

**Twelfth Annual  
UNC Pembroke  
Undergraduate Research and Creativity Symposium**



**Program with Abstracts**



Pembroke Undergraduate Research and  
Creativity (PURC) Center  
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Dear Students and Colleagues,

The UNC Pembroke Undergraduate Research and Creativity Center cordially welcomes you to the Twelfth Annual PURC Symposium, a campus-wide celebration of undergraduate research scholarship, creativity, and scholarly entrepreneurship. This year the symposium features seventy-two presentations, by eighty-nine undergraduates and thirty-eight mentors from across the university community. The work you see here today represents faculty mentored work funded by PURC this academic year and students who have taken coursework beyond class and developed their ideas with a faculty member further. Some of these presenters are trying out undergraduate research for the first time; some are making their second, third, or fourth appearance. Want to know how UNCP and PURC prepare our undergraduates for success? Just look around and listen today.

PURC provides a trio of opportunities for undergraduates interested in pursuing mentored research. Student Travel Funds (STF) assist with travel for research, presentation of extracurricular projects or exhibits, meetings, and performances. Student Scholarship Support (S3) funds short-term extracurricular research, creative projects, entrepreneurial, and scholarly endeavors. Summer Undergraduate Research Fellowships (SURF) fund extracurricular research, creative, entrepreneurial, and scholarly endeavors during the summer.

Contributions from Duke Energy help make this program possible. Duke Energy's commitment to higher education helps PURC continue to offer this extraordinary opportunity to our undergraduates.

Many thanks go to all the students and faculty mentors whose works are represented here today. I would also like to acknowledge the PURC Advisory Council for all the hard work they do throughout the year, the Office of Academic Affairs, Provost Ward, and Chancellor Cummings.

It is our desire that the PURC Symposium serve as a launching pad for student participation in research and formal presentation venues. So, please plan to take your works to local, regional, and international meetings.

Best,

Dr. Ryan K. Anderson  
PURC Director  
Associate Professor of History

UNC-Pembroke 12th Undergraduate and Research Creativity Symposium

**Schedule of Events**

**8:15-8:30am: Greetings**

**Dr. David Ward, *Provost***  
**Dr. Ryan Anderson, *PURC Director***

**8:30 9:30 Oral Presentations Part 1**

**"Men Don't Play Flutes": A Feminist Analysis of Gender and Music**  
**Megan Brinson, *Music***

**Interpreting Power in "Un día de estos" by Gabriel García Márquez**  
**Keily Ramirez, *English, Theatre & Foreign Languages***

**Into a Burning House: Black Nationalism and the Negative Impacts of  
Integration on Black-Owned Businesses**  
**Nicklaus Courmon, *History***

**Black Power: As It Relates to the Civil Rights Movement**  
**Tiara May, *Education***

**African American Collegiate Athletes during Jim Crow, 1940-1970**  
**Edward Owen, *History***

**9:30-11:00 Poster & Creativity Session**

**11:00-11:40 Oral Presentations Part 2**

**Studying the interplay between RNA Polymerase II and nucleosome dynamics**  
**Ereny Gerges, *Biology***

**Accurate Measurements Invalidate Published Verdet Constants for Olive Oil**  
**Killian McDonald, *Chemistry & Physics***

**Reducing Alzheimer-type Protein Accumulation Pathology and Associated  
*synaptopathogenesis* to Treat Early Dementia in a Mouse Model**  
**Kaitlan Smith, *Biology***

**11:40-11:45 Undergraduate Research Mentor Award Recognition**  
**Dr. Lisa Kelly, *Biology***

**11:45-12:45 Keynote Address: Are We Really Making a Difference?**  
**Dr. Cathy Marcum, *Government and Justice Studies, Appalachian State University***

**12:45 Closing Remarks**

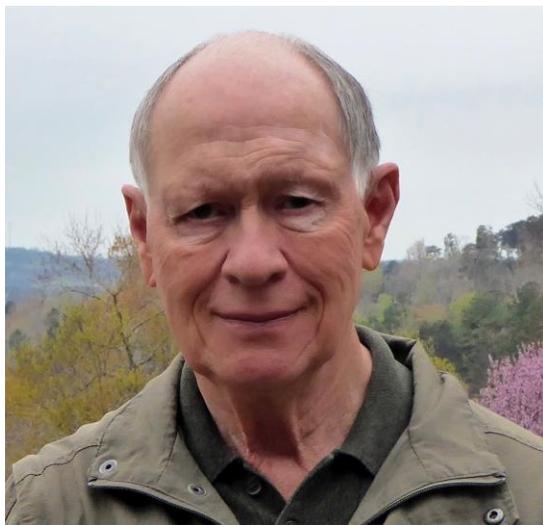
## PURC Symposium 2018: Special Guests

Guest Speaker:

**Dr. Cathy Marcum**

Talk Title: *Are We Really Making a Difference?*

Dr. Cathy Marcum is an associate professor and criminal justice curriculum coordinator in the Department of Government and Justice Studies at Appalachian State University. She earned a Ph.D. in Criminology from Indiana University of Pennsylvania. Her areas of teaching and research focus on correctional issues, cybercrime, and victimization, and she very much enjoys working with students on research. She has over 50 peer-reviewed journal publications and 10 academics in the fields of cybercrime, correctional issues and sexual victimization. Dr. Marcum is also the editor of the journal, *Corrections: Policy, Practice and Research*.



Travel

Award Benefactor:

**Dr. Charles Humphrey**

Charles Humphrey graduated from Pembroke State College in 1965 with a BS in Chemistry (Cum laude) followed by 2 years as a technician at Bowman Gray Medical School. While there he completed coursework at Bowman Gray and Wake Forest University in anticipation of entering graduate school if financial aid became available. A Fellowship was offered by Clemson University in 1967. Charles obtained a PhD in Nutrition/Biochemistry from Clemson in 1972. Charles' research interests at Clemson involved animal nutrition,

infectious diseases, and use of microscopy/electron microscopy. These interests and skill-sets have kept him "hooked" his entire career.

In 2016, Dr. Humphrey generously created the "**Dr. Charles Humphrey Undergraduate Conference Travel Award**" to encourage both undergraduate research and faculty mentorship. With this award, PURC has awarded a discrete number of conference travel awards to undergraduates to attend regional, professional conferences with a faculty mentor. This award opens the door for students who have never conducted research to experience an academic conference. This year the Dr. Charles Humphrey Undergraduate Conference Travel Award has helped nearly a dozen students attend conferences with a faculty mentor.

## List of Presenters & Abstracts

### **- Cathodoluminescence and Energy Dispersive Spectroscopy analysis of Kidney Stones – A first approach**

**Yara Abumohsen**, *Chemistry & Physics*

**Dan Middleton**, *Chemistry & Physics*

Mentor: **Sivanadane Mandjiny**, *Chemistry & Physics*

Presentation Format: Poster

We present results of an electron probe microanalysis study of a variety of kidney stones collected from the urinary tract of several different animals. The primary goal of this project was to investigate the viability of the electron microprobe as a tool to analyze biological materials. Microanalysis of kidney stones should allow determination of their composition and structure. In particular, it is thought that phosphates and oxalates are major contributors to the formation of kidney stones in humans and animals. Electron probe microanalysis data was used to discriminate between the oxalate and phosphate complexes as well as search for other, undiscovered minerals that could possibly be precipitated in the formation of kidney stones. Cathodoluminescence EDS data can be rapidly acquired and could potentially provide a cost-effective and efficient way to analyze kidney stones; providing timely feedback to physicians. These data can be used to develop a dietary plan for the patient based on the kidney stone composition.

### **- Benzoin Condensation**

**Jose Acosta**, *Chemistry & Physics*

**Macie Bethea**, *Chemistry & Physics*

Mentor: **Cornelia Tirla**, *Chemistry & Physics*

Presentation Format: Poster

This work investigates the synthesis of  $\alpha$ -hydroxy ketones, by benzoin condensation at very high speed (using microwave irradiation) using a catalytic amount of thiamine hydrochloride as catalyst. The goal of this work is to develop a protocol for a large variety of reagents like aromatic and aliphatic aldehydes, ketones, esters or oximes.

### **- Development of Microscale Chemical Assays Using Raman Spectroelectrochemistry**

**Britney Alcira**, *Chemistry & Physics*

Mentor: **Dr. Paul Flowers**, *Chemistry & Physics*

Presentation Format: Poster

Methods for the chemical analysis of very small samples are increasingly important in many areas of science and technology. These microscale techniques are useful for samples that are either intrinsically small, of limited availability, expensive, or hazardous when handled in large amounts. Our research group is developing new approaches to microscale chemical analyses that involve measuring the way samples interact with light (spectrometry) when they are electrolyzed, a technique known as spectroelectrochemistry (SEC). This poster describes our work on the development of microscale assays using Raman spectrometry (a technique comparable to infrared spectrometry but better suited for aqueous samples) and screen-printed electrode assemblies. Encouraging preliminary results have been obtained for standard chemical systems, and in the future we hope to demonstrate application to biomedically relevant systems such as drugs and metabolites in urine and serum. This material is based upon work supported by the National Science Foundation under Grant Number 1506817.

**- Investigation of the Antimicrobial Activity of Native Medicinal Plant *Nyssa Sylvatica* var. *Biflora* against commensal human microflora.**

**Uvina Allen**, *Biology*

Mentor: **Conner Sandefur**, *Biology*

Presentation Format: Poster

*Nyssa Sylvatica* var *Biflora* also known as Swamp Tupelo or Black gum is a native plant traditionally used by Lumbee Nation in North Carolina for a variety of ailments, including worms and diarrhea. Due to the use of this plant against parasites, we were interested in investigating the antimicrobial properties of *Nyssa Biflora* against 13 commensal human microflora using the Kirby Bauer agar disk diffusion method. In particular, we tested growth inhibition of Gram negative strains *P. mirabilis*, *P. aeruginosa*, *P. vulgaris*, *E. aerogenes*, *K. pneumoniae*, and *E. coli*, and Gram positive strains *N. sicca*, *M. luteus*, *S. epidermidis*, *S. aureus*, *E. faecalis*, *C. xerosis*, and *B. subtilis*. Aqueous extractions were composed of up to 100 % concentration from the ground stem and leaf materials of the plant. *Nyssa Biflora* extracts were most effective against *P. mirabilis*, *P. aeruginosa*, *P. vulgaris*, *S. aureus*, *S. epidermidis*, *N. sicca*, and *M. luteus*. Minimum inhibitory concentration for leaf-based extracts was 10 % and 40% for stem-based extracts. With evidence of inhibition against bacterial strains that can cause disease more research is warranted. Future research will be conducted on the both ethanol and aqueous extractions of *Nyssa Biflora* against anaerobic strains, including common gut microbiota.

