Welcome to the 10th UNCW Spring Student Research and Creative Scholarship Showcase

Sponsored by UNC Wilmington’s Center for the Support of Undergraduate Research and Fellowships (CSURF), the Honors College, Graduate School, Office of Undergraduate Studies, ETEAL, Academic Affairs, and Randall Library, the posters represent a variety of research areas in the arts, sciences, humanities, and professional areas, and there are examples from each of the Colleges and Schools. We are pleased to present both graduate and undergraduate research, plus several examples of graduate and undergraduate students working together with a faculty mentor.

Viewers will note special badges on select posters indicating that the authors are being recognized for special achievements. Among them are: Making a Difference graduate student awards, competitive CSURF Undergraduate Fellowships, receiving CSURF Travel Awards or Supplies Grants, or representing UNCW in the SNCURCS and CAA conferences. Look for these badges on the posters:

We are also highlighting research topics that have connections with the environment, global issues, health-issues, and service learning/community outreach.

Several undergraduate students will be recognized as UNCW Undergraduate Research Scholars and Distinguished Scholars because of their extended record of involvement in undergraduate research/creative scholarship on and off campus.

Enjoy the showcase!

Kate Bruce, Ph.D.
Director, UNCW Honors College & CSURF
Professor of Psychology

Tracy Chen, Ph.D.
CSURF Faculty Fellow
Associate Professor, Math and Statistics

Special thanks to:
UNCW Graduate School- Dean Ron Vetter & Nancy Holland,
Undergraduate Studies- Dean Martin Posey, Randall Library-
Sarah Watson, Christopher Rhodes, John Crawford, Printing Services, ARAMark Catering,

CSURF Graduate Assistants- Courtney Mauzy, Darryl Mott, & Catie Nealley, Honors Office Assistants, CSURF Faculty Advisory Board, and Honors College staff- Peggy Styes, Jeanne Harmon, Michael Mills, and Jennifer Horan.
ABSTRACTS OF RESEARCH/CREATIVE SCHOLARSHIP ON DIGITAL OR POSTER DISPLAY

--------

ALPHABETICAL LISTING BY PRIMARY AUTHOR
SECONDARY STRUCTURE OF TP10W, DL-1A, MUTANT PEPTIDES, AND RHODAMINE-LABELLED PEPTIDES
ANALYZED BY CIRCULAR DICHOISM

Circular Dichroism (CD) was used to analyze the secondary structure of multiple peptides. Rhodamine has been used as a fluorescent indicator in many studies, yet the activity of rhodamine as a probe has not been widely researched. In this study, rhodamine was analyzed through circular dichroism to determine the effect of rhodamine on the translocation of the attached peptide. Using the octanol-water partitioning coefficient method, the contribution of rhodamine to the free energy of the translocation of these mutant peptides was researched. Two parent peptides were used, DL-1a and TP10W, to be used as a comparison for when rhodamine is attached. A total of 10 peptides were analyzed by circular dichroism (CD): Ac-TP10W, Ac-TP10W-K19L, Ac-TP10W-K12/A18, LRh-TP10W, Ac-DL-1a, Ac-DL-1a-G4/K10, Ac-DL-1a-K26L, Ac-DL-1a-L11/K12, Ac-DL-1a-T18/K19, and LRh-DL-1a, with the number of residues within each parent and mutant peptide taken into account, with 21 residues for TP10W peptides and 26 residues for DL-1a peptides.

PATTERNS OF FINE-SCALE GENETIC STRUCTURE IN THE EASTERN OYSTER, CRASSOSTREA VIRGINICA

Despite its effects on critical features of ecological fitness, relatively little is known about the causes and consequences of genetic variation on important ecological processes. This is particularly true for benthic marine communities, where the competitive or cooperative nature of interactions is ultimately dependent upon the relatedness of neighboring individuals. However, fine scale genetic structure has yet to be assessed in the eastern oyster (Crassostrea virginica). Using ten genetic markers specifically designed for C. virginica, this project aims to characterize relatedness and fine-scale genetic structure in natural populations. Preliminary data reveals that there is significant genetic differentiation among oyster reefs located 20 meters apart, and aggregations of kin within reefs are higher than expected by chance. This fine-scale genetic structure could have a significant effect on critical aspects of performance. This research will provide guidance to fisheries management and restoration efforts, and aide in the design of marine protected areas.

TROPHIC TRANSFER OF MICROPLASTICS:
QUANTIFICATION OF UPTAKE FROM MICROZOOPLANKTON IN AN ESTUARINE LARVAL FISH

Microplastics, debris less than 5mm in diameter, are of increasing environmental concern in oceans worldwide. This small debris is dangerous due to its ability to be easily ingested, leach toxicants, and
bioaccumulate in sediments and organisms. This study focuses on the transfer of microplastics up a food web, specifically between microzooplanton and larval fish. A common marine zooplankton species (*Favella*) were exposed to fluorescent microplastics (10-20 microns). After the *Favella* consumed the plastics, they were then fed to larval fish (*Menidia beryllina*). Hundreds of individual microplastics were found in nearly half of the individual larvae sampled, being primarily localized in the gut area. This can cause multiple complications, like blocking of the digestive tract or a reduction in the absorption of nutrients from food. Our results indicate that microplastics can indeed be passed up the food chain, posing potential adverse health effects to marine organisms at multiple trophic levels.

Primary Author: Sarah Alexander  
Department/School: Marketing  
Faculty Supervisor: Tracy Meyer

THE EMERGENCE OF A SHARING ECONOMY:  
EXAMINING THE DRIVING FACTORS OF THE GENERATIONS BEHIND IT

The sharing economy, also known as collaborative consumption, is a newfound, technology-driven business concept in which consumers rent or share goods or services directly with one another rather than buy and own them. This in effect monetizes assets that are not being fully utilized. The emergence of collaborative consumption is fundamental for all businesses and consumers alike to understand. In this research we identify factors that drive individual's attitudes towards the sharing economy. Brief interviews were followed by a survey completed by 146 adults ages 18 to 69. In general, Millennial and Generation X participants were found to have a more favorable attitude towards the sharing economy. Overall, consumer trust, experience, and comfort with technology were proven to effect attitude. Standard corporate sentiment, consumer trust, comfort with technology, and experience on attitude were shown to be moderated by age group.

Primary Author: Ciera Ames  
Department/School: Biology and Marine Biology  
Faculty Supervisor: Amanda Southwood-Williard  
Environmental  
CSURF Travel Award

BLOOD BIOCHEMISTRY AND HEALTH ASSESSMENT OF KEMP’S RIDLEY SEA TURTLES CAPTURED BY RECREATIONAL HOOK- AND-LINE IN NORTH CAROLINA AND VIRGINIA

Despite the fact that recreational fisheries interactions have been identified as a threat to sea turtle recovery efforts, the frequency with which interactions occur and the level of sea turtle mortality attributable to interactions have not been well-characterized. In the state of North Carolina, numerous regulations are in place to reduce the number of sea turtles that are incidentally taken in commercial fisheries, however, no observer programs are in place for recreational fisheries and recreational fisherman are not required to report takes. The purpose of our study was to initiate efforts to document health status of sea turtles captured by recreational hook-and-line. These data will provide guidance on best practices for handling incidentally captured sea turtles, and as a basis for an initial assessment of the relative stress of capture in recreational versus commercial fishing gear. This pilot project will lay the groundwork for subsequent studies of post-release movements and a more comprehensive assessment of long-term impacts for sea turtles that interact with recreational fishing gear.
REPLACEMENT OF MENHADEN FISH MEAL PROTEIN BY GENETICALLY IMPROVED AND SOLVENT-EXTRACTED ULTRA LOW GOSSYPOL COTTONSEED MEAL PROTEIN IN THE DIET OF JUVENILE BLACK SEA BASS, CENTROPRISTIS STRIATA

Eight experimental diets were formulated and prepared to replace menhaden fish meal protein (MFP, 59.5% crude protein) by genetically improved low gossypol cottonseed flour protein (GLCP, 50.4% crude protein), solvent-extracted low gossypol cottonseed flour protein (SLCP, 53.8% CP) and untreated cottonseed flour protein (UCP, 45% CP) for juvenile black sea bass, Centropristis striata. Three test diets were prepared replacing 50, 75 and 100% of MFP by GLCP. Three other test diets were prepared replacing 50, 75 and 100% of MFP by SLCP. One diet replaced 100% FMP by UCP. A control diet (0% replacement) was formulated with high fish meal (40%) and other practical protein sources, including soybean meal, soy protein concentrate and poultry by product meal. Fifteen fish were stocked in each of twenty-four 75-L tanks (360 fish total), and each test diet was fed to triplicate groups of fish (mean weight = 7.7 - 0.10 g) for 56 days. Fish were fed twice per day (09:00 and 16:00 h) to apparent satiation. Apparent digestibility coefficients of protein and lipid was measured using chromic oxide (0.5%) in the diets following the feeding trial and fecal samples will be collected for analysis.

FIRE SUPPRESSION IN THE SIERRA NEVADA: MANAGEMENT EFFORTS AND ENVIRONMENTAL IMPACTS

The Sierra Nevada is part of the Cascade Mountain Range in the western United States. Most of the Sierra Nevada mountain range lies between the California Central Valley and the Basin and Range Province. It contains famous hiking destinations with peaks ranging from an impressive 11,000 to over 14,000 feet above sea level. Wildfire is a natural ecosystem component in the Sierra Nevada, but with development in the region came fire suppression, which has far reaching effects on the environment. Focusing on Tuolumne County, California, this research will study the ecosystem management differences in the suburban areas and national parks. It will also document the effects of current management practices of fire suppression/prescribed burning on wildfire frequency and intensity along with resulting water quality impairments.

DELAUNAY TESSELLATION AS A SCALE-FREE DESCRIPTION OF SPATIAL AGGREGATION

Detection of ecological processes requires sampling at the appropriate spatial scale. For example, when studying processes that depend on population density (e.g., birth or death), one must calculate the spatial density of organisms at some spatial scale (e.g., m$^2$, km$^2$). However, the choice of study scale may not match the scale of ecological interactions among organisms, obscuring important processes. One way to avoid this issue is to calculate spatial density via finding the distance between any one data point and its nearest
neighbors. This is easily done using Delaunay tessellation, but the standard method requires excluding the outermost points in any study plot, leading to a loss of valuable data. We developed an alternative method that retains the data points which would otherwise be eliminated. We simulated random datasets to illustrate the efficacy and accuracy of our method for describing spatial patterns and detecting spatial density-dependent processes.

Primary Author: Samantha Athey
Department/School: Chemistry and Biochemistry
Faculty Supervisor: Pamela Seaton
Environmental
CSURF Travel Award

INGESTED PLASTICS AS A TRANSPORT MEDIUM FOR MARINE TOXICANTS TO ENTER THE GASTROINTESTINAL TRACT OF LOGGERHEAD SEA TURTLES (CARETTA CARETTA)

Plastic in the marine environment is becoming an increasingly more important problem for the conservation of marine species. Plastics pose a serious threat to marine life because of entanglement and ingestion. From previous studies it has been found that polycyclic aromatic hydrocarbons (PAHs), many of which are known carcinogens, are adsorbed and leached from plastics into the gastrointestinal fluids of loggerhead sea turtles (Caretta caretta). This could have important conservation implications for these already endangered species. This study investigated how 4 different PAHs are absorbed and desorbed from polyethylene and polypropylene pellets into the gastrointestinal fluids of a loggerhead sea turtle. Pre-production pellets were spiked with chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, and anthracene of approximately the same concentration found on environmental plastics collected from the Sargasso Sea, North Atlantic. These spiked pellets were then placed in stomach, large intestinal, and small intestinal fluid recovered during a necropsy of a stranded loggerhead turtle. These plastics were incubated in the fluids for 48 hours at 27.5 C to simulate a loggerhead's natural digestion process. After the removal of plastic pellets and extraction of digestive juices, PAHs that leached from the plastics were examined and quantified using gas chromatography/triple quadruple mass spectrometry (GC/QqQ).

Primary Author: William Benfield
Department/School: Environmental Studies
Faculty Supervisor: Paul Hearty
Environmental

EVIDENCE FOR HISTORICAL CHANGES IN NORTH CAROLINA BARRIER ISLANDS: A RESPONSE TO SEA LEVEL RISE?

Barrier Islands make up a large portion of North Carolina's coastal system and are a constantly shifting system. Using a collected time series of aerial photography and satellite imagery, shoreline changes at four sites along the coast were examined. In analyzing these changes storm activity, human impacts and development, and sea level rise were all examined as possible explanations for these changes. As recently as 2013, the Intergovernmental Panel on Climate Change estimates sea level rise rates for the end of this century at between 0.32 and 0.98 meters. As sea level rises it will have serious implications for North Carolina barrier islands as this causes increased rates of erosion and landward movement as sediment transport is affected.
OBJECTIVE MEASURE OF ADHD: BUILDING A BETTER MOUSE TRAP

Adult Attention Deficit Hyperactivity Disorder is a prevalent and disruptive disorder, especially in college students. ADHD has been linked to premature death, and high comorbidity with depression and anxiety. However, our best current methods of diagnosis are subjective self report tests which are difficult to generalize and can be unreliable. Continuous performance tasks such as the test of variables of attention (TOVA) have been proposed as more objective measures of attention. However, the TOVA has been shown to be ineffective at case-by-case distinction. Some studies have suggested that measures other than the composite score offered by the TOVA may be more effective at case-by-case diagnosis. The purpose of this study is to develop better models for combining information from self-report and objective attention tests to achieve more consistent and reliable standards for diagnosing ADHD in adults.

A NEW TRIASSIC (NORIAN) MARINE STABLE ISOTOPE RECORD FROM WESTERN IDAHO: A PREVIOUSLY UNRECOGNIZED GLOBAL OAE?

Over the past decade, stable isotope stratigraphy, particularly using carbon isotope excursions (CIEs) and trends, has frequently been utilized in stratigraphic correlations with particular importance for global correlations. To date, limited stable isotopic data have been reported from Late Triassic marine rocks outside of the European Tethys. We collected 68 whole-rock Halobia- and ammonite-bearing limestone samples from a 51.5-meter section of the Kurry unit, Doyle Creek Formation in Hells Canyon at Pittsburg Landing, Idaho. The Kurry unit is composed of tan-weathering, dark gray, thinly bedded oolitic grainstones and skeletal packstones. Fossils collected from the upper portions of the Kurry unit are Lower Norian including Halobia cf. H. beyrichi and Halobia aff. H. salinarum. Stable carbon isotope values of bulk carbonates range from -6.0 to 1.0‰ with an overall negative trend from the base to the top of the section. The negative trend is punctuated at 10.5 m by a positive baseline shift of 3.5‰. Above this positive excursion, stable isotope compositions follow a negative trend to ~51.5 m. The long-term negative trend with a positive baseline shift of 3.5‰ in our data matches well-established, long-term negative trends and a positive baseline shift observed in other Norian-age locations in the European Tethys and in our new record from the Martin Bridge Formation, Oregon. In detail, the positive baseline shift is gradual over 20 m, and is punctuated by a large negative CIE. This detailed characteristic profile is similar to data from several Oceanic Anoxic Events (OAEs) in the geologic record, possibly representing an increase in carbon burial interrupted by an input of isotopically light carbon related to the release of methane into the ocean-atmosphere system. Late Triassic, Norian rocks from the European Tethys and western North America may record an isochronous stable isotope signal that represents a previously unrecognized global OAE.
USING CHANGING RATES TO MAKE HOMEOWNERSHIP A REALITY

Although there are many different lending products on the market, it seems first-time homebuyers still have trouble finding products that take into account their needs. Many recent college graduates are at the beginning of their career; student loans and short time period in the workforce make the average mortgage payments unaffordable to them. If a variable formula was applied to the mortgage payments, making lower payments at the beginning of a 30-year mortgage and higher payments as years go by, one’s salary would grow to match increasing mortgage payments and to assure the bank was compensated. With any lending product two conditions must be met, loan fulfillment and affordability. Using mathematical modeling in the format of differential equations, we attempt to test this new mortgage formula with various parameters (interest rates, initial payment amounts, and inflation rates) and find an optimal scheme for this new idea of mortgage lending.

