

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



April 12, 2017

Program with Abstracts

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Cover image by Courtney Hockett

Title: Creating 2-D and 3-D Underwater Flora and Fauna Hybrid Species"

Medium: Ceramic

Year: 2015



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Dear Students and Colleagues,

The UNC Pembroke Undergraduate Research and Creativity Center cordially welcomes you to the Eleventh 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 Locklear, 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

11th Annual

Pembroke Undergraduate Research and Creativity Symposium

Wednesday, April 12, 2017

UC Annex

Schedule of Events

8:15 - 8:30 am Registration

8:30 - 8:45 am Greetings

Chancellor Robin Cummings

Dr. Ryan Anderson, Director of PURC

9:00 - 9:45 am Oral Presentations

9:00 - 9:15 am Ongoing assessments of the effects of the Cathepsin B enhancing agent PADK in models of Mild Cognitive Impairment (MCI), aged mice, and the 3xtg-AD mouse model of Alzheimer's disease

Katherine Rentschler, *Biology* | Mentor: Dr. Ben Bahr

9:15 - 9:30 am Lysosomal Modulatory Compound as a Treatment for Alzheimer-Type Neurodegeneration

Cary Mundell, *Biology* | Mentor: Dr. Ben Bahr

9:30 - 9:45 am Technology and Business Development in Sub Saharan Africa

Sharon Ayioka, *Business* | Mentor: Dr. John Parnell

9:45 - 11:15 am Poster and Creativity Session

11:30 - 12:30 pm Keynote Address

North Carolina Literary Review, Inspiring Research for Over a Quarter Century

Dr. Margaret D. Bauer, Rives Chair of Southern Literature and Harriot College of Arts and Sciences
Distinguished Professor, East Carolina University, editor of the *North Carolina Literary Review*

12:30 pm Closing Remarks/Presenters take down posters

PURC Council: Dr. Ryan Anderson, Dr. Teagan Decker, Dr. Michele Fazio, Dr. Sonali Jain, Dr. Zhixin Kang, Dr. Robert Poage, Dr. Jose Rivera, Prof. Brandon Sanderson, Dr. Maria S. Santisteban, Dr. Cornelia Tirla

Keynote Speaker

Dr. Margaret D. Bauer

A Louisiana native, Margaret D. Bauer is the Rives Chair of Southern Literature in the Department of English and a Distinguished Professor of Harriot College of Arts and Sciences at East Carolina University. She has been the editor of the *North Carolina Literary Review* since 1997. She was named one of ten ECU Women of Distinction in 2007, and that same year received the Parnassus Award for Significant Editorial Achievement from the Council of Editors of Learned Journals.



Her other ECU honors include the Scholar-Teacher Award in 2004, the Five-Year Achievement Award for Excellence in Research and Creativity Activity in 2008, the Centennial Award for Excellence in Leadership in 2012, and the Lifetime Achievement Award for Excellence in Research and Creative Activity in 2014. She is also a past President of the North Carolina Literary and Historical Association. She is the author of four books on Southern writers, most recently *A Study of Scarletts: Scarlett O'Hara and Her Literary Daughters*, and the editor of two books on North Carolina playwright Paul Green: a biography by James Spence and a critical edition of Green's play *The House of Connelly*, in which she provides extensive critical analysis of this play.

EXHIBITS

- Uncovering the Beauty of Mineralogy and Artistic Expression

Ashley Nordquist, *Art*

Mentors: Dr. Carla Rokes, Prof. Amy Gross

As an Art Major at the University of North Carolina at Pembroke, I have had access to numerous opportunities within my studio classes which have resulted in allowing me to branch out and become more comfortable with experimentation. My goal for this project is to further my experimentation by implementing new techniques and combining both Art and Science to create a two part series dedicated to representing the many complexities of a mineral and its' role in life. Through the creative process of this project, I will learn new technical skills with drawing media such as Copic Markers, develop a stronger understanding of color theory, and gain more knowledge on the subject of Mineralogy. My choice of media will involve using Micron Pens and Copic Ciao Markers on Hot Press Watercolor paper to create a tightly controlled and informative two part series of work.

- Manipulation of Self via Digital Media

Anisha McDowell, *Art*

Mentor: Dr. Joseph Begnaud

During the fall 2016 semester, I created a series of five 3x4' paintings that focus on the sociological and psychological effects of various digital media, especially modern social media. With these paintings I explored the interrelated topics of isolation, intimacy, sexuality, ego, autonomy, creation and destruction of Self, and private self versus public self.

- The Body in Abstraction

Anisha McDowell, *Art*

Mentor: Dr. Joseph Begnaud

During the summer of 2016, I created a series of large-scale paintings focusing on the human body in abstraction. I abstracted the bodies through exaggerated forms, expressive line, and expressive color. The abstraction of the figures was an attempt to subvert the traditional imagery of the human body in art.

- A Surrealist Sculpture Study

Christian Happel, *Art*

Mentor: **Prof. Adam Walls**

My intent for this sculpture is to create a playful, safe and visually interesting sculptural bench to be installed on campus. It would be a large scale fabrication of the Amanita muscaria mushroom, which is the mushroom most commonly referenced in popular culture and surrealism. The act of increasing the scale of the mushrooms to unrealistic proportions will be the most important element of this design's success in order to properly attract passing viewers by creating a surreal environment.

- Expressing Asexuality in Self-Portraits

Lemuel Subdias, *Art*

Mentor: **Dr. John Labadie**

First introduced as an assignment for an ART 1500 class, this research explores asexuality in an expressive form as portraits. The project was first assigned as "face-making," where the class was asked to create a portrait of themselves digitally. The possibilities are endless, so I have decided to express sexuality through the principles and elements of design in self-portraits. Asexuality is a sexuality which isn't very well comprehended by the majority. Research on asexuality will be included. Instead of creating a single piece, I have decided to create a series presented in chronological order of maturation, from infant to young adult. Symbolism will play a heavy role in building the series. These digital projects will be printed into a tangible medium. The elements and principles of art and asexuality will be discussed to show how each individual piece brings the entire series into a whole.

- Creating Narratives Through Screenprinting

Katherine Davenport, *Art*

Mentor: **Prof. Brandon Sanderson**

Creating Narrative Through Screenprint, discusses how I learned the screenprinting processes and through trial and error discovered the methods that best fit the stories I sought to tell. Screenprinting initially intrigued me because it is a precise medium that requires careful planning and execution. First, I experimented with photo emulsion's light sensitivity in relation to exposure time thereby achieving the clearest transfer to the screen. Secondly, I ensured accurate registration, or lining up, of each screen in order to print the multiple layers of screenprinting that encompass the final piece. Color is critical to the mood of these narratives; as such, I made the color palettes bright and playful to provide a light character. My images come

from my everyday experiences and how I try to find humor in the world to maintain my sanity. Living in such a divided world I try to reflect on little moments that I have that can bring light to my existence. Hopefully my reflections inspire a viewer to think about their own absurd moments and they can find humor in being human too. I will continue to explore these narratives and improve my screenprinting. I've found this process to be extremely challenging but the more experience I have the easier it becomes.

- Animal Symbolism and the Bestiary as a Vehicle to Develop Artistic Style

Kaylee Buckley, *Art*

Mentor: **Prof. Brandon Sanderson**

Over the last year, I found myself increasingly drawn to the use of narrative in animal form. Consequently, this USA Grant is compiled multiple resources in the research and study of historical and contemporary depictions of animal form, one of which is the bestiary. Historically, a bestiary was a set of depictions of creatures from written or spoken account. Though the depictions were often stylized, the set was frequently used as a compendium of animal identification. This process became widely used in medieval times as a way to decorate armor and jewelry. From this analysis I created my own creatures in the formation of an individualized bestiary. This was accomplished through printmaking, particularly the etching process, which uses nitric acid to create incised metal printing plates. These plates were printed onto thick cotton paper and rice paper. In summary, I will study past and present depictions of animals in bestiaries and use the etching process to create my own with the objective of developing my individual imagination and artistic style.

ORAL PRESENTATIONS

- Ongoing assessments of the effects of the Cathepsin B enhancing agent PADK in models of Mild Cognitive Impairment (MCI), aged mice, and the 3xtg-AD mouse model of Alzheimer's disease

Katherine Rentschler, *Bio*

Mentor: **Dr. Ben Bahr**

Alzheimer's disease (AD) is caused by the accumulation of pathogenic proteins, such as A β 42 and hyperphosphorylated tau, which leads to the formation of paired helical filaments (PHF) and neurofibrillary tangles (NFTs). AD causes synaptic decline and neurodegeneration. The compound Z-Phe-Ala-diazomethylketone (PADK) enhances the lysosomal enzyme Cathepsin B (CatB), which degrades A β 42, and promotes clearance of PHF-tau. Impaired cognitive functioning associated with AD may alter appetite regulation and behavior. Oral dosing studies and hippocampal slice culture analyses were used to assess the efficacy of PADK. Oral Dosing

studies in the past have been conducted on aged mice, 3xtg-AD mouse models, and Fischer rat models of MCI. Hippocampal slices from rat pups were used to study baseline effects of PADK on synaptic integrity and CatB expression. Weight changes were monitored to assess PADK's effect on appetite. ALT and BUN analyses were performed to assess kidney and liver function. Immunohistochemistry was used on brain samples to assess the efficacy of PADK on synaptic integrity. The results indicated no observable side effects from the parameters investigated. Significant upregulation of GluR1, GluR2/3, and Synaptophysin was seen in the primary cortical regions of aged mice. CatB, GluR1 and Synaptophysin were significantly upregulated in rat hippocampal slice cultures. Behavior testing revealed PADK treated aged and 3xtg-AD mice performing above the level of the wildtype mice. By investigating the effects of PADK on behavior, synaptic recovery, and side effects, the evidence shows that PADK improves synaptic recovery without behavioral or physiological side effects.

