UNIVERSITY OF NORTH CAROLINA
WILMINGTON’S
2016 UNCW FALL SHOWCASE OF STUDENT RESEARCH AND CREATIVITY

Display
Monday and Tuesday, November 21 and 22 in Warwick Center

Reception
Monday, Nov 21, Warwick Center. 3:30 to 5:30 p.m.
Welcome to the
4th UNCW Fall 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 and creative scholarship, 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: competitive CSURF Undergraduate Fellowships, Summer and Spring Undergraduate Research and Creativity Awards receiving CSURF Travel Awards, 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

Special thanks to:
UNCW Graduate School- Dean
Ron Vetter & Nancy Holland,
Undergraduate Studies- Dean
Paul Townend, Randall Library-
Sarah Watstein, Christopher
Rhodes, John Crawford-, Printing
Services, ARAMark Catering,
CSURF Graduate Assistants-
Darryl Mott, Katie Dyer, Erika
Winnie, & Kaitlyn Proctor,
Honors Office Assistants, CSURF
Faculty Advisory Board, and
Honors College staff- Peggy
Styes, Morgan Alexander, and
Jennifer Horan. Very special
thanks to our new Assistant
Director of CSURF, Dr. Nathan
Grove.
Welcome to the Fall 2016 Student Research and Creativity Showcase.

Research and scholarship were once considered the purview of faculty and doctoral students. But the experiences and accomplishments featured in this showcase show us the potential for both undergraduate and graduate students to conduct faculty-mentored research and creative scholarly activity.

This Showcase, organized each semester by the Honors College in collaboration with Undergraduate Studies, the Graduate School, ETEAL, and the Randall Library, puts on display the work of our student researchers, work which is often accomplished out of public view in laboratories, libraries, marshes, fields, etc.

These student researchers know the importance of striving for excellence and making their education the foundation for their future.

While we hope that all students take advantage of the opportunity to engage in interesting and meaningful research, the gifts and goals of the students represented here have afforded them unique opportunities to work with professionals on and off campus to really discover, analyze, synthesize and advance knowledge in their chosen fields.

My congratulations to the students on their current achievement. My hope is that their work will inspire other students and that the tradition of meaningful faculty-mentored student research will continue as a hallmark of a UNCW education.

Marilyn A. Sheerer
Provost and Vice Chancellor for Academic Affairs
On behalf UNCW’s CSURF and Honors Scholars College and as Dean of the Cameron School of Business, welcome to the Honors Fall 2016 Student Research and Creativity Showcase. I applaud the efforts of those who bring this opportunity to UNCW students each semester, providing a platform to exhibit the fruits of their labor in research.

"If we knew what it was we were doing, it would not be called research, would it?" – Albert Einstein

Research is a time-honored tradition at most Universities. It is the foundation for knowledge and, thus, exchanged through literature, teaching, and applied learning. It is turning a thought, a dream, an inquisitiveness, into knowledge.

As a researcher myself, I know what is offered by being involved in a research project. For students, independent research offers an insight into the culture of research – taking what is taught in the classroom and furthering it through research. Students get hands-on involvement in strengthening their academic knowledge.

Aside from increased knowledge, research has the ability to enhance a skill set that is necessary for professional development. By being involved in a research project, students learn organizational techniques and problem-solving skills, teamwork, thinking creatively, development of verbal and writing skills, and judgment skills. These skills can be transform into your personal life and future careers.

An added surprise for students doing research is the almost risk-free opportunity to decide what they want to pursue in the future. Career decisions can be one of the toughest obstacles students will face. This is an opportunity for students to jump-start their careers and explore career fields. These students can get first-hand advice from mentors in turning their research into a career.

There is so much to gain in doing a research project and very little to lose.

In closing, may I encourage each of you to continue the path you have started. Keep up with your research – learning is perpetual.

Sincerely,

Robert T. Burrus, Jr.
Dean
Nov 8th, 2016

Welcome to the UNCW Fall Showcase of Research and Creativity. As the Dean of the College of Arts and Sciences, I am proud of all of the students who will be presenting their work today. You are truly exceptional members of UNCW.

Today is the culmination of much hard work and focus. It is an opportunity for you to engage in one of the most critical components of the research and creative process — sharing your work with others. Sharing your work and receiving feedback is one of the many strengths of these processes. It is both a means for you to disseminate the new knowledge you have created and also learn from others in order to improve the outcome of your work.

Through this sharing process, I hope you come understand that you can use your intellect and creativity to enrich the world and improve the public good. You are not simply learning or creating for yourself, you are using your abilities for the benefit of society. We need more people in the world like you — individuals committed to enriching the world as well as shedding light on and providing solutions for the world’s most pressing problems.

In addition to this aspirational aspect of your work, you have learned skills valued by employers. Employers are looking for people skills in creative thinking, data analysis and synthesis, collaboration, oral communication, and writing. Today, you will manifest these skills through the presentation your work. Congratulations.

I would also like to express my deepest appreciation for the faculty members who have served as mentors of your work. Their insight, commitment, and enthusiasm are gifts that will serve you well over the course of your life. I know you will use their guidance well. Good luck today and take the time to enjoy the experience.

Best,

Aswani Volety, Ph.D., Dean
UNCW College of Arts and Sciences
November 14, 2016

Dear UNCW Research Student,

As Founding Dean and Professor for the College of Health and Human Services, I am honored to offer a note to welcome you to the Fall Showcase of Student Research and Creativity. Your participation in this Showcase indicates your decision to move from a consumer of knowledge paradigm to a creator of knowledge paradigm. I commend you for “leaning in” and challenging yourself to explore this new paradigm.

I do hope that you have been challenged through this process and that you now see this paradigm as more of a method for problem solving than as some dark and mysterious realm inhabited by impractical people who speak and write in baffling terms. Indeed, I hope you have enjoyed it to the point that you not only appreciate your new found knowledge but have gotten the “bug” to continue developing your skills and expertise in this brave new world. Finally, I ask you to pass along your experience to your fellow students – urge them to follow in your footsteps and participate in this most impactful applied learning experience. Enjoy this day!

Yours in Health,

Charles J. Hardy, Ph.D.
Founding Dean and Professor
Welcome to everyone attending the fall 2016 Student Research and Creativity Showcase. And a special thank you and congratulations to our students for their intellectual, scholarly and creative work represented in the showcases. As a professional school, the work of our students sits at the intersections of basic and applied research that energizes the work of the University.

At those intersections, students in the Watson College — through their work as scholars of professional contexts and practices — participate in the construction of the knowledge bases that undergird our teaching and our engagement with the broader community and world. Our students bring a commitment to rigor and creativity as they learn to be critical consumers, users, and makers of the knowledge at the core of our professional work.

I want to acknowledge the work of our faculty who provide mentorship and collegial support to our students as they develop their research skills and practices. Our faculty expertise and experiences are invaluable in providing these learning experiences to Watson students. I also want to thank our partners in schools, community agencies and other settings who collaboratively work with us to provide these important research experiences for our students.

Van Dempsey, Dean
Watson College of Education
November 2016

Thank you for being part of the Fall UNCW Showcase of Student Research and Creativity!

As the projects within these pages illustrate, faculty and students are actively involved in discovery, innovation and collaborative research. What strikes me is the wide variety of research and scholarship happening at UNCW, and yet, this is just a sample of the innovative work going on. At most universities, research opportunities are reserved for graduate students; however, UNCW prides itself for making undergraduate involvement a priority as well.

I hope that you enjoy learning more about the projects highlighted within these pages, and find time to meet those behind this exciting work during the poster session. Learn more about the exciting research going on at UNCW by visiting uncw.edu/research.

Sincerely,

Ron Vetter, PhD
Associate Provost for Research and Dean of the Graduate School
ABSTRACTS OF RESEARCH/CREATIVE SCHOLARSHIP ON DIGITAL OR POSTER DISPLAY

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ALPHABETICAL LISTING BY PRIMARY AUTHOR
EFFECTS OF MARINE MEDIA ON THE GROWTH OF ANTIBIOTIC PRODUCING SOIL BACTERIA FROM THE CAPE FEAR RIVER

The discovery of antibiotic metabolites from marine resources has recently proven to be a new source for novel antibiotics used to treat bacteria infections. Culturing actinobacteria, such as Streptomyces, on media similar to their natural environment like a Marine agar 2216 or a manipulated ISP-2 media could result in more diverse isolates than those grown on normal media. In this study, soil samples were taken from Islands in the Cape Fear River, diluted with sterile H2O and cultured on Marine agar 2216 and ISP-2 media. After culturing, samples were tested for antibiotic producers by a TSB overlay inoculated with Staphylococcus epidermis. The marine media exhibited two zones of inhibition and the ISP-2 media produced six zones of inhibition. A cross streak against the 'ESKAPE' pathogens showed inhibition against Actinebacter calcoaceticus, a gram-negative bacteria. Further testing includes a genomic isolation and PCR 16S rRNA.

ARDUINO POWERED GIMBAL CAMERA STABILIZER

A gimbal is a pivoted support that allows an object to rotate around a specified axis. A powered gimbal controls the rotation of an object around a specified axis. The goal of this project is to prototype and create a 3-axis gimbal camera stabilizer for a GoPro Hero camera. This project utilizes an Arduino UNO for the gimbal logic, a motor controller which supplies a brushless dc motor with the required voltage and current needed to turn the motor clockwise or counter clockwise, and a gyroscope sensor to detect how far the camera has moved along a given axis. The implementation is a naive technique for gimbal operation, but the project explores and elaborates on various methods and techniques for controlling a gimbal.
FROM PHYSICAL COLLECTION TO 3D MODEL CONSTRUCTION: BUILDING THE METAL PCB DATASET

The UNCW Face Aging Group was contracted to develop a program that can learn and identify the various components of images of printed circuit boards (PCBs). In order to do so, though, data were greatly needed as only one dataset of PCB images existed at the beginning of the project. After hundreds of clocked hours of collecting various electronics, extracting their circuit boards, photographing the boards, annotating the various components, programming additional functionality to the annotation software, and later exploring the creation of digital 3D models and depth buffer images of the boards, we had built a thorough, unique, and well-needed dataset: the METAL (Micro-Electronics Taken Apart Logically) PCB Dataset.

COLLABORATIVELY DESIGNING AND BUILDING AN EXTENSIBLE SOFTWARE TOOLSET FOR 2D AND 3D FACIAL MODELING AND ANALYSIS

The Face Aging Group and other organizations had done much work on analyzing and parameterizing faces before -- but in 2D and with not the easiest software user interfaces to interact with. My research is on creating a new software tool that is organized and for more of a general purpose on face analysis overall, and additionally largely supports 3D analysis.
**Poster # 14**

**Primary Author:** Elizabeth Boswell  
**Undergraduate Student**

**Co-authors:** Katherine Woolard

**School/College:** College of Arts & Sciences

**Department/School:** Anthropology

**Faculty Supervisor:** Michaela Howells

**SURCA PROJECT**

**STRESS AND CREATIVITY: DOES PROVIDING A CREATIVE EXTRA CREDIT QUESTION AT THE END OF FINALS REDUCE STRESS IN UNDERGRADUATES? A PRELIMINARY REPORT.**

Chronic physiological stress has been shown to impact memory, immune function, cardiovascular health, and risk of depression. We sought to determine if an extra credit question requiring creative expression could reduce students’ chronic stress as measured by the Perceived Stress Scale (PSS) in 106 undergraduates (age 18-36) taking finals for STEM based introductory anthropology courses. We also tested whether the PSS, reflects differences between caffeine and tobacco use, recent infection, and antibiotic use. Participants were divided randomly into receiving a creative extra credit question or a non-creative extra credit question. The average PSS score in these participants (20) was a third higher than the average scores in other populations (12-15). A best-fit regression model that predicted PSS included caffeine and tobacco use, recent infection, and antibiotic use (p=.01, r²=.72). The next step of this project is to analyze salivary cortisol to determine if creative extra credit questions influenced acute stress.

