2022 UNCW

SPRING SHOWCASE

of Student Research & Creativity

April 9th, 2022 at 9:30 am
Watson Education Building
Oral Presentations
8:30 am – 11:30 pm
Education Building
Comparing metrics of wetland vegetation structure derived from UAS photogrammetric and LiDAR collections

Wetlands are one of the most productive ecosystems, but they are at a high risk of degradation from anthropogenic activities and climate change. The introduction of Light Detection and Ranging (LiDAR) technology and photogrammetric processing algorithms based on uncrewed aerial systems (UAS) data have extended our ability to detect, identify, and map wetlands remotely. Point clouds derived from these methods vary in data collection methodologies and processing, therefore, a detailed comparison of metrics of wetland vegetation structure is necessary. In this research, point clouds produced from UAS photogrammetry and UAS-borne LiDAR collections over a palustrine-riverine-estuarine range of wetland study sites along the southeastern North Carolina coastal region were evaluated using geostatistical methods. Results show that the canopy height metrics compared are not significantly statistically different through a range of densely forested wetlands and this holds true for metrics of point cloud density using different size tessellations and digital terrain computations.

Augmenting In Situ Habitat Data with Hyperspatial and Multispectral Imagery to Create Wetland Classification Training Data

Fragile coastal ecosystems are at risk of being destroyed by urban development. Improving land use/land cover mapping accuracy can improve management and understanding of affected ecosystems. Modern aerial platforms, such as drones, are now capable of carrying and using cameras for high-resolution vegetation mapping and ecosystem monitoring. This study's approach aims to provide effective methods of improving delineations. The project combines the collected imagery from these platforms with ground truth data from field missions across several select sites in North Carolina's Coastal Plain ranging from estuarine to palustrine wetlands over the past two years to inform and supplement habitat classifications. The augmented habitat data from this project assisted in producing accurate wetland prediction models. This study's results demonstrate the effectiveness of remote sensing and ground truth field data in studies like this one. Similar approaches can be applied to other studies concerning habitat delineation and classification in the future.
Detecting Woody Plants in Southern Arizona Using Data from the National Ecological Observatory Network (NEON)

Land use change has been occurring rapidly in response to human activities throughout the past century and has resulted in land degradation processes in dryland regions. One such process is called woody plant encroachment (WPE), which involves the transition from historically non-woody plant dominant ecosystems to woody dominance. It is critical to accurately determine the distribution of woody plants in dryland regions to efficiently manage WPE. Our methodology for monitoring woody plant cover in dryland regions is widely applicable, easily accessible, and accurate. We have developed such methods by integrating open-source remote sensing data and machine learning packages in Python and evaluating their efficacy for monitoring woody plant cover at Santa Rita Experimental Range (SRER, Arizona, US), where relatively novel data has been collected by the National Ecological Observatory Network (NEON). Through our methods we have determined the best models, variables, and classification scheme for monitoring woody plants at SRER.

Monitoring Northern Bobwhite Populations Through Recorded Calls

The population of Colinus virginianus, or the Northern Bobwhite, is in decline. For effective conservation efforts to be implemented, the behaviors, locations, and numbers of this species need to be better understood. One tool used for monitoring bird populations are ARUs, or Autonomous Recording Devices, which can be placed in bird habitats. Unfortunately, quantifying the number of bird calls in hundreds or thousands of hours of these recordings is extremely time intensive. The creation of an AI, called a Machine Learning Classifier, to perform this task instead of human workers will make this method of data collection much more efficient. This presentation discusses the process of using audio software to create training data suitable for the Classifier.
NLY01, a GLP1R agonist, decreases behavioral deficits, but not neuroinflammation or infarct size, in mouse models of ischemic stroke

Reducing neuroinflammation may be beneficial after stroke. The pro-inflammatory cytokines TNF-α, IL-1α, and C1q induce A1 neurotoxic astrocytes, which are detrimental to surrounding tissue. Microglia have been shown to release these cytokines after stroke. NLY01 is a glycogen-like peptide-1 receptor agonist that is capable of inhibiting microglia from releasing these cytokines. We hypothesize that NLY01 will reduce microglial and astrocyte activation, infarct volume, and decrease behavioral deficits after an ischemic stroke. Mice received NLY01 in doses of either 0-, 1-, 3-, or 15 mg/kg up to 6 days after stroke. No statistical differences were found 7 days after stroke for astrogliosis (p = .23) or microgliosis (p = .58). There was a significant difference in infarct volume (p = .04). Post-hoc analysis showed no significant difference between groups. Over varying behavior tasks, mice who received NLY01 performed better than those who did not receive NLY01. While NLY01 might not directly decrease neuroinflammation, it may decrease behavioral deficits after stroke.

The Effects of the NMDA antagonist memantine on working memory in rodents

Alzheimer's Disease (AD) affects various regions of the brain that are involved in learning and memory. Interestingly, a drug being used in the treatment of AD is the NMDA antagonist Memantine (MEM). NMDA antagonists block important brain receptors that respond to the neurotransmitter glutamate which is thought to be critical for learning and memory. In the current study, the mechanism of action of MEM was studied through rodents' performance in an automated memory task. In this task, three male rats were trained on the match-it task (MIT) in automated olfactometers where responses to familiar odors repeated during the session were reinforced while responses to novel odors were not reinforced. The three subjects were not able to master the task. The subjects were then given doses (1, 3, 10, 30 mg/kg) of MEM to test for improvements of performance on the MIT. One subject has showed some improved performance while the other two have shown no change in performance at any dose of MEM. Overall, the rats showed difficulty in mastering the MIT and MEM had little to no effect on performance in this task. This could prompt future research in understanding rats' slow or lack of acquisition of the MIT as well as MEM's mechanism of action.
**Oral Session B, EB 232**

**Time** 9:30 - 9:45 am  
**Primary Author** Pearl Marley - Graduate  
**Department** Film Studies  
**Faculty Supervisor** Dave Monahan

**Nothing but a Shell**
This documentary begins in a junky beach store and exposes how hermit crabs are taken from the wild, held in uphauling distributing facilities, and sent to tourist stores to be marketed as disposable children's toys. We follow three, young children who are given hermit crabs as pets in an attempt to physically show that marketing living creatures as pets is a bad idea. Hermit crabs require much more specified care than usually advertised. The documentary dives into how humanity's negative environmental impact has killed millions of crabs in just the southern hemisphere alone. It also explores how science has recently classified crab species as sentient which indicates hermit crabs experience pain when they are kept in stressful and physically poor living conditions.

**Time** 9:45 - 10:00 am  
**Primary Author** Casandra Murray - Graduate  
**Department** History  
**Faculty Supervisor** Dr. David Houpt

**Enslaved African Americans' use of the land.**
The institution of slavery stripped African Americans of basic rights, disenfranchised, and subjected them to forced labor by white Americans. Despite their enslavement, African Americans found ways to assert their independence. With the help of traditional agricultural and environmental knowledge, they utilized various plants and herbs to practice long-established healing, cooking, and farming methods on southern plantations. Through a close analysis of slave narratives and interviews with former slaves, this paper will build upon scholarship about environmental relationships and demonstrate that enslaved people's knowledge of the environment and various plants provided them a source of agency, protection, resistance, and culture. These practices, in turn, shaped how Americans of all races used medicinal plants, cultivated crops, and prepared meals.
**Landscape Painting and Nordic Identity in Sibelius' 'Soluppgång,' Op. 37, No. 3**

At the turn of the twentieth century, Finnish composer Jean Sibelius was an important figure not only musically but also culturally, as Finland strived towards independence from Russia following roughly 700 years of Swedish rule. As the dominant musical figure of Finland, Sibelius often conveyed strong national sentiment in his works and evoked Nordic identity through musical representations of landscape. Although Sibelius's instrumental works are most often highlighted for their nationalism, particularly the famous tone poem Finlandia, his vocal works, too, reflect Finnish identity through their distinctive images of nature. This presentation focuses on 'Soluppgång' (Sunrise), the third of Sibelius's Five Songs, Op. 37, as representative of the composer's musical landscape painting. Existing scholarship on Op. 37 has tended to overlook or even disparage this song: Robert Keane (2007), for one, dismisses 'Soluppgång' as offering only 'moderate interest' poetically and musically. Yet Sibelius himself described Tor Hedberg's 'Soluppgång' poem as 'powerfully atmospheric,' and I argue that Sibelius's musical setting is likewise effective in its depiction of a Nordic winter landscape at dawn, which serves as the symbolic backdrop for a medieval knight's inner turmoil.

**"The Sabbath Day of the South:" The Evangelical Protestant Foundations of Confederate Memorial Day**

Confederate Supporters adapted elements of evangelical Protestant worship in the daily lives of white Americans from antebellum United States into postbellum practices mourning the fallen Confederate leaders and soldiers. According to the organizers and participants, Confederate Memorial Day was a religious holiday that mourned the Confederate dead, not a political holiday containing religious structural elements. Decoration Day contained five elements that distinguished its ideology and activities as a part of evangelical Protestant mourning culture. The first element was present in the manner in which the women of the Ladies' Memorial Associations (LMAs) and United Daughters of the Confederacy (UDC) prepared for and led this sacred holiday. This preparation included collecting flowers as graveyard decorations at church services in the weeks prior to Memorial Day and starting Decoration Day with an early morning church service. The second element was the routine of UDC-appointed evangelical Protestant pastors leading opening and closing prayers. The third element was present in the Protestant songs that regular participants and invited performers sang and/or played with instruments. The fourth element was teaching children how to perform the activities on this self-proclaimed sacred holiday. The fifth element was Confederate-style hagiography that supporters of the Lost Cause used to publicly venerate Confederate leaders, such as Robert E. Lee, Stonewall Jackson, and Jefferson Davis.
Evaluating Rates of Moderate-To-Vigorous Physical Activity VIA Bout Analysis of Daily Steps

It is recommended that healthy adults engage in at least 150 minutes of moderate physical activity (MPA) or 75 minutes of vigorous physical activity (VPA) per week. However, nearly 75% of U.S. adults do not meet these guidelines despite the numerous health benefits that regular PA provides. Interventions are often designed to increase PA by targeting daily step counts, but very few studies have focused on intensity of steps and adherence to MVPA guidelines. Participants wore Fitbit accelerometers to track daily stepping patterns throughout the study. The purpose of the present study was to evaluate rates of MVPA using a bout analysis of daily steps. Researchers looked specifically at time spent in certain cadence bands and at rates of bouted versus nonbouted MVPA to determine the effects of an intervention on patterns and intensity of daily activity.

Effects of Cultural Competency: How the Cultural Competence of Healthcare Providers Affects the Self-Efficacy of Spanish Speaking Patients

This study is an initial assessment of how the cultural competence of healthcare providers affects the self-efficacy of Spanish-speaking patients in the United State. Focus groups with healthcare providers from non-profit federally qualified health centers and pen and paper surveying of Spanish-speaking patients took place over a five-week period. Results suggest that Spanish-speakers in the target population present with a higher level of self-efficacy than anticipated which may be due to the Hawthorne effect. The methods of self-efficacy measurement and provider response to results is proposed to be the primary barrier to high self-efficacy in the population. Though most providers tested high in their cultural competence due to on-the-job experience rather than skills acquired in a classroom setting, findings suggest that, with the use of human interpreters, actual physician cultural competence has little to do with the reported self-efficacy of their patients.
Oral Session C, EB 387

Time 10:25 - 10:40 am
Primary Author Reanna Jeanes - Graduate
Department Biology and Marine Biology
Faculty Supervisor Dr. Nicole Fogarty
Co Authors Dr. Stephen Kinsey and Dr. Nicole Fogarty

Investigating the combined effects of high temperatures and hypoxia on the threatened staghorn coral, Acropora cervicornis

Hypoxia resulting from increased oceanic surface temperatures has been understudied in coral research. This experiment monitored coral responses to incrementally induced ocean-warming and hypoxia conditions, after a sustained 12-day period. Fragments from nine Acropora cervicornis genotypes were subjected to ocean warming (OW: 31°C) and hypoxia (H: 3 mg/L O2) with controls of ambient temperature (AMB: 26°C) and normoxia (N: 6.5 mg/L O2), creating 4 treatments: OW-N, OW-H, AMB-H, and AMB-N (control). Coral growth and symbiont photosynthetic efficiency was measured through the duration of the experiment. Growth was not significantly different among treatments. However, corals in the OW-H treatment had significantly lower photosynthetic yield compared to the other three treatments (which did not differ from each other), suggesting OW-H harms the symbionts' photosynthetic capabilities. Pending analyses of symbiont damage from reactive oxygen species may elucidate the extent of this stress. These preliminary results suggest that ocean warming and hypoxia together can have more severe consequences to coral health than each stressor alone, emphasizing the need for multiple stressor experiments.

