



**The Office of Undergraduate  
Research**

UNC CHARLOTTE



**URC**

**UNDERGRADUATE RESEARCH  
CONFERENCE**

**2021 Abstract Book**



We are pleased to present the 2021 UNC Charlotte Undergraduate Research Conference (URC) Abstract Book. Even during this time of the Covid-19 pandemic, we have a vibrant conference with over 200 students presenting their oral presentations and poster presentations at the URC 2021! We believe this abstract book reflects the vibrancy and brilliance of the undergraduate research at UNC Charlotte. This belief aligns with the mission of the Office of Undergraduate Research (OUR), which is to support undergraduate students through opportunities to communicate their research to the wider community. As URC 2021 is a virtual conference, we have the unique opportunity to showcase UNC Charlotte's undergraduate research to the Charlotte region, across the State of North Carolina, and around the world. We would like to thank Academic Affairs, the Honors College, the Levine Scholars Program, the MU Chapter of the Phi Beta Delta (PBD) Honor Society for International Scholars, and Phi Kappa Phi (PKP) Honor Society for sponsoring the awards that are part of the URC 2021.

The vast array of research project abstracts included in this book would not be possible without the commitment of our UNC Charlotte faculty. Indeed, this abstract book represents the dedication of UNC Charlotte's faculty members who participate as research advisors. A big thank you to faculty for your service and dedication to undergraduate research and scholarship at UNC Charlotte. Likewise, we thank all the faculty, staff, and graduate students for your service as judges for the URC 2021. We would also like to especially recognize the conference organizing committee, the staff in the Office of Undergraduate Research, and the student leaders who all played integral parts in the URC 2021 planning. Most of all, please join us in congratulating our undergraduate researchers for their hard work and efforts!

Dr. Erin Banks, Assistant Dean, Office of Undergraduate Research  
Dr. Erik Jon Byker, Faculty Fellow and Chair, URC 2021 Organizing Committee

### **UNC Charlotte URC 2021 Organizing Committee Members**

Dr. Erin Banks, Assistant Dean, The Office of Undergraduate Research  
Dr. Nhi Cao, Program Coordinator, The Office of Undergraduate Research  
Dr. Erik Jon Byker, Committee Chair; Reading and Elementary Education, Cato College of Education  
Dr. Luke Donovan, Kinesiology, College of Health and Human Services  
Dr. Mohsen Dorodchi, Computer Science, College of Computing and Informatics  
Dr. Aba Ebong, Electrical and Computer Engineering, William States Lee College of Engineering  
Dr. Colleen Hammelman, Geography and Earth Science, College of Liberal Arts and Sciences  
Mr. Ryan Harris, J. Murrey Atkins Library  
Ms. Sarah Hedrick, Administrative Assistant, The Office of Undergraduate Research  
Dr. Tamara Johnson, Director of Engaged Scholarship, Metropolitan Studies  
Dr. Malin Pereira, English and Executive Director of the Honors College  
Ms. Sharon Reichard, J. Murrey Atkins Library  
Dr. Diane Zablotzky, Director of the Levine Scholars Program  
Ms. Julia Mileski, Graduate Assistant, The Office of Undergraduate Research

## Featured Speakers

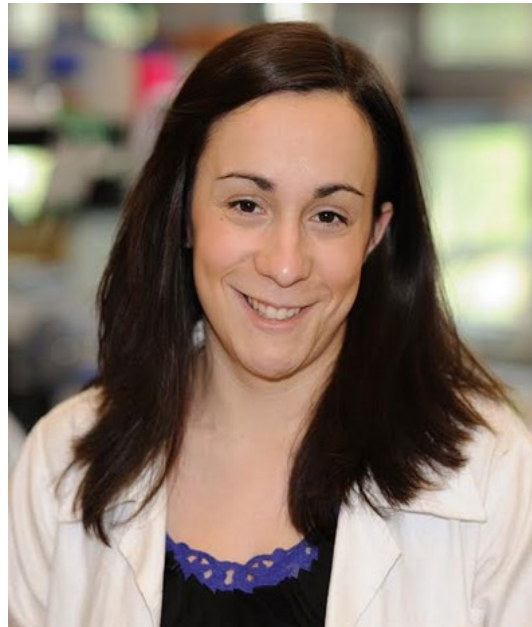


### Keynote Speaker: Dr. Tojan Rahhal

Dr. Tojan Rahhal is a scientist and engineer with a passion for an inclusive world! She is a Biomedical Engineering graduate of NC State University and has a Ph.D. in Pharmaceutical Sciences from UNC-Chapel Hill, where she worked on engineering therapeutic nanoparticles for pulmonary delivery. She has developed several award-winning programs and curriculums to address diversity and inclusion in STEM. She was recognized as a Women of Color History Maker in Diversity for her leadership in efforts to catalyze change to help [engineering] students from underrepresented populations overcome historic barriers. Dr. Rahhal recently served as Assistant Dean for Inclusive Excellence and Strategic Initiatives at the University of Missouri, and is currently the CEO of Engineering World Health.

### Alumna Speaker: Dr. Casey Rimland

Dr. Casey Rimland graduated magna cum laude from UNC Charlotte in 2012. While at UNC Charlotte she was awarded a C.C. Cameron Merit and a Goldwater Scholarship. Dr. Rimland completed her PhD training through the National Institutes of Health (NIH) Cambridge Scholars and Gates Cambridge Scholars program. Dr. Rimland will graduate from UNC Chapel Hill medical school in May 2021 and will pursue residency training in Internal Medicine followed by fellowship training in Rheumatology. She hopes to one-day run a translational research program aimed at elucidating causes of autoimmune disease in order to better treat her patients.



## URC 2021 Schedule of Events

### Monday, April 12, 2021

**8:00 AM:** The Undergraduate Research Conference (URC) 2021 Symposium platform opens to the public at the following link: [symposium.foragerone.com/urc2021](https://symposium.foragerone.com/urc2021). Asynchronous reviewing and judging of the presentations can begin at this time. We encourage reviewers, judges, mentors, and advisers to use the Commenting feature in the URC 2021 Symposium platform to add comments and provide feedback to the presenters.

### Thursday, April 15, 2021

**9:30 AM – 10:00 AM:** Opening Ceremony with comments and videos by Dr. Erin Banks, Dr. Erik Byker, and Provost Joan Lorden

**10:00 AM – 10:25 AM:** Dr. Tojan Rahhal's Keynote Presentation and Q&A Time  
(Thank you to the Office of Undergraduate Research for sponsoring the Honorarium for the Keynote Presentation)

**10:30 AM – 2:30 PM:** Live Q&A Sessions with Oral Presenters  
(Please refer to the URC 2021 Symposium Live Sessions tab in the Symposium system for the Q&A session times and Zoom link details)

### Friday, April 16, 2021

**8:00 AM – 12:45 PM:** Asynchronous reviewing and judging of the presentations continues  
\*Judges should have their judging completed and submitted by 1pm

**1:00 PM – 1:25 PM:** Dr. Casey Rimland's Alumna Presentation and Q&A Time  
(Thank you to the Honors College for sponsoring the Honorarium for the Alumna Presentation)

**1:25 PM – 1:30 PM:** Closing Remarks by Dr. Erin Banks and Dr. Erik Byker

Please note that the URC 2021 Awards will be announced by the OUR Office by Wednesday, April 21. The OUR Office will also notify the students who won awards by email. Please consider using Niners Commons to upload, document, and store your research presentation. Thank you for your participation in the URC 2021!

# ABSTRACTS

## Oral Presentations

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

# Arts and Design

**CE** - Community Engaged   **G** - Global   **H** - Honors   **NC** - North Carolina

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Abstract #: 100

Title: Ear-Training as a Tool to Connect Music to Sound Technology

Student Author(s): Gianna Agostino **H**

Faculty Advisor: Dr. James Grymes

Department: Music

Music and sound have always been intimately linked through their creation and the physiological response they elicit upon the listener. Commonly distinguished into categories for mastery, traditional ear training/aural skills exercises focus on pitch, harmony, and tone in ways that allow the musician to distinguish, recall, and craft specific sounds as they hear them both from external sources and through their own imagination. It is through this common vernacular, systems of measurement, and streamlined notation that we can begin to create methods of understanding and therefore pedagogical approaches to aural learning. However, there are new developments in music that extend beyond what is offered from Western ear training and music theory, such as music editing software and advanced recording techniques, that must be considered for the future of music education. My thesis will present the necessary pedagogical rethinking ear training requires in the twenty-first century. By examining the existing techniques involved in teaching ear training from the western canon, and giving attention to the rise of Sound Design and Audio Engineering as professions that stemmed from the invention of modern music technology, we can find a new pedagogical approach suited for the modern musician and engineer. This new approach will allow for common terminology across the field and explore how aural listening from both a performing and editing standpoint is a symbiotic relationship. The goal is to incorporate both elements into a curriculum that attempts to correct the growing divide between music creators and music listeners.

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Abstract #: 101

Title: A Guide to a Historically Informed Performance of Bach's Cellos Suites.

Student Author(s): Nicolas Allion

Faculty Advisor: Dr. Jay Grymes

Department: Music

This video lecture will discover, analyze, and demonstrate the techniques involved in the performance of, as well as the style of a historically informed performance of Bach's 1st Cello Suite. The methods I anticipate using to explore these techniques and style will be through framing the historical context of Bach's time, exploring the Baroque dances that influenced Bach's composition of the suite, a theoretical and historical analysis of Bach's 1st Cello Suite, and demonstrations of techniques followed by an explanation of the historical evidence for these techniques. The presentation and accompanying script will be divided into sections by the movements of the 1st Suite. I anticipate the highlight of my results will be the juxtaposition of the modern playing style with a more historically informed playing style. I anticipate that my conclusions will be: that while both historically informed and more modern styles of playing the Cello Suites are valid, it is important to explore both styles for a more complete understanding of the work as a whole; that modern cello students benefit greatly from an informed understanding of the Cello Suites; and that it is important for a professional cellist to explore multiple modes of performing the same piece so to develop a deeper understanding of their own instrument and its origins.

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Abstract #: 102

Title: Regenerative Facade

Student Author(s): Isabella Barrios-Silva **S**

Faculty Author and Advisor: Dr. Kyoung-Hee Kim

Department: Architecture

Commercial building owners struggle to find strategies to cut building energy costs, improve occupant productivity, and improve innovative cutting edge technologies, so we have found a way to complement all three necessities. For over a year, the Integrated Design Research Lab in the Architecture Department (IDRL) here at UNC Charlotte has been creating and reimagining an innovative window system that controls solar gain and maximizes daylight penetration to reduce a building's total energy consumption while generating on-site electricity. Unlike traditional double-pane windows, this photovoltaic system will be able to produce clean energy providing environmental impact, conserve energy for economic impact, and provide user satisfaction for social impact. The research directed by Kyoung-Hee Kim and worked on by the IDRL have constructed prototypes with continuing research, provided a market value with the NSF I-Corps Team Program, and is now working on continuing to evaluate performance assessments as well as collaborating with professionals in the field to find potential early adopters. What we have found is that smaller companies are not willing to risk trying new cutting-edge technologies, but bigger companies will invest if there is a reasonable return on investment in three to five years. Corporate companies, such as Google and Amazon, care about occupant comfort and company's environmental stewardship, so they will invest in anything high-tech and environmentally friendly to attract the right employees. This research has helped us define what problems companies are facing and how we can develop our work to accomplish a broader societal impact.

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Abstract #: 103

Title: A Photocatalytic Facade for Air Pollution Mitigation

Student Author(s): Dante Gil Rivas **S**

Faculty Advisor: Dr. Kyoung-Hee Kim

Department: Architecture

Indoor air pollution ensued from nitrogen oxides (NO<sub>x</sub>) and various volatile organic compounds (VOCs) in building materials and outdoor air pollution by the automobile exhaust gases pose severe threats to people's health and the environment. A data set collected from 100 randomly selected buildings in 37 cities in 25 states shows that all buildings contain carcinogenic VOCs, with the majority of the buildings containing more than a dozen different VOCs (1). Common sources of these indoor air pollution include fuel-burning appliances, building materials, furnishings, cleaning products, and outdoor air pollution (2). Exposure of NO<sub>x</sub> and VOCs caused by anthropogenic sources results in health impact, environmental impact, neurological impact, and equity impact. The project's proposal is an air depolluting façade system undertaken at the UNCC's Integrated Design Research Lab sponsored by an NSF ICorps Team. The façade system primarily improves the interior air quality of buildings, resulting in an improved interior space for people. Secondly, the façade improves the environment due to improved building performance based on the design, material consideration, and technology application. The façade provides various benefits such as a low maintenance system, a passive solution, solar control, and daylight illumination. It is vital to improving indoor environmental quality (IEQ) as in the United States, Americans spend on average 90% of their time indoors (3). And globally, buildings are responsible for about 40% of energy use and 60% of electricity use (4). Improvement in IEQ and reduction in energy usage will create a better space for people and the environment.

1. EPA. "Summarized Data of the Building Assessment Survey and Evaluation Study." EPA, Environmental Protection Agency, 16 July 2020, <https://www.epa.gov/indoor-air-quality-iaq/summarized-data-building-assessment-survey-and-evaluation-study>

2. EPA. "Volatile Organic Compounds' Impact on Indoor Air Quality." EPA, Environmental Protection Agency, 6 Nov. 2017, <https://www.epa.gov/indoor-air-quality-iaq/volatile-organic-compounds-impact-indoor-air-quality>

3. EPA. "Indoor Air Quality." EPA, Environmental Protection Agency, 16 July 2018, [www.epa.gov/report-environment/indoor-air-quality#:~:text=Americans%2C%20on%20average%2C%20spend%20approximately,higher%20than%20typical%20outdoor%20concentrations.](http://www.epa.gov/report-environment/indoor-air-quality#:~:text=Americans%2C%20on%20average%2C%20spend%20approximately,higher%20than%20typical%20outdoor%20concentrations.)

4. EIA. "Frequently Asked Questions (FAQs)." EIA, Energy Information Administration, 11 Feb. 2021, [www.eia.gov/tools/faqs/faq.php?id=86&t=1](http://www.eia.gov/tools/faqs/faq.php?id=86&t=1).

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Abstract #: 104

Title: Enticing, Wild, and Spectacular: Orientalism in Art and Music in Nineteenth-Century France

Student Author(s): Ruby Kate Hughey

Faculty Advisor: Dr. Jay Grymes

Department: Music

This presentation investigates Orientalism in the art and music of nineteenth-century France and the devices used to portray the exotic 'other.' In this project, I will study the artworks of French painters such as Eugène Delacroix (1798-1863), Horace Vernet (1789-1863), and Narcisse Diaz (1807-1876), and analyze how these French artists portrayed the exotic East as enticing, wild and spectacular, at least according to the appetites of their western audiences. In addition to exploring Western European relations with the Orient, I will analyze the formal aspects of the paintings themselves, comparing and contrasting them with other French paintings of their time. Similarly, I will also discuss and perform *Havanaise* (1887) for violin and orchestra by French composer Camille Saint-Saëns, who exhibited a distinct interest in the exotic sounds of Spain, a region in Southern Europe viewed as culturally and socially distant by its western neighbors. I will discuss Saint-Saëns' use of musical devices that suggest 'otherness,' such as the habanera rhythm and stark juxtapositions of moods and tonalities. Culminating in a lecture-recital, I anticipate that my inquiry will bring me to a conclusion about Western Europe's use of imagined or romanticized exotic sounds and images within a European tradition in its attempt to establish western culture as the ultimate reference point for cultural sophistication and domination. Their efforts lead to problems in systems of signification, namely loss of true information, reductiveness, and self-projection onto the other.

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Abstract #: 105

Title: "Dido's Lament" 2.0

Student Author(s): Rebecca Jurasits **H**

Faculty Advisor: Dr. Jay Grymes

Department: Music

Music is an everchanging, ever adapting, irreplaceable, and indispensable aspect of our day-to-day life. The earliest traces of music spanning all the way back to 230 BCE (Seaton, Douglas) show us that music has always had a sense of purpose in our world. From religious ceremony to leisure, there is a type of music for every situation. For each period of history, there was a genre considered the most sought after. I believe that music adapts to fit the surrounding culture, and when new composers recognize that and incorporate it in their work, they are revitalizing current composition to match the production of the trendiest music of the century. To demonstrate this change between traditional live performance in opera and present-day live performance in pop, I will be taking Henry Purcell's "Dido's Lament," written in 1689, as an aria in the opera Dido and Aeneas, and restructuring the melody, rhythm, and underlying harmonic structure to adapt to a modern-day pop song. First, I plan on stripping the instrumental harmony down to just a single guitar. This will already remove complicated distractions from the audience. I then plan on simplifying the melody line to match what the typical range of a non-trained singer would be. After I restructure the song, my goal is to record my new piece and insert it as a non-diegetic sound in various movie scenes to determine if classical music can appear in pop culture without appearing out of place.

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Abstract #: 106

Title: Community, Exhibition, Form: Phil Freelon and Designing Black Museums

Student Author(s): Emma Lineberger

Faculty Advisor: Dr. Emily Makas

Department: Architecture

African American history and culture museums became popular during the second half of the 20th century as Black communities sought to share and celebrate their struggles and triumphs in American history. Phil Freelon's architectural works in the early 2000s became significant due to his inclusion of African American culture and experience in America in the basis of his architectural designs, especially for the Black history and culture museums he designed. These projects show this connection between Freelon's principles of community involvement, black historic precedent, and celebration of diversity through architectural expression. An examination and further research into how his buildings relate to the location context and the curation of the museum galleries will provide further insight into how Freelon involved community in the design through figurative and literal means. Through analysis of Freelon's African American history and culture museum designs, I will examine how Freelon involved community in the design process, integrated the community's history and identity into building form, and responded to the physical community's needs. This analysis will be conducted through plans, sections, and review of secondary, oral resources, to detail how the design and process link these buildings their unique communities and neighborhoods. Context will be a key component in this research as the size, neighborhood, nearby communities and business of the site influence the different approaches to integrating community into the projects. The building form, exhibition content, and museum programs in these African American museums will be literal displays of this integration.

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Abstract #: 107

Title: Spirituals and Hidden Messages to Freedom

Student Author(s): Tia Wilson

Faculty Advisor: Dr. James Grymes

Department: Music

How did African-American spirituals serve as secret messages to freedom? With this concept I plan to dig deeper into the history of African-American spirituals to find common themes within code songs to elaborate on them and analyze some common spirituals that we are familiar with. Most specifically with how those common themes had hidden messages that served to help guide slaves to the northern states into their freedom. After being brought to the US from the slave trade, slaves were forced to abandon their religious practices and adopt Christianity. They used this religion as a means of sanity for their current conditions, they would compare themselves to other oppressed peoples in the stories of the bible and most songs were based on that. However, it was also used as a blanket to seem that they were just worshiping the Lord when also they were giving each other secret messages. We know that slaves used braid patterns in their hair to physically notate a map to freedom but these songs were used as well and they were sung right in front of their oppressor but went mostly unnoticed. As a music major in the vocal program, I am hoping to gain more insight in this topic to not only gain more knowledge but to also help me better interpret these pieces when performing. Knowing the underlying messages to freedom can help with how performances come across and really getting in tune with the character of the piece.

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# Education and Communication

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**S** - Sustainability

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Abstract #: 108

Title: Evaluating the Impact of Working in an Online Environment on the Communication Consultant Experience

Student Author(s): Kara Richardson and Sharmily Ambrose

Faculty Advisor: Dr. Heather Bastian

Department: Academic Affairs, Communication across the Curriculum

Research has found that peer mentorship can play a valuable role in a student's personal growth and development. At UNC Charlotte, the Communication Across the Curriculum program trains communication consultants to serve as peer mentors and provide one-on-one support to students within select classes. Unlike past semesters, consultants primarily worked remotely throughout Fall 2020 due to a global pandemic. This applied research project investigates the impact of working in an online environment on the communication consultant experience. In Fall 2019 and Fall 2020, consultants completed an online survey consisting of Likert scale and open-ended questions that asked them to reflect on their confidence levels in general and in different aspects of their role. In Fall 2020, consultants also were asked to report on different barriers they faced related to the online environment. Consultant survey results from Fall 2019 and Fall 2020 were compared to analyze how communication consultant confidence changed between the 2019 and 2020 school years. Additionally, open-ended questions on the surveys were coded to identify different factors that impacted confidence levels. Findings suggest that while confidence levels in particular areas were negatively impacted from the lack of in-person communication, confidence levels overall remained high and confidence with online communication greatly increased.

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# Health Sciences

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

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Abstract #: 109

Title: Genetics, Childhood Socioeconomic Status, and Health Insurance: Why Smoke?

Student Author(s): Amogh Bandekar **G, H**

Faculty Advisor: Dr. Lisa Schulkind

Department: Economics

Smoking is a leading cause of death worldwide. Since the 1960s, roughly 17 million deaths have been caused due to smoking and tobacco use in the U.S. alone. Not to mention, the annual economic burden of smoking in the U.S. has reached \$170 billion in medical treatments and related services. With the current U.S. healthcare system strained due to the global pandemic of COVID-19, along with smokers being twice as likely to die from COVID-19 than the general population, understanding factors that influence the decision-making process of tobacco users can help alleviate both the systemic economic and individual health detriments caused by tobacco use as well as improve understanding on effective cessation practices. This project seeks to understand the role health insurance, genetic and social factors play in the decision-making process of adult smokers. Utilizing ordinary least squared (OLS) estimation and data from a longitudinal study of U.S. adults between the age of 60 to 70 observed between 1992 to 2016, three self-constructed variables are examined – health insurance status, genetic predisposition for smoking and childhood socioeconomic status – to quantitatively determine the role these factors play in influencing daily maximum cigarette consumption and smoking behavior. We hypothesize that high genetic predisposition to smoking will overcome the beneficial protective effect that health insurance status and childhood socioeconomic status have in moderating the risk of smoking. Findings from this project will be able to be applied to improve health insurance policies and public health practices.

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Abstract #: 110

Title: Calls to Action via Twitter: A Qualitative Study of Tweets Following the 2019 UNC Charlotte Shooting

Student Author(s): Sarai Guerrero Ordonez **CE**

Faculty Author(s): Dr. Jessamyn Bowling and Dr. Erika Montanaro

Faculty Advisor: Dr. Jessamyn Bowling

Department: Public Health Sciences

This study sought to identify the most common calls to actions promoted via Twitter following the UNC Charlotte shooting on April 30th, 2019. Students aged 18-25 year old were the principal population impacted by the UNCC shooting and they are the age group most likely to use Twitter. Twitter provides a source of data on live updates, public reactions and grief processing. "Actions taken" refers to any action reported in response to the shooting, beyond tweeting. "Calls to action" refer to advocacy for individuals, policies, or other responses to the shooting (e.g. protesting for victims), suggesting implications for gun safety advocacy and grief support. For this study, qualitative methods were used to measure and analyze subsequent Tweets (N= 15,768). The current analysis focuses on the "calls to action" responses on Twitter and its role in grief processing (N= 8,329). Inclusion criteria was determined by using key phrases, quotes, and action descriptions, such as demands for policy change and advocacy of justice for victims. Preliminary findings showed the least commonly reported call to action response following the shooting was "action taken" (N= 476, 3.02%). The most common action-related response was "individual advocacy" (e.g., petitions and foundations) (N= 3367, 21.35%). "Individual advocacy" included advocating for victims and individuals. This study provides preliminary evidence that Twitter can be used for individuals to process grief and take action, going beyond simple discussions. Findings can aid in providing time sensitive community assistance and advocacy awareness following acts of violence.

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Abstract #: 111

Title: Identifying Collateral Sensitivity Networks in Burkholderia Multivorans.

Student Author(s): Tirtha Patel **H**

Faculty Author and Advisor: Dr. Todd Steck

Department: Biological Sciences

Cystic fibrosis (CF) is an autosomal recessive disease that leads to mucus buildup and chronic infections. Antibiotics are used to treat the bacterial infection present in the lung. However, the repeated use of antibiotics often leads to multidrug-resistant bacteria, resulting in the need for better therapies. Collateral sensitivity (CS) occurs when a strain that acquires resistance to a treatment antibiotic (abx A) simultaneously increases sensitivity to non-treatment antibiotic (abx B). Reciprocal CS is when this pattern is repeated in the other direction. The goals of this study are to determine the frequency of occurrence and identify CS networks in Burkholderia multivorans. CS is detected by observing changes in zones of inhibition (ZOI) when cells are added to solid growth media containing disks saturated in an antibiotic. The degree of resistance is enumerated using an Etest, a paper disk containing a concentration gradient of antibiotic. When CS is observed, resistance to that second antibiotic is evolved. Some strains have been identified that exhibit CS to two antibiotics: LVX and MIN; reciprocal CS pairs are currently being examined. These strains will be subjected to whole-genome sequencing to identify responsible mutations. CS is a beneficial treatment that allows one to switch between two members of a reciprocal CS antibiotic pair and never acquire resistance to both antibiotics at the same time, hence providing a solution for treating bacterial infections indefinitely. The long-term goal is to identify reciprocal CS networks and personalize antibiotic treatment based upon a patient's pathogen mutation profile.