**Poster # 49**

**Primary Author:** ChristiAnna Brantley  
**Undergraduate Student**

**School/College:** College of Arts & Sciences

**Department/School:** Chemistry & Biochemistry

**Faculty Supervisor:** Thomas Coombs

**INTERMOLECULAR PAUSON-KHAND REACTIONS OF N-SUBSTITUTED MALEIMIDES**

The intermolecular Co2(CO)8-mediated Pauson-Khand reaction of electron-deficient olefins typically affords low yields of cyclopentenone products and suffers from competitive beta-hydride elimination to produce 1,3-dienes instead. However, using N-substituted maleimides as the olefinic reactant in this transformation, moderate to good yields of the desired cyclopentenone product have been found to form. Experiments conducted to optimize reaction conditions using N-benzyl maleimide, phenyl acetylene, Co2(CO)8, and the promoter 4-methylmorpholine will be described, and the substrate scope using the optimized conditions will be discussed. The reaction works well for N-alkyl, N-benzyl, and N-aryl maleimides, but both unsubstituted maleimide (N-H) and maleic anhydride failed to deliver cyclopentenone product.
GENDER AND ETHNICITY IDENTIFICATION FROM FACE IMAGES

Recently, the study of human facial detection considerably increased because no defined algorithm to classify specific faces in a given image exists. Nevertheless, we know that human gender, age and ethnicity play a key role in defining an individual. Therefore, this study uses human gender and ethnicity for the recognition of a variety of faces. Facial images were collected from 540 subjects ranging from 5 different ethnicities and 2 types of gender using a variety of statistical techniques, such as logistic regression, linear discriminate analysis, k-nearest neighbors, bagging, random forest, boosting and support vector machines. We used software program RStudio to conduct analyses to determine which classification method provided the best accuracy rate for correctly identifying a human’s gender and ethnicity.

AN ANALYSIS OF BIRTH RATE USING RACE AND MARITAL STATUS AS PREDICTORS

Our project was about analyzing birth rate data from the years 1990-2010. We were exploring the data to see if there was a significant relationship between marital status and birth rate as well as race and birthrate and also be able to predict whether or not a couple will have a baby based on these parameters. For our data set there were 190 observations with 5 variables. The variables were: the year the survey was conducted, the marital status of the participants, and the race of the participants involved. After being divided by marital status, which was separated into 2 categories being married and unmarried, the data is divided into separate observations based on race. We looked at all races: African-American, Hispanic, Non-Hispanic, and white. The data was separated by year into the different marital status of the women. Then were also are the number of pregnancies and the number of live births. We used these averages to find the average birth rate. We are hoping to find a model that will be the best at predicting whether or not a couple will have a baby.
MOLECULAR BASIS AND MEDICINAL REMEDIES OF HEREDITARY CATARACTS

This poster describes the synthesis and use of recombinant protein as an in vitro model for studying the molecular basis of hereditary cataracts, and explores pharmaceutical interventions for inhibiting or reversing the effects of cataracts. This project examined the molecular basis of hereditary cataracts through the utilization of the recombinant mutant wild type protein in order to reconstruct heterozygous hereditary mutation in vitro. The in vitro hereditary cataract was used as a platform to search for molecules that can inhibit, prevent, or reverse cataract formation. The recombinant protein mutant and wild type protein were successfully synthesized. The study on these proteins will form the basis for the development of new molecules for desired properties of anti-cataract drugs.

PLACE-BASED LEARNING IN PRIMATOLOGY EDUCATION: FINDING THE 'FIELD' AT HOME

For many college students interested in field biology and conservation, temporal and financial constraints make it difficult to acquire the skills necessary to successfully design and implement field-based research projects. In this study, we explore the potential of using creative 'field studies' situated in local and accessible study sites, allowing the student researcher to practice observational field methods. This study analyzes observational data collected at the Maritime Museum in Beaufort, North Carolina to evaluate the overall 'visitor experience' of museum visitors. The use of observational methods that focus on ad libitum successive behavior responses of human subjects allowed researchers to collect data on proximity to exhibit, proximity to other human beings, and whether the exhibit evoked verbal and/or gestural responses from visitors. Our evaluations of the 'visitor experience', using methods in primatology and anthropology, demonstrate the utility of applied and creative 'field studies' to enhance the toolkit of undergraduate researchers.
Poster # 46
Primary Author: Michael Casper Undergraduate Student
Co-authors: Kinney Van Hecke, Tyler Benton
School/College: College of Arts & Sciences
Department/School: Chemistry & Biochemistry
Faculty Supervisor: Jeremy Morgan

SURCA PROJECT

AN EXPLORATION INTO THE REACTIVITY OF MESO-AZIRIDINES FOR PALLADIUM(II)-CATALYZED ENANTIOSELECTIVE SYNTHESIS OF TRYP TAMINES

Exploring new methods for the enantioselective formation of carbon-carbon bonds have led to the exploitation of Aziridine reactivity. Aziridines are 3-membered rings consisting of 2 carbons and 1 nitrogen. Various meso-aziridines, which have symmetric backbones, were first synthesized, then utilized for the purpose of palladium(II)-catalyzed enantioselective synthesis of tryptamines by the addition of differing indoles. This nucleophilic addition of commercially-available indoles to meso-aziridines can be useful for creating chiral molecules from achiral starting materials.

Poster # 60
Primary Author: Elizabeth Celia Graduate student
School/College: College of Arts & Sciences
Department/School: Environmental Studies and English
Faculty Supervisor: Sarah Kate Maddalena and Devon Eulie

Environmental

LIVING SHORELINE MONITORING PROJECT AT MORRIS LANDING: A COMPARATIVE STUDY

Living shorelines are the placement of organic and inorganic material along coastlines to restore habitat and prevent coastal erosion. The North Carolina Coastal Federation has been implementing living shorelines at Morris Landing to research their effects and alleviate habitat loss and coastal erosion. In this study, I examined differences among oyster reef structure and other living shorelines. I compared oyster density, size, and species diversity among bag sills and domes of three phases. I also compared species diversity among vegetation and reef structures, and surveyed vegetation. Currently, results indicate that living shorelines produce different oyster density, size, and diversity. Vegetation surveys indicate differences in plant diversity among the five phases. The results of this study will aid in the prescription of living shorelines for future intervention and study, and serve as a basis for continued research into environmental factors that affect oyster recruitment, growth, survival, and habitat creation.
Poster # 3

**Primary Author:** Hollie Champion  
**Undergraduate Student**  
**Co-authors:** Anna Kinslow, Caroline McClain, Rolf Frazier, Susanna Ek, T. Barreira  
**School/College:** College of Health & Human Services  
**Department/School:** Health & Applied Human Sciences  
**Faculty Supervisor:** Wayland Tseh

**EFFECTIVENESS OF NEUROMUSCULAR ELECTRICAL STIMULATION DURING REST AND EXERCISE**

Purpose: To determine the effectiveness of neuromuscular electrical stimulation (NMES) as an aid to enhance venous blood return during rest and submaximal exercise. Methods: Twenty apparently healthy males (Age = 35.0 ± 15.0 yrs; Height = 179.9 ± 8.5 cm; Body Mass = 85.4 ± 12.0 kg) provided informed consent prior to participation. In Session 1, participants were familiarized with all equipment. Sessions 2-4 were randomly selected and included the following 5-min trials: a) Rest and Rest+NMES, b) Rest, Arms-Only, Arms+NMES, and c) Rest, Arms+Legs, Arms+Legs+NMES. Physiological variables collected during rest and submaximal exercise were volume of oxygen (VO2), heart rate (HR), systolic and diastolic blood pressure (SBP and DBP), respiratory exchange ratio (RER), and rate pressure product (RPP). Paired sample t-test was used to determine if there were significant mean differences between the NMES and non-NMES trials. Bonferroni post-hoc analysis established alpha level at 0.008. Results: From the 18 paired t-tests, the only observed significant mean difference (t(19)=-6.4, p<0.001) was RER values between the Arms-Only trial compared to the Arms+NMES trial (0.94 and 1.00, respectively). Conclusion: While RER displayed a significant difference, collectively, NMES did not elicit consistent physiological alterations during rest and submaximal exercises within an apparently healthy population.

Poster # 65

**Primary Author:** Danielle Chaung  
**Undergraduate Student**  
**Co-authors:** Bruce Hunt, Jacob Oullette  
**School/College:** College of Arts & Sciences  
**Department/School:** Mathematics & Statistics  
**Faculty Supervisor:** Yaw Cheng

**IMAGE PROCESSING FOR CLASSIFICATION & REGRESSION**

This project focuses on identifying characteristics from a set of images of faces. These faces are from the MORPH-II dataset that use the Bio-Inspired-Feature technology at West Virginia University to extract meaningful data points from the images. Each image is quantified to 4,376 real value points and we use mathematical techniques to extract meaningful characteristics from the images. In order to predict characteristics from new images we can apply the same models that have learned from the old images. Thus, the project can be broken down into steps: 1) Dimension reduction and 2) Classification & regression. In order to save computational time, we use dimension reduction. Classification methods help us determine the genders, and regression helps determine the approximate ages.
HEART ATTACK PATIENTS: PREDICTING LIFE OR DEATH AFTER ONE YEAR

In the United States, a heart attack occurs every 20 seconds. Every minute a fatality from a heart attack occurs. A group of patients from Miami, Florida who had suffered from a heart attack were analyzed using classification data mining techniques to identify whether or not a patient was going to be dead or alive one year after suffering from the heart attack. We had nine prediction variables to provide a deeper understanding of the way the patient's heart is/was functioning. Classification methods of Logistic Regression, Linear Discriminant Analysis, Quadratic Discriminant Analysis, and K-Nearest Neighbors, Bagging, Boosting, and Random Forest. Methods of cross validation were applied to improve model prediction accuracy. There are plans to move forward with Support Vector Machines with linear and radial kernels. The model with the overall highest prediction accuracy with cross validation applied will be reported on.

APPLIED LEARNING EXPERIENCE: ETEAL VS. EBC?

ETEAL was initiated three years ago to have a positive impact on student learning with applied learning experience in three areas: critical thinking, thoughtful expression, and inquiry. Our purpose is to review the assessment data to evaluate its impact on instructor's practices and student learning. Our data includes faculty surveys, student surveys, and student scores from intention and critical reflections. Using methods of Descriptive Discriminant Analysis (DDA), we look at the seven high impact practices applied in ETEAL courses to determine which of these practices allow us to best discriminate between the two applied learning experiences. Students final critical reflections are scored based on four separate criteria. Further, based on these four reflection scores, we highlight which of the scores allows us to best discriminant between the two applied learning experiences.
THE EFFECT OF MAGNETIC FIELDS ON DRIFT CHAMBERS

Strong magnetic fields effect the lifetime of drift chambers that are used in high energy particle physics experiments. During these experiments low-energy charged particles (i.e. electrons and positrons) damage the sense wires used to track high-energy charged particles. Magnetic fields help to reduce the amount of background energy that is concentrated in one area by spreading out the energy equally across the drift chamber. To study these effects current measurements were taken with and without an external magnetic field from the Forward Drift Chamber (FDC) used in the GlueX experiment at Thomas Jefferson Laboratory. The data were then analyzed to show that magnetic fields lengthen the lifetime of drift chambers.

