UNION UNIVERSITY

Fall Poster Session

November 13, 2018

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Fall Poster Session

TUESDAY, NOVEMBER 13, 2018

SUB Hallway | 11:00–12:30 p.m.

Student Presenters

Biology

Rachel Lewis | "A Study on the Application of Pigments on Tissues Throughout the Plastination Process"

Kristin Smith | "The Effect of Phosphate and other Agricultural Influences on Invertebrate Communities in Riparian Zones Adjacent to Agricultural Lands in Tennessee"

Josh Bowden | "The Effect of Soil Moisture Content on Bottomland Oak Growth"

Matt Tucker | "Analysis Investigating the Effects of *Staphylococcus epidermidis* on Mmp-14 Expression in Zebrafish Retinas"

Sarah Lounsbury | "Life History Notes on the Rare Ectoparasitoid Wasp *Rhopalosoma nearticum*"

Gray Hamilton | "Measuring Glucose Uptake of Zebrafish"

Brandon Johnson | "Feeding Behavior of *Lepomis macrochirus* in Different Light Intensities and Turbidities of Water"

Physics

Cole Le Mahieu | "Improving the HALT Procedure for ATLAS Pixel Detector Modules"

Social Work

Rhonda Hudson and Students in SW 421-1 | "Technology Reduction and Stress Study"

Tammi Heflin, Danerry Miller, and Nicole Sears
"The Effect of Freshmen Year on College Students' Mental Health: A Research Proposal"

Britton Crenshaw, Hannah Graves, and Bethany Pawley
"The Effects of Burnout on Child Welfare Workers: A Research Proposal"

Carly Jo Archie, Kirstie Hurt, and Gabby Maxwell
"Caffeine and Its Effect on College Students Academic Performance: A Research Proposal"

Hannah Mead, Crista Karns, and Kaitlyn Stutz
"The Effect of Hurricane Michael on Children: A Research Proposal"

BIOLOGY

A Study on the Application of Pigments on Tissues Throughout the Plastination Process

Presenter: Rachel Lewis
Faculty Advisor: James Huggins

Plastination, a process of tissue preservation developed by Dr. Von Hagens in 1978, has become a valuable tool to the anatomy and physiology field for teaching and learning. Plastinated tissues have gained popularity due to the retained structural integrity and the ease in handling and storing of the plastinates when compared to other methods of preservation. However, specimens often lose natural coloration throughout the sample. To test restoration of this natural coloration, 3 pigments were added at 4 separate points during the 5-point plastination process to squirrel leg muscle samples. Each of the 12 experimental groups were compared back to fresh squirrel leg muscle samples to determine whether any of the dyes combined with the addition points can restore natural coloration without disrupting the plastination process in any way. This research concluded with promising results for the future of plastination coloration at Union University.

The Effect of Phosphate and other Agricultural Influences on Invertebrate Communities in Riparian Zones Adjacent to Agricultural Lands in Tennessee

Presenter: Kristin Smith
Faculty Advisor: J.R. Kerfoot

Riparian zones are important ecotones that act as natural corridors, chemical buffers, and habitat for wildlife. Riparian zones occur adjacent to agricultural lands, making them susceptible to run off from agricultural fertilizers. Potentially, riparian zones may buffer those pollutants from entering the waterway. Aquatic macroinvertebrate community composition is known to be impacted by pollution and the goal of this study was to investigate correlations between macroinvertebrate communities and physicochemical properties and riparian zone size. It was hypothesized that chemical pollution correlates with a decrease in macroinvertebrate diversity. Samples and measurements were taken at three riparian zone sites throughout Madison County in Jackson, TN. Samples were collected at 3 sites in winter 2017 and in summer 2018. Preliminary results of a Principal Components Analysis indicate significant separation of sites based on physiochemical parameters and estimates of macroinvertebrate communities are different between sites, suggesting, initially, a correlation between the two variables.

The Effect of Soil Moisture Content on Bottomland Oak Growth

Presenter: Josh Bowden
Faculty Advisor: Andy Madison

Wetland habitats are important ecosystems, providing numerous ecosystem services and, when managed appropriately, valuable timber. This research investigates overall growth and survivorship as well as growth rates of 8 oak species planted in a bottomland wetland of West TN at the UT AgResearch Center in Jackson to determine which species would grow best in this environment. Specifically, it compares growth rates over the last 7 years to initial growth rates measured for the first 5 years. The survival and diameter at breast height (DBH) of 136 trees for each species was recorded from February to early March 2018 and compared to data collected from the same trees in 2010. Nuttall oak had the largest mean DBH (13.7cm) while Shumard oak had the lowest (7.88cm). Swamp White Oak has the highest survival percentage (99%) while Shumard oak had the lowest (55%).