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**S** - Sustainability

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Abstract #: 112

Title: Understanding Food Insecurity in Cystic Fibrosis Populations within the Charlotte Community

Student Author(s): Madison Snyder and Ellison Clark **H**

Faculty Advisor: Dr. Heather Smith

Department: Honors College

According to the United States Department of Agriculture, 10.5% of American households in 2019 were food insecure. Moreover, there are indications the rate of food insecurity may be as high as 26.3% in Cystic Fibrosis (CF) populations. CF populations possibly face higher rates of food insecurity, defined as lacking consistent access to sufficient food, as a result of increased caloric needs, high costs of medical care, and unsatisfactory coverage for necessary medicines. These rates could prove to be even higher as the result of the COVID-19 pandemic. Thus, the estimation of the number of adults with CF who are food insecure in the Charlotte community will aid in accessing current needs for assistance. This project seeks to evaluate the extent of food insecurity in CF patients receiving care at the Adult Cystic Fibrosis Clinic in Mecklenburg County and the role COVID-19 has played. To assess the degree of food insecurity, phone interviews and qualitative surveys will be conducted on CF patients where data will be collected identifying the need for food assistance. The findings are expected to indicate a higher level of food insecurity than originally presumed in the CF clinic, thus revealing the unmet needs in CF food insecure patient populations. Furthermore, this awareness of the levels of food insecurity in patient populations will allow for future efforts in creating sustainable interventions to improve the health and well-being of CF patients.

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# Humanities

**CE** - Community Engaged   **G** - Global   **H** - Honors   **NC** - North Carolina

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Abstract #: 113

Title: How the Formation of Chinese Draft Banks in the Shanxi Region during the Qing Dynasty Resulted from the Control of Chinese Trade with the Russian Empire via the Tea Road

Student Author(s): Andrew Arthur

Faculty Advisor: Dr. Yongling Gorke

Department: Languages and Culture Studies

Presentation Withdrawn

This paper investigates the emergence of a major banking and financial center in the Shanxi region of China during the Qing Dynasty in relation to the Tea Road. Following the signing of the Treaty of Kyakhta in 1727, Shanxi merchants received permits to conduct trade with the Russian Empire. This led to the development of a northern Tea Road during a time of government restriction on maritime trade, as many commodities in addition to tea, such as salt, sugar, cloth, and silk, were transported through Mongolia to Russia in exchange for horses. The extensive transport of silver as a result of the trade led to the formation of Shanxi draft banks. The region, particularly in the area of Pingyao, became the “Wall Street” of China during this time, initially offering money transfer (similar to a checking system) then expanding into futures trading and investment banking. It concludes that the expansion of the Tea Road only reached the extensive levels of trade managed by the Shanxi merchants with the support of a sophisticated and comprehensive commercial banking and financial system.

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Abstract #: 114

Title: The Effects of the Chinese Exclusion Act and the Rise of Sino-Phobia on the Chinese Population In the West

Student Author(s): Luke Frantz **H**

Faculty Advisor: Dr. Dan Du

Department: History

The exclusion of the Chinese population in the United States marked a watershed event in the history of the country. As a nation founded originally on a concept of open and unrestricted immigration, the passing of federal laws restricting a specific ethnic group from partaking in the American dream was unprecedented and laid a foundation for the immigration debate which is still a fundamental part of the socio-political environment of the United States. By building upon the preexisting work of scholars who specialize on the topic such as Erika Lee, Beth Lew-Williams and Liping Zhu, I intend to provide greater insight into the causes and effects of Chinese exclusion. This will also be supplemented with in depth research into the historical records which reveal a deeper insight into ways in which this shift occurred and its impact on the Chinese population in the western states. Records of the media propaganda campaign against the Chinese still exist as well as bountiful amount of both state and federal legislation are both key when juxtaposed against the pro-Chinese progressive movement and the stories of the Chinese people who experienced the rise of Sino-phobia firsthand, as part of understanding the effect of this era. All of these resources will provide my research with unique insights into the development of the Chinese Exclusion Act of 1882 and its ramifications for not only the Chinese population but for the entirety of the nation.

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Abstract #: 115

Title: Civilized Paternalism: Mill, Autonomy, and Indian Assimilation Policies

Student Author(s): Christina Lee

Faculty Advisor: Dr. Joshua Miller

Department: Political Science and Public Administration

John Stuart Mill, a Western philosopher of the Enlightenment period, argues that paternalism is an infringement on an individual's autonomy. Although Mill argues as such, Western powers have been observed to exercise paternalism by way of imperialist policies and practices throughout history. In my thesis, I will argue that there is a paradoxical tension between a Western desire for anti-paternalism domestically alongside a justification for paternalism abroad. I will utilize a literature review to further support my argument. I will present a case study on the Lakota Indians in the Sioux Nation and the policies the United States federal government passed to restrict the cultural autonomy of these peoples. I argue that the federal government infringed on the autonomy of Lakota Indians by forced cultural assimilation and that such assimilation served a purpose to imperialize rather than to guide. I will delve into the implications of whether or not the federal government's forced cultural assimilation of the Lakota Indians can be justified by Mill's defense of British imperialism in India. My case study of the Lakota Indians will provide us with a way to view a loss of legal status of Indians from a loss of autonomy and the ramifications that has had on the Indian community. By considering the legal status of the Indian peoples, we are forced to acknowledge our current legal system and the ways in which such a system still acts to prevent Indian tribes from gaining full autonomy.

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**S** - Sustainability

**U** - Charlotte

Abstract #: 116

Title: A Vale of Humility: Toppling Confederate Statues in the Heart of North Carolina

Student Author(s): Nikolai Mather **NC**

Faculty Advisor: Dr. Beth Whitaker

Department: Political Science and Public Administration

The escalation of white supremacist movements in the late 2010s met antiracist resistance and rebellion. One increasingly common manifestation of this conflict was the toppling of Confederate statues: long considered symbols of racial intimidation and hatred, their removal was often the result of months, years, or even decades of contentious debate and protest. In 2019, the Southern Poverty Law Center reported that 114 American Confederate symbols and statues had been removed since the 2015 Charleston massacre. North Carolina was no exception: during the latter half of the 2010s, Raleigh, Durham, Chapel Hill, Pittsboro, Gastonia, and Asheville all saw movements to remove Confederate monuments from public spaces. This article seeks to compare and track these efforts to remove monuments, including unsuccessful or ongoing movements, by reviewing the history of these statues through oral interviews and archival analysis. Understanding how these statues fell is crucial for understanding how antiracist activism and 21st century racial politics will take shape in North Carolina and the rest of the South.

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Abstract #: 117

Title: A Reflection of His Era: Contextualizing the Views of H.P Lovecraft

Student Author(s): Logan Nance

Faculty Advisor: Dr. Carol Higham

Department: History

My thesis examines the short stories and letters of H.P Lovecraft, a noted weird fiction author of the early twentieth century. He had xenophobic, anti-modern, and anti-science views, as expressed in both his stories and his letters. He lived from 1890 to 1937. I will be comparing his ideas to other ideas of the period -such as the eugenics movement and the popularity of restricting immigration-, to see how his ideas and writings reflect popular ideas of the period. He wrote short horror stories and a great many letters in his lifetime, both full of things that reflect such views. Using his 75,000-100,000 letters as my primary sources, because few scholars have looked at them because they tend to look at his horror fiction, I will put these views in historical context. The few scholars who have tried to contextualize his views either looked solely at his stories or tried to brush aside his views- , and by examining this topic, we gain greater insight into Lovecraft's mind, broad social themes of the times in which he lived -such as the eugenics movement and scientific racism-, and the reactions of a conservative to the rapid social, economic, and cultural changes of early twentieth century America.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 118

Title: La Raza in Vietnam

Student Author(s): Chloe Nicola **G**

Faculty Advisor: Dr. John Cox

Department: Global Studies

The purpose of this research is to highlight the contributions and better understand the experiences of Latino Americans in the U.S.-Vietnam War. The work also compares the perspectives of the youth involved in the Chicano Movement with the perspectives of Latino veterans. Previous research had recognized the disproportionate death rates suffered by minorities in the U.S.-Vietnam War, resistance to the war within the military itself, and the anti-war movement's connection to the Civil Rights Movement. My research investigates the attitudes of Latino service members towards the war, analyzing ideological connections with the Chicano movement. This paper is based on a close analysis of interviews with Latino veterans previously conducted by the University of Texas, which I scrutinize through the lens of racism in the armed forces and the revolutionary attitude of the Chicano movement. My paper concludes that those involved in the Chicano movement held sharply contrasting views regarding the realities of life as a minority in the U.S. from Latino veterans of the U.S. Vietnam War. This research is important both to recognizing the disproportionate suffering of minorities during the U.S.-Vietnam War and to understand that minority service members held a wide range of political views related to the war.

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# Mathematics and Computer Sciences

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

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Abstract #: 119

Title: Weather Impact on High School Cross Country Athletes

Student Author(s): Ronin Gomez

Faculty Advisor: Dr. Douglas Hague

Department: Computer Science

Research in the past has found that, under normalization of age, atmosphere, time in season, and gender, cross country courses do have an impact on athletic performance. This, however, may work well under standard conditions, may not directly work well under non-standard conditions. These conditions, in particular, include weather and climate. The weather has proven time and time again how influential it is towards our lives. With that in mind, we hypothesize that weather, particularly temperature and precipitation, directly affects high school cross country athletes. We obtained historical weather data and blended that into a data set of high school cross country performances. We predict that there is a favorable temperature in regard to long distance (5000 meter) runners. As weather cools over the fall, an equivalent runner will have faster time, but we expect that there is a lower bound after which frigid weather detrimentally impacts an athlete's performance. In this study, we will use combined weather and high school 5k performance data to determine the most optimal temperature as well as observe other factors for an athlete's performance throughout the track season.

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Abstract #: 120

Title: Assessing Risk Factors for the Incubation Period of COVID-19

Student Author(s): Mai Nguyen **H**

Faculty Author and Advisor: Dr. Qingning Zhou

Department: Mathematics and Statistics

COVID-19, a coronavirus disease that has resulted in a global pandemic and more than one million deaths worldwide, has extremely complex behaviors regarding transmission, symptoms and incubation period. A better understanding of these key characteristics is needed for scientists and policy makers to monitor and control the pandemic as well as to set up proper quarantine procedures. In this project, we investigate variables associated with the incubation period of COVID-19, defined as the duration between infection and symptom onset. The findings could provide some guidance on shortening or lengthening the standard quarantine duration of 14 days for certain subgroups to help better control the pandemic. In our preliminary study, we analyzed data from 463 Wuhan-exported cases who left Wuhan before the travel ban on January 23, 2020. The data set includes the dates of beginning stay in Wuhan, ending stay in Wuhan, and symptom onset, as well as age and gender. We considered three different methods of handling incubation period: midpoint imputation for infection time, treating incubation period as interval-censored, and multiple imputation for infection time based on a nonparametric estimate of its distribution. We evaluated the association of age and gender with the incubation period of COVID-19 under the Cox proportional hazards model which is commonly used for the analysis of time-to-event data. Our preliminary results suggest that younger people seem to have longer incubation period, while the incubation periods for male and female have no significant difference

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Abstract #: 121

Title: Can College Students Accurately Assess Learning? Implementation of an Intelligent Tutoring System with Measures of Awareness in an Introductory Statistics Course

Student Author(s): Zachary Stirewalt

Faculty Author and Advisor: Dr. Michael Smalenberger

Department: Mathematics and Statistics

Presentation Withdrawn

In this study, the level of awareness college students had during an introductory statistics assignment was measured to see how it affected their accuracy in self-assessing competency. A second goal was to measure correlations between self-assessment of changes and awareness of accuracy, or prior self-assessment of competency. An Intelligent Tutoring System (ITS), a type of artificial intelligent software utilized in education allowing a seamless integration of instruction and practice, was incorporated into a statistics quiz. Statistical questions presented by the ITS were consecutively followed by prompts measuring students' awareness of inaccurate responses for the previous problem while gauging confidence for the next. These answers were compared to data provided by the ITS regarding students' actual accuracy. The Mindful Attention Awareness Scale (MAAS) was given to students measuring mindfulness in everyday life. Results show that both the amount of awareness for errors and the accuracy of self-assessed competency increased over the duration of the quiz. The ITS provide students with assistance to master academic content without face-to-face assistance as is necessary during the COVID-19 pandemic. Results show that combining ITS with a tool to increase awareness enhances remote post-secondary education performance. Measuring the awareness students have as they interact with the ITS indicates the impact raising mindfulness has on confidence of learned course material.

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# Science, Technology, and Engineering

**CE** - Community Engaged   **G** - Global   **H** - Honors   **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 122

Title: Fibrosis and Collagens in the Breast Cancer Tumor Microenvironment

Student Author(s): Layla Abu-Al-Halaweh and Courtney Samuels **H**

Faculty Author and Advisor: Dr. Didier Dréau

Department: Biological Sciences

Although our understanding of breast cancer progression has improved, breast cancer remains a leading cause of cancer-related deaths for women. Breast cancer is favored by a microenvironment that is supportive of cell proliferation and metastasis. In particular, cancer-associated fibrosis, i.e., the accumulation of extracellular matrix (ECM) proteins within the tumor microenvironment (TME), is an independent prognostic factor of breast cancer. Indeed, inflammation stimulates the deposition of extracellular matrix proteins, especially of fibrous collagens by resident connective tissue cells, i.e., fibroblasts. Moreover, our recent observations indicate that activated fibroblasts in part through NLRP3 inflammasome activation not only secrete the pro-inflammatory cytokine IL-1beta, but also collagen I along with the matrix metalloproteinase-14 (MMP-14), thereby promoting a pro-inflammatory microenvironment. Whether the activated fibroblast-driven secretions of pro-inflammatory cytokines and of fibrous collagen rely on gasdermin D transient membrane pore formation and/or NF-kappaB signaling is unknown. Further, whether subtypes of collagen are differentially expressed is also unclear. Here, in the L929 fibroblast in vitro model, we assessed whether inhibitors of NF-kappaB (MG132) and gasdermin D (Disulfiram) altered the secretions of pro-inflammatory cytokines and collagen subtypes. Moreover, the combined effects in vivo of MCC950 and 5-FU on tumor collagen deposition were determined. Lastly, using the clinical data base CBioportal.org, the relationship between genetic alterations in key fibrous collagen subtypes and OS was assessed. Our results indicate that the pathways investigated participate in the generation of a pro-inflammatory and pro-fibrotic tumor microenvironment and may be appropriate targets to prevent breast cancer progression.

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Abstract #: 123

Title: Exploring the Immune System with Hybrid Cube Nanoparticles

Student Author(s): Doaha Awad

Faculty Advisor: Dr. Kirill Afonin

Department: Chemistry

The immune system protects us from foreign particles by using receptors that can detect harmful pathogens. Receptors are located within the cell and outside of the nucleus. These receptors specifically recognize nucleic acid sequences or patterns. Once a pattern is recognized by the receptor, downstream interactions lead to the expression of chemicals that produce and regulate inflammation. The ability for immune cells to adequately protect from and destroy pathogens relies on receptors accurately distinguishing between pathogenic or non-pathogenic DNA or RNA. Current literature using nucleic acid nanoparticles (NANPs) such as 2D polymers shaped as triangles, squares, or rings, confirms greater immune responses from RNA structures as opposed to DNA, but there is limited knowledge on how the two compositions (DNA vs RNA) are distinguished by immune receptors. 3D hybrid DNA/RNA nanocubes offer a wide range of immune responses as they have combinatorial features of both nucleic acid compositions. These structures are assembled using nucleic acid strands and interactions are encouraged using heat and buffer salts to hold the cube shape together. Following assembly, the cubes were verified by gel electrophoresis. Once introduced to the cells, hybrid cubes are detected by receptors based on distinct features of DNA and RNA. Cell media was tested for inflammatory chemicals using an enzyme-linked immunosorbent assay (ELISA) and spectrometry techniques. The results indicated that hybrid cubes produced comparable levels of inflammation as RNA cubes. Cubes with more RNA produced more inflammation than hybrid cubes with mostly DNA.

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Abstract #: 124

Title: Synthesis and Assembly of Functionalized RNA Nanorings

Student Author(s): Jonathan Black and Morgan Chandler

Faculty Author and Advisor: Dr. Kirill Afonin

Department: Chemistry

Nucleic acids as programmable biomaterials have been designed to form a vast library of nucleic acid nanoparticles (NANPs), which have been demonstrated for broad applications as scaffolds, biosensors, and therapeutics. Here, we explore the processes involved in the synthesis and assembly of RNA-based nanorings functionalized with therapeutic moieties in various orientations. These therapeutic moieties embedded into the NANP design are Dicer Substrate RNAs which can then be processed for gene knockdown via RNA interference. As a proof of concept, these Dicer Substrate RNAs are designed against green fluorescent protein to explore uptake efficiency and silencing in cells. By characterizing and noting patterns in functionalization and orientation, we can further explore their applications in various fields of study.

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Abstract #: 125

Title: Solution-Processable, Blue-Emissive Thiazolothiazole Fluorophores for OLED Applications

Student Author(s): David Diaz and Abhishek Shibu

Faculty Author and Advisor: Dr. Michael G. Walter

Department: Chemistry

Organic light-emitting diodes (OLEDs) require millions of pixels to create the images on its display. A pixel may contain red, green, or blue fluorescent molecules that use excited electrons to emit their respective color. From those three, blue emitters have the most challenge with cost, device performance, and device lifetime. Dialkoxyphenyl thiazolothiazole (TTz), fluorophores are stable, planar structures that provide good charge mobility and strong, solid-state fluorescence. They are being studied as solution-processable, low-cost, and stable alternatives to currently used blue emission materials that use expensive, rare-earth based complexes. Blue emitting prototype devices are constructed in the lab to emulate OLED displays. To create one, the TTz compounds must be synthesized, purified, and characterized, and tested by creating a thin film. Thin films are the basis for the prototype devices. TTz materials with varying alkoxy carbon chain lengths are currently being investigated. Concentrated solutions of TTz are prepared and either drop-cast and spin-cast onto a microscope slide to create a thin film. A dibutoxy-containing TTz produces uniform crystal growth in drop cast tests. A diheptoxy TTz derivative shows promising results in spin-casted thin films. A newly devised dibutoxy-diheptoxy blend produces a thin film rivaling the diheptoxy TTz. An additional contribution of characterizing TTz compounds, allows for alternative applications in other fields to be explored. The research on this project, however, will ensure that OLED devices become more affordable and higher performing in the future.

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Abstract #: 126

Title: Identifying Collateral Sensitivity Networks and Associated Genetic Markers in Burkholderia Species

Student Author(s): Enosh Ishman **CE, G, H, NC**

Faculty Advisor: Dr. Todd Steck

Department: Biological Sciences

Antibiotic collateral sensitivity, seen when a drug-resistant organism becomes sensitive to an alternate drug, might be used to develop therapies to treat chronic bacterial lung infections in cystic fibrosis patients. Our purpose is to characterize how common this phenomenon is and to identify genes or specific mutations involved in collateral sensitivity (CS) in the study organism *Burkholderia multivorans*. Methods involve each strain being swabbed onto growth agar to create a lawn of bacteria, then adding antibiotic disks to the center of the Petriplate. After incubation to promote bacterial growth, the killing area caused by antibiotic diffusing from the disk is measured. This zone reflects the resistance category of the plated bacteria. Resistant bacteria are then tested for collateral sensitivity. If tested positive, an Etest, a strip of paper containing a known gradient of antibiotic concentration, will be used to quantitate the degree of change in antibiotic resistance. The Etest strip is placed on a plate seeded with bacteria, which then grows up to the place on the strip corresponding to the killing of antibiotic concentration. This process of selecting for resistant mutants, and identifying those that exhibit CS, will continue for multiple generations. The ultimate goal is to identify mutations involved in CS, and confirm involvement of those genes by introducing that mutation into a wild type strain using gene editing techniques.

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Abstract #: 127

Title: A Current Review on RNA Damage and Repair Pathways

Student Author(s): Naya Kayali

Faculty Advisor: Dr. Shan Yan

Department: Biological Sciences

There has been extensive research on the different mechanisms of the DNA damage repair and response yet the world of RNA damage and its responses remains largely unknown. DNA and RNA are analogous in their composition of nucleic acids so it is expected that RNA will have similar damages and possibly similar repair mechanisms that occur in DNA. It is commonly known that RNA is more susceptible to damages due to its single stranded nature so we can expect that there must be repair mechanisms ensuring cell's genome integrity. This presentation is an examination of the different ways both coding and non-coding RNA is able to respond and repair itself as a result of UV light damage, alkylative damage, oxidative damage, and other endogenous and exogenous sources. Given the role of RNA in the central dogma of molecular biology, it is important to understand how the cell copes with RNA damage as certain modification to RNA can have deleterious effects on not only the cell but the organism as a whole. Considering that there are not one but several RNA species, we expect that consequences of RNA damage to a cell/an organism to differ vastly depending on the type of damage acquired and on which class of RNA. Overall, we provide an updated review on RNA damage and repair pathways.

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Abstract #: 128

Title: Understanding the Many Functions of DBR1 using CRISPR-CAS9-Mediated Knockdown

Student Author(s): Dalton Kessans **H**

Faculty Advisor: Dr. Kausik Chakrabarti

Department: Biological Sciences

Lariat debranching enzyme 1 (DBR1) is a vital component of life for nearly all gene-splicing eukaryotic life forms. This enzyme can break the 2'-5' phosphodiester bond and linearize the lariat structures formed during mRNA maturation. This is necessary for lariat breakdown by cellular nucleases. However, downregulation of DBR1 affects the gene-splicing processes in eukaryotic cells, although how DBR1 regulates splicing pathways is unknown. This project focuses on targeted deregulation of DBR1 by CRISPR-Cas9 mediated genome editing to determine its role in mRNA processing. We seek to elucidate the role of DBR1 in RNA processing and regulation in two evolutionarily distinct cell types - in the parasitic protist *Plasmodium falciparum* which causes the deadliest form of malaria and its human host using the Human Embryonic Kidney cells (HEK-293). It is well documented that humans and the *P. falciparum* both have a form of the DBR1 enzyme. Although their forms differ to specialize for each species' genomes, DBR1 is an essential enzyme which means a total knockout would cause cell death. Using the CRISPR/Cas9 system to introduce a conditional knockdown via an auto cleaving ribozyme the cells can be studied under DBR1 deficient conditions. In malarial cells, DBR1 decrease is expected to have a negative impact on the parasite's virality by decreasing proteins that allow for infection. In the HEK-293 cells, this DBR1 deficiency is expected to decrease mRNA maturation. This research will help shed light on the effects of DBR1 downregulation on both the parasite and its host's cells.

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Abstract #: 129

Title: Multiplicity of Plasmodium Vivax Infections in Clinical Samples from Ethiopia

Student Author(s): Gabrielle Kolesar and Daniel Kepple **H**

Faculty Advisor: Dr. Eugenia Lo

Department: Biological Sciences

The two predominant species of malaria in Africa are *P. vivax* or *P. falciparum*, but recent reports are showing *P. vivax* is spreading at alarming rates across the continent. The ligand Duffy Binding Protein (DBP) binds to the Duffy receptor on the red blood cell as a means of invasion. Previous research indicates Duffy positive individuals could contract *P. vivax*, while Duffy negative individuals are less likely to contract the parasite. However, the reports of *P. vivax* infections in Duffy negative individuals indicate there is a different parasite ligand besides DBP the parasite is using. The main goal of my research is to find the multiplicity of *P. vivax* infections in Duffy negative individuals and how much such could affect disease severity. Polyclonality, i.e, the number of *P. Vivax* clones present in infected patients, will determine the multiplicity of *P. Vivax* in each individual and region of Ethiopia using microsatellite data. DNA Extraction and Polymerase chain reaction (PCR) will isolate the DNA from the dry blood samples to recognize the *P. vivax*. Furthermore, SYBR qPCR and TaqMan qPCR will be performed. SYBR qPCR will analyze the level of parasitemia to determine if the DNA contains the parasite. TaqMan qPCR will determine the Duffy status of the human. The individual can be homozygous Duffy negative (cc), homozygous Duffy positive (tt), or heterozygous (ct). Lastly, I will work alongside with the Bioinformatics Department at UNCC to analyze the microsatellite DNA to determine the polyclonality of *P. vivax* in Ethiopia. This will allow us to determine if polyclonality is related to parasitemia and the disease status of samples collected in Ethiopia.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

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Abstract #: 130

Title: The Electronic and Photophysical Properties of Solution-Processable Thiazolothiazoles

Student Author(s): Carly Kwiatkowski, Jackson Mower, Abhishek Shibu, David Diaz,  
Zac Taylor, and Kevin Boyle **CE, G, S**

Faculty Author and Advisor: Dr. Michael G. Walter

Department: Chemistry

Presentation Withdrawn

There is a current need in the field of molecular electronics for solution-processability, including the ability to dissolve materials of interest in organic solvents, solution cast, or print. Symmetric diaryl thiazolothiazole (TTz) dyes were synthesized for their outstanding photochemical properties and fluorescence. They are highly stable molecules and are easily synthesized. TTz dyes shown strong blue fluorescence; however, the dyes are easily tunable by changing the substituents on the molecule in order to change the emission color. A variety of TTz dyes were synthesized using a double condensation of aryl aldehydes with dithiooxamide, and were characterized using <sup>1</sup>H-NMR spectroscopy, MALDI TOF mass spectrometry, thin-layer liquid chromatography, and cyclic voltammetry. The unique properties of the TTz dye make it an especially promising candidate for use in organic light emitting diodes (OLEDs), as well as other molecular electronic devices such as organic solar cells. Organic light emitting diode devices were fabricated using a conductive polymer (PEDOT: PSS) spin-cast onto cleaned conductive Indium-Tin-Oxide (ITO) slides. TTz derivatives were spin-coated onto the PEDOT: PSS layer, and finally aluminum was evaporated on top to complete the device. From this research, we discovered satisfactory hole charge mobilities and electron charge mobilities and green electroluminescence that closely resembles that of the UV/vis spectrum.

