC returned back to the level of untreated cells. These results suggest that removal of stress signals may allow cells to return to their pre-stress phenotype.

If you are interested in learning more about P.U.R.E. or research opportunities, please visit the website at: http://departments.fmarion.edu/biology/PURE.htm. You can also contact me (Dr. Barbeau, tbarbeau@fmarion.edu), the coordinator of P.U.R.E.