**- Understanding the Interaction of Vegetation, Soil, and Ant Communities**

**La-Teisha Allen**, *Biology*

Mentor: **Dr Kaitlin Campbell**, *Biology*

Presentation Format: Poster

Ants are common organisms that are often used to monitor diversity and conditions in the community because they are sensitive to environmental disturbance and soil quality. Plants are very important because their diversity can influence organisms by changing the resource availability, structure and abiotic conditions of the environment. Several studies have found that seed-dispersing ants are important for plant diversity, however, the role of plant diversity and vegetation complexity on ants remains unresolved.

Our aim was to determine: 1) The role of vegetation on abiotic conditions (moisture, available sunlight, canopy cover) and 2) How vegetation structure and diversity (height/density) affects ant diversity. We established 20 sampling plots where we characterized the plant community (richness and abundance), vegetation structure (height, density, canopy cover), soil variables (texture and moisture), and ant community (richness and abundance). When all the data were collected we did general linear models to determine the relationships between the ant, plant and soil variables. In our results, we had an ant abundance of 289, 20 ant species and 72 plant species found. Ant abundance and richness were negatively affected by soil moisture (especially in flooded areas), but positively affected by vegetation cover. Plant richness was negatively affected by soil moisture, and vegetation cover was negatively affected by canopy cover. Soil texture did not appear in any of the best models. We came to the conclusion that canopy cover drives vegetation cover which affects the ant diversity, and both plants and ants are negatively affected by very moist soil conditions.

### **- Uncovering the Lumber River's Microbial Diversity**

**Cassandra Barlogio**, *Biology*

**Ashley Smith**, *Biology*

Mentor: **Conner Sandefur**, *Biology*

Presentation Format: Poster

The objective of this research is to establish a baseline of the microbial diversity present in the Lumber River by employing metagenomics on DNA extracted from the river water and soil. Research in this area is novel to date. The protocol used started with water sample collection from several locations along the river. Samples were then filtered through a Rapid-Flow unit and the filters were collected. Filtered and unfiltered water samples were used to culture agar plates for future analysis. DNA was extracted and purified from the filter samples using a QIAamp DNA mini kit. Once isolated, samples were analyzed with a NanoDrop spectrophotometer to determine concentration and purity. The samples which contained the two highest concentrations were run through a MinION nanopore sequencer and the initial results were obtained. While these were only the first two runs, the extraction protocol and MinION sequencer were successful in identifying some of the microbial diversity in the Lumber River. Upon further analysis of the sequences unclassified by the MinION program, a significantly higher percentage of *Echerichia coli* related-sequences have been identified. Continued analysis of the unclassified sequences, as well as additional river sites and samples are needed.

## **- Manufacturing an Integrated Apparatus to Measure Boltzmann Constant**

**James Barstrom**, *Chemistry & Physics*

**Killian McDonald**, *Chemistry & Physics*

Mentor: **Bill Brandon**, *Chemistry & Physics*

Presentation Format: Poster

As an engineering project, ten “plug and play” modular units capable of measuring Boltzmann’s constant were designed, constructed, and tested. A personal computer power supply (PC-PS) supplies current, via a potentiometer to a temperature controlled power transistor configured in common base mode. The PC-PS also powers an operational amplifier, allowing transistor collector current to voltage conversion via a feedback resistor. The units were designed so that students in an introductory modern physics lab may be introduced to concepts in solid-state physics in a non-rigorous manner via measurements of Boltzmann constant over many decades of current – with temperature dependence, in a relatively trouble-free manner.

## **- Height and Student Recognition on Campus**

**Korinne Bethel**, *Business*

Mentor: **Teagan Decker**, *English Theatre & Foreign Languages*

Presentation Format: Poster

This research project is meant to bridge a gap in height-preference research. The current research has covered the corporate world and high school students, but to our knowledge there is no research on college students who are selected or self-selected because of height preference. Using a survey of graduating seniors, this research aims to see if height is predictive of college activities and involvement, especially leadership on campus. This research will reveal when and how the height preference begins to give taller people an advantage through the experience and accolades they are able to add to their resumes as they enter the professional world.

## **- Farmworker Awareness Site Visit**

**Heather Boggess**, *Psychology*

**Sara Goldsberry**, *English Theatre & Foreign Languages*

Mentor: **E. Brooke Kelly**, *Sociology & Criminal Justice*

**Michele Fazio**, *English Theatre & Foreign Languages*

Presentation Format: Poster

For decades migrant farmworkers have been mistreated by their employers, harassed by the public, and subjected to some of the harshest working and living conditions in this country. The problems facing these people stem from societal issues related to race, gender, nationalism, and capitalism. As a class we have utilized social scientific methods and literary analysis to further document and explore the circumstances of migrant workers. Furthermore, we have created a service learning project in which we formed community between students and farm workers through a local site visit, during which we gave collections from a donation drive, participated in sports, and had a group meal. Future projects in this area are recommended to continue the advocacy for migrant farmworkers and their lived experiences.

### **- Dissecting the Synthetic Lethality Between *htz1Δ* and RPB2-2SL: An analysis of a second site suppressor**

**Cora Bright**, *Biology*

Mentor: **Maria Santisteban**, *Biology*

Presentation Format: Poster

Histone H2A.Z, coded for by the HTZ1 gene in *Saccharomyces cerevisiae*, is a highly conserved variant of histone H2A with many reported important roles in chromosome segregation, transcription regulation, maintenance of heterochromatin-euchromatin boundaries, DNA repair, cell cycle control and resistance to genotoxic stress, among others. Unlike its homologues in other species, the protein is not essential in yeast, as deletion of this gene is not lethal. We previously reported that Htz1 has a role in transcription elongation, but the mechanism of this is not yet understood. We uncovered a synthetic lethality between a HTZ1 null (*htz1Δ*) and a mutation in the second largest subunit of the RNA pol II (*rpb2-2*). That is, either mutant is viable individually but the combination is lethal suggesting that Htz1 and Rpb2 work together to facilitate an essential function. Moreover, the synthetic lethal phenotype is dominant, i.e. an extra wild type copy of the RPB2 gene in the *rpb2-2* mutant does not alleviate the dependence on Htz1, suggesting that Rpb2 could stall on the elongation template in the absence of Htz1. In order to study the mechanism of the Htz1 role in transcription elongation, we have focused our efforts on the *htz1ΔRPB2-2SL* synthetic lethality. A second site suppressor analysis of the *htz1ΔRPB2-2SL* synthetic lethal uncovered links to SET2, which encodes a protein that methylates H3K36 in RNA polymerase II transcribed regions of the genome. The nature of the interactions between HTZ1 and SET2 is understudy. We are working towards finding the mechanism that causes a non-functional SET2 to suppress the synthetic lethal phenotype of the *htz1ΔRPB2-2SL*.

### **- State Historic Marker for the Battle of Hayes Pond**

**Chapell Brock**, *History*

**Kathryn Sonnen**, *History*

**Chris Hunt**, *History*

Mentor: **Jamie Martinez**, *History*

Presentation Format: Poster

The Fall 2017 Public History course prepared a submission to the State Historic Marker Committee to establish a marker for the 1958 Battle of Hayes Pond, when Lumbee activists broke up a Klan rally in Maxton. In order to qualify for the marker, we needed to prove not that the event had taken place, but that the event had statewide significance. The research for this project was conducted in two stages. First we located and reviewed secondary historical sources on the event to understand the current interpretations and scholarship on the subject. After this we began to gather and analyze primary historical sources to corroborate secondary sources or to find contradicting evidence. This also included legal opinions and statements by North Carolina government officials related to Civil Rights activism and Klan activity throughout the 1960s. At this juncture the research group began to condense and interpret the information available through different historical lenses, arguing that the incident had a dramatic impact on the North Carolina State Government's interactions with and policies towards the Klan in North Carolina, and thus had shaped the history of the state as a whole. In December our proposal was put before the committee in Raleigh and was approved with minimal debate due to the thoroughness of the research and essay. After additional negotiations between the Committee, the Lumbee Tribe, and the Department of Transportation, the marker is fully approved and will be dedicated on July 5, 2018.

### **- The Impacts of Gender and Dependency on Cell Phone Use While Driving**

**Summer Brown**, *Psychology*

**Brittany Powell**, *Psychology*

**Tia Wilder**, *Psychology*

Mentor: **Rachel Morrison**, *Psychology*

Presentation Format: Poster

Increases in cellphone technology have significantly impacted the way we communicate in our daily lives. Cellphones have served many beneficial uses, but they can also bring disadvantages, such as, the psychological risk of dependency. The 95 participants for this study included conveniently sampled college students from the University of North Carolina at Pembroke (UNCP), who had various ethnicities and ages ranging from 18 to 39. The researchers measured cellphone dependency and how it impacts cellphone use while driving, and they also investigated potential gender differences in cellphone dependency. A Pearson correlation test was conducted, but did not find a significant relationship between cellphone dependency and cellphone use while driving. The data revealed that women were not more dependent on cellphones than men. However, as predicted results revealed that drivers with high dependency on cellphones were more likely to use cellphones while driving than drivers with low cellphone dependency. Future research needs to be done on cell phone dependency due to the inconsistencies in the findings of gender differences relating to cell phone dependency and in the way that dependency is being

measured.

### **- Developmental Polycyclic Aromatic Hydrocarbons Reduces Cardiac Sarcomere Size and Cell Morphology in Zebrafish**

**Amelia Brown**, *Chemistry & Physics*

Mentor: **Dan Brown**, *Biology*

Presentation Format: Poster

Studies have shown that high concentrations of certain polycyclic aromatic hydrocarbons (PAHs) cause cardiac morphology defects during fish development. While gross cardiac defects have been well described, little is known about how PAH mixtures specifically impact cardiac morphology on a cellular level. Therefore, we sought to determine how developmental PAH exposures influence sarcomere and cell structure and size. In our study, transgenic zebrafish labelled with *cmlc2:Cypher GFP* and *cmlc2:MKate caxx* were crossed to mark cardiac sarcomeres and cardiomyocyte cell borders. Embryos were then exposed at the 4-8 cells stage to varying dilutions of a complex PAHs mixture derived from sediments collected at the Elizabeth River Superfund site. Larval hearts were then imaged and assessed at 120 hours post fertilization (hpf) via fluorescent confocal microscopy and image J respectively. Our findings suggest that developmental PAH exposure resulting in atrium and ventricle misalignment caused sarcomere shortening and decreased cell size. This study strengthens our basic understanding of how PAHs specifically impact cardiomyocyte and cell morphology ultimately leading to gross misalignment of the atrium and ventricle.