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Abstract #: 131

Title: Correlation Between MUC1 Expression and Sensitivity of PDA Cells to STAT3-Inhibitor Napabucasin

Student Author(s): Priyanka Lala **H**

Faculty Author(s): Dr. Pinku Mukerjee

Faculty Advisor: Dr. Didier Dréau

Department: Biological Sciences

The purpose of this research is to determine if high MUC1 tumor subpopulations are more likely to benefit from STAT3-inhibitor Napabucasin alone or in combination with other drugs or antibodies. Cancer is one of the leading causes of death especially in the western countries. The main challenge for treatment is the heterogeneity and plasticity of the tumor and the key is to identify tumor antigens to target. MUC1 is a transmembrane glycoprotein known to be overexpressed and aberrantly glycosylated in cancer cells (Nath et. al. 2014). MUC1 regulates STAT3 expression in an auto inductive loop (Ahmad, 2011). Therefore, our hypothesis is that in high MUC1 PDA cells, MUC1-STAT3 survival pathway is constitutively activated that will make these cells more susceptible to anti-STAT3 therapies like Napabucasin, compared to low MUC1 PDA cells. For this study, different mouse and human breast, pancreatic, ovarian, colon cancer and melanoma cells with varying levels of MUC1 expression will be used. MTT cell survival assay, colony formation assay, invasion assay, western blot, PCR, and flow cytometry will be performed to test the hypothesis. Statistical significance will be determined with t-tests and ANOVA. Napabucasin will be more effective in killing high MUC1 cells and disrupt the STAT3-MUC1 loop, thus reducing proliferation and stemness in high-MUC1 cells. The innovation of our proposed study is to help identify subpopulations of tumors that are likely to benefit from Napabucasin and other STAT3 inhibitor therapies alone or in combination with other drugs.

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**S** - Sustainability    **U** - Charlotte

Abstract #: 132

Title: Contribution of cGAS to Inflammation Caused by DNA Damage

Student Author(s): Irina Leshchuk and Alex Suptela **H**

Faculty Advisor: Dr. Ian Marriott

Department: Biological Sciences

Damage to self-DNA can elicit inflammation that can exacerbate disease progression; this is especially problematic within the enclosed confines of the central nervous system (CNS). DNA is normally restricted to the nucleus and mitochondria in healthy cells. As such, its presence in the cytosol could act as a damage associated molecular pattern (DAMP) to trigger immune responses. The cytosolic DNA sensor cyclic GMP-AMP synthase (cGAS) is known to trigger inflammatory responses in CNS cells following viral infection and so might also serve as a sensor for damaged self-DNA in these cells. To test this hypothesis, we determined the ability of DNA damaging ionizing radiation and oxidative stress to elicit inflammatory mediator production in cultured normal wild type glial brain cells and cells that were deficient in the expression of cGAS. We found that glial cells deficient in the expression of cGAS produced markedly lower levels of the key inflammatory cytokine interleukin (IL)-6 and the chemokine IL-8 than wild type cells as assessed by specific capture enzyme-linked immunosorbent assays (ELISAs). These data therefore point to a significant role for cGAS in the perception of damaged self-DNA, broadening our understanding of the role of this cytosolic sensor in resident brain cells. Furthermore, this work sets the stage for future studies to more fully delineate the physiological importance of this activation mechanism in glial responses to DNA damage and its potential role in adverse inflammatory reactions to interventions such as cancer radiation therapy.

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Abstract #: 133

Title: Vps501 Cooperates with the SEA Complex to Induce Autophagy

Student Author(s): Alyssa Lucero and Shreya Goyal

Faculty Author and Advisor: Dr. Richard Chi

Department: Biological Sciences

Autophagy is the degradative process of cellular self-eating in eukaryotic cells, which can be initiated by environmental stresses such as starvation. Recently, an upstream regulator of the TORC1 pathway, the yeast SEA complex, was identified as part of this web of TORC1 GTPase effectors. The SEA complex (GATOR complex in humans) is a conserved eight protein complex that, like TORC1, is dynamically associated to the vacuole membrane; however, its complete structure and function are unknown. Our lab has recently identified a new component of the SEA complex, which we have named Vps501. Our previous data indicates Vps501 resides at the vacuole membrane and interacts with Sea1 to induced autophagy, however it's precise mechanism of action is not known. We hypothesize Vps501 cooperates with the Sea Complex to inhibit TORC1 signaling during autophagy induction. In this study, we used a combinational autophagy assay approach to quantify the severity of autophagy in *vps501Δ sea1Δ* cells and to determine which step in autophagy Vps501 participates. Using a Pho860 assay, an enzymatic assay used to precisely quantify autophagic flux, we find *vps501Δ sea1Δ* cells are significantly defective in autophagy as compare to wildtype and single deletions. Likewise, we found Atg13, a regulatory subunit of the Atg1 signaling complex, is hyperphosphorylated in *vps501Δ sea1Δ* cells indicating TORC1 is actively inhibiting autophagy. We have also found Kog1-GFP, a major subunit or TORC1, is mis-localized in *vps501Δ sea1Δ* cells, indicating Vps501's role in autophagy is to mediate SEA complex interactions with the TORC1 complex during autophagy induction.

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Abstract #: 134

Title: The Distribution of Sandhill Crane (*Antigone Canadensis*) Roosting Sites in Polk County, Florida

Student Author(s): Kerrington Maner **H**

Faculty Author(s): Dr. Reuben Howden and Dr. Didier Dréau

Faculty Advisor: Dr. Reuben Howden

Department: Kinesiology

As with many animals, there are numerous ongoing threats to migratory and non-migratory populations of sandhill cranes (*Antigone canadensis*) in both Central and South Florida. These threats – including habitat loss, wetland degradation, pollution and pesticides – have arisen as a direct result of both increased human activity and the urbanization of wild places. Because sandhill cranes have been forced to utilize suburban and urban areas in addition to their natural habitats, it is expected that the locations of their roosting sites have been affected as well. Using data collected by the citizen science database eBird, this study identified areas utilized by sandhill cranes as roost sites over the last 10 years in Polk County, Florida. The results of this study can be used by wildlife managers and researchers, contributing to the current understanding of sandhill crane distribution in the county and furthering the mitigation of human-wildlife conflict (HWC) with these animals. For humans, HWC with sandhill cranes can result in crop damage, homeowner property damage and collisions (vehicular and aerial). For sandhill cranes, HWC can result in habituation, entanglement, collisions, increased predation by dogs or cats, and diet disruption. The insight provided by this study may also help determine not only what areas need to be protected but also what kinds of urban and suburban habitats support sandhill cranes, the latter of which could be mimicked in future developments. Overall, this information can be utilized to better implement strategic management and conservation policies.

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Abstract #: 135

Title: Does Overexpression of Tumor Mucin 1 (MUC1) in Pancreatic Cancer Cells Modulate Levels of an Immune Checkpoint Protein, PD-L1 (Programmed Cell Death – Ligand 1)?

Student Author(s): Rebecca Mayberry

Faculty Author(s): Dr. Pinku Mukherjee

Faculty Advisor: Dr. Didier Dréau

Department: Biological Sciences

PD-L1 remains as a significant surface protein responsible for resistance to immunotherapy of cancer. The objective is to determine if there is a correlation between levels of tumor MUC1 and PD-L1 that could contribute to resistance to CAR T cell (Chimeric Antigen Receptor T cell) immunotherapy. This project will be innovative in recognizing the role of MUC1 in immune resistance via the PD-L1 gene. Due to the high mortality rate of patients with pancreatic cancer, finding mechanisms associated with treatment resistance will be beneficial. The first aim was to first determine the correlation between PD-L1 and MUC1 expression on a panel of pancreatic cancer cell lines. Cells were with TAB004 (an anti-MUC1 monoclonal antibody) and anti-PD-L1 antibody before flow cytometry to analyze levels of MUC1 and PD-L1 co-expression on cell surfaces. Second, we determined the contribution of co-expression of PD-L1 and MUC1 on pancreatic cancer cell's sensitivity to CAR T cell killing. This was conducted by blocking of PD-L1 with a neutralizing antibody and determining the viability of tumor cells using MTT assay. Three PDA cell lines were selected based on levels of MUC1 and sensitivity to CAR T cell killing. In the resistant cell lines, we may observe an increase in PD-L1 post CAR T cell treatment. We expect that blocking of PD-L1 will partially reverse the resistance of PDA cell lines to CAR T cells. If the project is successful, it could provide a treatment option to break down resistance to CAR T cells in pancreatic cancer patients.

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Abstract #: 136

Title: Comparing the Prevalence of Kelch13 Mutations Linked with Artemisinin Resistance between the Southern and Northern Regions of Ghana

Student Author(s): Victoria Morrison **G, H**

Faculty Advisor: Dr. Eugenia Lo

Department: Biological Sciences

Artemisinin combination therapies (ACT) are the first line of defense against Malaria in endemic regions worldwide. This study seeks to identify codon mutations within the pfk13 domain of the *P. falciparum* mosquito which are linked to antimalarial Artemisinin drug resistance. Prior work has identified Artemisinin resistant mutations within samples from southeastern Asia, where resistance has been identified since the 1990's, and in the central forest region of Ghana where resistance is currently emerging. DNA samples will be analyzed from the northern savannah and southern coastal regions of Ghana, which represent areas of high and low transmission rates of malaria, in order to assess the frequency and distribution of mutations linked with Artemisinin resistance and how they differ between regions. In order to assess and compare mutations in pfk13, *P. falciparum* DNA containing pfk13 will be extracted from dried blood samples and amplified through PCR. Samples will be run through gel electrophoresis to confirm pfk13 is present. Samples with confirmed pfk13 DNA will be sequenced and compared to a reference strain so that genomic changes, as well as their frequency, can be identified and compared. We expect that the frequency of pfk13 mutations will correlate with Artemisinin use, and mutations will show the highest frequency and diversity in the southern compared to northern regions. Results of this study will affirm how Artemisinin resistance is progressing in Ghana, how varied ecological, economic, and epidemiological factors affect the development and distribution of such resistance, and contribute to monitoring ACT resistance in western Africa.

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Abstract #: 137

Title: Embryonic Development and Immunity Responses a Sea Anemone Exposed to Different Viral and Bacterial Communities

Student Author(s): Rachel Nguyen **G, H**

Faculty Advisor: Dr. Adam Reitzel

Department: Biological Sciences

My research utilizes a model cnidarian species, *Nematostella vectensis* (starlet sea anemone), to determine the mechanisms of innate immunity in response to both bacterias and viruses. Specifically, I am interested in identifying the genetic responses these organisms exhibit due to historical differences in exposure to different viral and bacterial populations, including but not limited to bacteriophages and animal-specific viruses. Both are associated with anemones as part of the holobiont, where they may live in a mutual, commensal, or parasitic relationship. Thus, viral and bacterial communities can potentially become an integral part of this sea anemone. Although previous research has shown what viruses are associated with anemones, there is currently a lack of insights why individuals have different compositions and if individuals may be adapted to a particular community, and the understanding of embryonic development when exposed to different bacterias' toxic secretion. Through a survey of genes hypothesized to be involved in mediating a response to viruses, I selected five genes involved in the innate immune system. Gene amplification followed by DNA sequencing was utilized to compare the degree of variation between the genetic sequences from individuals throughout their geographical range in North America. Additionally, the anemones were exposed to different concentrations of bacterial secretions to investigate their embryonic development and immunity responses. For ongoing research, we will identify regions of the anemone's genome that have evolved in response to viral exposures, which will assist in understanding the impacts of the viral communities toward the process of natural selection.

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Abstract #: 138

Title: PARPi Resistance Mechanism in Breast Cancer: Current Model

Student Author(s): Katherine Norman **H**

Faculty Author and Advisor: Dr. Junya Tomida

Department: Biological Sciences

In this paper, we review the recent literature highlighting the role of DNA repair genes within BRCA1/2-deficient breast cancer. Although both men and women can develop breast cancer, American women have over a 12% chance of developing a malignancy, making breast cancer the most common form of cancer, while less than 1% of breast cancers are developed in men. Notably, 1 out of every 8 American women will develop breast cancer. Breast cancer has also become a major issue within developing countries. Currently, individuals with a family history of breast cancer are evaluated for mutations in Breast Cancer Type 1 Susceptibility Protein (BRCA1) and Breast Cancer Type 2 Susceptibility Protein (BRCA2). One promising new treatment for BRCA1/2-mutant breast cancer are the poly ADP ribose polymerase (PARP) inhibitors. Within this review, we discuss multiple PARP inhibitors currently on the market and how PARP inhibitors work as a chemotherapeutic. Despite these pharmacologic advances, chemoresistance often occurs, resulting in the cancer continuing to grow despite PARP inhibitor treatment. Clarification of the mechanisms underlying treatment resistance is becoming more important as PARPi gains broader approval. Because currently the cost of PARPi (Olaparib) maintenance therapy in cancer is \$13,440 per month, PARPi drugs require strategic application. Therefore, this review also discusses current PARPi resistance mechanisms and future studies.

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Abstract #: 139

Title: Activity Rhythms of Female Fiddler Crabs during Embryonic Development

Student Author(s): Leyna Pence **H**

Faculty Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Atlantic sand fiddler crabs (*Leptuca pugilator*) time their behavior with the cycle of the tides using an internal, tidal clock. Adults are typically active on mudflats during low tide but remain inactive in their burrows during high tide to avoid predators. Ovigerous (egg-bearing) crabs display a different pattern in the field. They remain in their burrows throughout embryonic development (~14 days). Our previous work indicates that the entrainment of this circatidal (circa=almost) clock occurs during this incubation period. However, the mechanism(s) by which tidal information is transmitted to the embryos is still unknown. To identify the behaviors exhibited by the female crab that may entrain the clock in the embryos, we measured activity as the horizontal displacement of the crab per hour and compared across the male, ovigerous, and non-ovigerous female crab groups. Crabs were recorded in constant conditions using video tracking (Ethovision 14.0, Noldus) for 72-96 hrs. We hypothesized that ovigerous crabs would exhibit high activity levels during low tide rather than remain inactive during incubation (in the burrows), as it would appear from field observations. Preliminary data suggests that although there is high variability in the activity of ovigerous ( $n=11$ ; Mean $\pm$ SEM:  $38\pm 28$ ) and non-ovigerous females ( $n=10$ ;  $11\pm 25$ cm/hr), overall female activity is lower than male activity ( $n=9$ ;  $48\pm 5$ ). The high variability observed among female crabs may be associated with the current stage within their monthly reproductive cycle.

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Abstract #: 140

Title: A Systematic Overview of Clinical Trial Drugs for Alzheimer's Disease

Student Author(s): Olivia Pike **H**

Faculty Advisor: Dr. Kristen Funk

Department: Biological Sciences

Alzheimer's disease (AD) is one of the leading causes of dementia, accounting for 50-75% of all dementia cases worldwide, and doubling its prevalence every five years. Since the 1970s, modern AD research and clinical trials have been underway. Currently there are 5 approved therapeutics approved for AD, but none of them are disease-modifying. Because of genetic associations with the amyloid processing pathway, many drug trials have targeted this pathway; however, so far they have not been successful in modifying disease progression. New research has led to increased focus on Tau, the immune system, and microbes on the onset and progression of AD. Here, I performed a systematic review of ongoing AD clinical trials, with a focus on these new therapeutic foci. I utilized [clinicaltrials.gov](https://clinicaltrials.gov), together with Pubmed and Alzforum, to investigate therapeutic agents currently approved and in clinical trials for AD. I organized these agents by their mechanisms-of-action. There are currently 113 total agents in clinical trials for AD. Of those, 35 are in phase 1 trials, 77 are in phase 2, and 26 are in phase 3. This study demonstrates a new emphasis on the immune system, Tau and microbial pathogens, which will continue to grow in the field of AD research.

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Abstract #: 141

Title: Antibacterial Efficacy of DNA-Templated Silver Nanoclusters Colocalized on an RNA Nanoring

Student Author(s): Melina Richardson and Leyla Denai **H**

Faculty Advisor: Dr. Kirill Afonin

Department: Chemistry

Silver ions and nanoparticles have been demonstrated to have inherent antibacterial properties. By combining silver nanoclusters with nucleic acid nanotechnology, it is possible to form DNA-templated silver nanoclusters (AgNCs) that have fluorescent and antibacterial qualities. Previous studies demonstrated the antibacterial efficacy of AgNCs formed from cytosine-rich single-stranded DNA oligonucleotides. These oligonucleotides are designed to self-associate into hairpin-like structures, through Watson-Crick base pairing, with a loop made of 12 cytosines serving as the silver binding region. The oligonucleotides also act as a capping agent that stabilizes the AgNC. The resultant AgNCs are expected to show increased antibacterial efficacy when compared to free silver. The solvent exposed AgNCs are vulnerable to degradation through oxidation, changing their fluorescence signal and reducing their antibacterial effectiveness. Rationally designed nucleic acid nanoparticles, such as RNA nanorings, can self-assemble in specific geometries and carry specifically oriented functional moieties, such as AgNCs. By arranging the AgNCs around an RNA nanoring, six AgNCs can be colocalized to a single particle and the RNA scaffold can serve as extra protection against oxidation of the AgNC. The work presented herein investigates if the additional protection against AgNC oxidation contributes to a prolonged antibacterial effect. Furthermore, we test if the colocalization of multiple AgNCs on a single structure is able to exhibit a similar antibacterial efficacy as the same AgNCs free in solution with a significantly reduced particle concentration.

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Abstract #: 142

Title: Understanding the Role of Farnesylation on Hsp70 Co-Chaperones

Student Author(s): Lizbeth Saa **H**

Faculty Author(s): Nitika and Dr. Andrew W. Truman

Faculty Advisor: Dr. Didier Dréau

Department: Biological Sciences

Hsp70 is a highly-expressed molecular chaperone and has an important role in protein folding. It works in conjunction with “helper” proteins known as co-chaperones that regulate the specificity and activity of Hsp70. A major co-chaperone in yeast is the Ydj1 protein, which has a similar counterpart in humans (DNAJA1). Ydj1 is modified by farnesylation at C406 and studies have shown that this is required for anchoring of Ydj1 to the endoplasmic reticulum and Hsp90 client maturation. Although the effect of Ydj1 farnesylation has been examined on a few clients, the global impact and cellular rationale for Ydj1 farnesylation remain unclear. We initiated this study to determine the global impact of C406 farnesylation on Ydj1 interactions and the yeast stress response. Phenotypic analysis revealed that Ydj1 farnesylation is required for the cellular response to heat stress and several other stressing agents. FLAG-Ydj1 and FLAG-Ydj1C406S protein complexes were purified and compared via mass spectrometry. Of 1,102 interactions, 21% were decreased in Ydj1C406S, 77% were unchanged in Ydj1C406S and 2% were increased in Ydj1C406S. These results are currently being validated by co-IP/Western Blotting. Taken together, our preliminary results suggest that although almost all Ydj1 is farnesylated, this farnesylation is critical for only a subset of Ydj1 functions.

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Abstract #: 143

Title: Dose-Dependent Bioflavonoid Exposure May Induce Oxidative Stress Serving as a Mechanism of DNA Damage

Student Author(s): Rachel Sielaty **H**

Faculty Author and Advisor: Dr. Christine Richardson

Department: Biological Sciences

Reactive Oxygen Species (ROS) are naturally occurring in the body and are known to not cause damage at normal, regulated levels. However, these species can cause damage to proteins, lipids and DNA which can be linked with multiple chronic diseases and cancers. ROS are generated during mitochondrial oxidative metabolism as well as endogenously from cellular metabolism in response to xenobiotics, cytokines and bacterial invasion. The regulation of intracellular ROS levels is critical since elevated concentrations can lead to oxidative stress and DNA damage. Oxidative Stress (OS) refers to an imbalance between antioxidant defenses and production of ROS. OS is thought to damage approximately 10,000 bases per day per human cell and one of the major causes of DNA damage and mutation. Excess levels of ROS lead to multiple DNA single strand breaks (SSBs) in close proximity resulting in double-strand breaks (DSBs) which require repair by non-homologous end-joining (NHEJ) or homologous recombination (HR). The repair of DNA via NHEJ can involve the deletion of nucleotides when combining two overhangs are lined up. Likewise, repair of DNA via HR includes the invasion of an undamaged DNA molecule by a damaged molecule of identical or very similar sequence. Both NHEJ and HR repair mechanisms have a higher likelihood of causing mutagenic DNA damage linked with diseases and cancers. Mutagenic DNA repair mechanisms are caused by several carcinogenic compounds as well as over-the-counter supplements and medications. It has been seen that bioflavonoids could direct DSBs to more mutagenic repair analogous to chromosomal translocations.

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Abstract #: 144

Title: Bleaching Rate of Differing Symbiodiniaceae Strains Under Thermal Stress in the Symbiotic Cnidarian *Cassiopea Xamachana*

Student Author(s): Sankalp Vadlapudi **H**

Faculty Author(s): Dr. Casandra Newkirk and Dr. Tingting Xiang

Faculty Advisor: Dr. Tingting Xiang

Department: Biological Sciences

Coral reefs are a vital part of a majority of marine ecosystems. Corals are members of the phylum Cnidaria; this phylum is composed of invertebrate marine animals known to form symbiotic relationships with dinoflagellate algae Symbiodiniaceae. The host cnidarian is reliant on this symbiosis, as the photosynthetic energy is crucial for survival. Climate change is causing coral bleaching, so heat tolerance of the cnidarian-algal symbiosis will be studied to investigate the effects of bleaching. Cnidarians are known to be able to form symbiotic relationships with Symbiodiniaceae; this experiment aims to see if axenic (a single algal strain) cultures can colonize and establish symbiosis with a cnidarian. *Cassiopea*, a genus of jellyfish within the phylum Cnidaria, will be used as a model to understand this symbiotic relationship. The cutting and subsequent regeneration of *Cassiopea* polyps will be conducted to form a proper procedure for the propagation of *Cassiopea* for future laboratory experiments. The propagated *Cassiopea* will then be used to determine if axenic Symbiodiniaceae cultures can successfully infect *Cassiopea*. Infection confirmation of *Cassiopea* polyps will be performed using an image analyzing software to determine the approximate number of algal cells residing inside host tissues. Heat tolerance will be tested by treating *Cassiopea* infected with algae to high temperatures and measuring the number of algal cells expelled. This experiment will allow for a better understanding of the underlying mechanisms of the cnidarian-algal symbiotic relationship, as well as a better understanding of the effects of high temperature on the stability of the symbiosis.

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Abstract #: 145

Title: Novel Therapeutic Targets in Prostate Cancer

Student Author(s): Jayline Zavala **H**

Faculty Advisor: Dr. Junya Tomida

Department: Biological Sciences

Prostate cancer (PCa) is the second leading cause of death among men, with the natural male sex hormones (androgens such as testosterone) contributing to the development and progression of malignancy. Between 10 to 20% of patients with PCa are eventually diagnosed with metastatic PCa (mPCa). For PCa or mPCa treatment, androgen deprivation therapy (ADT) and/or castration is selected. However, nearly all treated individuals develop resistance to therapeutics, resulting in significant effects on quality of life and eventually, patient death. As an alternative to ADT, a novel radiopharmaceutical therapy, radium-223 dichloride, was approved by the FDA in 2013. Because they induce double strand breaks in DNA, radioactive drugs such as radium-223 are especially useful for treatment of cancers that are defective in DNA repair processes. Published meta-analyses indicate that germline and acquired mutations in DNA repair genes are frequent in PCa/mPCa/mCRPC. However, these studies have not comprehensively addressed the known DNA repair gene mutations in these cancers. In this paper, we will review the published and unpublished DNA repair genes that have been identified as mutated in PCa/mPCa/mCRPC, including a recently identified gene, FAM35A, which plays an important role in the repair of double strand breaks. Through this research, we expect to identify potential avenues for the treatment of prostate cancers with defects in DNA repair pathways.

