

Welcome to the 18th Annual P.U.R.E. Symposium - Spring Session!

Tues Apr 18th LSF 207

Snacks 3:45, Talks begin at 4:00pm



This Semester's Presentations and Speakers:

4:00 – 4:15pm:

The Effects of Exposure to Great Pee Dee River Contaminants in Fathead Minnows (*Pimephales promelas*).

Students: Reina McCullough

Faculty Mentor: Dr. Elizabeth Jones

The Great Pee Dee River was once home to a large number of recreational fish species, however populations of these species have declined over time. The Great Pee Dee (GPD), is known to be a heavily contaminated river system, however effects of GPD contaminants on fish are unclear. Previous work has documented high contaminant loads in tissues of GPD fish; these loads have been associated with a suite of impaired health indicators including poor gonad differentiation and widespread tissue pathology. Therefore, we hypothesize that GPD contaminants represent a barrier to fish repopulation and may have an adverse effect on development of fish larvae. To test this hypothesis we exposed *Pimephales promelas* larvae (6 days post hatch) to one of two treatments: clean water (control) or GPD water. Water was changed every 48 hours. We then monitored larval survival and growth for one week. Finally, we examined the transcriptional effects of GPD exposure by performing qPCR on a two of genes known to be altered by contaminant exposure: CYP1A (a biomarker of hydrocarbon exposure), and VTG (a gene used in yolk production; typically upregulated by exogenous hormones). Data from this project will lend insight into the barriers to population recruitment in the GPD, and will provide valuable information to wildlife managers responsible for fish stocking programs.

4:15 – 4:30pm:

Chronic Heat Stress During Vegetative Growth in *Arabidopsis thaliana*: Changes to Vegetative Growth, Stomatal Density, Reproductive Growth, and Gene Regulation.

Student: Jared Ivey

Faculty Mentor: Dr. Jeremy Rentsch

During this experiment, we investigate how chronic heat stress during the vegetative growth stage will affect vegetative and reproductive growth, stomatal density, and gene expression for heat shock genes and genes for stomatal development in *Arabidopsis thaliana*. This is an interesting and important question because it allows us to better understand how plants can adapt to have better water use efficiency and acquired thermotolerance, which relates directly to crop yield and production. Data was taken on several different characteristics of the plant throughout its life cycle, including fruit number per millimeter of basal rosette diameter, phenotypic analysis of stomatal density, and RNA isolations to analyze gene expression for target genes. We found that heat stress does affect all of the following, except for differential gene expression for stomatal development during the time the plant tissue sample was taken. An unexpected result in this experiment was that experimental plants outperformed control plants in producing fruit number per millimeter of basal rosette diameter. That data, as well as the lack of differential gene expression for genes related to stomatal development, leads to a few interesting and possible follow-up experiments that may be performed in the future.

4:30 – 4:45pm:

The Effects of Sodium Lauryl Sulfate on Cytokeratin Gene Expression in *Pimephales promelas*.

Student: Reina McCullough

Faculty Mentor: Dr. Elizabeth Jones

Sodium lauryl sulfate (SLS) is an anionic surfactant found in many household and personal hygiene products such as toothpaste, shampoo, and laundry detergent. It's used in food as an emulsifier, and it's used in agriculture for crop production. SLS works by lowering the surface tension between two materials using its amphiphilic properties; it binds to proteins and disrupts their quaternary or tertiary structure. The National Institute for Occupational Safety and Health (NIOSH) warns against releasing SLS into the environment as it is toxic to aquatic organisms. Studies conducted on humans found that SLS can cause irritation in the skin, and when combined with warm water it is more irritating. Cytokeratin is a protein found in epithelial cells all over the body. It functions to help form tissues such as hair, nails, organs, and gills in fish. Previous studies suggest that exposure to SLS disrupts formation of epithelia and transcription of the cytokeratin gene (KRT1). The disruption of KRT1 gene expression in fish could be detrimental to their ability to respire as gill epithelia are essential for absorbing oxygen and releasing carbon dioxide. This project aims to investigate the potential dangers SLS has on developing fish by evaluating cytokeratin (KRT1) gene expression in *Pimephales promelas* after exposure to SLS. Larval (6 days post-hatch) *Pimephales promelas* were exposed to low, medium, and high concentrations of SLS over the first four weeks of their development. Survival and growth were measured to determine any overtly toxic effects of SLS treatments. In addition, we used NCBI to identify the sequence for *Pimephales promelas* KRT1 mRNA and ran qPCR to examine changes in gene expression.

4:45 – 5:00pm:

COVID-19 Case Surveillance on a University Campus.

Student: Jarrod Woodland

Faculty Mentor: Dr. Jennifer Lyles

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID-19 was first identified in Wuhan, China in late 2019 but has since spread worldwide, resulting in an ongoing global pandemic. Strategic practices have been employed in an effort to control the spread of the virus, including vaccination, frequent testing, quarantine, isolation, contact tracing, mitigation strategies (such as masks and social distancing), and case surveillance. A foundational principle of public health practice, case surveillance involves the collection of information about a case or individual diagnosed with a disease that poses a serious health risk to others, including COVID-19. This practice helps us to better understand diseases, including transmission, and determine appropriate actions to control the spread of the disease. Case surveillance is particularly important in large group settings, such as college campuses. While Francis Marion University (FMU)—consisting of nearly 5,000 students, faculty, and staff—has implemented many protective measures to maintain a safe learning environment on campus, case surveillance would further contribute to this mission by providing important information regarding the landscape of COVID-19 at FMU. Therefore, this study aims to implement case surveillance on campus by administering a survey to consenting individuals being tested for SARS-CoV-2 at the FMU Student Health Center. All survey data collected—including demographic information, vaccination status, symptoms, previous infection, underlying medical conditions, known exposures, residence, personal behaviors, social activities, and COVID-19 clinical diagnosis—are deidentified and analyzed using Qualtrics software. The results of this study may help to inform future preventative measures on campus as we move forward in this pandemic and can be translated to other institutions of similar size, demographics, and geographical location.

The FMU Department of Biology encourages student participation in research. 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 PURE or available research opportunities, scan the QR code.