### **- The Effect of Carbohydrates on the Growth and Bioluminescence of *Photobacterium luminescens***

**Joshua Cade**, *Biology*

Mentor: **Leonard Holmes**, *Chemistry & Physics*

**Devang Upadhyay**, *Chemistry & Physics*

Presentation Format: Poster

*Photobacterium luminescens* is a Gram-negative, pigment-producing enteric bacterium, bioluminescent, and pathogenic to insects. This bacterium has the capability to undergo phase variation. *P. luminescens* is symbiotically associated with the soil-dwelling nematode, *Heterorhabditis bacteriophora* and plays a crucial role in the reproduction cycle of this nematode. The phase I variant of *P. luminescens* produce bioluminescence, the red anthroquinone-derived pigment which is a symbiotic trait that infective juveniles of *H. bacteriophora* exploit to attract insect hosts. This study examines the effects of different carbohydrates at various concentrations on the growth of *P. luminescens* phase I variant and production of bacterial luminosity in liquid culture. In this study, 2x nutrient broth was used as a liquid growth media. The bioluminescence

was measured with a Modulus™ single tube luminometer (Turner Biosystems) and reported in terms of relative luminosity units (RLU). The bacterial growth density was measured at 600 nm using a spectrophotometer. The carbohydrates that were utilized in this study were sucrose, sorbitol, trehalose, dextrose and maltose. The concentrations were varied from 1% to 7%.

### **- Bringing More Attention To National Farmworkers Awareness Week**

**Joshua Cade**, *Biology*

**Alexis High**, *Biology*

Mentor: **Michele Fazio**, *English, Theatre, and Foreign Languages*

**Brooke Kelly**, *Criminal Justice & Sociology*

Presentation Format: Poster

National Farmworkers Awareness Week is an effort to bring awareness to many social issues farmworkers face in the US. Over 85% of the fruits and vegetables sold and produced in this country are handpicked, leading to the assumption that much of that work is done by day-laborers. Farmworkers face very demanding work daily, in the third most dangerous job in the US. Farmworkers are also not guaranteed certain federal provisions such as overtime and unemployment insurance. With all these injustices in mind, our class has embraced National Farmworkers Awareness Week as a service-learning project to bring more attention of these harsh realities to the UNCP campus. To bring that awareness to fruition, each member of the class will be hosting various events on campus with the goals of NFAW in mind. Part of the service component of the class will also involve the use of a table in the UC that will serve as a place for other students to learn more about NFAW. Another aspect of this service project will involve collaboration with the Pine Needle in the form of interviews and pictures to also share with other students and faculty on campus. The goal is to inform as many individuals as possible about NFAW to possibly invoke positive change that would eventually result with equal protection and equal rights for the farmworkers living in the US.

### **- Personality Profiling in Eastern Box Turtles**

**Maria Chavez**, *Biology*

Mentor: **John Roe**, *Biology*

Presentation Format: Poster

Eastern Box turtles face challenges every day in their environment from predators, finding resources and a mate, prescribed burning, and diseases. With these factors coming into play, personality traits could be an important factor in their day to day behaviors and overall fitness. We measured personality traits in two populations of Eastern Box Turtles using a simple field test and examined whether personality scores varied between sexes, body sizes, or population. We also examined whether personality score was correlated with in field behavior and fitness

measures including growth rates, timing of spring emergence, and home range size. Turtles were radio tracked to identify sizes of home ranges, annual growth rates, and timing of spring emergence. We performed personality tests which told us how bold (risk-taking) or shy (risk-averse) an individual was by placing each individual in a dark mesh bag for one minute and monitored how long it took each turtle to come out of its shell. We predict the bolder individuals will travel farther, grow faster, and emerge earlier from winter dormancy, giving them more access to resources. Shy individuals may have more limited opportunities for resource acquisition, but may experience other benefits such as lower energy expenditure and increased survival. A better understanding of how personality varies among individuals would help biologists interpret behaviors and fitness of free-ranging animals.

### **- Does the Fear of Self-Compassion Lead to a More Negative Rejection Response?**

**Gwendolyn Coker**, *Psychology*

Mentor: **Ashley Allen**, *Psychology*

Presentation Format: Poster

Self-compassion involves being kind to oneself, recognizing that one is not alone in his or her failures, and acknowledging one's emotions without becoming consumed by them (Neff, 2003). Self-compassion has been linked to a protective attitude against negative situations and outcomes of rejection. People who fear self-compassion may worry that they are not deserving of self-compassion, that being self-compassionate is emotionally upsetting, or that showing themselves compassion could make them less desirable to others (Miron, Seligowski, Boykin, & Orcutt, 2016; Kelly, Carter, Zuroff, & Borair, 2012). The purpose of this study was to address whether low fear of self-compassion acts as a buffer in response to the negative effects of rejection. A total of 134 students (Men = 45, Women = 87, Other = 2) participated in this study using an online survey. Students were randomly assigned to imagine attempting to converse with a group of people at a party and either being accepted or rejected. Following the scenario, students completed measures of belonging, burden, and negative affect. In addition, participants completed the Fear of Self-Compassion Scale. As predicted, participants who read about being rejected felt less belonging, more burden, and more negative affect than those who imagined being accepted. There was only one significant effect for fear of self-compassion showing that people who are higher in fear of self-compassion report feeling more burdensome when imagining the scenario. We did not find a buffering effect of fear of self-compassion suggesting that low fear of self-compassion does not protect people from the negative effects of rejection.

### **- Happiness and Physical Activity in Pet Owners**

**Barbara Dieringer**, *Psychology*

**Hydeia Leach**, *Psychology*

**Elizabeth Krostyne**, *Psychology*

Mentor: **Rachel Morrison**, *Psychology*

Presentation Format: Poster

Throughout history, the relationship humans have had with animals has evolved for a variety of purposes. Subsequently, researchers have been interested in the effects that animal companionship can have on people. Previous research suggests that therapy animals and pets can have positive impacts on well-being. However, there has also been conflicting research that suggests there is little benefit from pet-ownership. The current study compared pet owners to non-pet owners to determine whether pet owners were happier and if they exercised more than non-pet owners. Participants included 52 University of North Carolina at Pembroke faculty, staff, and students of various ethnicities, ages, and gender. Participants were given a survey to measure their levels of happiness and physical activity. Our findings suggest that pet owners were not significantly happier than non-pet owners. When data for levels of exercise between pet owners and non-pet owners was compared, the results suggest that pet owners did not exercise significantly more than non-pet owners. Future research needs to be done to give a more definitive answer as to how pet ownership impacts levels of happiness and physical activity. For example, pet owner attachment and whether pets are motivating factors for exercise can be taken into consideration.

### **- A Spectroelectrochemical Assay for Vitamin C**

**Xin Dong**, *Chemistry & Physics*

Mentor: **Paul Flowers**, *Chemistry & Physics*

Presentation Format: Poster

Ascorbic acid (Vitamin C) is an essential nutrient that is needed to maintain the health of skin, teeth, bones, and blood vessels. Vitamin C is found in many fruits and vegetables, and it is a popular ingredient in dietary supplements due to its many confirmed health benefits and very low toxicity. Measuring the amount of vitamin C in consumer products is an important part of quality assurance efforts in the food and pharmaceutical industries, as this enables accurate reporting of nutritional information. For some food products, the vitamin C level must be monitored and adjusted during processing to avoid negative effects on taste, aroma and shelf life. A variety of analytical methods are used to assess vitamin C content, each with practical benefits and drawbacks, and the development of improved methods is an active area of research. Work in our lab is focused on developing new assays for various compounds of biological importance that are based on making light absorption measurements (spectrometry) on samples undergoing electrolysis (electrochemistry), a technique known as spectroelectrochemistry (SEC). These SEC measurements are capable of providing advantages in analysis speed, cost, and selectivity. Presently we are developing a new assay for vitamin C that may be applied to various samples including dietary supplements and fruit juices. This poster describes the results of our work on this new SEC assay. This material is based upon work supported by the National Science Foundation under Grant Number 1506817.

## **- Biological Pesticide Application and Technology Utilizing *Heterorhabditis bacteriophora* and *Steinernema carpocapsae***

**Gabrielle Downs**, *Chemistry & Physics*

Mentor: **Leonard Holmes**, *Chemistry & Physics*

**Devang Upadhyay**, *Chemistry & Physics*

Presentation Format: Poster

*Heterorhabditis bacteriophora* and *Steinernema carpocapsae* are entomopathogenic nematodes (EPNs) used as a biocontrol measure for crop insect pests, as they provide advantages over common chemical insecticides. The commercialization of nematode mass production as well as increase in efficacy are important to make them successful. Certain biological traits, including a broad insect host range, their mutualistic relationship with a highly virulent bacterium, and safety towards non-target organisms (plants, livestock, humans, etc.) has increased the usage of these EPNs as an alternative to commercial insecticides. The mass production can be achieved through *in vitro* solid and liquid state fermentation processes. Currently, high costs, short shelf-life, and unstable field efficacies are among the major challenges that limit the development and large-scale application of these nematode products. This presentation will focus on the application of these bio-control agents as well as advantages and challenges of the current culturing methodologies used for the mass production of beneficial nematodes.

## **- Cellular Pathway Modulations by Potential Alzheimer's Disease Therapeutics**

**Ayanna Edwards**, *Biology*

Mentor: **Ben Bahr**, *Biology*

Presentation Format: Poster

Alzheimer's disease (AD) is a protein accumulation disorder that exhibits synaptotoxicity. Currently there are many therapeutic treatments undergoing investigation in search for a successful method to prevent or slow AD. A recent set of AD treatment studies highlights the upregulation of the lysosomal enzyme cathepsin B (CatB), but other studies have shown that blocking the protease calpain, a calcium sensitive protease, is also a target for an AD treatment. Potential therapeutic and weak inhibitor E64d (14  $\mu$ m IC50) also up-regulates CatB. PADK and E64d were compared regarding the blockage of calcium-induced cytoskeletal deterioration in brain samples. Calpain also completely degraded PTPN13 a protein tyrosine phosphatase. In calcium treated samples a PTPN13 band at ~100 kDa was degraded and the degradation was blocked by CX295, a specific calpain inhibitor. We also tested a natural product, an extract of the mullein plant. It provided evidence of synaptic protection and we are doing further testing for any connection to CatB modulation. The findings of this study indicate that PADK's positive and selective effects on CatB are consistent with human studies showing such elevation correlates with improved memory. We are identifying cellular elements that are a part of the pathology.

Effects on calpain versus CatB are part of the current study to compare compounds and on the calpain inhibitor CX295 versus cathepsin B- targeting compounds like Z-Phe-Ala-diazomethylketone (PADK). This evaluation could help develop a unique strategy to treat MCI (pre-AD) and AD.