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# Social Sciences

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

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Abstract #: 146

Title: Multiple Sclerosis Student Advocate Program

Student Author(s): Rachel Blanding

Faculty Author and Advisor: Dr. Suzanne Boyd

Department: Psychological Science

The purpose of this study is to educate and inform the community about Multiple Sclerosis. Those who participate in this study will have a better understanding on the basics of Multiple Sclerosis including diagnosis, researched contributing factors, and the background and knowledge that was discovered by the scientific community. The community will also have a better understanding of the daily life of a person who has Multiple Sclerosis. The information in this project builds on the first and second documentaries of "When I Walk, When We Walk" by Jason DaSilva and it observes his experience with MS and the impact on his life. The MS Student Advocate Program allows students to become more involved in MS education, resource sharing, and advocacy. 10 self-paced learning modules and MSSAP training post and pretests were created and reviewed by the researchers for the participants in the MS Student Advocate Program. The participants had to score at least a 90 percent or above and were allowed 3 attempts. The result of this study was that there was an increase in the scores on the pretest and posttest which showed that the participants increased their understanding on multiple sclerosis throughout the study

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

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Abstract #: 147

Title: Politics as Usual: Restricting Immigrant Access to Public Assistance after the 1996 Welfare Reform Act Amid COVID-19

Student Author(s): Heaven Brown

Faculty Advisor: Dr. Beth Whitaker

Department: Political Science and Public Administration

Beginning February 21, 2020, the Department of Homeland Security's Inadmissibility on Public Charge Grounds Final Rule made the receipt of various public assistance programs grounds for refusing immigrants legal permanent resident status in the United States. Observers are concerned that as a result of the Public Charge Rule, immigrants will disenroll or forgo needed public assistance during the pandemic for fear of jeopardizing their immigration status, furthering irreparable damage to Latinx communities and the nation's post-COVID recovery. In this paper, I provide an overview of literature about the 1996 Personal Responsibility and Work Opportunity Reconciliation Act, including (1) the influence of anti-immigrant and anti-welfare framing on the legislation; (2) the presence of exclusionary immigrant provisions in the PRWORA; and, (3) the consequences, implications, and lessons that can be drawn. In examining the consequences of exclusionary immigrant provisions in the PRWORA, I analyze data from the Department of Agriculture Food and Nutrition Service on the citizenship status of SNAP participants. Shifting to more recent developments, I subsequently review the Inadmissibility on Public Grounds Final Rule, drawing comparisons between the PRWORA and the Public Charge Rule. By simultaneously evaluating these policies, I seek to identify lessons from the past that can inform policymakers on the ramifications of implementing anti-immigrant measures in the current context. In closing, I argue, that given the history of exclusionary policies in immigrants' access to public assistance, the DHS Public Charge Rule is consistent with a long history of exclusionary policies and legislation, conducting politics as usual.

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Abstract #: 148

Title: Ethnic Conflict and Sexual Violence

Student Author(s): Jordan Byers **G, H**

Faculty Advisor: Dr. Beth Whitaker

Department: Political Science and Public Administration

This paper explores the relationship between ethnic conflict and sexual violence. Further researching this relationship is important because there is a gap between quantitative and qualitative literature on this topic. Qualitative literature generally suggests that ethnic conflict increases the likelihood of sexual violence by combatants, though some cases do not fit the expected pattern. Quantitative literature, however, has generally found little to no relationship between ethnic conflict and the prevalence of sexual violence. This paper will seek to resolve the puzzle presented by the findings of empirical research and qualitative literature. Using a mixed-method approach, I hope to reconcile the gaps presented by current research. In the quantitative section, I will test the relationship between ethnic conflict and sexual violence using newly-available data for both the independent and dependent variables. Building on the results of the empirical study, I will subsequently examine two case studies of ethnic conflict: Rwanda and Sri Lanka. This will allow for a comparison of a case that follows the expected relationship between ethnic conflict and sexual violence (Rwanda) with one that does not (Sri Lanka). While attempting to resolve the existing gaps in the literature, I hope to identify the conditions under which ethnic conflict is associated with an increased likelihood of sexual violence. Identifying these conditions may allow for the development of purposeful policy recommendations.

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Abstract #: 149

Title: Food Waste Prevention and Management Among UNC Charlotte Students

Student Author(s): Josephine Justin **CE, H, NC, S, U**

Faculty Advisor: Dr. Mary Jo McGowan

Department: Political Science and Public Administration

In the year 2017 alone, about 41 million tons of food waste was generated and only 6.3 percent of that was diverted from landfill and incinerators for composting according to the United States Environmental Protection Agency. Environmentally, reducing and composting food waste instead of sending it to landfills can reduce methane, a powerful greenhouse gas, and also help save resources and return nutrients to the soil. Ethically, the number of people who experience food insecurity can be reduced if we know how to better keep food from being wasted in the first place. Economically, another motivator for creating less food waste is simply that we can save money. This thesis explores what the current attitudes and behaviors of UNC Charlotte students are towards food waste prevention and management and what types of messaging influences these attitudes and behaviors through a survey experiment. There are a total of four study groups - a control group, environmental messaging group, economic messaging group, and ethical messaging group. Questions will be asked before and after participants are exposed to messaging to understand the impact of messaging. After collecting this data, I will be using Stata to analyze the data. From this data, we can better understand what type of college students are more likely to be engaged in food waste management and prevention strategies and hold positive attitudes. The data can also explain what impact, if any, messaging such as social media posts can have on food waste behaviors and attitudes.

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Abstract #: 150

Title: The Relationship Between Light Rail Transit and Income Segregation

Student Author(s): Nathan LePrell and Matthew Legato **U**

Faculty Advisor: Dr. Isabelle Nilsson

Department: Geography and Earth Sciences

Past research has investigated the relationship between the introduction of rail transit and economic segregation patterns in various US cities. This research has shown that low-income residents were not more likely to move out of a neighborhood with transit development than other income groups (Delmelle & Nilsson 2019). However, these are national averages where metropolitan specific tendencies are ignored. Hence, this research takes a closer look at Charlotte, NC using a GIS approach. This project builds upon previous research by examining how the introduction of the Lynx Blue Line has influenced residential income segregation patterns in Charlotte, North Carolina. Maps were created to display median household income for the years 1990, 2000, 2010, and 2017. Then, maps were generated using Hot Spot Analysis to visualize Clusters of low and high income. We concluded that income segregation patterns have changed in Charlotte, but that we cannot solely link that to the development of the light rail since there are likely other factors that could have contributed to it as well. These findings could be used to guide future rail development projects in Charlotte. For future research it would be useful to examine the relationship between the other light rail lines in Charlotte and income segregation.

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Abstract #: 151

Title: Stress and it's Correlation with Health Statuses and Absences

Student Author(s): Olivia Oyler

Faculty Advisor: Dr. Hannah Peach

Department: Psychological Science

Stress is present in everyone's life, especially college students who are trying to meet the ever-growing demands present in their young lives. Previous research indicates perceived stress levels along with college admission rates have been steadily rising. The purpose of this study was to analyze if there was a correlation between perceived stress and the number of sick days taken by college students. Stress can be acute or chronic, and often results in different health outcomes because each type of stress activates a different stress response. Previous studies indicated that increased stress led to increased absences in a wide variety of participants but failed to look at college students. The present study filled this gap by looking at stress related absences in college students. A correlational analysis concluded that there was a moderate positive relationship between stress levels and absences in college students. Chronic absences can lead to college students falling behind in their coursework, which could lead to declining performance in class. The academic success of college students depends on the management of stress.

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Abstract #: 152

Title: Task Goals Constrain Interpersonal Coordination: Evidence from the Alignment of Speech in Dialogues

Student Author(s): Niyathi Sulkunte, Marviene Fulton, and Sarosh Ahmad

Faculty Advisor: Dr. Alexia Galati

Department: Psychological Science

The benefits of interpersonal alignment on task performance are documented in tasks that require partners to closely monitor each other's perspective which is consistent with a prominent view that as task partners align their behavior, they converge conceptually. However, whether the benefits of alignment generalize to other tasks is unexplored: for example, in joint visual search, performance could benefit from a "divide and conquer" strategy. This study seeks to explore the relationship between success in specific task goals and interpersonal communication through dyad dialogues. In this study, dyads interacted with maps to complete 10 trials under different task goals: 5 trials involved planning a route from an origin to a destination (route planning) and 5 involved searching for landmarks (visual search). We transcribed a subset of the dialogues in detail. In each conversational turn, we coded for the presence of acceptances (e.g., mm-hm, yeah, OK), references to landmarks, and the use of metacomments (comments about the state of the task) through which task partners negotiated strategies. To the extent that route planning involves more perspective-monitoring of the partner's subgoals in the task, we expect to find more acceptances and more alignment in the use of landmarks in that task compared to visual search. Additionally, we expect that in visual search the dyads will be more likely to explicitly agree to divide the task space through the use of metacomments. Our findings would suggest that both alignment and complementarity can be emerging properties of the interaction that serve task goals.

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Abstract #: 153

Title: Conscientiousness, Extraversion, and Neuroticism: Investigating the Role of Personality as Moderators in a Passive Relaxation Stress Intervention's Ability to Reduce Stress

Student Author(s): Victoria Udomsirirat **H**

Faculty Author and Advisor: Dr. Linda Shanock

Department: Psychological Science

The proposed research study for the honors thesis aims to look at how dimensions of personality (Conscientiousness, Extroversion, Neuroticism) play a role in how efficient interventions can be to reduce levels of stress and anxiety. What first sparked this idea for this thesis was the observations of the levels of stress in the workplace environment. Stress is a facet that exists within our lives, but rarely do we ever proactively direct our energy towards resolving it. While there are individual well-being consequences, organizations also experience reduced efficiency, less profits, and lessened productivity if job-related stress is high. The literature is becoming increasingly focused on stress in the workplace by studying how stress management interventions (SMI) can be of aid. Additionally, studies on personality linked with stress reveal that conscientiousness, extroversion, and neuroticism are predictors for stress levels. Further investigation with this study will hopefully provide insight into these implications by showing how stress trajectories of individuals change throughout the SMI intervention. Expected results of the data will show that individuals high in conscientiousness and extroversion and low in neuroticism will experience less stress over time. Through these findings, organizations may be able to tailor certain stress management resources towards specific personalities that can be more effective than providing a stress management intervention for everyone. These results can be useful in the application of stress management initiatives in organizations, as well as further research in the domain of job stress.

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# ABSTRACTS

## Poster Presentations

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# Arts and Design

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Abstract #: 200

Title: Lazar Weiner's Concert Arrangement of Four Holocaust Songs

Student Author(s): Michael Coston

Faculty Advisor: Dr. Jay Grymes

Department: Music

I am going to be presenting 4 songs from Emma Schaver in 2 keys (high voice and low voice). I will be looking more in depth into the work that composer Lazar Weiner put together for the book Songs of the Concentration Camps from the Repertoire of Emma Schaver. I will be transposing the music using the music software Sibelius, so that it is available for more people to perform. Lazar Weiner is one of the most prolific composers of the Yiddish Art Song. I am excited to be learning about the opera singer Emma Schaver as well as her and Lazar Weiner's contributions to the Holocaust repertoire.

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Abstract #: 201

Title: Freelon's Use of Color and Pattern: Design and Inspiration

Student Author(s): Sierra Grant

Faculty Advisor: Dr. Emily Makas

Department: Architecture

Presentation Withdrawn

Phil Freelon was a well-respected but underappreciated African American Architect who passed away in 2019. Phil Freelon, and his firm, The Freelon Group, focused on the design of museums, cultural centers, libraries, universities, and other public buildings. My research has two parts; first, to study the role of color and pattern in Freelon's design, and second, to use Freelon's work as inspiration for the graphic design of an exhibition exploring and analyzing his work. I will be examining a series of his projects to compare, contrast, and make conclusions about color and pattern, and then proceed to engage the themes in my own design work. I aspire to find connections between colors and patterns in Freelon's designs. Preliminary observations include the variation of skin tone colors used on the Atlanta National Center for Civil & Human Rights' facade and the theme of quilted patterns utilized on the exterior of the Gantt Center in Charlotte. This area of study is significant because Freelon was known for using color to express cultural identity, history, and connections to community. As these are central themes highlighted within the exhibition of his work, it is important for these connections to resonate with the public as they explore and move through the gallery. The design of the exhibition can contribute to expressing the ideas that exist in the text, images, and diagrams; further showcasing the overall curatorial theme of Freelon's work itself exploring connections between content and design.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 202

Title: Masonry Exploration of the Bahamas

Student Author(s): Hannah Guffey, Tyler Trudeau, and Enosh Ishman **G, H, S**

Faculty Advisor: Dr. Jose Gamez

Department: Architecture

As an island nation, the Bahamas faces hurricanes, storm surges, and climate related catastrophes with increasing regularity, which can be attributed to the impacts of climate change. The complex dynamics that shape the Bahamas heighten the need to re-evaluate and re-design the built environment. The focus of the research that I have engaged has built upon work begun in the fall semester of 2020. The School of Architecture at UNC Charlotte partnered with the University of the Bahamas and with the One Eleuthera Foundation (OEF). OEF is interested in designing and building off-grid housing prototypes that can serve as both short-term shelters and as emergency housing for local populations. Specifically, through my research and exploration, I have come across the beauty and simplicity of masonry construction, which can be easily built and easily modified through a simple rotational change in the way that masonry units are stacked. This creates a way for passive cooling when the masonry is rotated on its side promoting sustainable design. Masonry structures are common in the Bahamas and on Eleuthera Island. However, masonry construction methods typically found on the island are poor choices for hot and humid climates because they require different mechanical systems. Our goal is to find ways to use conventional materials and simple construction techniques that will enable the One Eleuthera Foundation to build small structures, shelters or short term housing models that do not require mechanical systems.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 203

Title: Children's Book About Music

Student Author(s): Marion Sutton

Faculty Advisor: Dr. Jay Grymes

Department: Music

"What are the benefits of children's music books in the music classroom? Can we find a better way to incorporate children's literature into a non-traditional style of learning and teaching a specific subject?" For my final project, it is going to be a 20-page research paper on the effects and benefits of Children's music books in music classrooms. I will research a certain amount of children's music books from various plotlines all dealing with music and/or music-like qualities. All of these books will have an audience base from ages 5-8. I will compare and contrast them with one another and study what made them successful and how they can be used in the music classroom. From there, I will also be creating my own story picture book about a musical subject I feel will be beneficial to children's learning in the music classroom. This book will also be intended for the audience of age 5-8. I will incorporate things I feel are important to the younger audience and things I have learned from my research. I will make a point not to include things I think are not necessary and I will also make sure that this is something that can be used for more than this project. My goal is to make a book about a musical subject or subjects that will not be too hard to comprehend as a younger audience member. The whole idea is to continue building the library for younger children with more non-traditional learning styles such as something as creative as music.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte



# **Business and Economics**

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 204

Title: The Impact of Median Household Income on Incarceration Rates: A State-Level Analysis

Student Author(s): Connor Derrick

Faculty Advisor: Dr. Carol Stivender

Department: Economics

There is much research surrounding the impact of incarceration at an individual level on factors such as economic opportunity and life expectancy. Other studies have investigated the impact of mass incarceration at county and state levels on income inequality, poverty levels and public health. Furthermore, there are many pieces of work regarding the differing effects of incarceration on different races using measures of wealth such as homeownership. While there is much research regarding the impacts of incarceration, there are fewer studies of what leads to those incarceration rates in the first place, although there is some evidence of cyclical relationships between incarceration rates and economic factors such as child poverty levels. This work changes the direction of influence to investigate the impact of median income on incarceration rate using linear regression on annual state-level data from 2014 to 2017. Results show a strong correlation between median income and incarceration rates as well as connections between incarceration rate and other potential contributing factors such as graduation rates and teen births. From our analysis, we can conclude that median income has a statistically significant non-linear relationship with incarceration rates. As median income increases, we expect incarceration rates to increase up to a certain point and, once median income passes that point, we expect incarceration rates to begin decreasing.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

# Education and Communication

**CE** - Community Engaged   **G** - Global   **H** - Honors   **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 205

Title: The Boastful Hernan Cortés: The Conquering of the Colonial New Spain

Student Author(s): Tonantzin Apolinar

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Presentation Withdrawn

In the Hernán Cortés' *Letters from Mexico*, Cortés portrayed his leadership as effective due to his determination, resourcefulness, and resilience. Overall, Cortés described himself as an adept leader whose determination for conquering overpowered Moctezuma's ability to protect the Mexica people. According to the letters, Moctezuma is displayed as a leader who was well backed up by the people but overall was a weak leader, compared to Cortés, when it came to protecting his people. Another supporting factor of Cortés' impressive leadership was his resourcefulness, which can be seen through his ability to form mutually beneficial relationships with the indigenous people of Mexico; some of such relationships that later led to alliances and allowed Cortés and his people to have interpreters, advisors, and warriors. Cortés was astute by developing a relationship with the men from Cempoal, the people of Tlaxcala, the Tascatelcas, and later on La Malinche, an Indian woman who later played a key role in conquering the Aztec Empire. Through the various encounters with the indigenous people of Mexico, Cortés' resilient style of leadership became more apparent and the language of the letters depicted a pattern of consistent glorification of Cortés' leadership. In the battles, Cortés is portrayed as resilient who although experienced hardship, such as losing and being run out of Tenochtitlan, he continued to fight for the sake of the King; who Cortés described himself as a faithful vassal of the King. In the *Letters from Mexico*, Hernan Cortés was depicted as a well-rounded leader throughout the conquering of the indigenous people of Mexico.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 206

Title: Investigating how NC Teachers Analyze Quantitative Data for Culturally Responsive and Equitable Decision Making

Student Author(s): Lizzy Balzer\*\*, Piper Boger\*\*, John Benson\*\*, Alexandria Dixon\*, William Law\*\*, and Sierra Smith\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate the ways that teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of analyzing and evaluating statistical data. As future teachers, quantitative data analysis is important because it allows us to arrive at informed conclusions about student performance. For this research project we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection. We had two research questions to guide this examination: (1) What do the quantitative data like those from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? In addressing the first research question, we found that students of color had higher percentages, pertaining to scoring below proficiency on read exams, opposed to white students and two-thirds of students who cannot read proficiently by the end of 4th grade will end up in jail or on welfare. In addressing the second research question, we recommend providing guest speakers from different cultures and providing texts that relate to every culture. The overall contribution of this research study is that it helps to prepare us as future teachers to be more equitable and to ensure that lessons are culturally relevant for each student. This research is directly equipping us to be highly effective teachers. Research is a necessary component of instruction.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 207

Title: Quantitative Data Analysis to Inform Culturally Responsive and Equitable Teaching Practices

Student Author(s): Bethany Chalvet\*\*, Amani Parkins\*, Tierra Cursen\*, Taylor DeWitt\*\*,  
Jasmine Johnson\*, Megan Strong\*\*, and Kristen Sutphin\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate and summarize the ways NC teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of analyzing and evaluating statistical data. As future teachers, quantitative data analysis is important because it predicts outcomes in larger student populations and groups, prisons use data analysis to see how many prisons they need to build, the school to prison pipeline. For this research project we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions to guide this examination: (1) What do the quantitative data like those from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? In addressing the first research question, we found that testing reports, school data reports on attendance are two examples of what data reveals about schools and learners in North Carolina. In addressing the second research question, we recommend the following: ensure that libraries are culturally inclusive, getting in touch with students' families about getting involved in reading at home, to be responsive to these data findings. The overall contribution of this research study is that it helps to prepare us as future teachers to be culturally responsive and inclusive in a classroom.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 208

Title: Equitable Quantitative Data Analysis for Culturally Responsive Teaching Practices

Student Author(s): Nandi Dail\*, JuliAnn Kramm\*\*, Brianna Davis\*, Hailey Domian\*\*, Rachel Fuge\*\*, Lauren Huneycutt\*\*, and MarYahna Richardson\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate how teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of analyzing and evaluating statistical data. As future teachers, quantitative data analysis is important because it can be used to predict outcomes in larger student populations and to evaluate the performance of students and teachers. For this research project, we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions: (1) What do the quantitative data like those from the Civil Rights Data Collection descriptive statistics reveal about NC schools and learners? (2) What are culturally responsive and equitable ways to be responsive to these data? We found that quantitative data from the Civil Rights Data Collection measures and predicts student achievement, college and career readiness, school discipline, and more. For instance, according to the CRDC, two-thirds of students who cannot read proficiently by the end of fourth grade will end up in jail or on welfare. We recommend the following: create strong positive relationships with parents and/or guardians, maintain prompt and efficient communication between teachers, school administrators, and school communities, and provide equitable resources to target students' needs in response to data findings. The overall contribution of this research is that it introduces and helps prepare us with research knowledge and skills for conducting quantitative data analysis through an equitable and culturally responsive lens.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 209

Title: Equipping Teachers to Analyze Quantitative Data in Culturally Responsive and Equitable Ways

Student Author(s): Mackenzie Huffman\*\*, Katie Baker\*\*, Chloe Basile\*\*, DMya Blige\*, Myan Childs\*, Lily Hain\*\*, and Maria Kate Molamphy\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate and summarize the ways that teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of analyzing and evaluating statistical data. As future teachers, quantitative data analysis is important because teachers need to understand the students' population that you serve and the inclusion of their cultural identity. For this research project we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions to guide this examination: (1) What do the quantitative data like those from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? Analysis of the data collection revealed incarceration rates and welfare dependency correlates to reading proficiency by the fourth grade and a disproportionate distribution of ISS exists for students of color compared to their white peers. In addressing the second research question, we recommend the following; implementation of computer based consequence systems and appropriate intervention tools and scaffolded support to be responsive to these data findings. The overall contribution of this research study is that it helps to prepare us as future teachers to employ quantitative data to prepare culturally relevant and responsive instructional practices.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte



Abstract #: 210

Title: Investigating How Teachers Analyze Quantitative Data for Culturally Responsive and Equitable Instructional Decisions

Student Author(s): Morgan Jackson\*, Paisley Hojnacki\*\*, Bailey Rynk\*\*, Kristen Davis\*\*, Camille Groom\*, Heather McMullen\*\*, and Aysia Woody\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate how teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of evaluating statistical data. As future teachers, quantitative data analysis is important because it is used to evaluate the student' and teachers' performance and to predict the outcomes of large student populations by group. For this research project, we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions: (1) What do the quantitative data like those from the Civil Rights Data Collection reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? We found that most students were between levels of basic and proficient for grade level reading proficiency; there were very few proficient within the entire group measured. In addressing the second research question, we recommend the following: Have more culturally diverse activities and resources in the classroom with different cultures, languages, and disabilities. We can also make time to practice reading strategies in the classroom. Teachers could also distribute a survey to find students' reading levels. The overall contribution of this research is to prepare us as future teachers to be culturally responsive in the classroom and to be mindful of quantitative data.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 211

Title: Investigating how NC Educators Analyze Quantitative Data for Culturally Responsive and Equitable Instructional Decisions

Student Author(s): MyKia Kallie\*, Kayla Daniels\*\*, Lamia Bilal\*, Charnay Brown\*, Sarah Kummer\*\*, Emma Morton\*\*, and Vivian Roussis\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate and summarize the ways that teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of analyzing and evaluating statistical data. As future teachers, quantitative data analysis is important because it helps us understand where students may be struggling in their learning and concepts that need to be reviewed. For this research project we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions to guide this examination: (1) What do the quantitative data like those from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? In addressing the first research question, we found that American Indians have the highest percentile of being below proficient in reading and every race had 50% or more students who were non proficient in reading. In addressing the second research question, we recommend the following: relate activities to students' interests, build a relationship with your students so they are comfortable sharing information, and engage in critical thinking to be responsive to these data findings. The overall contribution of this research study is that it helps to prepare us as future teachers to be aware of what it is that we need to do to fill in the gaps.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 212

Title: Educators use of Quantitative Data for Culturally Responsive and Equitable Instructional Decisions

Student Author(s): Perrin Kingaby\*\*, Savannah McKinney\*, Aldeja Bell\*, Tashyra Fowler\*\*, Aubrey Durham\*\*, Connor Rudel\*\*, and Madelyn Boatwright\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

Our purpose is to examine how teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of evaluating statistical data. As future teachers, quantitative data analysis is important for the success of students. Data analysis is how teachers find answers to their questions about their students' progress. We examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions: (1) What do the quantitative data reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? We found that there is no equitable instruction due to the below reading proficiency percentages being above 50 percent for all minority students. According to data, there has been no substantial improvement in reading instruction over years 2013-2019. In addressing the second research question, we recommend the inclusion of culturally relevant material in students' education, which means materials that have to do with their lives, families, and culture. Another recommendation is to have students read one chapter book a week to progress their reading skills. Although this seems like a challenging task if the students pick the books out themselves, they would be more inclined to read, because it is an interesting book. This research study helps us prepare to assess and adjust our personal biases so that we may better instruct a classroom in a more conscientious and purposeful way.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 213

Title: Using Quantitative Data Analysis to Improve Instruction and Provide for a Culturally Responsive and Welcoming Classroom Environment