- Lysosomal Modulatory Compound as a Treatment for Alzheimer-Type Neurodegeneration

Cary Mundell, *Bio*

Mentor: **Dr. Ben Bahr**

Alzheimer's disease is a condition that is distinguished by the abnormal accumulation of Amyloid- β 42 (A β), tau proteins and the related synaptotoxicity. A novel method for the therapeutic treatment of these accumulation events is currently undergoing experimentation. The pathway being investigated is the upregulation of a lysosomal enzyme, Cathepsin B. Previous studies have shown that Cathepsin B is responsible for the degradation of the A β plaques that form during the abnormal accumulation events. Z-phe-ala-diazomethylketone is the novel treatment under investigation as it has previously shown the ability to upregulate enzymatic activity in the brain. While Intraperitoneal injection's effectiveness of PADK has been tested in mice, oral dosing has not. To ascertain potential behavioral improvements due to PADK oral dosing, exploratory habituation was performed. Mice were placed in an open box that had a grid overlaid upon it. The number of times that the mouse crossed specific boundaries was measured over a time of 5 minutes. In order to assess memory of the space, a percentage change in the amount of crossings was measured between the last minute and the first minute. This allowed for an establishment of whether the mice were becoming more comfortable with their space, and thus remembering what they were seeing. Behavioral analysis shows that there is an age effect and a potential drug effect. This was established by comparing 9 month wild type mice exploratory habituation with the 22 month aged mice exploratory habituation. The resulting effect would suggest that PADK does have a positive effect on the behavior of mice dosed with the drug.

- Technology and Business Development in Sub Saharan Africa

Sharon Ayioka, *Business*

Mentor: **Dr. John Parnell**

Technology has greatly improved in the world in recent years, most notably in Africa. These changes in technology have improved how businesses operate and develop over time in back office functions such as record keeping, accounting and payroll. Technology can also be used to create a secure environment for maintaining business or consumer information. Although technology has brought by changes in the running of businesses, its development in countries like the United States cannot be compared to that of sub-Saharan Africa. It has not only enhanced business performance, but has also contributed to overall economic development, a reduction in government corruption, and increased human flourishing.

PERFORMANCE

- Theme and Variations on Winnie the Pooh

Asia Passmore, *Music*

Mentor: **Dr. Jonathan Maisonpierre**

This performance will display an arrangement of the theme-song from the television show Winnie the Pooh. The finished product will be a set of theme and variations. Though it dates back to the Early Music Period, theme and variation sets were popular during the Classical music period. The theme is based on a popular melody well-known to the audience, while each variation is a reorganization of the theme. In a variation, the composer can add musical or stylistic elements, and still allow the the theme to be noticeable. My theme and variation arrangement will include the theme-song, transcribed by ear, and a set of three variations, each arranged in a particular stylistic form. The variations will feature major and minor modes, rhythmic variety, chordal elements, and the like. The result of this project will be a theme, based on the the original Winnie the Pooh theme-song, with a set of three stylistically different variations.

POSTERS

- Screen Printing

Andrew Alekseev, *Art*

Mentor: **Prof. Brandon Sanderson**

This project explores the screen printing method of printmaking. Using influences varying from 19th century French lithographs to contemporary promotional screenprints, the goal of this project is simple: learn how to make an appealing poster. Using different printing techniques, I've come up with a small body of work that chronicles my progression with the medium as well as my (many) failures with it. This presentation is in equal parts about learning the process and about the finished prints.

- Evaluation of the native *Gnaphalium obtusifolium* plant for antimicrobial properties

Uvina Allen, *Biology*

Whitney Pittman, *Biology*

Mentor: **Dr. Conner Sandefur**

Gnaphalium obtusifolium, commonly known as rabbit tobacco, is a plant native to North America and is used to treat a variety of health issues. These health issues include metabolic and respiratory disorders, which are correlated with disrupted microbial patterns in humans. Although the use of plants for medicinal purposes is a common practice little is known about their ability to deter bacterial growth. The goal of our study was to test the antimicrobial properties of *G. obtusifolium* against eight types of bacteria (*Micrococcus luteus*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Neisseria sicca*, *Bacillus subtilis*, *Staphylococcus epidermidis*, *Corynebacterium xerosis*, *Staphylococcus aureus*). Teas (water-based extracts) were made from the root, stems, leaves, and bud of *G. obtusifolium* to obtain ~ 90 % concentrations. Agar diffusion assays were performed by placing filter discs soaked in each tea on the bacterial cultures prior to overnight incubation at 37 degrees Celsius. *P. aeruginosa* was the only bacteria that exhibited evidence of growth inhibition via teas made from the roots and leaves of *G. obtusifolium*. The leaves exhibited a zone of inhibition of ~ 9 mm while the roots exhibited a zone of inhibition of ~ 2 mm. While bacterial inhibition from the tea extracts was not discovered for the remaining bacteria, the positive results obtained from *P. aeruginosa* warrants further research into the antimicrobial properties of plants and their potential uses. Additionally, some compounds found in plants are not extractable using water and hence other extraction methods may be necessary to obtain compounds from plant matter which may have increased inhibitory capacity.

- Exploration of Female Sexuality in Bram Stoker's Dracula

Kelli Allen, *English, Theatre & Foreign Languages*

Mentor: **Dr. Susan Cannata**

In his famous Gothic novel, *Dracula*, Bram Stoker introduces to us female characters that defy the behavior that a typical woman of that time would express and women that represent different versions of female sexuality. He creates Mina Harker, who seems to embody all of the things that a woman of their stature and society should. Mina is ladylike, respectable, and faithful to her husband, instead of being overtly sexual. On the other hand, Stoker also creates Lucy and the three vampire sisters who have just the right amount of sex appeal and allurements to catch the men of the novel off-guard. Lucy embodies traits of both of these women by being very sexual when she is a vampire, but also exhibiting motherly behaviors. I am looking at historical and cultural sources to analyze women and female sexuality during the Victorian era. I will compare my research of this novel to my research of the ideal woman in Dracula's society.

- Inhibition of Common Laboratory Bacteria Growth by *Persea borbonia* Extracts

Anthony Arrington, *Biology*

Mentor: **Dr. Conner Sandefur**

Indigenous peoples have traditionally used and continue to use plants for medicinal purposes. Advancements in science and technology have replaced plants with synthetic drugs. With the increase use of new technologies and medicines, antibiotic-resistant bacteria are emerging. In spite of bacteria becoming resistant to synthetic drugs, is it possible that bacteria are now weaker against fighting off chemical compounds found in plants since we are not relying on plants as much as our ancestors? In this study, we set out to test the antimicrobial properties of leaves from *Persea borbonia* (bay tree), which is used by Southeastern American Indian people for treating boils, sores, cuts, and burns. Aqueous extracts with concentrations of 25%, 30% and 35% plant material were used to perform agar diffusion assays on 13 common laboratory strains of bacteria. 70% isopropyl alcohol and distilled water were used as positive and negative controls, respectively. After a period of 24 hours of growth at 37 degrees Celsius, plates were examined for zones of inhibition. The 35% concentration of the extract had a 3.5 mm inhibition of *Micrococcus luteus*. Some plates were inconclusive because cultures may not have grown due to insufficient growth time, human error, or contamination. These results suggests a possible use of bay tree aqueous extracts in killing microbial organisms, but further research is needed to come to that conclusion.

- Role of PUF-9/PUF RNA-binding protein in Notch signaling-mediated tumorigenesis

Amanda Bowman, *Biology*

Mentors: **Dr. Myon Hee Lee, Dr. Robert Poage**

Stem cells have the ability to self-renew to maintain their own population and to differentiate by the generation of more lineage-restricted cells. A regulatory network controlling the balance between self-renewal and differentiation of stem cells is strictly regulated and critical for cellular homeostasis. Within the *nematode C. elegans* germline, GLP-1/Notch signaling and RNA regulators control germline stem cell (GSC) maintenance and the proliferation/differentiation decision. In this study, we specifically investigated a genetic link between GLP-1/Notch signaling and PUF (Pumilio and FBF) RNA-binding proteins in GSC maintenance and proliferation/differentiation decision. *C. elegans* has multiple PUF genes with special roles. We depleted the expression of each *puf* gene in *C. elegans* by RNA interference (RNAi) in temperature sensitive *glp-1(ar202)* gain-of-function (gf) mutants. At permissive temperature (20°C) or lower, most *glp-1(ar202gf)* mutants produce normal gametes. However, at restrictive temperature (25°C), all animals generate an ectopic mass of proliferating germ cells (called germline tumors) in the proximal gonad, a region normally occupied by fully formed gametes. Notably, RNAi of *puf-9* significantly enhanced GLP-1/Notch signaling-mediated germline tumor formation even at 20°C. To confirm the RNAi result, we have generated *puf-9(0); glp-1(ar202gf)* double mutants and analyzed germline phenotypes. Intriguingly, all *puf-9(0); glp-1(gf)* mutants developed germline tumors even at 15°C. This result suggests that PUF-9 inhibits GLP-1/Notch signaling-mediated germline tumorigenesis. *C. elegans* PUF-9 is predominantly expressed in somatic cells. Therefore, further studies include: 1) how somatic PUF-9 influences germline tumorigenesis and 2) identification of PUF-9 target mRNAs that are associated with GLP-1/Notch signaling-mediated germline tumorigenesis. Since Notch signaling and PUF proteins are highly conserved in humans, our findings may provide insights into Notch signaling-mediated tumorigenesis in other organisms, including humans.