PLANT-ANIMAL INTERACTIONS: REPEATED EVOLUTIONARY ACQUISITIONS OF COMPLEX CHARACTER SUITES IN A TROPICAL FLOWERING PLANT FAMILY (MELASTOMATACEAE)

Merianieae (Melastomataceae) comprise 287 species in 7 genera. These plants are native in diverse habitats, particularly lower to upper montane tropical forests (e.g. the Andes) where plant-pollinator interactions are correlated with explosive adaptive radiations. Suites of floral morphological characteristics are associated with pollinator shifts hypothesized to have transitioned from bees, to various vertebrates including hummingbirds, bats, and passerine birds. These associations are linked to frigid, high elevations where bees are less active. Some Merianieae have evolved foliar acarodomatia (protective structures) that house mites. In this mutualistic association, the beneficial mites clean photosynthetic surfaces, deposit nitrogen, and provide defense. In this investigation, seven molecular markers were sequenced from 103 species in 7 genera of Merianieae. A Maximum Likelihood phylogenetic analysis was conducted and plant-animal interactions were mapped onto the resulting cladogram. The results indicate that vertebrate pollination and mite associations have each arisen independently multiple times in this tribe.

EXPLORING THE EFFECT OF MOMENTUM ON THE NBA POINT SPREAD BETTING MARKET

The notion of ‘momentum’ and its effect on the outcome of sports games has been a point of contention for decades amongst academics. This paper does not attempt to prove or disprove the existence of momentum; rather, it explores how the public’s response to momentum - be it real or perceived - can affect sports betting lines on the National Basketball Association. After analyzing data and tabulating results from all 30 NBA teams spanning the 2001-2013 seasons, it is clear that the point spread betting market is inefficient. Betting
on teams to win that are already on a hot streak of at least four games, while betting on teams to lose that are already on a cold streak of at least four games is a consistently profitable betting strategy, yielding an overall winning percentage of 56.5%.

**Primary Author:** Paulina Capar  
**Department/School:** Geography and Geology  
**Faculty Supervisor:** Andrea Hawkes

**DEVELOPING HIGH-RESOLUTION RELATIVE SEA-LEVEL RECORDS AND VALIDATING SEA-LEVEL INDEX POINTS IN SOUTHERN NORTH CAROLINA**

The east coast of the United States functions as a significant region of latitudinal relative-sea level (RSL) variability due to the continuous recovery of the land from the deglaciation of the Laurentide Ice Sheet during the Last Glacial Maximum. The coast between southern North Carolina and northern South Carolina is experiencing a slower RSL change than those in reconstructed glacial isostatic adjustment latitudinal trends along the U.S. east coast. Older data along the Cape Fear River (CFR) suggests inconsistently high rates of RSL. These discrepancies may be due to the use of invalid proxies and/or outdated dating techniques. This project will develop a high-resolution RSL record to resolve inconsistencies from past RSL reconstruction techniques and compare this to an open-ocean site along the IntraCoastal Waterway to test for local influences and the influence of the CFR itself by using agglutinated foraminifera and their relationship to tidal inundation.

**Primary Author:** Liliana Carrara  
**Department/School:** Biology and Marine Biology  
**Faculty Supervisor:** Stuart Borrett

**NETWORK CHARACTERISTICS OF THE CAPE FEAR RIVER ESTUARY FOOD WEB**

The Cape Fear River Estuary is a black water system with a direct connection to the Atlantic Ocean. The estuary itself serves as a nursery area for commercial fisheries, as well as recreation and shipping. Primary production in the system is often limited due to a high concentration of colored dissolved organic matter, making it 'black.' We expect this limitation to impact the entire food web functioning. To assess this impact, we constructed an initial food web for the polyhaline portion of the estuary and applied network analyses to characterize the model. We compared the degree and betweenness centrality to highlight the importance of different groups in the estuary. Both centrality measures illustrated the importance of detrital compartments, while neither measure showed a relative importance of primary producers. Future work will focus on refining the model and characterizing carbon fluxes in the system using ecosystem network analysis.
DEVELOPMENT OF A FREE CHLAMYDIA AND GONORRHEA TEST ADMINISTERED TO STUDENTS VISITING A UNIVERSITY HEALTH CENTER FOR HIV SCREENING

The purpose of this study was to develop an inexpensive, urine-based PCR assay to test college students for asymptomatic chlamydia and gonorrhea infections. If left untreated, these infections can lead to pelvic inflammatory disease, infertility, and higher susceptibility to HIV, so regular testing is imperative to limiting transmission and complications associated with infection. Students visiting the Student Health Center for HIV testing were more likely to be sexually active and amongst a high-risk group for sexually transmitted infections. DNA isolation, polymerase chain reaction, and gel electrophoresis were used to identify the presence of chlamydia and gonorrhea DNA in the urine sample. Two urine samples tested positive for chlamydia. Results of 25 samples were confirmed by LabCorp, a diagnostic testing facility. Along with providing free testing for individuals, this study increased the awareness of the importance of safer sex practices and regular testing for STIs.

GETTING PEOPLE TALKING: AN OBVIOUS ANSWER TO THE MOBILIZATION PROBLEM

In America it is no secret that political participation rates are significantly lower than most other first world democracies and scholars have expended a considerable amount of effort trying to understand why this is the case. Many scholars cite low political efficacy as one of the main reasons for lackluster political participation, that is to say that citizens do not understand politics nor do they believe they can have any real impact on political outcomes and so they do not vote. High political efficacy manifests in many different forms but the most useful form for those interested in turnout/mobilization is when a person tries to influence someone else’s vote. After multiple analyses of the American National Election Study (ANES) data the conclusion was drawn that by using contact which encourages individuals to attempt to influence the votes of others, individual turnout can be increased by 5-12% depending on the election cycle. It was also concluded that the best way to induce an individual to try to influence others’ vote is by using a combination of simple paraphernalia and campaign contact."
Usage of Behavior Modification Strategies to Increase Steps Taken Daily and Decrease Meals Eaten Out

The population of the United States is increasingly overweight and obese - about 69% of adults. There are many risks associated with being overweight including hypertension, diabetes, high cholesterol, certain cancers, and heart disease. Behavioral interventions are the most successful in helping maintain weight loss. The purpose of the project was to help the client increase physical activity and decrease meals eaten out, despite her very busy life as a mother and caretaker for her own, aged parents. The client, a 47 year old female, had a history of difficulty losing weight. The target behaviors were steps taken daily as measured by a pedometer, and the number of meals consumed that were prepared outside of the home. After three weeks of baseline data collection, she averaged 7,813 steps/day and 4.3 meals eaten out/week. A changing criterion research design was employed over a 6-week intervention. Goal setting, self-monitoring, feedback and stimulus control were used to change behavior. Maintenance strategies included fading prompts, continued self-monitoring through logs, and a cookbook. The client’s average weekly steps increased 45% and meals eaten out decreased 65% over the intervention. A follow up 5 weeks later revealed that the client continued to increase steps (a total increase of 51%) and decrease meals eaten out (a total decrease of 77%). The client’s spouse served as the reliability observer, with 100% agreement. Overall the client lost a total of 6.2lbs. Behavior modification can offer a healthy, inexpensive way to encourage the adoption and maintenance of healthy behaviors.

CONSTRUCTION OF PCC02 TO DELETE A TRANSCRIPTIONAL REGULATOR IN FLAVOBACTERIUM JOHNSONIAE

*Flavobacterium johnsoniae* is a model organism for its unique ability to glide over solid surfaces. Regulation of gene expression as it relates to gliding motility and protein secretion has not been studied in this organism and was the focus of this study. *F. johnsoniae* cells use the Type IX Secretion System (T9SS) which is likely under several modes of regulation. *Fjoh_4053* is a 637 bp gene predicted to encode a cyclic AMP receptor protein that may function as a positive transcriptional regulator for the predicted cell surface adhesin *fjoh_4051*. To test this, a gene deletion strategy was used to generate an in-frame deletion of *fjoh_4053*. Plasmid pCC02 was generated by the sequential cloning of regions upstream and downstream of *fjoh_4053* into the suicide vector pRR51. The deletion construct pCC02 was confirmed by restriction digest and introduced into *F. johnsoniae* by tri-parental conjugation to isolate an *fjoh_4053* deletion mutant.
ADDRESSING THE EFFICIENCY OF THE COMPREHENSIVE LAND USE PLAN OF HARPERS FERRY, WV

Address the efficiency of the Comprehensive Land Use Plan of Harpers Ferry, West Virginia while focusing on three planning issues concerning water quality, preserving historical character through educational brochures and improving public facilities. Using goals of the Harpers Ferry Comprehensive Land Use plan adopted in 2007 and amended in 2013, and GIS data to develop and model three objectives important to the town. First model the development of a buffer system 100 feet from the edge of stream beds. Increase pervious surface for storm water to percolate, using best management practices. Next, Map the historic district. Develop brochure to educate public on the historic district. Finally, create or modify vacant lots to usable space for public facilities including parking using the most ecofriendly materials and low impact development available. The maps created in this project will model the resolutions of the primary planning issues in Harpers Ferry, WV.

THERMOHALINE CIRCULATION IN THE LABRADOR SEA OVER THE PAST 25,000 YEARS

Thermohaline circulation (THC), or meridional overturning circulation, is an important component of the climate system, contributing to heat distribution (Marchitto and deMenocal 2003), absorption of Carbon dioxide from the atmosphere (Hoogakker et al. 2011), and nutrient transport at upwelling sites. A branch of THC originates in the Labrador Sea, called Labrador Sea Water (LSW), and forms an intermediate-depth current that flows on top of the North Atlantic Deep Water (NADW). Because THC is driven by the density gradient of the northern Atlantic Ocean (Rahmstorf 2006), changes in freshwater input into surface seawater caused by global warming may alter LSW behavior or shut it down (Wood et al. 1999). I will use micropaleontological and sedimentological techniques to understand how LSW flow behavior has changed over the past 25,000 years so that an understanding can be generated of how it may alter again in response to future deglaciation events.

ANALYZING MUSCLE FIBER STRUCTURE IN ATLANTIC BASKING SHARKS (CETORHINUS MAXIMUS)

Basking sharks (Cetorhinidae) are closely related to sharks in the family Lamnidae (including great white sharks), reach sizes up to 10 m, are planktivorous, and are generally slow swimmers but can generate enough burst speed to breach fully out of the water. Surprisingly little is known about their muscle structure or metabolism. My goal was to determine whether basking shark muscle is similar to other sharks by measuring
muscle cell characteristics in biopsies from free-swimming animals. Another lamnid shark, the shortfin mako, has been shown to have muscle fiber diameter values of ~ 42-43 μm. Preliminary data from basking sharks suggest that their muscle cells are much larger, ranging from 96.23-691.07 μm (mean ~247.34 μm). In addition, the nuclei of basking shark muscle fibers are predominantly intermyofibrillar and do not exhibit any kind of organized arrangement. Basking sharks may have evolved muscle organization that is different from other sharks.

Primary Author: Zachary DeWitt  
Department/School: Environmental Studies  
Faculty Supervisor: Paul Hearty  
Environmental

INTERPLAY OF PLIO-PLEISTOCENE MARINE TERRACES AND AEOLIAN DUNES ALONG THE GULF OF MEXICO COASTAL PLAIN

Estimates of atmospheric CO2 levels as high as ~400 ppmv, during the mid-Pliocene (~3.3-2.9 Ma), display similarity to earth's atmospheric conditions today. Local field observations of mid-Pliocene sea levels help increase the accuracy of global eustatic sea-level estimates and a greater understand of climate sensitivity in a warmer world. We surveyed 6,781 km with a differential GPS along the Gulf of Mexico Coastal Plain (GCP) to map the precise elevation and location of Plio-Pleistocene marine terraces and dunes. A number of suspected Pliocene marine terraces and dunes were identified. Previous mapping of Plio-Pleistocene shorelines was accomplished through the interpretation of elevation contours on topographic maps, and our high-accuracy GPS measurements helped improve the accuracy of relict shorelines indicators along the GCP allowing for the development of new paleoenvironmental interpretations. Potential global significance of our findings is related to past, present, and future sea-level fluctuations.

Primary Author: Grant Diedrich  
Department/School: Biology and Marine Biology  
Faculty Supervisor: Chris Finelli  
Environmental

CLIONA CELATA: THE BORING SPONGE OR THE BORING SPONGE?

Crassostrea virginica, commonly known as the eastern oyster, is an important benthic filter-feeding species in estuarine ecosystems and is predominantly found in intertidal-zones in southeast NC. Although C. virginica has been well studied due to its economic importance, relatively little information is known about the impact of the boring sponge, Cliona celata, which bores into oyster shells, has on local oyster populations. The effect of C. celata on the growth rate, clearance rate, predation pattern, and overall condition of C. virginica was investigated in several field and laboratory experiments. It was found that oysters infected with sponge had an absolute growth rate significantly less (~1.75mm2/day) than those unaffected by the sponge. While this was the only significant difference between the two different groups of oysters, this study helps us understand the impact, or lack-there-of, that C. celata has on this important shellfish species.
HISTOLOGICAL COMPARISONS OF SILICA BIOMINERALIZATION USING SCANNING ELECTRON MICROSCOPY

Silica biomineralization is the deposition of silicate ions, which form solid structures in a diversity of marine organisms. This research surveys the histology of siliceous structures in sponges, diatoms, and copepods, and compares them to the siliceous tooth in the gastric mill of the blue crab, Callinectes sapidus. To better understand the mechanistic approach for mineral deposition and the dynamics of mineral deposits, scanning electron micrographs can be analyzed for structural evidence of silicification. The biochemical mechanisms of how siliceous structures are formed have been highly investigated in sponges and diatoms. However, little is known about these structures in crustacean models. This study comparatively explores the morphology of the dorsal tooth of the blue crab. Ultimately these data will further knowledge on structural characteristics of the tooth throughout the life cycle of C. sapidus, and biomineralization processes in marine organisms.

THE MAN BEHIND THE MASCULINITY: ERNEST HEMINGWAY'S COGNITIVE DISSONANCE ON GENDER AND SEXUALITY IN THE GARDEN OF EDEN

My research examines the controversial themes in Ernest Hemingway's posthumous novel, The Garden of Eden. Hemingway was and still is an iconic figure of masculinity, but his novel reveals his cognitive dissonance on the subject of gender and sexuality. First, I focused on Hemingway's history and gender training in Victorian Oak Park, Illinois to his life in erotic 1920s Paris. Next, I investigated the thematic elements of confused sexuality in his previously written works to reveal a pattern over time. Last is my analysis of Hemingway's complete confrontation of gender and sexuality in The Garden of Eden. My argument shows that Hemingway's struggle with sexuality and gender built up, and then peaked in The Garden of Eden. The depictions of madness and destruction from sexual experimentation in the novel are interpreted as a reflection of Hemingway's inability to reconcile his masculine identity and his proclivity for alternate sexualities.

