25TH ANNUAL

UNDERGRADUATE RESEARCH SYMPOSIUM

UNIVERSITY OF SOUTH ALABAMA
UNDERGRADUATE RESEARCH

2023

THURSDAY, OCTOBER 26, 2023
1:00 PM

USA STUDENT CENTER BALLROOM

25th Annual Undergraduate Symposium
Thursday, October 26, 2023

Welcome
Dr. Christy Wheeler West
Director of the Office of Undergraduate Research

Invited Student Presentations:
Connor Holm
Cheyenne Jackson
Felicity Bryant
Mia Elias
Pedro Infante
Jorjia Elmore

Phi Kappa Phi Poster Award

Poster Sessions – Student Center 2nd floor lobby
1:00 Odd-number posters
3:00 Even-numbered posters

Sponsored by:
Alabama Space Grant Consortium, University of South Alabama Academic Affairs, University of South Alabama Graduate School, College of Arts and Sciences, Mitchell College of Business, College of Medicine, School of Computing, College of Education, College of Engineering, and Pat Capps Covey College of Allied Health Professions

Welcome!

At this 25th Annual Undergraduate Research Symposium at the University of South Alabama, we gather to celebrate the efforts and achievements of more than 90 budding scholars. Whether you join us as a proud mentor or parent, a curious student or faculty member, a University administrator, or other guest, I know you will be impressed with all these outstanding student researchers have accomplished, especially through the challenges faced in the last couple of years.

The Office of Undergraduate Research (OUR) seeks to promote scholarly and creative activity and enhance critical thinking, problem-solving skills, and communication. We take pride in our foundational role in developing the scholars and scientists of tomorrow. Still, our work would be empty without the tremendous commitment of the faculty mentors who not only foster the progress of the research projects but also nurture the undergraduate researchers in their scholarly development.

We are grateful for the generous sponsorship of the Alabama Space Grant Consortium, the Academic Affairs Office, and individual colleges and departments. We also express our appreciation to the members of the University Committee on Undergraduate Research, especially for their time and insight in support of the Summer Undergraduate Research Fellowship (SURF) program.

Dr. Christy Wheeler West
Director, Office of Undergraduate Research

Dear Colleagues and Students,

Welcome! This year marks a very special Undergraduate Research Symposium as we celebrate the 25th year since its inception. This symposium showcases the extraordinary efforts of our developing scholars as they present their research to the University community. The University of South Alabama prides itself on supporting undergraduate research as the impact of students working with faculty research mentors is profound. The benefits for students participating in scholarly activities are well documented, including enhanced opportunities to develop creativity, think critically, problem solve, and embrace intellectual independence. Undergraduate students participating in research are well prepared for their post- graduation plans, whether that is to begin their career in the professional world, continue studies in higher education, or a combination of both. Ultimately, the impact of undergraduate research is widespread as faculty and students examine issues collaboratively, and disseminate their findings in the scholarly community. It is through this dissemination that participation results in an impact to the global community as new knowledge is contributed.

It is with great pride that we commend our students and faculty who participate in the research endeavor through the Office of Undergraduate Research. We are confident that all who participate in the symposium will enjoy the experience and be inspired by the extraordinary work of their peers.

Andrea (Andi) M. Kent, Ph.D.
Executive Vice President and Provost

Oral Presentations

Connor Holm
Major: Biomedical Sciences
Faculty Mentor: Dr. Phoibe Renema
Department: Biomedical Sciences
College: Covey College of Allied Health Professions
The Effects of Pseudomonas aeruginosa ExoY on Executioner Enzyme Caspase 3/7 in Pulmonary Microvascular Endothelial Cells

Cheyenne Jackson
Major: Economics & Finance
Faculty Mentor: Dr. Al Chow
Department: Marketing and Quantitative Methods
College: Mitchell College of Business
Healthcare Volatility versus COVID-19

Felicity Bryant
Major: Mechanical Engineering
Faculty Mentor: Dr. Elena Pavelescu
Department: Mathematics and Statistics
College: College of Arts and Sciences
Connected Domination Numbers in Planar Triangulations

Mia Elias
Major: Biomedical Sciences
Faculty Mentor: Dr. Robert Barrington
Department: Microbiology and Immunology
College: College of Medicine
Production of Amyloid Precursor Protein is Herpes SImplex Virus 1 Strain-Depedent.

Pedro Infante
Major: Mechanical Engineering
Faculty Mentor: Dr. Dhananjay Tambe
Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering
College: College of Engineering
A platform to automate manufacturing of hydrogel substrates for biological cells

Jorjia Elmore
Major: Biology
Faculty Mentor: Dr. Jason Strickland
Department: Biology
College: College of Arts and Sciences
Interspecific venom variation between two shades of *Aphonopelma* tarantulas

Mentor Honor Roll

Mentor, Department	Nominated By
Dr. Robert Barrington Immunology and Microbiology	Mia Elias
Dr. Glen Borchert Pharmacology	Kevin Nguyen
Dr. Al Chow Marketing and Quantitative Methods	Cheyenne Jackson
Dr. Ashley Flagge Speech and Hearing Sciences	Emily Gatewood
Dr. Michael Francis Physiology and Cell Biology	Alexis Bui
Dr. Caitlyn Hauff Health, Kinesiology and Sport	Paige Fandel
Dr. Joshua Keller Health, Kinesiology and Sport	Genevieve Batman and Kyndall Ransom
Dr. Heidi Lyn Psychology	Steven Baker
Dr. Marie Migaud Pharmacology	Juanita Monteiro-Pai
Dr. Phoibe Renema Biomedical Sciences	Connor Holm
Dr. Carol Sawyer Geography	Francis Guy III
Dr. Jason Strickland Biology	Jorjia Elmore and Sarah Beth Pierce
Dr. Dhananjay Tambe William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering	Pedro Infante
Dr. Kaushik Venkiteshwaran Civil, Coastal and Environmental Engineering	Devyn Roh
Dr. Shenghua Wu Civil, Coastal and Environmental Engineering	Levi Arroyo

University Committee on Undergraduate Research
Program Director: Dr. Christy Wheeler West