- The Effects of Caffeine on Cognition

Matthew Bradford, *Psychology*

Mentor: **Dr. Erik Tracy**

While previous research has found that caffeine causes a positive change in individuals psychomotor functioning (Childs & de Wit, 2006; 2008; Walach et al., 2001), there has been lack of research on how caffeine affects individuals lexical processing. Due to previous research findings, it was hypothesized that caffeine would increase RTs and lower accuracy when deciding that a spoken utterance is a real or nonsense word through the lexical decision task (LDT). For accuracy, I had found that participants did not vary in how accurate they were when deciding if a spoken utterance was a real word or nonsense word. These findings did not help support part of the hypothesis that caffeine caused lower accuracy. For RTs, I had found that participants differed with how fast they are when deciding if the spoken utterance was a real word or nonsense word, supporting the other part of the hypothesis that caffeine causes faster RTs. However, I had speculated that since the participants became familiar with the experiment this caused a decrease in their RTs between the first and second block of words.

- Understanding Cheating: The Effects of Assignment Type, Appeal Outcome and Student Sex on Perceptions of Plagiarism

Noel Bradford, *Psychology*

Mentor: **Dr. Kelly Charlton**

Academic dishonesty is a common problem in both high school and post-secondary education. Previous research has indicated that the main causes of cheating are a lack of consensus between educators and students in regards to what is considered cheating, and a lack of clarity about the consequences for students upon being found guilty of cheating. The purpose of this study is to understand how students perceive academic dishonesty when presented with a plagiarism case. This study also investigates if the gender of the person charged, type of assignment, and harshness in penalty given by an appeals board affect how participants perceive a plagiarism charge. Participants read about a hypothetical male or female student who plagiarized an assignment as well as the outcome of a hearing board appeal involving that student. Participants then completed a questionnaire about their perceptions of the case. Results show that the outcome of the hearing board appeal strongly affected how participants perceived future cheating, hearing board fairness and school quality.

- Dissecting the synthetic lethality between *htz1Δ* and *RPB2-2SL*: the interplay between RNA Pol II and the nucleosome dynamics

Cora Bright, *Biology*

Ereny Gerges, *Biology*

Mentor: **Dr. Maria Santisteban**

The *HTZ1* gene in *Saccharomyces cerevisiae*, is a highly conserved variant of histone H2A an important roles in transcription regulation. Unlike its homologues in other species, the protein is not essential in yeast, as deletions of this gene are 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*). Moreover, the synthetic lethal phenotype is dominant, suggesting that *rpb2-2* 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. It has been shown in cells lacking *Set2*, initiation of RNA polII transcription occurs inappropriately within the protein-coding regions of genes, rather than in the proximal promoter regions; a phenotype that has been referred to as “cryptic” initiation. We tested our strains for cryptic initiation phenotypes and have found that *htz1Δ* cells exhibit a mild cryptic initiation phenotype and *rpb2-2* has a strong phenotype. A plausible explanation for these results is that the *rpb2-2* mutant polymerase is particularly prone to aberrant transcription initiation and when nucleosome dynamics is altered in the absence of *Htz1*, the effect is exacerbated.

- Race and Prejudice

Cierrah Brooks, *English, Theatre & Foreign Languages*

Mentor: **Dr. Susan Cannata**

In the novel, *Devil In a Blue Dress*, Walter Mosley develops a major theme of race and prejudice. Easy Rawlins, an African-American man, is trying to survive in the late 1940's. Through the novel, he faces numerous situations of racial discrimination and white privilege, all while he is unconsciously rejecting racist stereotypes. Race hinders Easy at almost every turn and to preserve the ownership of his home, which he holds most dear, he faces situations that threaten that ownership as well as his life. In such situations, Easy is disempowered. For example, he initially loses his job at a defense plant and is further degraded by the actions of members of white people in society. However, Easy's empowerment is driven by the experience of being a homeowner and acquiring gainful employment through Mr. Albright. As an African American man in this period, Easy's goals of maintaining ownership are not simple tasks. Mosley uses symbolism and imagery throughout the novel to further demonstrate the extremity of race as a major factor. Over the course of the novel, the significance of race is portrayed through the characters and revealed by their actions towards one another. For this project, I plan to research discussions of race in literature while looking at critical race theory and other scholarship of *Devil In A Blue Dress*.

- Host Specificity and Elevation Biodiversity of Costa Rican Ants

Sheldon Brown, *Biology*

Mentor: **Dr. Kaitlin Campbell**

Ants are important ecological engineers, interacting organisms above and below ground. Ants are more diverse in tropical locations with more nutrients and warmer soil temperatures. Mites can be found in ant nests where they use resources and ride on the ants for dispersal. Mites can be as diverse as ants, but most of them are too small to be seen by the unaided eye. We studied the biodiversity of mites, ants and velvet ants (ant-like wasps) across an elevation gradient at three Costa Rican sites. The goal of this study was to examine the diversity and relationships of the hosts and mites with respect to elevation and host specificity. My questions were: are there patterns of ants and mite biodiversity as elevation increases and are the mites associated with specific hosts? My hypotheses were 1) mites are primarily affected by their hosts and would maintain associations at different elevations, and 2) ant biodiversity is negatively related to elevation because higher elevations have cooler temperatures and less nesting and food resources. Hosts and their associated mites were hand collected. Each host was identified and individually inspected for mites which we identified to morphospecies. Our preliminary findings include 33 ant, 6 velvet ant and 9 mite species. We are currently performing statistical analyses for elevation and host specificity. Ants are important to biodiversity in many ecosystems, and as climate change impacts higher elevations it is important that we understand the effect this may have on biodiversity of ants and associated fauna at those elevations.

- Range of hibernation of Eastern Box Turtles

Maria Chavez, *Biology*

Tyler Scoville, *Biology*

Mentor: **Dr. John Roe**

Eastern Box turtles live in areas that require them to hibernate for 3-5 months. With food being scarce and temperatures low, ectothermic animals like turtles cannot raise their body temperatures high enough to maintain normal activity in warmer months. Overwintering is a vulnerable time for turtles so we would expect them to exhibit behaviors to minimize risks. In some areas of North Carolina, a risk to turtles during winter is prescribed fire, where land managers intentionally burn the forest for habitat management. This causes additional danger to the turtles as they have limited mobility. If a turtle is not buried deep enough in the leaf litter to protect themselves from the fire during hibernation, they may die. Fire alters the habitat structure and microclimate of overwintering refuges to make them lower quality for turtles. We studied how turtles respond to prescribed fire by comparing overwintering site fidelity of turtles at a site that has been managed to prescribed fire for 40 years to those that have not been managed with fire. Turtles were radiotracked to locate winter locations over a 5-year period. We expect turtles at the burn site to select habitats offering refuge from fire and to maintain closer associations with previous overwintering sites and that turtles at the unburned site to be less restricted in finding suitable overwintering sites and that an individual's overwintering locations be more widely dispersed. Prescribed burning, even though an important and vital management and control tool in helping our ecosystems, could be managed in a way to minimize turtle casualties if land managers were given better information on turtle responses to fire.

- Small Farmers and the Local Market

Ethan Clewis, *Interdisciplinary Studies*

Mentors: **Dr. Brooke Kelly, Dr. Michele Fazio**

The lives of small farmers is heavily influenced by the crops they grow and the local demand for these commodities. To better understand their plight in life, I conducted interviews with three small farm owners to gather information about growing practices, challenges, and the overall struggles of farm work. Along with being part of a Service-Learning Project, my hopes for this information is to increase the purchase of small farm crops by the public along with possibly the university.

- Do Closeness and Likability Impact the Ability to Observe Self-Compassion in Children?

Gwendolyn Coker, *Psychology*

Mentor: **Dr. Ashley Allen**

Self-compassion has been the subject of numerous studies since it was first introduced to western psychology in 2003. Neff (2003) defines self-compassion as involving kindness to the self,

recognition that everyone suffers, and the ability to keep one's emotions balanced. Very few studies have investigated where self-compassion originates; however, some researchers suggest parents impact the self-compassion development of their children (Neff & Vonk, 2010). When reflecting back on childhood, teenagers who report more parental abuse report lower self-compassion (Tanaka, Wekerle, Schmuck, & Paglia-Boak, 2011). In addition, parents who report higher self-compassion exhibited better parenting (Psychogiou et al., 2016). The purpose of this study was to investigate whether parents were aware of their child's level of self-compassion and if other factors such as perceived closeness and likability influenced these evaluations. Participants included 73 college students and parents. Students completed the Self-Compassion Scale as well as questions about their relationship with the parent. The parents completed an adapted version of the Self-Compassion Scale evaluating the student's self-compassion and answered questions about their relationship with the student. Correlation analyses revealed that parents' ratings of self-compassion were positively correlated with the students' self-compassion scores showing that parents are able to accurately observe their child's self-compassion. Surprisingly, parents who liked their children less were more accurate in their observations of the child's self-compassion. Implications and future directions will be discussed.

- Examining the Consumer's Perspective of Patient Advocacy

Elizabeth Crawford, *Nursing*

Mentors: Dr. Jennifer Johnson, Dr. Teagan Decker

The purpose of this study is to better define the concept of patient advocacy by examining the health consumer's perspective, creating a stronger basis for further research while better aiding the nursing student in self-reflection and refinement of individualized patient centered care. A universally supported interpretation of patient advocacy has yet to be formulated, and previous research fails to examine the consumers' perception of the concept. To generate a more complete understanding of the constantly fluctuating concept of patient advocacy, consumer perspectives are explored. Consisting of a total of eight students from a southeastern university, two focus groups were constructed to explore the healthcare consumer's perception of patient advocacy. Focus groups were audio recorded and then later transcribed and analyzed for prominent themes. Five significant themes regarding the conceptualization of patient advocacy were identified, including healthcare professional personality characteristics; autonomy and self-determination; patient's values, beliefs, rights, and desires; information disclosure; and patient safety. The current study's findings further confirm the previous conceptualizations of patient advocacy. With the incorporation of the healthcare consumer's perceptions, healthcare professionals are more so empowered to better serve their patients through a more complete understanding of how to refine advocacy practices in providing higher quality individualized patient-centered care.