NEW URBANIST DESIGN IN FIVE POINTS, EL PASO, TEXAS

New Urbanist design is a novel or foreign concept to most city planners nationwide, but not for the planners of El Paso, Texas. Latest city plans, released in 2011, highlight the benefits of smart growth schematics founded in the principles of sustainability, aesthetic beauty, and compact functionality. Current regimes in El Paso, though more advanced than four years prior, still do not adequately address the issues facing the
region including projected population growth rates, increased temperatures related the urban heat island effect, and increased crime rates in deteriorating urban centers. Several areas within El Paso's borders are of more significant concern including the community of Five Points, which will be the focus of this study. Five Points is an archetype for the effects of these concerns on a community's growth and would be ideal for a design overhaul incorporating vertical growth, mixed land use, and increased green space.

**Primary Author:** Katie Dyer

**Co-authors:** Tiffany Phasukkan, Catharine Nealley, Michael Mathews, Alyssa Cawley, Katrina Gobenciong, Irene Fobe, and Danielle Panoz-Brown

**Department/School:** Psychology

**Faculty Supervisor:** Kate Bruce and Mark Galizio

CSURF Travel Award   Board of Visitors CSURF Fellowship   Georgia & Gary Miller CSURF Fellowship

**OLFACTORY MATCHING- AND NON-MATCHING-TO-SAMPLE IN RATS**

The ability to differentiate whether stimuli are the same (identity) or different (oddity) has been said to be the most fundamental abstract concept. There is evidence for such concept learning in nonhumans including apes, monkeys, sea lions and pigeons. Research with rodents has generally been less successful, but recent work from our laboratory has shown matching and non-matching to sample in rats using manually-presented odor stimuli. The present study was an effort to replicate these findings using a computer-controlled olfactometer apparatus. Rats were trained on successive conditional discrimination procedures (Go-No-Go) under matching or non-matching-to-sample contingencies with four different odor stimuli. When accuracy criteria were met, a different set of four odor stimuli was introduced, either under the same or reversed contingencies. Rats developed high levels of accuracy on both matching and non-matching contingencies and most showed evidence of transfer when novel stimuli were introduced. High levels of transfer are particularly noteworthy given the relatively few trained exemplars that preceded exposure to novel stimuli.

**Primary Author:** Matthew Eckard

**Department/School:** Psychology

**Faculty Supervisor:** Carole Van Camp

**INDICES OF MODERATE AND VIGOROUS PHYSICAL ACTIVITY IN CHILDREN**

Regular physical exercise is an important component of children's health. A number of community organizations, like the YMCA, design programs to encourage physical activity (PA) in children. The present study evaluated the PA levels, as measured by heart rate and step counts, associated with various activities at the YMCA. First, to establish PA baseline levels, subjects were asked to walk (moderate PA) and jog (vigorous PA) as they normally would. Next, subjects were asked to engage in various exercise behaviors (e.g., elliptical machine, basketball) to determine the extent to which they engaged in moderate or vigorous PA. The results show consistent differences in HR and steps between moderate and vigorous PA trials, and covariation between the two measures. Future research on utilizing such measures to teach children to self-regulate PA levels will be discussed.
Emotion dysregulation (or problems handling emotions), predicts internalizing and externalizing symptoms in adolescence. The current study examined whether peer influence and psychosocial maturity influence relations among emotion dysregulation, mental health symptoms, and offending. Participants included 91 adolescents with varying levels of justice system involvement. Controlling for age, general emotion dysregulation predicted internalizing symptoms and delinquency, and hostile rumination predicted delinquency. Simple slopes plots revealed that youth who are average and high in peer resistance (who don't care about the opinion of others) are more likely to act out and behave badly when they are emotionally dysregulated. Additionally, youth who were high in maturity were more likely to act out when emotionally dysregulated, and the opposite was true for youth who were low in maturity. The current study has implications for preventing delinquent behaviors and mental health issues among a variety of adolescents.

Melting Points of Acoustic Fats from Deep Diving Odontocetes

Previous studies have shown that the fats in the jaw and forehead of odontocetes (toothed whales) are comprised of complex, heterogeneously distributed lipids that are thought to enhance acoustic transmission and reception. While there have been many studies on the structure and composition of these lipids, very little is known about their physical properties, which relate directly to their acoustic function. In other media, such as water, sound travels more quickly through solids than through liquids, and although this has not been directly measured in fats, it could be that phase in the acoustic tissues has the potential to affect sound transmission. We extracted pure lipids from the melons, mandibular fats, and blubber of various species of toothed whales to examine their melting points as a first step in considering phase. Data collected to date from Kogia, Mesoplodon and Ziphius show that melting points exhibit wide ranges. Values were highest in the melons of Kogia breviceps (range 17.5 to 29.8°C). The melting points of the acoustic tissues of the beaked whales were much lower: Mesoplodon densirostris inner (2.0 to 15.6°C) and outer (-1.2 to 15.7°C) jaw fats; Ziphius inner (-15.0 to 1.9°C) and outer (-3.9 to 1°C) jaw fats. The values for beaked whale jaw fats were also lower than those of Mesoplodon blubber (1.7 to 27.1°C). The wide ranges of each melting point likely reflect the complex mixtures of lipid molecules present (e.g. different species of waxes and triacylglycerols, each with its own melting point). Our data suggest that in some species, these lipids may be liquid much of the time; perfusion with warm blood through macro- and micro-vessels would enhance this effect. Such a response could help to slow sound speed, which could channel sound beams, particularly in tissues with complex topographical distributions of lipids.
MODELING HOW SODIUM AND CHLORINE DECAY DURING SODIUM CHLORIDE SYNTHESIS USING DIFFERENTIAL EQUATIONS

Through the study of differential equations, we are able to model the rate at which reactants decay as they form products in a chemical reaction. This applied learning project aims on using a mathematical model to determine the concentration of any given product at any given time, based upon the initial conditions of the experiment. We used simple reagents, Sodium and Chlorine, and through a first order differential equation the concentration of Sodium Chloride can be found at any given moment, given the initial concentration of Sodium and Chlorine. This project is part of ETEAL supported applied learning in MAT361. Modeling and analysis of the reaction rate is useful to chemists because it provides valuable insights into (1) how the reaction rate changes by changing a specific reactant and (2) whether the nature of the product has any influence on the decay rate of a reactant.

ANTIBACTERIAL ACTIVITY OF SYNTHESIZED KUCHINOENAMINE ANALOGS

Kuchinoenamine, an alkaloid produced by a marine sponge, has been shown to have moderate antibiotic activity. Extraction of this compound from sponges has proven difficult; therefore, novel methods for synthesizing kuchinoenamine analogs are being explored so these analogs can be tested for antibiotic activity. Cyclopentadienol and cyclopentadienone are liberated from ferrocenium hexafluorophosphate when exposed to air, and react together via rapid Diels-Alder cycloaddition to produce the core structure of kuchinoenamine. Novel analogs of the core molecule were produced from Diels-Alder reaction between cyclopentadienol and 1,4-naphthoquinone (compound 8), benzoquinone (compound 9), and methyl-p-benzoquinone (compound 10) in good-to-excellent yields. Compounds were evaluated with disk diffusion and microdilution techniques to determine the effects against several species of bacteria. These methods are used to test for antibacterial activity by evaluating zones of inhibition and for calculating the minimal concentration of the compound needed to inhibit bacterial growth. Compounds 1-7 showed no antibacterial activity by disk diffusion. Compound 8 showed moderate inhibition of *Staphylococcus epidermidis* only and its minimal inhibitory concentration (MIC) was calculated to be 125 μg/mL. Compounds 9 and 10 demonstrated inhibition of several bacteria and had MIC values against *S. epidermidis* of 31.25 μg /mL and 15.63 μg /mL, respectively. Further modifications of the most potent analogs will be pursued in order to investigate any enhanced antibiotic effects.
IMMIGRATION AND ENGLISH LANGUAGE SERVICES
IN THE WILMINGTON, NORTH CAROLINA COMMUNITY

Our research strives to highlight the accessibility and knowledge of English language services working with the immigrant population in our community; namely New Hanover County, Pender County, and Leland. Factors that affect an immigrant's likelihood and ability to learn English after arriving in America will also be investigated. These factors include possible barriers, attitudes towards immigrants, and methods of language learning.

RAPID ACQUISITION OF PREFERENCE IN CONCURRENT CHAINS:
EFFECTS OF MORPHINE AND OXYCODONE ON SENSITIVITY TO REINFORCEMENT AMOUNT

It previously has been reported that acute administration of opiates (e.g. morphine) increases 'impulsive' choice (i.e., shifts preference toward a smaller, sooner reinforcer). In the present study, the effects of morphine and oxycodone on sensitivity to reinforcement amount under a concurrent-chains schedule were examined using a rapid-acquisition procedure. Six pigeons were given the choice between two different reinforcement amounts. The side keys associated with the larger and smaller reinforcers changed pseudo-randomly across sessions. Relatively high sensitivities to reinforcement amount were obtained (0.59-1.53). Once preference consistently tracked the change in reinforcement amount across sessions, doses of morphine (0.3 mg/kg - 3.0 mg/kg) and oxycodone (0.1 mg/kg - 5.6 mg/kg) were administered. Typically, at intermediate doses (in which response rates were not substantially reduced), a decrease in sensitivity to reinforcement amount was observed. These results suggest one potential behavioral mechanism of opiate's effects on impulsive choice: a drug-induced decrease in sensitivity to reinforcement amount.

THE LONG-TERM EFFECTS OF CHILDHOOD CANCER ON SURVIVORS ENTERING ADULTHOOD

The increasing prevalence of childhood cancer affects many people in today's society. There is limited research, however, displaying how this experience as a child may influence survivors as they enter adulthood many years later. This qualitative study was designed to question young adults, ages of 18-24 years, on how their experience has changed their lifestyle and recognize the challenges they may face long-term because of it. The purpose of this research is to not only understand how the childhood cancer experience is perceived
by young adult survivors, but also to assess whether or not survivors are consistent with long-term oncology follow-up care. With this information, healthcare systems can better identify any psychological needs that have not been addressed either during treatment or later in life, as well as explore what can be done to improve the overall care of childhood cancer survivors as they enter adulthood.

**Primary Author:** Danielle Gaal  
**Undergraduate Student**

**Co-authors:** Andy Hanna and Nicholas Loekman  
**Department/School:** Mathematics and Statistics  
**Faculty Supervisor:** Yishi Wang

**Health-related**

**LATENT VARIABLE DISCOVERY FOR A TSI SURVEY THROUGH EXPLORATORY FACTOR ANALYSIS**

The Trauma Symptom Inventory (TSI) is a Psychological evaluation utilized to help assess posttraumatic symptomology. Each item in the 100-item survey asks respondents to report the occurrence rate of a certain symptom on a scale from 0 (never) to 3 (often). Recently, TSI survey results have been collected from active duty and veteran Marines and Sailors in Camp Lejeune, North Carolina. Through the utilization of exploratory factor analysis (EFA) on the survey results, interrelationships were discovered among the battery of measured variables.

**Primary Author:** Erin Gallagher  
**Undergraduate Student**

**Department/School:** International Studies  
**Faculty Supervisor:** Florentina Andreescu

**Global**

**'THE LAND OF CHILDHOOD,' 'THE DARK MANTLE OF NIGHT': HISTORICAL IMAGINARIES OF AFRICA IN THE WESTERN GAZE AS SEEN THROUGH THE ICONOGRAPHY OF AID**

In this thesis, I explore how Africa is included in the Western imaginary, specifically through historical images and modern aid iconography. I examine early visual representations, such as those of Saartje Baartman, to current day 'poverty pornography' depictions which saturate marketing campaigns of NGOs and international aid institutions. I argue that these representations rely on three rhetorical commonplaces: The Body, The Child and The Woman, and The Victim. The deployment of these commonplaces creates a perception of Africa as an objectified, infantile, and feminine victim of a traumatic past and a troubled present. These commonplaces reinforce preexisting core-periphery power relations and undermine aid itself. I analyze these pervasive commonplaces through a relational constructivist lens, using insights from the literature on abjection, trauma, phantasy and imagined communities to uncover how it is that these images create and re-create imaginaries, where they come from, how they are used politically, and how they affect Africa, the West, and aid.
LEARNING WITH GOOGLE GLASS

Google Glass is a device that interacts with the user via visualization, sound, voice, and physical gestures. These qualities are utilized in an application that runs on Glass in order to study the effects of memory retention of the information displayed on the device. This study explores developing in a new paradigm and examines how users adapt to and learn from an innovative piece of technology. Commit to Memory is a flashcard application that communicates with the user via speech and text. The interface responds to voice commands as well as hand gestures, which have overlapping functionality, therefore allows the user to interact with the device as he or she elects. A separate application was designed for an Android phone. During the human subject experiment, users were given one of the two devices for their study session and the results of their post-study tests were analyzed.

NON-TRADITIONAL COLLEGE TRANSFER STUDENT POPULATION DEMOGRAPHICS

One of the rising trends in higher education is non-traditional students. Higher education institutions are shifting their focus from the traditional transfer applicant to this non-traditional population. However, what are the demographics of this population? By using data analysis and social science research methods, I intend to look at several characteristics of this population and what is statistically significant. Determining the demographical characteristics of this population will demonstrate the need for specialized recruitment strategies including admission coordinators to work exclusively with these populations, tailored communication plans and community college outreach, as well as integration methods.

DELETION OF TATC GENE IN FLAVOBACTERIUM JOHNSONIAE

Flavobacterium johnsoniae cells exhibit rapid gliding motility across certain surfaces. The mechanism for gliding motility in this organism is not fully understood, but protein secretion across the inner and outer membranes via the Sec-dependent and Type IX secretion systems is required. A third secretion system, the Twin-Arginine-Translocation (Tat) system secretes folded proteins across the inner cell membrane, and its role in gliding motility is unknown. This study aimed to investigate the role of Tat secretion in gliding motility by deleting tatC, a gene encoding a structural protein of the system. Primers were designed with engineered restriction sites to amplify the regions upstream and downstream of tatC by PCR. The regions were cloned into the suicide vector pRR51, and restriction enzyme digest was used to confirm the insertions. The resulting suicide vector, pJG02, was introduced into F. johnsoniae by tri-parental conjugation, but, attempts to isolate a tatC mutant were unsuccessful suggesting this mutation may be lethal.
THE POTENTIAL FOR TROPHIC TRANSFER OF DEEPWATER HORIZON OIL FROM Brachionus rotundiformis TO Menidia beryllina

Following the Deepwater Horizon spilled oil in 2010, research has been performed to evaluate impacts on wildlife in the region. We first conducted a range-finding exposure with the rotifer, *Brachionus rotundiformis*, using three concentrations of Deepwater Horizon Macondo oil (2, 20, 200 mg/L). The extrapolated 24-hour LC50 was 278.52 mg/L. Rotifers were then exposed to the concentration of 20 milligrams per liter for 24 hours, and exposed rotifers were fed to larval silversides (*Menidia beryllina*). Following a 24-hour feeding period, silversides were snap-frozen for future analyses, and the number of rotifers remaining in each replicate was quantified. Significantly fewer rotifers were eaten in the treated groups (81.6%), compared to the control groups (89.6%), indicating that PAH exposure reduced the palatability of prey. *B. rotundiformus* tolerance to relatively high concentrations of oil indicates that rotifers would be a vector for the transfer of toxic polycyclic aromatic hydrocarbons to higher trophic levels.