Time 10:40 - 10:55 am
Primary Author Lindsay Kness - Graduate
Department Computer Science
Faculty Supervisor Karl Ricanek

Developing AI Data: Minimizing AI Algorithm Bias for Facial Analytics

The rise of AI is driven by the rise of data. In today's world data is ubiquitous; however, there are gaps in the data that provide potentially large errors in AI models that are derived from said data. This work extends the work of "Gender Shades" by developing a crowdsourced data set of face images from around the world that has 12 labels. This is effort is the first open-source facial dataset that can be used to investigate bias at the country level. The dataset captures faces validated by country, e.g., this work verifies that the face is from a specific country. The goal is to capture validated faces from most industrial and emerging countries to create with labels capturing facial attributes. My work will focus on developing the system to optimize labeling via a crowdsourcing platform. There is a multitude of crowdsourcing platforms that provided space for companies to use their product for data labeling and are ai based.
Analysis of Bias for Natural Language Understanding Between Top NLU Providers

Natural Language Processing (NLP) is improving very fast, and it has become a salient artificial intelligence (AI) technology with long-reaching implications. Example of NLP implementations includes Woebot, virtual assistant (e.g., Apple Siri), sentence completion, which could also help in cost savings and efficiency. However, various NLP applications today contain some biases; they do not perform well for all demographics. In addition, this work aims to determine if bias exists in popular commercial speech-to-text API services and afterward provide profound ways which we could use to mitigate the bias in various NLP systems. The three frameworks used for this work are IBM speech-to-text API service, Google speech-to-text API service, and Microsoft speech-to-text API service among top companies in AI technology. The datasets used for this work include (1) Corpus of Regional African American Language (CORAAL) dataset, which consists of $\textbf{4448}$ speakers; (2) Speech Accent Archive dataset, which consists of $\textbf{2,140}$ speech samples. Experiments on the three commercial speech-to-text API services with the SAA dataset indicate that the systems contain gender bias with an average word error rate (WER) of $\textbf{0.156}$ for males and an average WER of $\textbf{0.151}$ for females. Further, a statistical significance test was carried out on the systems WER results, and it shows that the speech-to-text API tools are honestly significantly different from each other. Furthermore, an experiment on the three commercial speech-to-text API tools using CORAAL dataset shows that the systems contain gender bias with an average WER of $\textbf{0.39}$ for males and an average WER of $\textbf{0.28}$ for females. Moreover, statistical significance test results on the systems WER indicate that the machines are statistically significantly different from one another. Therefore, these experiments and testing results shows that there are biases in the three commercial speech-to-text frameworks. To mitigate these biases, we conclude by suggesting that machine learning engineers should train their NLP models or applications with large, diverse balance datasets that include African American Language (AAL) and as well as non-native speakers of English. Machine learning engineers should also avoid unhealthy gender stereotypes in their algorithms.
Neural Implicit Representation and Neural Compression

Implicit neural representations (INR) show promise in 3D re-construction and media compression. We look to expand upon existing methods of compression using INR neural compression, and explore new methods of neural compression. First, we show that adding a simple pre-training step to training a coordinate pixel mapping vastly improves encoding rate, and also can improve final compression quality, especially for bounded number of iterations. Secondly, we show that changing the pixel space from RGB to YCbCr creates large improvements to both encoding rate and final compression quality when compared to similar methods.
Poster Presentations
11:30 am – 1:30 pm
Education Building Atrium
**Poster #** 1  
**Primary Author** Sebrina Brooks - Undergraduate  
**Department** Biology and Marine Biology  
**Faculty Supervisor** Dr. Patrick Erwin  
**Co Authors** Patrick Erwin  

**Diversity, Structure, and Host-Specificity of Cetacean Gut Microbiomes**

Living organisms’ diet and identity heavily influence which microbial partners inhabit their microbiome. Cetaceans are a large contributor to the health of their ecosystems, but little is known about their microbiomes. Our research focuses on characterizing cetacean microbiomes and assessing how it impacts marine mammal health. Fecal samples previously collected from stranded Humpback (Megaptera novaeangliae), Cuvier's beaked (Ziphius cavirostris), and Gervais's beaked (Mesoplodon europaeus) whales were prepared for DNA extraction by measuring 200 g of each sample. DNA extractions were performed using the DNeasy® Powersoil® Kit (Qiagen) and used as templates for PCR with primers targeting 16s rRNA gene sequences. DNA extracts and PCR products were visualized through gel electrophoresis to determine extract quality and PCR-viability. Successful samples will be further processed using next-generation DNA sequencing to determine which bacteria inhabit different species' microbiomes and how they vary within and across hosts within the order Cetacea.

**Poster #** 2  
**Primary Author** Miles Buddy - Undergraduate  
**Department** Biology and Marine Biology  
**Faculty Supervisor** Raymond Danner  
**Co Authors** Marae West, Raymond Danner  

**Quantifying investigator disturbance on wintering marsh sparrow movements using Cellular Tracking Technologies**

The effects of investigator disturbance have been studied in nesting birds, but less often in non-breeding communities. In coastal North Carolina, we study the populations of three Ammospiza sparrows (Passerellidae) that spend the winter in syntopy in tidal marshes. Researchers regularly pass through the marshes to conduct mark and recapture and telemetry of Seaside (A. maritima), Saltmarsh (A. caudacuta), and Nelson's Sparrows (A. nelsoni), focusing on supratidal marshes where the sparrows congregate to roost at high tide. Using CTT (Cellular Tracking Technologies) radiotelemetry arrays, we are investigating how human activities influence sparrow movements. We fitted several individuals of each species with CTT LifeTags over the course of two winters at five similar marsh sites. The telemetry systems record signal strength datapoints from which locations can be estimated. We developed three predictions to test the hypothesis that human activities influence bird movements. First, we expect that frequency of movement on high tide roosts, described by transmitter signal strength variance, will positively relate to researcher presence on site. Second, we predict that home range analysis with minimum convex polygons (MCPs) will reveal an expansion of home ranges during and immediately following disturbance. Third, we predict that responses will vary among species based on behavioral differences. This study has the potential to inform best practices to minimize human disturbance in marshes and other systems. The novel methods described here should help researchers plan similar studies for other species.
Posters:

**Poster # 3**

**Primary Author**  Meagan Colston - Undergraduate  
**Department**  Biology and Marine Biology  
**Faculty Supervisor**  Dr. Carolina Priester

**Cortisol Hormone Analysis in Hair and Saliva**

This study will be investigating the accuracy and effectiveness of two methods of cortisol stress hormone analysis in humans, hair cortisol analysis and salivary cortisol analysis. We will be obtaining hair cortisol levels and salivary cortisol levels from 15 students and faculty at the University of North Carolina Wilmington. The purpose of the study is to gain a better understanding on the effectiveness of cortisol measurements in hair and saliva and develop guidelines for future studies. The hypothesis is that hair cortisol analysis is more accurate in detecting cortisol levels compared to salivary cortisol.

**Poster # 4**

**Primary Author**  Robert Finn - Graduate  
**Department**  Biology and Marine Biology  
**Faculty Supervisor**  Julia Buck  
**Co Authors**  Griffin May, Ciera Benefield Andrade

**Rumble in the Prawns: A Conflict of Interest Between Behavior Modifying Parasites**

A conflict of interest between parasites occurs when species manipulate the behavior of their host in contradictory ways. Within the grass shrimp *Palaemonetes pugio*, trematode parasites cause the shrimp to be more active than usual around predators while bopyrid isopod parasites cause the shrimp to be less active than usual around predators. Since the parasites are altering the host's behavior in opposite directions, a conflict of interest should occur in doubly-infected shrimp. Through a field survey of shrimp populations in four tidal creeks in the Cape Fear River, we found a significant negative association between the two parasites, suggesting that the parasites resolve the conflict of interest through avoidance of co-infection.
Mitochondrial density in the pectoral muscle of Green sea turtles (Chelonia mydas) and Diamond-backed terrapins (Malaclemys terrapin).

Sea turtles migrate long distances between breeding and foraging grounds, and their capacity for these migrations are unique among reptiles. In comparison to estuarine or freshwater turtles, sea turtles may display differences in muscle morphology and capacity for sustained activity reflective of enhanced aerobic metabolism. Mitochondrial density within muscle tissues is a reliable indicator of the aerobic capacity. The goal of this study was to compare mitochondrial density in the swimming muscle of green sea turtles (Chelonia mydas) with diamond-backed terrapins (Malaclemys terrapin). It was hypothesized that sea turtle muscle would exhibit higher mitochondrial density compared with diamond-backed terrapin muscle, which would be indicative of enhanced aerobic capacity beneficial for the long-distance migrations undertaken by sea turtles. SDH staining intensity was used as an index of mitochondrial density, and staining intensities in green sea turtles (45.5 ± 4.8, 12.6) and diamond-backed terrapins (73.7 ± 40.7, 99) were not statistically significant.

Does the 'Throat Hit' Vaping Style Give Vapers Higher Health Risks?

Inhaling cigarette smoke is largely uniform among smokers. However, among e-cigarette users discrete vaping styles exist, ranging from gentle puffing to taste the various flavors to an aggressive, pleasure-inducing, inhalation phenomenon known as 'throat hit'. My hypothesis is that the vaping style deemed 'throat hit' may result in higher risks of respiratory problems like coughing. Survey data of 300 vapers who were former smokers was collected from several local vape shops. We found a strong association between engaging in throat hit inhalation and risk of persistent coughing (RR=4, 95%CI 1.3-13.4). Other respiratory symptoms also correlated, but did not reach statistical significance. Most concerning is that approximately 8% of throat-hit vapers report worsening cough compared to when they were smoking tobacco cigarettes, which is widely considered more detrimental to respiratory health. More and larger studies are needed to investigate the specific health risks of this popular inhalation style among e-cigarette users.
Strong association of cinnamon flavor in e-cigarettes and risk of persistent cough

Cinnamon flavoring in e-liquid of electronic cigarettes contains cinnamaldehyde, which is known to disrupt human bronchial epithelial cell functions such as airway ciliary motility. It is unknown whether exposure to cinnamon flavors containing cinnamaldehyde is detrimental to respiratory health. We hypothesized that users of cinnamon-flavored e-liquid would be more likely to experience respiratory symptoms. This was investigated in a cross-sectional study of 301 exclusive vapers who were former cigarette smokers. Cinnamon users were more likely to experience worsening of coughing and wheezing (11.9% vs. 2.7%), had higher risk of self-reported respiratory symptoms (31% a vs. 12%), and specifically self-reported coughing (7.1% vs. 0.8%), compared to non-cinnamon-flavor users. These findings were statistically significant (p < 0.05). We found no association with demographic or vaping consumption metrics between the two groups. When advising former smoker to switch to e-cigarette, physician should be aware that cinnamon flavors could worsen a patient's respiratory health.

Identifying Antibiotic-Producing Microbes from Soil near Burnt Mill Creek, Wilmington.