- Does Owning a Pet Impact a Person's Personality?

Mary Grace Curiale, *Psychology*
Rashanda Coachman, *Psychology*

Mentor: **Dr. Rachel Morrison**

The impacts of animals on humans have been studied for many years; results have shown that humans have benefited from animals as a source of food, transportation, and companionship. However, human-animal relationships are relatively new topics of research and there is evidence showing that forming attachments to animals, in particular pets, benefits humans both physically and psychologically. Previous research indicates there may be a difference in characteristics and personality traits of pet owners and non-pet owners, but little is known about the relationship between pet ownership and factors of agreeableness and compassion for others. In this study researchers surveyed 99 participants on the University of North Carolina at Pembroke (UNCP) to determine if pet owners had a higher degree of agreeableness than non-pet owners and if pet owners had a higher degree of compassion than non-pet owners. Results showed that there were no significant differences in levels of agreeableness or levels of compassion between pet owners and non-pet owners. However, when we looked at the length of time owning a pet we found a significant difference between the agreeableness scores of people who owned their pets for 4 years or less and those that owned their pets for 5 years or more. The findings of this study provide support for some previous research regarding agreeableness, which showed no difference between pet owners and non-pet owners. This study highlights the need for better measures of personality traits of pet owners and further research regarding human-animal relationships and attachment, as there are other facets of animal influence on human behavior that have yet to be studied.

- Bram Stoker's *Dracula*: A Shift in Female Hysteria

Barbara Dieringer, *English, Theatre & Foreign Languages*

Mentor: **Dr. Susan Cannata**

The Victorian era was formed on the basis of a patriarchal society where women were considered more fragile and less empowered than men. In a time where gender was defined by separate spheres, the burgeoning field of psychology further exemplified inequality by primarily focusing on aspects of mental disorders in females. For example, hysteria was a popular disorder attributed to women, not men. The diagnosis of hysteria led to a disproportionate amount of women in insane asylums. However, there is a hidden history of men who suffered from what was classically defined as a female malady. In *Dracula*, Stoker challenges the assumptions of hysteria as a female disorder; instead, depicting males displaying symptoms of hysteria. To explore the implications of this shift, I will research how hysteria was defined through Victorian gender roles and how that can affect the reading of Bram Stoker's classic tale.

- Distinctions between drugs that inhibit Calpain vs. enhance Lysosomal Proteases for treating Alzheimer's disease

Ayanna Edwards, *Biology*

Camille Colvin, *Biology*

Mentor: **Dr. Ben Bahr**

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. One of the most current set of AD treatment studies highlights the upregulation of the lysosomal enzyme cathepsin B, but other studies have shown that blocking the protease calpain, a calcium sensitive protease, is vital for an AD treatment. Cathepsin B is capable of reducing the amount of AD type intercellular protein accumulation and this leads to synaptic protection. Calpain blockage reduces cytoskeletal change, thereby providing synaptic repair. To evaluate both classes of protease, our study evaluated compounds for their ability to block calpain versus their effect on lysosomal enzymes like cathepsin B. Calpain-mediated breakdown of the cytoskeletal protein spectrin was assessed with antibodies against the breakdown product (BDPs). These have been known to be biomarkers for traumatic brain injury (TBI) and perhaps in AD. Effects on calpain versus cathepsin B are part of the current study to compare compounds and on the calpain inhibitors E64d and Calpain Inhibitor I 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.

- Defining a Protagonist in M.T. Anderson's *Feed*

Marissa Eller, *English Education*

Mentor: **Dr. Susan Cannata**

In M.T. Anderson's young adult dystopian novel, *Feed*, the protagonist Titus is vastly different from a typical young adult protagonist. Titus, like nearly all the people in his society, has a chip implanted in his brain called a feed. The feed controls his brain and provides him with an unlimited supply of information, like a search engine in his head. Anderson's dystopia is centered around a lack of personal intelligence and a need to conform. While this is a common premise in this genre, Titus does not have the heart of a Katniss Everdeen or the fighting spirit of a Tris Prior. For this project, I will research traditional traits of young adult dystopian protagonists and analyze the elements of Titus' character and explore the ways that they influence the major themes of the novel. The difference between Titus and other protagonists is important because it is indicative of the way that *Feed* differs greatly from other novels in its genre. I plan to explore what defines a young adult dystopian protagonist, and what ultimately defines a young adult dystopian novel.

- Growth Inhibition of Human-dwelling Bacteria by the Plant Persimmons

Kam Elliot, *Biology*

Mentor: **Dr. Conner Sandefur**

The abundance of antibiotic resistance bacteria is increasing at an alarming rate. In this study, we examined the inhibitory effect of the plant *Diospyros virginiana* (persimmons) on thirteen laboratory strains of bacteria commonly found in or on the human body. Leaves and stem samples were obtained from a *D. virginiana* plant at Sampson's Landing in Pembroke, NC. These samples were made into a tea by finely chopping the leaves and stem and boiling them in distilled water. Thirteen different bacteria were grown as pure cultures by inoculating media with each culture in separate tubes. Each of the thirteen bacteria cultures were swabbed onto agar plates containing media. Filter discs soaked in teas were placed on the plates, which were then incubated over a 24-hour period at 37°C. After incubation, the zone of inhibition was calculated using a metric ruler. It was found that the stems and leaves of the plant *D. virginiana* did in fact inhibit growth on seven out of the thirteen bacteria sampled in the experiment. These preliminary results mark an exciting step towards understanding and perhaps employing the antimicrobial properties of the plant *D. virginiana*.

- Implications of the Future in M.T. Anderson's *Feed*

Tylir Engel, *English, Theatre & Foreign Languages*

Mentor: **Dr. Susan Cannata**

M.T. Anderson's *Feed* presents a future America where the need for instant gratification dominates all other desires, leading to a nation of apathetic individuals driven by a neural implant known as the Feed. The world seems to be in its death throes with polluted oceans, artificial clouds, virtually no animal life, and other nations threatening war if something isn't changed. The picture painted is one without hope, where the future — though ambiguous — is not promising. It is through the eyes of the main character Titus that we can see a glimmer of hope and maybe even a chance at redemption for a society dominated by the Feed. Titus is presented as just an average teenager in a bleak dystopian future, and in the beginning his drives and desires are a reflection of the world around him. He isn't presented as a rebel character or someone who wants change- rather, he seems to enjoy all the things his friends enjoy. The feelings of instant gratification and apathy that surround his friends also affect him, and Titus doesn't want to change this. Many readers might take his ideals and actions and consider Titus as someone who isn't likeable and is rather selfish at times. However, considering the world he lives in and who he is it is understandable- he isn't a rebel symbol or a hero, he's just an everyday boy trying to live his life. It is with this information, coupled with studies on character development in dystopian novels, that a clear understanding can be made. Through his eyes we see the world, and through his thoughts we can see how he changes throughout the story and what this could mean for the future.

- Analysis of Antimicrobial Characteristics of *Prunus serotina* Expressed on Common Gut Bacteria

Frederick Feely II, *Biology*

Mentor: **Dr. Conner Sandefur**

The microflora present in the human gut plays an important role in metabolism and digestion. As a result, the abundance of different phyla have been linked to obesity and type-two diabetes. Within the last two centuries, there has been a rise in cases of the two diseases brought on by changes in the diet across many cultures. While there has been many advances in medical technologies, some individuals return to traditional methods to treat ailments. We focus on plants once used as a traditional medicine in Native American communities that have been used to treat obesity or diabetes. Bark and wood Extractions were done using ddH₂O and Ethanol to test inhibition potential of *Prunus Seritona*. These extracts were then applied to disks to test inhibition. Though there was variation in the results of initial experiments, the preceding data suggests the bark of the black cherry tree to have little to no antimicrobial effects on the bacteria tested.

- HPLC Determination and Validation of Amoxicillin in Dosage Form

Taylor Felton, *Chemistry & Physics*

Emily Batton, *Chemistry & Physics*

Mentor: **Dr. Meredith Storms**

Various environmental factors such as temperature, humidity, and light play an important role in how the quality of a drug substance or product varies with time. While pharmaceutical companies in the United States are required to adhere to regulatory requirements set by agencies such as the Food and Drug Administration and the United States Pharmacopeia, there stability requirements are not necessarily viewed with the same importance in many African countries. The use of poor quality drugs can lead to poor treatment outcomes, waste of financial resources by prolonging illnesses, increase the potential of recrudescence, and propagate the development of drug resistance. Since antibiotics are in high demand globally, it is essential to understand the importance of drug stability in producing safe and effective products when extreme heat, humidity, and inconsistent voltage can easily destroy drugs. Therefore, the purpose of this research is to develop and validate an HPLC method for the determination of amoxicillin in dosage form. Once the method is validated, pharmaceuticals obtained from African countries will be analyzed and poor quality drugs will be reported to the medical regulatory authority (MRA) in the country where the drugs originated, and also to the WHO Rapid Alert system.