DEVELOPMENT OF A PROTOTYPE CALORIMETER FOR HALL D AT JLAB

Future forward calorimeter upgrade (FCAL-II) in Hall D at JLab will replace the existing lead glass counters in the central region of the calorimeter with high granularity, high resolution and radiation resistance PWO crystal counters. Two issues are important for this project. The first one is the magnetic shielding on the photo multipliers (PMT) since the FCAL-II will work in the fringe field of a superconducting magnet (at levels of ~60 Gauss). The second issue is the high rate for the counters near a high intensity photon beam. As undergraduate students, we worked two months at JLab during summer 2016. We took major responsibility to study the magnetic effect on the Hamamatsu 4125 HA PMT and to develop a passive magnetic shielding with mu-metal. We were also involved in developing a small prototype calorimeter for a beam test in the fall 2016. We will present the status and some results of these activities.
A MATHEMATICAL ANALYSIS ON THE TRANSMISSION DYNAMICS OF *NEISSERIA GONORRHOEAE*

In this project, we analyze an epidemiological model describing the transmission of gonorrhea. We address two stratifications— one based on age groups, and one based on education levels— each with a core sexual activity class and two noncore sexual activity classes. Using parameters based on sexual behavior in the United States, we address the impact of the average number of partners per year for each sexual activity class on the behavior of the model around two equilibrium points, a disease-free equilibrium and an endemic equilibrium. The focus of the project is to identify the conditions leading to the existence of each of the equilibrium points, analyze the stability of these points, and discuss the results. Ultimately, the goal of the project is to find conditions for the bifurcation of the two equilibrium points, in order to find the conditions resulting in the eradication of gonorrhea.

SEMI-LAGRANGIAN METHODS FOR TIME DEPENDENT PARTIAL DIFFERENTIAL EQUATIONS

In mathematics, differential equations can be used to model all sorts of natural phenomena. For this research we will be studying partial differential equations that are time dependent, by doing so we will be able to trace a moving particle through time and space. These differential equations are hard to achieve exact solutions for so we will be approximating their solutions by implementation of both Euler and Runge-Kutta methods and with help from MATLAB technology. In application we can use our numerical methods to model fluid flow in two dimensions with the future goal of being able to approximate the path of a hurricane anywhere on the globe.
RACISM AND THE MEDIA

Abstract This purpose of this study was to determine how negative imagery of African Americans in the American media has impacted the lives of African Americans. I chose six peer reviewed articles on the subject of negative imagery of blacks in America’s media. The different forms of media sources were examined, and each were shown to have a tradition of sharing racist stereotypical images of blacks. The images spanned from the time of slavery in America through the present. The imagery is significant to the way African Americans are seen and treated by other people.

THE EFFECTS OF OCEAN ACIDIFICATION ON THE REPRODUCTION OF THE EASTERN OYSTER (CRASSOSTREA VIRGINICA)

The Eastern oyster (Crassostrea virginica), an economically and ecologically important species found along the southeastern coast of the United States, faces many challenges to its survival. Though not a new problem, ocean acidification (OA) has become a growing concern to scientists. Previous studies have looked at some physiological impacts of OA on larvae and juveniles, but none have looked at the effects on reproduction. This study looked at the effects of decreased pH on multiple parameters of the reproductive success of adult Eastern oysters. The data presented here describes multiple factors of oocyte morphology and an assessment of reproductive stages used to determine the effects of ocean acidification on reproductive output.
ON THE THEORY OF NONLINEAR SHOCK WAVES AND SUPersonic FLOW

We relate nonlinear wave propagation with supersonic flow to understand sonic booms. We explore the formation of shock waves described by the solutions of simple nonlinear wave equations based on conservation laws, such as the inviscid Burgers’ equation. In general, shock waves result from wave steepening due to nonlinearity. In gas dynamics, this results in an abrupt change in the medium often due to the speed of the wave being greater than the local speed of sound of the fluid.

FREQUENCY TO WHICH CARDINALS’ WINGS FLAP IN A CALCULUS STANDPOINT

In this project, we look into how a bird stays in the air while only flapping their wings a minimal amount of times. The problem arises with the comparison to fixed-winged aircrafts. Firstly, we determine the speed of a fixed-winged aircraft to minimize the required power and then again in regards to minimizing the required energy. For the cardinal, its mass and its required power for lift are both determined for an entire flight cycle. Then, it is determined for minimizing power and minimizing energy. In conclusion, this project shows that if the cardinal flaps faster then the power is decreased but the energy is increased and that if the cardinal flaps slower then the power is greatened but the energy is decreased.
Poster # 34
Primary Author: Tiffany Ernst Undergraduate Student
Co-authors: J. Ochab, S. Kinsey
School/College: College of Arts & Sciences
Department/School: Biology & Marine Biology
Faculty Supervisor: Heather Koopman

Environmental SURCA PROJECT

GLUCOSE TRANSPORTERS IN ADIPOSE TISSUES OF THE BOTTLENOSE DOLPHIN, TURSIOPS TRUNCATUS:
EFFECTS OF TISSUE TYPE AND DEVELOPMENTAL STAGE

Marine mammals all share one type of adipose tissue known as blubber, which surrounds the body and helps with thermoregulation, energy storage and buoyancy. Odontocetes that echolocate have another type of specialized lipid known as acoustic lipid, which can be found in a cranial depot known as the melon, and mandibular fats surrounding the jaw. Previous studies have found that these tissues play an important role in the transmission of sound for echolocation and hearing. For this study, melon and blubber tissue were removed from frozen Tursiops truncates (the common bottlenose dolphin) specimen and analyzed by Western Blotting to detect glucose transporter 4. Data collected to date, show detectable Glut4 in some sections of the melon, which may indicate metabolic activity in a tissue previously thought to be metabolically inert. Variation across the melon poses more questions about the tissues' heterogeneity and a potential in metabolic activity across the tissue.

Poster # 39
Primary Author: Samantha Farquhar Undergraduate Student
School/College: College of Arts & Sciences
Department/School: Biology & Marine Biology
Faculty Supervisor: Tom Lankford

Environmental

AGE AND GROWTH OF INVASIVE LIONFISH: NORTH CAROLINA, USA VS BONAIRE, DUTCH CARIBBEAN

Lionfish are an invasive species that are now well established throughout the Atlantic. Originally from the Indo-Pacific, they have decimated local fish populations due to their rapid reproduction, broad environmental tolerance, voracious appetite, and lack of predators. Through the examination of otoliths paired with morphometric data, this study investigates the age and growth of lionfish (sp. P. volitans) from two locations: North Carolina, USA and Bonaire, Dutch Caribbean. Otoliths were extracted from lionfish samples, embedded in resin, and then sectioned so that age could be determined with microscopic analysis. These age estimates along with the corresponding total lengths were used to calculate growth rates via the von Bertalanffy growth equation. Results returned a K and L-infinity value of 0.32 cm and 42.5 cm for lionfish from NC and 0.39 cm and 38.7 cm for Bonaire, respectively. The average total length of lionfish collected in Bonaire was 12.8 cm while North Carolina lionfish was 27.6 cm. Furthermore, the age range of lionfish collected in North Carolina was 0.6–6.0 years old with an average age of 2 years old. Bonaire lionfish showed a range of 0.1–5.0 years old with an average age of 1 year. Statistical analyses showed a significant relationship between age and total length as well as location and total length. Overall, these findings suggest that lionfish from North Carolina survive longer, growing older and larger, than that of lionfish from Bonaire. This likely attributes to: the differing start dates of the invasion; Bergmann’s Rule; and other environmental influences such as climate, resource accessibility, and removal efforts between the two localities.
**Poster # 67**

**Primary Author:** William Fox  
**Co-authors:** Cassidy Nix  
**School/College:** College of Arts & Sciences  
**Department/School:** Mathematics & Statistics  
**Faculty Supervisor:** Russell Herman

**SPACETIME GEODESICS AND THEIR APPLICATION TO SCHWARZCHILD DYNAMICS**

We present two different formalisms to derive general equations of geodesics, optimal paths in spacetime. We use both the calculus of variations and the concept of the parallel transport of vectors in a curved space to obtain the same geodesic equations. Using these equations, we then obtain the orbits of particles travelling near black holes in the Schwarzschild geometry.

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**Poster # 12**

**Primary Author:** Josephine Frith  
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**Department/School:** Early Childhood, Elementary, Middle, Literacy & Special Education  
**Faculty Supervisor:** Christine Liao

**MEASURING DIVERSITY IN CHILDREN'S LITERATURE: A TOOL FOR TEACHERS TO QUANTITATIVELY EXAMINE THE DIVERSITY IN THEIR CLASSROOM LITERATURE**

The purpose of this research was to design a method for teachers to use to measure the diversity found within their own classroom literature. This includes books, films, video games, etc. Each literature is examined in pieces (such as minute-by-minute for films) and a diversity percentage is found based on how much a diverse character appears or diversity concepts are discussed. Diversity is broken up into 10 categories and characters can fit one, more than one, or none at all. The sample used in this study were
**Poster # 9**  
**Primary Author:** David Giordano  
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**School/College:** College of Health & Human Services  
**Department/School:** Health & Applied Human Sciences and Nursing  
**Faculty Supervisor:** Robert Boyce, Jared Kerr, Justine Reel, and Susan Sinclair

**EXPLORING COMPLEMENTARY THERAPIES FOR CHRONIC OBSTRUCTIVE PULMONARY DISEASE: STUDENT PERSPECTIVES**

Lung diseases are a significant threat to public health and a leading cause of death in the United States. Medicine and surgery are conventional therapies, while yoga, tai chi, and herbal supplementation are examples of complementary therapies. To learn more about individuals with lung diseases, an interdisciplinary UNCW research team created a cross-sectional survey, targeted specifically at patients with Chronic Obstructive Pulmonary Disease. Additionally, the team is testing the feasibility and usability of a non-invasive device, the Easy Breather Exercise Table (EBET), that was designed by a local entrepreneur with the notion that its use may serve as a complement to conventional therapies. Students have been involved in nearly all aspects of this project and have received mentorship from multiple disciplines, which is the differentiating factor in this mentorship model. Therefore, the purpose of this poster is to highlight student involvement, showcase interdisciplinary mentorship, and report the learning outcomes from a student's perspective.

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**Poster # 21**  
**Primary Author:** Robert Gordon  
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**Department/School:** Biology & Marine Biology  
**Faculty Supervisor:** Kevin Kiser

**THE USE OF SOIL EXTRACTION AGAR TO CULTIVATE ANTIBIOTIC-PRODUCING BACTERIA UNDER ENVIRONMENT-LIKE CONDITIONS**

Due to the increasing prevalence of antibiotic resistant pathogens it is urgent that new antibiotics are discovered to combat new resistant strains. Even with modern techniques we are only able to cultivate around one percent of microbes present. An additional issue in identifying antibiotic producing bacteria is that the potential antibiotic producing colonies grown do not always produce their antibiotics under their present conditions. Agar has been prepared using water that has been filtered through the same soil as the sample being cultured in an attempt to leach the nutrients and any other abiotic factors present within the soil. This should allow the bacteria present in the sample to grow in nutritive conditions similar to that of their natural environment. A new species belonging to the genus *Paenibacillus* has been isolated using this method and appears to be producing a broad-spectrum antibiotic.
CRASSOSTREA VIRGINICA LARVAL SETTLEMENT RESPONSE TO THE PRESENCE OF SNAPPING SHRIMP

The goal of this research is to determine if Crassostrea virginica larval settlement is affected by the soundscape of their environment, specifically due to the presence of Alpheus spp. snapping shrimp. Alpheus spp. were used in this experiment due to their natural presence on settlement reefs as well as their ability to produce measurable high amplitude, broadband sounds. An understanding of the effect snapping shrimp have on Crassostrea virginica larval settlement can lead to an increase in commercial oyster yields. We placed containers of oyster larvae at sites with added snapping shrimp as well as sites without in order to observe the effects that increased presence of shrimp potentially have on larval settlement. Based on the data collected over three trials, there appeared to be increased larval settlement in sites where increased snapping shrimp activity, meaning increased high amplitude, broadband snapping sounds, were observed.