Infectious microorganisms have become increasingly resistant to antibiotics; thus, it is vital we discover and develop new antibiotics to treat these resistant microbes. Additionally, since soil microorganisms have many antibiotic properties, I collected a soil sample near Burnt Mill Creek in Wilmington and tested it for antibiotic activity. I cultured the soil microbes on agar plates incubated at different temperatures to see if temperature would influence their growth and it did. Single colonies were then spotted on lawns of Staphylococcus aureus and Escherichia coli to see if they inhibited the growth of these bacteria. After discovering that two isolates (A4 and B4) showed inhibition, I tested them for inhibition against five other bacteria and a yeast and characterized them by gram staining and microscopy. I found that isolate A4 was gram positive and B4 was gram negative. Although the isolates demonstrated minimal antibiotic activity against S. aureus, isolate B4 showed the highest activity against a pathogenic yeast. I will continue to investigate the antifungal activity of isolate B4 and identify its species by DNA sequencing.
Genetic Diversity of Stela plicata over time in the Masonboro Channel

Ascidians, more commonly known as sea squirts, can be found all over the world. One species in particular, Styela plicata, is commonly found throughout the waters of Wilmington, North Carolina and is widely distributed throughout the world as a result of its tendency to attach itself to traveling ship hulls. Located on a coastal shipping channel, Masonboro Channel, UNCW Center for Marine Science is home to several ascidian species, including S. plicata. Oftentimes, introduced ascidians can have large effects on ecosystems, highlighting the importance of monitoring these populations to understand the survival potential of the population as a whole and its effects on the pre-existing environment. My goal was to accomplish the genetic barcoding of 30 Styela plicata individuals. As other DIS students did in previous years, I sequenced the COI (Cytochrome Oxidase subunit I) mitochondrial marker and added sequences obtained for the 2021 cohort to similar data obtained since 2007. This large data set allowed me to determine whether the genetic structure of the S. plicata population in Masonboro Channel is changing over time.

Diversity of Zooplankton Dormant Embryos in Jordan Lake, NC

Nutrient inputs into aquatic systems are increasing due to human activities, and these nutrients can cause problematic algal blooms. Algal blooms degrade water resources by blocking sunlight, producing toxins and reducing oxygen levels, which can cause the destruction of other species in the system. Many bodies of water that suffer from algal blooms are also used by communities for water supply and recreation, and it is important to maintain healthy environmental conditions to support these activities. To date, little research has been conducted on the effects of algal blooms on zooplankton in North Carolina. Zooplankton produce resting eggs as part of their life cycle that can lay dormant in the sediment for up to hundreds of years. These resting eggs, or embryos, can provide a record of the active population in an ecosystem, and can be used to determine shifts in population structure over time. Jordan Lake is a multipurpose reservoir in North Carolina that suffers from frequent algal blooms. In this study, sediment was collected from various locations around Jordan Lake. Dormant zooplankton were isolated from the sediment and separated by physical appearance. The embryos were then placed in an incubator to induce hatching to determine what species of zooplankton are present as dormant embryos in the lake. Three different hatching mediums were tested (EPA approved, 0.35 ppt artificial freshwater, and EPA medium supplemented with artificial sea salt). Two different incubator temperatures (20 C and 25 C) were also tested. Neither changing hatching solution nor temperature increased hatching success. Both copepod and cladoceran hatching was observed, but all larvae died shortly after hatching. No rotifers successfully hatched during this study.
Assessing Neurogenesis in Bony and Cartilaginous Fishes
While mammalian brains show limited adult neurogenesis, or the addition of new neurons in the brain, the brains of fishes grow indeterminately, suggestive of lifelong neurogenesis. However, few studies to date have measured this in fishes. The rate of neurogenesis has historically been quantified by staining actively dividing cells through their incorporation of the thymidine analogue 5-bromo-2'-deoxyuridine (BrdU). This technique can produce maps of neural proliferation zones and allows for the calculation of rates of neurogenesis in the brain. This project will optimize and apply this technique in bony (goldfish) and cartilaginous (little skate) fish species.

Advanced Primer Design of Opsin Expressed Genes from Artemia franciscana
Artemia franciscana (brine shrimp) can lay dormant for countless years because embryos only hatch with the right conditions. Embryos can detect light, and that light cue helps to bring the zooplankton embryos out of dormancy. One possible mechanism for detecting light is the use of proteins called opsins. We used the gene sequences produced by a previous student in our lab to design primer sequences for a process called PCR and we will use PCR to examine the expression of opsins in embryos. As a first step, we excluded a conserved domain that might be found in other proteins. Then we excluded regions with repetitive elements. Lastly, we developed primers while considering primer length, melting temperature, nucleotide G and C content, and the Delta G (free energy for binding) of dimers and hairpin structures. The primers we designed with this method were superior to those designed by computer algorithms.
A Histological Survey of a Novel Bay Scallop Parasite, a Didymozoid Trematode
A novel bay scallop parasite, a didymozoid trematode recently discovered off the North Carolina coast, was analyzed using histological and microscopy techniques. Groupings of parasites, visible to the naked eye, were located within the gill tissue, surrounding the adductor muscle of the scallops. Fixation, dehydration, paraffin embedding, rehydration, and staining with hematoxylin and eosin were used to prepare the tissue samples. Light microscopy was then used to ascertain the presence and location of parasites within the tissue sample. The parasites were found in the afferent vessel of the gills and were enveloped by a membrane. Comparisons of gill structure were made between healthy and parasitic bay scallops.

Genetic diversity over time: Has the population of the sea squirt Styela plicata at the UNCW Center for Marine Science docks remained stable since 2007?
Sea squirts, or ascidians, are marine invertebrates that often live attached to docks or ships. Styela plicata is a species of ascidian that is commonly found in Wilmington, NC, though it is nonnative to this area. Our research examined the genetic diversity of this species to determine whether the population of S. plicata at the Center for Marine Science docks is genetically stable. We sequenced the barcoding gene Cytochrome Oxidase I (COI) of twelve individuals from this species collected in January 2022. We then compared the obtained DNA sequences to sequences from 2007 to determine if new genotypes had arrived to this population in the last fifteen years. A phylogenetic analysis showed that similar genotypes were present in the samples from 2007 and 2022, so the genetic structure of the population of S. plicata at the Center for Marine Science docks has remained stable over time.
**Advanced Primer Design of Opsin Expressed Genes From Artemia franciscana**

Artemia franciscana (brine shrimp) can lay dormant for countless years because only embryos hatch with the right conditions. Embryos can detect light, and that light cue helps to bring the zooplankton embryos out of dormancy. One possible mechanism for detecting light is the use of proteins called opsins. We used the gene sequences produced by a previous student in our lab to design primer sequences for a process called PCR and we will use PCR to examine the expression of opsins in embryos. As a first step, we excluded a conserved domain that might be found in other proteins. Then we excluded regions with repetitive elements. Lastly, we developed primers while considering primer length, melting temperature, nucleotide G and C content, and the Delta G (free energy for binding) of dimers and hairpin structures. The primers we designed with this method were superior to those designed by computer algorithms.

**Using Stable Isotopes to Assess Foraging Behavior at Three Adelie Penguin Colonies in Antarctica**

Stable Isotope analysis of modern and ancient Adelie Penguin bones can reveal changes in their diets due to the effects of climate change or other factors. This experiment focuses on modern Adelie Penguin bones from chick carcasses collected from Devil Island (Antarctic Peninsula), Sabrina Island (Bellany Islands) and Cape Adare near the Ross Sea, Antarctica. I can investigate differences in foraging strategies by the Adelie Penguin between these locations by analyzing the stable isotopes sulfur, nitrogen, and carbon from bone collagen. Data from ancient bones of the same regions can be used to predict and discover changes in penguin foraging behavior through time. Modern bones of regions such as the Antarctic Peninsula that have experienced a greater warming effect than the Ross Sea can be compared to modern bones of less affected areas in the Ross Sea to predict and identify changes in their diets.
The effects of thermal stress on the oxygen consumption rate of the daf-18 mutant of Caenorhabditis elegans

Organisms adapt to stress by allocating more resources to tissue maintenance and less to growth and reproduction. In Caenorhabditis elegans, activity of the daf-18 gene is associated with the regulation of stress resistance and increased lifespan. When daf-18 is non-functional, the nematode is unfit to deal with stress. This research aims to quantify the effects of thermal stress on the metabolism of daf-18 mutants via measurements of oxygen consumption rate (OCR) using the Aligent Seahorse XFp metabolic flux analyzer. Mitochondrial function was evaluated at four life stages (L1, L2/3, L4, and adults). The age synchronization protocol used for non-mutated nematodes (N2) resulted in the mutants dying and the protocol was modified. At higher temperatures of thermal stress, all life stages experienced a decrease in OCR with the greatest effects on the L1, L2/3, and L4s. This research will help us to understand the differences between daf-18 mutants and N2s further.

Influence of reproductive activity and dietary restriction on mitotic zone size in Caenorhabditis elegans

Reproduction is the most important biological function of any organism, yet the relationship between reproduction and stress resistance is complex and has yet to be fully explained. The purpose of our research is to examine the effect of caloric restriction on specific reproductive parameters and heat stress resistance in the context of energy allocation. To study this problem our lab uses the model organism Caenorhabditis elegans, a small nematode. In this study we co-manipulate dietary supply and ovulation and assess the consequences on germline stem cell niche size as an indicator of energy allocation towards reproduction. Our preliminary results suggest that starvation and the absence of males have a negative impact on germ stem cell activity. In future experiments we will determine the effect of caloric restriction on thermal stress resistance to compare to germ stem cell niche activity.
Assessing the effects of bacterial inoculation on the survivorship of Pseudodiploria clivosa larvae (knobby brain coral)

Probiotics have been used to promote coral health by enhancing coral resistance to heat stress. Yet, using probiotics to increase coral survival during the earliest and most vulnerable stages has been understudied. Through the screening of bacterial isolates, this study is the first step to determine if potential probiotics can be identified for Pseudodiploria clivosa. We isolated 250 bacterial isolates from four adult P. clivosa. Isolates were randomly selected and organized into 25 bacterial isolate groups. Three inoculations were conducted over 9 days, with daily water quality measurements (salinity, temperature, ammonia, and dissolved oxygen) and quantification of survivorship. Results suggest that four isolate groups enhanced larval survivorship 5-9% above controls indicating further research on the potential beneficial effects on P. clivosa larvae is warranted. As more effort is allocated to rearing corals recruits in land-based nurseries, developing a probiotic treatment to boost survivorship is critical for upscaling reef restoration.

Impacts of seagrass species composition on Zostera marina seed germination rates off the coast of North Carolina

North Carolina is in the transitional zone between temperate and tropical seagrass bioregions. Currently, NC seagrass meadows, containing both temperate (Zostera marina) and tropical seagrass species (Halodule wrightii), are declining. Declines are attributed to loss of the temperate species due, in part, to stressful summer water temperatures (>28°C). In this region Z. marina reestablishes following seasonal declines from surviving vegetative shoots and seeds; however, little is known about the impacts of H. wrightii on Z. marina recovery. The impact of H. wrightii on Z. marina maximum germination and mean time to germination was quantified. There was no significant difference in mean time to germination between treatments ($Z = -1.86; p = 0.063$). However, maximum germination was significantly greater when H. wrightii was absent ($Z = -2.509, p = 0.012$). These results indicate that increasing H. wrightii populations may have a negative impact on long-term Z. marina survival in NC.
The Impacts of Elevated Temperatures and PCB’s on Hatching, Survival, and the Expression of Heat-Shock Proteins on Boeckella Poppei

I am analyzing the effects of climate change on embryos of the Antarctic zooplankton, Boeckella Poppei. These embryos live in their dormant state for up to two centuries and their active life stages for less than one. In their dormant state, they are exposed to more temperature changes than the active stage. Their hatching and developmental stages after dormancy may be negatively impacted by temperature changes and anthropogenic chemicals. I hypothesize that elevated temperatures predicted by climate change models will negatively impact recruitment of dormant embryos. I also hypothesize that PCB exposure in combination with temperature stress will decrease recruitment more than temperature stress alone. To test this, I will isolate embryos and incubate them in 12 well plates to evaluate the effects on recruitment to the larval stage. This will be repeated with the presence of PCBS's. Firstly, I tested and modified an incubator to maintain temperature and hydration.

The Effects of Expressive Writing Therapy on the Stress Response

Expressive writing therapy has been investigated and used to help individuals deal with traumatic events. The prompts used are part of the Pennebaker paradigm. Based off Pennebaker's experiments it was seen that students who wrote about a traumatic event visited the health center less. The aim of this study was to determine if expressive writing therapy can decrease stress levels in students. Stress levels were measured with salivary cortisol and a Perceived Stress Scale. Both stress indicators were sampled before the first writing prompt and after the final writing prompt, four days later. The results showed that there was no significant change in stress according to the PSS, and there was a small decrease in cortisol levels after the writing intervention. Future studies would need to be done with a larger sample size and monitoring of the participants to ensure they completed the paradigm.
The Effects of Starvation and Body Size on Energy Stores in C. elegans

Research suggests that larger body and cell sizes are metabolically cheaper. Considering this, could larger body size reduce the expenditure of stored energy in response to starvation? We focused on intestinal tissue of the nematode, C. elegans, because it is the primary energy storage tissue and is a good proxy for measuring energy stores. We compared intestinal volumes of the larger body size mutant, CB4123, to the wild type control (N2) using endogenous fluorescent reporters targeted to the intestinal cell membranes. We hypothesized that the larger mutant intestinal volume would shrink proportionately less than wild type controls under starvation. After 4-6 hours under the experimental conditions, we saw a ~35% decrease in starved intestines compared to the fed intestines in both strains. Thus, our hypothesis was not supported, suggesting that both strains deplete the same relative volume of energy stores despite the body size differences.