RELATION BETWEEN GENDER, BMI, AND BODY PART DISCOMFORT

The musculoskeletal health of employees can affect an organization’s effectiveness. Also, the fatigue that an employee may experience can affect their productivity and morale on the job. Little research has been done to compare the relationship between musculoskeletal health and fatigue and its effect on workplace employees. PURPOSE: To compare musculoskeletal discomfort and employee demographics between those reporting low shift fatigue and those reporting moderate-high shift fatigue. METHODS: The subjects were University staff (N=174, Age=46.2±13.3, Males = 53%). The questionnaire response rate was 55%. An ANOVA model was used to analyze the questionnaire. The questionnaire included variables of: gender, height, weight, shift fatigue, physical job demands, and musculoskeletal discomfort values. The fatigue and musculoskeletal scales ran from 0-5, with 0 being no fatigue/no discomfort and 5 being very fatigued/very uncomfortable. High fatigue (>3) and low fatigue (<2) groups were selected for comparison based on the end of shift fatigue. RESULTS: Those employees experiencing moderate-high fatigue (n=57) in comparison to those reporting low fatigue (n=117) have a higher body mass index (BMI) (30.5±8.4 vs. 26.4±4.6, p<0.01), higher fatigue in the first five minutes of work (1.0±1.5 vs. 0.3±0.9, p<0.001), and significantly (p<0.01) higher discomfort in all measured body parts. The body parts with the greatest difference between low and fatigue were the upper back (2.3±1.8 vs. 0.8±1.1), legs (1.9±1.7 vs. 0.7±1.2), buttocks (1.7±1.7 vs. 0.6±1.1), neck (1.9±1.6 vs. 0.8±1.1), shoulders (2.0±1.8 vs. 0.8±1.2) and lower back (2.5±1.8 vs. 1.4±1.4). CONCLUSION: Based on the results, there is a relationship between body discomfort and fatigue at work. It appears that the
upper back discomfort is most related to the change in fatigue over shift. More research is needed to determine if interventions that target musculoskeletal discomfort areas such as the upper back will reduce employee fatigue in an effort to improve morale, productivity and overall health.

**Primary Author:** Heather Harrell
**Co-author:** Darius Suddreth
**Department/School:** Geography and Geology/Environmental Studies
**Faculty Supervisor:** Eman Ghoneim
**Environmental**

---

**THE DEFORESTATION OF RONDONIA, BRAZIL**

Deforestation is a major global issue and is considered one of the main contributing factors to climate change. While forests still cover about 30% of the world's land area, 18 million acres are lost every year. Brazil is the most deforested country in the world, with the state of Rondonia accounting for 19% of its total loss. Using Landsat images spanning a 19 year period, the remote sensing technique of maximum likelihood supervised classification was employed to analyze the rate of deforestation in our study area. During that time frame, 42% of the area's forest was lost, or 418km$^2$ per year. A statistical regression analysis was employed to project how long, at current rates, complete deforestation of our study area would take. The classified images are quite shocking to observe and it is very unsettling to find that it would take a mere 20 years to deforest this area completely.

**Primary Author:** Henry Hauser
**Department/School:** Biology and Marine Biology
**Faculty Supervisor:** Alison Taylor
**Environmental**

---

**THE ROLE OF CALCIUM ATPASES IN CALCIUM TRANSPORT DURING COCCOLITHOPHORE CALCIFICATION**

Coccolithophores are eukaryotic phytoplankton that calcify to produce highly organized calcite structures, coccoliths, which cover the cell exterior lend to coccolithophore's distinct appearance. A current working model of calcification in coccolithophores suggests that Ca$^{2+}$ is pumped into the endoplasmic reticulum (ER) via sarco-endoplasmic reticulum Ca$^{2+}$ ATPases (SERCA) before being packaged and transported to the site of calcification. Previous studies have demonstrated that inhibition of SERCA has a negative effect on calcification. The present study investigated the role of SERCA in calcification by adding two inhibitors, thapsigargin and cyclopiazonic acid (CPA), to *Coccolithus pelagicus* cultures in varying concentrations. Cell morphology was examined under the SEM to determine the extent of calcification disturbance. The data obtained indicate that CPA caused a significant increase in aberrant coccoliths while both SERCA inhibitors caused a decrease in complete coccoliths suggesting SERCA plays a role in coccolithophore calcification.
MASS MATTERS: CALCULATING THE MASS OF A ROCKET DURING ITS BURN PHASE

When a rocket is propelled, it is burning fuel and constantly changing mass. By modeling a small hobby rocket and engine, one can better understand how large-scale rockets accelerate and change mass over time. In this project, we first found the velocity function of a specific rocket over time so that we could further understand the acceleration due to the thrust. After modeling the thrust of the rocket and using the acceleration function derived earlier, we were able to express our rocket in a convenient form of the rocket equation. With the functions obtained, a mathematical model in the format of first order differential equation was established and later solved by method of separation. The expected result of this project is to establish a function that represents the mass of a specific rocket at any given time during the burn cycle.

PILOT STUDY OF ANXIETY AND BRAIN FUNCTION

Anxiety is known to induce biological changes within the body that may impact brain function. Using the Beck Anxiety Inventory (BAI), Adult Self Report (ASR), and a 64-channel electroencephalography (EEG), 27 participants (22 female, 5 male) were tested to examine if anxiety is related to cortical activity when presented a stimulus. Participants with ASR anxiety scores that varied from the mean had more electrical activity in the frontal region of the cortex than participants with ASR anxiety scores at the mean ($t (25) = -2.477, p=.02$). A relationship was not found for the BAI and EEG. The ASR anxiety subscale and BAI measure different constructs related to anxiety, which could account for these differences. The ASR measures behavioral manifestations of anxiety, whereas the BAI measures more cognitive components. Therefore, when linking anxiety symptoms to brain function, behavioral symptoms may be more directly related to cortical activity than cognitive constructs.

NORTH KOREAN HUMAN RIGHTS: REVISITING HISTORICAL HEGEMONY AND RHETORIC

Annually, the UN releases a report on the global human rights violations. Within these reports North Korea is seen as a major perpetrator of injustice, unwilling to cooperate with international norms. It is the government and political power of the Democratic People's Republic of Korea that is listed as not only the largest contributor to the human rights atrocities accused of taking place, but as the sole force in disabling...
the prominence of those rights. While the violations of North Korea are grave and of serious stature, the cause and purpose of Seoul’s unwillingness to cooperate is not simply their fault. In this essay I will highlight the fundamental issues with addressing North Korean human rights, and how outside circumstances such as Western rhetoric, the United States and imperialism keep them from complying with international norms. First I will examine the UN's human rights report on North Korea, critiquing the use of Western language and calls for regime change. Then I will explain the opinion of the North Korean government, in combination with imperial historical importance. Lastly I will better define the unique relationship North Korea holds with the United States, and how that is reflected through power politics.

Primary Author: John Jameson  
Co-author: Ryan Davis  
Department/School: Biology and Marine Biology  
Faculty Supervisor: Ryan Rhodes  
Health-related

PRESENCE OF *BORRELLIA BURGDORFERI* IN TICK POPULATIONS OF SOUTHEASTERN NORTH CAROLINA

* Borrelia burgdorferi * is the causative agent of Lyme disease, and alternates between a tick vector and mammalian host. The disease is prevalent in the Northeast and upper Midwest, and appears to be on the rise in the Southeast. The purpose of this study is to evaluate the presence of *B. burgdorferi* in ixodid tick populations in southern coastal North Carolina. Eight hundred and sixty four ticks were collected from 6 deer harvested in Brunswick, New Hanover, Pender, Duplin, Bladen and Columbus Counties in the fall of 2014. Ticks were catalogued and stored at -20°C prior to homogenization and DNA extraction. Following extraction, DNA quality was evaluated by gel electrophoresis and concentration was measured by spectrophotometry. To date, DNA has been extracted from 240 ticks (40 per deer) and samples are being processed with *B. burgdorferi* specific primers by PCR.

Primary Author: Ellen Johnson  
Co-author: Derrick Knox  
Department/School: Biology and Marine Biology  
Faculty Supervisor: Ryan Rhodes  
Health-related

GROWTH AND UTILIZATION OF N-ACETYLGLUCOSAMINE IN *BORRELLIA BURGDORFERI*

* Borrelia burgdorferi * is the spirochete that causes Lyme disease. The bacterium obtains essential nutrients from its host and requires a complex medium for in vitro propagation. One essential nutrient is N-acetylglucosamine (GlcNAc), a sugar necessary for the formation of the cell wall. In the absence of GlcNAc cells exhibit biphasic growth, but previous work demonstrates that cells can utilize chitin to grow in a single exponential phase. In this study we aim to generate a medium free of exogenous chitinases that can be used to investigate the *B. burgdorferi* chitinase. Specifically, we are testing defined lipid supplements to replace rabbit serum, the chitinase-containing medium component. Additionally, we are investigating differences in biphasic growth observed between different lab strains of *B. burgdorferi*.
DEVELOPMENTAL DIFFERENCES IN THEORY OF MIND

Theory of Mind is one's ability to recognize different mental states in themself and others. One of the most commonly used measures of Theory of Mind is the False Belief Task. This task involves placing an object in a new location without the protagonist's awareness (Hutchins et al. 2008). There are multiple forms of the False Belief Task that have been examined in past research. In this study we utilized the Theory of Mind Task Battery, with children ages three, four and five years old. Previous research has found differences in Theory of Mind among children ages 2.5 to 3.5 and 4-5 years. The results of the present study indicated developmental differences in Theory of Mind, with older children scoring higher than younger children. Specifically, four-year-olds and five-year-olds scored higher than three-year-olds.

CE QUE LE JOUR DOIT À LA NUIT: DO WE CHOOSE OUR OWN IDENTITY?

Yasmina Khadra’s novel *Ce que le jour doit à la nuit* (What the Day owes the Night) is set during the 1930s, when the destiny of a young traditional Algerian boy named Younes changes when his father realizes that he can no longer afford taking care of him and asks Younes to live with his Uncle Mahi, a sophisticated and educated man married to a French woman. When younes moves to Oran or what he calls the European City, his name changes to Jonas, a French name. Younes and Jonas represent the same physical person but two different and controversial identities. This project reflects the influence of people from different social environments, French and Algerian, in shifting and determining the boy's identity according to their patriotic, social, and love interests. This project also reflects the perception of identities in literature as a metaphor for colonialism.

EFFECTS OF METHYLPHENIDATE ON IMPULSIVE CHOICE: CHANGE IN SENSITIVITY TO REINFORCEMENT DELAY OR REINFORCEMENT AMOUNT?

The primary focus of my honors project is to examine the method by which the psychostimulant drug methylphenidate, which is commonly prescribed to treat symptoms associated with ADHD, decreases impulsive choice. This is accomplished by implementing a delay-discounting task in order to examine the
change in sensitivity to reinforcement delay and reinforcement amount that occurs as a result of methylphenidate administration. In the context of my project, impulsive choice refers to the tendency of an individual to choose a small, immediate reward over a larger, delayed reward. Delay-discounting is a method by which the rate of impulsive choices is examined based on an individual's preference for a large reward over a small, immediate reward as the delays to the large reward increase over time. My project implements a concurrent chains procedure in which the delays to the reward, as well as the amount of the reward, are manipulated over time.

Primary Author: Alexander Koch
Department/School: Geography and Geology
Faculty Supervisor: Todd LaMaskin

SANDSTONE PETROFACIES AND DETRITAL ZIRCON GEOCHRONOLOGY OF THE PERMIAN–EARLY JURASSIC BAKER TERRANE MÉLANGE BELT, NORTHEASTERN OREGON

The relationship between the late Paleozoic–early Mesozoic Baker terrane mélangé belt of the Blue Mountains Province, eastern Oregon, and surrounding lithotectonic assemblages is unresolved. The Baker terrane consists of numerous deformed subterranes including (1) argillite-matrix mélangé of the outboard Bourne subterrane, and (2) serpentinite-matrix mélangé of the inboard Greenhorne subterrane. To resolve Baker terrane–and subterrane–relationships to North America, to the outboard Wallowa terrane, and to each other, we analyzed the petrography of chert-grain sandstone samples from both mélangé units of the Baker terrane for comparison to detrital zircon ages from the same units. Baker terrane sandstone samples all represent chert-rich petrofacies indicative of a subduction complex, lithic recycled orogenic provenance. In addition, all samples contain volcanic grains, single-grain plagioclase, and low amounts of monocrystalline quartz. We recognize three distinct chert-rich variations: 1) argillaceous-chert dominated samples (>90%), 2) samples with an elevated percentage of volcanic grains (>10–20%), and 3) samples with abundant detrital carbonate grains and elevated percentage of volcanic grains. Samples from the outboard Bourne subterrane represent group 2 and 3 variants and are generally dominated by Devonian–Permian ages with variable amounts of Precambrian grains ca. 2.7–2.5 and 2.2–1.8 Ga. Samples from the inboard Greenhorne subterrane are group 1 and 2 sandstones, and have abundant Precambrian detritus (2.7–2.5 and 2.2–1.8 Ga) and low abundance of Pz or Mz ages. These observations support a well-established distinction between the inboard Greenhorn and outboard Bourne subterranes. The ubiquitous presence of Precambrian grains and argillaceous chert grains suggests that (1) both the Greenhorn and Bourne subterranes originated in a pericratonic setting adjacent to the Olds Ferry arc, and (2) the sediment source was an uplifted accretionary prism. Provenance data are not consistent with derivation from the Wallowa arc which lacks significant chert or Pre-Mississippian ages. The contact between the Borne and Greenhorn subterranes represents an important boundary within an evolving continent-fringing forearc region.
TOGETHER IS BETTER: THE IMPORTANCE OF HETEROTROPHY AND PHOTOAUTOTROPHIC SYMBIOSIS FOR GROWTH OF THE SEA ANEMONE \textit{Aiptasia pallida}

The sea anemone \textit{Aiptasia pallida} is a possible model system for studying the nutrition of reef-building corals because both have the same algal symbionts. The relative importance of exogenous nutrition (NH) and symbiont-derived nutrition (NP) for this species is largely unknown. When stressed, both anemones and corals bleach (expel symbionts) and have to rely solely on NH. I measured changes in wet weight after 60 days of anemones divided into 4 treatments that manipulated the presence and absence of NH and NP. Anemones with both sources of nutrition gained significantly more weight than other treatments ($p<0.001$). All other treatments lost weight and were not significantly different from each other. Under the experimental conditions of this study, \textit{A. pallida} needs both NH and NP to grow, suggesting that some component of each nutritional source is necessary for the health of this sea anemone.

AMMONIUM CONCENTRATIONS IN WINTER RAIN: COMPARISON WITH 2002-2003 CONCENTRATIONS AND PATTERNS OF CORRELATION

The concentration of ammonium (NH4+) in rainwater collected in Wilmington, NC during the winter season of 2014-2015 was analyzed using a fluorometric method. The concentration of NH4+ in rain was in the micromolar range. Ammonium in rainwater is primarily sourced from agricultural activities and can alter rainwater pH and be a source of reactive nitrogen to sensitive terrestrial and aquatic ecosystems. The data collected in this study have been compared to Wilmington rainwater data from 2002-2003, and current concentrations have a higher average ammonium concentration. As other nitrogen species such as nitrate decrease in rainwater due to air quality regulations, ammonium is contributing a more substantial portion of reactive nitrogen in rainwater. The ratio of ammonium to nitrate concentrations will also be compared with older data. Patterns of correlation among rainwater components have also been explored.