EFFECTS OF FOOD AVAILABILITY ON SWAMP SPARROW MELANIN CONCENTRATIONS

Feather molt is an important process to adapt to new seasons. Molting produces colorful feathers during the breeding season that are used for sexual signaling. Environmental constraints, such as food availability, have been shown to limit the timing and extent of new molt. In particular, birds given supplemental food undergo earlier prebreeding molt, which should allow birds more time to find good breeding territories and mates. It is unclear, however, if and how this affects feather qualities used for sexual signaling. We are testing the effects of supplemental food on feather quality and comparing it to non-supplemented birds. Determining molt quality for sexual signaling is done by quantifying the melanin concentrations in feathers through HPLC. The pheomelanins and eumelanins can show what an ideal molt should look like compared to a molt with food limitation. We predict that birds with supplemented food will have greater melanin contents than unsupplemented birds.
UNDERAGE SMOKING UPTAKE PREDICTS LONG-TERM NICOTINE OVERCONSUMPTION AMONG ELECTRONIC CIGARETTE USERS

Nicotine uptake at young age predicts long-term smoking habits and heavy consumption. It is unknown whether these patterns persist in former smokers who switched to electronic cigarettes (vapers). We hypothesized that vapers who started smoking as minors are more likely to become high-consuming, long-term vapers than those who started after the age of 18. We present an interim analysis of the VEEPS1 survey of former smokers, now exclusive vapers. Only one-third of participants who started smoking as minors indicated they ever want to quit vaping, compared to nearly one-half of those who started as adults. The findings were borderline significant (RR=0.77, 95%CI 0.51-1.15). Younger age at smoking uptake was associated with a 50% increase in consumption of nicotine-containing e-liquid (p=0.01). Because underage populations continue to gain access to electronic cigarettes, tighter age restrictions - including age-verification by online retailers- should be considered to prevent lifelong, potentially high-risk vaping habits in minors.

TUMBLER STUDY: UNDERSTANDING THE EFFECTS THAT TUMBLING OYSTERS HAS ON OVERALL SHELL PERFORMANCE AS WELL AS OVERALL GROWTH

This study’s objective is to explore how tumbling oysters, over a 6 week period, affects their growth behavior and potentially creates a more marketable product. 4,500 oysters were placed into 9 cages of 500 oysters. There are 3 replicates for 3 treatments where 3 cages are not tumbled (control), 3 cages are tumbled biweekly, and 3 cages are tumbled weekly. 25 specific oysters from each cage are measured by height, length, width, and weight every week. Our findings show that the control percent increase for height, length, width, and weight is 5.81, 7.36, 12.03, and 35.43. For the biweekly treatment the percent increase is 2.40, 2.41, 14.67, and 33.23. For the weekly treatment the percent increase is 1.71, 2.01, 12.52, and 31.41. Over the course of this project we expect to smaller and wider oysters for those who endured the tumbling while the control is expected to be larger and weaker.
NBA DRAFT: PREDICTING DRAFT PICK USING DATA MINING TECHNIQUES

This project provides a general exploration into predicting and classifying an NBA players draft pick in the NBA draft from the range of 1976-2015. Based on variables such as Win-Share, Draft year, and others, the goal of this project is to optimize a statistical model to accurately predict and classify players based on their draft pick. Such models include Logistic Regression, Linear Discriminate Analysis (LDA), Quadratic Discriminate Analysis (QDA), K-Nearest Neighbors (KNN), Bagging, Random Forrest, and Boosting. Based upon each classifiers accuracy, we will then compare and explore the most accurate model to ensure highest model fitness possible.

TRICLOSAN RESISTANCE IN STAPHYLOCOCCUS AUREUS ISOLATED FROM NOSES AND THROATS OF NURSING STUDENTS

*Staphylococcus aureus* (*S. aureus*) is an opportunistic pathogen which is carried in the noses of 30% of the population. It is of concern in healthcare settings, where vulnerable patients are at a heightened risk of becoming infected. Antibiotic resistance has further complicated this problem, making infections difficult to treat. For this research, I tested isolates of *S. aureus* collected from nursing students for resistance to triclosan, the antimicrobial component of antibacterial soaps and toothpastes, to see if resistance was developing as it has with antibiotics. Samples were screened on TSA plates infused with triclosan at varying concentrations. Those which could grow at concentrations of 0.512µg/mL were subjected to MIC and MBC testing and genetic analysis. 27 of the 28 samples which were tested contained sh-fabI which has been shown to confer resistance. This research found that resistance can occur in carrier isolates and sh-fabI is important in acquiring resistance.
ACOUSTIC BEHAVIOR OF SOUTHERN RESIDENT KILLER WHALES; USING PASSIVE ACOUSTIC MONITORING TO INFORM PROPOSED CRITICAL HABITAT EXPANSION

Critical habitat for Southern Resident killer whales (*Orcinus orca*) (SRKW) is currently designated in the inland waters of Washington and British Columbia. However, SRKWs only spend approximately 1/3 of the year in these waters. A network of acoustic recorders has been deployed from Washington to California to better assess the movements of SRKWs in coastal waters. We performed an in-depth analysis of acoustic data from 14 locations, 8 years, and 285 acoustic encounters. We also looked at encounter length, time of occurrence, and acoustic behavior to better understand potential biases in the data. Acoustic encounter duration ranged from 10 minutes to over 10 hours, but 65.6% of these encounters were less than two hours. The most frequent sound made throughout these encounters was calls. These results will contribute to an improved interpretation of passive acoustic monitoring, which can be applied to help better characterize habitat use and distribution of SRKWs. (NOAA Hollings research)

A BLUEPRINT FOR BUILDING PROFESSIONAL DEVELOPMENT

This is the story of how one community college decided to address the issue of lagging student success rates in its online courses. Participants will be introduced to a unique and synergistic process for creating effective professional development. From initial steps to end phases, educators will learn about a theoretical model for building a quality professional development programs for instructors who teach online. Quantitative and qualitative data analysis assessing the effectiveness of the professional development program is also included.
DELETION AND CHARACTERIZATION OF FJOH_0638, A GENE ENCODING AN RPON ENHANCER BINDING PROTEIN

RpoN is an important protein necessary for recruiting RNA polymerase to specific promoter regions during environmental stress. In addition, an enhancer binding protein (EBP) is required for RpoN to bind and recruit RNA polymerase. This study aimed to disrupt fjoh_0638, one of six genes predicted to encode a protein with the common features of an EBP. This EBP is also unique as it may respond to extracellular signals as part of a two-component system with the sensor kinase fjoh_0637. Primers designed with engineered restriction sites were used to amplify the regions upstream and downstream of fjoh_0638 by PCR. The deletion construct (pSNJ02) containing these regions was constructed via cloning and confirmed by restriction digest and DNA sequencing. pSNJ02 was transferred to Flavobacterium johnsoniae by triparental conjugation and the mutant was isolated. We present phenotypic analysis of the mutant here as we evaluated gliding motility, bacteriophage sensitivity, and metabolic phenotype.

NEAR-INFRARED SPECTROSCOPY REVEALS THE ROLE OF THE ROSTRAL PFC IN THE BRAIN'S DEFAULT MODE NETWORK

We used Near-Infrared Spectroscopy (NIRS) to study hemodynamic activity in the rostral prefrontal cortex (rPFC) when attention was internally- or externally-focused. Primary results showed increases in oxygenated hemoglobin when attention was directed internally and decreases when attention was directed externally, a pattern consistent with operation of the brain’s Default Mode Network (DMN). Additional results showed a reduction of the primary pattern in older adults, and hints of a similar reduction in males (relative to females) and depressed (relative to non-depressed) individuals. NIRS can be used to study the brain’s Default Mode Network.
EXAMINATION OF THE VALIDITY OF DESCRIPTIVE AND FUNCTIONAL ANALYSES IN THE TREATMENT OF PEDIATRIC FEEDING DISORDERS

Previous research on the correspondence between hypotheses derived from descriptive and functional analyses has been limited to the assessment of severe problem behavior and has shown mixed findings (e.g., Lalli, Browder, Mace, & Brown, 1993; Lerman & Iwata, 1993; Thompson & Iwata, 2007). Moreover, there is a scarcity of studies comparing the relative effects of treatments matched to each hypothesis when results do not correspond. To our knowledge, no studies to date have conducted a systematic comparison of descriptive and functional analyses outcomes in the treatment of pediatric feeding problems. Therefore, we compared the results of a descriptive analysis and caregiver- and therapist-conducted functional analyses of the inappropriate mealtime behavior of 8 children with feeding disorders. Then, using a reversal design, we compared treatments matched to the results of each analysis using extinction and differential reinforcement procedures. Results of the descriptive and functional analyses did not correspond for any of the children. Results of the subsequent treatment evaluations showed that treatments matched to the functional analysis were more effective for 7 of the 8 children. Food acceptance increased and inappropriate mealtime behavior decreased to clinically acceptable levels only when the functional analysis treatment was implemented for these 7 children. Experimental control was not obtained for one participant.

CHARACTERIZATION OF ELECTRONIC CIGARETTE USERS WHO NEVER WANT TO QUIT VAPING

About 40% of cigarette smokers attempt to quit each year, partly because of smoking-related health impairments. We hypothesized that electronic cigarette users (vapers) perceive vaping as a healthier alternative to cigarette smoking and are, thus, less likely to ever want to quit, especially if they can maintain their habit at low nicotine levels. We investigated this in the VEEPS1 cross-sectional survey of former smokers who now use electronic cigarettes exclusively. In support of our hypothesis, only 10.5% of participants have tried to quit in the last year, with nearly 50% of participants indicating that they have no plans to ever quit vaping. Contrary to our hypothesis, this subset actually consumes nearly 30% more nicotine-containing e-liquid (p=0.01) and is 2.5% more likely (p<0.001) to use a modification that allows for hyper-efficient nicotine delivery. We have identified a subpopulation of vapers that, due to life-long nicotine overconsumption, may experience long-term health risks.
**Poster # 75**

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**Faculty Supervisor:** Yaw Chang  
**International/Global**

**SIGNALLING MODELS IN OPEN-MARKET, COOPERATIVE SETTINGS: AN APPLICATION OF GAME THEORY TO ISLAMIC FINANCE**

In 2010, the International Monetary Fund conducted a study investigating the performance of Islamic banks during the Great Recession. It was concluded that Islamic banks were more resilient than conventional banks. The I.M.F. attributed this phenomenon to the strong risk management methods that ameliorated conventional exploitative, high-risk practices. Islamic finance prohibits riba and gharar, or unjust increases and exploitative usury, respectively. For over a millennium, scholars have debated which financial practices and instruments can be categorized as riba or gharar, coming to the conclusion that Islamic finance is characterized by cooperation between all parties involved in a transaction, bound by religious principles that will circumvent exploitative practices, allowing all parties to gain. Dr. Mahmoud El-Gamal utilizes a game theoretical approach, the prisoner's dilemma, to illustrate that both parties in any transaction benefit more should there be mutual cooperation, as set up by the Trading in Risky Assets Model. El-Gamal proves that trading in risk is 'at worst efficiency neutral and at best efficiency enhancing.' We present a signaling model that employs cooperative risk-and-return sharing between competitive open-market entities. We conduct a case study, utilizing this model, on the manufacturing of the 2014 World Cup Brazuca.
IN DEFENSE OF THE DRAMATURG: A STUDY OF METHOD IN AN UNDEFINED ART

Though dramaturgy has existed for several centuries in theatre practice, it still lacks a standard professional definition. This fact has several consequences: first, there is no precise standard by which a dramaturg can gauge their success beyond the quality of the end result be it a script or a fully staged production. Another repercussion is that any show is affected by the relationship between dramaturg and director – some directors don’t want anything from a dramaturg or perhaps feel somewhat territorial about their realm of influence, others like to use the dramaturg as a bounce board for even the most random thought, and yet another group of directors enjoy having the dramaturg to rely on for clarification and creative input in difficult areas of the script. There are also economic strains and job-maintaining issues within the profession. This situation has led to a culture within the community heavily centered on mentorships, both in academic and professional settings. Some dramaturges focus their work more inwardly such as Lenora Inez Brown who stresses most of reading and rereading of a text. But just as there are many interpretations to the job, there are plenty of commonalities, certain services that a dramaturg should be capable of providing and those services will be explained in this paper to give a basic understanding of the position and its requirements.