Student Author(s): Lindsay Poole\*\*, Kayla Robinson\*, Brenee Davis\*, Abigail Melton\*\*, Darien Mikell\*, Caroline Owens\*\*, and Kaylee Stewart\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate ways teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of analyzing and evaluating statistical data. As future teachers, quantitative data analysis is important because it helps teachers monitor the progress of individual students and the entire class. Also, it allows teachers to know what each student needs. For this research project we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions to guide this examination: (1) What do the quantitative data like those from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? In addressing the first research question, we found a pattern of zero improvement in Grade 4 reading proficient scores from 2013-2019. Also, as a whole about 50% or more of students had not met reading proficiency. In addressing the second research question, we recommend the following: find books that students of different cultures can relate to and make sure that everybody understands the vocabulary or events happening in the story because not all experiences are universal. The overall contribution of this research study is that it helps to prepare us as future teachers to adapt instruction to our students while also creating a welcoming environment where teachers are culturally aware.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 214

Title: Empowering Teachers with Culturally Responsive and Equitable Quantitative Data Analysis

Student Author(s): Autumn McDonald\*\*, Meredith Twigg\*\*, Candace Horton\*, Cheryl Brewer\*\*,  
Natalie Davis\*, and Maria Sanchez Herrera\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

Our Executive Summary presentation's purpose is to examine how to empower teachers with culturally responsive and equitable quantitative data analysis tools. As future teachers, quantitative data analysis is important because over a specific time span data can show consistency or inconsistency in a specific area. Data can also show a starting point, growth, and progress. We examined North Carolina data from the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions: (1) What do the quantitative data from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in NC? (2) What are culturally responsive and equitable ways to be responsive to these data? We found that African American students were in the majority of students that were below proficiency on their reading levels. We also found that Hispanic and Latino students were consistently low. American Indian students also had the highest percentile for low reading proficiency, but no data was recorded for the year 2017. We recommend the following to be responsive to these data findings: one-on-one sessions with students to work on reading, having culturally relevant texts for students to read including picture books to support reading development with visuals, and working closely with families to provide support for reading practice at home. Our study prepares us as future teachers to analyze and read data over periods of time, identify strategies to improve data for struggling students, and think deeply about making our future classrooms culturally relevant.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 215

Title: Equipping Teachers with Culturally Responsive and Equitable Quantitative Data Analysis

Student Author(s): Kayleen Oetjens\*\*, Ashton Harrelson\*\*, Keila Compean\*\*, Desirae Harris\*,  
Sadie Kay-madgett\*\*, Sarabi Kearner\*, and Sara Walker\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

Our Executive Summary presentation's purpose is to examine ways teachers analyze quantitative data for culturally responsive and equitable decision making. As future teachers, quantitative data analysis is used to predict outcomes, evaluate student and teacher performance, raise awareness about disparities, and inform recommendations for needed improvement. We examined North Carolina data in databases like the Civil Rights Data Collection. We had two research questions: (1) What do quantitative data like the Civil Rights Data Collection descriptive statistics reveal about schools and learners in NC? (2) What are culturally and equitable ways to be responsive to these data? In addressing the first research question, we identified a disparity in CMS and Guilford county schools' out-of-school suspension rates. CMS county schools had 2.7% of all students had an out of school suspension, while Guilford county schools had 2.0% of students have out of school suspension. Of CMS county school's 2.7%, 3.8% of those students were male and 1.7% were female. Of Guilford county school's 2.0%, 2.8% of those students were male and 1.1% were female. In response to these data, we recommend: implementing restorative justice programs as an alternative response to out-of-school suspensions and requiring all county professionals to participate in consistent explicit and implicit biases training to be responsive to these data findings. This research prepares us as future teachers to be aware of cultural differences in our classroom and equips us to take steps to decrease gaps in education among our students.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 216

Title: Seeing the Disparities: Quantitative Data Analysis for Culturally Responsive and Equitable Instructional Decisions

Student Author(s): Khayla Speaks\*, Briana Brown\*, Victoria Knapp\*, Lee Kuvakis\*\*, Elanna Peay\*\*, Alianna Rentas\*\*, and Jane Tarleton\*\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

Our presentation's purpose is to examine ways that teachers analyze quantitative data for culturally responsive and equitable instructional decisions. As future teachers, quantitative data analysis is important because it equips us to assess the practices or curriculum that are and are not working. Quantitative data analysis helps us identify what students know and the needed improvements. We examined North Carolina data in databases like the Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions: (1) What do quantitative data reveal about schools and learners in NC? (2) What are culturally and equitable ways to be responsive to these data? We found disparities in Grade 4 reading test scores over 2013-2019. Test scores of non-Asian or White students continue to be the worst in NC. We recommend having a diversity of books for the students to choose from and promote small group time, which is more diverse in its students and their reading levels. We also recommend making teaching applicable to the students' cultures and traditions. Our research's overall contribution is that it prepares us to respond to data and develop plans for improvement. Being culturally responsive to data helps us see the disparities in different demographics and find solutions. This is an empowering way to be responsive to future students. Our research will show visual data that will enlighten administrators and school boards about the needed changes in specific areas for the betterment of the students who are enrolled in our county's schools.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

Abstract #: 217

Title: Setting up Students for Academic Success through Culturally Responsive and Equitable Quantitative Data Analysis

Student Author(s): Katie Wilson\*\*, Deandrea Israel\*, Giulia Decaria\*\*, Logan Mangum\*\*, Jocelyne Otoy\*\*, and Palmer Womble\* **NC**

Faculty Advisor(s): Dr. Nakeshia Williams\* and Dr. Erik Jon Byker\*\*

Affiliations: North Carolina A&T State University\* and UNC Charlotte\*\*

The purpose of our Executive Summary presentation is to investigate and summarize the ways that teachers analyze quantitative data for culturally responsive and equitable decision making. Quantitative data analysis is the process of analyzing and evaluating statistical data. As future teachers, quantitative data analysis is important because it shows us where our students are and how we can accommodate the needs of our students. For this research project we examined North Carolina data in databases like the U.S. Department of Education's Civil Rights Data Collection (<https://ocrdata.ed.gov/>). We had two research questions to guide this examination: (1) What do the quantitative data like those from the Civil Rights Data Collection descriptive statistics reveal about schools and learners in North Carolina? (2) What are culturally responsive and equitable ways to be responsive to these data? In addressing the first research question, we found that reading scores didn't improve and remained consistent throughout the six years. In addressing the second research question, we recommend the following; incorporating a variety of books in the classroom to eliminate bias, make modifications to accommodate learning and cultural differences, and communicate with families to mirror what students are doing at home to be responsive to these data findings. The overall contribution of this research study is that it helps to prepare us as future teachers to be prepared to provide resources to support students who need it, be able to better assess all students, and set up our students for academic success.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte



Abstract #: 218

Title: Reflections on Teacher Efficacy and Professional Development: Interviews from Teachers, Professors, and Staff

Student Author(s): Zoe Ziegler, Brenda Morales Flores, and Faith Frayman **CE, NC, U**

Faculty Advisor(s): Dr. Scott Gartlan

Department: Academic Affairs, Dean's Office

Research analyzing more than thirty studies concludes that effective teacher professional development aimed at student achievement is content focused, supports collaborative learning, provides expert support, and offers space for feedback. Somewhat less well known are how teachers' and professors' perspectives on these experiences relate to effective professional development. This study analyzed data from five audio interviews conducted with participating teachers, professors, and staff for usage in a video project. A grounded theory methodology and a constant comparison method were used to analyze interview data by developing codes, categories, and themes based on the direct testimonial with the goal of identifying an emergent theory of professional development. Interrater reliability through code-sharing among the research team helped to identify common themes that emerge from the interviews. Themes along with direct quotes were shared with interviewees as a member check. Four preliminary themes emerged: (1) CTI seminars support teachers to delve into relevant topics, (2) collaboration between participants in CTI seminars facilitates growth both personally and professionally, (3) benefits of CTI seminars are evident through purposeful implementation of formal curriculum and improved teacher efficacy beliefs, and (4) CTI seminars are intentional about addressing difficult topics such as racial inequity so teachers can better serve their students. These patterns will shed light on the relationship between teachers' and professors' experiences and features found in effective teacher professional development. These preliminary themes suggest collaborative learning among K-12 teachers led by a university provides a learning environment focused on professional feedback, expert support, and relevant topics.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability

**U** - Charlotte

# Health Sciences

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 219

Title: Assessing Staff /Client Beliefs and Attitudes to Inform Tobacco-Free Campus Policy Implementation at Substance Use Disorder Treatment Centers

Student Author(s): Amogh Bandekar, Kim Bayha, Ashley Finke, and Vanessa Mallory **CE, H, NC, U**

Faculty Author(s): Dr. Michael Dulin

Faculty Advisor: Dr. Michael Thompson

Department: Public Health Sciences

In the United States, patients with behavioral health conditions have smoking rates two to three times higher than rates among the general population. Tobacco-free environments at substance use disorder facilities can positively impact tobacco treatment. This study assessed client and staff beliefs, attitudes, and knowledge regarding the implementation of a tobacco-free campus policy at McLeod Addictive Disease Center. The McLeod Center is a full-service substance use disorder treatment facility based in Charlotte, North Carolina, with additional medication assisted treatment clinics in the region. During the height of the 2020 COVID-19 pandemic, the research team conducted online staff surveys (n=28) and semi-structured virtual client interviews (n=38) prior to the agency going tobacco-free in January 2021. Staff reported being bothered by secondhand smoke exposure (n=10) and expressed that the tobacco free campus policy will positively impact client SUD recovery (n=12). Clients also expressed positive feelings associated with the policy (n=16) and reported wanting to receive tobacco quit treatment (n=25). Since the McLeod Center is one of the first community-based substance use disorder treatment facilities in North Carolina to transition to a 100% tobacco-free campus, the research and results could serve as a blueprint for other behavioral health facilities. Further study will include follow up surveys and interviews at 3 and 6-month intervals after policy implementation, as well as examining data collected in the electronic health record, to examine policy impact.

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Abstract #: 220

Title: Pro-Angiogenic Vascular Endothelial Growth Factor Subtypes and Breast Cancer Progression

Student Author(s): Brianna Dickens and Caitlin Buggeln

Faculty Author and Advisor: Dr. Didier Dréau

Department: Biological Sciences

Breast cancer is one of the leading types of cancers diagnosed in women. Besides tumor mutations, the tumor microenvironment, especially the generation of newly formed blood vessels, i.e., angiogenesis, promotes cancer progression. Previous observations including ours linked inflammation and vessel formation. In particular, vascular endothelial growth factors (VEGFs) and their signaling were critical to angiogenesis associated with cancer progression. Angiogenesis results from the local balance of pro- and anti-angiogenic factors and within the tumor mass, pro-angiogenic VEGFs are prevalent. Whether VEGF isoforms and/or their receptors differently modulate angiogenesis in breast cancer is unclear. Here, we assessed in silico the correlations between key VEGF and VEGFR subtypes and breast cancer patients' survival. In particular, the effects of mutations, deep deletion and amplification of specific VEGF subtypes and their receptors, and thus their corresponding proteins, on patients' overall survival was assessed through CBioPortal.org. The data highlight (1) the relationship between specific genetic alterations in the VEGF subtypes and receptors assessed and (2) the potential of targeted anti-angiogenic approaches in preventing breast cancer progression.

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Abstract #: 221

Title: Investigating and Comparing Aspects of Sustainable Development Goal #3

Student Author(s): Karissa Ewing **G, H, S**

Faculty Advisor: Dr. Erik Jon Byker

Department: Honors College

The purpose of my research poster is to investigate and compare aspects of the Sustainable Development Goal (SDG) #3: Good Health and Well-Being. In particular, I examine the following aspects of SDG #3: (1) the impact of COVID-19 on health and well-being and (2) the interconnections between SDG #3 and the other SDGs. The two main research questions for my comparative study are: What are the similarities and differences between Australia and the United States in relation to the impact of the COVID-19 pandemic on good health and well-being? How have the two countries related or differed in their response to the interconnectedness of SDG3 to other SDGs? For this research presentation, I focus on comparisons among Australia and the United States. To conduct this research, I used a literature review research design methodology. I searched for resources on the UNC Charlotte J. Murrey Atkins Library databases using keywords like: Australia, COVID-19, good health, GDP, health reports, SDGs, United States, and well-being. My data consists of three country reports, one international dataset, and two other reliable sources. The findings of my research reveal (1) the success of SD3 is in critical condition due to the impacts of the COVID-19 pandemic and (2) the success of other SDGs is crucial in relation to the success of SDG3. The research poster includes an examination of the challenges and possibilities in meeting SDG 3: Good Health and Well-Being.

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Abstract #: 222

Title: PTSD and the RT

Student Author(s): Renee Howell

Faculty Advisor: Dr. Brian Ring

Department: Kinesiology

Purpose: Post traumatic stress disorder (PTSD) is most often associated with veterans and people who have been around mass casualty events, but front-line workers frequently suffer from occupational-induced secondary traumatic stress and posttraumatic stress disorder. PTSD in the respiratory care practitioner (RCP) has not been studied. Respiratory care practitioners have very strenuous routines that do not allow for time to decompress the traumatic situations they encounter on a daily basis while bedside. Due to the lack of data available as to how many RCPs suffer from PTSD, this investigation will explore the association of PTSD. Methods: Fifty RCPs will be asked to take a 20 question, 5-point Likert scale response, survey that will evaluate three domains of secondary stress related to PTSD. Results: Data is expected to demonstrate that the majority of the participants will have a high total score and be found to have a measurable negative life impact associated with their work environment through the survey results. Conclusion: RCPs encounter traumatic situations daily and the lack of current data available as to how the RCP is affected. Some that suffer from PTSD suffer from emotional distress that may be severe and persistent. Bringing awareness of PTSD and RCP that is bedside will be a benefit to them and their patients.

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Abstract #: 223

Title: Understanding the Role of HOXC6 in Ovarian Epithelial Tissue

Student Author(s): Nedhe Jariwala

Faculty Author and Advisor: Dr. Christine Richardson

Department: Biological Sciences

Epithelial ovarian cancer is a serious gynecological cancer and accounts for approximately 90% of all ovarian cancers. More than 60% of epithelial ovarian cancer are not diagnosed until the cancer has metastasized to distinct locations. Understanding epithelial ovarian cancer biomarkers can help early diagnosis and increase survival rates. Homeobox genes also known as HOX genes are transcription factors that regulate embryonic development and progenitor cells in adult tissues. Dysregulation of HOX genes has been observed in epithelial ovarian cancer. A subtype of epithelial ovarian cancer is serous ovarian cancer. Serous ovarian cancer exhibits up-regulation of HOXA and HOXB genes and down-regulation of most HOXC genes. The HOXD cluster of genes demonstrate a variable up- or down-regulation in serous epithelial ovarian cancer. The purpose of this study is to determine the role of HOXC6 in epithelial ovarian tissue cells. CRISPR Cas-9 technology will be used to knockdown HOXC6 in the normal ovarian epithelial cells. Cells will then be sorted and analyzed by Western blotting for loss of gene expression. Several assays will be performed on these cells to determine if the loss of HOXC6 activity promotes a transformation phenotype. Assays for the test of cell proliferation may include Ki67 assay and MBright assay. To test for apoptosis the Vybrant MTT Cell Proliferation Assay Kit can be used to test for apoptotic markers Western blotting can be used. We predict that the ovarian tissue cells will show hyperproliferation once HOXC6 gene has been reduced analogous to what is observed in cancer.

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Abstract #: 224

Title: A Qualitative Assessment of Chronic Obstructive Pulmonary Disease (COPD) Education and Health Literacy in Rural North East North Carolina

Student Author(s): Ashley Jones **CE, NC**

Faculty Advisor: Dr. Brian Ring

Department: Kinesiology

**Purpose:** With the growing population and how specifically the baby boomer generation continues to advance in age, there is an average of 115,000 people a year diagnosed with chronic obstructive pulmonary disease (COPD). Despite the high numbers of people diagnosed with COPD, it is found that they do not understand their disease and are therefore not able to manage themselves adequately. As insurance guidelines and reimbursement policies continue to change and affect how hospitals manage COPD, can an educational program geared toward COPD positively impact patients' quality of life and help reduce hospital readmission rates? **Methods** Data will be collected from healthcare professionals from various departments in a 25-bed rural critical access hospital. A series of interviews will be conducted, and information gathered will consist of opinions and experiences from providers concentrating on the treatment and management of COPD patients. **Results:** The information obtained will highlight indications and implications on how a structured COPD educational program could benefit the patients served. **Conclusion:** This qualitative assessment will identify the need for a more structured COPD education program and provide insight into the current, perceived health literacy of COPD patients treated at this facility.

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Abstract #: 225

Title: Educational Models Incorporated in Pulmonary Rehabilitation for the Betterment of MDI Techniques and Usage

Student Author(s): Logan Joyner

Faculty Advisor: Dr. Brian Ring

Department: Respiratory Therapy

Introduction: Patients that attend pulmonary rehabilitation maintain pulmonary complications. Throughout a pulmonary rehabilitation program, patients improve quality of life and acquire knowledge on personal medication and disease management. One objective of pulmonary rehabilitation is to highlight personal medication techniques and adherence with each patient to ultimately improve quality of life. Various education models, such as visual representations, teach-back method, and open-ended questions are tailored into medication education for personal comprehension for each learning style in efforts to advance personal MDI usage and lean out the process after being discharged from pulmonary rehabilitation. Methods: Patients that suffer from a spectrum of pulmonary diseases that present to Nash UNC Pulmonary Rehabilitation Center will complete a questionnaire relating educational models employed in the pulmonary rehabilitation program compared to their metered-dose inhaler (MDI) usage and technique in association with chronic obstructive pulmonary disease (COPD). Results: The expected results of this study will prove that various educational models in relationship to MDI usage and technique are essential in the pulmonary rehabilitation setting. Primarily, patients that maintain a pulmonary disease, such as COPD, should fully comprehend how to properly administer MDI medication to maintain and improve their COPD disease process. Conclusion: Various educational models within pulmonary rehabilitation will improve MDI technique and usage in the external environment of pulmonary rehabilitation which will advance each COPD patient's overall health status, reduce hospital readmissions, decrease the possibilities of adverse reactions, increase effectiveness, and decrease the overall cost of MDI medication due to less misuse.

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Abstract #: 226

Title: A Systematic Review on Digital Weight-Management Interventions for Gestational Weight Gain

Student Author(s): Victoria McClare

Faculty Author(s): Dr. Alicia A. Dahl, Jan Mooney, and Farida N. Yada

Faculty Advisor: Dr. Alicia Dahl

Department: Public Health Sciences

Excessive gestational weight gain (GWG) during pregnancy leads to a higher risk of postpartum obesity, delivery complications, hypertensive disorders of pregnancy, and other negative health outcomes for pregnant women. Studies have shown about 32% of women gained the recommended amount of weight for pregnancy, while 69% of women gained weight outside the recommended weight based on Institution of Medicine (IOM) guidelines. A proposed answer to excessive GWG is using digital self-monitoring tools to reduce the weight gained during pregnancy. Over 79.0% of women report owning a smartphone making a mobile intervention feasible and accessible for pregnant women. However, more research needs to be conducted to understand the effectiveness of digital intervention to manage GWG. The purpose of this study is to examine if pregnant women stay between the IOM recommended range for GWG with the use of digital weight-management interventions. Furthermore, the synthesis of results will help identify effective interventions to reduce excessive GWG. The study is conducted through a scientific literature search by following the PRISMA-P guidelines for systematic review protocols. Electronic databases such as PubMed, Web of Science, Google Scholar, CINAHL, Academic Search Complete, PsycINFO, and EMBASE were searched for articles with the key words "Gestational weight gain" and "digital health". The search produced a return of 1,100 articles. At present, the article abstracts are being systematically reviewed for inclusion. The hypothesis is that the use of digital self-monitoring tools will prevent excessive GWG.

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Abstract #: 227

Title: Macrobenthos Communities in Natural and Restored Saltmarshes

Student Author(s): Aashiana Patel **S**

Faculty Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Saltmarshes are coastal wetlands that are valuable to humans because they provide protection against wave erosion and storm surges. Additionally, they provide habitat, nourishment, and refuge for many organisms, including fish and invertebrates. Within the United States, coastal land loss is greatest in the Mississippi River Delta. Marsh restoration projects, like the Lake Hermitage Marsh Creation Project in Plaquemines Parish, Louisiana, are vital as they are aimed at mitigating coastal land loss. One way to evaluate the success of restoration projects is to measure biodiversity (species composition and abundance) as an indicator of marsh health. This study aims to assess the diversity of benthic invertebrates (polychaetes and nematodes) at two newly established marshes relative to a reference marsh in Lake Hermitage. Our hypothesis is that restored marshes (established about three years prior to sampling) will have similar benthic invertebrate communities to nearby natural marshes. Samples used for this project were collected using litter bags (nylon mesh bags filled with dried vegetation) deployed on the marsh surface at varying distances from the marsh edge (0, 1, 10, 25, and 50 meters). We hypothesize that higher biodiversity will be measured at marsh edges relative to inland locations, due to increased water exchange that may result in higher recruitment levels of benthic invertebrates. The biodiversity indices measured in this study will provide a baseline to determine the impact of high volumes of freshwater associated with planned river diversions and other episodic stressors such as hurricanes.

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Abstract #: 228

Title: The Need for a Modernized Inhaler: a Pilot Study into Public and Professional Sentiment on a Streamlined Rescue Inhaler

Student Author(s): Anthony Scheffelman

Faculty Advisor: Dr. Brian Ring

Department: Kinesiology

Introduction: The current standard for a rescue inhaler prescribed by the majority of physicians, is one to two puffs of albuterol through an HFA style inhaler. This form requires teaching the proper technique as well as additional equipment to get the full dose as efficiently as possible, creating problems with portability and ease of use. The proposed modernized battery-powered-breath actuated-mesh nebulizer is the size of a USB while holding fewer doses of albuterol, would increase the medications effectiveness as well as the ability for patients to readily carry their rescue inhaler. A review of the literature comparing albuterol administered by HFA propellant and mesh nebulizer to identify deferring attributes between them. A survey of current rescue inhalers was conducted at a pulmonology clinic, for the target population's sentiment of the proposed inhaler. Interviews with professionals were conducted to assess industry support. analysis of the data shows strong support from the patient and provider populations. While a review of the compiled literature shows similar deposition in the small airway, with the mesh nebulizer providing a more uniform particle size. The proposed battery-powered mesh nebulizer style inhaler can be a superior method of albuterol administration over the current standard. It will increase the likelihood that a patient will consistently carry their rescue inhaler, that increased availability will increase compliance leading to better long-term outcomes.

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# Humanities

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Abstract #: 229

Title: Hurricane Recovery on the Carolina Coast: How the Clash of Local Autonomy and External Forces Affects Long-Term Recovery

Student Author(s): Savannah Brookins **H, NC**

Faculty Advisor: Dr. Nicole Peterson

Department: Anthropology

As the coast of North Carolina is faced with an increasing number of annual hurricanes and organizations work to deal with them, it is easy to overlook the many smaller impacts that these events have on communities. The field of anthropology has conducted decades worth of research about the relationships between people affected by natural disaster and organizations that try to help them, especially after major disasters such as Hurricane Katrina or the 2010 Haiti Earthquake. However, there is a far smaller amount of this kind of research conducted on the coast of North Carolina. This research will be building off of previous work done by anthropologists with victims of disaster and the work that has already been done on the North Carolina coast to understand how these particular communities interact with outsider organizations. The study's aim is to understand how local communities interact with and view government agencies or NGOs (Non-Governmental Organizations) that give and dictate funding to the community after disaster, and how this affects survivor's ability to receive post-disaster aid. It will be conducted remotely and will collect data through interviews with staff members of community organizations who deal with post-disaster recovery on the North Carolina coast.

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Abstract #: 230

Title: "The Fall of Temixtitlan (Tenochtitlan)": The Set Up of The Siege

Student Author(s): Colin Coffie **H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Presentation Withdrawn

Cortes and his men destroyed a whole civilization for their King just to claim the land that they wanted. Cortes came over with Velazquez hoping to spread the Kings rule and religion. However, Cortes mutinied and went off on his own journey with his men to conquer new territory on the mainland of the Americas. He explored the lands that he wanted meeting several native groups. These native groups did not take to Cortes and his men very easily which cause conflict between the Spaniards and the natives of these lands. They then met the Tlaxcala, who fought with the Spaniards until they deemed the Spaniards strong enough to be Allies. This would be the start of the undermining of the current Emperor Montezuma. When Cortes finally reaches Tenochtitlan, he talks with Montezuma and captures him to make sure that Montezuma listens to what Cortes has to say. Cortes starts to pull the strings behind all of Montezuma's decisions and the natives of Tenochtitlan start to figure out what is going on. When Cortes leaves the city with most of his men, the natives then turn and attack the Spaniards. This causes Cortes to come back to the city and fall into a trap set by the natives. This turn of events makes Cortes flee from the city and rally his allies to come together and take siege on the city of Tenochtitlan.