Analysis Investigating the Effects of *Staphylococcus epidermidis* on Mmp-14 Expression in Zebrafish Retinas

Presenter: Matt Tucker
Faculty Advisor: Hannah Henson

Staphylococcus epidermidis represents a common source of bacterial infections on indwelling medical devices including those used for retinal procedures. These infections can cause an inflammatory response resulting in the activation of matrix metalloproteinases (MMPs), which degrade the extracellular matrix around the cell. For this study, I examined this relationship between *S. epidermidis* infections and MMP activation using zebrafish (*Danio rerio*). Interestingly, zebrafish retinas possess a robust regenerative ability in response to damage or inflammation. Specifically, I examined changes in MMP-14 expression which is localized to the zebrafish retina. After injecting the bacteria into the zebrafish eye, I collected the zebrafish and used quantitative PCR to look for changes in MMP-14 expression.

Life History Notes on the Rare Ectoparasitoid Wasp *Rhopalosoma nearticum*

Presenter: Sarah Lounsbury
Faculty Advisor: Jeremy Blaschke

Rhopalosoma nearticum is an uncommonly collected ectoparasitoid wasp whose known hosts include the restless bush cricket (*Hapithus agitator*) and loud-singing bush crickets (*Orocharis saltator*). Little is known regarding the biology and life-cycle of this wasp. We investigated the presence of *R. nearticum* at 2 study sites (Shenandoah National Park, VA and Cypress Grove Nature Park, TN) from April-October 2018, and attempted to rear larvae to adulthood. The larva and their crickets hosts were kept in a controlled laboratory environment for observation, pupation, and eventual emergence of adults. *Anaxipha exigua* represents a new host species for *R. nearticum*. Two cocoons and one pre-pupa were observed and described to provide more information on this cryptic species. The species was previously not known to utilize a pre-pupa stage, and the two cocoons are predicted to emerge in March 2019.

BIOLOGY

Measuring Glucose Uptake of Zebrafish

Presenter: Gray Hamilton
Faculty Advisor: Hannah Henson

Premature infants are commonly diagnosed with hyperglycemia due to insulin resistance or glucose infusions. However, long-term effects of hyperglycemia during early development, specifically on the brain, are largely unknown. One structure that may be affected by hyperglycemia is the choroid plexus. The choroid plexus transfers blood into the cerebrospinal fluid through the blood-cerebrospinal fluid barrier. We examined whether hyperglycemia affects the development of this barrier using zebrafish (*Danio rerio*). Zebrafish are transparent during early development, making visualization of internal structures easy. The purpose of this project is to develop methods to induce hyperglycemia in zebrafish and to measure their glucose levels. Multiple trials were performed using different concentrations of glucose to determine what concentrations zebrafish can tolerate. One trial used dexamethasone treatments, a steroid known to promote elevated glucose levels. However, results indicated dexamethasone treatments had an adverse effect on the concentration of glucose present in zebrafish embryos.

Feeding Behavior of *Lepomis macrochirus* in Different Light Intensities and Turbidities of Water

Presenter: Brandon Johnson
Faculty Advisor: J.R. Kerfoot

Bluegill (*Lepomis macrochirus*) are found throughout North America in different light intensities and turbidity levels. Even though this species is found throughout many different light intensities and turbidities of water, it is unknown how these factors influence their feeding behaviors. The objective of this study was to be test light intensity and turbidity effects on feeding kinematics. This was done by filming a bluegill 3 times in different turbidities of water, using a slow-motion camera. First, starting with no turbidity, then adding soil to slowly make the water turbid. ■

PHYSICS

Improving the HALT Procedure for ATLAS Pixel Detector Modules

Presenter: Cole Le Mahieu
Faculty Advisor: Fonsie Guilaran

The purpose of this research project is to improve the HALT (Highly Accelerated Lifetime Testing) procedure for ATLAS pixel detector modules. The system to do this consists of a vibrational table, on which the pixel detector modules are mounted with a pneumatic piston attached directly beneath the table to provide a source of mechanical stress on the modules. Once this first piston operates controllably, two more pistons will be added to the system. In order to guarantee a repeatable procedure for testing the modules' durability, there must be a consistent correlation between the pressure of the pistons and the acceleration of the modules. ■

SOCIAL WORK

Technology Reduction and Stress Study

Presenters: Dr. Rhonda Hudson and Students in SW 421-1

Current research supports the phenomenon among technology use among college students (Samaha & Hawi, 2016, Hampton, Lu & Shin, 2016). Students in SW 421-1 decided in explore the effect of reduction of time spent on social media (specifically Twitter, Facebook, Instagram and Snap Chat, from 10 pm -6 am) on perceived stress, as an in-class research project. During this 9-week study, each student used his/her mobile phone alarm as a reminder to turn these identified social media sites off for the specified time, and also completed the 10-item Perceived Stress Scale (PSS) (Cohen, S., & Janicki-Deverts, 2012). The PSS is reprinted with permission of the American Sociological Association, from Cohen, Kamarck and Mermelson (1983). In addition to deciding on and developing the question, the students also contributed to the literature review, in addition to developing the method and analyzing the data for the results of their research.