Effects of heat and starvation stress on muscle tissue in C. elegans

Organisms use energy allocation to optimize energy use. When organisms are in conditions of energy stress, they reallocate energy from reproduction to homeostasis and maintenance. Recently, it was shown in the model organism C. elegans that heat stress changes muscle tissue that are related to cellular metabolism. Specifically, it caused changes in myofilament structure and fragmentation of the mitochondrial network. We wondered whether starvation would result in the same changes to myofilament and mitochondria as seen in heat conditions. To address this question, we used C. elegans because they are a well-known model organism to study aging, physiological stress, and energy allocation. We hypothesized that starvation stress would cause similar effects to heat stress. We subjected adult nematodes containing fluorescent reporters that mark either mitochondria or myofilaments and imaged them to quantify mitochondrial fragmentation and myofilament organization. Preliminarily, starvation induces mitochondrial fragmentation, but not myofilament defects.
**Poster #** 25  
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**Department** Biology and Marine Biology  
**Faculty Supervisor** Dr. Nicole Fogarty  
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**Identifying potential probiotics to enhance Pseudodiploria clivosa (knobby brain coral) recruit growth and survivorship**

Using beneficial microorganisms (probiotics) to boost coral recruit health is a restoration technique that has largely been overlooked. This study aimed to identify bacterial groups that have the potential to enhance recruit survivorship and growth. Bacterial strains (n=250) were isolated from adult Pseudodiploria clivosa corals, from which inoculums were created by randomly selecting 10 strains and assigning them to an isolate group (n=25). Larvae were generated from lab spawned P. clivosa colonies and settled on ceramic tiles. Tiles with at least 3 recruits were exposed to an isolate group weekly for 24 hours over a 6-week experiment. Each group was tested in triplicate and compared to five control tiles that were not exposed to bacterial inoculants using weekly survivorship counts and bi-weekly photographs for growth analyses. Results show that four isolate groups increased survivorship by 2-5%, though not significantly (log-rank survival analysis p>0.05) and growth decreased for these same four isolate groups. Further growth analyses may elucidate an isolate group that increases growth however, it is possible that a beneficial strain has yet to be isolated for both survivorship and growth. Developing novel methods to improve rearing coral recruits will enhance future restoration efforts.

**Poster #** 26  
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**Department** Biology and Marine Biology  
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**Cloning Developmental Network Genes from the tropical coral Orbicella Faveolata**

Orbicella faveolata is an important tropical coral reef species in the Caribbean that displays remarkable biological innovations. The keys to these innovations are encoded within their genomes. Little is known about gene expression during embryonic development in this vital coral species. Here, our research goal is to characterize gene expression during embryonic development of this coral. The first step is to clone genes known to be involved in embryonic development of other cnidarians. Here we will use molecular approaches such as Polymerase Chain Reaction (PCR) to amplify these genes from cDNA. Next, we will sequence these gene products and compare them to known gene sequences. The products of these genes will then be used for the continuing research on the embryonic development of this organism.
**Biochemical and Structural Analysis of UDP-glycosyltransferases (UGTs) in the Biosynthetic Pathway of Stevia**

Diabetes is a dangerous and growing epidemic. Because of the 34.2 million cases of diabetes in the US and an estimated 88 million people with prediabetes, scientists are working diligently to find methods of combatting the disease. Diabetes renders the body incapable or less capable of breaking down sugars, primarily in the form of glucose. For this reason, the identification of new, natural, zero-calorie or low-calorie sugar alternatives could be key to preventing or combatting diabetes. Steviol glycosides derived from the leaves of the tropical Stevia rebaudiana plant are one of the most promising options. For this project, we have identified the enzyme UGT85c2, one of several UDP-dependent glycotransferases (UGTs) in the production pathway of steviol glycosides. The goals are to produce UGT85c2 via Escherichia coli, isolate and purify the proteins, analyze their 3D protein structure, and run enzyme assays to characterize activity.

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**Biochemical and structural analysis of flavone 3’-O-methyltransferase from Oryza sativa (rice): Research Project in Biochemistry Laboratory (CHML365, Spring 2022)**

S-adenosyl methionine (SAM)-dependent methyltransferases are a class of enzymes involved in the metabolism of xenobiotic and endogenous compounds, gene transcription, and methylation of biomolecules. Specifically, flavone 3’-O-methyltransferase (flavone 3’-OMT) plays a vital role in the flavone biosynthesis pathway in rice (Oryza sativa). The three-dimensional (3D) structure of flavone 3’-OMT can provide a molecular basis for the characterization of its enzymatic function and potential applications. Here, the UNCW Biochemistry Laboratory (CHML365, Spring 2022) investigates the biochemical activities of OsMT and the roles of active site residues using a combination of molecular biology and biochemical techniques, including DNA plasmid isolation, PCR-mediated site-directed mutagenesis, protein purification, and crystallization. A series of point mutations were generated by QuikChange PCR mutagenesis, and the resulting proteins were expressed as his-tagged fusion proteins and purified by nickel-affinity chromatography to examine the effect of changes in the substrate and cofactor binding sites. A kinetic analysis will be used to analyze the effect of mutations on activity and substrate specificity. Our results will provide insights into the contribution of active site residues to OsMT function.
Natural Product Discovery from Marine Parasite Microbiomes

Marine microbiomes could be the key to treating previously untreatable diseases. A substantial amount of marine life has yet to be explored, especially in the unique ecological microenvironments. For example, the blood-sucking isopod Olencira praegustator contains its own microbiome. Interactions between the isopod, its marine host, and symbiotic bacteria foster the production of natural products. When isolated, these natural products could be capable of fighting cancer or drug-resistant pathogens. UNCW Drug DISCOvery collected over 200 strains of bacteria from O. praegustator, other parasites, bacteria from deep arctic mud, and have generated a chemical extract library of the molecules they produce. The extracts have been screened against drug-resistant pathogens and cancer cells. Several extracts have shown potent activity, which will lead to further investigation.

Evaluating Molecular Emission in Solution Cathode Glow Discharge

The solution cathode glow discharge (SCGD) is a portable and inexpensive instrument with the capability of detecting emission of light from metal ions and atoms through atomic spectrometry. This emission allows for the measurement of concentrations of metallic elements in a solution. It would be advantageous to be able to also detect molecular species. By doing so, nonmetal concentrations could also be measured. It is important to adjust features of this device in effort to find the optimal conditions so that it can detect emission from molecular species, which may be different conditions from those previously used to detect metal atoms. Some of the modifications that have been tested consist of changing the capillary sizes, adjusting the flow rate, and adjusting the current. A further application of this device is utilizing the emission from a certain molecular species to measure and identify isotopes of atoms in the molecules.
**Synthesis of Inhibitors against Aspartate beta-semialdehyde Dehydrogenase**

Aspartate beta-semialdehyde dehydrogenase (ASADH) is an enzyme found in a pathway for the synthesis of amino acids for bacteria or fungi. The enzyme synthesizes the production of six amino acids that are essential to mammals and must be ingested through the diet. The production of these amino acids for bacterial or fungal organisms is necessary for their survival and growth. By synthesizing inhibitors that resemble the substrates that bind to the enzyme ASADH, it prematurely inactivates the enzyme and prevents the organism from building proteins needed for survival. Bacterial organisms are continually evolving in ways that allow them to become resistant to drug inhibition.

**Enantioefficient Wittig Gamma-Lactam Synthesis from Aziridines, Ää**

Aziridines are 3-membered carbon heterocycles containing a nitrogen and are highly reactive due to ring strain. Upon modification with a nosyl activating group, aziridines have increased reactivity to undergo ring-opening chemistry. Reaction with Wittig reagents provide ring opened aziridines that can further react with aldehydes to generate gamma-lactams, which are biologically active and important in drug development. To further explore the limitations of this chemistry, various reaction conditions were tested, including reaction time, solvent, and temperature, and starting material aziridine and aldehyde substituents. NMR analysis was used to verify purity and structure of products, revealing a high stereoselectivity for the E- alkene gamma lactam. Herein, these experimental conditions are reported to show this reaction's usefulness for its unique chemistry that can be used in pharmaceutical development.
Load-Inducing Topics for General Chemistry 1

Working memory can only handle a certain quantity of data at once. Cognitive overload occurs when working memory reaches its limit, causing the learning process to be slowed. By collecting data in real-time and being sensitive to slight fluctuations owing to learning, the data gathered by monitoring heart rate may be utilized as a valid tool for detecting changes in cognitive load. Furthermore, created by technological advancements, data may be acquired discreetly. This research was carried out as a result of four participants (N=4); being monitored for changes in their heart rates during the lectures. General chemistry is a crucial subject in a student's degree since it establishes the foundations for higher chemistry courses later in their career. This data was used to create a list of general chemical subjects that cause load.

Intraocular Delivery

We are collecting further research on drugs that have shown promising results in prior research in reversing cataracts.

Structural Revision of a catenin Modulator and Confirmation of Cannabielsoin Constitution and Configuration

Cannabielsoin (CBE), a natural product produced by Cannabis sativa, has also been reported to be an important cannabidiol (CBD) metabolite. In this project, we revise the structure for a previously reported synthetic product proposed to be the 1R,2S-cannabidiol epoxide and reassign it as CBE. Confirmation of the originally proposed structure and configuration of CBE was achieved using anisotropic NMR and synthetic chemistry methods. These results provide a direct link to the first known biological target and function of CBE. Results include improved conditions for the synthesis of CBE and clarification on conflicting structural proposals presented in previous key reports involving CBE and 1,2-CBD epoxide. This project also discusses epoxide opening reactions involving 1,2-CBD epoxide.
**Palladium Catalyzed Enantioselective Desymmetrization of Meso-Aziridines with Pyrrole Nucleophiles**

Aziridines and related derivatives are significant intermediates in the development of pharmaceuticals. Due to the highly strained property associated with the three-membered nitrogen ring, they can undergo ring-opening with a broad range of nucleophiles to synthesize various important natural products with a range of interesting biological activity. Our research focuses on the enantioselective desymmetrization of meso-aziridines using pyrrole nucleophiles under palladium catalysis. A variety of pyrroles were synthesized and utilized to determine the effects on ring-opening of N-acylaziridines. Efforts to maximize yield and enantioselectivity for pyrrole substrates will be presented. Aziridine backbone derivatives were also investigated using the standard conditions with lower yields observed. A mechanism and future experiments will be proposed.

**Utilization of glycine betaine in methylotrophic methanogenesis in coastal wetlands**

Methane is over 25 times more potent than CO2 as a greenhouse gas. Methanogenesis is generally considered minimal in saltwater environments compared to freshwater because sulfate reducers outcompete methanogens for substrate. The methylotrophic pathway is, however, able to produce methane in saltwater environments. We wanted to explore the contribution of GBT to methanogenesis in salt marshes. Mud from the New River was collected and homogenized, then treated three different ways: control, GBT spike, and GBT and sulfate spike. These samples were split into eight time points, a week apart to determine the rate of methane production and the glycine betaine concentration in the porewater. Methane concentrations were determined using gas chromatography (GC) and GBT concentrations were determined using unsuppressed ion chromatography (IC). Understanding the effect of GBT on the methylotrophic pathway could provide valuable information on methane production in coastal wetlands.
**Poster #** 38  
**Primary Author** Jonah Parker - Undergraduate  
**Department** Chemistry and Biochemistry  
**Faculty Supervisor** Dr. Winifred Johnson

**Marine Carbon Cycling: Osmolytes**

Osmolytes are a group of small organic metabolites responsible for regulating the osmotic balance within cells. These molecules are abundant carbon sources for heterotrophic microbes and are produced and transferred throughout the microbial food web. However, we don't fully understand the factors that control the production of these molecules. Using targeted liquid chromatography-mass spectrometry, we determined the particulate abundance of common osmolytes such as glutamate, trigonelline, and glycine betaine in the intracoastal waterway and isolated patterns related to fluctuations in temperature and salinity. Understanding these relationships is imperative to our knowledge of the marine microbial food web and will play a significant role as we work towards a better understanding of the composition and cycling of organic matter in the ocean.