DIET ANALYSIS OF HARBOR PORPOISES (\textit{Phocoena phocoena}) IN THE U.S. MID-ATLANTIC

The feeding habits of harbor porpoises, \textit{Phocoena phocoena}, have been well studied in the northern extent of their range, but to date, the diet of only a single individual has been described in the Mid-Atlantic. We examined 61 stomachs from stranded (n=34) and bycaught (n=27) porpoises collected between North Carolina and New Jersey. Fifteen species of fish and two species of squid were identified, representing higher
prey diversity than has previously been recorded for this species in the western North Atlantic. Relative importance of prey was assessed using the revised Costello method. The bay anchovy, *Anchoa mitchili*, was the most important prey for bycaught individuals, and hakes from the genus *Urophycis* were the most important prey for the stranded individuals. These data indicate relatively high prey diversity for this species in the southern extent of its range and suggest that bycaught and stranded harbor porpoises have demonstrable differential foraging abilities.

**Primary Author:** Andrew Lade  
**Co-authors:** Karl Mohr and Lauren Rowan  
**Department/School:** Geography and Geology  
**Faculty Supervisor:** Roger Shew  
**Environmental**

**CREATING SOUTHEAST LOUISIANA RISK ASSESSMENT MAP (SEL-RAM)**

Sea level rise associated with climate change could cause dramatic changes in low-lying, coastal regions. Southeast Louisiana is a topographically low, deltaic plain situated on the northern Gulf of Mexico. Low elevations, high populations, and geographic location on a common storm path make this region highly susceptible to inundation by sea level rise and storm surges. In order to effectively prepare for inundation, the relative risk of the region has been determined by combining human and geologic factors. An inundation risk index (IRI) has been developed and its components were combined to create a southeast Louisiana risk assessment map (SEL-RAM).

**Primary Author:** Kevin Lally  
**Department/School:** Geography and Geology  
**Faculty Supervisor:** Scott Nooner  
**Environmental**

**QUANTIFYING THE EFFECTS OF ROTATION ON HIGH PRECISION PRESSURE TRANSDUCERS**

High precision pressure transducers are critical for determining water depth in oceanographic research. Although the transducers are calibrated for pressure and temperature at the factory, other important instrument characteristics, such as gauge drift, hysteresis, and apparent pressure changes due to rotation, need to be determined either in the field or the laboratory. In this work, a deadweight calibration system was used to quantify the effects of gauge rotation and hysteresis for four new Paroscientific pressure transducers which will be used this summer to measure water depth to sub-centimeter precision. The design of the pressure sensor causes the apparent pressure of the transducer to change depending on the orientation with respect to the Earth's gravitational field. This effect was quantified by measuring apparent gauge pressure through a full 360 degree rotation of the instrument. Results were fit to a sinusoid with an average amplitude of about 0.3955 psi.
COLORS OF THE CLASSROOM:  
THE EFFECTS OF ART INTEGRATION IN THE GENERAL ELEMENTARY SCHOOL CLASSROOM

Arts and education are two things that people have been separating more and more lately. However, could it be possible that art may be the instrument that improves our education system in the general elementary school classroom? In this paper I go into an ordinary public school and experiment by teaching both typical lessons, as well as arts integrated lessons to determine if the integration of the arts can improve student achievement. Through this research I find that teaching students using art, is just what they need to stay focused, find their voices, and learn.

AN EVALUATION OF NEUROFEEDBACK EFFICACY IN ADULTS WITH ADHD

Neurofeedback is a brain training technique. Brain waves are recorded, relayed to the person for observation, and then reward the brain for changing its own activity to more appropriate patterns. This study is UNCW’s first National Institute of Health (NIH) sponsored clinical trial and is registered with clinicaltrials.gov. The primary objective of this double-blind, placebo controlled clinical trial is to evaluate the effectiveness of neurofeedback training (NFB) on objective measurements of attention in young adults with ADHD. The secondary objectives are to evaluate neurofeedback effects on self-report measures of attention, ADHD symptoms, and to identify electroencephalogram (EEG) markers of ADHD and neurofeedback efficacy. Our study focuses on individuals 18-40 years of age with attention deficit hyperactivity disorder (ADHD). Each subject’s attention is evaluated at baseline, after 12 and 24 training sessions and a one month follow-up after the last neurofeedback session.

EMERGING TRENDS IN WATER RESOURCE MODELING:  
INCLUDING THE COEVOLUTION OF HUMAN-WATER SYSTEMS THROUGH AGENT-BASED MODELING

Most current water management strategies rely on information derived from the application of global climate predictions to hydrologic models. However, these models are limited because they cannot represent the impact of the evolution of both basin hydrology and human water usage. Agent-based models, on the other hand, consist of agents whose behavior, derived from the agent's individual characteristics and interaction with other agents and the environment, guides individual decision-making and is used to model the impacts of human behavior. A combined hydrologic and agent-based model can better represent changes in water availability and access by incorporating the impacts of both climate change and individual decision-
making. The proposed model is a combination of the Soil and Water Assessment Tool (SWAT) and Agent Analyst and its accurate projection of both physical availability of water and water usage will provide policymakers the necessary information for more effective and sustainable water access strategies.

Primary Author: Angela Lenard
Department/School: Biology and Marine Biology
Faculty Supervisor: Amanda Williard
CSURF Travel Award

THE EFFECT OF WATER TEMPERATURE ON LACTATE ACCUMULATION IN EXERCISING YELLOW-BELLIED SLIDER TURTLES (TRACHEMYS SCRIPTA)

In temperate climates, yellow-bellied sliders overwinter in submerged aquatic habitats for extended periods and rely heavily on anaerobic metabolism. The link between overwintering behavior and anaerobic metabolism has been well studied in yellow-bellied sliders; however, anaerobic metabolic pathways can also play an important role during strenuous exercise. We were interested in whether temperature affects the role of anaerobic metabolism during exercise. Six turtles were acclimated to 18°C and six turtles were acclimated to 28°C. Following an acclimation period of 4 weeks, turtles were exercised for 20 minutes in a swim flume with water temperatures corresponding to acclimation temperature. The percent time swimming during the trial was documented, and blood samples were taken before and after each trial for analysis of lactate concentration. Exercise resulted in an increase in lactate of 0.389±1.09mmol·l⁻¹ for the 28°C treatment group, and 0.276±0.383 mmol·l⁻¹ for the 18°C treatment group.

Primary Author: Ryan Lenzmeier
Department/School: History
Faculty Supervisor: Mollenauer

A SHORT LIFE AND A MERRY ONE:
BRITISH SAILORS' REASONS TO ENGAGE IN EARLY EIGHTEENTH CENTURY PIRACY

Pirates, in recent years, have achieved an almost mythical quality in the American imagination. Subsequently, there has recently been a large amount of historical focus on pirates. Specifically these studies investigated the often subversive counter-cultures created about pirates ships. However, the reasons sailors forsook their duties aboard merchant or military ships and entered into a life of piracy remains under-investigated. This paper attempts to remedy that omission by focusing on the material reasons, such as more gold, better food, and more alcohol, that convinced men to risk execution and become criminals. Using contemporary woodcuts, admiralty records, and trial transcripts, this paper investigates the material circumstances of eighteenth century British sailors and pirates. Further, the paper argues that these reasons were much more real and convincing to sailors and therefore better explain the popularity of 'going upon the account' in the first thirty years of the eighteenth century.
COMMUNITY ORGANIZATIONS’ NEED FOR, KNOWLEDGE OF, AND ENDORSEMENT OF LOCAL ENGLISH AS A SECOND OR OTHER LANGUAGE (ESOL) SERVICES IN THE GREATER WILMINGTON, NORTH CAROLINA AREA

Limited English Proficiency (LEP) individuals often encounter inadequate educational, employment, and healthcare opportunities, partly due to their language deficiency. Many of these individuals cannot access English as a Second or Other Language (ESOL) services due to certain barriers including transportation and child care. Implementing workplace ESOL programs may eliminate some of these obstacles and make these services more accessible to those in need. Research suggests employers are overall unreceptive to ESOL initiatives due to cost concerns and perceived lack of benefit. Through a partnership with the Cape Fear Literacy Council (CFLC), a local ESOL service provider, we distributed an online survey to organizations in the greater Wilmington area (N = 36) inquiring about the organizations’ need for, knowledge of, and endorsement of ESOL services. Findings suggested that despite awareness of ESOL services, organizations were generally unwilling to utilize them even if they indicated a potential need for such services.

DOES ALEXITHYMIA MODERATE THE ASSOCIATION BETWEEN EMPATHY AND ATTRIBUTIONS OF BLAME IN SEXUAL ASSAULT?

Empathy-bolstering interventions tend to reduce people’s endorsement of sexual violence. However, some people may be less sensitive to such interventions. The present study examined whether one trait marked by difficulty in describing emotional experiences- alexithymia- may moderate the effectiveness of empathy interventions. Participants (N = 158) completed a trait measure of alexithymia and watched a video depicting a sexual assault. Prior to the video, participants were instructed either to empathize with the victim or to remain objective. Afterwards, they assigned blame to the victim and the perpetrator. Unexpectedly, the empathy induction did not reduce victim-blaming, nor was its effect moderated by alexithymia. However, the empathy induction did interact with gender to predict perpetrator blame. Although the empathy induction had no effect on females' perpetrator blame, males in the empathy condition attributed more perpetrator blame compared to males in the control condition. Implications for sexual assault prevention programs are discussed.
POPULATION DYNAMICS OF SPERM WHALES:
THE EFFECTS OF PAST WHALING ON CURRENT POPULATION TRAJECTORIES

Sperm whales (Physeter macrocephalus) were heavily exploited from 1945-1986, and remain endangered today. There is considerable interest in the dynamics and trajectory of sperm whale populations. A common approach is to use stage-based models, and assume that the population is currently at its unexploited stable stage distribution. However, exploitation of sperm whales may still be affecting the population today because past harvest may have left fewer old whales in the current population, which could affect the model projection. I improved previous model projections by incorporating past whaling data. Using parameters from a recently published study, I investigated the worst-case, most likely, and best-case scenarios for North Atlantic sperm whale population demographics. Results for all scenarios indicated that the current population has recovered from past whaling and is similar to the stable stage distribution.

INVESTIGATION OF THE ROLE OF VACUOLAR-TYPE H+ ATPASES DURING PHAGOCYTOSIS IN THE COCCOLITHOPHORE SCYPHOSPHAERA APSTEINII

This study examined the mechanisms of phagocytosis in the non-motile diploid calcifying stage of the coccolithophore Scyphosphaera apsteinii. Specifically, the role of vacuolar H+ATPases in phagosome maturation was investigated. Cells were incubated with the vacuolar H+ATPase inhibitor Bafilomycin A1 (0.1 - 100 nM concentrations) in addition to the lysosomal marker Lysotracker RedTM in order to determine the presence of an acidic phagosome. Using confocal fluorescence microscopy, cells were subsequently scored for presence of lysotracker positive organelles. Preliminary experiments demonstrate no significant effect of Bafilomycin A1 on the presence of acidic phagosomal compartments. These data indicate that Bafilomycin A1 may not be an effective inhibitor of vacuolar H+ATPases used in phagosome maturation in these marine protists. Alternatively, there may be additional mechanisms for acidifying the phagosomal compartment in coccolithophores.

"GOD-GAP" IN AMERICAN POLITICS?
THE EFFECTS OF RELIGION ON OPINIONS TOWARDS SAME-SEX MARRIAGE

Does religion influence opinions towards same-sex marriage? Drawing on previous research that highlights the relationships between religion (measured by religious affiliation and different degrees of religiosity), and public opinion about homosexuality, same-sex marriage, and civil unions, I perform a crosstabulation survey
analysis to determine the effects of religion on opinions towards same-sex marriage. Utilizing data from the ANES 2012 Time Series Study, I conduct crosstabulations between religious affiliation, religiosity (measured in terms of the importance of religion, degree of guidance that religion provides, views towards the Bible, and frequency of church attendance), and positions on gay marriage, to show that religion does in fact have an effect on opinions towards same-sex marriage. Less religious and politically liberal individuals have more favorable attitudes towards same-sex marriage; more religious and politically conservative individuals have less favorable attitudes towards same-sex marriage; and moderately religious and politically moderate individuals have more moderate views towards same-sex marriage, often favoring civil unions. My results suggest that the extent to which religion influences opinions towards same-sex marriage depends on an individual’s religious affiliation, degree of religiosity, and placement on the liberal-conservative scale.

Primary Author: Daniel Lookadoo  
Graduate Student  
Department/School: Chemistry and Biochemistry  
Faculty Supervisor: Christopher Halkides  
Health-related

THE BIOMECHANICAL PARADIGM OF FLAGELLAR MOTOR SWITCHING IN CHEMOTAXIS

Signal transduction is a universal process that is critical for understanding health and curing disease. All living organisms depend on signal transduction to process extracellular information into a functional intracellular form. Chemotaxis is the ability of a bacterium to alter its direction of movement by means of a propulsion system. Chemotaxis is readily applied to model the perceptions and responses cells have to their environment. Protein molecules are a class of chemicals that govern all signal transduction pathways, including chemotaxis. Understanding protein physics and protein engineering has exciting implications for potential new technologies. The presented study investigates the structure, function and mechanism of a highly cooperative macromolecular assembly, the bi-directional flagellar rotary motor responsible for chemotactic propulsion. This research focuses on protein interactions that prompt directional motor switching. The chemical modification, characterization, and complexation of chemotaxis response regulator protein CheY, from T. maritima, will be described.

Primary Author: Mary Malinowski  
Undergraduate Student  
Department/School: Biology and Marine Biology  
Faculty Supervisor: Ryan Rhodes

CONSTRUCTION OF PLASMID PMEM02 FOR THE DELETION OF RPON, AN ALTERNATIVE SIGMA FACTOR IN FLAVOBACTERIUM JOHNSONIAE

Flavobacterium johnsoniae is known for its unique gliding motility and has been well studied for this process. Although the genes required for motility have been identified, the regulation of the system has yet to be studied. We predict that alternative sigma factors may be involved in the regulation of motility genes, and disruption of the genes encoding these factors will disrupt gliding motility. Therefore, we devised a strategy to delete the rpoN gene using an allelic exchange system. Primers were designed with engineered restriction sites and regions upstream and downstream of rpoN were amplified and cloned into the suicide vector pRR51. The final plasmid, pMEM02, was confirmed by restriction digest, sequenced, and transferred to F. johnsoniae cells by tri-parental conjugation to isolate an rpoN mutant.
HOUSING AND DEMOGRAPHICS IN SAN DIEGO, CALIFORNIA

Due to recent population incline in the San Diego region, the city struggles to house the growing number of residents. The city cannot reasonably extend its physical boundaries any further without infringing upon natural environments or crossing into adjacent urban areas; this has caused a wave of re-development strategies in the city in effort to support the population safely and sustainably. In this project, I use GIS data and city planning research to analyze and visualize San Diego's land use planning approaches as they relate to population, housing, and redevelopment. Furthermore, I specifically analyze redevelopment areas in conjuncture with the city's demographics using census data, racial distribution analysis, and an exploration of the socioeconomic implications of housing distribution.