College	Member, Department
Pat Capps Covey College of Allied Health	**Robin Mockett**, Biomedical Sciences
College of Arts and Sciences	**Jason Coym**, Chemistry **Lesley Gregoricka**, Sociology, Anthropology, and Social Work **Zoya Khan**, Foreign Languages **Christine Lindeman,** Art & Art History **Steven Schultze,** Earth Sciences **Jack Shelley-Tremblay**, Psychology **Jason Strickland**, Biology
Mitchell College of Business	**Al Chow**, Marketing and Quantitative Methods
School of Computing	**Tom Johnsten**, Computer Science
College of Education and Professional Studies	**Ryon McDermott**, Professional Studies
College of Engineering	**Na Gong**, Electrical and Computer Engineering **Silas Leavesley**, Chemical and Biomolecular Engineering
Honors College	**Doug Marshall**, Sociology
College of Medicine	**Thomas Rich,** Pharmacology
College of Nursing	**Rebecca Graves**, Research, Development, and Evaluation

Office of Undergraduate Research
Located in the Honors College
Seamans' Bethel Theatre
(251) 460-6243

Poster: 1

Ella Absher

Major: Biology

Faculty Mentor:
Dr. Amy Sprinkle |
Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Funding Source(s): Study Abroad, Stokes School of Marine and Environmental Science

Snapper Life Stage Distribution In Mangroves Related to Reef Distance

The distribution of snapper species in fringing mangroves is thought to be variable based on their proximity to reefs. Snapper species show strong habitat shifts throughout their lives. Early life stages are typically found in seagrass beds or mangroves, and as snappers grow and mature, they move offshore to reef habitats 1. We examined the distribution of different snapper species and life stages in relation to distance to coral reef across Turneffe Atoll, Belize. We used underwater video cameras to record the fish species in fringing mangroves at sites spanning from 0.5km-8km from the fringing barrier reef. Despite our predictions, we found no clear patterns related to distance from the main reef. During our research we discovered a surprising amount of patch reef and coral throughout the inner lagoon area of Turneffe Atoll. This complex seascape may explain why the distribution of snapper species ranged through all life stages in each of our study sites.

Poster: 2

Shahem Alqudah

Major: Biomedical Sciences

Faculty Mentor:
Dr. Glen Borchert

Department: Pharmacology

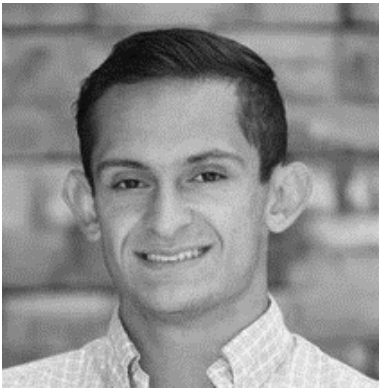
College: College of Medicine

Funding Source(s): SURF, NSF

Characterization of G4-based enhancer :: promoter regulations

A prominent secondary structure found in genomic DNA is G-quadruplex (G4), which can form under physiological conditions. It is a four-stranded, highly thermostable, square-planar nucleic acid structure in which guanine repeats are stabilized by Hoogsteen hydrogen bonds. The minimum sequence criteria to form intra-molecular G4 DNA have classically been described by the following motif: GGGnGGGnGGGnGGG. Our group has identified 301 Long G4-capable Regions (LG4) in genomic sequences. Of these LG4s, 217 overlap with annotated enhancers, and the promoters regulated by these enhancers are also enriched with G4-capable sequences. We hypothesize that a subset of enhancer-promoter regulations may be mediated by G4 DNA-G4 DNA interactions. LG4 sequences may interact directly with distal promoter G4s via G4 kissing or form hybrid G4s with promoters. The abundance of G4 donor sequences enables LG4 enhancers to function like long “Velcro-like” regions, interacting with nearby gene promoters to coordinate their expression. To test this hypothesis, we employed EQuIP-seq assays to experimentally identify LG4 enhancer target promoters via precipitation of enhancer::promoter duplexes that can be sequenced. Pulldowns of a specific LG4 located at Chr5:551937-556935 found that the Exoc3 promoter sequences were enriched. To determine if direct G4-G4 interactions are necessary for LG4 enhancer-promoter association, we will employ in vitro EMSA and Luciferase assays based around Exoc3.

Poster: 3



Levi Arroyo

Major: Civil Engineering

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

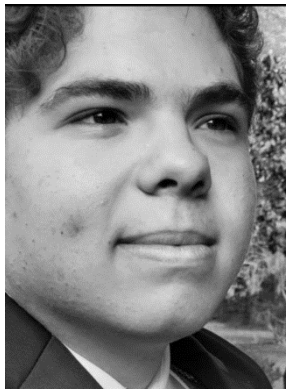
College: College of Engineering

Funding Source(s): SURF

Evaluation of 46-Month Field Performances of a Low Carbon Cold Mix Asphalt with l00% Reclaimed Asphalt Pavement

Efforts towards sustainable and low-carbon asphalt pavements have been a priority in the construction industry. However, the majority of existing studies assessing cold-mix reclaimed asphalt pavement (RAP) are confined to simulated laboratory conditions. This study seeks to advance the understanding of sustainable asphalt performance by examining the implementation of a rejuvenated 100% RAP cold-mix in real-world field conditions. Specifically focusing on low volume roads in warm, non-freezing climates, this paper investigates the pavement condition over a service period of 46 months, with evaluations conducted at 7, 22, 34, and 46 months. The analysis of the pavement condition index (PCI) over time revealed that the primary factors influencing degradation were raveling and weathering, while cracking and rutting were notably absent. Additionally, delayed compaction of the asphalt mix, particularly near the road edges, was found to be a contributing factor to decreased PCI values. The study underscores the importance of prompt and uniform compaction of the asphalt overlay to optimize the long-term performance of sustainable, rejuvenated asphalt in low volume roads. Double drum roller could be better to achieve smoothness and compactability. These findings hold significant implications for future pavement design and maintenance practices, providing valuable insights into enhancing the durability and sustainability of asphalt surfaces in low cost road applications.