**Poster #** 39  
**Primary Author** Kristy Witte - Undergraduate  
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**Characterization and site-directed mutagenesis of Aldehyde dehydrogenase A and B from Pseudomonas syringae DC3000: Structural and biochemical analysis**

This project examines the role of aldehyde dehydrogenase enzymes in the bacterial biosynthesis of auxins. Indole-3-acetic acid (IAA) is a predominant auxin in plants and synthesized by the bacterial plant pathogen Pseudomonas syringae (strain DC3000) to assist in pathogenesis [1]. Aldehyde dehydrogenases catalyze a crucial reaction in P. syringae's synthesis of IAA. Using site-directed mutagenesis, this project aims to understand specific amino acid importance in the active binding site of homologs Aldehyde Dehydrogenase A (AldA) and Aldehyde Dehydrogenase B (AldB). Polymerase Chain Reaction (PCR) amplified the mutated deoxyribonucleic acid (DNA) for DpnI digestion. The targeted gene was transformed into Escherichia coli (E. coli), protein expression was confirmed, and wild type AldB was isolated for enzyme assays. A crystal structure of wild type AldB was then produced. Future enzyme assays will help characterize the mutated active binding sites for AldA and AldB and the functional effects of such mutations.
Potential Cyanobacterial Bioactive Compounds from Lakshadweep Archipelago

This study is focused on exploring the bioactive potential of natural products produced by marine filamentous cyanobacteria that were previously sampled and isolated from Lakshadweep as part of an international collaboration between researchers from India, USA, and China. The living cyanobacterial cultures, preserved environmental samples, and organic extracts thereof were maintained at the Marine Micro-Algal Culture Collection (MACC) facility of the Indian National Centre for Aquatic Animal Health for further detailed biological and chemical investigations. The antimicrobial activity and cytotoxicity of obtained cyanobacterial extracts and compounds were analysed and it was concluded that a cyanobacteria strain that is closely related to the genus Okeania (16S gene sequence clades) produces one or more antimicrobial compounds without overt cytotoxicity to human cells in vitro. Further purification, characterization and chemical structure elucidation of the bioactive compounds are currently being investigated at the UNCW Department of Chemistry and Biochemistry and Center for Marine Science.

Derivatization of Small Organic Metabolites in Seawater

Organisms in the marine environment play a vital role in the global carbon cycle. To survive, heterotrophic microorganisms must consume organic compounds. Small organic compounds that function as osmolytes, maintaining osmotic balance across the cell membrane, are easily transported into the cell compared to other small molecules. These molecules of interest are highly polar molecules and are challenging to isolate from seawater. In this research, I tested two derivatization methods targeting the carboxylic acid functional group to enhance solid phase extraction of these molecules. Tests were run in artificial seawater that contained 10 osmolytes at three different concentrations. Liquid chromatography-high resolution mass spectrometry was used to determine the success of the extraction methods. The results demonstrate that a derivatization approach can successfully extract some osmolytes from seawater. Further development of these methods will allow us to study the cycling of these molecules and their significance in the global carbon cycle.
Eating disorders, depression and anxiety.
This is a proposed research study composed of surveys given to college students. If we were to perform the study, potentially in the near future. We would survey 500 UNCW college students, half male half female. Before they take the survey they will be given key words and terms beneficial for their knowledge before they begin the EAT-26 and the DASS-21, eating disorder and depression surveys. The surveys consists of different questions and formats in their own ways, after we gather our data we will see if there is a correlation between eating disorders, depression and anxiety.

Neonatal Abstinence Syndrome
Background: NAS has been recognized for more than four decades with substantial changes in the past 10 years with a dramatic increase in prevalence, changes in exposure substances, and clinical management.
Purpose: The purpose of this review is to summarize the current literature on NAS clinical characteristics, prevention, identification, and treatment.
Method: This study used a systematic review to evaluate the strength of scientific evidence, identify gaps in current research, identify the need for future research, and create a bridge between related areas of work.
Results: A study conducted in 2017 stated that out of the 751,037-birth hospitalization and with 748,239 delivery hospitalizations of those numbers 5,375 babies were diagnosed with NAS.
Conclusion: Gaps still exist, with lack of clarity and consistency in how the syndrome is defined, measured, and managed.
Implications to Nursing: Primary-prevention strategies are needed to address the epidemic of opioid use and the associated development of NAS."
Neurotoxins as Potential Therapies

The neurotoxins as potential therapies study uses brevetoxins from the Karenia brevis species that occur in red tide algae blooms to see what type of immune response they provoke from the cells. The cells are treated with the toxins and are tested using cell-based assays such as ELISA and Flow Cytometry. The data that results from the tests will be used to help identify which brevotoxin is less toxic; the one that contains an alcohol or one that contains an aldehyde. These findings can be helpful in future research on if brevotoxins can be used as potential therapies for immune disorders and stroke therapies.

The effectiveness of an Army Combat Fitness Test (ACFT) 12-week exercise program.

15 army recruiters have willingly decided to participate in a 12-week exercise program developed by TRX elite to determine the effectiveness of the said program with conducting the ACFT (Army Combat Fitness Test). The recruits were asked to complete the ACFT which took roughly one hour. Over a 12-week period (currently on the 3rd week of the program) the recruits were asked to complete the weekly program using the straps that TRX compiled for them. At the end of the twelve weeks (towards the end of May) the recruits will complete the ACFT all over again so we can see if this 12-week exercise program overall improved their scores.

How COVID-19 affected feeding in families following discharge from the NICU

Infants who require admission to NICU can have many issues when it comes to feeding. There are techniques that parents must closely follow to ensure that their infants are getting what they need in terms of feeding. This is a presentation of a selection of data from a larger longitudinal study of infant feeding development when the infant was at-risk for development of feeding problems that included interviews with moms of babies discharged from NICU at 6, 12, 18, and 24 months after discharge. The interviews were guided by the Family Management Style Framework and as part of this framework, contextual influences are an important consideration. The COVID-19 pandemic became an unanticipated contextual influence during the study.
Immune Response to Toxins
This study measured immune response to toxins, specifically brevetoxin, the toxin found in red algae, through the process of flow cytometry and ELISA's. The process of cytotoxicity counts the number of alive cells after being exposed to different concentrations of the toxin in order to understand what concentration of toxin should be used for the flow cytometer and ELISA. The Flow cytometer measures photon emissions of lasers at different wavelengths after they are shone through the sample. ELISA's read colored wavelengths to detect antibodies in the blood. The data from this study can be used to create informed restrictions on shellfish being sold for public consumption based on its exposure to red algae. Another implication that can be used from the data would be to harness the strong reaction the body has to toxins to create a strong reaction to medicines and treatments if the undesirable side effects could be eliminated.

Effects of suspension (TRX) training on stress/ anxiety among college students
Stress and anxiety are a disruption to the balance of homeostasis in the human body (Sandi, 2013). Moderate to high percentages of university and college students suffer from stress and anxiety disorders between the ages of 18-24 (Asif, S., et al, 2020). Modalities utilized to decrease the symptoms of stress and anxiety are yoga, mindfulness and breathing exercises, prescription medication, and moderate to vigorous physical activity. Engaging in physical activity has been identified as decreasing the symptoms of stress through the reinforcement of positive emotions such as higher self-esteem and confidence. Furthermore, increased physical activity is associated with the release and increase of hormones and neurotransmitters known to be mood stabilizers (REF)Suspension training system (STS) has been listed as top 10 health/fitness trends for the past 10 years. Suspension training is popular because it is simplistic, user-friendly, portable, and predicated upon utilizing an individual's body mass as the solitary source of resistance. Suspension training focuses upon the development of strength, balance, flexibility, and core stability simultaneously. The first phase of research was completed in spring of 2021, where this data comes from. The second phase of research with cohort two is still in the intervention process and will finish in Spring of 2022. The purpose of the study was to fill in the literature gap by way of examining the effects of suspension training on anxiety, stress, and depression levels amongst a college aged population.
Test-retest Reliability and Validity of an Eye-Tracker

Background: Eye-tracking devices have a long reputation in psychological research. More recently, motor performance studies use the same devices to measure gaze behavior during tasks like throwing. Objective: To analyze the reliability and validity of an eye-tracker during a goal-directed overhand throwing task. Methods: Six participants performed seven blocks of 10 throws from three different distances (4, 5, and 6 m). Endpoint error (centimeter distance between the target center and the ball's endpoint) and gaze fixation (milliseconds) of eight areas of interest (AOI) were measured during each throw. Results: Correlational analyses indicated that only the 4-m distance endpoint error had significant correlations with gaze fixation of relevant AOIs such as the target center and ball (P = 0.026 and 0.015). Conclusion: We concluded that the eye-tracker is only reliable with measurements taken from a 4-meter distance. As distance increases gaze fixation of relevant AOIs does not correlate with endpoint error.

Mindfulness Practices on Test Anxiety

Our research's purpose is to find out if mindfulness practices have an impact on test anxiety. To do this, we have two groups (waitlist control group and the mindfulness group) that we'll be looking at over two 5 week periods. We will be giving assessments to measure their test anxiety scores before and after the 5 weeks.
Effects of TRX Suspension Training on Army Combat Fitness Test Scores
The purpose of this study is to determine the effectiveness of TRX Suspension Training Programs in improving test scores on the Army Combat Fitness Test (ACFT). The ACFT, which replaced the Army Physical Fitness Test (APFT) in October 2020, is a new test designed to assess soldiers' combat readiness. Soldiers must pass the test once every year in order to maintain their position in the Army or Army National Guard. This study is implementing a 12-week TRX Suspension Training Program to determine its effects on ACFT scores. If improvements are shown to be significant, TRX Suspension Training Programs may be distributed to all recruits in the Army and Army National Guard for training purposes.

Gender Representation in the Doctor Who Universe: The Fan Reactions to the Thirteenth Doctor
A fandom is a group of people that share a similar interest, whether it be a genre, book, or a piece of media. The BBC TV Show Doctor Who has a fandom with a 60-year history of the dynamic between a male protagonist and female companion, but recently changed that dynamic to a Female protagonist and a mixed group of companions. My research examines whether the gender of the Doctor plays a role in how the fandom perceives the protagonist. From my research of the Doctor Who fans on Twitter, I have observed that, though there is a lot of contingency, most Doctor Who fans agree that casting a female Doctor is admirable, but the show needs to improve its portrayal of the female character and relationships.
Poster # 53
Primary Author Taryn Saunders - Undergraduate
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Personal Narratives of Depression and Anxiety Among College Students
Struggles revolving around mental health are seen abundantly today. In this research, I specifically looked at college students to understand this issue. Moving into college is a drastic life change for young adults. As it brings new lifestyles with new routines, away from the people individuals have spent their entire life with, it has the potential to bring hardships. Following moving into college, depression and/or anxiety is prevalent among students. In this study, I conducted narrative interviews with two college students at UNCW who have struggled with depression and/or anxiety as they came to college. Through these interviews, I found common themes that emerged. As a result of not living with a support system for the first time, states of depression and anxiety emerged. Additionally, I found a theme that students are preparing themselves by talking about depression and finding ways to prevent it by working towards responding ahead of time in various ways.

Poster # 54
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Using Virtual Reality to Determine Implicit Bias
We are using a virtual reality game to try to better understand implicit bias. In this study, participants walk back and forth in a virtual reality experience that presents them with an obstacle, a human differing between race and gender, and we observe their avoidance to said obstacle. After measuring their avoidance behavior, we conclude with a survey to determine any correlation between their actions and self-perceived biases. This type of study fundamentally differs from previous implicit bias tests as it is the first to include physical actions as a factor instead of just relying on association tests. The results can also benefit researchers who intend on discovering how a virtual reality experience can be translated into real life.
Defining the Movement of Free-Ranging, Adult California Sea Lions

California sea lions are a species found off the west coast of North America. Our research specifically studies adult female California sea lions and their diving patterns when foraging. Female California sea lions are highly active and are able to dive at depths exceeding 500 meters. During these dives, the sea lions' lungs will collapse under pressure allowing them to descend to lower depths and drift strategically in order to avoid predators and obtain food. The first goal of our research is to be able to recognize movements, specifically a snake-like pattern, from five different female California sea lions. We will then create plots in order to see the movements of the sea lions and classify any particular patterns shown.