- Fermentation study of *Xenorhabdus nematophilus* in a bioreactor

Elizabeth Gerdes, *Biology*

Mentors: **Dr. Lenord Holmes, Devang Upadhyay**

Xenorhabdus nematophilus is a gram-negative, entomopathogenic bacterium that exists in a mutualistic relationship with the *Steinernema carpocapsae* beneficial nematode. This combination of bacteria and nematode is unique in that the virulent factors produced by bacteria will kill the insect host while simultaneously protecting the nematode. *Xenorhabdus nematophilus* has two phases with very different properties associated with them. In Phase I, the bacteria produce virulent factors, while Phase II cells produce no virulent factors. This growth kinetic study was conducted using a 2L A plus Sartorius Stedim bioreactor by varying the environmental conditions to achieve higher yield of bacterial biomass in shortest incubation period. The study showed that the parameters of 1.0 vvm, pH 7.8, 25°C and 200 RPM had the highest specific growth rate 3.1 h⁻¹ and the lowest doubling time 0.22 hr. The bacterium, *X. nematophilus* growth was best under those conditions.

- A Solution Toward Decreasing Health Disparities Among Farmworkers of Robeson County

Ereny Gerges, *Chemistry & Physics*

Mentors: **Dr. Michele Fazio, Dr. Brooke Kelly**

Health disparities are inequalities in the provision of health care access and awareness to particular ethnical and socioeconomic groups. They are widespread in Robeson County due to the rural geographical and social settings. According to the North Carolina Farmworkers program, about 89% of farmworkers and family members are uninsured. Local and migrant farmworkers do not have access to adequate health care or are aware about ways to reduce health risks. Therefore the need for medical care and health awareness is necessary. The proposed project is one of the most feasible methods to provide basic medical screenings for local and migrant farmworkers around the area through a mobile clinic managed by the Nursing Department's directors and students and other potential needed community partners. This project will benefit our Nursing department as a service-learning and training opportunity to improve the life quality of our community residents. If this project comes to reality, we as a campus caring for the improvement of our local community will provide our students with valuable training to reduce the health disparity migrant farmworkers face each day.

- Fire Ant Friends: Biodiversity of Mites Associated with an Aggressive Ant Species

Kailey Godwin, *Biology*

Mentor: **Dr. Kaitlin Campbell**

In the Southeastern region of the United States, fire ants are an introduced invasive species. They are highly competitive generalist predators known to harm native species. Fire ants pose a threat

to the environment because they have numerous nests that can alter an area's physical and chemical state. Although fire ants seem aggressive, they, like other ants have mite species that are associated with them. Mites have a mutualistic relationship with fire ants by ingesting fungi or bacteria in the fire ant's nest and use ants for dispersal. This study investigated the different species of mites that were associated with fire ants and aimed to find out if there was a difference in species of mites that were associated with two different locations, Sampson's Landing and the UNCP campus garden. Data were collected by thoroughly examining the ants for mites from both locations. Mites were mounted on slides, identified and sorted into species. After inspecting 1104 ants, 14 mites were found comprising 3 different species. Mites in Cohort Heterostigmata were dominant in both locations. The mites belonged to families Pygmephoridae and Scutacaridae. The results suggested that there is a diversity of mites associated with fire ants, but the locations are similar in which species were found, where mites were found on the body of the ants, and how many ants carried mites. These mite species seem to be associated specifically with fire ants which suggests they brought them from their native country. Our findings support previous studies of mites associated with fire ants in Alabama and demonstrate that fire ants are important hosts affecting biodiversity of other organisms.

- Female Aggression and Intimate Partner Violence

Bianca Haywood, *Sociology & Criminal Justice*

Mentor: **Dr. Renè Lamphere**

Aggression is a common form of emotions frequently displayed in relationships that are plagued by intimate partner violence. However, how common is it for IPV in a heterosexual relationship to yield a female aggressor and a male victim? Female aggression is an unexplored avenue in the field of intimate partner violence and this lack of research has created a gap in the current literature. The lack of female perspective shows how important it is for female aggressors to be analyzed so that their point of view can be compared to male aggressors. This literature review analyzed aggression characteristics, cultural and racial differences in domestic violence/aggression, compared female perpetration of domestic violence to male perpetration of domestic violence, and compared the police response to both female and male aggressors. Ultimately this literature review showed the importance of the female aggressor perspective, shined a light on male victims, and addressed the social norms aspect of female and male perpetrators of domestic violence.

- Representation of protein-DNA Binding Dynamics via a Gal Induction Informed Mathematical Model

Lonzie Hedgepeth, *Biology*

Mentor: **Dr. Conner Sandefur**

When subjected to environmental stimuli, eukaryotic cells vary genome-wide expression of genes using transcription factors. These transcription factors represent an array of proteins that have specific DNA recognition sequences, which upon binding, regulate gene transcription. Competition chromatin immunoprecipitation (cChIP) measures the displacement between

constitutive and inducible proteins and is utilized to investigate protein-DNA binding kinetics (dynamics). Current predictions of protein-DNA dissociation (turnover) rates use a simplified statistical model, which is limited to transcription factors that remain bound to DNA for a longer period of time. Here we present the development and implementation of a mechanistic mathematical model, which incorporates the experimentally used gal induction system. Our model, implemented in the freely available Python 3.4 language, captures the dynamics of the relative protein levels (induced to constitutive) by incorporating the positive feedback inherent in the gal induction system. This is a first step towards developing a mechanistic model which can more accurately capture transcription factors that have a shorter residency time.

- Monitoring Ground Water Levels of the Black Creek Aquifer in Southeast North Carolina

Rebecca Hunter, *Geology & Geography*

Mentor: **Dr. Daren Nelson**

The Black Creek Aquifer is a primary ground water resource for five different counties in Southeast North Carolina. Bladen, Columbus, Cumberland, Hoke, and Robeson County all receive the majority share of their public water supply from the Black Creek Aquifer through the use of ground water wells. The mission of the Robeson County Ground Water Project is to monitor the impacts of ground water use on the Black Creek Aquifer, specifically in Robeson County. Through collection and analysis of 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 individual county databases that categorize the ground water data based on the monitoring well used to record it. The large database of ground water levels and well data is being created as reference in this ongoing research project to develop a suitability map of potential well locations in Robeson County. Currently we are working with Robeson County to map, plan, and drill up to 10 new monitoring wells. In addition, the project is also monitoring ground water levels on campus. A local well driller has donated a pumping and monitoring well for campus and this research is helping us place the wells on campus. These new wells will provide the opportunity to continue future research in the field as they are going to be used to monitor and collect ground water levels of the Black Creek Aquifer throughout Robeson County over the next three years.

- The Recharacterization of the Detective in Walter Mosley's *Devil in a Blue Dress*

Tremain Ingram, *English, Theatre & Foreign Languages*

Mentor: **Dr. Susan Cannata**

Walter Mosley reimagines the typical literary detective with his character Easy Rawlins in *Devil in a Blue Dress*. Easy, the main protagonist, finds himself investigating a missing persons case that quickly escalates into a dangerous situation not only for himself, but for many people involved in the disappearance. The most interesting thing about this character is that he is not the Sherlock Holmes type of detective who is known for his superb intellect, observant nature, and his ability to disregard some criminal actions if deemed justifiable. He is not the Sam Spade

“antihero” type of detective who is brash, tough, and willing to go the extra mile for his clients by putting himself in harm’s way. Easy has very little resources when it comes to money or affluence, and is an ordinary, average guy. He is simply himself and uses the limited skills, knowledge, and resources he possesses to solve the mystery. I plan to research and analyze criticism of detective fiction to better understand what the types of detectives are, which will posit Easy Rawlins against the image of what detectives are typically.

- Defining Plant Communities and the Vascular Flora of Sampson’s Landing, Robeson County, North Carolina

Robbie Juel, *Biology*

Mentor: **Dr. Lisa Kelly**

Floristic inventories aid in understanding the plant diversity of ecological communities. We analyzed data from plant inventories (2010 and 2011) of Sampson’s Landing in Robeson County, North Carolina, for floristic composition. Our main objectives were to identify dried pressed plants collected from Sampson’s Landing and to integrate this information with our existing database: 1) number of taxa present, 2) number of rare and exotic species, and 3) life history characteristics. We also mapped plant communities via GPS coordinates. The analysis revealed 91 families, 197 genera and 265 species (of which 16 were exotic), and 6 plant communities. The most common growth habit identified was forb (127 species). One species named [*Macbridea caroliniana*] is listed as a federal Species of Concern and state Endangered species. The large variety of plant communities is likely caused by various elevational and soil differences on the site. This study has already aided the Lumber River Conservancy in the identification of species of concern and noxious weeds on the site. The study will assist in teaching students about the local flora and could aid entities in managing similar sites along the Lumber River.

- Utilizing Literacy and Skill-Focused Teaching Methods

Jared Kaiser, *History*

Laura Spillman, *History*

Alta Davis, *History*

Mark Czechowski, *History*

Zach Freeman, *History*

Mentor: **Dr. Serina Cinnamon**

The National Council of Social Studies(NCSS), is a national professional organization that is devoted to the betterment of social studies education. To achieve their goal, the NCSS offers professional development opportunities that allow educators to engage with each other in an effort to improve the way content knowledge, intellectual skills, and civic values are taught. Our six student group from the University of North Carolina at Pembroke attended the 2016 NCSS annual conference in Washington D.C. with the goal of learning about the newest trends in teaching. Each of us attended different seminars and walked away from the conference with unique perspectives on how to teach social studies in the 21st century. Since the conference, four of our members have been in K-12 public school classrooms utilizing teaching methods that

were demonstrated at the conference. This presentation aims to discuss the information we gathered from the conference, explain how we used it to inform our teaching methods, and examine how this experience transformed us as educators.