Poster: 4



Steven Baker

Major: Psychology

Faculty Mentor:
Dr. Heidi Lyn

Department: Psychology

College: College of Arts and Sciences

Funding Source(s): SURF

Intuitive Understanding of Probabilities in Monkeys vs Humans

Throughout history, the concept of luck has woven its way through diverse cultures, entangled with the notion of probability—the likelihood of specific events occurring. Research has revealed a human tendency to intuitively miscalculate probabilities, rooted in our inclination to seek patterns in our surroundings, a behavior often referred to as “apophenia”. This tendency adversely affects various aspects of life, from gambling habits to healthcare decisions and investment performance. Interestingly, certain species, like dogs and rats, exhibit superior decision-making skills in situations determined by randomness. The leading hypothesis attributes this to humanity’s penchant for over-analysis and pattern-seeking, while dogs and rats adopt a simpler, more 'logical' approach. To understand why this difference occurs, there should be an effort to find when apophenia evolved. This can be tested by using a species closer to humans in an evolutionary sense, such as capuchin monkeys. These monkeys were put against humans in a controlled test where correct answers were assigned based on a probabilistic relationship. The findings of this study show that monkeys likely display similar behavior to dogs and rats in their approach to these situations. This supports the idea that this apophenic behavior did not evolve in monkeys and more research needs to be done to examine if it has evolved in other species closer to humans on the evolutionary chain.

Poster: 5

Jacob Barefoot

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Funding Source(s): Glass Half Full Recycling Company

Mycorrhizal fungi improve survivorship and salinity tolerance of seaoats (*Uniola paniculata*) but reduce growth of beach morning glory (*Ipomea imperati*)

Erosion of US coastlines costs an estimated $300 million in damages annually. Dune replenishment, a costly and labor-intensive task involves adding new sand to beaches and establishing plant communities to anchor that sand in place. However, these plants often fail to survive due to the high salinity, low nutrient availability, and low freshwater availability in these harsh environments. Mycorrhizal fungi are soil-dwelling fungal symbionts that interface with plant roots and provide increased access to nutrients and water, and increase plant survival and growth. However, to date, application of mycorrhizal fungi within coastal restoration systems has been largely ignored within the literature and practice. We hypothesize that inoculation with mycorrhizae will increase plant survival and improve salinity tolerance of inoculated dune plants. We tested the effect of mycorrhizal colonization on salinity tolerance and survival within three common dune restoration plants, *Uniola paniculata*, *Ipomea imperati*, and *Ipomea pes capre*. We transplanted two-month-old seedlings of each species into sand from Dauphin Island, Alabama, that had either experienced sterilization of soil microbial communities or had live soil communities. Live and sterile plants were then subjected to either 0, 2.5, or 5ppt saline water and grown for 20 weeks. Overall, we found that live mycorrhizal fungi increased growth and survival in *U. paniculata*, however reduced growth and survival in *I. imperati* in salinity treatments. Further study is needed to determine the mechanisms driving these differences in reaction to mycorrhizal presence, however, mycorrhizal fungi may be critical component to the restoration of coastal ecosystems.

Poster: 6

Jacob Barefoot

Major: Biology

Faculty Mentor:
Dr. Tuan Tran

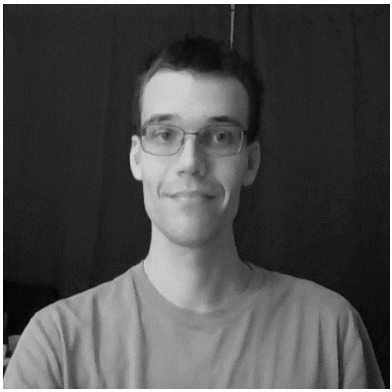
Department: Biology

College: College of Arts and Sciences

Ralstonia solanacearum adhesins contribute to bacterial biofilm formation and virulence in tomato

Ralstonia solancearum, a soil-dwelling bacterial plant pathogen, is the world's second most damaging plant pathogen, estimated to cause $848 million in annual damages across 78 countries in the potato crop alone. *R. solanacearum* infection causes bacterial wilt disease, where *Ralstonia*, after infiltrating a host plant via it's roots, begins forming biofilms within the host's xylem, blocking the flow of sap through the xylem and cause severe wilting and eventually plant death. Adherence factors governing *R. solanacearum's* ability to attach to neighboring cells and the interior surface of xylem vessels are known to influence the bacteria's virulence. We evaluated the contribution of two adhesin proteins, LecX and LecF, known to be involved in bacterial adherence, upon the virulence of R. solanacearum. We acquired 4 strains of *R. solanacearum*, GMI 1000, a widely studied wild type, and 3 mutants of GMI 1000; 2 of which (lecX and lecF) were deficient in genes encoding for different adhesin proteins, and one of which (phcA) being deficient in a master regulator governing several virulence factors. Our data indicated that, while both lec mutants have a definite impact on virulence, lecF contributed more to virulence than lecX.

Poster: 7



Stefan Bednarczyk

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Funding Source(s): Study Abroad, Marine Science Course

Gut Content of Flats Fishery Fish in Nursery Habitat and Connectivity to Sargassum

Permit, *Trachinotus falcatus*, are one of the most prominent and valuable of reef flats targets of the tourism sport fishery. This fishery in Belize, has an economic impact of approximately $115 million USD. Yet this fishery is under a perceived threat from over abundant Sargassum blooms, particularly at the nursery stage of life, which could potentially cause water quality issues. To understand the effect of the Sargassum on the nursery habitat of Permit, exploration of potential food web linkages was needed, followed by examination of permit diets along a beach with sargassum wrack, as well as quantification of invertebrate abundance in the wrack. The wrack contained high abundances of amphipods that were absent elsewhere on the beach. Data from this was plotted and preliminary results show that at some level the Permit require the Sargassum at this critical stage in life, being that it supports an important food source for juvenile permit, but there still may be negative impacts at high loads.