Using Artificial Intelligence to Predict Patient Electronic Health Record Access Points

Electronic Health Records (EHRs) have been helpful in many ways, however they are often split, resulting in difficulties for patients seeking access their complete medical record. In the course of our analysis, we discovered the average for 11 counties within the Coastal Carolina Health Information Exchange (CCHIE) was 1.82 EHR per patient. Using predictive analysis and machine learning methods, we delved deeper and discovered differences in age class and ZIP code, which resulted in different access to EHR per patient. Due to inconsistencies and the volume of data, additional analysis is ongoing.

Using AI to Predict Caregiver Ability to Self-Manage Chronic Illness When Caring For Children With Special Health Care Needs

The children with special care can easily be treated if parents take care of them. These factors can be pushed further when the parent caring for the child also must treat an illness and care for themselves. It happens sometimes that parents also suffer from chronic illness or depression. The purpose of this paper is an analysis of data collected from a variety of respondents might show a predictive correlation between both the severity of child and parents’ illness to the impact those factors both have on the parents life.
Facial Analytics: Analyze Facial Images for demographic and cultural bias using AI
In recent times, widely used machine learning algorithms in real-time applications have been proved to be discriminating based on categories like gender and ethnicity. This was mainly because of running machine learning models on a dataset which doesn't contain equal representation of the categories present. As a result of this, the bias in the dataset was due to the problem of class imbalance. A balanced dataset, where each class has equal representation, governs stable performance of an algorithm. Keeping in mind this behavior pattern, for our face and gender detection project, we aim to collect images from countries in various regions like Eastern Europe, North Africa, East Asia, Middle East etc. Both female and male images are gathered from Google knowledge graphs, for validity of the images we consider popular individuals like actors, politicians, musicians, athletes etc., from regions around the world.

Using AI to derive insights from American Hospital Association survey data
The American Hospital Association's (AHA) survey data is a valuable asset for health services researchers. The AHA's Annual Survey data gives utilization details of hospitals in different regions: admissions, births, surgeries, staffing, physician arrangements, hospital service lines and facilities, organizational structure, and affiliations. However, since the variables that are required are vast and change or add very frequently, there is a pressing need to have consistent data and a structure to be followed.

Using AI to Predict Caregiver Ability to Self-Manage Chronic Illness When Caring For Children With Special Health Care Needs
The children with special care can easily be treated if parents take care of them. These factors can be pushed further when the parent caring for the child also must treat an illness and care for themselves. It happens sometimes that parents also suffer from chronic illness or depression. The purpose of this paper is an analysis of data collected from a variety of respondents might show a predictive correlation between both the severity of child and parents’ illness to the impact those factors both have on the parents life.
Meet at the Table
We are developing an AI environment simulation to observe the principle of shooter bias within participants. This will be completed by rendering an environment that the subject can interact with and presenting them with a scene and a target, based on the immediate judgment they will have to either shoot or not. The environment, subject, clothing, and object held are all variables that will be changed to observe correlation. This is being observed over race, socioeconomic class, environmental socioeconomic class, and potential threat to the subject. We are expecting to find a correlation between the subject, the target, and their bias to shoot or not based on the variables given.

Using Artificial Intelligence to Detect Falls
This work aims to apply both traditional machine learning approaches and deep neural networks in the field of human activity recognition. A multi-modal approach is used to identify falls both as they happen as well as in whole videos. The models use camera data from a single position as well as three-axis accelerometer data to identify falls. This paper aims to present possibilities for an easily implementable model using affordable data sources and limit the burden on healthcare staff by mitigating false-positive results. The traditional machine learning models used returned an accuracy of around 80% but resulted in many false positives due to the unbalanced dataset. Because of this, a deep learning approach was used. In this deep learning approach, the accuracy was higher at around 85% and, importantly, the model returned fewer false positives with a precision of 95% for the frames where a subject had fallen.

Discovering Children's Perceptions of Covid through Drawings
For my project, I will be discussing the effects of COVID-19 on young children. I will be doing this by analyzing drawings that children have made. These children were told: draw me a picture of what you think of when you think of COVID-19. Along with Dr. Jones, I have gathered drawings of children from preschool through fifth grade. We are comparing these drawings with a code to discover common themes between all of the drawings.
Refined Oil in UNCW Campus Ponds

The goal of this research was to examine the extent of refined oil pollution in ponds on campus to provide insight into the runoff generated from our campus. Refined oil is used for motor engines and frequently leaks onto the ground. Refined oil is made up of Hydrocarbons, Phenoxides, and contains heavy metals, all of which are dangerous to animals and humans alike. Once this contaminant enters the groundwater, it poses a threat on the watersheds nearby. The watersheds in Wilmington drain either into the Cape Fear River, or the Intracoastal Waterway, both of which lead to the Atlantic Ocean. One set of samples was taken during a period of everyday drought conditions, and another set was taken immediately after a large rain event. The data showed overall higher refined oil content during drought conditions, which may be explained due to the rainfall that diluted the oil content. The results showed that the sampling locations in proximity to parking lots had higher levels of refined oil when compared to locations further from parking lots or roads.

The Effects of Shifting Habitat Types on Red and Grey Foxes

Grey (Urocyon cinereoargenteus) and Red foxes (Vulpes vulpes) are habitat generalists, capable of surviving in most habitats present in North Carolina if given enough range. The goal of this study was to determine the effect urbanization and fragmentation had on fox abundance in North Carolina from the years 1991 to 2016. To do this, population data for foxes, evaluation of landscapes, and the correlation between the two needed to be found. Preliminary results of fox abundance suggest high clustering of the population in the North Central region of the state. Results regarding the correlation of fox population to landcover change have not been calculated yet but are predicted to be inversely proportional for Grey foxes.
Quantifying Nonpoint Source Discharge into Tidal Creeks from UAV Thermal Imagery in Ogden, North Carolina

Non-point source (NPS) pollutants continue to be regarded as the major cause of impairment to US surface waters. Submarine groundwater discharge (SGD) is a primary transporter of these pollutants within tidal creek systems. Thermal imagery collected with unmanned aerial systems (UAS) provides a promising approach to identifying source of non-point pollutants that are occurring via SGD. UAS has been used more often to assess SGD's spatial and temporal variability. Thermal imagery of a tidal creek system was collected by a fixed-wing drone equipped with a thermal camera after several large precipitation events in Ogden, North Carolina. Six monitoring wells have been installed along a transect over a known artesian spring within the tidal inlet to establish a groundwater flow rate. Preliminary results show there is a correspondence of temperature from loggers and thermal imagery. Combining the UAS thermal images with on-site sampling enables one to identify SGD occurrence and determine fluxes of SGD. Thermal infrared mapping can thus serve as a powerful tool for study of SGD and other coastal processes.

Hatred in Harry Potter: Is Antisemitism J.K. Rowling's Legacy?

In the Harry Potter series, J.K. Rowling used a strong Holocaust allegory to attempt to teach morality and the nature of evil to young people. However, the presence of antisemitic stereotypes in Rowling's writing possibly negated this attempt. In Harry Potter, the main villain, Voldemort, was based on the ideas and personality of Adolf Hitler, and the rhetoric and persecution of Muggle-born Wizards were based on the methods and ideology used against Jews in WWII. While Rowling used these allegories to build her world, she also included antisemitic stereotypes in her Goblin characters, who control the Wizarding World's banks, are considered greedy and untrustworthy, and have prominent noses and swarthy 'Jewish' features. Because popular media influences many, in order to stop the spread of antisemitism and antisemitic hate crimes, these problems must be noted and recognized as antisemitism.
On experiencing and fighting injustice in America's Concentration Camps

My project addresses the impact of Japanese WWII incarceration and considers the long-term effects on the regions. Research on this topic often focuses exclusively on statistical impact or individual accounts. This project seeks to blend both approaches. My research question asks how personal experiences were shaped and what emergent economic trends came from internment and litigation surrounding internment. In seeking to address this question, I reviewed historical records, the novels of Julie Otsuka, and various bibliographies focused on the subsequent Error Coram Nobis litigation seeking the abandonment of the Korematsu verdicts. Additionally, my research included visits to important historical sites, including the Little Tokyo in LA, The Manzanar Internment Camp, and the Japantown in San Francisco. My project motivates the view that Japanese Incarceration still impacts the economic and legal landscape in substantial ways of potent interest to both scholars and laypeople.

Commonalities in Indigenous Language Revitalization: A Systematic Literature Review of Practices, Barriers, and Measures

Language revitalization is becoming an increasingly important effort as Elders and other speakers age. However, despite there being numerous studies examining revitalization efforts, there is a gap in the literature regarding common revitalization methods and barriers, as well as regarding assessments and measures for revitalization projects. This paper aims to address those gaps via a systematic literature review of studies, articles, and papers on language revitalization. I focus specifically on the three areas mentioned above: revitalization methods, barriers to revitalization, and measurements of revitalization efforts. Through my research, I have identified five categories of modality that language revitalization efforts fit into, as well as three categories that revitalization barriers fit into at the local level. I have additionally recognized that there is a gap in the literature surrounding measurements for revitalization programs, particularly evaluations by and for Indigenous people.
Whiteness and the Recession

David Roediger's writing in his book The Wages of Whiteness, which centers around the historical formation of white identity in the U.S. working class, argues that whiteness and the privileges that come with it function as a psychological "wage" that compensates the otherwise low wages received by working class whites. Using this theory of the psychological wage of white identity as a guiding framework, I analyze four articles on race published in mainstream news media from 2009-2012. This period is significant for white identity because white working class citizens were facing the election of the first Black president, a nationwide recession, and an increase in data suggesting that the United States would become a "majority minority" country in the next few decades. The four articles consist of 'The End of White America?' by Hua Hsu for The Atlantic, 'The Recession's Racial Divide' by Barbara Ehrenreich and Dedrick Muhammad for The New York Times, 'What's Driving President Obama's Agenda?' by Glenn Beck for Fox News, and 'Are whites racially oppressed?' by John Blake for CNN. Through an analysis and comparison of these articles and the basic assumptions that they bring to the discussion, we can assess the opinions shaping the public understanding of whiteness in the years following the recession.

Following in the Footsteps of 19th Century Mediums in Boston: A Wentworth Scholarship

Following in the Footsteps of 19th Century Mediums in Boston

Recently, on a road trip to Charlottesville, I started listening to the Parcast podcast 'Mediums' on Spotify. I never thought much about mediums before—besides obsessing over the quirky medium characters in Maggie Stiefvater's YA series The Raven Cycle, but this podcast fully invested me in the world of nineteenth-century spiritualism. 'Mediums' focuses on a different prominent medium from the nineteenth century in each episode, explaining their greatest accomplishments and if they were ever debunked.

I consider myself a bit of a skeptic when it comes to the world of spiritualism. I have always scoffed at the idea of modern-day mediums, but it was fascinating to learn the origins of medium-ship as we know it today and how popular it really was in the Victorian era. I also loved how this podcast took a feminist approach to study these women. Most mediums were women, and if they became successful enough, they were able to support themselves completely through their craft. Even if their craft was fabricated, it is pretty impressive to me that these women came up with a way to make a living that for the most part, helped people. After the Civil War, people were desperate for a way to make peace with the loss of their loved ones. Mediums provided this space for them. Additionally, many mediums didn't charge for their services, instead of supporting themselves through donations. The nineteenth century's mediums' biggest critics were usually men, including the infamous Harry Houdini who made it his mission to debunk as many
mediums as he could. This was especially hypocritical, seeing as Houdini learned some of his best tricks from male mediums he was friends with.