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Abstract #: 231

Title: The Role of Women in Science and Technology of the 19th Century:  
Alicia Catherine Mant and Her Cohort

Student Author(s): Rachel Crisler

Faculty Author and Advisor: Dr. Alan Rauch

Department: English

If we are to understand the nature of the “growth of knowledge” in the 19th century, we must devote increased scholarly attention to the contribution made by women to science and technology. Through translation of difficult complex texts, these women spread knowledge to the next generation. Children and women were able to grasp and retain knowledge due to increased literacy, readily available texts, and expanding sources of information. Through translations, both of language and meaning, women found that they could contribute to the increasing dissemination of scientific and technological thought, and thus were able to enlighten a new generation of readers. Alicia Catherine Mant (1788-1869), a noted and published author was one of these women. Several of her children’s stories became a part of well-known compilations, most notably *The Blue Jar Story Book*. Several editions were published and translated, with Mant’s *The Little Blue Bag* as a two-part series. She clearly had appealed to many readers at home and abroad. Yet records of her early life and the years following her success, are almost non-existent. This absence of information is a frustrating, but not uncommon situation for female writers of the time. The tangential biographical knowledge, through her prefaces and the works themselves, are the keys to understanding her objectives as a writer. This research, drawing on Mant as a focal point, is an effort to gain insight into the nature of her successes, and by extension, a deeper understanding of contributions of other influential, yet poorly known, female authors.

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Abstract #: 232

Title: "I Shall Make Every Effort to Acquaint Your Highness, as Best I Can, with the Truth":  
The Influence of Hernán Cortés's Narrative on Charles V of Spain

Student Author(s): Rolando Dorbecker **H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Throughout Hernán Cortés *Letters from Mexico*, Cortés portrays himself as this popular, righteous, and an intelligent leader that was almost able to single-handedly conquer the Mexica Empire for the Spanish Crown. When the text is further analyzed, the portrayal of Cortés and his successes as a leader in the letters are told in an exaggerated way in order to influence King Charles V of Spain for political favors and protection while conquering the Mexica Empire. So far, I anticipate that most of the descriptions and portrayal of Cortés in the Letters from Mexico are exaggerated by Cortés himself as well as the biased council of Vera Cruz which can be found to affect how events are told in the letters. The main points of interest are when Cortés exaggerates military victory/defeat, portrayal of the indigenous people, and portrayal of Diego Velázquez. These exaggerations show that Cortés had ulterior motives that pushed his preferred narrative of him being a great leader in his letters. By analyzing the bias and his narrative, there can be a better understanding of how primary sources cannot always be taken literally, or as a sincere recounting of events, and that there can be an ulterior intent behind primary sources. In order to accomplish this research, I am going to use a textual analysis as my approach as I examine Hernán Cortés, *Letters from Mexico*, translated, edited, and with a new introduction by Anthony Pagden.

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Abstract #: 233

Title: "It Pleased God": The Role of Christianity in the Conquest of the Aztec Empire

Student Author(s): Sierra Duckett

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Within Hernán Cortés' *Letters from Mexico*, religious influences and desires of the Spanish played a significant role in the conquest of the Aztec Empire. The desire of the Spanish to spread the Catholic faith not only served as motivation to interact with and gain influence over the natives of Cempoala, Tlaxcala, and other allied groups, but also justified the conquest of the Mexica people. Cortés and the Spanish council referred to God and the Holy Catholic Faith as the reason why they continued to succeed in their disputes with the Mexica and their allies. Furthermore, their faith shaped not only how the Spanish viewed themselves and their endeavors but also how they viewed the culture, customs, and religious practices of the indigenous people. The Spanish council claimed that many of the spiritually-driven actions of the native groups — such as the practice of human sacrifice that originated among the Mexica — were in service to the Devil; therefore, the Catholic beliefs of the Spanish were often used to justify combative and forceful actions against the Mexica. This conflict between religious beliefs, with the Spanish believing that they followed the true faith and thus their actions against the indigenous were righteous, functioned as a critical element in the eventual collapse of the Aztec Empire.

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Abstract #: 234

Title: Blood, Mutilation, Murder: How Cortes Uses Religious Devotion to Justify Conquest of the Aztec Empire

Student Author(s): Nikol Fotiushang **H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Throughout Hernan Cortes's conquest of the Aztec empire during the sixteenth century a clear pattern of his purposeful word choices throughout the communication with the Spanish crown and his subordinates showcases the numerous violent accounts ranging from mutilation to murder and massacres. Cortes's letters are very purposeful in their depiction of violence with Cortes and people writing on his behalf emphasizing their faith devotion and servitude to the crown. Cortes on numerous occasions emphasized how God-serving he was be it through his letters to the king, by the establishment of the city of de la Vera Cruz, or the city of True Cross, or him going to Mass in the middle of the armed and bloody conflict with the indigenous Mexica people. Cortes's words of devotions are strongly intertwined and in conflict with his actions as he speaks of God and his mercy in one sentence, then cutting hands of messengers in another, and massacres indigenous people with who he was in peace in third. This pattern is a truly interesting study of how Cortes eloquently and deliberately tipped the scales on his side on numerous occasions after he arrived in the Mexican valley and how the conquest of the valley came to be. His shifting description of the indigenous peoples as barbaric shifts when he sees value in them, and that they could be great vassals to the king of Spain, and of course God, however, his elaborate wordplay to use God as a shield for his actions continued.

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Abstract #: 235

Title: The Power of Affordable & Clean Energy

Student Author(s): Levar Fredericks **G, H, S**

Faculty Advisor: Dr. Erik Jon Byker

Department: Honors College

The purpose of this research project is to investigate and compare aspects of Sustainable Development Goal (SDG) # 7, which pertains to affordable and clean energy, in the United States and China. In particular, I examined the following target areas of SDG # 7: providing all developing countries with present-day and sustainable energy services, along with creating a collaborative environment amongst countries. The main research questions for this comparative study were: to what extent does a country's leadership truly impact its ability to reach sustainable energy goals, and what would happen if society were to partially adopt SDG #7 and only focus on either affordable or clean energy? The research is framed by Bereday's Comparative Model and a literature review research design methodology was used to help conduct this research that accounted for the stability of presidencies within each respective country. Additionally, I searched for resources on the Atkins Library databases using keywords like energy, affordability, and sustainability. My data consists of a single country report paired with two other reliable sources. The findings from this research include: the creation of clean energy technology alone not being enough to meet SDG # 7, as well as a country not being able to meet SDGs like SDG # 7 without quality leadership at the forefront of its government. Lastly, this research project contributes an opportunity to reflect as people about how we can improve society, which is important so that we can do better for our planet.

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Abstract #: 236

Title: "Who Might Act in Your Majesties' Name, as Chief Justice, Captain, and Our Leader":  
Cortes Leads the Way to the Kings Good Graces

Student Author(s): Kylie Johnson **H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Hernan Cortes was a Spanish explorer who mutinied against his former employer Velasquez, Governor of Cuba and King Charles V in order to discover and settle the new land of Mexico, for Spain, on his own. This decision put Cortes in danger of serious legal retribution so from 1519 to 1521 every Tlaxcalan ally Cortes made, every village he massacred and every battle in the Aztec city of Tenochtitlan was written down and recorded in an effort to demonstrate Cortes's imperial leadership in the eyes of the Spanish King and increase the likelihood that he would be accepted under the King's singular authority. This written record of Cortes's actions was done through letters sent, from both Cortes and his Municipal Council in Vera Cruz, directly to the King throughout Cortes's Mexican takeover. These letters included great emphasis on Cortes's selfless desire to explore and learn about the land for God and country and applauded his initially peaceful approach toward interacting with the indigenous peoples. The letters also call attention to Cortes's strong and strategic leadership in battle as he conquered the land for Spain, eliciting tactics that both preserved his men and strove for peace. Comparisons of Cortes's honorable leadership style to that of Velasquez's and the Aztec Emperors' leadership styles were also included in the letters as a tactic to impress the King in the hopes he may overlook Cortes's crime and permit him to continue his expeditions in Mexico with the King's good graces.

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Abstract #: 237

Title: Massacres for the King and the Faith: A Deeper Look into Cortes's Actions and His Reasonings

Student Author(s): Ryan Kistemaker **G, H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Hernán Cortés's campaign through the Mexica Empire began in 1519 and ended in 1521 after he conquered Tenochtitlan, and the Mexica Emperor mysteriously died. Throughout this conquest many tragedies befell the Mexica people however two tragedies stand out, those being the Cholula and Temple Massacres. Cortés defended these events, he claimed they were unavoidable and essential for both the Spanish King and for Christianity, however, Cortés defends each massacre with a different rationale. Cortes used language that made the Cholula Massacre seem necessary or that it was in the King's best interest for the massacre to take place. Despite Cortés not being present at the Temple Massacre, he makes it seem like it was necessary to stop evil, it was for the good of the church. In both instances, he defends the actions that took place, but he explains that one was for the good of the King while the other was for the good of Christianity. These two arguments both similar were different ways to win over the King's favor. Cortés put himself in a position that allowed him to control the narrative. He spun the story to best suit his needs first by inflating the Kings ego then with justification of faith and Christianity.

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Abstract #: 238

Title: "Well Suited for Such a Position": Spanish Leadership and Its Impact on the Conquest of the Mexica Empire

Student Author(s): Jacob Matson **G**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

The Spanish conquest of the Mexica Empire from 1519 to 1521 was a bloody, complex conflict. The leadership of Spanish leaders Hernán Cortés, Diego Velázquez, and King Charles ultimately resulted in victory over the Mexica. According to the municipal council of Vera Cruz and Cortés himself, however, their leadership methods varied drastically. In Letters from Mexico, they placed great significance on Cortés' highly capable leadership skills, passionate religious fervor, and utmost loyalty to his king and country. At the same time, they both frequently emphasized the shortcomings and unjust treatment brought about by the avaricious Velázquez as governor of Cuba. They showed praise to King Charles at every given opportunity, to demonstrate loyalty and gain his approval for their exploration and conquest, while also defacing the reputation of Velázquez. Cortés and his men viewed themselves as heroes, whereas Velázquez was an objective evil with few redeeming qualities. Due to disobeying Velázquez's commands and continuing onwards to Mexico, Velázquez and his men viewed Cortés as a traitor committing treason against their king, and requested that the king arrest Cortés and stop his exploration. These conflicting leadership styles, perspectives, and motives gave Cortés an enemy among the Spanish and created a sense of urgency for Cortés to successfully conquer the Mexica Empire, in order to be forgiven by the king.

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Abstract #: 239

Title: Hernan Cortes as God's Chosen Champion

Student Author(s): Phoebe Pruneda **H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Hernan Cortes traveled throughout Mexico to bring the people “the knowledge of our Holy Catholic Faith” (Cortes, 2001, 11). Upon his journeys, Hernan Cortes is appointed mayor of the Villa Rica de la Veracruz, which gave him legal ground to continue to spread the word about his faith under the name of King Charles V. The Council de la Veracruz wrote to the King and spoke of how righteous Cortes acted and how devoted he was to his faith. Hernan Cortes also sent letters to the King, telling of his travels and his explorations. In these letters, Cortes portrays himself as God’s chosen champion. When Cortes spoke of war, he would speak of how God handed him victories against his enemies, and when lost spoke of how God showed him “another road” (Cortes 2001, 77). In 1521 during the conquest of Tenochtitlan, Cortes called upon his faith for victory and claimed God had granted him that victory. Cortes used this God-given victory, and his devotion to both sovereign and eternal, to justify his actions within Mexico. When Cortes took or spared a life, it was on God’s behalf; Cortes did all things through God. Cortes could do no wrong, as his actions were deeply rooted in devotion, righteousness, and his faith. God saw Hernan Cortes as his champion and allowed him to be victorious in his pursuits to continue spreading his word.

Cortés, H., Pagden, A., & Elliott, J. (2001). *Letters from Mexico*. Yale University Press.

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Abstract #: 240

Title: "We Burnt Every Single House Down:" The Spanish's use of Massacres  
in the Conquest of Mexico

Student Author(s): Rebecca Wicklin **H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

The municipal council and Cortés depicted in their letters the ruthlessness of Cortés himself and the Spanish conquistadors during both the Cholula Massacre and the Tenochtitlan Temple Massacre. These letters also show the use of military extremism to their advantage. Both the Cholula Massacre and the Tenochtitlan Temple Massacre were used as a strategic advantage by Cortés and had a profound effect on the conquest of Mexico benefiting Cortés and the Spanish King. The consequences of these massacres resulted in Cortés' ability to weaken the native people to the point of domination which expedited his conquest of all of Mexico. In October 1519, Cortés assembled the nobles of the city Cholula in a courtyard, accused them of treachery, and massacred the unarmed people. The Cholula Massacre sparked fear throughout Mexico and sent a strong message to all the influential leaders in the area, especially Montezuma, the most prominent leader in Mexico, showing what happens if Cortés' wishes are not followed. Pedro de Alvarado, who Cortés left in charge of the Spanish mission in Tenochtitlan and knew of Cortés' view on forcible conquest, massacred the Mexica as they were holding an annual festival to honor one of their gods. The Mexica at that time was the most advanced and powerful empire in that region and, after the Tenochtitlan Temple Massacre, Cortés' overthrow of Montezuma showed his military dominance in the area. This allowed other city-states to submit to his rule and thus he conquered Mexico.

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# Mathematics and Computer Sciences

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Abstract #: 241

Title: Determining Course Effect on XC Races

Student Author(s): David Benton

Faculty Advisor: Dr. Doug Hague

Department: Data Science

This research aims to create a process for assigning time correction factors to any cross country course. To create this method, we relied on data from high school five-kilometer races in North Carolina from the past five years. To make this correction as accurate as possible, we normalized the data for athlete skill level, age, gender, when the race was run in the season, and race atmosphere. We started from the Speed Rating methodology designed by Bill Meylan and built upon it for our needs. We gathered and cleaned an extensive data set from many years and courses, applied linear regressions to model trends, and interpreted the output. This method aims to allow for new courses to be analyzed with as little data as possible. It also allows for predicting an athlete's time based on their best performance that season, the race's date, and the course they will be running on. Currently, the predicted times for these races are within nearly 3% of the actual. This method's primary benefit is that it provides an easily extendible base that allows other variables to be added to increase the model's complexity and accuracy.

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Abstract #: 242

Title: CS Education Inequity: The Differences in Attitudes, Self-efficacy and Interests in Middle School Girls and Boys

Student Author(s): Shriya Kothi

Faculty Author and Advisor: Dr. Audrey Rorrer

Department: Computer Science

The integration of computer science into the K12 curriculum in the US has been challenging over the years due to the understanding and perceptions of CS, the real-world implications of CS in the modern world, and most importantly gender disparity. Specifically, K-12 students have limited opportunities to pursue the various computer science fields and areas of interest because of the disparity of access across schools. In Charlotte Mecklenburg County, an urban school district in NC, there are over 40,000 students in middle school. Within these middle schools the average math proficiency score is 49%, with 4 schools out of 47 offer computer science related courses. Research shows that math proficiency teaches communication and understanding through abstract language along with algorithms which form the basis of computer science skills. Access and interest in CS education is related to gender, with belief in one's ability to do computing, interest in it, engagement and attitudes about it relating to interest in careers and future studies. At Northridge Middle School, a CMS magnet program, students have been exposed to CS across the curriculum. The research question addressed in this study is: are there differences in attitudes, interests, self-efficacy and engagement in computing between middle school girls and boys who have been exposed to CS? A survey about attitudes, interests, self-efficacy have been conducted with 128 students. Results indicated that males were more interested to show their attitudes and engagement towards computer science than the girls.

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Abstract #: 243

Title: Developing the Community Oversight of Privacy and Security Mobile App

Student Author(s): Nicholas Osaka and Brandon Poletti

Faculty Advisor: Dr. Heather Lipford

Department: Software and Information Systems

Privacy and security concerns are increasingly a point of discussion among modern communities. People rely on their friends, family and other loved ones to help make informed decisions about their digital privacy and security. However, these social processes are rarely supported by technology. This project proposes a community oversight model that identifies mechanisms for members of a community to help others with making privacy/security decisions. We are evaluating this model with mobile app permission decisions through the design and deployment of a community oversight of privacy and security (CO-oPS) mobile app. The CO-oPS mobile application is designed to provide meaningful, contextual, and functional discussions surrounding privacy/security concerns between members of a community. The app analyses metadata of the applications installed on the users' mobile phones, then shares information with the user's community alongside discussion and comments regarding privacy/security. Through this app, we are investigating which design features provide community awareness and support interaction and oversight. We have designed and implemented a community feed, views of a user's own apps, views of community members apps and permissions, and notifications around app decisions. A user study will be conducted using this app to collect information on how interactions between members of the community evolve over time. Metrics that can provide evidence of an effective community oversight model include: revocation of permissions from applications performing unnecessary data collection, interaction with community "tech caregivers" that result in meaningful conversations about security and privacy, and frequent utilization of the community social features.

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Abstract #: 244

Title: Build a Word Cloud Assignment using BRIDGES

Student Author(s): Thao Pham

Faculty Advisor: Dr. Kalpathi Subramanian

Department: Computer Science

BRIDGES is a software system that was created to encourage the learning of data structures and algorithms in Computer Science. It helps instructors create engaging assignments and allows students to implement and visualize data structures using real-world data sets. Built as part of the BRIDGES assignment repository, this project aims to develop a Word Cloud application to visualize the results for literary collections. A word cloud is a visual representation of word frequency that depicts more frequently used words in a source text with bigger sizes. To efficiently implement a word cloud, we investigated two layout strategies: using a horizontal layout in alphabetical order, and using Wordle's algorithm. The layouts are then displayed using the Shape collection supported in BRIDGES API. The expected outcome of our project will be an assignment and scaffolds that are ready for publishing in the BRIDGES assignment repository for external users of the system.

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Abstract #: 245

Title: Evaluating Provably Private Obfuscations for Eye and Face Images

Student Author(s): Dominick Reilly

Faculty Advisor: Dr. Liyue Fan

Department: Computer Science

Image data privacy is a significant concern in today's society. A substantial amount of image data is continuously being collected, with much of it containing sensitive biometrics, such as face and iris, that can be used maliciously if in the hands of an adversary. Therefore, it is imperative to develop image privacy solutions which do not disclose sensitive information about participants. Many image obfuscation methods exist and are widely used (blurring, covering sensitive regions,) but these are primitive approaches, prone to inference attacks, and do not quantify privacy leakage. In this project, we propose the use of differentially private mechanisms to perform image obfuscation and analyze their efficacy against inference attacks and practical utility. Differential privacy (DP) is a rigorous notion for quantifying privacy leakage in sensitive data and has been adopted in large-scale deployments such as Google, Apple, and the Census Bureau. In this project, we implement and evaluate state-of-the-art DP mechanisms designed for image data and assess their performance on commonly collected biometric data, namely eye-tracking and face images. Performance is evaluated using practical metrics for quantifying privacy and utility for each respective data type: for privacy evaluation, we will perform authentication and re-identification attacks on obfuscated images; for utility evaluation, we will consider specific tasks, such as gaze estimation, as well as perceptual quality measures. The expected outcome of this project is to provide a comparative analysis of state-of-the-art DP mechanisms for protecting eye and face images and software tools to facilitate the adoption of image privacy.

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# Science, Technology, and Engineering

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Abstract #: 246

Title: Genome Annotation of the Arthrobacter Phage Tokki

Student Author(s): Alicia Aguilera Marti

Faculty Author(s): Dr. Ellen Wisner, and Mrs. Tonya C. Bates

Faculty Advisor: Dr. Tonya Bates

Department: Biological Sciences

Bacteriophages are viruses that infect and replicate within bacterial hosts. They are the most abundant organisms in the biosphere with around  $10^{31}$  phage particles on the planet. Due to its abundance and ability to kill bacteria, a better understanding of these microorganisms could help in the advance of phage therapies, agriculture, food safety, environmental conservation, and other applications. This presentation will focus on the genomic annotation of a newly found bacteriophage, Arthrobacter Phage Tokki, which we are annotating as a part of the SEA-Phages Program (Science Education Alliance-Phage Hunters Advancing Genomics and Evolutionary Science) whose main goal is to increase the interest and retention of biological sciences in undergraduate students (1). Tokki was originally collected in River Falls, Wisconsin under a tree near a forest. This phage has a genome of 57,652 base pairs and a GC content of 50.3%, undergoes the lytic cycle, and belongs to the AU2 cluster (2). The annotation process predicts the genes and features coded within the phage genome. Although computer algorithms assess the location of the Open Reading Frames (ORFs), it is necessary to manually verify each ORF and the function of each potential gene. The computer programs used to complete the annotation of Tokki were DNA Master, Phamerator, Starterator, NCBI BLAST, GeneMark, and Glimmer. The final annotation of Tokki will be uploaded to both GenBank and phagesdb.org and will contribute to the diversification of the bacteriophage database even more and to a path of better understanding bacteriophage.

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Abstract #: 247

Title: Detection and Manipulation of Peptidoglycan Synthesis in Gram Negative Bacteria

Student Author(s): Moradeke Alabi

Faculty Author and Advisor: Dr. Colleen Eade

Department: Chemistry

Peptidoglycan is an important cross-linked polymer that preserves bacterial shape and integrity and prevents osmotic lysis of bacterial cells. For this reason, techniques that monitor peptidoglycan synthesis and its intermediates are key to developing anti-bacterial therapy. The synthesis of peptidoglycan is dependent on the availability of cellular substrates, which is affected by other biosynthetic pathways in the cell. Monitoring the cumulative effect of these pathways informs our understanding of bacterial physiology and provides an avenue for the manipulation of bacteria. Historically, it has been challenging to monitor Peptidoglycan synthesis because manipulations are lethal. MurJ is the proposed flippase that moves Peptidoglycan precursors from the cytoplasm to the periplasm for assembly. Interference with Mur J will result in a buildup of precursors in the cytoplasm, osmotic lysis of the cell and cell mortality. By using a mutant whose expression of murJ can be controlled, a new technique to monitor this synthesis pathway is being developed. We optimized the growth of an E. coli strain whose expression of murJ was conditional. Bacterial cells were lysed and analyzed by mass spectrometry, to identify accumulated peptidoglycan precursors. We found that murJ repression required more than 80 minutes to arrest culture growth; time points beyond this were optimal for detecting precursor accumulation. By developing a new technique to monitor this synthesis pathway, we expand our repertoire of methods to assess bacterial physiology. This will enable the development of new antibacterial therapies.

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Abstract #: 248

Title: Comparing the Genomes of Cluster AU2 Bacteriophages

Student Author(s): Robert Atwell, Bianca Desai, Nicholas Bullock, and Samuel Everett

Faculty Author(s): Dr. Ellen Wisner and Mrs. Tonya Bates

Faculty Advisor: Dr. Ellen Wisner

Department: Biological Sciences

Bacteriophages are viruses that infect bacteria and require the host machinery to replicate. The Science Education Alliance-Phage Hunters Advancing Genomic and Evolutionary Science (SEA-PHAGES) promotes a centralized networking system among students, educators, programmers, and scientists as a way to accomplish annotations for bacteriophage genomes. Popular estimations say that there exist around  $1 \times 10^{31}$  bacteriophage particles in the world. The SEA-PHAGES members at the University of North Carolina at Charlotte during the Spring semester of the year 2021 annotate the arthrobacter phage, Tokki. Tokki is a bacteriophage that undergoes a lytic life cycle which involves the insertion of the phage's genetic data into the host. After injection of its genetic material, the bacterial host becomes a housing unit for the reproduction of phage proteins; when assembled, the next generation phages burst (lyse) through the host's cell, destroying it in the process. We will examine the variation in the functions of Tokki's genes as compared to other phages in its subcluster. This will be completed by using a variety of bioinformatics tools including: basic local alignment search tool (BLAST), DNA Master, HHPred, and phamerator to find homologous genes among phages and compare the differences among the phages by their nucleotide and protein sequences. Annotating Tokki's genes as well as other bacteriophages will allow scientists a new means of combating many issues that plague the modern world. Issues like antibiotic resistance have been an impediment in both the medical industry and the agricultural industry. Gene annotation will allow us to better understand phages and why they are so effective at killing certain bacteria, in addition to enabling future scientists to understand the function of Tokki's genes in relation to other phages.

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Abstract #: 249

Title: Synthesis of Benzodiazepine Chalcogenone Complexes of Palladium with Potential Anticancer Activity

Student Author(s): Giovanni Bizzarro and Johnathan Moore

Faculty Advisor: Dr. Dan Rabinovich

Department: Chemistry

Cisplatin, a platinum coordination complex with a rather simple chemical formula,  $(\text{NH}_3)_2\text{PtCl}_2$ , is one of the most important FDA-approved drugs for the treatment of a variety of cancers. Ever since Barnett Rosenberg and colleagues at Michigan State University discovered the cytotoxic activity of cisplatin (1965), hundreds of variations of this remarkable compound have been prepared to improve its anticancer potency and lower the side effects of its administration. Thus, complexes with a variety of anionic ligands other than chloride have been synthesized, as are compounds with several platinum centers or with the platinum in a different oxidation state [e.g., platinum(IV)]. In a similar vein, a few palladium analogues have also been explored since Pd and Pt are in the same group of the periodic table and therefore exhibit similar physical and chemical properties (and a few differences). This project involves the synthesis and characterization of palladium(II) compounds of general formula  $(\text{SBzDzArE})_2\text{PdCl}_2$ , where SBzDzArE represents a family of N-heterocyclic thione and selenone ligands derived from benzodiazepine. A systematic variation of the aromatic substituents (Ar) and the donor group (E = S or Se) will be assessed and described in this presentation.