Poster: 8

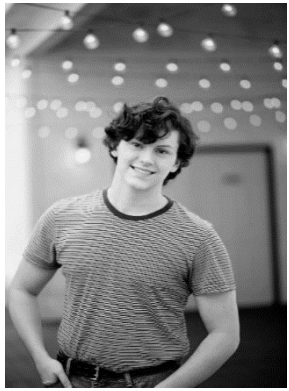
Ethan Blum

Major: Computer Science

Faculty Mentor:
Dr. Michael Black

Department: Information Systems and Technology

College: School of Computing



Ensuring Protection from Unauthorized Access to Long-Distance, Constrained Devices

Satellite communication is essential for the exploration and study of distant worlds. Satellites allow communications with far-away rovers and take incredible pictures of celestial surfaces. With the rise of Ground Station as a Service (GsaaS), the ability to efficiently send action commands to distant satellites must ensure non-repudiation such that an attacker is unable to send malicious commands to distant satellites. Distant satellites are also constrained devices and rely on limited power. Therefore, this study attempts to propose a novel method of ensuring non-repudiation in long-distance satellite communications while also ensuring the power consumption on constrained devices remains low.

Poster: 9

Coleman Braddock

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Snapper Life Stage Distribution In Mangroves Related to Reef Distance to Reef Distance

The distribution of snapper species in fringing mangroves is thought to be variable based on their proximity to reefs. Snapper species show strong habitat shifts throughout their lives. Early life stages are typically found in seagrass beds or mangroves, and as snappers grow and mature, they move offshore to reef habitats1. We examined the distribution of different snapper species and life stages in relation to distance to coral reef across Turneffe Atoll, Belize. We used underwater video cameras to record the fish species in fringing mangroves at sites spanning from 0.5km-8km from the fringing barrier reef. Despite our predictions, we found no clear patterns related to distance from the main reef. During our research we discovered a surprising amount of patch reef and coral throughout the inner lagoon area of Turneffe Atoll. This complex seascape may explain why the distribution of snapper species ranged through all life stages in each of our study sites.

Poster: 11

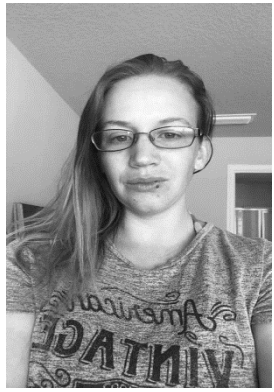
Taylor Brady

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle |
Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences



Funding Source(s): Study Abroad

Rates of Herbivory in Patch Reef and Surrounding Seagrass Communities

Seagrass beds have large effects from energy and nutrient flow to nearby habitats. Grazing on these beds is commonly thought to be minimal globally due to a decrease in large marine vertebrate herbivore populations. However, grazing near coral reefs from invertebrates and herbivorous fish plays a large role in returning nutrients and energy to the reef. Sand “halos” bordering reefs display this grazing pressure near-reef. Understanding spatial variability of herbivory can aid in quantifying the role of seagrass beds in supporting energy transfer in coupled seagrass-reef habitats. To quantify grazing rates and herbivore community composition, standardized Thalassia testudinum leaves were tethered to 4 set distances (15m into the reef, the edge of the reef, and 15 and 30m out of the reef) at 2 sites and camera surveys deployed at patch reef sites in Turneffe Atoll, Belize. Ultimately, 1 site showed a slow decrease in grazing further from the reef traveled, while the other site showed a complete drop of herbivory once the edge of the reef was reached. For species composition, the number of unique species decreased with distance from reef, but there was similarity in presence of wrasses at almost all sites. Studying the herbivory rates will help ecologists to better comprehend the interactions between plants and herbivores, as well as ecosystems. The information collected can be vital for gauging the health and durability of natural ecosystems.

Poster: 10

Felicity Bryant

Major: Mechanical Engineering

Faculty Mentor:
Dr. Elena Pavelescu

Department: Mathematics and Statistics

College: College of Arts and Sciences

Funding Source(s): SURF, MAA Tensor Women & Mathematics Grant, Alabama Space Grant Consortium

Connected Domination Numbers in Planar Triangulations

Inspired by Dominating Sets in Planar Graphs by Matheson and Tarjan, this project considers the relationships between domination number, connected domination number, and total number of vertices in planar triangulations. A set of vertices of a graph G such that each vertex of G is either in the set or is adjacent to a vertex in the set is a dominating set of G. Additionally if the dominating set induces a connected subgraph of G then it forms a connected dominating set of G. The domination number, d(G), of a graph G is the smallest number of vertices in a dominating set. The connected domination number, cd(G), of a graph is the smallest number of vertices in a connected dominating set. Domination number is strictly less than or equal to connected domination number. We found that when a vertex of G has degree n - 1 where n is the total number of vertices in the graph, d(G) = cd(G) = 1. Similarly, if a vertex of G has degree n - 2, d(G) = cd(G) = 2. Finally, we found if a vertex of G has a maximum degree of n - 3 or n - 4, cd(G) = 2 or 3. We prove that Matheson and Tarjan's conjecture of d(G)≤n4 does not hold for connected domination. We also proved that the difference cd(G) - d(G) can be arbitrarily large. Domination numbers can be used to analyze anything that can be represented as a graph such as flight paths and roads. By understanding more about the dominating sets of these graphs we can effectively locate where resources need to be placed to be the most efficient.

Poster: 12

Alexis Bui

Major: Biomedical Sciences

Faculty Mentor:
Dr. Michael Francis

Department: Physiology and Cell Biology

College: College of Medicine

Funding Source(s): SURF

Development of A Parallel Plate Flow Chamber to Study Shear Stress-Induced Cell Responses Within the Vascular Endothelium

Wall shear stress (WSS) is a hemodynamic force imparted by blood flow. As blood flows through the vasculature, endothelial cells (ECs) respond to WSS via cell signaling to maintain vascular homeostasis. Disturbed blood flow generates abnormal magnitudes of WSS, resulting in irregular EC response and an imbalance in vascular homeostasis. These irregularities are known to be factors in vascular diseases. Thus, it can be said that studying WSS-induced cell responses can contribute to gaining a better understanding of diseases occurring within the vasculature. There are existing methods being used to study WSS-induced cell responses within cultured cells but not yet in intact arteries ex vivo. To alleviate this, a parallel plate flow chamber was designed to study WSS-induced EC calcium response in intact arteries. The 3D printed chamber was designed and tested using a Cole Parmer Masterflex L/S peristaltic pump to produce fully-developed, laminar flow and, therefore, predictable magnitudes of WSS. Further testing phases were performed to validate design integrity, design compatibility with en face artery preparations, velocity, and EC calcium response.