**- Does Facebook dependency impact college students' GPA and romantic relationship satisfaction?**

**Faith Elder**, *Psychology*

Mentor: **Rachel Morrison**, *Psychology*

Presentation Format: Poster

Since its inception in 2004, Facebook has become one of the largest social media websites. With Facebook's popularity, is it important to understand the implications of overuse on highly dependent individuals. This study was designed to measure the impact high Facebook dependency may have on both student's grade point average (GPA) and romantic relationship satisfaction levels. Surveys measuring Facebook dependency, GPA, and romantic relationship satisfaction levels were given to 96 students attending the University of North Carolina at Pembroke. These students varied in gender, age, ethnicity, and education levels. We found no significant differences between the GPA of the high and low Facebook dependency groups. There was also no significant difference found between the romantic relationship satisfaction levels of the high and low dependency groups. These findings show that the different levels of Facebook usage may not negatively affect GPA or romantic relationship satisfaction. This could suggest that today's college students are not as negatively impacted by Facebook use because it is a part of their daily lives; however, there are other factors that need to be further researched.

**- A Highly Accurate Analysis Method for Large Angle Physical Pendula**

**Mariam Gerges**, *Chemistry & Physics*

**Andrew Stephens**, *Chemistry & Physics*

Mentor: **William Brandon**, *Chemistry & Physics*

Presentation Format: Poster

A Pasco rotary motion sensor and Capstone software are used to determine the corresponding periods and amplitudes of variable length pendula constructed from readily available stainless steel (Thorlabs optical) posts. The data, along with our analysis technique, give highly accurate results when compared to an exact theory, which is provided by the arithmetic-geometric mean (AGM) function. However, the validation of our method for analysis warrants discussion since the equation of motion leading to the exact solution results from assuming an incomplete theory for a real physical pendulum since it ignores friction.

### **- Prison Life: Female Prisoners**

**Whitney Givens\***, *Sociology & Criminal Justice*

Mentor: **Renee Lamphere**, *Sociology & Criminal Justice*

Presentation Format: Poster

While women are incarcerated, they face a variety of difficulties that they must overcome. These obstacles range from being separated from their families and children, losing outside relationships while trying to protect themselves from dangerous relationships behind bars, to making friends and becoming family with other inmates, to being pregnant while incarcerated, and having to give birth and trying to figure out if and how they will regain custody of their children once released. All of these factors can have a substantial impact on how the women behave, interact, and finish out their sentences.

### **- Measuring Linear Expansion Using the Fraunhofer Diffraction Pattern**

**Sandra Huneycutt**, *Chemistry & Physics*

Mentor: **William Brandon**, *Chemistry & Physics*

Presentation Format: Poster

Utilizing a previously designed experiment, we determined the linear coefficient of thermal expansion (CTE) of three metal samples using a metal U-shaped sample affixed with two razor blades forming a slit and a means to monitor temperature, in conjunction with a helium-neon laser. Essentially, the thermal expansion is determined by measuring the average change in the fringe widths as a function of temperature. In addition to simplifying the experimental method, we obtained the following percent errors for our samples – 3003 aluminum (3.9%, 4.3%), 360 brass (7.8%, 5.9%), and 110 copper (0.6%, 1.1%) for the –(4th, 6th dark fringes, respectively). Finally, we addressed potential improvements in experimental design and method.

### **- Types of food and lifestyle effect on Diabetes and Cholesterol.**

**Neveen Issa**, *Chemistry & Physics*

Mentor: **Siva Mandjiny**, *Chemistry & Physics*

Presentation Format: Poster

This research focused on diabetes type 2 and cholesterol diseases in Asian countries, specifically South Korea. The chemistry and biochemical pathway of most common foods consumed in Korean diet were studied; along with diabetes and cholesterol disease percentage data among different groups of ages within the population. The purpose of this research was to relate the relationship between two diseases diabetes type 2 and cholesterol to lifestyle and type of food of

different culture.

### **- Gender Differences when Coping with Depression**

**Jerica Janney**, *Psychology*

Mentor: **Shilpa Regan**, *Psychology*

Presentation Format: Poster

Major depression is one of the most common mental illnesses that is characterized by sadness, loss of interest/pleasure, low self-esteem, disrupted sleep/appetite, fatigue/loss of energy, and poor concentration. Coping is a mediator between stress and major depression. Coping can be defined as the thoughts and acts people use to manage specific stressful situations (problem-focused coping) as well as their emotions (emotion-focused coping). Gender is a factor that affects the input (determining if a situation is stressful) and the output (coping responses and health implications) of the stress process. The hypothesis was that men use more problem-focused coping mechanisms, whereas women use more emotion-focused coping mechanisms and tend to seek more social support. There were 114 students (73.7% female and 26.3% male) aged 18-22 attending a Southeastern University. They voluntarily completed four measures: BEM Sex Role Inventory, Center for Epidemiologic Studies Depression Scale, coping measure, and demographic measure. Overall, there were no significant gender differences in coping mechanisms. The results of this study contrasted with other studies which found that men use more problem-focused coping mechanisms, whereas females use more emotion-focused coping strategies and seek more social support. Our findings suggest that there may be a decline in gender differences of coping mechanisms and college students are generally more liberal in thinking with regards to appropriate social roles.

### **- Automated Aeroponics System using IoT for smart farming**

**Stephen Kerns**, *Mathematics & Computer Science*

Mentor: **Joong-Lyul Lee**, *Mathematics & Computer Science*

Presentation Format: Poster

In recent years, the Internet of Things (IoT) has received much attention in the areas of industry and academia. Currently, IoT technologies are applied in many fields and changing lives in many areas such as smart homes, smart cities, smart grids, autonomous cars, and the industrial internet. However, traditional agriculture is still waiting for many changes to occur in networking technology, especially in IoT. Many researchers and engineers are working towards applying IoT technology to traditional agricultural methods. Aeroponics farming is an efficient and effective process for growing plants without using soil. When we apply IoT technology to an aeroponics system, it is expected that there will be many improvements such as decreasing water usage, increasing plant yield, minimizing rate of growth and reducing the workforce. In this paper, we

designed and implemented a new automatic aeroponics system using IoT devices. Our system is comprised of three main components: a mobile application, service platform and IoT devices with sensors. The mobile application provides the user a graphical user interface to monitor and adjust the aeroponics system. The service platform is a middleware system that provides information for the mobile application to store the gathered information from IoT devices using sensors within the aeroponics system. The IoT device uses sensors within the aeroponics system to control each pump and access data. Our work is a new application in the agricultural industry and is expected to be a promising application that will help the farmer in increasing productivity in farming and reducing his or her carbon footprint.

### **- Comparing Home Ranges of the Eastern Box Turtle**

**Amy Kish**, *Biology*

Mentor: **John Roe**, *Biology*

Presentation Format: Poster

As part of a six year study, eastern box turtle have been studied to examine home range differences between prescribed fire areas and non-prescribed fire areas. Weymouth Woods has implemented prescribed fire practices for 40 years, while Lumber River only recently perform their first prescribed fire. We wanted to look at the differences in home ranges within both areas. 20 turtles of mixed sex were tracked at each location using radio telemetry. Turtles locations were recorded weekly at each location. We then used GIS to map the location points of each turtle. Using GME we were then able to calculate each turtles home range using Minimal Convex Polygons (MCP). We were also able to use these points to calculate the home range for each turtle using GME to create the Kernel Density (KDE) for each turtle. We wanted to compare the differences in not only the home ranges but the average home range size depending on the type of method used for calculation. The results showed that females at both locations had much larger home ranges than males. We also saw that in the areas using prescribed fires regularly the home ranges were noticeably smaller for all turtles. The KDE average per turtle was nearly double that of the MCP's at both locations. We expected to see marked difference in the home range of turtles where prescribed fires are used and felt our data supported our hypothesis. We believe that prescribed fires directly impact the home range area of the eastern box turtle. In areas using prescribed fires, the impact on turtles is not only fire mortalities but also the home range required for survival.

### **- Investigation of Mercury Content in the Lumber River**

**Dana Lamberton**, *Chemistry & Physics*

**Brianna Thompson**, *Chemistry & Physics*

**Megan Bryne**, *Chemistry & Physics*

Mentor: **Roland Stout**, *Chemistry & Physics*

Presentation Format: Poster

Coal contains trace amounts of mercury that, if not filtered out, are released into the air when it is burned for fuel. During the 1920s through the 1970s coal was widely used as a heat source and fuel in homes and industries in the communities around the Great Lakes and the Ohio and Tennessee Valleys. The decades of burning coal has been the primary contribution to the mercury pollution of the Lumber River, and although the use of coal as a fuel is now less popular and more regulated, the effects of the past remain. Mercury has found its way not only into the water and sediments of the river, but also into the flora and fauna that live in and around it. We have used microwave plasma atomic emission spectrometry to investigate the concentration of mercury within these organisms that live in the river, particularly three different species of fish; largemouth bass, chain pickerel, and flathead catfish. The largemouth bass and chain pickerel contained no detectable mercury, while the flathead catfish was discovered to have significant level, close to the order of 1 part per million. Ongoing investigation is underway to verify these results.

#### **- Antimicrobial Effects of St. John the Worker Plant Based Native American Tea**

**Cheyenne Lee**, *Biology*

Mentor: **Conner Sandefur**, *Biology*

Presentation Format: Poster

Patients with obesity and type II diabetes are characterized by an altered gut microbiome. Antimicrobial agents may be a possible avenue to restore normal gut microbiota. This experiment was designed to test *Hypericum hypericoides* or St. John the Worker, a traditional medicine of the Lumbee Native American tribe of North Carolina, for antimicrobial properties on thirteen different bodily bacteria. The bacteria were streaked over thirteen plates, and each plate was divided into six sections. The tea was brewed with approximate concentrations of 100% and 75% with 0.5g of plant to 0.5mL of water and 0.375g of plant to 0.5mL of water respectively. The tea extract was taken from the plant matter to be plated separately. The extracts and plant matter took up four slots of the plate while the other two slots contained distilled water as a negative control and 70% isopropanol as a positive control. The results suggest growth inhibition of five of the thirteen studied species: *Corynebacterium xerosis*, *Micrococcus luteus*, *Bacillus subtilis*, *Staphylococcus aureus*, and *Neisseria sicca*. Our experimental data suggest a possible avenue of therapy by using traditional medicines to target altered microbiomes in obesity and type II diabetes.

#### **- Malus Law Teaching Apparatus: High Quality at Near Zero-Cost**

**Dakota Lee**, *Chemistry & Physics*

Mentor: **William Brandon**, *Chemistry & Physics*

Presentation Format: Poster

The Law of Malus is an essential background topic if one is to understand elementary aspects of experimental spectropolarimetry. Unfortunately, a commercially available educational laboratory apparatus can be cost prohibitive. In this work, an inexpensive apparatus (less than \$5.00 per unit) is described assuming the availability of USB power (laser diode) and a digital multimeter (monitor photocurrent). Six robust, user friendly, and functionally transparent units, affording relatively accurate data, were constructed for our introductory optics lab activities. In addition to polarization via selective absorption and Malus' Law, these particular units consist of parts that expose students to some fundamental aspects of USB architecture and electro-optics. Finally, the data analysis methodology of the lab activity can be extended from the first year college/high school physics level to intermediate level physics using non-linear curve fitting techniques.