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Abstract #: 250

Title: Feeding and Habitat Use of Marsh-Dependent Fish

Student Author(s): Kathryn Brinegar

Faculty Author and Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

Many fish have complex life cycles that include a larval stage that migrates from coastal waters into estuaries, where they feed and grow before migrating back to coastal areas as adults. In estuaries, these transient fish depend on marsh resources, similar to the resident fish which spend their entire lives in estuaries. To compare the feeding and habitat use patterns of marsh-dependent fish at varying distances from coastal areas, we used multiple biomarker tracers. We collected samples in Barataria Bay, Louisiana, from two transient fish species, juvenile spot (*Leiostomus xanthurus*; n=18), and juvenile sand seatrout (*Cynoscion arenarius*; n=7), and one resident fish, gulf killifish (*Fundulus grandis*; n=25). Muscle tissues were analyzed for stable isotopes ( $\delta^{13}\text{C}$ ,  $\delta^{15}\text{N}$ , and  $\delta^{34}\text{S}$ ) to determine energy source and trophic position. Results indicate sand seatrout in this system feed at a higher trophic position and obtain their energy from more pelagic sources relative to spot and gulf killifish. Our next goal is to determine whether the length of time spent in the estuary predicts diet. We predict that fish with more pelagic signatures have entered the estuary more recently. To determine how long transient fish have been in the system, we will measure strontium concentrations (Sr/Ca) in their otoliths (fish ear bones). Higher Sr/Ca concentrations are indicative of coastal areas with higher salinity. Otoliths from these same fish are being prepared for microchemical analysis. These findings can help us understand how these juvenile fish use the resources in nursery habitats.

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Abstract #: 251

Title: Synthesis and Electronic Properties of Polymerized Thiazolothiazole Derivatives

Student Author(s): Andrew Brotherton and Tyler Adams **S**

Faculty Advisor: Dr. Michael G. Walter

Department: Chemistry

Electronics are an essential part to our everyday lives with research expanding into multifunctioning devices and sustainable alternatives to current technology. Organic conductive polymers are easily tunable via structure, flexible, and more abundant than the rare metals used in current electronics, making them cheaper. Combined with easier processing, large scale productions such as printing electronics are capable. Organic conductive polymers are being used in organic light emitting diodes (OLED), solar cells, window displays, and sensors. Thiazolothiazole (TTz) derivatives have been studied for applications in solar cells, sensors, and color changing devices for self-tinting windows. Many organic compounds however lack thermal stability compared to inorganic counterparts whereas the TTz has demonstrated a higher threshold. In our research, we synthesize TTz derivatives with varying functional groups and electropolymerize using cyclic voltammetry to create electroactive, conductive polymer films. By creating a conductive polymer with more capabilities, that is thermally stable, and with a greener manufacturing, electronic devices can be created for a more sustainable world and a greater quality of living.

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Abstract #: 252

Title: A Case Study of the EF-4 Tornado Produced in the 2 March 2012 Tornado Outbreak

Student Author(s): Lauren Decker

Faculty Author and Advisor: Dr. Casey Davenport

Department: Geography and Earth Sciences

On 2 March 2012, a severe squall line moved through Southern Indiana and Northern Kentucky and produced eight tornadoes, including a deadly EF-4. This tornado touched down in Clark County, Indiana and produced a path of destruction almost 50 miles long and 700 yards wide, ending in Trimble County, Kentucky. The tornado lasted less than 10 minutes, but killed 11 people. The purpose of this case study is to determine what synoptic and mesoscale factors combined to produce this strong and deadly tornado. This analysis will be completed with a variety of data sources, including the event write-up from the Louisville National Weather Service office, archived model soundings, archived surface analyses, radar images from NOAA's Weather and Climate Toolkit, archived WPC surface analysis, and the NCEI Storm Events Database. Preliminary analyses indicate that the warm front draped across Southern Indiana was a key feature, along with the cold front in Southern Illinois that helped to initiate convection within the warm sector. The unseasonably warm, moist environment also had strong vertical wind shear that supported the development of rotating updrafts and strong tornadoes. The combination of these conditions resulted in significant tornado development in the early afternoon, and supported its lengthy, damaging path across Southern Indiana and Kentucky.

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Abstract #: 253

Title: Predicting Flood Damage for Emergency Decision Support using Data Analytics.

Student Author(s): Jannat Ejaz **CE, G, NC, S, U**

Faculty Advisor: Dr. Michael Smith and Dr. Nicole Barclay

Department: Engineering Technology and Construction Management

Floods, which are one of the most common and deadly natural disasters, have brought destruction to many states in the United States. The consequences of these events have continued to increase especially in areas that are prone to flooding. Increasingly, we can see that inland communities are finding themselves under the threat of flooding. This research aims to explore data analytics where the data-driven software will have the ability to generate warnings that a certain condition in an area is concerning. The information provided by the data-driven software will help in decision making which may offer valuable insight regarding flood management and decision making. In order to produce a data-driven software tool, the study will produce a terrain model in Mecklenburg County by using LIDAR data sets, which will help in producing an interactive GIS-based map. This interactive map will allow us to map areas and locations according to the severity of rainfall events. During the research, we conducted literature reviews to help understand how previous studies used LIDAR effectively. To support data analysis, we have also plotted 10 years of discharge and rainfall datasets of each creek in Mecklenburg county via Python to allow visualization and analysis of the data. We have, so far , analyzed and visualized an interesting relationship that discharge has with rainfall and infrastructure.

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Abstract #: 254

Title: Green Synthesis of Water Purifying Nanomaterials

Student Author(s): Sydney Elmore and Abbey Oliver **S**

Faculty Author and Advisor: Dr. Jordan C. Poler

Department: Chemistry

Current drinking water treatment technology is not effective at removing many small molecules and ions that are harmful to human health. The US Environmental Protection Agency (USEPA) is focused on the removal of many classes of compounds from drinking water and wastewater including; disinfection byproduct (DPB) precursors, pharmaceuticals, personal care products, heavy metals, and per- and polyfluoroalkyl substances (PFAS). These pervasive substances are related to adverse human health conditions and they are persistent in the environment. We propose to developed new materials that remove these compounds more effectively than current products available in the marketplace. These materials were synthesized using green sustainable chemistry that conforms to new manufacturing requirements. We have shown that our sonochemical processes are faster and more energy efficient than traditional thermal reflux conditions. Using our sonochemical process we have eliminated the need for organic solvents, metal reducing agents and we reduced the copper catalyst to <4ppm. Moreover, these new materials will be regeneratable and reusable. We have shown that our material can be regenerated and reused over 40 times without loss or degradation. Our initial modeling predicts that our material can be reused up to 500 times.

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Abstract #: 255

Title: Tracing Quantum Particle Trajectories

Student Author(s): Alexander Gray

Faculty Advisor: Dr. Donald Jacobs

Department: Physics and Optical Studies

This project involves implementing an alternative description of quantum phenomena by solving classical equations of motion that are modified by a quantum potential. The work follows along the line of Bohmian Mechanics where a deterministic formulation of quantum mechanics has been developed, however in this case, even the necessity of wavefunctions has been done away with and no reference is made of the Schrodinger equation. It has recently been shown in the literature that this approach is equivalent to the standard wavefunction formalism of quantum mechanics for non-relativistic spinless particles. The aim of this project is to implement the new approach, applying it to known quantum mechanical systems such as: a step potential barrier, an Eckart potential barrier, and a Gaussian potential barrier. Emphasis will be placed on particle scattering in 1 and 2 dimensions to understand the manifestation of reflection and transmission of particles through a barrier, as well as interference effects. Particle scattering across an array of barriers will also be considered, reminiscent of particle scattering through a crystalline solid. The equations of motion will be solved numerically, and sensitivity of particle trajectories to initial conditions will be explored. This new formalism has the potential to greatly improve numerical simulation of quantum phenomena including molecular dynamics, electron transport in condensed matter physics, and chemical dynamics.

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Abstract #: 256

Title: Characterizing the Acoustic Signature of a Quadrotor in Hovering Flight

Student Author(s): Jacob Harrison

Faculty Advisor: Dr. Artur Wolek

Department: Mechanical Engineering and Engineering Science

Quadrotors are small unmanned aircraft systems (sUAS) that generate sound characterized by a unique acoustic signature. In this research, we aim to determine the acoustic signature of a quadrotor and differentiate it from ambient noise in audio samples. Our hypothesis is that we will be able to distinguish between different quadrotors-microphone relative ranges by analyzing the frequency spectrum around the propeller blade's rotation rate and its harmonics. The quadrotors were designed with four Cobra CM-4008 multirotor motors connected to 11 inch diameter propeller blades. In our experiment, we collected multiple one minute audio recordings of the quadrotor in an outdoor environment on campus. Data was collected at varying distances, in addition to a control recording of the ambient noise. A Dayton Audio UMM-6 microphone and windscreens were mounted to a stand boom for collecting recordings. The collected audio files were analyzed in MATLAB to produce spectrograms in the 10 Hz to 1 kHz band, plotted with a common range of intensities from -150 to -90 dB/Hz. There is evidence of higher sound intensity in the 150 Hz to 250 Hz range in audio recordings with the quadrotor operating. These frequencies correspond approximately to the motor and propeller blade rotation rates. Our preliminary results suggest that detecting the quadrotor is possible at a distance of at least 5 meters. Ongoing work aims to improve the characterization of the signature and determine if relative range can be inferred from the audio signal.

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Abstract #: 257

Title: Analyzing Local Habitat Quality in Stormwater and Remnant Ponds to Guide Anuran Conservation Efforts in the Charlotte Metropolitan Region

Student Author(s): Michael Haulk, Adrienne F. Boucher, and Matthew S. Baber **H, NC, U**

Faculty Author and Advisor: Dr. Sara Gagné

Department: Geography and Earth Sciences

Globally, amphibian populations are facing an extinction crisis, with an estimated 40% of species in danger of extinction and overall populations in decline since the 1950s. In urban areas, stormwater ponds have the potential to become a valuable habitat resource for anuran species. With urbanization encroaching upon our natural wetlands, the management and creation of breeding areas has never been more important. The goal of our research is to find out how we can better design stormwater ponds in order to improve their habitat quality for anurans. I hypothesize that water quality, specifically conductivity, and amount of vegetation in and around the surrounding area of the pond will be the most important variables in determining anuran diversity at stormwater ponds. A previous study at the University of North Carolina at Charlotte surveyed 66 ponds, 33 remnant and 33 stormwater ponds, for anurans in the Charlotte Metropolitan Region. Local habitat variables that were collected during the study include submerged objects, bare ground, submerged vegetation, emergent vegetation, floating vegetation, water temperature, depth, water pH, water conductivity, the presence of fish, and tree cover, surrounding impervious surfaces .5km-5km. Regression trees will be used to identify the most significant predictors of anuran species and the abundance of individual anuran species at ponds. This will allow for better management for stormwater and remnant ponds, by showing what features are most impactful for conservation of anuran species.

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Abstract #: 258

Title: Investigation of Silver Complexes with New Thione and Selone Ligands Derived from Benzodiazepine

Student Author(s): Paulina Ilies and Olivia Redlich

Faculty Advisor: Dr. Daniel Rabinovich

Department: Chemistry

Cancer is one of the leading causes of death worldwide and the number of new cancer cases per year is expected to increase. The need for new anticancer therapy continues to be high. Silver complexes have drawn research interest for their antimicrobial and chemotherapeutic properties. Our goal is to discover new silver compounds to be potentially used in cancer treatments. In this presentation we outline the synthesis of two new heterocyclic chalcogenone ligands abbreviated SBzDzXyS and SBzDzXySe, which are derived from a saturated benzodiazepine core. The large 2,6-dimethylphenyl (xylyl) substituents provide steric protection to the metal center, while the presence of either sulfur or selenium donor groups will allow us to assess the electron-releasing power of these two ligands. Our initial studies have led to the isolation of the first silver complexes of general formula  $[Ag(SBzDzXyE)_2]X$  ( $E = S, Se$ ), where X is a counterion such as nitrate, tetrafluoroborate or perchlorate. The new coordination complexes are characterized using a variety of analytical and spectroscopic techniques, including elemental analysis and nuclear magnetic resonance (NMR) spectroscopy, as described in this presentation.

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Abstract #: 259

Title: Synthesis and Reactivity of a New Bulky Thione Ligand

Student Author(s): Naya R. Kayali and Sophia M. Gucciardi

Faculty Advisor: Dr. Daniel Rabinovich

Department: Chemistry

Compounds of silver and other transition metals are frequently studied for the many benefits they can offer to human health, including the treatment of various diseases. This presentation describes the synthesis and our initial survey of the coordination chemistry of a new N-heterocyclic thione (NHT) ligand with bulky 2,6-dimethylphenyl (xylyl) substituents on the nitrogen atoms, which we abbreviate SDiazXyS. Our reactivity studies have led so far to the isolation of an iodine derivative (SDiazXyS)I<sub>2</sub> and the silver nitrate complex [Ag(SDiazXyS)<sub>2</sub>]NO<sub>3</sub>, both of which have been fully characterized by a variety of analytical and spectroscopic techniques. Interestingly, our attempts to prepare simple mercury(II) complexes (SDiazXyS)HgX<sub>2</sub> (X = Cl, Br, I), resulted instead in the unexpected formation of species with a 3:2 metal-to-ligand stoichiometry, namely [Hg(SDiazXyS)<sub>2</sub>][Hg<sub>2</sub>X<sub>6</sub>], as confirmed by X-ray crystallography. This presentation will describe the preparation of these compounds as well as their characterization using nuclear magnetic resonance (NMR) spectroscopy and elemental analysis, among other techniques. Furthermore, comparisons with their selenium analogues, derived from the SDiazXySe ligand, will be discussed.

**CE** - Community Engaged    **G** - Global    **H** - Honors    **NC** - North Carolina

**S** - Sustainability    **U** - Charlotte

Abstract #: 260

Title: Comparison of Arthropod Biodiversity Within Different Locations in Reference and Restored Marshes

Student Author(s): Rebecca Lucero **S**

Faculty Advisor: Dr. Paola López-Duarte

Department: Biological Sciences

One consequence of sea-level rise is the loss of saltmarsh habitats (or coastal wetlands), which are essential for many macroinvertebrates like arthropods. Marsh restorations are one way to mitigate this loss of land. This project aims to evaluate the biodiversity of the arthropod communities in Southern Louisiana's restored marshes in comparison to communities in reference (natural) marshes. Arthropods (e.g., insects, spiders, crustaceans) play essential roles in marsh food webs as both predators and prey. Bags of litter (nylon mesh bags filled with dried vegetation) were deployed for two months (May-July) in two restored (built <5 years ago) and one reference marsh at varying distances from the marsh edge (1, 10, 25, 50, and 100 m). Arthropods were sorted and identified to the lowest possible taxonomic group in the laboratory. The expectation is that the reference marsh supports higher biodiversity of arthropods because it is more established, while restored marshes have the opposite. In addition, areas at the marsh edge support a higher level of biodiversity in aquatic insects (e.g., crustaceans) relative to areas further inland that is home to terrestrial (e.g., insects, spiders) arthropods. Research predicts that differences in the arthropod community will be more evident in well-established marshes in comparison to newly-established marshes. These restored marshes exhibit lower levels of biodiversity along the marsh edge-inland transect compared to reference marshes.

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**S** - Sustainability    **U** - Charlotte

Abstract #: 261

Title: Synthesis and Reactivity of New Sterically-Demanding Chalcogenone Ligands

Student Author(s): William D. McDearmon Jr. and Hannah A. Quinn

Faculty Advisor: Dr. Daniel Rabinovich

Department: Chemistry

The use of sterically-demanding ligands is a well-known strategy in coordination chemistry since it allows the isolation of compounds that often exhibit unusual structural features (e.g., low coordination numbers). Given our interest in the synthesis and reactivity of new N-heterocyclic chalcogenone ligands, we describe in this presentation the synthesis of a pair of new such ligands derived from benzodiazepine and bearing bulky 2,6-diisopropylphenyl substituents flanking the thione and selenone donor groups. In addition to the synthesis and characterization of the ligands, this presentation will summarize our efforts to obtain metal complexes derived from the SBzDzDippE ligands (E = S, Se). Thus, we have prepared several new compounds of mercury(II), a soft metal ion that has a good affinity for these types of ligands, and we are now focused on the preparation of cationic silver derivatives of general formula  $[\text{Ag}(\text{SBzDzDippE})_2]\text{X}$ , where X is a weakly coordinating anion such as nitrate or perchlorate. The new coordination complexes are characterized by a combination of analytical and spectroscopic techniques, including elemental analysis and infrared (IR) and nuclear magnetic resonance (NMR) spectroscopies, as outlined in the presentation.

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Abstract #: 262

Title: Quantitative Electroluminescence

Student Author(s): Franklin McNeill, Ali Alhaddad, Matthew Seman, and Zolfa Allamadani **G, NC**

Faculty Advisor: Dr. Abasifreke Ebong

Department: Electrical and Computer Engineering

This project aims to design an inexpensive and accurate Electroluminescence Imaging Technique (ELIT) System by improving upon a current prototype. The ELIT system applies incremental voltage to a solar cell via bus bar probes. The luminescence of the solar cell is captured by a CCD sensor camera within a blackout box, which blocks outside light sources. The CCD sensor, although intended for visible light capture, is sensitive to infrared light which is emitted from a solar cell when voltage is applied. Once the internal filter is removed, the CCD camera will allow efficient image captures with shortened exposure times. These images are then transferred into software that interfaces with MATLAB to calculate series resistance measurements for the solar cell. Series resistance measurements correlate to the performance of a solar cell. Low resistance cells have higher efficiency and lower thermal losses. With UNC Charlotte engaging in solar cell research and manufacturing, the ELIT system will be used in characterizing modern solar cell designs, furthering the research for methods in high efficiency cells. Our design of the ELIT system is produced using readily available and modular parts which allow the system to perform the same function as commercial systems, allowing interested researchers the ability to perform this analysis at a fraction of the cost. The ELIT will provide (i) quick analysis of the series resistance of a solar cell (ii) larger stage to accommodate commercial sized solar cells, and (iii) automated operation to provide the quantitative series resistance from the qualitative images.

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Abstract #: 263

Title: Determination of Functional and Nonfunctional Major Intrinsic Proteins within  
Nematostella Vectensis

Student Author(s): Olivia Mikula

Faculty Advisor: Dr. Adam Reitzel

Department: Biological Sciences

Aquaporins and aquaglyceroporins are Major Intrinsic Proteins (MIPs) that serve as channels that allow water and small molecules to travel across the cell membrane through selectively filters. This function is necessary for all organisms and MIPs are known to be shared in both prokaryotes and eukaryotes. The MIP family has expanded tremendously in animals, but the function of these proteins remains little studied, particularly within marine invertebrates. Eight MIPs have been previously identified within the model cnidarian, a sea anemone named *Nematostella vectensis*. Cnidarians are a phylum of animals that are informative for the evolution of gene families and protein function due to their phylogenetic position as an outgroup to vertebrates and insects. Currently, there are no reported data on the expression or potential function of MIPs in *Nematostella* or other cnidarians. I conducted database searches to collect similar proteins from diverse cnidarians. To discern the evolution of function, these proteins were used to create an evolutionary tree that displays the relationships between Cnidarian MIPs. Furthermore, I compared gene expression datasets from specific developmental stages and cell types to protein models that together allowed protein functionality to be predicted. Aquaporin 3, which showed increased expression within cells of the digestive tissues, was deemed nonfunctional due to its small bottleneck radius generated within the protein models. Aquaporin 6, predicted functional, was expressed in yeast to confirm the predictions of functionality made with these data.

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Abstract #: 264

Title: Coordination Chemistry of Mesityl-Substituted Benzodiazepine Thione and Selone Ligands

Student Author(s): Kristen Minehart and Madeline M. Pitts

Faculty Advisor: Dr. Daniel Rabinovich

Department: Chemistry

This presentation outlines the synthesis and characterization of two new N-heterocyclic chalcogenone ligands derived from benzodiazepine. More specifically, the thione SBzDzMesS and the selone SBzDzMesSe, both of which bear bulky 2,4,6-trimethylphenyl (mesityl) substituents on the nitrogen atoms of a saturated benzodiazepine core, have been prepared in good yield. The molecular structures of both ligands have been obtained by X-ray crystallography, which allows a detailed comparison of their structural parameters. Our initial studies of the reactivity of these ligands will be described in this presentation, including the preparation of mercury(II), silver(I) and palladium(II) derivatives, and how elemental analysis and nuclear magnetic resonance (NMR) spectroscopy, among other techniques, are used to determine the purity and composition of the new complexes.

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Abstract #: 265

Title: New Spider Silks Differ in Two Communal Spider Families

Student Author(s): Priya Patel and Sarah Stellwagen

Faculty Advisor: Dr. Adam Reitzel

Department: Biological Sciences

Spider silks are made up of large, repetitive proteins called spidroins that are encoded by genes from the same family. The protein is originally a liquid within the spider's silk glands where it is produced and stored, but as the liquid moves through ducts to the spinnerets during the spinning process, it transforms into a solid fiber. Spider silk is strong, durable, and flexible, and some types have adhesive properties. Most spider silk studies focus on orb weaving spiders but all spiders produce silk and this research builds upon other silk studies by investigating spidroins in publicly available genomes of spiders with few or no reports on their silk genetics. Webs from communal spiders have been used in fishing or wound coverage because of their outstanding mechanical and biomedical properties, and this study focuses on three spiders with this social lifestyle: two from the same genus, *Stegodyphus dumicola* and *Stegodyphus mimosarum*, and a third, *Anelosimus studiosus*, from another family. While these spiders have different habitats and differ in size, they live cooperatively in similarly constructed webs. We used GenBank and BLAST to collect silk gene sequences from each species' genome and compared the sequences by aligning the termini or repeats to investigate similarities between the three spiders' silks, which may be attributed to similarities in communal lifestyle. Silks have many relevant mechanical and biomedical properties but unresearched silks from non-orb weaving spiders can provide new, interesting properties for synthetic silk production.

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Abstract #: 266

Title: Prediction of Flood Damage Due to Extreme Rainfall Events for Mitigation Planning Support Using Spatial Analysis

Student Author(s): Jazmine Pritchett **NC, U**

Faculty Advisor: Dr. Nicole Barclay and Dr. Michael Smith

Department: Engineering Technology and Construction Management

Research has shown that with the increased impacts of climate change causing more rainfall events, infrastructure built in earlier decades were not built to sustain these higher rainfall amounts. The purpose of this study is to evaluate the impact of flood events on roadway infrastructure within Mecklenburg County and provide solutions to mitigate the impacts. Analysis of rainfall impacts are collected and studied through gathered Quality Level 2 LiDAR datasets from North Carolina Spatial Data Download, along with flow and rain gauge measurements from the United States Geological Survey. In the methodology of this study, these data sets are analyzed with several software applications (e.g. Excel, Python, and ArcGIS) to evaluate the relationship between rainfall and discharge amounts across the landscape of Mecklenburg County over a 10 year period. These rainfall measurements are also coupled with characterization of infrastructure types around the study area. These analysis methods can be accurately conducted to summarize areas that pose the most risk of having infrastructure impacted by these extreme rainfall events. Through findings, it is shown that there is a direct relationship of intense rainfall events on high stream discharge within areas located around increased natural structures and built environments. More information is expected to show that specific areas have greater risk of flooding compared to other areas. We expect to show which particular areas have higher risk and the infrastructure associated with these risks. Our findings overall will suggest that there is a need for mitigation actions due to the continued changing climate. This study serves as a way to show the extent that specific areas will be impacted and the mitigation that should be addressed for recommendation in Emergency Management.

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Abstract #: 267

Title: Developing SQL Databases to Predict Changes in Trypanosoma Brucei Telomerase RNA Structure and Organizing DNA Primer Data

Student Author(s): Roshna Ragunathan and Kaitlin Klotz

Faculty Advisor: Dr. Kausik Chakrabarti

Department: Biological Sciences

African Sleeping Sickness is a parasitic disease caused by the protozoan *Trypanosoma brucei* that can often be fatal without timely medical treatment. The telomere complex has been shown to play an essential role in *T. brucei* pathogenesis. The telomere complex comprises the telomerase enzyme, which extends the telomeric ends of chromosomes to preserve genomic integrity. Telomerase is a ribonucleoprotein that includes the Telomerase Reverse Transcriptase (TERT) core protein that must be bound to an RNA template (TR) that provides instructions for telomere synthesis. It is crucial to study the secondary structure of TbTR for a greater understanding of the telomere complex and its role in pathogenesis in *T. brucei*. Using SHAPE-MaP technology, we can visualize mutations induced in the TbTR sequence and utilize base reactivity profiles to predict TbTR secondary structure. These results will be stored and available for analysis in a novel database constructed using SQL. In conjunction, an independent SQL database to store and organize primer sequences of interest for the SHAPE-probed *T. brucei* cells was developed. DNA primers are an essential component for sequence-specific hybridization when amplifying nucleotide sequences. The incorporation of the database will enhance the efficiency of DNA primer selection for SHAPE experiments. In the distant future, these databases can be used together to optimize experimental prediction-making regarding dynamic changes in the shape of RNA molecules in *T. brucei*.