- Historical Hurricanes Of North Carolina

Joseph Leary, *Geology & Geography*

Mentor: **Prof. Nathan Phillippi**

This poster will outline the major hurricanes that made landfall or had significant impact to North Carolina as far back as hurricane Hazel. The poster will detail each hurricane and how it impacted the region environmentally and economically. I will also have a laptop on display that shows the story map I created so other people can interact with it. It will have everything the poster does just in a way that allows people to interact with the hurricanes and impacts.

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

Cheyenne Lee, *Biology*

Mentor: **Dr. Conner Sandefur**

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 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 1g of plant to 1mL of water and 0.75g of plant to 1mL of water respectively and 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 seven of the thirteen studied species: *Neisseria sicca*, *Corynebacterium xerosis*, *Staphylococcus epidermidis*, *Bacillus subtilis*, *Staphylococcus aureus*, *Micrococcus luteus*, and *Enterococcus faecalis* (slight inhibition). These data suggest a possible avenue of therapy by using traditional medicines to target altered microbiomes in obesity and type II diabetes.

- The Antimicrobial Effects of Pokeweed Tea

Dakota Lee, *Biology*

Mentor: **Dr. Conner Sandefur**

Native Americans have the highest age-adjusted incidence of type 2 diabetes. Disruptions in the gut microbiome are a hallmark of type 2 diabetes; recovering normal gut microbiota is a recent

proposed therapy for this disease. Traditional medicines, such as pokeweed (*Phytolacca Americana*), were and are still used by indigenous people to treat a variety of disorders including those more commonly associated with microorganisms, such as parasites and digestive disorders. Here, we report the results of experiments designed to characterize the antimicrobial properties of teas made from pokeweed against thirteen different laboratory strains of bacteria commonly found in or on the human body. Antimicrobial assays were constructed by smearing cultured bacteria onto agar plates and placing 50% concentration of pokeweed tea on each plate. A negative control of distilled water and a positive control of 70% isopropanol was also used. The substances were applied via saturated filter discs and the inhibitory effects on the growth of bacterial colonies were noted in comparison to the positive and negative controls. Pokeweed was found to have some inhibition of the growth of the skin dwelling bacteria *M. luteus*. These results suggest some antimicrobial effects of pokeweed against human dwelling bacteria and are an important first step towards characterizing the antimicrobial effects of pokeweed on gut bacteria.

- Genomics Education Partnership: Teaching and Learning Genomics Through Annotation of a Drosophila Species

Kelsey Leigh, *Biology*

Mentor: **Dr. Maria Santisteban**

It has been documented that students who participate in research report gains in many areas and objectively show improvements in academics, problem solving skills, etc. The earlier students are exposed to research the better the benefits. However, it is impractical to bring large undergraduate classes to wet labs. Several strategies have been adopted to bring research into the undergraduate classroom. Bioinformatics, in particular is an attractive option: it is inexpensive, large amounts of data are available on line, and the average student today is fairly computer savvy. My project is part a larger effort: The Genome Education Partnership (GEP). The GEP is designed to engage undergraduates in a joint research project in genomics while introducing them to bioinformatics tools and resources with the goal of increasing their understanding of eukaryotic genes and genomes, as well as immersing them in the practice of science.

Undergraduate students participating in the program can improve the quality of genomic sequence and annotate genes and other features, elucidating meaning from DNA sequence. Research questions in genomics are addressed, leading to student presentations and ultimately research publications. Students involved in the program have worked to produce hundreds of gene models using evidence-based manual annotation. I have participated in the annotation project, which required me to generate precise gene models (start, splicing and stop sites). This process provided me with significant conceptual learning about genes and genome structure, while I learned applicable bioinformatics skills, those that can be used in analyzing sequencing results from any organism.

- Investigating mullein, a traditional medicine, as a treatment for Type II Diabetes

Austin Locklear, *Biology*

Mentor: **Dr. Conner Sandefur**

The epidemic of type II diabetes among Native Americans, and in particular, among the Lumbee Tribe, is the driving force of this research project. It was recently demonstrated that the microbiome of the stomach is different in individuals with type II diabetes versus those without the disease. Our overall goal is to identify herbal medicines that might be used to adjust the microbiome as a treatment for type 2 diabetes. Here, we investigated the plant mullein (*Verbascum Thapsus*), used by several Native American communities, including the Lumbee Tribe, for the treatment of type II diabetes. Teas (hot water extracts) of mullein were generated using stem, root, flower, and leaves at concentrations of 90%, 78%, 95%, and 83% respectively. Thirteen laboratory strains of human dwelling bacteria were smeared onto individual agar plates. Filter discs soaked in tea extracts were applied to each of the plates and the plates were incubated overnight at 37 degrees Celsius. In the two trials performed thus far, no growth inhibition was obtained using the teas. These results are in contrast to previously published results of alcohol extracts that inhibited growth in 6 of the 13 strains used. These results suggest that the traditional medicinal vehicle, teas or water-based extracts, impact bacterial growth differently than lab-based alcohol extracts. Future work will address understanding the mechanism underlying these differences.

- The effect of being an African American woman in the United States

Simone Lott, *Sociology & Criminal Justice*

Mentor: **Dr. Renee Lamphere**

With their unique physical and psychological attributes, African American women are exposed to stereotypes and cultural expectations which affects their self-identity and their health. Traditionally, African American women are viewed as sovereign, robust, impartial, un-emotional, and un-bothered beings. Underneath the surface, Black women are susceptible to violent sexual acts, discrimination and prejudice, and in a spiral pattern of silence. Cultural norms of Black women hold them to high standards and require them to endure any and everything they may experience without seeking physical or mental help even when they desperately in need; these women believe they must deal with their problems on their own. The previously mentioned factors are some of the reasons contributing to health issues, affecting self-identity and mental sanity, and worsening societal perceptions of African American women.

- Solid State Fermentation Study of Beneficial Nematode *Steinernema Carpocapsae*

Jeison Mazuera, *Biology*

Ashraf Alsaidi, *Biology*

Mentors: **Dr. Leonard Holmes, Devang Upadhyay**

The focus of this study was to mass produce the beneficial nematode *Steinernema carpocapsae* in an ideal environment on a solid media using solid state fermentation technology. The nematode *S. carpocapsae* has a symbiotic relationship with the bacteria *Xenorhabdus* nematophila that makes them an effective biological control agent, an alternative of chemical pesticides. This biocontrol agent is not harmful to the environment or humans and does not cause contamination to milk and meat, unlike chemical pesticides. The media used in this study was known as YOO media and it was poured into different size plates to optimize inoculum size and fold outcome.

- Antibacterial Properties of *Chimaphila umbellata*

K'Yana McLean, *Chemistry & Physics*

Mentor: **Dr. Conner Sandefur**

Increasingly we are understanding that metabolic disorders, such as diabetes, involve disruptions in the pattern of microbial organisms, or microbiome, living within us. Addressing the disruption in microbiota is therefore a possible therapeutic avenue to treat these disorders. The overall goal of this project is to characterize the antimicrobial properties of plant-based teas used in traditional medicine to treat diabetes. *Chimaphila umbellata*, commonly known as pipsissewa, is a plant frequently used by Southeastern American Indian communities as a treatment for digestive and metabolic disorders. The leaves, stems and roots of *C. umbellata* plant were collected from Sampson's Landing in Pembroke, NC. Water-based extracts (teas) were created using these plant parts to use in agar diffusion assays. Briefly, to test for antimicrobial properties, filter discs soaked in teas were applied to agar plates smeared with 7 laboratory strains of human-dwelling bacteria. Teas with concentration ranging from 32% to 80% inhibited the growth of *S. aureus*, *B. subtilis*, *P. mirabilis* and *P. vulgaris*. These results suggest pipsissewa teas used in traditional medicine may have antibacterial properties and therefore, may provide an alternative approach to treating disrupted microbiomes in diabetes.

- Promoting and Advocating Equality for Migrant Farmworkers Using a Local Social Media Campaign

Tenisha McLean, *English, Theatre & Foreign Languages*

Mentors: **Dr. Michele Fazio, Dr. Brooke Kelly**

Robeson County is a community that has been historically known for its agricultural practices. However, many who live in the surrounding area may be unaware of the dangerous and unfair treatment farmworkers face on a daily basis, and how this can directly and indirectly affect them.

For this reason, I plan to host an information session on March 28th to promote National Farmworker Awareness Week to raise awareness on campus about the living and working conditions migrant farmworkers face on a daily basis and what could be done to aid them in the struggle to achieve social justice. This information session will include statistics about the critical work migrant workers contribute to local and global food system and how it impacts surrounding communities as well as inform participants on the action needed to become involved. I will introduce a social media and news campaign as one way the campus community can make a difference. This event will hopefully initiate others to annually participate in National Farmworker Awareness Week and advocate for this community throughout the year.

- Effects of Fire on Home Range Sizes of the Eastern Box Turtle (*Terrapene carolina carolina*)

Joseph Nancy, *Biology*

Mentor: **Dr. John Roe**

Prescribed fires are critical tools used by management programs for the conservation of North Carolina's longleaf pine ecosystems. While these fires promote the restoration of abiotic and biotic communities in these ecosystems, their effects on box turtles has yet to be described. In this study, we analyze box turtles within two NC state parks as sites of interest: Weymouth Woods-Sandhills Nature Preserve (WEWO) and Lumber River State Park (LRSP). Management officials periodically employ prescribed fires at WEWO while LRSP is used as a control group as it does not implement this tool. Forty-three box turtles within these sites have been outfitted with radio-transmitters and their locations were regularly obtained using radio-telemetry. Their GPS coordinates were then plotted on maps of the parks which display habitat and terrain features. Minimum convex polygons (MCPs) based on each turtle's yearly movements were generated to better distinguish each turtle's home range. Turtles at WEWO used smaller home ranges, likely due to the restricted availability of unburned mesic hardwood forests, with much of the environment being under the risk and influence of fire. Turtles at LRSP were less constrained due to the wider availability of preferred mesic hardwood forests and low risk of fire. Interestingly, turtles expanded their multi-year home ranges to cover much larger areas than single year estimates would have revealed. Assessing both the long and short-term effects prescribed fire has on terrestrial turtle populations will provide management officials, conservation specialists, and other biologists significant information vital to sustaining healthy turtle populations.