### **- Scoliosis: A Silent Medical Condition**

**Jullienne Lim**, *Biology*

Mentor: **Velinda Worix**, *Biology*

Presentation Format: Poster

Scoliosis is an abnormal sideways curvature of the spine that affects a wide age range within the population. Scoliosis currently affects millions of people in the United States but many are unaware of this medical condition since it is not a disorder that would cause immediate death. The purpose of this research was to discuss and bring awareness to the topic of scoliosis as written by various published articles. Findings show that as scoliosis progresses, risk for a variety of health complications increase which may include but are not limited to: spinal injury, paralysis, back pain, decrease in cardiac and respiratory function, immobility, and more. It was established that scoliosis can be classified into different categories based on how it was developed, severity of the curvature's angle, and age of onset. Various treatment options have been developed and are being implemented but there is ongoing research to provide less invasive treatment for patients. Because research on scoliosis is not as widely known as other medical conditions, this paper was written with the purpose of educating the public about it.

### **- Experiences Unique to the Female Correctional Officer: Effects on Job Satisfaction and Stress**

**Kathleen Lindsey**, *Sociology & Criminal Justice*

Mentor: **Renee Lamphere**, *Sociology & Criminal Justice*

Presentation Format: Poster

Female correctional officers experience the workplace in ways that differ from their male counterparts. This research primarily examines the way in which these experiences have an impact on female officers' levels of stress and overall job satisfaction. Further, this research highlights the importance of women working in corrections through their contributions to institutional security and rehabilitation efforts. Central topics include female perceptions of risk, the masculine culture within corrections, sexual harassment, peer and administrative support. It is important to discuss these issues in order to improve the working environment not only for female officers, but all involved in the system. This research has implications for future studies, namely in regard to perceptions of sexual harassment, administrative support, and shifting social values concerning gender.

### **- Is Reagan's America a "Paradise City?"**

**Avery Locklear**, *History*

Mentor: **Ryan Anderson**, *History*

Presentation Format: Poster

Guns N' Roses' hit, "Paradise City," appeared on 1987's *Appetite for Destruction* and is remembered as a party song with little substance or social message. But, read within the context of eighties conservatism it sounds more like a protest song than heavy metal mindlessness. "Paradise City" emphasized individualism and offered listeners an alternative to the conformity of the decade's culture. Using primary sources that included interviews, magazines, articles, and music videos I established the song's meaning and the band's stance towards American cultural attitudes. Secondary sources in the form of biographies, journals, and documentaries let me frame my understanding of how the song impacted young people, and the Reagan administration's attitude towards people who did not meet the Moral Majority's social expectations. Writing this cultural history meant looking not only at the band members' personalities, but also what audience and critics thought about metal music at the time and how the song affected listeners' attitudes. "Paradise City" remains an influential song because it denounced the Reagan administration's claims that conventional behavior created social consensus. As a follow up, a comparison of Guns N' Roses with bands in other rock genres of the period would prove useful. I am also curious whether or not conservatives recognized the band's criticism and would like to understand why Guns N' Roses included this political song on an album that generally focused on sex, drugs, and partying.

### **- "Evidence for Antimicrobial Properties in Fresh Aloe vera Gel Extracts"**

**Ashley Lytle**, *Biology*

Mentors: **Conner Sandefur**, *Biology*

**Lisa Kelly**, *Biology*

Presentation Format: Poster

Aloe vera is a common plant species with many claimed medicinal uses not necessarily proven by science. A few claims include burn remedies, cavity fighters, improved digestion, and detoxification. Data were collected from bacterial inhibition experiments of thirteen bacterial species on agar plates to see if A. vera does indeed have anti-microbial properties that could be associated with the claims made by many pharmaceutical and health companies. Agar diffusion experiments with filter discs of gel extracts prepared from fresh leaves, along with positive and negative controls, were performed. The results showed A. vera inhibited the growth of certain species of bacteria. *Micrococcus luteus* was the most affected bacterium so far, with an average inhibition ring measuring ~7.5 mm. This bacterium species is commonly found on human skin and in the air, but is usually harmless with only a small possibility of being a pathogen to people with compromised immune systems. Further experiments will attempt to eliminate extraneous variables and find a new extraction method for the gel to produce more consistent results. This study will potentially encourage further research to find new possible uses for the plant, along with possible side effects of the plant's antimicrobial activity on the human body.

### **- Dreams of Graduate School? Advice from Professors in the Sociology and Criminal Justice Department**

**Kayla McCarty\***, *Sociology & Criminal Justice*

Mentor: **Renee Lamphere**, *Sociology & Criminal Justice*

Presentation Format: Poster

During my internship as a teacher's assistant in fall 2017, I interviewed faculty members in the sociology and criminal justice department at UNC Pembroke from September to November. In these interviews I asked each member of the faculty about their experiences in higher education, their past and current research project activity, and how they contribute to the three major aspects of their careers: teaching, service, and research. My presentation will highlight the advice I was given by the faculty members as well as the variety of perspectives surrounding their careers.

### **- The Virulence Properties of *Photobacterium luminescens* and Its Potential Application in Pest Management**

**Elijah Mebans**, *Biology*

**Jalen Chappelle**, *Biology*

Mentors: **Leonard Holmes**, *Chemistry & Physics*

**Devang Upadhyay**, *Chemistry & Physics*

Presentation Format: Poster

Photorhabdus luminescens is a Gram-negative, phase variant bacterium that symbiotically associates with bio-control Heterohabdus bacteriophora. Phase I P. luminescens produces many virulence factors, toxin complexes, lipase enzyme and antimicrobial compounds which cause insect death. The toxins produced by P. luminescens are classified into four different groups: (1) the “makes caterpillars floppy” (mcf) toxins (2) the toxin complexes (Tcs); (3) the Photorhabdus insect related (Pir) proteins and (4) the Photorhabdus virulence cassettes (PVC). Lipase enzyme released from the bacteria converts host tissue hemolymph into proper nutrients for the nematodes. The antimicrobial compound also has a function in the reproductive phase of the nematode cycle, allowing them to reproduce without contamination by other bacteria. This presentation will review virulent properties secreted by P. luminescens and their role in the killing of insects.

### **- Metis Fiddling: A Matter of Identity**

**Sarah Middleton**, *Music*

Mentor: **Joshua Busman**, *Music*

Presentation Format: Poster

The Metis, descendants of French and English fur traders and Native American women, have been politically and socially sidelined for centuries - branded as half-breeds or mixed - and the 1982 Constitution Act which finally granted them Aboriginal status in Canada is not the end of the story. In this presentation, we will look at a brief history of the Metis struggle for recognition and identity and then focus in on the specific ways that the Metis fiddle tradition has mirrored this struggle. Although it could be dismissed as simply a holdover from French and British fiddle traditions of colonial times, we will see instead that the Metis fiddle has become a syncretic instrument that continues and exemplifies many of the traditions and values of Native heritage, including oral history, percussion, dance, and rhythm. Over the past two hundred years, the Metis have taken the fiddle and developed their own musical style which, although similar to European traditions, bears many uniquely aboriginal characteristics and values. This parallels the Metis' struggle for identity as they have come to terms with what it means to be Metis in a world that often seeks to define race and identity solely by ancestry. Just as the Metis fiddle tradition has descended from several different traditions, but become its own distinct tradition, the Metis have also forged their own unique sense of identity and culture.

### **- On the Universality of Frequency Swept Driven Oscillators**

**Zach Miller**, *Chemistry & Physics*

**Chase Curt**, *Chemistry & Physics*

Mentors: **Tom Dooling**, *Chemistry & Physics*

**William Brandon**, *Chemistry & Physics*

Presentation Format: Poster

This investigation focuses on the transient behavior of frequency swept driven oscillators. Specifically, the experiments consisted of two analogous systems; a mechanical oscillator consisting of a mass on a spring and an electrical circuit consisting of an inductor and capacitor connected in series (i.e. a tank circuit). Essentially as each of these systems is driven to oscillate by a linearly-swept frequency driver, a novel beat pattern emerges as a result of the competition of the resonant frequency and the continuously changing driver frequency. The differential equation describing such systems cannot be solved with analytical techniques, hence a numerical solution was computed using Green's Function and simulated using Python. The similarity of the two systems further extends our notions of the universality of driven oscillators. The accuracy of the model is justified by the remarkable agreement between the numerical simulation and the acquired data.

### **- Investigating the relationship between gut microbiota and glucose regulation in type 2 diabetes**

**Cody Morazan**, *Mathematics & Computer Science*

Mentor: **Conner Sandefur**, *Biology*

Presentation Format: Poster

Type 2 Diabetes (T2D) is a chronic metabolic disease that causes the body to irregularly produce and respond to a hormone, insulin, which results in elevated blood glucose levels. With disrupted and inflamed intestinal epithelial cells, gut microbiota lose their balance and diversity which causes unregulated metabolism of carbohydrates into glucose and desensitization of insulin signaling. As glucose continues to leave the intestinal lumen and enter the blood without proper insulin production to utilize that glucose, this metabolic dysfunction ultimately results in chronic T2D and can be fatal. T2D statistically affects Native American adults more than any other race or ethnicity. Plants that were once used to control such diseases are no longer used as often and it is known that the gut microbiomes of Native Americans are moderately different than the gut microbiomes of other races and ethnicities. In this project, we created a computational model of glucose-dependent microbiota in intestinal epithelial cells. Future work will employ the model to identify potential therapeutic approaches for T2D. Long-term consequences of continued research on the importance of gut microbiota and its relationship to metabolic diseases could potentially lead to therapeutic and preventative treatments of such diseases.

### **- Establishment of the Modern Olympic Games**

**Nathaniel Nash**, *Health, Physical Education & Recreation*

Mentor: **Marian Wooten**, *Health, Physical Education & Recreation*

Presentation Format: Poster

The Olympic Games have been around for many years. They date all the way back to the Ancient Greeks. Originally only men could participate in the Games and it was part of a religious festival to honor the Greek god Zeus. The modern Olympics still entail some of the Ancient Olympics practices, but over the many years the Olympics has grown tremendously. The Olympics is not just devoted to where it originated now, Greece, but is a major worldwide event.