The Effect of Freshmen Year on College Students' Mental Health: A Research Proposal

Presenters: Tammi Heflin, Danerry Miller, and Nicole Sears

Faculty Advisor: Rhonda Hudson

Current research supports how freshmen college students experience an increase in stress and difficulty adjusting to college lifestyle seen through poor mental health (Punia & Malaviya 2017). The population the researchers will focus on is College Freshmen. This population was chosen because one out of three college freshmen begin to show signs of mental health issues at the onset of the first college experience. (Guppy & Temple, 2013). The researchers predict college freshmen will have a decrease in mental health during their freshmen year. According to Awang, Kutty, & Ahmad (2014), social support, academic adjustment, and emotional adjustment with freshmen students are linked to their mental health (Awang et. al., 2014). The researchers will use the Patient Health Questionnaire (PHQ-9) assessment tool (Pfizer Inc.1999) to survey students every two months during the first year on depressive symptoms.

SOCIAL WORK

The Effects of Burnout on Child Welfare Workers: A Research Proposal

Presenters: Britton Crenshaw, Hannah Graves, and Bethany Pawley
Faculty Advisor: Ronda Hudson

Current research supports the phenomenon of burnout among social work professionals within child welfare (Lizano & Mor Barak, 2015; McFadden, Campbell, & Taylor, 2014; Hamama, 2012; Van Hook & Rothenberg, 2009; Powell, 1994; Salloum, Kondrat, Johnco, & Olson, 2015). The researchers will explore the effect of burnout (including compassion fatigue, compassion satisfaction, and coping/self-care strategies) within this population. Using a mixed-methods approach, the researchers plan to ask 300 participants to complete the Maslach Burnout Inventory-Human Services Survey (MBI-HSS) (Maslach & Jackson, 1986) and respond with their personal coping strategies (Kim, Ji, & Kao, 2011; Diaconescu, 2015). The MBI-HSS will be reprinted with permission of the Mind Garden, Inc., from Maslach, Jackson, Leiter, & Schaufeli (1986). The researchers will use SPSS Version 17 to analyze the data with inferential statistics (e.g. ANOVA, SEM). The researchers will group common responses aligned with percentage data.

Caffeine and Its Effect on College Students Academic Performance: A Research Proposal

Presenters: Carly Jo Archie, Kirstie Hurt, and Gabby Maxwell
Faculty Advisor: Rhonda Hudson

There has been a recent increase in caffeine consumption among college students to supposedly improve academic performance. (Reissig,2009) It is unknown if caffeine truly improves academic performance, or if it may hinder it. The researchers are planning to gain demographic information through an online survey where college students will self-report caffeine consumption and their GPA. The students will report their cumulative GPA and report their caffeine consumption in how many cups they consume per week. The researchers will seek to recruit a goal 130 participants. The researchers will graph the information received and analyze based on past research examples. The study is quantitative. The research question is: How does caffeine consumption affect academic performance in college students?

The Effect of Hurricane Michael on Children: A Research Proposal

Presenters: Hannah Mead, Crista Karns, and Kaitlyn Stutz
Faculty Advisor: Rhonda Hudson

Past research has shown that hurricanes have had major effects on the survivors' distressing feelings and anxiety (Hensley & Varela, 2008). Our research group in SW 421-1 has decided to study the effects Hurricane Michael had on 100 children (4th to 12th grade), and the possible presence of anxiety and distressing feelings among this population, by asking the parents of the children. Specifically, the researchers would like to explore children's sleeping patterns and school grades after the recent devastation of Hurricane Michael (Kronenberg et al.) The schools in Bay County, FL., will send out a notice letting parents know that the researchers are looking for participants. Those who respond will complete The Disaster Assessment and Referral Tool for Children and Adolescents (National Child Traumatic Stress Network, 2005), and asking parents how their child is sleeping, and obtaining their child's grades (Kronenberg et. al 2009). The researchers will use a mixed method to analyze the data using descriptive and inferential statistics. We will analyze the descriptive data (sleeping patterns and school grades), using NVivo qualitative software, and use SPSS Version 17 to analyze the data from the "Disaster Assessment and Referral Tool for Children and Adolescents" (e.g. independent T tests and ANOVA). ■

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