

Welcome to the 13th Annual P.U.R.E. Symposium! “Spring Session”

Thursday Apr 19th, 2018, LSF 102

Snacks 3:45, Talks begin at 3:58pm



This Semester's Presentations and Speakers:

3:58 – 4:10pm:

“Survey of parasites infecting *Hexagenia* (Ephemeroptera: Ephemeridae) nymphs from western Lake Erie.”

Student: Amber Zonca; Faculty Mentor: Dr. David Malakauskas.

Burrowing mayflies, *Hexagenia* spp. (Ephemeroptera: Ephemeridae), are important biomonitoring indicators of mesotrophic water quality. However, little research has been done on parasites infecting *Hexagenia* spp. nymphs and what role parasites may play in *Hexagenia* population dynamics. Therefore, the aim of our study is to catalog parasites of a population of burrowing mayfly nymphs from western Lake Erie, Michigan and to describe basic ecological information such as infection prevalence, parasite loads, host specificity, parasite distribution, and host-parasite population dynamics. Burrowing mayfly specimens were collected as part of ongoing biomonitoring studies and examined for parasites microscopically. Based on tentative morphological identifications, *Hexagenia* nymphs are infected with trematodes in the genus *Crepidostomum*, protists of the genera *Vorticella* and *Epistylis*, and a nematode in the genus *Rhabdochona*. Parasites will be molecularly characterized by sequencing appropriate genes. Results from the genomic analysis of burrowing mayfly nymphs show two species present in the samples: *Hexagenia limbata* (n=36; 78%) and *Hexagenia rigida* (n=10; 22%). We present current progress on molecular and ecological work.

4:10 – 4:20pm:

“Oviduct and egg morphology in the Two-Toed Amphiuma (*Amphiuma means*).”

Student: Alexis Fowler; Faculty Mentor: Dr. Tamatha Barbeau

The purpose of this study was to examine the reproductive anatomy of the Two-Toed Amphiuma (*Amphiuma means*), an aquatic salamander. Virtually nothing is known about the reproductive biology of this species due to its secretory behavior of hiding at the bottom of streams, ponds, and swamps. During this study, reproductive tissues from two female *A. means*, collected from a previous research, were examined using histology and microscopy in order to examine the structure of eggs with the ovaries, and the oviducts. Through microscopic morphometric analysis of the oocytes, we found that oocyte size and stage of maturation varied significantly between the two females. The eggs from one female were Stage 2, small pre-vitellogenic oocytes while the second female had larger, Stage 5 vitellogenic and pre-ovulatory oocytes. We also found differences between oviduct epithelial cell and goblet cell heights, with one female clearly showing advanced reproductive maturity of the oviducts.

4:20 – 4:30pm:

“Acidification kinetics of kefir fermentation in dairy milks.”

Student: Coen Hasenkamp; Faculty Mentor: Dr. Jennifer Lyles

Kefir, a probiotic milk beverage, was grown in various types of dairy milk and the resulting reduction in pH analyzed for differences based on the type of milk used. It was hypothesized that differences in milk nutritional composition (whole vs. skim), preparation (fresh vs. powdered), or bacterial load (pasteurized vs. raw) could result in differences in the rate at which the Kefir grains acidify the different types of milk. In addition to studying changes in pH, a novel method of using blood glucose monitors and lactase enzyme to measure remaining free lactose throughout the fermentation was used. This method, although reliable only at weakly acidic pH values, supports the prior observation that Kefir grains ferment lactose.

4:30 – 4:40pm:

“Chromosome preparation in the genus *Sarracenia*: steps towards karyotyping the genus.”

Student: Ryan Holland; Faculty Mentor: Dr. Jeremy Rentsch

Terrestrial pitcher plants of the southeastern United States have evolved to live in low nutrient soils by virtue of their ability to capture and digest prey in their modified leaves. Pitcher plants are known to hybridize freely, so one might expect them to all have a similar karyotype, however a number of discrepancies seem to exist regarding even the basic chromosome count in the genus. Some authors previously reported a $2n$ of 26 while other authors reported a $1n$ of 12. Further, recent work analyzing the transcriptomes of *S. psittacina* and *S. purpurea* suggests a whole genome duplication event relatively recently in the genus. Here, we begin to investigate the karyotype evolution within the genus *Sarracenia* by first developing a method for producing chromosome preparations despite the existence of cork cells surrounding the root apical meristem. Eventually, we will karyotype a number of *Sarracenia* species (and subspecies) including: *S. alata*, *S. flava*, *S. leucophylla*, *S. psittacina*, *S. purpurea* subsp. *purpurea*, *S. purpurea* subsp. *venosa*, and *S. rubra*. We will apply a Giemsa stain to the chromosome preparations in order to produce a G-banding pattern, which will help us identify interspecific homologies. These data should help us elucidate the timing of the whole genome duplication event in *Sarracenia* and the extent to which the group has returned to a functional state of diploidy.

4:40 – 4:50pm:

“Determining the Cause of Massive Cedar Waxwing Death.”

Student: Larnisha Matthews; Faculty Mentor: Dr. Norma Salcedo

This study was designed to identify the cause of death of a flock of Cedar Waxwings collected in Kingstree SC by Dr. Krebs in 1993. We hypothesized that the birds died of cyanide poisoning due to excessive consumption of berries of the Japanese native plant *Nandina*. We based our hypothesis on similar research project performed by the Southeastern Cooperative Wildlife Disease Study in Decatur Georgia. The sample consisted of twelve cedar waxwing specimens in which we weighed determined sex, age and then extracted the contents of their gastrointestinal tract. Five birds were female, three were males, and four were undetermined. The stomach content was identified as berries and seeds. After a few calculations we found the mean of the berries were 3.83, while the seeds mean was 26.5. The standard deviations were 3.270622 in berries and 21.81117 in seeds. Most berries were found in the esophagus while others were in the gizzard. All seeds were in both the gizzard and intestines.

4:50 – 5:00pm:

“Title: Use of ITS gene regions in a phylogeographic study of the Pine Barrens treefrog (*Hyla andersonii*) and related *Hyla* species.”

Student: Katie Piner; Faculty Mentor: Dr. Jeff Camper & Dr. Paul Zwiers

The current range of the Pine Barrens treefrog (*Hyla andersonii*) is restricted to three isolated regions within a wide geographic range, New Jersey, North and South Carolina, and Alabama and the Florida panhandle. This taxon is found in acidic habitats and is particularly susceptible to changes in pH. It is therefore considered near threatened by the IUCN, and is a species of special concern in Florida and threatened in New Jersey. A comprehensive phylogeographic study would estimate the evolutionary relatedness, times of divergence, species status, and potential methods of isolation among these groups. Here we present results of our assessment of the ITS gene regions. Uniformity in the ITS1 has lead to exploration of the ITS2 sequence and secondary structure in both regions. Data on secondary structure may help reconstruct past evolutionary events within the species, and aid in estimating relationships with other *Hyla* species.

The Department of Biology at FMU strongly encourages student participation in research activities. We offer many opportunities for undergraduates to assist in faculty research or develop their own independent research projects. Students can earn academic credit through Special Studies (BIOL 497) and Honors Independent Study.

If you are interested in learning more about P.U.R.E. or available research opportunities, please visit our website at: http://people.fmarion.edu/tbarbeau/PURE_symposium.htm. You can also contact Dr. Barbeau (tbarbeau@fmarion.edu), the coordinator of P.U.R.E., to answer any questions you might have and get you started on a research project!