STABLE ISOTOPE ANALYSIS OF ANCIENT ADÉLIE PENGUIN MUMMIES FROM THE ROSS SEA, ANTARCTICA

Stable isotope analysis of penguin tissue provides insight into dietary preferences of the individuals as well as isotopic fractionation of carbon in the natural environment. Analysis of δ13C and δ15N isotopes was conducted on eight Adélie penguin (*Pygoscelis adeliae*) ancient chick mummies excavated from abandoned colonies in the southern Ross Sea region, Antarctica. Available feather, skin, bone, and toenail samples were analyzed for each individual. An identical analysis was performed on 20 modern Adélie penguin chick carcasses from two active colonies in the Ross Sea to compare ancient versus modern diet and isotopic fractionation. The results of these analyses are presented here and suggest a trophic level difference in modern diet between chicks from Cape Hallett and Adelie Cove. Fairly consistent isotopic fractionation of δ13C is also evident. These results provide a glimpse into the adaptability in diet of the Adélie penguin across the region and provide a framework for similar analyses of carcasses and mummies.
PERCEIVED FREQUENCY AND SUCCESS OF THE INSANITY DEFENSE AND ITS IMPACT ON NGRI VERDICTS

Negative attitudes towards the insanity defense appear to be associated with the perception that the defense is grossly overused, and rehabilitating these attitudes does not appear to change verdicts. Study 1 demonstrated that mock jurors are less likely to render NGRI verdicts when given exaggerated statistics about the use and success of the insanity defense from a credible source (i.e., the DA) or when given memorable examples of its use. In study 2, NGRI verdicts were again less likely to occur when participants were given memorable examples of its use, but NGRI verdicts were unaffected when exaggerated frequency/success statistics are delivered by a less credible source (i.e., the newspaper).

DNA-METHYLATION CHARACTERISTICS OF A DNA MINOR GROOVE ALKYLATOR CONJUGATED TO VARIOUS CANCER CELL-TARGETING LIGANDS

Research in our laboratory is focused on developing novel anti-cancer molecules that can target cancer cells overexpressing a particular receptor and generate cytotoxic N3-methyladenine adducts in these cells. We have successfully developed DNA-methylating compounds that can target the estrogen receptor, androgen receptor and glucose transporters by attaching ligands, which bind to these proteins, to a DNA-methylating moiety that binds to the minor groove of DNA at A/T-rich regions. The choice of cell-targeting ligand, and the composition of the linker attaching it to the DNA-methylating unit, play a crucial role in the ability of the molecules to produce the desired N3-methyladenine adducts. Minor changes in the hydrogen bonding ability of the compounds have a significant effect on the ability of the molecules to methylate DNA. We present here the DNA-methylation profiles of molecules bearing different cell-targeting ligands and draw conclusions regarding the structural features of these molecules that favor potent DNA-methylation.
DEPRESSION AND ANXIETY ON MEDICATION ADHERENCE IN PERSONS OVER 50 LIVING WITH HIV

The prevalence of adults over the age of 50 living with HIV continues to grow as medical treatment advances and new cases of the disease are confirmed. AIDS-related mortality was once the primary concern for an HIV diagnoses, but the latest treatments have now transformed HIV into a chronic disease. However, medication adherence is vital in HIV management putting older adults at a disadvantage due to the likelihood of comorbidities. The current literature indicates that mental disorders, specifically depression and anxiety, negatively affect medication in the general adult population (Springer, Dushaj, & Azar, 2012). However, little research has focused on persons with depression and anxiety over the age of 50 living with HIV. With the prevalence rate of HIV rapidly growing in the older adult community, it is essential to understand the mental health issues they are facing and how it impacts the medication adherence trend within this particular population.

ACNE ANTIBIOTIC EFFECTS ON THE CARRIAGE OF STAPHYLOCOCCUS AUREUS

Acne vulgaris is a chronic inflammatory condition caused by the Propionibacterium acnes bacterium infecting the sebaceous glands of the skin. This study has been designed to determine whether there is a correlation between antibiotic treatment for acne and Staphylococcus aureus carriage rates in college students ages eighteen to twenty-eight. UNCW students were recruited and asked to fill out a survey that asks about if they have been diagnosed with acne vulgaris, and use of antibiotic therapies. Facial, nasal, and throat swabs were collected from each participant. By using Chromagar differential medium, the presence of Staphylococcus aureus bacteria from swab samples were identified by expression of a pink color when streaked and incubated. If isolates expressed a light pink color, a coagulase test would be implemented. Antibiotic sensitivity of isolates was determined with the use of a disk diffusion test. So far, sample from eighty-eight participants have been collected and analyzed.
**Poster # 41**

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**Faculty Supervisor:** Troy Alphin

**Environmental SURCA PROJECT**

**EVALUATION OF TECHNIQUES FOR MONO-CULTURE AND POLY-CULTURE OF CRITICAL ESTUARINE ORGANISMS**

Amphipods (side swimmers) are a group of marine organisms that serve a critical role in the estuarine food chain. Many of the most important commercial and recreational finfish species, depend on amphipods as a major course of nutrients, during their early juvenile stages. Amphipods form a critical link in the benthic pelagic coupling, taking energy from primary producers and detrital food sources. There are 1000’s of species of amphipods, worldwide and 100’s resident in our local estuaries, but surprisingly little is known how this group of organisms and their respond to large scale shifts in environmental conditions associated with climate change or increased coastal development. The goal of this project was to initiate the develop culture methods for both polyculture (growing many species in a single space) as well as for isolating and culturing a single species of amphipod. Over the course of the semester collection method, food type, holding chamber design, and temperature ranges were tested. By growing single species cultures we can provide data on species tolerances and the potential influence that shifting environmental condition will have on this critical food source.

**Poster # 47**

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**SURCA PROJECT**

**LIBRARY OF BENZYLATED TRYPTAMINES**

A library of benzylated tryptamines was assembled and tested for biological activity to determine if Sigma 1 and Sigma 2 receptors were bound tightly to the receptor.
SURCA PROJECT

MATING TRIALS AND OFFSPRING ANALYSIS OF GASTROPOD *NUCELLA LAPILLUS*

Mating system variation drives individual fitness in almost all known organisms however these variations are not well studied in marine organisms. The gastropod *Nucella lapillus* practices polyandry, where one female mates with multiple males, making it an excellent model organism to study the effects of mating system variation. *Lapillus* adults collected from Maine were placed in mating trials including one female with either 1, 3, or 6 males. The resulting offspring will have additional research done, including genetic analysis and predation trials to determine effects of size on survival. *Lapillus* clutches were also collected from a field site in Maine and preliminary data was measured. On average there were 21.8 embryos per capsule and 4.7 capsules per clutch. All embryos from these clutches were preserved in ethanol and DNA will be extracted and analyzed using microsatellites to look at embryo relatedness.

MAPPING THE CARBON FOOTPRINT OF SMALL BUSINESSES IN THE DOWNTOWN WILMINGTON AREA

Climate change is a global issue that everyone needs to take part in reducing their contribution to the problem. Knowing what your carbon footprint can be one step towards making that action. My project of mapping the carbon footprint of businesses will raise awareness through visualization and allow those businesses to build a plan to cut back their carbon footprint and also visualize where their competition is standing so that the companies can influence each other to make a difference.
**VISUALIZING THE CARBON FOOTPRINT OF SMALL BUSINESSES IN DOWNTOWN WILMINGTON, NC**

The emissions of greenhouse gases have become a concern to the public as climate change is at the top of the list of major issues the world faces today. This project brings that concern to our local community and allows us to visualize where the businesses in our community are relative to similar businesses in the nation. I have calculated the carbon footprint of the businesses using the EPA's carbon calculations that use direct energy emissions from individual businesses. I gathered the data through surveys, The Energy Information Administration (EIA), The Environmental Protection Agency (EPA), and Duke Energy. By creating this map hopefully, businesses will take the initiative to lower their carbon footprint and set Wilmington in the direction of sustainability.

**THE MATHEMATICS OF CARD GAMES**

In this paper we look at the following question: How can a player optimize their chances of performing well in a card game? There are many different approaches one could take to analyze this problem. The specific subjects in this paper include those of strategy: Game Theory and Markov Chains, and those of randomization: optimization of card shuffling. The key methods used to analyze this problem include: optimal strategy, optimal stopping of Markov Chains, and total variation distance.
EFFECTS OF MK-801 AND METHAMPHETAMINE IN A RODENT INCREMENTAL NON-MATCH-TO-SAMPLE TASK

The Odor Span Task (OST) is a procedure that is increasingly used to study remembering in rodents. The procedure involves placing the rat or mouse in an arena in which odor stimuli can be presented using cups filled with scented materials or covered by a scented lid. An incrementing non-match-to-sample (INMTS) procedure is used such that selection of each odor produces food reward when first presented, but not on any subsequent presentations. Thus, correct selections depend on the subject remembering which stimuli have already been presented. The use of an arena setting with manual stimulus presentation makes the OST labor-intensive and limits experimental control; thus an automated INMTS task would be of value. The present study used an operant chamber equipped with a 15-channel olfactometer. Rats were trained on successive conditional discrimination procedures (Go-No-Go) under the incrementing non-matching-to-sample contingency and developed high rates of responding to odor stimuli when they were initially presented and relatively lower rates of responding on subsequent presentations of that stimulus. Both methamphetamine and NMDA antagonist MK-801 decreased the discrimination ratio in a dose-dependent fashion. These findings support the use of this automated version of the OST to study the behavioral pharmacology of remembering in non-human subjects.