Poster: 13

Nick Campbell

Major: Computer Science

Faculty Mentor:
Dr. Jingshan Huang

Department: Computer Science

College: School of Computing

Funding Source(s):
Doran-Longenecker Research Award

SURFr: Algorithm for Identification and Analysis of ncRNA-derived RNAs

Noncoding RNAs (ncRNAs) play a crucial role in regulating gene expression in essential cellular functions and impact the development of many human diseases. Next-generation sequencing (NGS) technologies have enabled significantly increased efficiency of evaluating and analyzing the ncRNA transcriptome. NGS approaches produce genome-wide expression profiles, which have recently led to the unexpected discovery of novel RNA fragments obtained from some types of ncRNAs - namely, small nucleolar RNAs (snoRNAs) and transfer RNAs (tRNAs). Although these ncRNA-derived RNAs (ndRNAs) were initially thought of as random, insignificant products of microRNA (miRNA) degradation, further evidence suggests that they are specifically excised, fully functional ncRNAs instead. Emergent evidence of previously unrecognized roles of ndRNAs implies a broad need for efficient, accurate computational models to help analyze NGS output data. Through our research, we have introduced a novel computational method named SURFr for the identification, analysis, and interpretation of currently annotated and novel ndRNAs with linear complexity in both time and space. Results obtained from aligning a 1.5MB database file of known ncRNA sequences to ten NGS files ranging from 0.9GB to 6.8GB with SURFr show an average alignment time of 0h:2m:33s. This average time, when compared to an average time for the same files of 3h:19m:00s with NCBI's alignment tool BLAST+, shows an extreme increase in the efficiency for our algorithms over one very popular tool. Our algorithms also provide a visual representation of the expression levels of specifically excised ndRNAs including the starting and ending positions of each and every ndRNA of interest.

Poster: 14

Riley Clark

Major: Exercise Science

Faculty Mentor:
Dr. Matthew Stratton

Department: Health, Kinesiology, and Sport

College: College of Education and Professional Studies

Funding Source(s): SURF, Alabama Space Grant Consortium

Comparison of Two Systems for Assessing Resting Energy Expenditure via Indirect Calorimetry

Resting energy expenditure (REE) is most utilized for altering dietary habits for weight management, assisting acute healthcare providers in diagnostic procedures, and in the creation of personalized care plans for individuals. CosMed has created a new device, the Q-NRG, that measures REE conveniently and economically. However, this device has no known investigations to determine its' accuracy. Thus, this study investigated the likelihood in both accuracy and validity of the produced variables in comparison to another historically accurate CosMed device, the Quark CPET. Twenty males and females who were dry fasted for 8 hours and sedentary for twenty-four hours completed two experimental trials. Within the two visits, participants' anthropometric data was collected prior to the completion of a thirty-minute rest period. A single twenty-minute trial on each of the Q-NRG and Quark CPET devices was conducted. Researchers utilized a REE canopy purchased from CosMed. The most consistent five-minute interval of the trial, volume of carbon dioxide produced, oxygen consumed, respiratory quotient (RQ), coefficients of variation (CV) for all produced variables, temperature, humidity, and barometric pressure were measured for all trials throughout the visits. Data was used to assess the accuracy and validity of the Q-NRG in comparison to the Quark CPET. On average, the Quark CPET interpreted each individual's REE to be around 300 kilocalories more per day. Less variance between the two methods was found for lower REE values and greater for higher REE values. This data suggests that the difference in REE measurement between the two devices is significant and CosMed's Quark CPET and Q-NRG cannot be used interchangeably for measuring REE.

Poster: 15

Darian Coleman

Major: Secondary Education Mathematics

Faculty Mentor:
Dr. Joanna Furno

Department: Mathematics and Statistics

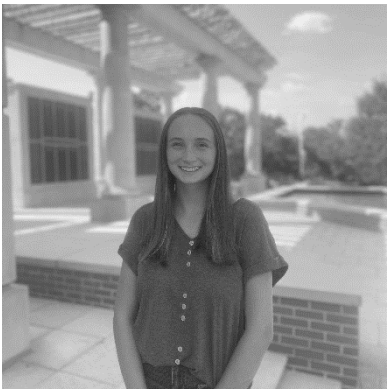
College: College of Arts and Sciences

Funding Source(s): SURF, This material is based upon work supported by the National Science Foundation under Grant No. 2213516

Polynomial Being Complex

We will discuss iterates of polynomials on the complex numbers. These polynomials have degrees that get arbitrarily large. We use the iterates to color-code pictures based on whether the iterates get large or stay bounded. In researching these pictures, we can observe patterns in long-term behavior of the iterates.

Poster: 16



Alexis Couture

Major: Biomedical Sciences

Faculty Mentor:
Dr. Kimberly Zlomke

Department: Psychology

College: College of Arts and Sciences

Funding Source(s): SURF

Relationship between Emergency Room or Urgent Care Visits in Youth with Sickle Cell Disease and Missed Days of Work by their Guardian

Introduction: Sickle cell disease (SCD) is a hematological chronic health disorder that affects 20 million people worldwide. As a result of the condition, patients experience episodes of extreme pain known as pain crises. Due to these pain crises, youth with SCD miss an average of 20-40 days of school per year while in the emergency room. The goal of this study was to identify the correlation between days spent in the emergency room by youth with SCD and days of work missed by their guardian.

Method: Participants included 10 youth with SCD between the ages of 6-16, with an average age of 11.2 years. Participants' guardians were asked to complete the Pediatric Quality of Life Inventory (PedsQL™) Family Information Form.