For my Wentworth trip, I would like to visit Boston, Massachusetts to walk in the same footsteps as some of the biggest figures in this movement. I will base my itinerary on spots featured in Dee Morris’ Boston in the Golden Age of Spiritualism: Seances, Mediums, and Immortality, as well as a few spots based on mediums I am interested in. Leonora Piper, the only trance medium in the nineteenth century to never be proven wrong, lived in Boston for a large portion of her life. This is where she was studied meticulously by William James and Richard Hodgson of the Society for Psychical Research. The Society for Psychical Research focused on a scientific approach to studying supernatural phenomena, and its interactions with Piper are told in Deborah Blum’s Ghost Hunters: William James and the Hunt for Scientific Proof After Death. Hodgson experimented on Piper in her Boston home on 40 Pickney Street in Beacon Hill to the point of physically pinching her while she was in a trance to see if she would reveal her bluff. She never broke, but after he nearly poisoned her, she refused to be an experiment for a period of time. Piper fascinates me because, for the longest time, she refused to embrace her gift, ashamed of how people looked at her when she said she could hear from the dead. However, after people kept seeking her out to bring them solace, she finally agreed to regular sittings. She never charged her clients, though.

Given the chance to visit Boston, I plan to read as much about Leonora Piper as I possibly can, starting with Michael Tymin's Resurrecting Leonora Piper: How Science Discovered the Afterlife. I would like to see the outside of Piper's house in Boston and perhaps journal on the view she would have seen outside her window. I think Leonora Piper's story and her relationship with Hodgson could make a great play or book of poetry. I plan on using this Boston trip to fuel inspiration for me to create some sort of long creative work.

Another medium who lived in Boston in the same area as Leonora Piper was Mina Crandon, otherwise known as 'The Witch on Lime Street.' She lived on 10 Lime Street in Beacon Hill. She is famously known for her rivalry with Harry Houdini who was intent on proving her powers wrong (which he eventually did). I would like to visit the outside of her house as well, continuing with my journaling exercises.

Finally, some other things I would like to do are one, go on a Boston ghost tour to perhaps encounter my own supernatural activity; two, visit the First Spiritual Temple on Exeter Street; three, visit the Boston public library and look into the spiritualism archives; and finally, view the Harvard Bridge where Houdini performed one of his most famous stunts: jumping off the bridge in chains.
Wilmington's Old Longleaf Pines

Longleaf pine ecosystems with mature, old trees were once abundant along the coastal plain of the Southeastern United States. Unfortunately, due to various harmful human activities (e.g., the naval stores industry, logging, etc.), these once thriving ecosystems are now rare. This research is part of a larger project that aims to identify and study old-growth longleaf pine trees that remain around the Cape Fear Region. For our portion of the project, we collected increment cores from two seemingly old longleaf pine trees at Cameron Art Museum and determined their age and life history using tree-ring science (dendrochronology). Both trees are over a century old, confirming their longevity. We also observed interesting relationships between historical climate and tree-ring growth. Our findings can be used to educate the community about the importance of the longleaf pine ecosystem and of protecting and preserving old trees.

Sea-level Rise Impacts on Carolina Beach State Park

Protected coastal areas are constantly changing and very hard to sustain and maintain because of the environmental factors that come with climate change such as sea-level rise, higher intensity storms, and erosion. They serve many purposes such as recreation, education about the coastal environment, and research. These are just a few examples of why people care so strongly about these areas and the impact if these areas decline over time. The coastal area I will be focusing on is Carolina Beach State Park. Carolina Beach State Park is a 761-acre park located 10 miles south of Wilmington and borders the Cape Fear River. I will be presenting a comparison of modeling estimates and projections of what the park is going to look like over time due to sea-level rise driving wetland habitat loss and ecosystem change. One set of projections results from a modeling effort by Dr. Eulie and the CES lab and the other set of projections will come from NOAA and the Pew Charitable Trust. The method used by the lab to model the amount of habitat loss was the Sea Level Affecting Marshes Model (SLAMM). The model was run using four scenarios based on the project goals: IPCC A1B, and the three recommend scenarios from the North Carolina Coastal Resources Commission Science Panel (0.4 m, 1.0 m, and 1.4m). Preliminary results for these scenarios show a tipping point in ecosystem state change by the year 2050 and conversion of freshwater wetland habitats to transitional and tidal saltmarsh habitats. In the future, I will also be going to the park and utilizing both GPS and drone flights to provide field validation of the model.
Environmental Justice in North Carolina: Impacts of Swine Concentrated Animal Feeding Operations Activity upon Cape Fear River Basin Communities

Increased demands for meat have shifted farming practices from smaller farms to highly compact industrial farms, or concentrated animal feeding operations (CAFOs). Although CAFOs have increased animal production, the consequences associated with CAFOs are often detrimental to the surrounding communities. Such concerns are present in North Carolina, the second-largest producer of swine in the United States. The Cape Fear River Basin in North Carolina is home to most swine CAFOs in the state. Our research examines how swine CAFO abundance and proximity impact human wellbeing. The impact on human wellbeing was examined through human health, socioeconomics, and geography. Our analysis utilized multivariate regression coupled with geographic weighted regression to examine the degree to which CAFO presence and proximity influenced human wellbeing. Based on preliminary statistical data analyses, socioeconomic disparities and health impacts are expected to correlate to CAFO presence. Our initial analysis suggests that CAFOs proximate to communities leave citizens vulnerable to an overall lower wellbeing.

From Vegetables to Vaccines

This study aimed to further examine the political, geopolitical, and public health relations between China, Russia, The United States, and the rest of the world. Many hours were spent scouring sites like JSTOR, The New York Times, and educational journals to find relevant information. To create this research, information taken from these sites was mixed with interviews, speeches, and some of Dr. Morris's personal experiences from a past trip to Guatemala.
On Some Structural Properties of a Zero-Inflated Negative Binomial Distribution with Applications

In modeling discrete count data, quite often there is a presence of 'excessive zeros' which cannot be adequately modelled by either a Poisson and/or by a negative binomial distribution. This calls for new probability models to address the issue of this 'excess zero problem'. In this project, we envision a scenario in which a Zero-Inflated Negative Binomial (ZINB) distribution will be appropriate to model the discrete data with excessive zeros. We particularly focus on several structural properties, including but not limited to limiting behavior, moments, measures of skewness and kurtosis, and order statistics. During this course we will also discuss and possibly provide a framework to estimate the model's parameters under both the classical and Bayesian paradigms. This distribution has several applications in many domains, namely in modeling lifetime data analysis, where observations are quite often censored (such as a patient's record) due to various plausible reasons.

Bi-Lipschitz mapping on a Space of Orbits

The project focuses on the idea of phase retrieval, where we look to understand the properties of an actual object through its projection onto another dimension. An excellent example would look into understanding the properties of a three-dimensional bone structure by observing its two-dimensional x-ray image.
An Analysis of the Lotka-Volterra Model With Migration
The basic Lotka-Volterra model is a pair of first order, non-linear differential equations that attempts to model the predator-prey interaction between two species, but to create the model, several assumptions had to be made. One of which concerns the idea of the two species interacting in an ideal closed habitat. By modifying our model to include a migration factor, we are able to determine the stability of our system and compare to the basic Lotka-Volterra model. By doing so, we show that by adding our migration factor the modified model begins to stabilize more frequently for immigration, but destabilize more frequently for emigration. We then use numerical simulations to show the stability results along with providing phase portraits to show an asymptotically stable trajectory. Further explanation on the ecological outcomes will be given at the poster presentation.

Is the Satanic Temple a religion?
The purpose of this study was to identify what makes The Satanic Temple (TST) a religion, its impact in law and its relationship to politics. What Christians believe is a religion and what makes a religion under the law are different. Religious scholars do not define religion as belief in something. Scholars define religion as a material practice and culture, as well as how an individual lives, feels, smells, hears, and sees. This suggest in law, religion is not defined as belief. Thus religion, Satanism, law, and politics are all intertwined.
**Masonboro Inlet Sand Deposition Basin Efficiency**
A study was undertaken to investigate the performance of the weir jetty and deposition basin efficiency from mid 1950’s to 2020 of Masonboro Inlet jetties and Wrightsville Beach. Analyzing dredging records, collecting shoreline change data for Wrightsville Beach and Masonboro Island from historical aerial photography, satellite imagery, stored shorelines within GIS databases and evaluating spatial changes on both beaches over time relative to location of inlet and jetties were completed. The shoreline position data and generic wave heights and directions were used in the CERC formula to calculate longshore sediment transport to evaluate temporal changes. Although varying dredging activity occurred in the inlet, no significant changes of shoreline orientation or sediment transport were found. Further tests of other variables will be conducted to gain a better understanding of effects.

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**Simulation of Float Body Motion Under Waves Using FLOW-3D Model**
Wave interaction with floating bodies is a topic that holds vital information for coastal and oceanic engineering, understanding its methodology and processes can help with preparation and execution of specific coastal designs, increasing the projects efficiency and ultimately saving both time and money.

Model and data validation concerning non-linear waves, and its interaction with a small floating box, are investigated within a numerically generated wave flume using the computational software FLOW-3D and FLOW-3D POST. The parameters given in Dr. Ren's 'Nonlinear simulations of wave-induced motions of a freely floating body' are identical to those that are set in the FLOW-3D model for both consistent and valid results. The components of the model that are being validated consist of four elements: wave elevation, sway, heave, and roll under two different wave conditions. The floating box’s location and wave surfaces are also tracked throughout the numerically generated flume at specific time periods, which are then compared to the reference figures found in Dr. Ren's paper, contributing to a physical, measurable assurance of the validation model and its processes.
Continuous beach morphology observations under active storm forcing using 3D LiDAR

Winter Storm Kenan (as unofficially named by the Weather Channel) hit the southern Outer Banks of North Carolina on Saturday, January 29, 2022. Kenan was preceded by two other significant erosive events in January 2022, which cumulatively led to major erosion, dune scarping, overwash, ocean and soundside inundation, and windblown sand. The NSF-funded Nearshore Extreme Event Reconnaissance (NEER) Association deployed a field team to Rodanthe ahead of the storm to observe the storm impact on the barrier island communities. On February 9, one house collapsed into the surf zone due to continued post-storm erosion, with several other houses declared uninhabitable by Dare County. Two 3D LiDAR scanners with overlapping fields of view measured the beach morphology (erosion and post-storm accretion) every four minutes from January 29 - February 3. Two wave gauges deployed on a nearby pier measured wave transformation along the LiDAR survey region.

Simulation of wave breaking over coastal structures using FLOW-3D model

This study looks at solitary waves breaking and overtopping on a seawall. In this research study solitary waves are used to model tsunami waves to further our understanding on their interaction with coastal structures. The data used in the study came from the wave flume in Tainan Hydraulics Laboratory (THL), National Cheng Kung University. The model was then validated using Flow 3D so that we could further our research. Through concentrating on three different wave conditions we were able to learn more about overtopping volume and flux. It is pertinent for us to understand more about tsunami interaction with coastal structures so that we can design better protection from them.
A 3D Printed Optical Granulometry Grain Size Analysis Camera System, SediCam

Sediment grain-size analysis is a first-order aspect of coastal science as it can expose important coastal processes such as susceptibility of transport, erosion, and therefore morphological change. Conventional laboratory approaches for identifying grain size distribution and relevant statistics such as sorting, skewness, and kurtosis on sandy beaches is laborious and can be expensive (e.g., laser diffraction and sieve analysis). In contrast, optical granulometry derives grain size statistics from images, which can surmount both the time and expense of traditional grain size analysis methods. Here we embed computational methods for optical granulometry on a low-cost portable camera system running on a Raspberry Pi 4, making sediment statistics instantly available in the field. We call our tool SediCam, which is encased in a fully 3D printable enclosure, with a touch display screen. SediNet-Cam implements two existing, tested optical granulometry methods, pyDGS (Buscombe, 2013) and a convolutional neural network (SediNet; Buscombe, 2019). This approach is not only highly accurate compared to traditional methods but also fast. Preliminary experiments show percent errors as small as 0.4% and take mere seconds to compute. In addition, the SediCam does not require calibration, boots up in seconds, and will save GPS coordinates, time, and relative user-chosen statistics for each photo and grain size analysis. This makes the SediCam capable of doing sediment analysis on large swaths of beaches relatively quickly, with near-instantaneous results. A user manual, bill of materials, and ‘.stl’ 3D printing part files are all available on GitHub (https://github.com/UNCG-DAISY/SediNetCam).