EFFECTS OF PHENCYCLIDINE AND METHOXETAMINE ON REMEMBERING IN THE ODOR SPAN TASK

The present study used the odor span task (OST) to assess drug-induced deficits in remembering multiple stimuli in rodents. The OST uses an incrementing non-match to sample procedure in which responses to a new olfactory stimulus result in reinforcement on each trial, while responses to previously presented stimuli are not reinforced. NMDA antagonists have been associated with impairments in remembering in a variety of animal models, however, there are inconsistencies across both the chosen NMDA antagonist and the task used (Bannerman, 2006). Galizio, Deal, Hawkey, & April, 2013) found a selective effect of the NMDA antagonist MK-801 on remembering in the OST. The current study compared the effects of phencyclidine, which has been examined in previous putative memory tasks, with the novel NMDA antagonist methoxetamine on responding in the OST.
THE ROLE OF OUTER SURFACE ADHESINS IN FLAVOBACTERIUM JOHNSONIAE

*Flavobacterium johnsoniae* is an aerobic, gram-negative bacterium that serves as a model organism for studying gliding motility, gene regulation, and biochemistry in the Bacteriodetes phylum. Unlike other motile bacteria, *F. johnsoniae* exhibits gliding motility, which is characterized by non-flagellar movement across surfaces, using Gld and Spr proteins to aid in movement. Evidence suggests that Gld proteins compose the motor within the cell envelope that propels adhesins (such as SprB) around the cell surface. Inspection of the genome revealed eight other genes encoding putative cell surface adhesins. We hypothesize that these proteins are involved in biofilm formation and/or mediate motility on substrates other than agar and glass. To test this, we characterized expression of the adhesins by RT-PCR, generated plasmid constructs to molecularly tag the adhesins, and investigated the ability of adhesin mutants to form biofilms.

MODELING BEAM VIBRATIONS

Basic physics fundamentals allow for derivations and data models of beam vibrations. We solved differential equations based off of three different boundary conditions. The conditions represent vibrations of an airplane wing, a bridge, and a tennis racket. These are configured using cantilevered beams in two instances; fixed at only one end and fixed at both ends. We used nonlinear regression to fit the solutions of the mathematical model to the data.
INCREASING PHYSICAL ACTIVITY LEVELS USING REINFORCEMENT: EFFECTS OF BASELINE ACTIVITY, TYPE OF REINFORCEMENT, AND PARTICIPANT CHARACTERISTICS

Physical activity is an important to a 'healthy lifestyle.' Sedentary behavior is linked to risk of obesity, cardiovascular disease, and diabetes. Our lab has conducted six experiments in adults to increase physical activity using reinforcement. Baseline walking patterns, effectiveness of reinforcer schedule and type, and variables to predict responsiveness to interventions were examined. Participants were 107 adults (74% female) with an average age of 25.5 (18-67 years). Body Mass Index (BMI) averaged 25.5 kg/m² (18.3-43.2), with 41% categorized as overweight or obese. Linear regression examined stepcounts during the intervention: Baseline steps and reinforcer frequency were significant correlates, but gender, age, BMI, and type of reinforcement were not significant variables. In a separate regression, only baseline stepcounts was significantly correlated with percent change from baseline to intervention. Exploratory analyses of walking patterns across days of the week, and meeting CDC recommendations will be presented.

THE EFFECTS OF FOMC COMMUNICATION ON FEDERAL FUND FUTURES RATES

The effectiveness of central bank's forward guidance has been a controversial issue over the past decade. It was implemented by the Federal Reserve as a way to increase transparency and decrease uncertainty in the market about the future path of interest rates. This study examines the effects of different forms of FOMC communication on the range between daily high and low values of Federal Fund Futures Rates. A lower range between the high and low values implies less uncertainty in the market about the Fed's future actions. The results of this model concluded that the Federal Reserve's use of explicit and data dependent forward guidance successfully decreased the range of Fed Fund Futures Rate in the short term. However, in the longer term their use of forward guidance increased the range, suggestion market participants may have lost confidence in the Fed's communication about their expect path of future interest rates.
GOVERNMENT-BASED VOLUNTEER PROGRAMS IN THE NEW MILLENNIUM: PUBLIC SECTOR VOLUNTEERS AND THE ATTITUDES TOWARDS THEM

This research examines the use of volunteers to assist local governments in providing services to citizens in the new millennium. The researchers conducted an online survey of all North Carolina county governments to assess their use of, and satisfaction with, volunteers in the ten main areas in which they have traditionally been involved in service-delivery, such as arts and culture, education, libraries, natural resources, and human and social services. In all 355 county government officials responded to the survey, yielding a response rate of 35.5%, a very high cooperation rate. Findings show that all North Carolina county governments use volunteers in at least one service domain to assist public employees in delivering services. As might be expected employees express mixed opinions concerning volunteer involvement. The results indicate that volunteer use in county services will likely increase, and that governments will become more accustomed to relying upon these novel human resources.

PATH TO SAFETY AND HEALING: PET-OWNING SURVIVORS OF DOMESTIC VIOLENCE

Domestic violence can involve coercion and emotional abuse of survivors by targeting pets. Literature lacks information about pet-ownership related to safety and emotional health of survivors who are clients of pet-friendly-domestic-violence-shelters, which this study addressed. Participants (n=13) were clients of North Carolina pet-friendly (n=5) and no-pets-on-site (n=8) shelters. A survey revealed that abusers harmed and/or made threats concerning pets of nearly 85% of participants, which was associated with the extent that pet-friendly-shelter access would lead survivors to leave earlier (Spearman’s r=0.613, p=0.026). 92.3% indicated that access to pet-friendly-shelters would limit time with abusers. The more survivors were concerned about pets' wellbeing when seeking shelter, the greater the role pet-friendly-shelters played in limiting survivors' time with abusers (Spearman’s r=0.836, p=0.001). Future research should investigate, on a larger scale, the extent that pet-friendly-shelter access may reduce survivors' exposure to violence, limit risks of injury and homicide, and support survivors' mental health.
A LONGITUDINAL RETROSPECTIVE STUDY OF BODY COMPOSITION TRENDS IN POLICE RECRUITS

Mapping body composition patterns of those hired as police officers has implications not only to the health of officers during their careers but also in their ability to perform in emergency situations. In order to evaluate body composition changes that occurred in police recruits from 1990 to 2013, 2,468 recruits were studied in their first week of training regarding their body mass (kg), lean mass (kg), and % body fat. Using ANOVA and Bonferroni post hoc procedures, significant differences were seen in male recruits' body mass and lean mass from 1990 to 2000, (80.6 ± 1.2kg to 87.3 ± 1.2kg, p ≤ 0.05) (68.9 ± 0.8kg to 73.4 ± 0.8kg, p≤ 0.05) respectively. Although there was an increase in body mass, pre lean mass and % body fat over time in males, these increases were low. In addition, these increases were lower in females.

PREDICTING INCOME LEVEL WITH DATA CLASSIFICATION TECHNIQUES

Census data has many uses. It can be used for planning for education, health care, transportation, and many other important purposes. The data for our project is census income data from the 1994 Census database which includes over 30,000 observations. The purpose of our project was to utilize different data mining statistical techniques in order to correctly predict an individual's income level (whether they make <=$50,000 or >$50,000) based on demographic information such as age, occupation and education. In search for the best classifier to most accurately predict income level, we have tried 8 different data mining methods with R software and completed cross-validation in order to determine the best model. These methods include LDA, QDA, Logistic Regression, KNN, Bagging, Boosting, Random Forest and SVM.
**Poster # 58**

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**Environmental**

**ESTIMATION OF COSEISMIC DEFORMATION OF THE ~1,100 BP AND ~1,300 BP GREAT EARTHQUAKES IN COASTAL WASHINGTON USING FORAMINIFERA**

A foraminiferal, lithologic, and statistical analysis of peat-mud contacts at ~1,100 BP and ~1,300 BP in a monolith from a saltmarsh at Oyster Locality (Niawiakum River, Willapa Bay) record coseismic subsidence of megathrust earthquakes along the Cascadia Subduction Zone (CSZ). To estimate the amount of subsidence at each contact, a local modern foraminiferal dataset of 20 samples was clustered into elevation-dependent faunal groups. With the modern dataset, a Weighted Averaging Partial Least-Squares transfer function was developed and applied to fossil foraminifera obtained from the monolith. The transfer function estimates coseismic subsidence of 0.295 ± 0.295 m during the ~1,100 BP earthquake and the ~1,300 BP earthquake is interpreted to have subsided >1.0 m. Comparison of subsidence estimates from other saltmarshes in Oregon and Washington suggest the ~1,100 BP earthquake only partially ruptured along the CSZ while a full length rupture is associated with the ~1,300 BP earthquake.

**Poster # 35**

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**SURCA PROJECT**

**DEVELOPMENT OF CALCITE STAINING AS A TOOL TO INVESTIGATE COCCOLITHOPHORE BIOMINERALISATION AND PELAGIC CALCIFICATION**

Coccolithophores are a group of calcifying unicellular marine phytoplankton recognized for production of extracellular calcium carbonate plates known as coccoliths. Coccolithophores are the most abundant calcifying organism in the world’s oceans and therefore play a significant role in regulation of upper ocean carbonate chemistry and driving of the marine carbon cycle. Furthermore, coccoliths sink and form calcareous sediments that ultimately lead to chalk deposits over geological timescales. Despite their oceanographic and geological significance, coccolithophore calcification is poorly understood at the cellular level. Tools for tracking the production of individual coccoliths would be of great value but are currently unavailable. This project proposes a novel method to stain coccoliths utilizing Calcein, a chemical which selectively binds to calcium and labels coccoliths. Results to date demonstrate that Calcein staining was successful but exhibited variable effects across five species of coccolithophore. Nevertheless, it has proven a promising alternative to existing methods.
LIVING WITH VOLCANIC HAZARD: PREDICTION UNCERTAINTY AND PERSONAL BEHAVIOR - A COMPARATIVE STUDY OF TUNGURAHUA AND COTOPAXI, ECUADOR

This project compares citizen knowledge of volcanic hazards, scientific prediction and personal protective behavior across two South American communities with varying degrees of exposure to active phase volcanoes. The central research question is how knowledge and confidence in volcano monitoring organizations (volcano prediction science) is related to citizen knowledge of protective actions (e.g., hazard awareness, evacuation strategies, mitigation actions). Our research will also explore the impact of the Ecuadorian government’s recent transition from a national civil defense model to a modern civilian based hazard management and response model.

DATA MINING FOR RELIABILITY AND VALIDITY WITHIN THE BLAST DATASET

The blast dataset is comprised of a substantial battery of psychometric testing collected from a sample of 893 veterans. Due to the self-reporting nature of their assessment, malingering, poor effort, and superlative self-representation have great potential to invalidate the results. In this study, simple and multiple linear regression will be used to evaluate the relationship between different tests of similar symptoms and validity under the reasonable assumption that they should agree for the same participant given consistent response. Classification methods like Logistic Regression, Quadratic Discriminant Analysis, and Random Forest will also be applied in modeling professional diagnosis of Post-Traumatic Stress Disorder after significant clinical scales of the Trauma Symptom Inventory to assess how precisely it meets the designed objective of measuring the sequelae of traumatic events. The array of data mining techniques studied promises to return a sense of consistency that can be relied upon to produce valid future analyses.
ANTIBIOTIC DISCOVERY: PATHOGEN RESISTANT BACTERIAL ISOLATION WITH CHARACTERIZATION OF FRESHWATER AND ANTHILL SEDIMENTS

Antibiotics lose effectiveness against deadly pathogens because of an increase antibiotic resistance due to overuse on infections and diseases. Microbiology experiments incorporate bacterial research from sediments in aquatic environments to discover solutions for the growing strength of the ESKAPE pathogens. The goals of antibiotic discovery involve discovering unique bacteria species that produces substances resisting growing cultures of ESKAPE pathogens and incorporating those properties into manufacturing antibiotics. The research design started by taking sediment samples from four locations, two in the anthill topsoil and two from the banks of freshwater environments due to moisture content to aeration capability. Six isolates resisted one or more of the ESKAPE pathogens using cross-streak tests. The bacteria had unique physical characteristics and their scientific names identified through microscopy, PCR and BLAST results. Preliminary testing is running currently for PKS and NRPs genes and the well diffusion assay for antibiotic sensitivity.