CHARACTERIZING VARIATION IN GENETIC DIVERSITY IN NATURALLY AND ARTIFICIALLY SEEDED EASTERN OYSTER REEFS

The genetic diversity of groups of interacting individuals, especially for habitat-forming species, can have profound effects at the population, community, and ecosystem levels, influencing total biomass, resilience from disturbance, invasion success, and the abundance and diversity of other species [1]. However, our understanding of the spatial scales at which genetic diversity is partitioned in natural populations is limited. More importantly, how this diversity is distributed at scales where it has been shown to affect these ecological processes remains largely unexplored [2]. Here we use 10 microsatellite markers to characterize the distribution of genetic diversity over two field seasons at three artificially and three naturally seeded reefs in the Eastern oyster, *Crassostrea virginica*, an economically valuable, habitat-forming species that is found primarily along the Atlantic and Gulf coasts of the United States. We find that naturally seeded reefs harbor significantly greater levels of genetic diversity, and that this difference remains stable across seasons, despite the potential for high gene flow among reefs. Further work is needed to determine how these differences might affect reef productivity and survival, which could have important implications for the design of reef restoration activities.
NATURE'S PLAYGROUND IN FULL SWING

The goal of this research is to study the long-term dynamics of a forced mechanical vibration system with a given external force and varying friction scenarios. This type of mathematical model widely arises in the world of mechanical and electrical engineering. In a vibration system where the applied force creates a frequency that matches or different from the natural frequency, we would like to find out what affect does the friction in the system play. The mathematical model is set up in the format of linear second order non-homogeneous differential equations. With different levels of friction (high, low, and non-existent), we will find the solution of the differential equations analytically and numerically. In this project, the long-term dynamics of the vibration system will also be graphed and thoroughly discussed. This mathematical modeling experience is a part of the ETEAL supported applied learning in MAT361, and will provide a greater insight on forced mechanical vibrations.

VISUALLY IMPAIRED CHILDREN'S HOPE AND HAPPINESS

This study stems from the new and emerging field of positive developmental psychology, which focuses on children's strengths and virtues (Seligman & Csikszentmihalyi, 2000). The aim of this study was to investigate happiness and hope in children with visual impairments. Happiness is the degree to which one experiences both positive feelings and positive activities (Holder, 2010). Hope is the perceived capacity and motivation to achieve goals (Snyder et al., 1997). The participants included visually impaired children and their parents, as well as sighted children and their parents. In this study, data was collected using the Happiness Face's Scale and the Children's Hope Scale. Parents' perception of their children's happiness and hope were also measured with these scales. Overall, the results show a difference in visually impaired children's levels of hope and their parents' perceptions of their hope, contributing to our growing understanding of positive functioning in children.

MERCURY AND STABLE ISOTOPE ANALYSIS IN ADELIE PENGUIN TISSUES FROM ANTARCTICA

Contaminants produced by anthropogenic activities circulate by oceanic and atmospheric processes affecting local, regional, and global environments. The deposition of mercury into marine environments results in the biomagnification of the highly toxic form, methylmercury, leading to a decline in overall ecosystem health.
The purpose of the current study was to investigate diet and methylmercury levels in Adélie penguin tissues between three populations in the Antarctic Peninsula. Stable isotope analysis was employed and δ15N and δ13C values were compared to evaluate diet and foraging habitats. The eggshell membrane total mercury (THg) concentrations did not differ between colonies. Due to sampling difficulty feather samples were collected only from Seymour Island and Hope Bay. Feather THg concentrations between these two colonies were significantly different. Comparison of eggshell THg and δ15N values indicate a weak correlation between these two parameters. In contrast, feather THg and δ15N values indicate a strong correlation.

**Primary Author:** Andrea Mejia  
**Co-authors:** Angela Sekely, Hana Kuwabara, and Zara Melikyan  
**Department/School:** Psychology  
**Faculty Supervisor:** Antonio E. Puente  
**Health-related**

**PRELIMINARY ANALYSIS OF A LARGE DATASET WITH MILITARY PERSONNEL**

An increasing number of military service members are surviving injuries from Improvised Explosive Devices (IED). These individuals tend to display long-term effects of traumatic brain injuries and/or acquire long-term health problems such as post-traumatic stress disorder. The University of North Carolina Wilmington, in conjunction Carolina Psychological Health Services, and Camp Lejeune Marine Corps Base has been working to understand these injuries and to create a dataset that will be instrumental in the future treatment of Marines/sailors. The dataset contains 1017 individuals, more than 150 variables and close to 1,000 data points per person. This update will provide focus on how the present data has been obtained and demographics of the current data set. The age range of participants was 18-52 and their education ranged between 10-17 years of schooling. Ethnicities ranged from 84.88% White, 7.45% Hispanic, 4.51% African American, 0.68% American Indian, 0.45% Asian American, and 0.45% Pacific Islander.

**Primary Author:** Forrest Melvin  
**Department/School:** Geography and Geology  
**Faculty Supervisor:** Narcisa Pricope  
**Environmental**  
**CSURF Travel Award**

**FUSING MULTI-SENSOR IMAGERY TO ASSESS SHIFTS IN SMALLHOLDER FARMING PRACTICES IN RESPONSE TO CONSERVATION PRIORITIES IN THE MAYUNI CONSERVANCY, NAMIBIA**

The establishment of community-based natural resource management programs throughout Namibia has led to changes in natural resource planning and management within designated conservancies. The economic benefits that eco-tourism and trophy hunting bring are significant enough that wildlife preservation has become integral to community planning. Recent land management plans have promoted shifts in land use to separate human and animal interactions for the enhancement of wildlife access to water and grazing resources. To balance competing land uses and address increasing human-wildlife conflicts, active agricultural lands have been shifted further away from the Kwando River. Using Object Based Image Analysis (OBIA) and multiple-sensor fusion techniques, we determined the overall trend of agricultural land use change within the Mayuni Conservancy, located in the northern Namibia. This agricultural movement reflects recent policy changes that allot land close to the Kwando River for wildlife migration, relocating the human population away from the river to safely continue traditional subsistence practices.
SEDIMENT PROFILE FOR LAPA DO PICAREIRO CAVE, PORTUGAL

Lapa do Picareiro is a cave in Central Portugal that contains a thick and continuous sequence of sedimentary deposits that have been dated through the late Pleistocene epoch. This cave has been excavated for its archaeological richness since 1994, with major findings including abundant faunal remains, lithic artifacts, an extensive, limited human remains, and some cultural ornaments. This evidence demonstrates periodic occupation of early humans throughout the last 45,000 years, encompassing the Middle Paleolithic, Upper Paleolithic, Epipaleolithic and the Neolithic cultural eras. Over the past 5 years, a variety of geologic analyses have been conducted in order to gain a greater understanding of the sedimentary processes associated with the cave and to provide paleoenvironmental context for the artifacts that have been discovered. The purpose of this paper is to present to findings of physical, bio-geochemical, and elemental analyses that have been executed on the full sediment profile.

IDENTIFYING FACTORS DRIVING ESTUARINE HABITAT USE OF SOUTHERN FLOUNDER (PARALICHTYS LEHOSTIGMA) USING ACOUSTIC TELEMETRY AND FINE-SCALE ENVIRONMENTAL SAMPLING

Quantifying habitat use of a species and identifying important habitat features is critical to understanding its ecology and for implementation of spatial management strategies. The southern flounder Paralichthys lethostigma is a valuable coastal finfish in North Carolina. Beyond settlement habitat preferences, little is known about the factors shaping southern flounder habitat use. The goal of this study was to examine several habitat features to explain fine-scale distribution patterns of southern flounder during estuarine residency. Both active and passive acoustic telemetry were used to monitor the habitat use and movement of southern flounder between June and October 2014 within an estuarine tributary. Spatial and temporal patterns in prey fish species richness and abundance, as well as sediment grain size and organic content were measured concurrent with flounder tracking. Analysis revealed positive relationships between the occurrence of southern flounder and prey fish abundance and species richness, as well as with moderate levels of sediment organic content.
EXAMINING HEALTH CONDITIONS, THE EXPECTED POPULATION INCREASE, AND THE FUTURE OF ALAMEDA COUNTY

Planning of the built environment has a large impact on the way societies are shaped today and as societies progress it becomes evident that there is a need to address the interdisciplinary aspects of living and how to plan for them. This project aims to explore the inequitable conditions affecting health in Alameda County, specifically highlighting the racial inequality and stressing the importance of the relationship between place and health; to examine the impacts of the expected population growth in the Bay Area but focusing primarily on Alameda County; and lastly to analyze the current or proposed plans of the areas with the greatest inequalities, the areas expected to have the highest growth and based on those findings develop a suggested plan for the areas most affected. The methods for the project include comprehensive review of health assessments and planning documents for Alameda County, key cities, and places.

HYdrogeology of the surface and groundwater resources in southeastern North Carolina: Sources, Demand and Environmental Issues

Rapid growth in southeastern (Brunswick, New Hanover, and Pender counties) North Carolina has generated an increased demand for public and industrial uses of water resources. Further stresses on the water supply include drought, interbasin water transfers, saltwater intrusion, and animal operations supplying excess nutrients to the surface waters. The Cape Fear River is the primary supply of surface waters and is the largest supplier of water for municipal and industrial uses. It is the largest watershed contained entirely within the state and supplies water for >20 municipalities and ~2 million people. Flow within the river is mostly adequate for water demand but in low flow conditions, as has happened twice in the last 13 years, conservation practices and groundwater were used to insure supply met demand. Groundwater well fields and aquifer storage and recovery operations play an important role currently and may be even more important in the future. Excess groundwater withdrawal has its own issues, though, as increased demand may lead to cone of depression formation near the well fields and mine sites, sinkhole development, and saltwater intrusion.
THE EFFECT OF WZX DELETION ON FLAVOBACTERIUM JOHNSONIAE

Flavobacterium johnsoniae is a Gram-negative bacterium that serves as a model organism for studying bacterial gliding motility. Genomic analysis identified a flippase homologue, wzx (fjoh_2240), which is predicted to transport polysaccharides across the cytoplasmic membrane for glycosylation of proteins in the periplasm. In this study an allelic exchange system was used to delete wzx to determine the role of glycosylation in motility and adhesion. Primers were designed with engineered restriction sites, and regions flanking wzx were amplified by PCR. The PCR products were cloned into the suicide vector pRR51 to generate plasmid pBEM02. pBEM02 was introduced into wild-type F. johnsoniae by tri-parental conjugation to generate the wzx deletion mutant. Bacteriophage assays, BioLog™ assay, biofilm formation assay, phase contrast microscopy of colonies and individual cells, and growth curves did not identify any phenotypic differences between mutant and wild-type cells.

GENDER PARITY IN THE FILM INDUSTRY: A LONG WAY TO GO

This thesis examines gender parity in Hollywood, on screen and behind the camera, in an attempt to analyze whether the film industry is moving towards more equal representations and employment of the sexes. Additionally, the damaging repercussions of unequal representations will be discussed. The methodology consists of a comparison between existing statistics with my own data and research. Over 200 films from the past ten years were analyzed to identify the trends of gender inequity and its decline, stagnation, or improvement within films and the industry overall. As expected, the data illustrated that sexism in Hollywood continues to be as pervasive as ever and has failed to noticeably improve in the past decade. This paper will pose that Hollywood continues to shut out females because of sexism at the studios, economic risks, and widespread gender stereotypes, and discuss how such distortions of reality perpetuate societal expectations of males and females.

SMALL THINGS THAT MAKE A BIG DIFFERENCE

Cape Fear Clinic (CFC) is a non-profit corporation that started in 1991 to provide medical care to individuals without insurance, government health assistance, and a household earned gross income at or below 200% of the federal poverty level. This Explorations Beyond the Classroom project consisted of assisting the pharmacist in administering Pneumovax 23 (Pneumococcal Vaccine Polyvalent) to qualified patients through Merck's patient assistance program. Pneumococcal disease is caused by Streptococcus pneumoniae, and accounts for 175,000 cases each year in the United States. Priced at $72.384 per dose, 295 patients were
approved for this vaccine. This saved the clinic $21,353.28 on Pneumovax 23 alone. Other vaccines that are currently administered include Twinrix, and Prevnar 13. How much does it cost to change a life and make a difference? Small contributions, such as volunteers donating a few hours per week, can make a significant impact in the lives of CFC’s patients.

Primary Author: Steele Olsen
Co-author: Erin Diskin
Department/School: Chemistry and Biochemistry
Faculty Supervisor: Pamela Seaton
Health-related

MASS SPECTROMETRY AND GAS CHROMATOGRAPHY TECHNIQUES USED TO IDENTIFY TOXIC CHEMICALS LEACHING FROM BPA FREE PLASTIC POLYMERS

This study examines dissolved organic chemicals which leach into water stored in BPA (Bisphenol A) free plastic bottles under a variety of conditions using gas chromatography. Synthetic polymers, commonly known as plastics, contain traces of compounds, which under the right conditions can become soluble and are capable of dissolving or 'leaching' from their parent material. Some of these components are known to be toxic to humans when ingested. Plastic water bottle manufacturers claim to have no chemical contaminants that leach into the water that they bottle. These claims were put to the test by analyzing water stored in plastic bottles that were subject to a variety of conditions. Gas chromatography was performed to detect leached compounds. The findings of this research may be beneficial to consumer knowledge concerning a variety of chemicals that a plastic bottle is capable of leaching and the harmful results it may have on one's health.

Primary Author: Jin-Si Over
Department/School: Geography and Geology
Faculty Supervisor: Andrea Hawkes
Environmental

ASSESSING THE UTILITY OF FORAMINIFERAL ASSEMBLAGES IN DEVELOPING LATE HOLOCENE SEA-LEVEL RECORDS IN NEWFOUNDLAND, CANADA

At the furthest extent of the Laurentide Ice Sheet 18,000 years ago, Newfoundland was completely covered by the Newfoundland Ice Dome. The southern and eastern portions of the island deglaciated much faster than the north and west, and ice fully retreated from Newfoundland 8,000 years ago. The deglaciation has caused a complex and variable post-glacial sea level history around the island. To deduce the current rate of potentially accelerated sea-level rise, the glacial isostatic response needs to be quantified from longer-term RSL records. Here, we investigate if current sea-level reconstruction techniques using elevation-dependent zones of salt marsh foraminifera are feasible and if so, are a precise method of attaining Newfoundland RSL records. A short modern transect and core were sampled from a small salt marsh in southern Newfoundland. Results show *Balticammina pseudomacrescens* and *Jadammina macrescens* are the dominant agglutinated foraminifera throughout the core and track a recent accelerated sea-level transgression.
HETEROGENEITY IN ACOUSTIC FAT DEPOSITS IN THE NARWHAL, MONODON MONOCEROS

Odontocete echolocation involves a complex array of biological elements used to produce, transmit, and receive sounds. Specialized “acoustic” fats in the forehead and jaw contain unique lipids with branched components that are believed to focus and modulate sound velocity. This project attempted to determine whether the spatial arrangement of the acoustic fats in the narwhal mirrors patterns found in other Odontocetes. Lipids were analyzed from multiple locations in the inner (n= 21) and outer (n=18) jaw fats from one narwhal. We found high concentrations of isovaleric acid (i-5:0, a saturated, branched, short 5-carbon chain). i-5:0 dominated the acoustic fats’ ranging from 14-58 mol%. There was considerable heterogeneity in lipid composition, with highest levels of i-5:0 occurring in the anterior outer jaw fat and the posterior inner jaw fat. Narwhals have high levels of isovaleric acid in the tissues closest to the earbones, which will likely serve to focus incoming sound.