- Efficacy Of Human Spermatogonial Stem Cell Transportation And Cryopreservation For In Vitro Propagation And Subsequent Autologous Transplantation

David Pedersen, *Biology*

Mentors: **Dr. Maria Santisteban, Dr. Robert Poage**

Infertility plagues many families due to genetic disorders, traumatic injuries, cancer, lifestyle choices, and idiopathic etiologies. Approximately 8% of men are at risk for impaired fecundity (2002 CDC study - National Survey of Family Growth). In fact, this dysfunction contributes to

50% of couple's inability to conceive (Male Infertility and Its Causes in Human, Miyamoto, T. et al.). Other times children are affected by radio or chemotherapy to treat leukemia or other forms of cancer. While this treatment has a high success rate, it can sometimes render the child sterile. The aim of this project is two-fold: to provide a testicular tissue collection kit and a central tissue banking facility. Once a patient is deemed a good candidate for this process, healthcare providers can employ the kit to preserve the tissue to maximize its viability during transport to a banking facility. Upon receipt, the tissue will undergo characterization and cryopreservation. When the patient reaches maturity, he may elect to have his own cells implanted in an effort to permit him having his biological children.

- The Relationship between Self-Compassion, Post-traumatic Stress Disorder, Coping and Acceptance in a Military Population

Kiana Perez-Jimenez, *Psychology*

Mentor: **Dr. Ashley Allen**

Self-Compassion involves being kind to oneself, aware of one's emotions, and conscious that other people go through difficult situations. Self-compassion has numerous benefits including greater psychological well-being as well as less depression and anxiety (Macbeth & Gumley, 2012; Zessin Dickhauser, & Garbade, 2015). U.S. military personnel experience an increased rate of depression with approximately 12% experiencing major depressive disorder. Therefore, self-compassion may be particularly beneficial in this population (Gadermann, et al., 2014). Previous research shows self-compassion may be related to less chronic PTSD symptoms in veterans (Hiraika, Meyer, Kimbrel, DeBeer, Gulliver, & Morissette, 2015). Other findings suggest self-compassion may minimize the effects of traumatic experiences on veterans' overall functioning (Dahm, Meyer, Neff, Kimbrel, Gulliver, & Morissette, 2015). Self-compassion should also be related to acceptance for a military population (Neff, 2003). In this study, we will recruit 200 military-affiliated participants through Amazon Mechanical Turk. These participants will complete an online survey to assess self-compassion, PTSD, coping, and acceptance. Additionally, fear of self-compassion and social acceptability of self-compassion will be included to determine if being self-compassionate is undesirable in a military setting. We hypothesize that self-compassion will be negatively related to PTSD and positively related to effective coping and overall acceptance. However, we expect for these effects to be moderated by one's belief in the social acceptability of self-compassion.

- Incarcerated Mothers and their Children

DeAndria Purdue, *Sociology & Criminal Justice*

Mentor: **Dr. Renee Lamphere**

The purpose of this research is to examine the many struggles incarcerated mothers and their children endure. Currently there is not much in depth information on the topic. Majority of the women that are being incarcerated are mothers. Mothers are typically the primary caregiver, causing their children to be effected the most. The separation between the two is only the first barrier to overcome. Incarcerated mothers then find ways to cope with both the separation and

being incarceration. Some other struggles that follow include post incarceration, rekindling relationships, and a child's response to the incarceration. By evaluating this issue on a macro and micro sociological level it allows one to have a better understanding of what comes with being incarcerated.

- "The Little House Series": Laura Ingalls Wilder and a Nostalgic Portrayal of Childhood During the Great Depression

Abby Rosen, *History*

Mentor: **Dr. Ryan Anderson**

In 1932, "The Little House on the Prairie" book series depicting the childhood of Laura Ingalls Wilder during the late nineteenth century became a staple of children's literature. But why were books written about the 1880's so popular during the 1930's? After examining three books in the series—*Little House in the Big Woods* (1932), *Little House on the Prairie* (1935), *On the Banks of Plum Creek* (1937) -researching Wilder's published letters from the 1930's, and reading secondary works on childhood and the Great Depression, it became clear that the economic catastrophe challenged ideas about raising successful children. Wilder's childhood became something of a fairytale after urbanization and modernization swept through the United States. Her childhood represented a nostalgic glimpse of America that was long gone by the thirties. Childhood in America took shape more from values related to urban life and a corporate economy, which stood in contrast how the Ingalls family raised their daughters on the prairie. Wilder's stories reminded readers of mythically traditional American values. Family, industry, bravery, and hard work helped the Ingalls family survive; the book encouraged children's respect for individual success. "The Little House on the Prairie" books gave children hope that industry, bravery, and hard work still mattered, even if their own experiences during the Depression told them otherwise. In a time of economic hardship, these books served as a beacon of hope that traditional childhood values would survive modernization and urbanization.

- Planes, Trains, and Automobiles Through China

Anna Scholten, *Geology & Geography*

Mentor: **Prof. Nathan Phillippi**

This project is a result of my travels in China through the study abroad programs and the School of Business of the University of North Carolina at Pembroke. An interactive map was created using ESRI's story map application in ArcGIS online. It shows my travels starting from North Carolina and throughout China. Points of interest on the map are linked with photos and information about that site. A description will also be included that explains the history of the location as well as my experiences in China. Using ESRI's story map I was able to share my travels through China and illustrate my experiences of a different culture.

- Does Restricted Space Limit Potential Growth in Warmouth (*Lepomis gulosus*)?

Tyler Scoville, *Biology*

Maria Chavez, *Biology*

Mentor: **Dr. John Roe**

The effect that available space has on the growth rate and ultimate size of fish is a topic that has received little scientific testing. This research looks to see if a smaller environment results in reduced growth in sunfish. The data gathered from this experiment will be relevant to the broader subject of phenotypic responses to environmental challenges in fishes. This information is relative not only to evolutionary biologists but also the commercial raising of fish both for pets and consumption. Ten wild-caught juvenile warmouth were placed randomly in ten, ten gallon aquariums with filtration and aeration. The following treatments were applied: partitions that reduced access to five gallons of space in the ten gallon aquarium, and a control that did not restrict the space in the ten gallon aquariums. This study is being performed in a greenhouse at the University of North Carolina at Pembroke with a starting date of February 6th and an end date that has not yet been determined. A three-day feeding schedule was used, and the amount of food allotted was 10 percent of the mean population weight. From this experiment the popular belief that a fish will only grow to the size of its enclosure will be tested.

- Developing a Spectroelectrochemistry Assay for Acetaminophen

Kaitlan Smith, *Chemistry & Physics*

Gabriell Green, *Chemistry & Physics*

Mentor: **Dr. Paul Flowers**

The techniques and instruments used to perform chemical analyses on medically relevant substances are essential tools used for applications ranging from disease diagnosis to fundamental medical research. In the case of clinical applications, these tools are used mainly to identify and quantify target compounds in human body fluids and tissues. Our laboratory conducts research aimed at developing new clinical assays that are based on making light-absorption measurements (spectrometry) on samples that are being subjected to electrolysis (electrochemistry), an experimental approach known as spectroelectrochemistry (SEC). Our work in this area is motivated by the potential benefits in analysis speed, cost, and selectivity that can be achieved using SEC. We've recently focused this effort on developing a new assay for a common nonprescription pain-reliever, acetaminophen. As preliminary work towards the goal of designing an emergency room-appropriate method for blood and urine specimens, we have investigated the SEC properties of acetaminophen and common interfering compounds in aqueous buffer solution. This poster describes our newly developed SEC acetaminophen assay in terms of its performance in comparison to existing assays. Advantages are noted in a per-sample analysis time of about three minutes, and in the absence of interference by aspirin and caffeine, two compounds often included with acetaminophen in specialized nonprescription pain medications. This material is based upon work supported by the National Science Foundation under Grant Number 1506817

- Curriculum Enhancement for Biology at Purnell Swett High School: A Service-Learning Project

Caleb Smith, *Biology*

Mentor: **Dr. Dennis McCracken**

For my project, I will present my biology service-learning experience at Purnell Swett, a local high school in Pembroke's community. The major task of this project is providing an educational and positive learning experience of biology and science for tenth-grade students, who are preparing to take the state-mandated End of Course Test (EOCT) for biology. I demonstrate the impact of tutoring and review sessions each week for tenth-grade students currently in biology classes, particularly for students struggling to understand main concepts, while incorporating hands-on experiments and activities within the community to further their biological understanding. The overall goal of my project is to encourage local high school students to continue pursuing a higher education, as well as helping them feel prepared for the biology End of Course Test. My project will also provide an example of how service-learning can be incorporated into any subject, and the positive effect of service-learning within a community.

- The Removal of Heavy Metal Ions from Water (such as Cu^{2+} , Cd^{2+} , Pb^{2+} , and Zn^{2+}) using Calcium Alginate Beads.