Grant Methodology for a Pilot Study of Short-Term Alcohol Abstinence in College Students

The present poster summarizes the grant writing methodology for a proposed pilot study of short-term alcohol abstinence in college students. This poster describes the steps taken to develop a grant proposal to examine how short-term alcohol discontinuation may impact the adverse effects of heavy alcohol use on brain function. Heavy alcohol use is defined in this study as two binge drinking occurrences per month or daily drinking of three or more drinks. Past research has found that short-term abstinence from substances has positively affected adolescents and young adults, especially those with heavy substance use. The poster is meant to display the process of grant development for this pilot study. In working on this grant, researchers wrote a grant abstract, budgeted for materials and compensation, identified relevant background research, determined study hypotheses, and identified methodology for the proposed pilot study.
Peer Aggression and Prosocial Behavior in Child Witnesses of Intimate Partner Violence
We assessed how witnessing IPV and provocation affected decisions to engage in prosocial or aggressive behavior during peer interaction in children ages seven to 13. Children who had witnessed IPV chose to aggress more, regardless of provocation status. Treatment implications for child witnesses of IPV are explored.

Exploring incidence of PTSD symptoms in the NCANDA sample
I am exploring the incidence of lifetime PTSD symptoms from the NCANDA sample within adolescents and racial minorities. Past research has shown that there are no differences between racial minorities and PTSD along with other studies that have shown major differences between racial minorities and their likelihood to acquire PTSD compared to majority groups. Therefore, with this poster, I will be examining data from the multi-longitudinal study NCANDA site and determining differences between racial minorities and their likelihood to acquire PTSD compared to majority of the population. I hypothesize that racial minorities will be more likely to develop lifetime PTSD symptoms than those who are in the majority of the population.

Obesity and Stroke: An Experience in Histology
The brain is a complex organ and behaves in ways that researchers have yet to completely understand. One area of interest is how obesity influences stroke. Obesity is a serious chronic inflammatory disease. People who are obese are 65% more likely to have a stroke, and the infarct damage caused by stroke in obese individuals increases in volume. All of these processes are rooted in small cells in the brain that participate in neural-immune response and neuroinflammation. Little is known about how microglia and astrocytes interact within the brain and with its environment. Much research is still needed to understand how these cells perform some of the most important functions of our brain. This project will outline the process of assessing neuroinflammation and infarct size in the context of obesity and stroke. The effects of stroke and neuroinflammation can be mapped by tracking the activity of glial cells in the brain, one route being through mice.
Do 'Dark' People Want 'Dark' Partners?: Dark Traits and Ideal Partner Preferences

For the vast majority of human population, a major event in our lives is to find a relationship partner through the pursuit of our ideal partner images. Our own qualities and traits impact who we desire as our partner. But what does this mean when it comes to the negative traits? Dark Traits refer to the dark side of personalities, primarily consisting of three major traits, Narcissism, Psychopathy, and Machiavellianism. Little research examining how Dark Traits impact the type of partner individuals desire. This study aimed to explore whether individuals desire a partner more similar or complimentary in terms of their Dark Traits. A voluntary sample of 1,017 participants completed an online survey and reported their Dark Traits, their ideal partner's Dark Traits as well as their Big Five personality traits and gender attitudes. The results revealed that participants' own Dark Traits were strong predictors of their ideal partner's Dark Traits, over and beyond their Big Five traits and gender attitudes. However, while there was moderate evidence for similarity, there was also some indication for dissimilarity in the preference of a partner's Dark Traits.

Interrater Reliability Among Experiments With Rats

In my research I studied interrater reliability among different studies with rats in the psychology department. This means I watched videos of trials different students had run, and rescored their data to see how accurate their recordings were. These trials were experiments on the memory and cognition of rats, whether it be flavor trials or drug tests. The scoring I did contained categories such as stimulus visits, latency, and whether or not the rat was successful. I used the same data sheets as the original tester, and compared the two sheets to see how accurate the original tester was when they were collecting the data. That is what interrater reliability is, essentially a double check to ensure that the information presented is accurate.
Fear of Being Cancelled: How Rumination may Preclude Authentic Growth

‘Cancel culture’ is a movement aimed at holding people accountable for their problematic behavior (e.g., de-platforming individuals in a position of power/influence who abuse that privilege or hold prejudicial beliefs). Though the original intent of this movement has merit, unintended consequences have been observed (e.g., greater avoidance of social topics or marginalized groups, performative activism). To better understand the complex effects, our lab developed a measure to assess individuals' fear of this new wave of social ostracism. In an large, unselected sample, we found 'intolerance of uncertainty' to be highly related to fear of being 'cancelled' (e.g., consequences to themselves, related avoidance). Further, ruminative thought style fully mediated this observed relationship. Thus, while self-reflection is important and can lead to positive changes in one's behavior, rumination may problematically enhance fear and unproductive behavior for those less able to tolerate the uncertain climate and may inadvertently preclude authentic growth.

A Study of Undergraduate Sleep Habits

Sleep is critical for undergraduate students, as it is fundamental in memory consolidation and impacts quality of life. There has been a remarkable shift in daily living with the onset of COVID-19. Since the beginning of the pandemic, there has been an increase in lack of work-life balance, stress levels, and isolation. These issues have the potential to disrupt sleep. Therefore, we wanted to explore sleep habits of undergraduate students. Through survey responses, we found that students were sleeping around 7 hours per night, on average (M= 3.26, SD= 1.30), which is comparable to undergraduate students at other institutions (Williams et al., 2020). Most participants found some level of difficulty falling asleep (90.79%). Trouble falling asleep could be indicative of mental health issues. We found a strong, negative association between high depressive symptomology and trouble falling asleep, r(74)= 0.49, p<0.001. This information will be used to guide future research.
Comparing Preference Hierarchy and Behavioral Economic Demand for Food Choice

It is important to understand the choices individuals make regarding food consumption, as food is a pathological reinforcer that contributes to trans-disease processes such as obesity (DeHart et al., 2020; List & Samek, 2015). The concept of reinforcer pathology suggests that problematic overvaluation and excessive delay discounting of certain reinforcers, such as food, underlies a variety of maladaptive health behaviors and contributes to various health issues. As the US is currently ranked 12th in the world for obesity, and obesity increases the risk of other health conditions, research and intervention improvements are crucial (Rozin et al., 2011; Senthilingam, 2021; CDC, 2021). The present study used behavioral economics and behavior analytic preference assessments to examine different aspects of food choice. One hundred and thirty-eight U.S. adult participants were recruited from Amazon Mechanical Turk (mTurk) (N=59) and the psychology department's Sona Systems (N=79). Correlations were used to compare individual demand intensities (i.e., Q0 or the highest amount of food consumed at $0) with preference ranking for 10 foods.

The relationship between views on cancel culture and beliefs

Recent social justice movements have created new standards of accountability and accompanying consequences for engaging in hurtful or problematic actions. There has been little research on this new form of social ostracism (i.e., 'cancel culture'); we were interested in participants' perspectives on 'cancel culture' as it relates to underlying prejudicial belief systems. In a large community sample (N=488), two groups emerged: one group viewed the impact of cancel culture as more negative than positive and the other group reported nuanced/ambivalent views (i.e., more positive, equally positive and negative, or no opinion) on the subject. Compared to the latter group, those who viewed cancel culture as negative were more likely to endorse symbolic racist beliefs and less likely to endorse positive attitudes towards sexual minorities. People in this group also reported less concern about potentially hurting or offending others and were more likely to avoid conversations about social movements.
**Poster # 95**

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### Delays and Their Effect on Working Memory in Rats

The Odor Span Task (OST) is commonly used in animal models for developing treatments for working memory loss. In the OST, the selection of session-novel odors results in reinforcement. We separated 24-trial, daily OST sessions into two halves, with delays (0min, 10min, 60min, 240min) inserted midsession. On each trial of the second half, choices consisted of session-novel odors and an odor presented in the first half and another presented in the second half of the session. Most rats made few errors in the second half of the OST after 10min delays, while in two accuracies were impaired. All but the two rats did not show significant decreases in accuracy until the 60min delay. When errors were made, they were consistently to the least familiar odor. These results were compared to previous delay research in our lab to underscore the utility of the OST as a memory model.

**Poster # 96**

Primary Author  Alex Shelton - Undergraduate  
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### Decarbonizing the Supply Chain: A Case Study of a Starbucks Coffee Bean

The freight transportation sector is one of the largest contributors of carbon dioxide (CO2) emissions (a major greenhouse gas), and as such, much effort has gone into understanding how different supply chains affect these emissions. The purpose of this research is to conduct a case study that evaluates the CO2 emissions associated with a global supply chain: the movement of Starbucks coffee from Addis Ababa, Ethiopia to Wilmington, NC. Using mapping techniques and emissions analysis that addresses different modes of transportation, the research explores CO2 emissions along multiple legs of a coffee bean's supply chain network. Results from this case study indicate that upwards of 4.7 pounds of CO2 are emitted from the transportation components of the supply chain for every pound of coffee delivered. These results demonstrate and help inform further research and policymaking related to the opportunities for decarbonizing the supply chain for consumer goods.
Food Insecurity Among College Students

This semester, I had the opportunity to learn about food insecurity among college students generally, and the COVID-19 pandemic’s impact specifically. I learned how to conduct interviews and analyze qualitative data through code interview transcripts for reoccurring themes. Dr. Waity, Dr. Huelskamp, and I are in the process of conducting interviews and focus groups to learn about the social and psychological effects of college food access among students at UNCW in an effort to more accurately measure food insecurity. We anticipate findings similar to those across other universities in North Carolina that we are working with, including limited nutritious food access and increased stressors related to food insecurity. In relation to the COVID-19 pandemic, we expect to see worsened or changed food access and increased dependence on government and university assistance programs.

Human Trafficking

This study examines Human Trafficking Courts in the United States and the use of the therapeutic jurisprudence model. The purpose of therapeutic jurisprudence, or Problem-Solving Court, as it is commonly called, is to keep individuals out of prison. While therapeutic jurisprudence is normally reserved for offenders with chronic reoffending, this model is used by human trafficking courts to treat victims. An analysis of court observations, interviews, literature reviews, and analysis of the victims’ criminal records is being conducted to better understand how therapeutic jurisprudence impacts victims.

Human Trafficking

Human trafficking is a global epidemic that has no solution, our goal for this research is to gather information in order to analyze the proceedings within the criminal justice system relating to the prosecution, sentencing, and rehabilitation of victims. The research conducted will reconstruct the knowledge around prostitution and trafficking of victims, with the goal of creating literature for educational purposes in order to maintain a safe environment for rehabilitation within the criminal justice system.
Poster # 100
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**Human Trafficking Courts**
This research investigates the new stance the United States Courts are taking on Human Trafficking. We discovered how the courts are changing the laws for how they are prosecuting traffickers. Throughout this research, restorative justice is a major theme of how offenders are being looked at in the courts. Victims are also a major priority of the court because of how vulnerable they are. By using literature reviews, we learned data on human trafficking within the United States. We also interviewed victims, judges, lawyers, and social workers to learn from their different perspectives. This subject is very important to learn about because research shows that if we do not take care of the victims and help them get out of the situation, they soon become the trafficker. Without stopping this cycle, human trafficking will never disappear.

Poster # 101
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**Who Should Speak for Us?: The Influence of Lived Experiences on the Outlook of Black Politicians**
Black politicians are frequently placed on a pedestal to speak on black issues. However, the way the black population views black issues is shaped by the way they view the black experience. Since time has shown us again and again that the black experience is not a monolith, I believe that black politicians don't inherently know the best way to approach black issues and should therefore not automatically be placed on this pedestal. To support my theory, I have selected twelve autobiographies from eleven senators and congressmen to code the language they use to describe the black experience and, consequently, how that influences their approach to resolving black issues.
Effects of orthography and cognate status on L2 Spanish lexical encoding
We examined learners' accuracy in storing Spanish sounds in cognates (words spelled similarly with the same meaning, e.g., 'human' and 'humano') and noncognates (e.g., 'people' vs. 'gente') specifically spelled with <g> and <h>. The letter <g> can be pronounced as in 'gym' in English, while it can be pronounced like a hard 'h' in Spanish. The letter <h> is typically pronounced in English, while omitted in Spanish. In the first task, participants heard words (stimuli) with either a real or fake pronunciation of a Spanish word given the aforementioned sounds, and they had to decide whether it was accurate. The second task had participants deciding between the two pronunciations of each Spanish word with the English and Spanish sounds, and they selected which was accurate in Spanish. We found that <h> and <g> noncognate words had high scores and possibly more accurate mental representations compared to <h> cognate words.