COMPARING MEASURES FOR SYMPTOMS OF POST TRAUMATIC STRESS DISORDER AND TRAUMA AMONG COLLEGE STUDENTS

Past research has indicated that trauma symptoms are distinct from posttraumatic stress disorder (PTSD) symptoms and both are needed for understanding trauma recovery. Our study examined trauma symptoms and post-traumatic stress disorder symptoms in a college sample. This sample consisted of 46 students ages 18-20 with 17.4% males and 82.6% females. Participants completed the TSC-40, a checklist assessing trauma symptoms and the PCL-C, a checklist assessing PTSD diagnostic symptoms. Results indicated a large correlation (r=.708, p<.006) for total TSC-40 and PCL-C. This supported our hypothesis that higher scores on the TSC-40 are related to higher scores on the PCL-C. While this was a high correlation, it was still below the .8 cutoff for multicolinearity, indicating that trauma symptoms and PTSD symptoms are distinct constructs. These results support the notion that understanding the symptoms that follow trauma as well as those related to PTSD diagnosis are both important in trauma recovery.
NOSE AND THROAT CARRIAGE RATES FOR *STAPHYLOCOCCUS AUREUS* IN UNDERGRADUATE NURSING STUDENTS

Methicillin-resistant *Staphylococcus aureus* (MRSA) carriage in patients is a risk factor for infections in hospitals. Approximately 30% of healthy individuals carry *S. aureus* in the nose; however, only a small percentage of those isolates are MRSA. Healthcare workers may serve as transient carriers of *S. aureus* on skin and clothing and may pose a transmission risk to patients. Whether healthcare workers acquire nose and/or throat carriage when repeatedly exposed to MRSA patients has not been clearly determined. To examine the role of clinical exposure in MRSA carriage, UNCW nursing students were tested over the past three semesters for nose and throat carriage. After students filled out consent forms and questionnaires, swab samples from their nose and throat were cultured on CHROMagar Staph aureus plates. Once isolated and identified, each *S. aureus* isolate was tested for antibiotic sensitivity by disk diffusion. MRSA was characterized by cefoxitin-resistance. Across three semesters, the *S. aureus* carriage rates were 38% (21% nose/25% throat), 44% (26% nose/33% throat), and 62% (46% nose/35% throat). This study highlights the importance of testing the throat, as well as nose, for *S. aureus* colonization, where seventeen percent of subjects were exclusive throat carriers. Only five students (1%) tested positive for MRSA. This low rate may have occurred because students were well informed about protecting themselves against MRSA or newly admitted nursing students had not yet been exposed to MRSA. A longitudinal study is currently underway to track students from the semester prior to starting the nursing program, through their clinical experience, until graduation.

MOLECULAR CLONING AND CHARACTERIZATION OF EQUINE HERPESVIRUS TYPE 1 GLYCOPROTEINS I (GI) AND E (GE) FROM THE NEUROVIRULENT STRAIN OHIO 2003

Equine herpesvirus type 1 (EHV-1) causes abortions, respiratory problems, and neurologic disease in horses. Glycoproteins I (gI) and E (gE) on the surface of EHV-1 virions are known to contribute to the cell-to-cell spread of the virus and have been identified as virulence factors. To investigate the properties of gI and gE from a neurologic strain of EHV-1, we first cloned these genes into expression plasmids. We are in the process of generating a cell line that will constitutively express both glycoproteins. This cell line will be used to complement a gI/gE deletion virus and allow us to obtain data about the function of these two glycoproteins, which were derived from the neurologic EHV-1 strain OHIO 2003. We hypothesize that gI and gE from neurologic EHV-1 strains will be better able to mediate cell-to-cell spread and ultimately allow for more efficient spread of EHV-1 from the bloodstream to the CNS.
INFLUENCE OF SOCIAL INTERACTIONS ON SATISFACTION ABOARD CRUISE SHIPS

This study examined social interactions that occur aboard cruise ships and analyzed the effect those interactions had on passenger satisfaction with their social experience and cruise experience overall. Social interactions with other passengers were found to affect satisfaction more than social interactions with crew members. The regression models produced suggest that while crew interactions may be important to satisfaction, especially those interactions that were positive, the passenger interaction had a greater affect overall, particularly when these were positive and resulted in close relationships.

THE RELATION BETWEEN TRAUMA SYMPTOMS AND P300 LATENCY IN EEG

Trauma symptoms, which are the behaviors and feelings people experience after a traumatic event, may be related to brain function, which organizes the body's response to trauma. A pilot study was conducted to observe the relationship between brain function and scores on the Trauma Symptom Checklist (TSC-40). Utilizing electroencephalography, we measured P300 latency of the event-related potential (ERP) during a Go/NoGo task in a sample of 27 college students (81.5% females, 18.5% males). A variable was created to differentiate between high (n=19) and low (n=8) trauma symptoms as measured by the TSC-40 total score. Results indicated a lower peak latency for the high scoring group (M=42.63, SD=8.05) when compared to the low scoring group (M=13.89, SD=5.03) that was statistically significant (t (24.28)=2.663, p=.014) during go trials at the Cz electrode. This suggests that individuals with more trauma symptoms may process certain stimuli more rapidly than individuals with fewer trauma symptoms.

DECISION-MAKING ON THE IOWA GAMBLING TASK AS A FUNCTION OF WORKING MEMORY

Iowa Gambling Task (IGT) literature reveal several brain regions that may be involved in decision-making on this task, two being the ventromedial prefrontal cortex (vmPFC) and the dorsolateral prefrontal cortex (dlPFC). Among this literature, researchers posit that decision-making on the IGT is driven by emotional and/or cognitive processes. The current study was designed to find evidence that supports the cognitive approach, and sought to find a relationship between working memory capacity (WMC) and advantageous performance on the IGT. Undergraduate psychology students participated in one of two experiments. The first experiment had participants perform the IGT, followed a widely used measure of working memory, the AOSPAN. The second experiment had participants perform the AOSPAN and perform the IGT at least twenty
four hours later to control for possible cognitive depletion. The results from the two experiments were virtually the same in that there was no significant correlation between WMC and IGT performance. When the data were combined for more analyses, the lack of a relationship persisted. A fine grain analysis revealed a small relationship between WMC and an improvement IGT performance in roughly the middle of the task. These results suggest that baseline WMC may not be predictive of decision-making on the IGT. However, there may be a benefit of having a high WMC at some points during the task.

Primary Author: Lauren Schaefer
Department/School: Psychology
Faculty Supervisor: Kate Nooner

RELATIONS BETWEEN ANXIETY, EATING DISORDERS, AND TRAUMA SYMPTOMS IN COLLEGE STUDENTS

We conducted a pilot study investigating the relationship between anxiety symptoms, trauma symptoms, and eating disorders in a college sample. Our pilot sample consisted of 27 college students ages 18-20. We used three self-report measures to assess eating disordered symptomatology, anxiety, and trauma symptoms. These measures were the Eating Disorder Examination Questionnaire, the Beck Anxiety Inventory, and the Trauma Symptom Checklist, respectively. These constructs are correlated in the literature, and our sample extends this pattern. In our participants, scores on the EDE-Q were positively correlated with both scores on the BAI (r = .622, p = .001) and scores on the TSC-40 (r = .575, p = .002). Scores on the BAI were also positively correlated with scores on the TSC-40 (r = .537, p = .004). These findings can inform both research and practice of the relationship between anxiety, trauma symptoms, and eating disorders in a college sample.

Primary Author: Lauren Schaefer
Department/School: Psychology
Faculty Supervisor: Kate Nooner

PILOT STUDY OF THE RELATIONSHIP BETWEEN EATING ATTITUDES AND BRAIN FUNCTION

We conducted a pilot study investigating the relationship between eating attitudes and brain function using electroencephalography (EEG). We hypothesized that participants with higher scores on the Eating Disorder Examination Questionnaire (EDE-Q) would display longer latencies in the P300 component of the cortical event-related potential (ERP). Our pilot sample consisted of 27 college students. We collected EEG data while participants completed a standardized auditory Go/No-Go cognitive task. ERP’s were calculated for three EEG electrode sites, chosen based on current literature (Cz, Fz, Pz). Participants with an elevated EDE-Q score displayed significantly longer P300 latencies, meaning that it took more time for them to process the tones in the Go/No-Go task. Given that this is a non-clinical sample, these findings indicate that there may be observable cognitive differences present before individuals meet diagnostic criteria for an eating disorder. Accordingly, EEG could be helpful in clinical settings in diagnosing and guiding treatment.
JOB ACTIVITY CLASSIFICATION AND RELATIONSHIP WITH MUSCULOSKELETAL DISCOMFORT

The amount of physical activity that is required on the job can affect employee musculoskeletal health. Classifying job physical activity demands relative to reported musculoskeletal discomfort would assist in the development of university ergonomic programs by representing target areas of concern.

MUSIC AS RHETORICAL SITUATION

Lloyd Bitzer’s theory of rhetorical situation has been a topic of study for almost 40 years. Bitzer argued that the core elements of his theory (exigence, audience, and constraint) appear in almost any situation. Since its publication in 1974, rhetorical theorists have applied Bitzer’s rhetorical situation to a variety of communication phenomena. However, a gap in the research appears regarding how the rhetorical situation applies to music. While scholarship exists that claims music can have a rhetorical effect on consumers' purchase intent, research has not extended to study how Bitzer’s theory relates to the marketing purposes of music. This paper explores how Bitzer’s theory can be applied to understand the rhetorical effects of music in integrated marketing communication (IMC).

VERTEBRAL MATURATION IN AGE ESTIMATION: A TEST OF THE REVISED METHOD OF SCORING THE TIMING AND PROGRESS OF EPiphyseAL RING UNION

The process of maturation (epiphyseal union) of the superior and inferior "rings" of the vertebrae in the human spinal column has been shown to correlate well with known age at death. The purpose of this current study was to test the revised Albert and Sherwood (2013) method of scoring stages of vertebral maturation on all three presacral vertebral types—cervical, thoracic, and lumbar—to see if the accuracy of this age estimation method could be improved. The sample comprised 92 individuals (54 female, 38 male) from the Lisbon Collection housed at the Museu Nacional de História Natural, Museu Bocage in Lisbon, Portugal. Statistical analyses showed there were relatively high positive correlations ($r = 0.84$ - $0.92$) between vertebral type (cervical, thoracic, and lumbar) examined separately, for sexes combined and separated. There was no statistically significant difference between the sexes. These initial findings show that this revised method may potentially improve the estimation of age at death in teenagers and young adults. When this method is used in conjunction with other skeletal age indicators, it may increase the accuracy of estimating the age of unknown individuals.
THE GYNECOLOGICAL GLASS CEILING: LIMITATIONS FACED BY GREEK MIDWIVES DUE TO MALE ENCROACHMENT, 5TH CENTURY BCE- 2ND CENTURY CE

From the late fifth-century BCE onward, traditional Greek midwives encountered increasing male anxiety over the fact that they held positions of influence with minimal supervision and control. Discomfort toward female agency in gynecological issues manifested itself in two ways: the creation of reproductive medical treatises and a movement to limit female obstetric activity from the fifth-century BCE to the second-century CE. However, this movement was not without resistance. Greek women, disturbed by incompetent male physicians encroaching into female medical issues, preferred and often subversively sought the opinions of midwives. The issue of the gynecological glass ceiling that Greek midwives faced due to suppressive legislation underlines tensions regarding traditionally perceived gender roles in Greek society, both on male and female sides.

QUESTIONNAIRE REFINEMENT IN NEUROPSYCHOLOGICAL ASSESSMENTS

The 100 item Trauma Symptom Inventory (TSI) diagnoses and assesses the activity of posttraumatic stress disorder (PTSD) and other psychological disorders. Over the past few years the TSI has been administered to thousands of veterans and active marines stationed in Camp Lejeune, a base in Jacksonville, North Carolina, who were referred by military neurologists. In utilizing Item Response Theory (IRT) on these test results, multiple statistical analyses provided insight into the underlying characteristics of the TSI: item difficulty, item discrimination, and local dependency. The TSI is time consuming, therefore a shorter test with tailored assessments is needed. From the IRT model, the selected subset of items will provide an equally as informative test as the longer version, while still maximizing precision along all segments. According to psychologists, ‘poor effort’ constitutes up to 50% of the difference in cognitive testing performance, which may stem from the length of the TSI.
various interest groups, including African American genealogists, historic preservation professionals, African American community leaders, museum professionals, African American parents, museum tour guides, and college students in American history courses, in order to get more in depth responses. The data we compiled represents the largest known collection of visitor responses regarding slave dwellings and offers great insight into what visitors know and assume about slavery, slave dwellings, and preservation.

Primary Author: Corinne Spivey
Department/School: Early Childhood, Elementary, Middle, Literacy and Special Education
Faculty Supervisor: Linda Mechling

TEACHING PERSONAL SAFETY SKILLS, USING VIDEO MODELING, TO STUDENTS WITH MODERATE INTELLECTUAL DISABILITIES

The purpose of this study was to evaluate the success of using video modeling to teach individuals with disabilities how to address and respond to strangers. The participants in this study were all females diagnosed with moderate intellectual disabilities and were of the age of 21 years old. They were also all enrolled in the same Transition Program for Young Adults. A multiple probe design was used across three sets of social skills. This design was used to demonstrate a functional relationship between video modeling and subsequent changes in students’ behaviors. The results of this study indicated that the use of video modeling is a useful and effective instructional procedure which also supported generalization and maintenance of skills at community sites. The procedures resulted in the learning of three sets of Personal Safety Skills Questions.

Primary Author: Rachel Stearns
Department/School: Geography and Geology
Faculty Supervisor: Andrea D. Hawkes

CREATING A MODERN FORAMINIFERAL DATASET FROM SOUTH AFRICA FOR RECONSTRUCTING HIGH-RESOLUTION LATE HOLOCENE SEA LEVEL

Holocene sea level records are absent, incomplete or low-resolution in much of coastal South Africa. In order to produce high-resolution sea level records in this region, new chronological control on valid sea level index points are required. Foraminiferal distribution displays narrow vertical zonation associated with tidal inundation period and frequency. Benthic salt marsh foraminifera will be used to develop a regional modern dataset that establishes the relationship between foraminifera and tidal inundation. Four modern transects of foraminiferal assemblages, vegetation, elevation, and salinity from sites in southern South Africa will be analyzed. Preliminary South African studies show that this method may provide the much needed high-resolution RSL records (geologic sea level context) necessary to help evaluate the future of South African sea level. A dataset of statistically-derived zonations of foraminiferal-elevation assemblages will be evaluated for utility and precision. Using this dataset to predict downcore elevations of fossil foraminiferal assemblages will provide high-resolution reconstructions of late Holocene South African sea level.
SWIMMING UNDER THE INFLUENCE:
EFFECT OF ALGAL TOXINS ON THE BEHAVIOR OF THE MARINE CILIATE FAVELLA SP.

Although it is known that microzooplankton can regulate harmful algal bloom (HAB) dynamics through grazing of algae, the effects of HAB-related toxins on these micrograzers are unknown. Therefore I examined the effects of the algal toxins domoic acid (DA), brevetoxin (PbTx-2), and 2,4-trans,trans-decadienal (DDA) on the swimming behavior of the ciliate *Favella sp.* Neither DA nor PbTx-2 had a significant effect at the highest concentrations tested (800nM and 400nM respectively). However, about 50% of ciliates ceased swimming after 1 h exposure to 30 µM and 50 µM DDA and displayed significant behavioral changes within 5 min. Preliminary recovery experiments showed that up to 80% of the non-swimming ciliates are viable after 24 h, suggesting in these DDA did not induce programmed cell death. This work demonstrates that some, but not all, algal toxins may compromise the ability of microzooplankton to evade predators, capture prey, and regulate HABs.