Results: There was a significant relationship between days spent in the emergency room by youth with SCD and days of work missed by their guardian, $r = 0.778$, $p= 0.008$.

Conclusion: The relationship between days spent in the emergency room by youth with SCD and the days of work missed by their guardian is important. Missing work for extended periods of time may lead to financial issues due to working less hours, fewer promotions because of poor performance, and, in extreme cases, getting laid off. All of which are likely to induce or increase caregiver stress.

Poster: 17

Ashwin Dahal

Major: Mechanical Engineering

Faculty Mentor:
Dr. Melike Dizbay-Onat

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Funding Source(s): SURF

Adsorption properties of improved biochar

This project employs commercially available pine-based biochar and enhances its fundamental characteristics, specifically focusing on elevating surface area and optimizing pore size distribution. Biochar, a carbon-based material derived from the controlled heating of organic substances, serves as the foundation of this research. The main objective of the study revolves around optimization of the material's surface area through the manipulation of key activation parameters, such as temperature and duration of heating. The process of activation involves subjecting the biochar to elevated temperatures while introducing CO_2, resulting in a much higher surface area. An increase in surface area correlates to a greater adsorption capacity which is desirable for environmental and storage reasons. High adsorption capacity is important in order to filter harmful chemicals from the environment. Arsenic is a compound that is commonly found in the soil which may contaminate drinking water. In addition to investigating the enhancement of surface area and adsorption capacity, this project will conduct testing on arsenic removal efficacy using both untreated and activated biochar. This part of the research is important in establishing the practicality and effectiveness of the developed biochar material for real-world applications.

Poster: 18

Coleman Davis

Major: Mechanical Engineering

Faculty Mentor:
Dr. Carlos Montalvo

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Funding Source(s): SURF, AIAA, Alabama Space Grant Consortium

Autonomously Throttleable Hybrid Rocket Engine

The goal of our SURF was to design, construct, and test an autonomously throttleable hybrid rocket engine for use in a high powered sounding rocket. A hybrid rocket engine is a type of engine that uses both solid and liquid propellant in order to produce thrust. Our design utilizes a solid paraffin wax fuel grain that is housed in the engine's combustion chamber and liquid nitrous oxide which is pumped in under high pressure to facilitate combustion. As the combustion gasses expand and pressurize the chamber, the gasses are forced through a converging diverging nozzle, lowering the pressure while increasing the speed of the exhaust. By regulating the amount of nitrous oxide that flows into the combustion chamber, the thrust of the engine is altered. Through the use of a "feedback loop" system, we can modify the engine's thrust output over time to optimize the launch vehicle's flight and accurately reach a specific altitude. This will be done through our Autonomous Throttling Controller. The ATC will measure live pressure, acceleration, and orientation data to predict the rocket's flight path and altitude. It will then calculate a difference between the simulated altitude and our desired altitude and determine what changes in the thrust are needed to correct the difference. The ATC will then open or close the control valve accordingly. This change in flow rate will directly change the thrust output of the engine. This process will repeat until the motor is finished burning.

Poster: 19

Destinie Diggs

Major: Computer Engineering

Faculty Mentor: Dr. Na Gong

Department: Electrical and Computer Engineering

College: College of Engineering

Funding Source(s): SURF

Viewer-Aware Power-Efficient Adaptive Mobile Video System Reducing Power Consumption using Video Bit Truncation Based on Ambient Luminance

Mobile devices have become an integral part of our lives in modern times. But video processing uses intensive computation and consumes large amounts of data making the process power hungry. This project aims to reduce the amount of memory used in video processing by taking the novel approach of accounting for viewer-awareness. Previous research found that biggest factor on viewer awareness is the brightness of surroundings. So the video data used can be based upon brightness to save power, as saving data saves power. A prototype system uses a technique called bit-truncation to adaptively adjust the data used based upon the brightness of the viewer's surroundings. The heart of the system is the UDOO Bolt v8 single board computer. With 2.0 ghz processing speeds and 32 gbs of RAM this powerful computer is faster than most full-size commercial laptops. The onboard Arduino Leonardo is paired with a TSL2561 luminosity sensor to read the surrounding brightness. A 5" monitor is housed in a 3D printed PLA plastic case. This powerful system is completely portable in a slim convenient form-factor. It's important for this system to be portable and imitate a mobile device for human testing that will be conducted soon.

Poster: 20

Mia Elias

Major: Biomedical Sciences

Faculty Mentor:
Dr. Robert Barrington

Department: Microbiology and Immunology

College: College of Medicine

Funding Source(s): SURF

Production of Amyloid Precursor Protein is Herpes Simplex Virus 1 Strain-Dependent.

In the amyloidogenic pathway, amyloid beta (Aβ) peptides are released by cleavage of amyloid precursor protein (APP). As an antimicrobial peptide that neutralizes microbes, Aβ functions as part of the innate immune system. Accumulation of Aβ is linked to the pathogenesis of Alzheimer's Disease (AD) raising the possibility that infection may contribute to AD. Whether processing of APP contributes to antiviral responses is debated. Herpes Simplex Virus-1 (HSV-1) is a neurotropic double-stranded DNA virus that establishes lifelong latency. HSV-1 reactivation can lead to different outcomes ranging from asymptomatic to herpetic encephalitis. It's unknown whether different strains of HSV-1 are responsible for disparate outcomes. Using three different HSV-1 strains, we compared the regulation of APP associated proteolytic processing in both a corneal infection murine model and an in vitro model. In the cornea, single-cell RNA sequencing revealed APP and its key processing components were differentially expressed dependent on HSV-1 strain. A similar result was observed in vitro using RT-qPCR. APP levels also differed both in vivo and in vitro dependent on HSV-1 strain, as measured by western blot. Therefore, different strains of HSV-1 induce expression of APP and genes involved in its processing differentially. Clinically, these findings may help resolve the controversy regarding APP pathway neutralization of HSV-1 as well as the association of HSV-1 with AD.