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Abstract #: 268

Title: Investigating and Comparing the Target Areas of Sustainable Development Goal #13:  
Global Greenhouse Gas Emissions and Global Citizenship Education

Student Author(s): Mahita Sadula **G, H, S**

Faculty Advisor: Dr. Erik Jon Byker

Department: Honors College

The purpose of my research poster is to investigate and compare aspects of the Sustainable Development Goal (SDG) # 13 Climate Action, which relates to taking urgent action to tackle climate change and its impacts. In particular, I examined the following target areas of SDG # 13: 13.2 reduce the global greenhouse gas emissions and 13.3 increase Global Citizenship Education. The main research question for my comparative study is: What are the similarities and differences between the United States and Brazil related to these target areas of Sustainable Development Goal #13? The research study is framed by Bereday's (1964) Comparative Model. To conduct this research, I used a literature review research design methodology. I searched for resources on the Atkins Library databases using keywords like Brazil, climate change, Paris Agreement, SDG 13, and the United States. The data for the study consisted of five international reports, three journal articles, two statistical databases related to climate change, and six other reliable sources. The findings of my research reveal that both countries rely heavily on the consumption of fossil fuels, however, the United States ranks second globally in terms of installed capacity of renewable energy, whereas Brazil ranks third. Under the Paris Agreement, the United States and Brazil pledged to reduce greenhouse emissions by 2030. Additionally, both countries have implemented programs to educate students about climate change and mitigation efforts. The research poster includes an examination of the challenges and possibilities in meeting SDG # 13 Climate Action.

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Abstract #: 269

Title: Synthesis and Reactivity of Heterocyclic Chalcogenone Ligands with Mesityl Substituents

Student Author(s): Marjan Shahani and Wendy Vo

Faculty Advisor: Dr. Daniel Rabinovich

Department: Chemistry

This project involves the synthesis and reactivity of a pair of new N-heterocyclic thione (NHT) and selone (NHSe) ligands based on a saturated diazepine core and large 2,4,6-trimethylphenyl (mesityl) substituents on the two nitrogen atoms present in the diazepine ring. Reactivity of the SDiazMesE ligands (E = S, Se) towards closed-shell metal ions has led to the isolation of several new coordination complexes, including the mercury(II) compounds  $[\text{Hg}(\text{SDiazMesE})_2][\text{Hg}_2\text{X}_6]$  (X = Cl, Br) and the silver(I) derivative  $\text{Ag}_3(\text{SDiazMesS})_2(\text{NO}_3)_3$ . The characterization of these species relies on the use of elemental analysis to verify their purity and other techniques, such as nuclear magnetic resonance (NMR) spectroscopy and X-ray crystallography, to fully establish their identity. This presentation will summarize the results obtained so far, including the molecular structures of all the aforementioned complexes.

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Abstract #: 270

Title: Understanding the Role and Regulation of Ydj1 Acetylation

Student Author(s): Courtney Shrader

Faculty Author(s): Nitika and Dr. Andrew W. Truman

Faculty Advisor: Dr. Andrew W. Truman

Department: Biological Sciences

Organisms must continuously adapt and respond to environmental challenges that cause protein misfolding, including heat, osmotic, and oxidative stress. They deal with these stresses through expression of the Hsp70 and Hsp40 molecular chaperones that refold denatured proteins. Although Hsp40s have been studied for several decades, work has primarily focused on their expression in response to stress. Recent research has uncovered a substantial number of modifications (acetylations) on lysine residues that are added to Hsp40 proteins in cells, but the role of these remains unknown. To investigate these further, we mutated a series of Hsp40 acetylation sites on the yeast Hsp40 Ydj1 to either arginine (KR mutants) to block any acetylation or glutamine (KQ mutants) to mimic constitutive acetylation. Yeast cells expressing these Hsp40 mutations were serially diluted onto media that contained stressors, and were compared to their wild type counterpart. Cells in which acetylation was prevented appeared to have no visible phenotype, whereas KQ mutant cells displayed a variety of defects including the inability grow at high temperature. We are currently assessing Hsp70-Hsp40 interaction in these mutants via co-immunoprecipitation and Western Blotting. While our data clearly points to acetylation as a means to inhibit Ydj1 function, it remains to be determined what the a) trigger or b) the cellular rationale for Ydj1 acetylation might be.

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Abstract #: 271

Title: Apoptosis and Breast Cancer Progression

Student Author(s): Madison Snyder and Katherine Holtzman **H**

Faculty Author and Advisor: Dr. Didier Dréau

Department: Biological Sciences

Breast cancer remains a leading cancer-related cause of death for women. Moreover, patients with inflammatory breast cancer have an even worse prognosis. Indeed, the tumor microenvironment, especially inflammation, promotes both tumor growth and metastasis. Pro-inflammatory cytokine secretions within the tumor microenvironment stimulate breast cancer. In particular, inflammatory cytokine secretions are produced in part through the activation of inflammasomes in both immune cells and stromal cells including tumor cells. Previous observations highlight the potential role of the NLRP3 inflammasome activation in the maturation of Interleukin 1 beta (IL-1 beta) and Interleukin 18 (IL18) pro-inflammatory cytokines. Whether the inhibition of NLRP3 inflammasome leads to a ratio cell proliferation to apoptosis limiting breast cancer progression is unclear. Here, we assessed the effects of the combination of MCC950, a specific inhibitor of the NLRP3 inflammasome, and of Fluorouracil (5-FU) chemotherapy in the aggressive 4T1 murine model of breast tumor both in vitro and in vivo. The results indicate that in vitro, 5FU promoted 4T1 cell apoptosis regardless of the MCC950 doses tested. MCC950 (10 $\mu$ M) limited Caspase 1. In vivo, the combination MCC950 + 5-FU led to overall smaller tumors with lower active Caspase 3 expression. Taken together, these data highlight the potential of combining anti-inflammasome and current chemotherapy treatments to prevent breast cancer progression.

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Abstract #: 272

Title: Novel Push-Pull Thiazolothiazole Fluorescent Dyes for Biological and Environmental Sensing Applications

Student Author(s): Krista Tang

Faculty Author(s): Dr. Nickolas A. Sayresmith, Mr. Jackson Mower, and Dr. Michael G. Walter

Faculty Advisor: Dr. Michael G. Walter

Department: Chemistry

A new library of asymmetric Thiazolothiazoles (a-TTz) are being created for environmental and biological sensing applications. They are easily made, highly tunable, and exhibit remarkable chemical and thermal stability. TTzs are created with push-pull functional groups at the end of a  $\pi$ -conjugated aromatic core to increase their efficacy for monitoring molecular interactions, processes, and other events that require high specificity and environmental sensitivity. They can turn on/off their fluorescence through different interactions in their environment that greatly enhances cell fluorescence microscopic imaging. By varying the electron donating and accepting groups, we are working on expanding the library and improving the synthetic yields of a-TTzs that can be screened as voltage sensitive dyes in the hopes of finding dyes with higher sensitivity, better stability, more favorable membrane localization, and tailored absorption/emission characteristics.

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Abstract #: 273

Title: SAXS Characterization and Three-Dimensional Modeling of an RNA Nanoring

Student Author(s): Caroline West, Lewis Rolband, and Morgan Chandler

Faculty Advisor: Dr. Joanna Krueger

Department: Chemistry

Small-angle x-ray scattering (SAXS) is an important technique to characterize the structure of biomolecules in solution. It utilizes x-rays shown through a sample suspended in a buffer solution, which creates a diffraction pattern where the intensity and angle at which the x-rays diffract are measured. For this experiment, the SAXS data was obtained from a synchrotron source for the buffer alone and the particle in solution. The background scattering was subtracted to yield the particle scattering. The radius of gyration was calculated by a Guinier plot and from the pair-wise probability distance distribution,  $P(r)$ , function. Additionally, this  $P(r)$  plot provided the maximum linear dimension of a particle. Data analysis and modeling was performed using the ATSAS suite of programs. After initial analysis, the data was then put into the program GASBOR to create a model of what the nanoparticle may look like by folding a chain of dummy amino acid residues. Several corrections needed to be made in order to accommodate the fact that the original intent of the software was to model proteins. The dimensions calculated from the scattering profiles and the final models that resulted were validated with dynamic light scattering, atomic force microscopy and molecular dynamics simulations. As such, we conclude that SAXS is capable of resolving the structures of complex, rationally designed bionanomaterials and can play a significant role in the future characterization of these novel macromolecular assemblies.

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Abstract #: 286

Title: The Function and Mechanisms of APOBEC3 In Genome Integrity and Cancer Biology

Student Author(s): Brianna Bush

Faculty Advisor: Dr. Shan Yan

Department: Biological Sciences

The genome of cells is exposed to damage regularly from endogenous resources such as oxidative stress or environmental toxins, leading to DNA lesions. Cells have evolved several stress response pathways such as DNA repair and DNA damage response pathways to maintain genome integrity. Defects in DNA repair and DDR pathways have been linked to human diseases including cancer. The APOBEC3 family of cytosine deaminases can turn cytosine bases into uracil bases, leading in C to T transitions/mutations and DNA strand breaks. Increased APOBEC3 expression and enzymatic activities in certain types of cancer cells are consistent with detected mutational signatures, suggesting APOBEC3 is involved in cancer etiology or oncogenesis. This review will examine the diversity of functional domains in seven APOBEC3 genes (A3A-A3G) and the evolution of APOBEC 3 genes in mammals and their survival advantages. Whereas APOBEC3 proteins are antiviral factors that are developed to protect humans and mammals from viruses, we will focus on how DNA lesions induced by APOBEC3 are repaired and their effects on genome stability. We intend to provide evidence and analysis of how APOBEC3 may contribute to cancer development and other diseases such as HPV, HIV, and cancer. Insights from this review can help researchers develop drugs that can restrict or modulate APOBEC proteins and/or associated cytosine deaminase activity for new avenues to cancer therapeutics.

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# Social Sciences

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Abstract #: 274

Title: Your Majesty's Vassals; Hernán Cortés, the Tlaxcalans, and the King

Student Author(s): Kaley Aucello **H**

Faculty Advisor: Dr. Peter Ferdinando

Department: History

Cortés portrayed himself to have pure intentions in conquering Mexico to create vassals of King Charles V, but Cortés wanted to make more for himself than disciples. Cortés had a desire to build a following in Mexico, and stopped at nothing to do so, all while justifying the villages he set ablaze by writing letters to the King, saying that the indigenous people he conquered promised to be Your Majesty's Vassals. Cortés wrote letters to the Spanish Royal court emphasizing his great leadership tactics, ability to make friends with the indigenous people, plan to conquer new land for the King, and desire to make disciples of the Catholic faith. He often documented massacres of women and children in response to the indigenous groups resisting Cortés attempts to make them vassals. Within days they would be back, begging to be vassals of the King, with gifts of gold, garments, and slaves to give to Cortés. The Tlaxcala were so devoted to their Gods that they could not have been so easily converted like the way Cortés described in his account. The natives he conquered were probably not truthful disciples but rather subdued to Cortés because of his promise for protection from their enemy, Moctezuma. Cortés realized the power he held in protecting them and used that to his advantage to strengthen his military, acquire more gold, conquer more land, and further his ascension to power as he continued this process through his journey to Mexico.

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Abstract #: 275

Title: A Woman's Autonomy and Power in Heterosexual Relationships

Student Author(s): Sofia Escotto-Pimentel

Faculty Advisor: Dr. Hannah Peach

Department: Psychological Science

Women have historically been subjugated to a role of subordination to men, having endured socialization practices that perpetuate the internalization of this role. Current literature lacks an understanding on how the extent of internalizing these roles can affect a woman's interpersonal romantic relationship dynamics. The present study surveyed women in a heterosexual relationship in order to determine whether a woman's sense of autonomy affects the power dynamics of a heterosexual relationship. Results show a negative moderate relationship between a woman's sense of autonomy and power dynamics - a woman with a higher level of autonomy was more likely to be in a relationship with power dynamics that favor the male. These findings suggest that autonomy may not be the desired construct for examining factors that signify the internalization of femininity ideologies. Future research should focus on exploring relevant constructs to this issue.

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Abstract #: 276

Title: Community and the Built Environment: The Physical and Social Consequences of Gentrification in Charlotte's Lockwood Neighborhood

Student Author(s): Quinton Frederick **CE, U**

Faculty Author and Advisor: Dr. Nicole Peterson

Department: Anthropology

This project examines the link between community relations and physical space in Charlotte's Lockwood neighborhood. Property values in Lockwood are growing at one of the fastest rates in the country and show no signs of stopping. This growth makes Lockwood a fitting place to investigate gentrification, an increasingly important issue in Charlotte and beyond. Previous researchers have recorded oral histories from Lockwood's residents during this period of property value increase. A significant theme was revealed by qualitatively coding these oral histories; residents consistently mention a decline in the neighborhood's sense of community. At the same time, additional interviews and archival research indicated dramatic changes to Lockwood's built environment. As property values rise, historic homes are demolished and replaced with new construction at an alarming rate. This project examines those comments about deteriorating community interactions through the context of these documented physical changes. I suspect the loss of community building spaces was a significant indicator of the changes described by residents in their oral histories. This would identify the physical and social consequences of Lockwood's gentrification as interdependent factors. In light of those findings, I would argue for the preservation of the remaining community spaces in Lockwood and places like it.

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Abstract #: 277

Title: Investigating Racial Bias in Traffic Stops: The City of Charlotte

Student Author(s): Carson Groulx **NC, U**

Faculty Author and Advisor: Dr. Anthony Fernandes

Department: Mathematics and Statistics

Police traffic stops remain the most common way that law enforcement and civilians interact. Historically, traffic stops have not been well tracked or systematically investigated. A number of studies conclude that police bias exists and that black and brown drivers are stopped at higher rates than white drivers. However, other studies conclude that there is no police bias and point to shortcomings in the analysis. This research study examined about 200,000 traffic stops from Charlotte, NC, from 2016-2017 and 2019-2020 to determine if there was a police bias in the traffic stops. R was used to conduct the analysis on the data from The Charlotte Open Data Portal. The analysis of the data suggests that black drivers are more likely to be searched and or arrested in a traffic stop. Black drivers are also disproportionately targeted for searches, despite lower rates of arrests in stops with searches. The cause of disparities found between outcomes in traffic stops data must be carefully examined to reduce police bias. Given that the data available was not comprehensive, research on more detailed data is needed to examine the persistence of bias. This reproducible research will make the R code available for analysis on similar datasets.

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Abstract #: 278

Title: The Power of Sustainability: Energy in South Korea

Student Author(s): Noah Holloway, Lauren Marie Jenkins, and Stephanie Mercado-Olivares **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

In 2014, South Korea was the eighth largest consumer of energy in the world. Today, South Korea is undertaking several efforts to update and re-evaluate their current legislation and regulation of energy to ensure that its citizens can get the power they need. The constant need for accessible energy has posed a number of challenges in deciding on and implementing the best options. In this project, we address the question: How does the management and regulation of coal, wind, and nuclear energy differ in South Korea and what are the best prospects for more sustainable energy production? This question is important because it is related to other environmental issues in South Korea, such as air quality since it is the ninth largest producer of greenhouse emissions due to nonrenewable energy producing materials. To combat this issue, South Korea's non-governmental organizations (NGOs) and its government are making strides to push for the use of efficient renewable energy sources that do not damage the environment as severely as other production methods. To examine the effectiveness of these efforts, we will analyze several sources of information. In particular, we will review academic studies, media coverage, information about NGOs, and policies implemented by the Korean government. By gaining a better grasp on how South Korea manages its energy production, we can compare it to other countries to see if similar approaches can be adopted elsewhere and decrease the potential risk nonrenewable energy sources have on the environment.

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Abstract #: 279

Title: A Serious Drinking Problem: The Pollution of Moldova's Water Sources

Student Author(s): Emma Levy, Deniese Yelverton, and Patrick Cunning **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

From pollution problems in large and developed countries to clean water sourcing in smaller and more developing nations, water sustainability is a problem across the globe. Eighty percent of global wastewater goes untreated, containing everything from human waste to highly toxic industrial discharges. Since gaining independence from the Soviet Union in 1991, Moldova has suffered from the lasting effects of industrialization, development, and population growth. Some of these effects include the contamination of water with various pollutants. In this project, we explore what Moldova is doing to counteract such problems and what they are doing to improve water sustainability. More specifically, we examine the question: How does water sourcing in rural areas compare to water sourcing in main cities and suburbs? Our project will focus on water sourcing, water treatment, and the negative health effects associated with only having access to polluted water. To answer our research question we will analyze information from non-governmental organizations (NGOs) addressing this issue in Moldova, relevant governmental policies, scholarly articles, and various media articles on water issues in the country. Examining challenges of water sustainability in rural and urban Moldova can shed light on the problems associated with providing clean water from a viable water source both in Moldova and countries with polluted water all over the world.

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Abstract #: 280

Title: Combating Climate Change: The Italian Approach

Student Author(s): Isabel Marez ,Guadalupe Arriaga, and Sam Maganti **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

Although scientists were aware of global climate change as far back as the 18th century, more recent advances have demonstrated the impact of harmful chemicals, plastics, and energy waste. Drawing on such scientific advances, Italy has taken steps to decrease their national contribution to factors that accelerate climate change. In this project we ask, how does Italy fight climate change through governmental policies, partnerships with non-governmental organizations (NGOs), and by increasing national awareness of the problems being faced by climate change? In order to answer this question effectively, we are collecting data from governmental sources, gathering information about NGOs operating in Italy, reviewing scholarly articles, and following media coverage on climate change in Italy. By focusing on governmental policies, we can see how Italy is working internationally as well as domestically to address the problems faced by climate change. In addition to governmental action in Italy and partnerships between the government and NGOs, we will address the involvement of the community. Many NGOs are bringing awareness to the community as well as organizing service projects for decreasing plastics use, decreasing chemical use, and pushing for renewable energy. Our goal is to assess the sustainability of the Italian response to issues surrounding climate change, which has implications for the best strategies for combating climate change around the world.

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Abstract #: 281

Title: Grand Challenges for Social Work: Addressing the School-to-Prison Pipeline

Student Author(s): Keshawn Mathews

Faculty Advisor: Dr. Susan McCarter

Department: Social Work

The Grand Challenges for Social Work were implemented in 2020 to target inequities and create solutions for significant social issues. One of the 13 Grand Challenges is Achieving Equal Opportunity and Justice and it includes Juvenile Justice. This Grand Challenge for Social Work focuses on juvenile justice history, policies, and research, and culminates with five goals for improving the juvenile justice system within the next 5 to 10 years. These goals for juvenile justice would 1) improve data collection for vulnerable populations, 2) increase positive discipline options to dismantle the school-to-prison pipeline and decriminalize nonviolent school behaviors and status offenses, 3) offer diversion options for first time and low-risk offenders, 4) set a consistent age of criminal responsibility, keeping youth in juvenile justice system up to 21 years old, and 5) improve reentry success for youths transitioning from the justice system back to the community by implementing a wraparound model. My contribution to this research has included facets of all five goals through curating research, contributing to national meetings, and conducting collaborative scholarly writing. For the purposes of OUR Research, I will focus on Goal 2: Increase positive discipline options to dismantle the school-to-prison pipeline and decriminalize nonviolent school behaviors and status offenses. Through this research and as an aspiring social worker, I am able to help create a path forward to improving the juvenile justice system over the next decade for youth and their families in Charlotte and across the U.S.

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Abstract #: 282

Title: State of the Plate

Student Author(s): Shanara Mercer **CE**

Faculty Author and Advisor: Dr. Nicole Peterson

Department: Anthropology

Attaining equal and consistent access to food is an ongoing issue for many Americans. Our food system is composed of resources that are unevenly dispersed, so an individual's position in society can lead them to becoming the victims of inequity. Both rural and urban areas are impacted by the challenge of food accessibility, but the struggle escalates for those who, in addition, live in food desert areas without access to healthy markets or grocery stores. To live in the community of a food desert is to experience a disadvantaged quality of life, and with the start of the COVID-19 pandemic, the economic downturn has further driven food insecurity among residents of already marginalized communities. In the Charlotte-Mecklenburg food system, the local Food Policy Council has reported an increased need for resources and services within the past year. Sociological findings determine that stress is not arbitrary, but instead, stress is influenced by the experiences and patterns of inequality with gender, race, social class and age differences. By interviewing people around the Charlotte-Mecklenburg area, we hope to understand how experiences with food have been affected by the pandemic and these intersecting factors. In order to gain personal insight from those impacted, interviews will be conducted with local residents via Zoom. Questions regarding shopping and eating habits, food insecurity status, healthcare, housing, transportation, and digital access are all points of inquiry. We expect to find that many of Charlotte's residents impacted by low income are experiencing challenges and making adaptations within the current food system. Overall, this research will help inform local organizations on the needs and desires of Charlotte residents. More broadly, this is part of a larger study to help establish the creation of a food hub to connect local farmers.

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Abstract #: 283

Title: Understanding Food Insecurity Among Charlotte-Mecklenburg Residents During the COVID-19 Pandemic

Student Author(s): Claire Patrick **CE, H, NC, U**

Faculty Advisor: Dr. Nicole Peterson

Department: Anthropology

Equitable food access and sustainable food justice is critical for a healthy food system. Inconsistent access to food is a continually pervasive problem for many individuals in the Charlotte-Mecklenburg food system. With the start of the COVID-19 pandemic, the economic downturn has further driven food insecurity among residents of already marginalized communities. The Charlotte-Mecklenburg Food Policy Council, a local organization linking many aspects of the food system, has reported an increased need for resources and services within the past year. According to the literature, inconsistent access to food is also linked with unreliable access to other local services; however, little is known from the perspectives of residents who encounter these challenges. This study seeks to understand how low-income Charlotte residents are faring with regards to food accessibility during the COVID-19 pandemic. More broadly, this research also hopes to highlight the obstacles and opportunities within the Charlotte-Mecklenburg food system. In order to gain personal insight from those impacted, interviews will be conducted with local residents recruited through local community organizations via Zoom. Questions regarding shopping and eating habits, access to healthcare, housing, transportation, and digital access are all points of inquiry. We expect to find that many of Charlotte's residents impacted by low income are experiencing challenges and making adaptations within the current food system. Overall, this research will help inform local organizations on the needs and desires of Charlotte residents.

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Abstract #: 284

Title: Rebel Human Rights Abuses During Civil Wars: Al Shabaab in Somalia

Student Author(s): Meredith Rodden **G**

Faculty Author(s): Dr. James Walsh and Dr. Beth Whitaker

Faculty Advisor: Dr. James Walsh

Department: Political Science and Public Administration

The Rebel Human Rights Violation (RHRV) project identifies the types and degrees of violence against non-combatants committed by rebel groups. Existing research focuses primarily on rebels' use of lethal violence. The RHRV data set measures a much wider range of human rights abuses, including lethal but also non-lethal violence. Seven categories of violations are analyzed: unlawful or arbitrary killings, detention and disappearances, torture, property violations, forcible recruitment, and sexual violence. Researchers coded the US Department of State's human rights reports to code abuses for all civil wars from 1990 to 2018 on a 3-point scale. The data indicates many rebel organizations rarely violate rights, while some rebels regularly commit a wide range of abuses, and others develop "repertoires" of violence. This research poster visualizes human rights abuses by the group Al Shabaab in Somalia and documents the groups frequent use of a wide range of violations from 2008 to 2018. The RHRV project is the first systematic, cross-conflict documentation of violations by rebel groups. Policymakers can use this data to better allocate resources towards situations in which rebels are committing human rights abuses frequently or systematically. Researchers can also draw on the data to understand the causes and consequences of rebel violations of human rights.

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Abstract #: 285

Title: Addressing the Environmental Impacts of Mining in Brazil

Student Author(s): Samara Williams, Nataila Cupp, and Saeh Poe **G, S**

Faculty Advisor: Dr. Vaughn Schmutz

Department: Sociology

Brazil is an exceedingly diverse country with many natural resources, thus environmental exploitation is unfortunately common, and the rights of the indigenous peoples who reside by these resources are being threatened. Mining is one of the major contributors of deforestation in the Amazon Forest. While illegal mining does contribute to environmental destruction, the majority of damage is caused by the mining companies that possess the adequate paperwork, but are poorly regulated by the Brazilian government. Subsequently, the Northern Amazon Forest has been cleared by 28% in the past year alone, leaving large areas in a state of ruin. In this project, we aim to understand how mining affects indigenous rights and the flora and water sources of the Amazon Rainforest. We will use NGOs such as Friends of Earth to see how they are fighting against the excessive mining. Other data used will help us explain how mining has negatively affected Brazil and the impact it has on the country. Recognizing the issues Brazil is facing will help us understand the impact that further environmental destruction can have globally.

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