**- National Parks**

**Arjay Navalta**, *Health, Physical Education & Recreation*

**Aarika Jacobs**, *Health, Physical Education & Recreation*

**Christine Rolfes**, *Health, Physical Education & Recreation*

**Dominic Foy**, *Health, Physical Education & Recreation*

**Jalen Baskerville**, *Health, Physical Education & Recreation*

Mentor: **Marian Wooten**, *Health, Physical Education & Recreation*

Presentation Format: Poster

Our objective of this poster is to educate and inform individuals upon the subject of the history of national parks and national parks in general

**- Gentrification & Displacement Resulting from Urban Renewal Efforts, and Planning Policies to Combat These Effects**

**Jacob Newton**, *Political Science & Public Administration*

Mentor: **Joe West**, *Political Science & Public Administration*

Presentation Format: Poster

Urban renewal is the process of revitalizing dilapidated or “worn down” urban areas; while this typically has the effects of improving infrastructure, creating economic growth, and increasing traffic to an area, an often-cited downside is the concept of gentrification: locals, especially the socioeconomically disadvantaged, are pushed out of the area by rapidly-increasing rent prices and property taxes. Since this burden falls disproportionately on the poor – those who already have low mobility and fewer options than wealthier groups – these people are likely to experience significant difficulty and distress when searching for a new place to live. The research questions I set out to answer are as follows: What is the relationship between [race/gender/age/SEI] and displacement following urban renewal efforts? How effective are policies aimed at curbing displacement associated with urban renewal (e.g. rent ceilings, government buyouts of private property, quotas for low-income housing, etc.)? Which of the aforementioned groups receives the greatest benefits from these types of policies? How do these

types of policies impact economic growth in the affected areas?

### **- Nazis, Propaganda and the Press**

**Levy Pait**, *History*

Mentor: **Robert Brown**, *History*

Presentation Format: Poster

The Nazi government wielded the press and media as weapons to achieve their goals. They took complete control of the press and radio to spread their message and only their message. They deprived their people of factual information, instead twisting information to support their agenda. They intentionally spread lies through the media as propaganda. Only certain information was allowed out of the country. The essay will answer the question of how the Nazis controlled the press, both domestic and foreign. The essay will also address the question of what information they allowed to be reported to their own citizens, as well as to the rest of the world. It is important to understand the power of the press and media. The Nazis were able to use them as propaganda machines to deceive their people. It was also used to feed false information to other nations about the state of affairs in Germany. This information is critical to understand how the Nazi government was able to convince its people to carry out their plan.

### **- The Effects of Acculturation on Mexican American Population**

**Dominique Perez**, *English, Theatre & Foreign Languages*

Mentor: **Enrique Porrua**, *English Theatre & Foreign Languages*

Presentation Format: Poster

This research explores the mental health of 2nd generation of Mexican Americans whose parents were immigrants, singling out factors that prevent this population from obtaining a balance in mental health. I focus on factors such as additive, substitutive, and rejective acculturation particularly in identity, beliefs, and values that result in alienation of the child/adolescent. Acculturation processes cause mental suffering, which often result in the isolation of the child/adolescent from his/her parents. The child usually begins acculturation at the time school starts; it is at this time when the child branches out to explore American culture that has been out of his/her reach while at home. This idea is formed from media, peers, or role models. As the child grows, he/she learns to maneuver by balancing both cultures. Then, when the child starts practicing the values of American culture over the values of his/her own culture, he/she can experience parent-child/adolescent conflict. These tensions come from differences between cultures, such as difference in identity based on gender roles, differing definitions in mental health beliefs and conflict with parenting style. In Mexican culture, family is the foundation to a child's mental wellness. Usually home tensions are resolved; however, there are factors that

heighten tensions. Seeking psychological services in Mexican culture is taboo; in this paper, I explore this common problem regarding mental health faced by 2nd generation Mexican Americans that is often ignored. I will conclude that these unresolved family conflicts and child/adolescent isolation threaten the mental health and future of Mexican youth in America.

### **- The Relationship between PTSD, Family Support, Combat-Experience, and Post-battle Experience**

**Kiana Perez-Jimenez**, *Psychology*

Mentor: **Brian Smith**, *Psychology*  
**Ashley Allen**, *Psychology*

Presentation Format: Poster

PTSD (post-traumatic stress disorder) is a condition that is caused by exposure to a traumatic event. Some symptoms include avoidance, hypervigilance, or emotional numbing (Tsai et al., 2012). PTSD is one of the most common disorders in the military population (Xue et al., 2015). Research suggests that soldiers that have strong bonds with those that are close to them are less likely to experience some of the problems that the disorder may cause (Tsai et al., 2012; Charivastira & Cloitre, 2008). This research investigated the relationship between PTSD, combat experience, post-battle experience, and family support. An online survey was conducted, with the main population being military personnel. The main hypothesis is that family support will mediate PTSD severity among those that have experience combat and post-battle experience. Using a hierarchical regression we found a significant 3-way interaction between family support, combat experience, and post-battle experience on PTSD severity ( $\beta = 2.954$ ,  $t = 2.451$ ,  $p = .015$ ). Specifically, family support impacts individuals who are high in post-battle experience but low in combat experience.

### **- The Robeson County Groundwater Project: A Partnership With The Community**

**William Prutzman**, *Geology & Geography*  
**Samuel Barnes**, *Geology & Geography*

Mentor: **Daren Nelson**, *Geology & Geography*

Presentation Format: Poster

The Department of Geology and Geography at UNCP is teaming up with industry leaders and county and state administrators to analyze our local ground water resources so that we can sustainably manage the resource. The mission of the Robeson County Ground Water Project is to monitor the impacts of ground water use on the local Black Creek Aquifer so that water users can better understand how the water flows in the aquifer, how it is currently being used, and to plan for future use. Undergraduates are helping site 15 monitoring wells across the county and on the UNCP campus. Through collection and analysis of measurements taken from these wells and

the merging of older county, state, and national data we have been able to monitor the variations in ground water levels of the aquifer from the 1940s to present day. The data collected is being used to create a regional publicly accessible database that categorizes ground water data based on the well used to record it. Undergraduates create well construction and formation diagrams for each of the wells by synthesizing all the data for each well, create monthly piezometric maps for the region based on the measurements from the wells, and then report these findings to the county on a semi-annual basis. The monitoring of the ground water in the region and the database will hopefully act as a reference for water managers to determine how increased industrial and agricultural uses are impacting our local groundwater systems and to effectively manage the resource. The program has been a collaborative effort to help undergraduates, industry leaders, and public administrators learn more and manage our local water resources.

### - Acto Latino - La Quinta Temporada

**Keily Ramirez**, *English, Theatre & Foreign Languages*

*Mentor: Ana Cecilia Lara, English Theatre & Foreign Languages*

Presentation Format: Poster

Acto Latino is a diverse group of both Latino and non-native Spanish speakers with one goal: to present theater performances in the Spanish language. Although we are a young group, we have a certain passion for theater. Our group has presented our play, *La Quinta Temporada*, several times over the spring semester.

### - Antimicrobial properties of *Sassafras Albidum*

**Fredejah Royer**, *Biology*

*Mentor: Conner Sandefur, Biology*

Presentation Format: Poster

*Sassafras Albidum* is a plant traditionally used by Southeastern Native American communities to treat bacterial based infections. The leaves, roots, and bark of this plant was used to make a tea, which was then consumed by the individual to treat infection. Based on this traditional use, we wanted to investigate the antimicrobial properties of *Sassafras Albidum*, with an overall goal of addressing disrupted gut microbiota common to individuals with type 2 diabetes. The first step was composing aqueous extracts using the leaves of *Sassafras Albidum* and testing them against 13 aerobic and facultative anaerobic bacteria via agar diffusion. I have found the inhibitory actions take place when using a lower concentration of *Sassafras Albidum* between .06-.08 grams to 500 microliters of Distilled Deionized H<sub>2</sub>O. Thus far, extracts were identified as having inhibitory action against *Micrococcus luteus*, *Neisseria sicca*, and *Pseudomonas aeruginosa*. While extracts did not inhibit the growth of; *Bacillus subtilis*, *Staphylococcus epidermidis*, *Escherichia coli*, *Klebsiella pneumonia*, *Enterococcus faecalis*, *Corynebacterium xerosis*,

*Proteus vulgaris, Proteus mirabilis, Enterbacter aerogenes, and Staphylococcus aureus.* After further replications of this experiment are completed, one future direction is investigate the impact of aqueous extracts on the anaerobically growing bacteria commonly found in the gut as a potential therapeutic avenue. To address the disrupted gut microbiota observed in type 2 diabetes.

**- National Farmworkers Awareness Week Social Media Campaign**

**Regina Ryan**, *Sociology & Criminal Justice*  
**Spencer Ray**, *Sociology & Criminal Justice*

Mentor: **Brooke Kelly**, *Sociology & Criminal Justice*  
**Michele Fazio**, *English Education*

Presentation Format: Poster

I have developed a social media campaign to bring awareness to farmworkers and the conditions that they face. The social media campaign uses Twitter as its platform to help reach a large population in a timely manner while also using local news outlets to reach the local community. The goal of this campaign is to increase awareness about National Farmworkers Awareness Week (NFAW) and to create more social responsibility for the public. Everyday for the month of March leading up to National Farmworkers Awareness Week, a statistic regarding farmworkers, provided by the nonprofit organization Student Action with Farmworkers, will be posted to bring awareness of the adversities that farmworkers face and bring forward a population of people that are often hidden or forgotten about in our world today. The tweets provide statistics about the demographics of farmworkers and different alarming conditions that farmworkers must constantly face. Twitter provides analytics with every tweet that can show how many interactions are made. This data will help to analyze the effectiveness of this social media campaign overall. In addition to Twitter, newspaper outlets have been contacted with information regarding NFAW to increase awareness within the local community and to encourage the community to attend the events that we will be hosting during NFAW.

**- Searching for new antibiotics in the soils of southeastern North Carolina**

**Brenna Sifford**, *Biology*

Mentor: **Conner Sandefur**, *Biology*

Presentation Format: Poster

Antibiotics are drugs used to treat bacterial infections and other related illnesses in humans. Unfortunately, overuse and misuse of antibiotics has increased the amount of multidrug resistant bacteria in the environment. A possible solution to antibiotic resistance is to identify novel antibiotics produced by the largely undescribed microorganisms occurring in our natural

environment. The overall goal of this project is to identify new antibiotics from soil-dwelling bacteria. As part of a microbiology lab course, soil samples were collected from various locations in southeastern North Carolina. To isolate bacterial colonies, soil was diluted in water and plated on agar plates. Single isolates were selected and characterized via Gram staining and selective media testing. Isolates were also assayed for antibacterial activity against *E. coli* and *S. aureus*, two common multi-drug resistant bacteria. Preliminary results suggest that ten percent of bacterial colonies isolated from soil inhibit the growth of *E. coli* and *S. aureus*. Future directions include generating aqueous and alcohol extracts to identify putative compounds generated by our growth-inhibiting-soil-dwelling bacteria. The identification of new antibiotics would provide healthcare professionals with tools against evolving bacterial species, many that may become or have become resistant to other antibiotics already in use.