THE EFFECTS OF OYSTER AQUACULTURE ON THE GROWTH RATES AND BIOMASS OF THE SEAGRASS HALODULE WRIGHTII

Halodule wrightii is a species of tropical seagrass found on the coast of North Carolina. One of its most important resources is light which is often limited in the water column from eutrophication. Oysters can reduce the eutrophication in the water and therefore increase the light attenuation from the surface of the water to the benthos. Oyster aquaculture has the potential to be beneficial or harmful to seagrass habitats. The present study conducted experiments in mesocosms to study the effects of oyster aquaculture on the productivity and biomass of H. wrightii. Tanks containing both seagrass and oysters were compared to tanks only containing seagrass to compare the differences in water quality, nutrients, chlorophyll a content, seagrass biomass and leaf productivity.
**Poster # 91**
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**INCREASING PHYSICAL ACTIVITY IN ADULTS USING ESCALATING SCHEDULES OF MONETARY REINFORCEMENT**

This 5-week ABA reversal study aimed to increase physical activity in underactive adults using financial incentives. Participants (aged 18-65) wore an accelerometer. During baseline, participants were instructed to behave as they normally would. Half of the participants were required to make a $25 deposit to help fund their three-week intervention, which used an escalating schedule of reinforcement with a reset contingency. Meeting the first individualized goal resulted in $0.25, with each subsequent goal worth an additional $0.25. Failure to meet goals reset the reinforcement value to $0.25. The total amount available was $57.75 over a 3-week intervention. During the return to baseline period, the participants wore the Fitbit for one week without goals or reinforcement. Changes in daily step counts will be presented for all individual subjects. Group comparisons for the deposit requirement will be discussed.

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**Poster # 78**
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**Environmental**

**STABILITY ANALYSIS OF A TRI-TROPHIC FOOD CHAIN IN A 2-PATCH SYSTEM**

We explore the dynamics of a tri-trophic food chain in a 2-patch system. The tri-trophic food chain consists of a prey, predator, and super predator. The two patches are coupled with the migration of the super predator. There are two main purposes of this research. The first is to find and establish conditions for positive equilibrium solutions. The second is to perform a stability analysis on each equilibrium solution. The ultimate coexistence equilibrium in which all populations survive is of particular interest. Numerical simulations are also included as graphical representations of the model dynamics.
Poster # 48
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VOLATILE ORGANIC COMPOUNDS FROM PLASTICS

The use of plastics in the world has increased dramatically and there isn’t much research done on the chemical compounds escaping plastics. Volatile organic compounds (VOCs) are leaching out from plastics at both elevating temperatures and at room temperature. This research compares VOCs leaching out of different plastics and at different temperatures.

Poster # 97
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RECRUITMENT OF RURAL PARTICIPANTS IN THE US FOR NEUROPSYCHOLOGICAL RESEARCH STUDY: CHALLENGES AND LESSONS LEARNED

A two-hour long neuropsychological battery was used to access memory and attention in rural individuals with strict inclusion criteria as part of a larger cross-cultural psychology study. We highlight the successes and difficulties of conducting research with a marginalized group and the lessons learned to improve future studies.
**Poster # 32**

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**Faculty Supervisor:** Stephanie Kamel  

**Environmental SURCA PROJECT**

**INTRASPECIFIC VARIATION IN THE PREDATOR AVOIDANCE RESPONSE OF TWO LITTORINID GASTROPODS**

Despite the central role of gastropods in marsh ecosystems, the ecological consequences of population variation in key behavioral traits, such as predator avoidance, remains largely unexplored. Using a series of laboratory experiments, we assess patterns of intraspecific variation in this trait in two marsh-dwelling snails (*Echinolittorina ziczac* and *Littoraria irrorata*). Snails were sorted into three size classes and their avoidance behavior, measured as the maximal vertical height climbed in the presence of the predatory blue crab, *Callinectes sapidus*, was measured. Overall, avoidance behavior in both species differed between treatments: snails climbed significantly higher when a predator was present. However, we found no significant differences in the magnitude of avoidance behavior (i.e. height climbed) among the three size classes of snail. Our results thus suggest that, contrary to the paradigm 'bigger is better', factors other than individual size may be more important predictors of survival in these important prey species.

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**Poster # 96**

**Primary Author:** Lauren Schmidt  
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**Faculty Supervisor:** Simone Nguyen  

**SURCA PROJECT**

**VISUALLY AND HEARING IMPAIRED CHILDREN’S HOPE, HAPPINESS, AND GRATITUDE**

This study stems from the emerging field of positive developmental psychology, which focuses on children's strengths and virtues. This study investigates hope, happiness, and gratitude in children with visual and hearing impairments. Hope is the perceived capacity and motivation to achieve goals. Happiness is the degree to which one experiences both positive feelings and activities. Gratitude is a positive emotional reaction in response to the receipt of a gift/benefit from someone. The participants included visually and hearing impaired children, as well as children without impairments (N = 42, Mage = 11.59). Data were collected using hope, happiness, and gratitude questionnaires. The results show that visually impaired children had significantly higher hope than hearing impaired and typically developing children. Surprisingly, the results show that typically developing children had significantly higher gratitude than both visually and hearing impaired children. The findings show no difference in happiness across the groups.
BENCH PRESS STRENGTH CHANGES OVER 23 YEARS IN POLICE RECRUITS WITH GENDER COMPARISONS

Strength is a vital component in the performance of police duties to ensure the safety of officers and those they serve. Therefore, the initial strength the officers bring to the training program predicts the level of strength they will maintain throughout their careers. PURPOSE: To evaluate bench press strength changes that occur in police recruits from 1990 to 2013 with gender comparisons. METHODS: During the first week of police recruit training in a large southeastern metropolitan area, bench press strength and bench press weight ratio were evaluated in 2,460 recruits. ANOVA and Bonferroni post hoc procedures were used to evaluate data. RESULTS: The initial ANOVA indicated significant differences in males for both variables at p ≤ 0.05. Males tended to increase in bench press strength from 1990 to 2007 (83.7 ± 2.0 kg to 95.9 ± 2.1 kg, p ≤ 0.01). Male bench press strength tended to plateau after 2007. No discernable pattern was seen in females for both variables and little change in males was observed in bench press weight ratio. CONCLUSIONS: Overall, males had a tendency to become stronger over time when considering their initial test scores in recruit school. However, females tended to remain at approximately the same muscular strength across the 23 years.

A PLACEBO-CONTROL EVALUATION OF NEUROFEEDBACK EFFICACY IN ADULTS WITH ADHD

Attention-deficit hyperactivity disorder (ADHD) is a psychological disorder that is marked by impulsivity and inattentiveness. ADHD is often associated with pathological brain oscillations, most commonly elevated levels of theta and reduction in beta frequency. Neurofeedback is a computer guided, EEG interface that uses principles of operant conditioning to reinforce brain electrical frequencies associated with calm, focused attention. Under a double-blind, randomized sham controlled design, the current study utilized a protocol that down-trained (reinforced reductions) theta and up-trained (reinforced increases) beta and sensorimotor rhythm (SMR) waves, seeking to improve ADHD symptomology in adults. Significant improvements were observed on two measures of attention after 12 sessions of neurofeedback. However, similar improvements were also observed in the group that received 12 sessions of sham neurofeedback, suggesting that improvements in the group that received true neurofeedback may have been due to placebo effects. On a measure of anxiety after 12 sessions, participants who received true neurofeedback showed significant less anxiety than the control. A similar trend was observed on a measure of depression, although it was not statistically significant. This placebo effect raises questions about the mechanism of action underlying neurofeedback.
MATHEMATICAL MODEL OF THE SOUND WAVES CAUSED BY LIGHTNING

Through the study of differential equations, we are able to mathematically model inaudible sound waves. By simplifying the hyperbolic partial differential wave equation we were able to find two ordinary differential equations that combine to give us the sinusoidal wave equation. Mathematically modeling and graphing inaudible sound wave frequencies are the focus for the project. If the frequency of the wave is 20 Hz or less, the sudden increase of temperature and pressure from a lightning bolt can cause inaudible thunder. The relationship between wave oscillation rate and the frequency in hertz is modeled.

LONGITUDINAL STUDY ON THE CHANGES IN 1.5 MILE RUN TIMES OF POLICE RECRUITS OVER 18 YEARS

To evaluate patterns in cardiovascular fitness of police recruits upon entry into the police academy over 18 years including gender differences. Shows a correlation of the 1.5 mile run times for the recruits over time for both males and females.
SURCA PROJECT

APPLYING THE INFORMATION-MOTIVATION-BEHAVIORAL SKILLS MODEL TO PREDICT HPV VACCINATION INTENTIONS, INITIATION, AND SERIES COMPLETION FOR ADOLESCENTS

Human papillomavirus (HPV) is the most common sexually transmitted infection in the United States. HPV vaccination is the most effective method to prevent HPV, and the ideal developmental period for vaccination is during early adolescence. The information-motivation-behavioral skills model (IMB) is a parsimonious framework that guides us to understand health behaviors. The purpose of this study was to develop a psychometrically valid instrument to assess IMB-based constructs to predict parents'/guardians' HPV vaccination intentions, initiation, and series completion for their adolescent children. The instrument development process consisted of a literature review, expert panel reviews, and assessment of readability by Flesch-Kincaid Grade Level test. The instrument development process resulted in a 57-item face and content valid survey. Upon IRB approval, data collection will take place at a local adolescent health clinic. This tool that may be used in the design of an IMB-based HPV vaccination intervention targeting parents/guardians of adolescent children.

ARE INTRINSICALLY MOTIVATED EX-SMOKERS GOOD CANDIDATES FOR STEP-DOWN MEDIATED NICOTINE CESSATION?

Intrinsically motivated people are more successful at accomplishing their goals, including quitting cigarette smoking. Switching from cigarette smoking to electronic cigarette use (vaping) may be used for sequential step-down in nicotine level, ultimately leading to nicotine cessation. However, it is unknown whether this is a common trajectory. We hypothesized that smokers who were highly intrinsically motivated to switch to vaping would be more successful at reducing their nicotine consumption to end their nicotine habit. We used data from the VEEPS1 survey – a cohort of former smokers who now vape exclusively. We found that intrinsically motivated participants were 45% more likely to attempt nicotine-step down (p=0.01), however they were not more likely to succeed or willing to quit vaping altogether. When physicians counsel smoking patients on electronic cigarettes, they should consider that intrinsic motivations – while a powerful incentives – are not sufficient for step-down mediated nicotine cessation.
LEAF WAX ISOTOPES FROM THE CAROLINA BAYS: EVIDENCE OF LATE QUATERNARY CLIMATE CHANGE IN THE SOUTHEASTERN U.S.

In the southeastern U.S., the ambiguity of late Quaternary climate change is largely attributed to sparse records and deficient proxies. However, new geochemical tools, such as compound-specific isotope analyses, permit detailed hydrologic reconstructions in regions where inadequate or unavailable proxies have historically hindered paleoclimate investigations. Here, we combine compound-specific carbon and hydrogen isotopes with pollen, charcoal, and bulk geochemical analyses to revisit and refine records of late Quaternary climate change from Jones Lake and Singletary Lake in North Carolina. The hydrogen isotopic composition of terrestrially-derived leaf waxes (d2H alkane) in both lakes corresponds to global temperature trends and rapid, large scale climatic events including the Younger Dryas and Bølling Allerød. Pollen influx and compound-specific carbon isotopes (d13C alkane) indicate a mostly desolate landscape with minimal tree colonization until ~10,000 cal yr BP. These data present a comprehensive and unprecedented record of regional paleoclimate in the southeastern U.S.

WHO CHOOSES HIGHER EDUCATION?

