BIOLOGY V

Section Moderator: Dr. Robert Grammer
Room: Beaman Hitch Science Building 209
Time: 8:00 – 8:45 PM

8:00 – 8:15
"Phototaxis in wild-type and mutant *Chlamydomonas rheinhardtii*"

Lynette C. Rives
Faculty Advisor: Robert Grammer

The goal of this project was to develop a quantitative method for measuring phototaxis in *Chlamydomonas rheinhardtii*. This alga responds to light using its eyespot, which senses light, and its flagella, which are its mechanism for swimming. Along with wild-type algae, two mutant forms were tested, *eye1*, lacking an eyespot, and *pf18*, lacking functional flagella. The phototaxis experiment was performed inside a pipette that had only a portion exposed to light. After some time under light the cells were drained into test tubes in portions that isolated the sections that were in the dark and the section that were exposed to the light. The biomass of the algae was measured by absorbance at 550nm, and some experiments counted the cells microscopically. Preliminary experiments as a test of the method were performed on *Euglena gracilis*. Wild type *Chlamydomonas* responded within 10-30 minutes, whereas both mutants failed to respond at all.

8:15 – 8:30
"Prevalence of *Trypanosoma cruzi* in Conenose Bugs (*Triatoma sanguisuga)* From Selected Peridomestic Areas in Middle Tennessee"

Dana Halchak
Faculty Advisor: Dr. Steve Murphree

Evidence suggests an increasing prevalence of *Trypanosoma cruzi*, the causative agent of Chagas disease, in Tennessee and other southeastern states. Conenose bugs (*Triatoma sanguisuga)* are endemic to middle Tennessee and are know to serve as hosts for *T. cruzi*, however the infection rate is unknown. Conenose bugs were collected in peridomestic areas in middle Tennessee to determine the percentage infected with *T. cruzi*. Polymerase chain reaction (PCR) analysis was performed on DNA obtained from gut contents of bugs collected. Fifty percent of the DNA samples from conenose bugs (n=6) tested positive for *T. cruzi.* With the emerging appearance of these bugs in peridomestic settings, the need for public awareness is of great importance.

8:30 – 8:45

"Investigating a Possible Connection between Pathogen Avoidance and Reproductive Output of *Caenorhabditis elegans*"

M. Christina Inman
Faculty Advisor: Dr. Robert T. Grammer

In this project, the reproductive rates of five *Caenorhabditis elegans* strains were compared to the strains' survival rates when exposed to a known pathogen, *Bacillus thuringiensis* (Bt), to determine whether a correlation existed between reproductive rates and survival rates. Hasshoff et al. demonstrated the role of DAF-2 insulin-like receptors (ILR) in *C. elegans'* behavioral avoidance of pathogenic Bt. The behavioral responses include increased physical evasion and reduced oral uptake of Bt. Inhibition, or down-regulation, of these receptors indirectly results in greater pathogen resistance, longevity, and stress resistance through these behavioral responses Using my data, I wanted to determine whether a correlation existed between the reproductive rates of *C. elegans* strains and their survival rate when exposed to Bt in two conditions: fed and starved. Starvation modulates behavioral avoidance of pathogens and therefore, pathogen resistance. If starvation had modulated such avoidance, then I should have seen a significant difference between the proportion of survivors in the starved and fed conditions. However, my research shows that starving the worms did not lead to greater resistance because the proportions of survivors were the same for both experiments. Although the presence/absence of the *C. elegans'* food source played a seemingly minute factor in the *C. elegans'* resistance, it is possible that the slightly positive correlation between survival rate and reproductive output observed in the experiment without the addition of a food source could be indicative of another effect of down-regulating DAF-2 ILR: greater reproductive output as a behavioral resistance to pathogens.