### **- The Effects of Invasive Fire Ants (*Solenopsis invicta*) On Ant Diversity in Coastal North Carolina Longleaf Pine Savannas**

**Hannah Swartz**, *Biology*

**Grant Wood**, *Biology*

Mentor: **Lisa Kelly**, *Biology*

**Kaitlin Campbell**, *Biology*

Presentation Format: Poster

The invasive fire ant (*Solenopsis invicta*) outcompetes native species, which causes harm to many ecosystems. The purpose of this study was to identify which ant species resided in a longleaf pine savanna ecosystem in North Carolina as well as the impact of this invasive species on native ant communities. During the summer of 2017, workers from invasive fire ant colonies were collected from three sites on the coast. To survey the ant fauna, fire ants and pitfall traps were surveyed along belt transects. The overall analysis will be conducted by comparing the species richness and abundance of the pitfall samples with the number of fire ant colonies present within 12-meter diameters of the pitfall traps. Among the sites surveyed, an additional invasive species of ant was identified, the Chinese needle ant (*Brachyponera chinensis*), in high abundance. These invasive species were more abundant than the native species. Currently, these results indicate that the invasive species may be outcompeting the native species, but further analysis and studies will need to be completed to strengthen these findings. Continued monitoring will also need to be done to detect any changes in the ant community. The sites surveyed in this study are some of the most diverse in terms of fauna and flora in North Carolina, so it is paramount to understand the impact of the invasive ants in order to mitigate any environmental effects of the species.

### **- Nosema and Varroa Mite Monitoring in UNCP Honey Bee Colonies**

**Marica Thomas**, *Biology*

Mentor: **Kaitlin Campbell**, *Biology*

Presentation Format: Poster

In recent years honey bee (*Apis mellifera*) colonies have greatly decreased due to habitat loss from developed landscapes, pesticides, and parasites. Honey bees perform vital pollination for plant reproduction. They are critical to the ecosystem, biodiversity and food diversity, being responsible for between 1.2-5.4 billion dollars in crop productivity in the US. The goal of this study is to discover if there are relationships between parasites and temperatures to better understand bee health. We are monitoring honey bee colonies for parasites such as Varroa mites, an external parasite that sucks the blood of larvae and transmits viruses, and Nosema, a microsporidian parasite, that affects the digestive system. Once a colony is infected with nosema, life expectancy is reduced, brood are infected failing to produce adult honey bees and dysentery infection increases. The impacts of these parasites weaken bee health, decrease population and can cause a collapse. We are also recording temperatures inside and outside of the hive using remote sensing iButtons. Bees regulate the internal beehive temperature to ensure the brood develops correctly. Observing both the external and internal temperatures will give insight on how bees maintain temperature stability. My hypothesis is that very cold or hot outside temperatures create more stress on the colony and therefore increase parasite loads, and when the colony becomes weak due to high parasite loads, their internal temperatures may become less carefully regulated. By understanding these relationships beekeepers can potentially promote optimal health and help bee populations that are affected by parasites.

### **- In Vitro Development and Reproduction of the Entomoparasitic Nematode (EPN) *Steinernema carpocapsae* in Monoxenic Liquid Culture**

**Jeison Valencia**, *Biology*

Mentor: **Leonard Holmes**, *Chemistry & Physics*

**Devang Upadhyay**, *Chemistry & Physics*

Presentation Format: Poster

*Steinernema carpocapsae* is an entomopathogenic nematode used as a biological control agent for crop insect pests. A bio-control agent is a safe and healthy alternative to chemical pesticides. These nematodes can infect a wide range of insects that have a negative impact to farm lands while not causing harm to the beneficial insects or the soil. *S. carpocapsae* has a symbiotic relationship with *Xenorhabdus nematophila* bacteria. The nematode provides a route for the bacteria to get to pest insects, which will be killed within 24-48 hours. Thus, this symbiotic relationship is what makes *S. carpocapsae* a bio-control agent. The current work involves studying the growth cycles and the mass production of the nematode using liquid culture fermentation technique. *Galleria mellonella* larvae were infested by the *S. carpocapsae* nematodes and the resulting dead larvae were dissected to isolate *X. nematophila* from the hemolymph. There are several in vitro technologies used to mass produce this biological control agent. Mass production in liquid media is an ideal culturing method as it increases nematode yield and lowers production cost. Reproduction of *S. carpocapsae* was conducted by using a 5L Sartorius Stedim Biostat® fermentation system. In this batch culturing-process,  $7.0 \times 10^4$  IJs/mL

yield was achieved from  $3 \times 10^3$  IJs/mL inoculum concentration after 13 days. In the bioreactor, it is possible to identify the different nematode life stages by the nematode's appearance and to calculate the percentage of each life stage.

### - A Geography of Dystopia

**Aaliyah Weatherington\***, *Geology & Geography*

Mentor: **Dennis Edgell**, *Geology & Geography*

Presentation Format: Poster

This presentation will show that geography is much more than just maps. A lot of people don't realize that Geography is related to every aspect of today's society, including pop culture. Diving further, pop culture isn't just things on the surface (i.e. movies and books), but also the specifics of things on the surface (i.e. genres of movies and books). This presentation will focus on the Dystopian genre due to the rising popularity of it in today's pop culture. A dystopia is the idea of an imagined setting (time and place) in which everything is unpleasant in some aspect. Using some examples, this presentation will also portray how the Dystopian genre is related to the five themes of Geography: region, diffusion, ecology, interaction, and landscape.

### - National Farmworker Awareness

**Aaliyah Weatherington\***, *Sociology & Criminal Justice*

Mentor: **Brooke Kelly**, *Sociology & Criminal Justice*

**Michele Fazio**, *English Theatre & Foreign Languages*

Presentation Format: Poster

Eating food is a part of our daily culture, but where does our food come from? People always enjoy eating a good meal but are not likely to stop and think about where it came from. Even if they did, they would not understand what goes on behind the scenes. Migrant farmers spend months being away from their family and working under harsh conditions just so you and I can enjoy meals. My presentation touches on National Farmworker Awareness Week; more specifically, I will be creating a map or maps that promote awareness of migrant farmworkers in America.

### - African-American Women During Jim Crow

**Aaliyah Weatherington\***, *History*

Mentor: **David Walton**, *History*

Presentation Format: Poster

Reconstruction was meant to help African Americans thrive in society with the banishment of slavery, allowing for everyone to be recognized as citizens and that their rights (such as the right to vote) be protected. Instead of leading African Americans into a time of opportunity, Reconstruction led them into an era of oppression due to several factors: the split amongst the Republican Party, the Compromise of 1877, and loopholes in the Reconstruction Era Amendments. The failures of Reconstruction led to near-slavery for African Americans, marking the beginning of the Jim Crow Era. This study explores how African American women were affected and how they were able to overcome their struggles. African American women occupied the bottom of the racial and gender-based hierarchy. They had to work harder than men if they hoped to be successful. They had the lowest-paying jobs, yet many of them held jobs in an effort to supplement the low wages African American men earned. Many African American women became involved in politics speaking out against the racial-gender hierarchy as well as against general racial discrimination. The identified women provided a voice for their, and following, generations. African American women focused on women's lives, Black Liberation, and discrimination in other aspects of their lives (such as education). As a result of individual and communal struggles, African American women overcame oppression via personal experiences, involvement in the Black Liberation movement, providing voices for their communities, and by publishing writings that gave hope to African Americans.

#### **- Changes in Social Form Dominance of Invasive Fire Ants in a Carolina Bay (Antioch)**

**Grant Wood**, *Biology*

**Hannah Swartz**, *Biology*

Mentor: **Lisa Kelly**, *Biology*

Presentation Format: Poster

The red imported fire ant (*Solenopsis invicta*) exists in two different social forms, monogyne and polygyne. Both forms apply different means to a common goal, reproductive success. The polygyne's ability to have multiple egg-laying queens improves its chances of reproductive success, which could promote its ability to persist in intact systems, like wetlands. In a Carolina bay (Antioch Bay), both colony forms were present in the year 2013. Before conducting research in the summer of 2017, we hypothesized that, because of prolonged flooding, few colonies would persist and that polygyne colonies would be more common. Using two belt transects, the site was sampled for fire ant colonies. Colony samples were subjected to PCR techniques to genotype the social form. Comparing results from 2013 and 2017, we saw a dramatic drop in abundance of total colonies and a change in the dominant social form (from monogyne in 2013 to polygyne in 2017). We conclude that the disproportionate decrease in monogyne colonies is likely attributed to a reduced chance that the single egg-laying queen will escape flooding. While unclear whether flooding was the underlying cause for these observed changes, it is a likely candidate. Monogyne colonies are territorial, and unlike their polygyne counterparts, resources are not shared among them. Sharing of resources may be critical for the survival of individual colonies where flood conditions limit access to food. We intend to study how changes in social

form dominance may influence the site's native biota.

- **"Men Don't Play Flutes": A Feminist Analysis of Gender and Music**

**Megan Brinson**, *Music*

Mentor: **E. Brooke Kelly**, *Sociology & Criminal Justice*

Presentation Format: Oral

When we think of music, various phenomenon come to mind, often in the form of sounds and pleasant feelings. Music is capable of reaching the deepest parts of our humanity and drawing out what is often too complex to express verbally. Yet these sounds, no matter how powerful, are in turn influenced by the same social constructs that shape our societies; one particular construct is gender. This research examines the relationship between gender and music through a feminist lens, with particular regard to the way that music is "gendered" and the effect this has on those who participate in this art form. Using sociological understanding gained from an independent study in feminist theory as well as compiled research related to the academic discipline of musicology, this study will demonstrate that many aspects of music are influenced by cultural ideas surrounding gender and masculinity. This includes instruments themselves, music education in schools, women in the professional music industry, and even the academic study of music. Understanding the influence that these ideologies have over music brings forth connections between certain instruments and masculinity or femininity, as well as between the performing arts and which performers are most successful. These findings can inform music educators, performers, potential musicians, and sociologists alike in regard to reducing the stigma around certain instruments and creating an environment of equality for all involved.

- **Into a Burning House: Black Nationalism and the Negative Impacts of Integration on Black-Owned Businesses**

**Nicklaus Courmon\***, *History*

Mentor: **David Walton**, *History*

Presentation Format: Oral

From Martin Delany to Malcolm X, the ideology of Black Nationalism has been misunderstood, undervalued, and underutilized. Despite marking the end of racial discrimination in public accommodations, the Civil Rights Act of 1964 also marked the beginning of the extirpation of black-owned businesses and limited the circulation of the black dollar in the black community. One must acknowledge the significance that Black Nationalism has played in the history of black people in the United States and the potential role it could play in their future. Had Black Nationalism been embraced for what it truly was, the negative impacts of desegregation would not have outweighed its positive impacts. This study delves into the conception of Black Nationalism and its evolution in the United States, and the effect it had on Black Economics.