THE AMERICAN WAY: ISSUE FRAMING AND ATTITUDES ABOUT THE NATIONAL GUN CONTROL DEBATE

Public support or opposition to gun control legislation seems to be ever-changing. Mass casualty shootings like those in Aurora, Colorado and at Sandy Hook Elementary School continue to galvanize people and bring the gun control debate to the national stage. However, little policy change actually occurs from this surge in concern. Instead, indignation tapers off and the push for stricter gun control legislation to keep these events from ever happening again fades away and gun rights, self-defense, and the Second Amendment come to replace assault weapons bans, universal background checks, and other control policies on the national stage. This back and forth continues on for decades, with gun control and guns rights advocates fighting for control of the narrative. This study uses Framing Theory to analyze the efficacy of positive and negative frames of gun ownership, which are employed by pro-gun and gun control advocates, respectively, and suggests some mitigating factors that may impact the way a frame is used and offers explanations as to why some frames are more effective than others.
Petrographic and Provenance Investigation of Cedrosan Saladoid Ceramic Sherds, St. Georges Region, St. Croix, US Virgin Islands (USVI)

St. Georges is located along the northwestern edge of the full graben that bisects the central portion of the island of St. Croix, USVI. The soils are the Hogensborg Clay Loam (contain early to middle Miocene carbonate materials) and the Glynn gravelly loams. The drainages eroding into the graben are dissecting the upper Cretaceous (Judith Fancy Fm.) northwestern horst. These sediments contain volcaniclastic intermediate material rich in quartz, feldspar (plagioclase and k-feldspar), white mica, amphibole, biotite, epidote and opaque minerals (hematite and magnetite). Ceramic sherd samples from the Anderson Collection, provided by the USVI National Park, were defined as Cedrosan Saladoid (500 BCE - 400 CE) by type and form.

Petrographic investigation of 9 sherds found their aplastic composition was dominated by very coarse to medium mineral fragments (quartz, feldspar and amphibole), volcaniclastic and carbonate rock fragments and some contained fossil and shell fragments. In comparison, the soil sample from the region contained very coarse to medium carbonate (fossiliferous to micritic) and volcaniclastic material. Both the soil and sherd samples contained similar mineral fragments, volcaniclastic and crystalline carbonate rock fragments, as well as micritic mud. The micritic mud in the soil sample contained some mineral grains (hornblende and feldspar). The soil sample also contained white mica and volcaniclastic rock fragments (feldspar + biotite) while the sherd samples do not. The fossil fragments in the sherd and soil samples are elongate shell fragments and gastropods. The soil sample contained a coral fragment and lath-like opaque material (organic debris). Based upon the petrography of the St. Georges sherds, their materials could have been derived from either the graben sediments or the eroded materials from the northwestern horst. 3 of the 9 sherds contain only volcaniclastic rock and mineral fragments that could be evidence for manufacture in another area and relocation to St. Georges. The remaining sherds all have crystalline and micritic mud carbonate rock fragments. These could have been formed due to erosion of the volcanic material into the graben and incorporation into the clay loams. Study of additional sherds from this region could help define the provenance question more precisely.

Least Cost Path Analyses for a New Railroad to Alleviate Midwest Rail Shipment Delays

With the Midwest oil boom in full swing, the railroad network surrounding North Dakota has been seeing an unusually high number of delays in shipments. This affects local farmers trying to export record breaking harvests, vehicle manufacturers with excess stock setting at a standstill, and passengers of the popular Amtrak train service who are getting shoved aside for the priority of oil. I have proposed a least cost path for a new railroad that would help alleviate these issues.
INCREASING PHYSICAL ACTIVITY USING GOAL SETTING AND CONTINGENCY MANAGEMENT

Data from the 2010 National Health and Nutrition Survey indicates that 43% of men and 52% of women report partaking in no daily physical activity. Physical inactivity is associated with negative health consequences and thus, it is critical to promote activity related behaviors. As reinforcement and goal setting interventions have helped increase physical activity, the current study employed an ABCA reversal design to examine the separate contributions of goals and monetary incentives. Five participants underwent a 10 day long baseline phase without any goals or incentives followed by a 10 day goal-setting phase. Daily step count goals were set without any scheduled contingencies. Next, a 10 day incentive phase that delivered $1.50 contingent upon each daily goal achieved. Finally, there was a 7 day return to baseline condition. All participants' steps increased during intervention compared to baseline with notable differences between intervention phases.

POSSIBLE SELVES AND THE INFLUENCE OF PAST DEATH-RELATED EVENTS ON FEAR OF DEATH

Possible selves are future images of the self that we hope to become or are afraid of becoming. Research has focused on the role that possible selves have on motivation and development across the lifespan; however, the relationship between possible selves and death anxiety was unexplored. The focus of the present study was to analyze 1) the relationship between past death-related events, religion, age, and death anxiety, 2) whether or not death anxiety predicts the absence or presence of death-related possible selves, and 3) whether characteristics of death-related memories influence death anxiety. Results indicate a significant negative relationship between death anxiety and both age and religion. Death anxiety did not predict the absence or presence of death-related possible selves, but relationships were found between death-related memories and death anxiety. Understanding how past death-related events influence death anxiety may allow for therapeutic interventions to aid in the grieving process.

TEACHERS' USE OF KITS: TEACHING AND INTEGRATING SCIENCE IN THE ELEMENTARY SCHOOL

The lack of science is prevalent in the elementary classroom. However, varieties of strategies have been put into place to help alleviate this issue and ensure the inclusion of science content. These strategies include the utilization science kits and the integration of science with other content areas. This study sought to obtain the opinions of local elementary teachers regarding their science instruction, particularly related to
the use county provided science kits. The teacher responses within the study illustrated the time constraints preventing the inclusion of science content, the popularity of integrating science with literacy, the diverse utilization of the science kits, and the inadequate alignment of the kit materials with the state educational standards. Modifying the current science kit system could benefit teachers by reducing these problems.

**THE CONTINGRENT VALUATION OF THE GREEN INITIATIVE FUND AT THE UNIVERSITY OF NORTH CAROLINA WILMINGTON**

Finding the value of environmental programs has generated interest in utilizing statistical and economic instruments to capture significance beyond monetary terms. The value of goods not traded on the market may be skewed when using traditional economic principles. Contingent valuation (CV), a nontraditional instrument, assesses a population’s willingness to pay (WTP) by simulating a market situation with hypothetical consumer choices. This study focuses on the use of CV to quantify the University of North Carolina Wilmington (UNCW) student body’s WTP for a fee that will fund environmental programs. This fee, known as the Green Initiative Fund, proposes an appropriation of $5 from each student at UNCW each semester in order to finance initiatives for a more sustainable campus. The student body was surveyed using a probit bivariate method of questioning in order to measure the WTP, resulting in a model that determines the average UNCW student’s WTP for environmental programs.

**THE EFFECTS OF ANXIETY ON FEMALE ALCOHOL CONSUMPTION**

The purpose of the current study is to further investigate how anxiety influences drinking behavior in women. There is currently a large volume of information regarding social anxiety and how different levels affect drinking and its consequences. However, there is limited information about how trait and situational anxiety affect whether females ultimately drink more or less and what type of consequences they face from their drinking behavior. Also, this study is directed at finding why anxiety results in consumption of alcohol rather than other alternatives. Therefore, the current study is directed towards addressing this. My hypothesis is that anxiety provoking situations will increase the desire to consume alcohol to relieve these feelings rather than using alternative resources.
STORMWATER MANAGEMENT IN ANACOSTIA WATERSHED USING LIDS (LIGHT IMPRINT DESIGNS AND LOW IMPACT DEVELOPMENT)

My research aims towards creative solutions for mitigating storm water runoff in the Anacostia watershed which spans from Maryland to Washington D.C. Creative solutions are mainly, but not limited to, light imprint designs and low impact developments where there are none or where existing designs could be improved. In Anacostia's comprehensive land use plan, storm water runoff is listed as the primary nonpoint source polluter at 75-90%. It is also interrupting some aquatic life cycles. I will focus on the most polluted areas of the river and then give examples about how, where and which types of low imprint designs/low impact developments could be implemented in surrounding communities.

MORPHOLOGICAL AND GENETIC CHARACTERIZATION OF INTRODUCED ASCIDIANS AND THEIR DISTRIBUTION PATTERNS IN NORTH CAROLINA HARBORS AND MARINAS

Marine introduced species have become increasingly prevalent around the world, in both natural and artificial environments. Ascidians are successfully introduced in many areas due to their high reproductive capacity, population growth rates and tolerance for a wide variety of environmental factors. In this study, we assessed the biodiversity and distribution of ascidians in 12 marinas along the North Carolina coast. Ascidians were identified using appropriate morphological keys and species descriptions and by sequencing a fragment of the mitochondrial gene cytochrome oxidase I (COI). DNA sequences were compared to those in GenBank using BLASTn, and a taxonomic catalogue of DNA barcodes was assembled. Five sites had no ascidians and of the 12 sites with ascidians, the most widespread and abundant species was the non-native *Styela plicata*. Further insights on the distribution patterns of native and introduced ascidians in North Carolina harbors and marinas will also be presented.

POPULATION DENSITY ANALYSIS OF NC USING CLUSTERING METHODS

This project will analyze the counties in North Carolina based on similar growth patterns in economic variables such as earnings, education, and housing costs. After finding these clusters, an analysis of these groups will be performed to define significant variables within the clusters. These significant variables will then be used to indicate policies to boost population or stabilize people per square mile within areas of North Carolina.
TROPHIC NICHE PARTITIONING OF TWO TROPICAL CARIBBEAN SEA GORGONIAN OCTOCORALS

It is widely accepted that gorgonian octocorals obtain nutrients from both suspension feeding of large zooplankton and via symbiotic zooxanthellae. However, the relative contribution of each nutrient resource is unresolved for many Caribbean species. Using stable isotope analysis, Carbon (δC13) and Nitrogen (δN15) isotopic signatures were determined for 2 species of tropical gorgonians and analyzed to compare the contribution of large particulate organic matter (POM). Differences between gorganian species help to determine trophic niche specialization, and the signatures relative to the signature of POM determines the contribution of this food source to gorgonian growth. This preliminary data shows that these two species found off the coast of Bocas del Toro, Panama are not feeding primarily on large POM, but instead relying on nutrients provided by zooxanthellae undergoing photosynthesis within the gorganian tissues.

THE IMPORTANCE OF THE 2013 REAUTHORIZATION OF THE VIOLENCE AGAINST WOMEN'S ACT FOR NATIVE WOMEN ON NATIVE AMERICAN RESERVATIONS

On March 7, 2013, President Obama signed into law the Violence Against Women's Reauthorization Act of 2013 (or VAWA 2013). This law established the right for Native Americans to hold criminal jurisdiction over both Native and non-Native offenders who commit acts of domestic violence, dating violence, or who violate certain protection orders against Native women who live on Native American Reservations. VAWA 2013 officially took effect on March 7, 2015, however it also authorized a voluntary 'Pilot Project' that involved three Native tribes that could begin exercising this newly given sovereign power before March of 2015. My research involves the critical evaluation of VAWA 2013, specifically on what measures it is putting into place and why it was necessary, along with its limitations and what measures need to be done now in order to decrease the rapidly growing violence on Native American lands.

TEMPORAL CHANGES IN TOTAL IRON IN RAINWATER

Total iron is the sum of dissolved plus particulate iron, and it is highly variable in rainwater. Total iron has been determined using the spectrophotometric ferrozine method for 43 coastal rainwaters collected on the UNCW campus from May 2013 through April 2014. Previous research indicates that total iron decreased by approximately half between 1997 and 2008, however high concentrations were observed in the summer of 2013. Based upon analysis of these 43 samples, the current annual volume-weighted average is 478 nM vs 265 nM in 1997-2001 and 121 nM in 2008, which does not support the idea that total iron concentrations are continuing to decrease in coastal NC rainwater. Dissolved iron has decreased by more than half over this
time period because of better emission control from automobiles and power plants, increasing rainwater pH and a greater proportion of rain of marine vs terrestrial origin, which means that particulate iron in rainwater has increased. Rainwater iron is especially important in coastal rainwater because iron is often a limiting reactant in photosynthesis and rainwater is an important source of iron to marine surface waters.

**Primary Author:** Erika Winnie  
**Department/School:** Psychology  
**Faculty Supervisor:** Christine Hughes

**DELAY DISCOUNTING EFFECTS ON RATS USING MATCHING LAW ANALYSES**

The present study was conducted to attempt to quantify and analyze impulsive choices using Pitts and Febbo’s (2004) concurrent-chains procedure and Herrnstein’s (1961) matching law. Eight male rats were used as subjects and responded according to a VI 5-s schedule. They chose between a small reinforcer after a short delay and a large reinforcer after a long delay that increased across blocks within the session. Response ratios of responses made on the large reinforcer lever over responses made on the small reinforcer lever across blocks showed high variability and trending so a number of procedural manipulations were implemented to the original concurrent-chains procedure. For two rats (M31 and M34), response ratios began to show a typical delay-discounting function after several procedural manipulations were implemented. For the other rats (M27, M28, M29, M30, M32, and M33), response ratios continued to show high variability across all procedural manipulations.

**Primary Author:** Michael Wooster  
**Department/School:** Biology and Marine Biology  
**Faculty Supervisor:** Joseph Pawlik  
**CSURF Travel Award**

**DEFENSE BY ASSOCIATION:**  
**SPONGE-EATING FISHES ALTER THE SMALL-SCALE DISTRIBUTION OF CARIBBEAN REEF SPONGES**

Sponge-eating fishes have recently been shown to control Caribbean sponge community composition through predation. Palatable sponges that do not have a chemical defense like defended sponges are typically grazed off the reef by spongivores, but can sometimes be found in close association to refuge organisms like coral and gorgonians. In the absence of sponge predators we would not expect this pattern because palatable sponges would be relieved of top-down control and allowed to persist wherever they settle. We conducted 30m belt transect surveys of sponge abundance in relation to refuge organisms on two sites with radically different spongivore abundances. Palatable sponges in Panama were randomly distributed and none exhibited a significant trend of association to refuge organisms while in Florida the palatable sponges exhibited a significant trend of association with refuge organisms. These data show that predation alters the meter-scale pattern of sponge distribution on reefs where spongivores are present.
INFLUENCE OF BEACH RENOURISHMENT ON SEDIMENT GRAIN SIZE AND FISH HABITAT UTILIZATION PATTERNS AT WRIGHTSVILLE BEACH, NORTH CAROLINA

Wrightsville Beach has been renourished since 1938 to combat erosional losses of sand and protect oceanfront structures. Little is known about the long-term effects that this practice may have on fish habitat quality and utilization of the adjacent surf zone. This paper, (1) evaluates changes to sediment grain size distributions associated with three successive (2006, and 2010) renourishment projects, and (2) investigates whether sediment changes resulted in altered fish abundance and utilization patterns at renourished (n=3) versus control (n=4) sites for three common species. Sediment and fish data available for these analyses were collected over the period 2006-2012.

ACADEMIC DIFFICULTIES CHINESE INTERNATIONAL STUDENTS ENCOUNTER ON AMERICAN CAMPUS

The purpose of this study is to examine the academic experiences Chinese international students go through on American campus and inform the policy-making on this group of students. The number of Chinese international students in the United States is currently the largest of all the sending countries. In 2012, the number went up to 235,597, representing over a quarter of all foreign students. In the 2012-2013 academic year, international students contributed $24 billion to the U.S. economy. Seven international students can facilitate to create three U.S. jobs. Higher education has become the U.S. top service sector exports. Though institutions of higher education across the U.S. are endeavoring to enroll more Chinese international students, the researcher's literature review suggests there is a very thin literature body on this group of students, and Chinese international students are overlooked, and their difficulties and needs are ignored.