Our project was about analyzing whether or not students between the ages of 15-22 wish to go on and receive a higher education. We were exploring the data to see if there was a significant relationship between a student’s demographics, family history and personal background and whether they wish to get a higher education. Our data consists of 649 students and 33 variables. We are hoping to find a model that will be the best at predicting whether or not a student wishes to get a higher education or not.
INVESTIGATIONS INTO PRODUCTION EFFICIENCY OF MARINE NATURAL PRODUCTS IN *KARENIA BREVIS*

The dinoflagellate *Karenia brevis*, produces a suite of neurotoxins that act by binding to site 5 of voltage gated sodium channels, disrupting essential cellular functioning. These ladder frame polyethers (LFPs) are termed brevetoxins and during algal blooms, when toxin concentrations are high, cause large fish kills. However, research conducted in drug discovery laboratories have found therapeutic uses for natural products produced by *Karenia brevis*. The scope of my research focused on trends of toxin production in *Karenia brevis* throughout its life cycle. One main bottleneck in drug discovery is availability of potentially therapeutic compounds for research. With very little sources of brevetoxin standards and natural products brevenal and brevisin for testing, upscaling production efforts at MARBIONC is key to further therapeutic development. By identifying the time period where *Karenia brevis* produces the most of certain toxins and natural products, we will be able to optimize the extraction process to ensure the most efficient use of materials and time. Studying toxin production will also help us to understand the complex relationship between *Karenia brevis* and the multitude of bacterial species that are essential to the creation of therapeutic compounds such as brevenal and brevisin. The method designed during this study will serve as a constant variable in future studies into factors effecting toxin production.

WHEN A PATIENT’S TRUTH MAY NOT BE REALITY: A SECONDARY ANALYSIS OF SELF-REPORTED MEDICAL DIAGNOSES COMPARED WITH MEDICALLY DOCUMENTED MEDICAL DIAGNOSES IN ADULTS WITH CHRONIC HEART DISEASE

Current literature of the validity and concordance of patients’ self-reports of medical diagnoses with medically documented medical diagnoses is lacking and contradictory, highlighting the need for further research. False or otherwise compromised self-reports may have a negative impact on the effectiveness of care within the clinical setting, confound outcomes in clinical or other healthcare research, and affect validity of epidemiologic studies utilized to monitor the prevalence of many chronic illnesses including this study’s focus and one of the leading chronic conditions affecting adults in the United States: cardiovascular disease. This is a secondary analysis of self-report data collected from subjects participating in a descriptive, cross-sectional study. The goal of this analysis was focused on the self-report data of demographics and cardiovascular disease and their concordance with the medical records of those participants to consider gaps in knowledge, the importance of healthcare providers having access to medical records, and the implications.
THE APPLICATIONS OF LAGRANGIANS IN CLASSICAL PHYSICS

The intention of this paper is to understand and develop the Euler-Lagrange Equations of Motion and use them for two different fields of study, Biodynamics and Electrodynamics. We will do this by first, understanding Hamilton's Principle and then showing how it effects Euler's Equation from the Calculus of Variations. Having done that, we will proceed to develop our respective Lagrangians for use in the Euler-Lagrange equations after sufficiently and efficiently giving background information in our fields of research. It will be a good example of how the Euler-Lagrange equations may be used to simplify processes in Biodynamics and to find Maxwell's Equations.

COLLEGE FOOTBALL: PREDICTING SEASON WIN PERCENTAGES IN THE POWER 5 CONFERENCES

Data mining techniques apply statistical methods, like classification and regression, to assist in the analysis and interpretation of large data sets. The computer program R was specifically designed to assist in statistical computations and is a powerful tool to apply to large data sets. Utilizing R and applying principles of data mining, which football season statistics (e.g. rushing attempts per game or interceptions per game) are most important in predicting a team's win percentage? Cross validation techniques were utilized to create a model using a pruned decision tree to predict win percentage for football teams in the NCAA Power 5 Conferences. Since athletic events bring in millions of dollars to organizations, the ability to create accurate predictive models of success by identifying the most important variables for that organization to focus upon will assist in efforts to maximize both performance and profits.
INFLUENCES ON ELEMENTARY AND SECONDARY SCHOOL REVENUES

Money for operating the education system is an issue in most states rather it be for teacher salary or supplies for student learning. This paper will focus on Elementary and Secondary schools in the 2007-2008 school year and the variables that could affect the amount of revenue that each state received. The data collected includes all 50 states plus the District of Columbia, and 28 variables. The statistical techniques being used are Linear Regression, Regression Tree and Support Vector Regression (SVR). All analyses were performed using RStudio.

EVIDENCE OF GENE FLOW TO ADJACENT OYSTER POPULATIONS FROM A COMMERCIAL AQUACULTURE LEASE

Commercial aquaculture leases typically support dense aggregations of shellfish that may contribute to wild populations through their reproductive efforts. Aggregations are thought to facilitate successful spawning and fertilization, potentially producing large numbers of larvae that may recruit to wild populations. We investigated the reproductive contribution of cultured oysters (Crassostrea virginica) to wild populations around a commercial aquaculture lease in Stump Sound, North Carolina. Through the late 1990s, the lease was stocked with oysters that originated from remotely set larvae that were produced in a hatchery in Louisiana using oysters from the Gulf of Mexico, which are genetically distinguishable from North Carolina oysters. An initial evaluation in 2001 using mitochondrial 16S ribosomal gene sequence data from oysters collected from seven natural beds in and around the lease site showed a significantly elevated frequency of oysters exhibiting the Gulf Coast haplotype. The same sites around the lease were revisited in 2015 to evaluate subsequent changes in the frequency of the Gulf Coast haplotype in North Carolina. Preliminary analysis indicates that the frequency of the Gulf Coast haplotype has increased in two of the five sites sampled, but remained unchanged in the other three.
MODELING PLANETARY ORBIT

Based on Newton’s second law of dynamics, the mass of an object is inversely proportional to the acceleration of the object while the external force on the object is known. Using the mass of the planet and the distance from the sun, we will seek for the gravitational force and then apply this data to a differential equation model for each planet. The differential equation will be solved to find the motion based upon the planetary mass and gravitational force. Through computation algorithms, we will simulate the planetary orbits.

FLEXAGONS

A flexagon is a flat, three dimensional object, in the shape of a polygon, that can be folded (or flexed) to show different faces than the original two shown on the front and back. Through the derivation of the generating function for the Catalan numbers, we will find a formula to represent the Catalan numbers for flexagons through the Taylor Series Expansion, the Gamma Function, and the Lagrange Inversion. This formula will represent the number of pats a flexagon has.
Poster # 17
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Environmental

STABLE ISOTOPES IN SCALLOP SHELLS AND TISSUES AS INDICATORS OF WATERSHED NITROGEN SOURCE IN THE PECONIC BAY ESTUARY, NY

As populations increase in watersheds, estuaries such as the Peconic Bays in Long Island, NY, have been experiencing an increase in nitrogen (N) loads resulting in eutrophication. Filter-feeding bivalves in these habitats can record environmental changes by assimilating organic matter into their shells and soft tissue from the surrounding water. Stable isotopes in these bivalve tissues can be used as indicators of anthropogenic N sources such as wastewater and agriculture, and potentially be used to track source-specific N inputs through time. In this study, we examined nitrogen and carbon stable isotopes (δ¹⁵N and δ¹³C) from shell and corresponding soft tissues of the bay scallop (Argopecten irradians) collected throughout the Peconic Bay Estuary. By comparing the stable isotope results between the shells and soft tissues, we believe shells to be a suitable proxy for tissue values.

Poster # 61
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WRITING WHITE SUPREMACY: SOUTHERN JOURNALISTS AND THE WILMINGTON COUP OF 1898

This research examines how journalists wrote about the Wilmington Coup of 1898 and its antecedents, precursors, and aftermath. The Wilmington Coup represented the culmination of the Democratic Party’s state-wide “White Supremacy Campaign”—its successful attempt to violently overthrow inter-racial democracy and unseat elected officials. Newspapers played a decisive role in the lead-up to the coup and the subsequent telling of the Coup. It was white journalists and newspapermen who first wrote articles that both created and heightened the “White Supremacy Campaign.” In the aftermath of the Coup, it was these same journalists who told their readers that the Coup represented a victory for white people and a restoration of home rule. In the end, these newspapermen wrote a false and fraudulent record of the Coup. In so doing, they wrote the first history of the Coup, which deliberately reinforced white supremacy and the “Myth of the Lost Cause.”
**Poster # 19**

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**CD40 EXPRESSION IN THE OSTEOSARCOMA U2OS CELL LINE AND ITS EFFECTS ON CELLULAR DIVISION IN THE U251 GLIOBLASTOMA (GBM) CELL LINE**

CD40 is a membrane bound receptor that is found on antigen presenting cells and is required for their activation. It was previously observed that glioblastoma U251 cells with CD40 deleted did not divide as rapidly as the parental U251 cells. The goal of this research was to confirm these findings and examine if the deletion of CD40 would have a similar effect on other cancer cell types. We compared the U251 knockouts and parental cells for four consecutive days by cell counts and found that CD40 did not significantly affect cellular division, but there was a difference observed ($t=1.6368$, $p=0.1770$, $df=4$). In addition, we were able to confirm that CD40 is present in osteosarcoma U2OS cells using PCR with CD40 primers. Further research needs to be done in this area among other cell lines to see if this mechanism is universal among all cancer cells or just a select few.

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**Poster # 38**

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**ANTIBIOTIC-PRODUCING BACTERIA DISCOVERED AT LOCAL ANNE MCCRARY PARK**

The discovery of new antibiotics is becoming a growing need in the world as bacteria evolve to be immune against our medicines. With the vast amount of soil covering the Earth, more antibiotic compounds are bound to be in our soils, waiting to be discovered. With this research project, my goal was to search for antibiotic activity in soils collected from the Wilmington area. In doing so, I found a microbe at the Anne McCrary Park that produces an antimicrobial compound and inhibits the growth of four of the six ESKAPE pathogens, including *S. aureus*, *K. pneumoniae*, *A. calcoaceticus*, and *P. aeruginosa*. After sequencing the 16S rRNA, I discovered that this bacterial species is *Pseudomonas soli*. Though this species was previously known to have antibiotic activity, there is a need for continued study to determine the identity of the actual compound.
**Poster # 55**

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**AGRICULTURAL IMPACTS ON WATER RESOURCES: A COMPARISON OF TWO WATERSHEDS**

The Lower Klamath watershed and Upper Fox watershed, two vastly different watersheds that are both impacted by agricultural practices, are compared based on water quality, quantity, and conflict. While the watershed in the West is plagued with water allocation battles, the watershed in the Midwest deals with areas of dense populations and agricultural lands. They both have waters listed on the EPA's 303(d) impaired waters list and cross through multiple states, creating tension between the states.

**Poster # 2**

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**PREDICTING OUTCOMES OF SHELTER DOGS**

Every thirteen seconds, a perfectly healthy, adoptable pet is euthanized in the United States, leaving well over two million dogs and cats whose lives must be cut short each year due to overpopulated shelters. In an effort to increase adoption rates of these animals to avoid euthanasia, many researchers have sought to find which characteristics of an animal improve and harm chances of adoptability. This research project seeks to go one step further, by creating a tool that shelters can use to approximately predict the probability of adoption of an incoming shelter dog. By using adoption information from a database in Austin, Texas and applying several analysis techniques, a tool can be created that shelters can utilize to determine upon intake which dogs are at a higher risk for euthanasia. In turn, a shelter can change their technique for adoption in order to give this high risk dog a better chance at survival.