This study also details the political, social, and economic foundations of Black Nationalism and the importance Black Nationalists intended it to serve in the development of black people in America. By examining W.E.B. DuBois' voluntary segregation theory, Booker T. Washington's idea of self-reliance, and Garveyism, this project correlates Black Nationalism and Black Economics.

### **- Studying the interplay between RNA Polymerase II and nucleosome dynamics**

**Ereny Gerges**, *Biology*

Mentor: **Maria Santisteban**, *Biology*

Presentation Format: Oral

In *Saccharomyces cerevisiae*, histone H2A.Z is coded by the HTZ1 gene. It is a highly conserved variant of histone H2A and has many reported important roles in chromosome segregation and transcriptional regulation, among others. In yeast, this gene is not essential, unlike its homologues in other species where a deletion of this gene is lethal. We previously reported that HTZ1 has a role in transcription elongation, but the mechanism of this is not yet understood. It has been shown that many elongation mutants exhibit a "cryptic" initiation phenotype, i.e. initiation of transcription by RNA pol II occurs inappropriately within the protein-coding regions of genes, rather than in the proximal promoter regions. Suppression of cryptic initiation requires a repressive chromatin structure. It is then expected that mutations in chromatin structure modifying factors, as well as elongation mutants, which may fail to reassemble nucleosomes in the wake of elongating RNA polymerase II (RNAPII), would display cryptic initiation phenotypes. We tested our strains for cryptic initiation phenotypes and have found that HTZ1 $\Delta$  cells exhibit a mild cryptic initiation phenotype and HTZ1 $\Delta$ RPB2-2SL has a strong cryptic initiation phenotype. A plausible explanation for these results is that the Rpb2-2 mutant polymerase is prone to cryptic initiation, and when nucleosome dynamics is altered in the absence of HTZ1, the effect is exacerbated.

### **- Black Power: As It Relates to the Civil Rights Movement**

**Tiara May\***, *Education*

Mentor: **David Walton**, *History*

Presentation Format: Oral

This paper discusses the history of both the Civil Rights Movement and Black Power Movement, while providing context to the shift away from civil disobedience toward black nationalistic militancy; within the minds of diasporic Africans living in the United States circa the Civil Rights Era. Black Power: As it Relates to the Civil Rights Movement intends to identify the ways in which Black Power, as an ideology and movement, affected the Civil Rights Movement and the struggle against systematic oppression. The Civil Rights Movement is comprised of

social and political efforts by African Americans to attain social equality, political presence and freedom from institutionalized racism in the American South. Theoretically, The Black Power Movement is the same thing; sharing the goals and intentions of the Civil Rights Movement. It was more specifically the strategies and semantics between the two movements that differed the most. The Black Power Movement wanted equality and freedom from oppression just the same but rejected passive means to obtain it. This paper is a result of the information gathered through research, primary source texts and class discussion coupled with my love and admiration for Black Power. This course reinforced my passion for African American History and my end goal of teaching it as a professor. This paper is a reflection of the great teachings of Dr. David Walton.

**- Accurate Measurements Invalidate Published Verdet Constants for Olive Oil**

**Killian McDonald**, *Chemistry & Physics*

Mentor: **Bill Brandon**, *Chemistry & Physics*

Presentation Format: Oral

Materials with large Verdet constants can be exploited in many useful applications such as; optical switches, modulators, nonreciprocal elements in laser gyroscopes, optical circulators, magnetic field sensors (i.e, electric currents). Previously, researchers found large values for the Verdet constants for olive oil in the red portion of the visible spectrum utilizing DC magnetic field measurements. Based on the absorption spectra of olive oil around 670nm one might suspect anomalous dispersion of the Verdet constant, and hence, a large value. However, our highly accurate measurements, based on AC magnetic fields and phase sensitive detection stand in direct conflict to these reported values. Other physical considerations lend credence to our conclusion.

**- African American Collegiate Athletes during Jim Crow, 1940-1970**

**Edward Owen\***, *History*

Mentor: **David Walton**, *History*

Presentation Format: Oral

[No Abstract]

**- Interpreting Power in "Un día de estos" by Gabriel García Márquez**

**Keily Ramirez**, *English, Theatre & Foreign Languages*

Mentor: **Cecilia Ana Lara**, *English Theatre & Foreign Languages*

**Melissa Buice**, *Political Science & Public Administration*

**Enrique Porrua**, *English Theatre & Foreign Languages*

Presentation Format: Oral

This paper discusses the role of power and authority as exercised by the “the Mayor”, a main character in the short story “Un día de estos” by Gabriel García Márquez and the extension of this topic as it permeates the novel “La mala hora” by the same author. It will analyze the use of power by a single character becoming relevant as it serves as a model to explain how power is exercised in national governments in Latin America as a whole. The paper starts by analyzing a specific situation that a small scale demonstrating attitude towards authority and power, the tensions between the local dentist and the Mayor, that will allow us later to amplify its implication on the larger scale. Both stories present the dentist as the Mayor as a dichotomy contrasting the corruption and abuse found in the government throughout the little town. Usually, in García Márquez’s stories most readers would find many topics associated with politics frequently, and in most cases focusing in the negative aspects of it such as corruption and cruelty. These topics offer a variety of interpretations. Maybe readers would be conscious of the definition of democracy as having a stable government and by sharing equal justice throughout society. Gabriel García Márquez always leaves his readers to interpret by themselves how the government is understood or handled in Latin America. It is a denunciation towards a corrupt government with power, that prevents the advanced development of politics in Colombia. This research paper will provide feedback of both stories by García Márquez that share the people’s suffering as they are abused in a corrupt political system in their microcosmos.

### **- Reducing Alzheimer-type protein accumulation pathology and associated synaptopathogenesis to treat early dementia in a mouse model**

**Kaitlan Smith**, *Biology*

Mentor: **Ben Bahr**, *Chemistry & Physics*

Presentation Format: Oral

Alzheimer’s disease (AD) is the most common age-related neurodegenerative disorder, characterized by multi-proteinopathy and progressive synaptic deterioration. AD pathology is due to inefficient protein clearance, leading to characteristic protein accumulations and synaptic pathology. A major protein clearance mechanism entails the lysosomal pathway and compounds that enhance this pathway represent a promising therapeutic avenue. The compound Z-Phe-Ala-diazomethylketone (PADK) positively modulates the protease cathepsin B (CatB-30), a lysosomal enzyme which degrades pathogenic proteins. PADK has previously been shown to enhance lysosomal efficiency and thereby eliciting improvement in protein clearance, increases in compromised synaptic markers, and a corresponding recovery of cognitive performance. To further this work, we have made use of the 3xTg mouse model of AD (3xTg-AD). When

memory was assessed across two days in an exploratory habituation paradigm, 3xTg-AD mice were found to have a major deficit in habituation as compared to wild-type mice. Interestingly, those 3xTG-AD mice that received PADK (oral 18mg/kg/0.5 day) exhibited improved memory as compared to those that received inactive control compound (p=0.0176). To determine if improved memory is due to improved protein clearance, the brain tissue was assessed for tau species and synaptic markers in cortical regions. On blots, tau species were shown to be reduced by PADK in correspondence with improved synaptic markers and increased CatB-30 levels. Concluding, selective lysosomal modulation appears to be a promising avenue to treat early AD pathology and possibly other protein accumulation disorders.

### **- WoodBlock Relief Printing**

**Andrew Alekseev**, *Art*

Mentor: **Brandon Sanderson**, *Art*

Presentation Format: Exhibit

My goal for this PURC was to complete a series of woodblock prints and display them locally. To create a print, I carve a block of plywood, ink it up, and stamp it onto a sheet of paper. I already had two unique images in this series, and with help from PURC, was able to introduce a third and final image into the collection. The second part of this project is displaying my work at a local venue. I believe this to be very important for my personal growth, and will help me learn about exhibiting work and presenting myself professionally.

### **- Pop-up Engineering**

**Brittany Crocker**, *Art*

Mentor: **Carla Rokes**, *Art*

Presentation Format: Exhibit

The project “Pop-up engineering” is an exploratory creative research project focused on the production of a pop-up book and a series of three contextually relevant calligraphy drawings. This project is heavily focused on the process of paper engineering, book illustrating, and bookbinding methods. The book and calligraphy drawings will follow an illustration-based narrative, gauged towards children, on the fictional lifespan and research of a personally conceptualized dragon species. This artistic project was featured in a larger installation during the 2018 senior thesis exhibition which additionally included a large scale paper sculpture of a stylized Madam Butterfly Snapdragon flower and children’s artwork consisting of 25 illustrated paper dragons.

### **- Experimental Processes of Printmaking and Sculpture**

**James Jacobs, Art**

**Amber Tyler-Elliott, Art**

Mentor: **Brandon Sanderson, Art**

Presentation Format: Exhibit

Intaglio methods were originally used to decorate armor and is still used today to produce currency. Our presentation will demonstrate experimental etching techniques such as line etch, aquatint, and sugar lifting. We will also be reviewing mixing printmaking techniques to other medias such as sculpture. There will be a demonstration of these processes along with a collection of our proofs and prints.

### **- The Artistic Representation of Mental Illnesses**

**Ashley Nordquist, Art**

Mentor: **Carla Rokes, Art**

Presentation Format: Exhibit

Mental illness has been a highly controversial topic in recent years, especially in regards to whether it is a true medical illness. This series that I have developed focuses on a handful of the most common symptoms of mental disorders that affect millions of people today. By integrating art with the scientific aspect of mental illnesses, I was able to represent the ways mental disorders affect individuals in their daily lives in a representational fashion. Through this, viewers will see mental disorders in a new light that will help them better understand the severity of such illnesses and that they are indeed as real as any form of physical disease.

### **- A Study of Established Photographic Styles through Practice as Research**

**Dakota Young, English, Theatre & Foreign Languages**

Mentor: **John Labadie, Art**

Presentation Format: Exhibit

This project focuses on the careful study of stylistic photographic techniques used by four well-known photographers in an attempt to replicate each style through an eight portrait series. The four photographers that were studied are Annie Leibovitz, Yousuf Karsh, Diane Arbus, and Bruce Gilden. Two portraits were shot for each photographer, focusing on separate styles that each artist gravitated towards in their body of work.

This symbol "\*" identifies the students who were award the Dr. Charles Humphrey Undergraduate Conference Travel Award this academic year.

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