Kennedi Stewart, *Chemistry & Physics*

Megan Stevens, *Chemistry & Physics*

Mentor: **Dr. Sivanadane Mandjiny**

The purpose of this study is to determine the removal of Cu^{2+} from water using calcium alginate beads. Sodium alginate, a naturally found bio-polymer that is formed from the monomers glucuronate and manuronate, precipitates when added to a calcium chloride solution. Solutions of Cu^{2+} of varying concentrations were prepared. The Cu^{2+} was removed from these solutions using a continuous method, gel-filtration chromatography, as well as using a batch method. The concentrations of Cu^{2+} of the various solutions were experimentally determined using atomic absorption. The percentage removal of Cu^{2+} ions from the solution using the gel was determined to be 55%. The gel was also determined to have excellent storage stability. Using the Langmuir absorption isotherm, the affinity constant between the gel and the copper ion was determined to be 0.014 grams of Cu^{2+} per milliliter gel experimentally, which leads us to conclude that future directions of this research include increasing the percent removal of Cu^{2+} from the gel to 100%.

- Robeson County Guardian *ad Litem* Volunteer Deficiency

Hannah Stockton, *Social Work*

Mentor: Dr. Jody Thomas

My project is on why the Robeson County Guardian *ad Litem* Program lacks volunteers and its significance. GAL is a child advocacy agency where trained volunteer speak for abused and neglected children involved in court. More child victims are involved in court than there are volunteers involved in GAL and so, I want to understand why a gap exist. My research shows if a significant association exist between participants and participants' ethnicity and between participants and participants location regarding if the participants have heard about GAL. My research involves 12 ethnicity categories and 4 location categories with a total of 122 participants. Many survey participants give their perception on potential barriers that could prevent them from hearing about GAL. Questions surfaced while synthesizing these potential barriers and are mentioned as well. These rhetorical and thought-provoking questions are gaps that could potentially be filled by enhancing the overall community which in turn could help GAL gain volunteers and job positions.

- Perspective Taking and Perception of Poverty

Lea Tardanico, *Psychology*

Mentor: Dr. Ashley Allen

Perspective taking has been demonstrated to have genuine effects on people's attitudes and behaviors toward a subject. Furthermore, imagining oneself in an undesirable position can yield a different response outcome than imagining others an undesirable position. Past research has confirmed the effects of self versus others perspective taking, showing that when people imagine how others feel about a situation, they are more likely to feel empathy and generate altruistic motives. Opposite, the empathy brought on by imagining how oneself feels about a situation may generate distress and egotistical motives (Batson, Early, & Salvarani, 1997). When people imagines themselves in another person's situation and is asked how they would feel about it, empathy is reported as well as greater psychological arousal, though when strictly imagining the self in a situation, emotional distress is reported (Jackson, Brunet, Meltzoff, & Decety, 2006.). Literature suggests that when a person is in a position of advantage over the "other" whose perspective they are taking, moral action is stimulated (Batson et. al, 2002). Given these ideas, this study examines the ways in which people's attitudes toward poverty and social mobility are influenced by either having to place themselves in an impoverished situation or reading about someone else in said situation.

- The Impact of Self-Compassion on Strategies, Perceptions, and Attainment of Academic Success

Kimberly Taylor, *Psychology*

Mentor: **Dr. Ashley Allen**

Self-compassion involves being kind to oneself, keeping one's emotions balanced, and recognizing that all people suffer (Neff, 2003). Less self-compassionate individuals may view their academic ability or performance as weaker causing them to steer clear of academic challenges or help (Neff, Hsieh, & Dejitterat, 2005). Individuals of a lower social class are commonly unaware of the benefits of learning strategies such as using academic resources. Students of lower social class are more likely to have jobs; therefore, they have less time to take advantage of academic resources (Stephens, Brannon, Markus, & Nelson, 2015). This study investigated whether trait self-compassion predicted academic outcomes such as use of academic resources, GPA, and perceptions of academic failure. University students (N=175) completed an online study measuring self-compassion, use of academic resources, perceived SES, GPA, and perceptions of academic failure. Perceived social class and GPA were incorporated as moderators in some of the analyses. Regression analyses showed that self-compassion was related to higher use of academic resources for participants with a lower GPA. Perceived social class was positively related to use of resources for participants with a lower GPA. Self-compassion was also related to less belief that one needed to get all A's in order to be successful, but only for low SES individuals. In terms of actual performance, less self-compassionate individuals with higher SES reported higher GPAs than other participants. Overall, self-compassion buffered low SES students from possible failure; however, it did not lead to higher academic success.

- Dracula: A Man's Brain and a Woman's Heart

Brittany Tullock, *English, Theatre & Foreign Languages*

Mentor: **Dr. Susan Cannata**

Bram Stoker's Gothic novel *Dracula* presents the ideal woman during the nineteenth century, but also challenges this idealization. His female heroine, Mina and the disastrous affair of Lucy seem to mock the male characters' opinions of women. Bram Stoker presents the female characters in his novel as both: the ideal woman and the "new woman". The nature of ideal women during the Victorian era was to remain meek and pure, while also being ruled by their emotions. Lucy and Mina are both viewed as pure by the men of the novel. Stoker also used a Victorian term that was given to women who were rational, bold, and male-like in their behavior- the "new woman". Stoker presents these dual-sided women in both Lucy and Mina, as they both are pure on the surface, but have the minds of men. The women of the novel express male attributes in their thoughts and actions. While Lucy's tragic story of falling victim due to lust could be a lesson for women to remain as the "ideal", Mina's story is a mockery of the ideal institution. Bram Stoker's *Dracula* celebrates the strength and beauty that is a woman with a man's brain, instead of demonizing it.

- An Ecocritical Reading of M.T. Anderson's *Feed*

Ashley Underwood, *English, Theatre & Foreign Languages*

Mentor: **Dr. Susan Cannata**

In his novel, *Feed*, M.T. Anderson creates a futuristic dystopian society that is consumed by the use of technology. Technology has impacted society to the point that even the environment that they live within is synthetically made. The feed is a tiny computer chip embedded in the majority of people's heads from a young age. The feed controls and limits everything a person sees and even learns and is one of the things that has had a huge impact on how people treat the world around them. The society within *Feed* is one that is not highly aware of their dying environment. This is due to the fact that they live in bubble domes with controlled environments with synthetic air and breezes. Also, the feed does not actively show them what is going on within their world. In the novel, Titus' is the first-person narrator and we see the world as he does and it is not until he meets Violet, that he starts to see the implications of the feed that are affecting the environment and society around him. Through the differences between Titus' world and Violet's we see how technology has affected people's education, interpersonal skills and relationships, and even their personalities. People are conditioned to be consumers of products, and nothing more. I plan to analyze the novel through an ecocritical approach, exploring how the advancements of technology within the novel has impacted society and destroyed their environment.

- Understanding the Black Creek Aquifer

Wren Varga, *Geology & Geography*

Mentor: **Dr. Daren Nelson**

The high use of groundwater in the western portion of Robeson County, North Carolina has had notable effects on the Black Creek Aquifer. These changes in the aquifer have been observed by comparing potentiometric surfaces for five years (2010 to 2015). A three dimensional model of all the aquifers in North Carolina has also been developed to further our understanding of the geophysical properties of the aquifers. The research done throughout this project is for the overall purpose of understanding properties of the Black Creek Aquifer, focusing primarily on what is beneath Robeson County. The properties being observed include the overall direction of groundwater flow and the history of the groundwater system. This research is part of a the Robeson County Groundwater Project; where the university and the county are working together to develop a monitoring program for our local groundwater resources.

- Design and Performance of a Sub-Microliter Spectroelectrochemical Device

Wei Wang, *Chemistry & Physics*

Dayten Hodge, *Chemistry & Physics*

Mentor: **Dr. Paul Flowers**

Spectroelectrochemistry (SEC) is the term used to describe a well-established experimental approach in which analytes undergoing electrolysis are monitored by various light-absorption techniques. The various technologies derived from SEC are widely utilized in many basic and applied scientific fields. Our research group is presently working towards the design, fabrication, and evaluation of new devices that are capable of SEC measurements. Most recently, we have focused on device designs that can accommodate very small sample volumes (e.g. less than one-millionth of a liter) in an effort to contribute to the inventory of “microscale” techniques that are increasingly important to the advancement of science. This poster describes the design and performance of a sub-microliter (<1 μL) SEC device recently developed by our research group. Results obtained using this device to measure spectral and electrochemical signals for standard chemical systems show it functions effectively with sample volumes 10X-100X lesser than any similar device reported in the literature. In addition, a digital imaging study of concentration gradients produced during electrolysis, will also be presented. This material is based upon work supported by the National Science Foundation under Grant Number 1506817.

- Online Map of K-12 Schools in, and Surrounding, Robeson County

Aaliyah Weatherington, *Geology & Geography*

Mentor: **Prof. Jesse Rouse**

As part of an upcoming workshop on spatial thinking, a map was created to show the location of the local schools as part of the planning process which provide an example of how the tools might be used. The map allows us to view the local school locations and ascertain whom to invite and to determine the distance they are from UNCP. It will also allow the teachers an opportunity to see how easy it is to use the mapping tools and how they can apply them in the classroom at the workshop. This map illustrates the location of K-12 schools in southeastern North Carolina and northeastern South Carolina.

- The Underground Railroad

Aaliyah Weatherington, *Geology & Geography*

Mentor: **Prof. Jesse Rouse**

The Underground Railroad was a series of routes that slaves took to escape from the southern states to the freedom of the northern states and Canada before and during the Civil War. This route is recognized as a highly significant corridor, which developed due to slavery and is a significant event in African-American history. The most famous conductor, or leader, of the Underground Railroad was Harriet Tubman who made nineteen trips to the South and helped three hundred slaves to gain freedom. This poster will show select locations along the route of the Underground Railroad connected to Harriet Tubman.

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