Poster: 22

Jorjia Elmore

Major: Biology

Faculty Mentor:
Dr. Jason Strickland

Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF, American Arachnology Society

Interspecific venom variation between two shades of *Aphonopelma* tarantulas

Interspecific phenotypic variation is a common occurrence throughout the animal kingdom and evolves in response to differential selection pressures between species. Species-based differences occur frequently in venomous species including arachnids, and is often due to differences in gene presence/absence. These differences tend to be dramatic in closely related species. The North American tarantulas (*Theraphosidae: Aphonopelma*), have undergone recent taxonomic changes which identified several lineages of previously undescribed species. To test for interspecific venom variation in two species, we converted mRNA to cDNA from the venom gland and sequenced the RNA-seq libraries on an Illumina NovaSeq 6000. Using our data, we generated the first venom gland transcriptome for *A. hentzi* (Texas Brown Tarantula) and *A. anax* (Texas Tan Tarantula). By comparing annotated transcriptomes between species we found evidence of interspecific differences. Specifically, we found similar protein families between the species but differences in expression and sequence that may be leading to the overall differences in their venom transcriptome profiles. Examining interspecific venom variation offers a window into the evolution and ecology of both species, and provides data for a poorly studied family of organisms.

Poster: 21

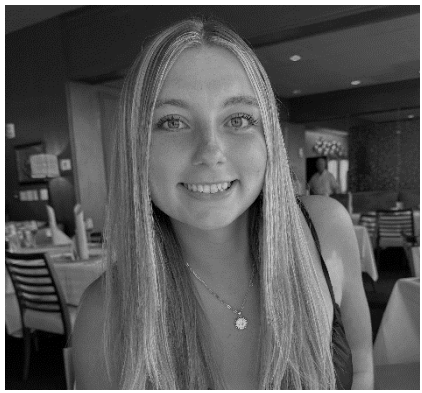
Paige Fandel

Major: Psychology

Faculty Mentor:
Dr. Caitlyn Hauff

Department: Health, Kinesiology, and Sport

College: College of Education and Professional Studies



Funding Source(s): SURF

Mental Health In Collegiate Male Football Athletes

The mental health of athletes has become an increasingly discussed topic as highly-watched athletes have begun sharing their personal struggles. As the discussion of mental health has become more prominent in society, research has started to focus on why athletes feel they are unable to discuss their mental health, or their personal barriers that keep them from speaking out. As more research surfaces, it is important to assess the stigmas that exist across multiple genders and more. More specifically, there needs to be more pointed research examining the differences between sport types and the possible psychological issues these differences can cause. In order to fill this gap, for my research project, I qualitatively examined male football players at the collegiate level. This population of student-athletes is understudied and it is important to identify what makes them different. For this research, the goal was to determine how these athletes feel about the accessibility of mental health resources, the experiences the football players have had being an athlete, and the stigma they feel surrounds mental health. Often, many student-athletes undergo their battles silently, ultimately suppressing their emotions only making them worse. Through the research, we discovered the athletes are battling through their mental health struggles daily. We hope to continue research to take a further dive into the minds of these athletes, and to help continue discovering the best solution to ensuring these athletes are okay.

Poster: 23

Jacob Fetner

Major: Geology

Faculty Mentor:
Dr. Benjamin Linzmeier

Department: Earth Sciences

College: College of Arts and Sciences

Funding Source(s): SURF

Using Mechanistic Modeling to Evaluate the Survivability of Extinct Crocodilians

Paleoclimatology, vital for comprehending past climates, underpins the study of historical ecological dynamics. We present an undergraduate project employing Paleonichemapper to model extinct organisms' responses to climate change, addressing a fundamental issue in paleobiology. Paleonichemapper bridges user input and Niche MapperTM, enabling simulations of how extinct species reacted to microclimatic variations. We refined Paleonichemapper, enhancing its functionality and documentation. This study uses the improved Paleonichemapper to model the Late Cretaceous crocodilian's response to climate change, revealing critical climate vulnerabilities. We demonstrate Paleonichemapper's value in investigating ancient ecosystems, shedding light on factors such as aquatic habitat affecting survival. This interdisciplinary work illustrates paleobiology's synergy with computational modeling, offering insights into ancient species' adaptability amid climate shifts. Broadly, it underscores the importance of integrating advanced computational tools into paleontological research, opening new avenues to explore Earth's ecological history and its relevance to modern environmental challenges.

Poster: 24

Rachel Fleck

Major: Biology

Faculty Mentor:
Dr. Allyson Shea

Department: Microbiology and Immunology

College: College of Medicine

Funding Source(s): SURF

Aquagenx^{TM}: Water Quality Field Test Kits Turned Diagnostic Tool for Asymptomatic Bacteriuria

Between 2-10% of pregnant women experience asymptomatic bacteriuria (ASB), the presence of bacteria in the urine at concentrations greater than 10^5 CFU/mL most often caused by uropathogenic *E. coli* (UPEC). Pregnant women are screened for ASB with a urine culture test to prevent adverse pregnancy outcomes that occur when ASB is left undetected. However, limited funding and access to proper microbiology diagnostic tools makes diagnosis and proper treatment of ASB extremely difficult in low-resource areas. Here, we present Aquagenx^{TM} as an ASB screening tool in regions where access to plate microbiology may be limited. Aquagenx^{TM} water quality field test kits detect the presence of *E. coli* in drinking water via a colorimetric indicator, turning from yellow to green in the presence of E. coli. Because the kits can detect as few as 1 CFU in 100mL, the development of a urine sample dilution protocol was required to achieve a color change in the test kit for samples >10^5 CFU/mL. Our proposed dilution protocol consists of a one-step dilution of the urine sample using a plastic 10µL inoculating loop. We conducted six trials with this established protocol using 10^5 CFU/mL and 10^4 CFU/mL samples to determine the false negative and false positive rates, respectively. From these experiments, the false positive rate of the bag was 33%, and the false negative rate of the bag was 6%. These findings suggest that Aquagenx^{TM} technology has great potential to be taken from a field biology tool to a feasible diagnostic tool for ASB in low-resource areas.

Poster: 25

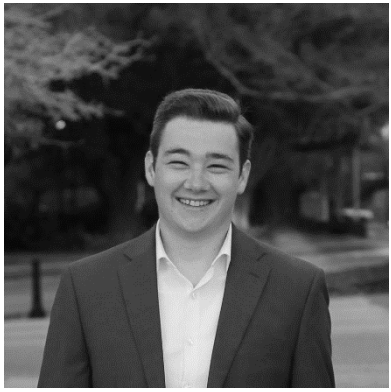
Nicholas Flynn

Major: Information Technology

Faculty Mentor: Dr. Michael Black

Department: Information Systems and Technology

College: School of Computing



Can An Algorithm Be Developed Which Can Identify and Calculate the Amount of File Slack on An Image of A Given Drive?

In today's digital age, society heavily relies on technology, leaving everyone increasingly vulnerable to cybercrime. This has resulted in a surge of anti-forensic techniques used by cybercriminals to evade detection and prosecution. In particular, one popular form of anti-forensics is obfuscating, or hiding, data in the file slack of file systems. This ongoing research aims to provide a tool that will allow digital forensics analysts to assess where anti-forensics actors might have hidden data by calculating the amount of file slack on a given drive. The three-phased method consists of creating a virtual testing environment, creating the data to be tested against, and calculating the amount of file slack on an image of a given drive. Success of the algorithm will be determined by the percentage of calculations producing the accurate amount of file slack for each block. This process will serve as a first step in future digital forensics research to recover data obfuscated in file slack, and many other applications.

Poster: 26

Emily Gatewood

Major: Speech and Hearing Sciences

Faculty Mentor:
Dr. Ashley Flagge

Department: Speech and Hearing Sciences

College: Covey College of Allied Health Professions

Funding Source(s): SURF

The Influence of Personality Traits and Body Vigilance on Balance in a Dual Task Paradigm

Prior research suggests that certain personality traits and individual differences may influence performance on balance tasks (Zaback et al, 2015). Additionally, research suggests that body hypervigilance, or over-awareness of body functions or changes in function may contribute to increased perceptions of instability in older adults (Ellmers et al, 2021). To further investigate these claims, young, healthy adults (n=11) that previously participated in a dual task (balance & speech understanding in noise) research protocol were invited to complete an electronic survey containing personality (BFI-2) and body vigilance (BVS) questionnaires. Although results revealed no significant relationship between any personality facet and balance performance in any condition, trends were noted. Specifically, negative emotionality was negatively correlated to almost all balance conditions, suggesting that higher levels of anxiety and depression may lead to a more rigid postural strategy (less sway). Analysis of body vigilance scores revealed that individuals with higher awareness of body sensations, especially changes in vision, tended to sway less than those with less awareness of body sensations. Since it has been documented that adoption of a postural rigidity strategy (less sway) can lead to decreased postural stability in some populations, it is possible that increased body vigilance and levels of negative emotionality, even in a young healthy population, may be contributing to increased postural rigidity. However, additional research is needed to further elucidate these findings in clinical populations and in older adults.

Poster: 27

Kyle Gaviria

Major: Biomedical Sciences

Faculty Mentor:
Dr. Seema Singh

Department: Pathology | Biochemistry and Molecular Biology | Mitchell Cancer Institute

College: College of Medicine

Funding Source(s): Mitchell Cancer Institute's Summer Research Program

The Association Between Socioeconomic Factors and Racially Disparate Outcomes in Breast Cancer

Breast cancer is the most frequently diagnosed cancer in the United States, accounting for 15.2% of all new cancer cases estimated in 2023. Not only is this cancer widespread, but it also has disproportionate effects on different racial/ethnic groups. Black individuals display the worst trends in mortality, triple-negative breast cancer (TNBC) incidence, and more. Recent studies have shown that social and lifestyle factors, such as diet, living conditions, and income, are related to these racial disparities. However, the connection between these factors and tumor progression remains unclear. To further elucidate the effects of socioeconomic hardship on breast cancer, we recruited breast cancer patients and cancer-free individuals. Then, we categorized them based on socioeconomic status (SES), social deprivation index, and perceived stress level, and examined the differences between Black and White individuals. We found that Black breast cancer patients were more likely to have low SES (1.4-fold higher) and high social deprivation (2.2-fold higher) than their White counterparts. Additionally, we observed that cancer-free Black individuals had higher rates of low SES and high social deprivation (4.7-fold and 2.2-fold higher, respectively) than their White counterparts. Black breast cancer subjects also displayed increased rates of TNBC (3.3-fold higher) and early-onset breast cancer (1.7-fold higher). Importantly, low SES and high SDI were prevalent in Black subjects with either TNBC or early-onset breast cancer. Unlike SES and SDI, our measure of perceived stress did not reveal any major differences between races. Altogether, these results provide evidence that certain social and lifestyle factors play a role in the development of poor outcomes and racial disparities in breast cancer. Further investigation into these relationships will guide the creation of tailored interventions and treatment plans, reducing the breast cancer burden for everyone.

Poster: 28

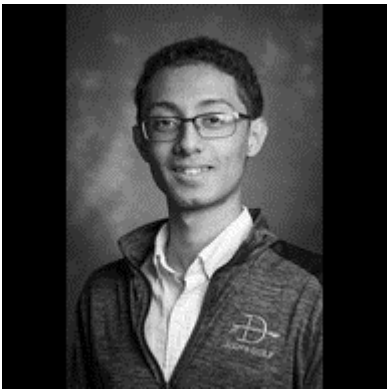
Reeshi Ghosal

Major: Computer Science

Faculty Mentor:
Dr. Martin Frank

Department: Physics

College: College of Arts and Sciences



Funding Source(s): SURF, Alabama Space Grant Consortium

Improving the Reconstruction Algorithm in the Search for Magnetic Monopoles at Slow Velocities

A sub-focus of the NOvA experiment is the search for magnetic monopoles. The detectors, located in Illinois and Ash River, Minnesota, are integral in the search for these particles. When the far detector is hit, scintillating oil in the detector lights up, causing the particle to show on the event display. The path of the particle is reconstructed using an algorithm. However, the efficiency of the reconstruction algorithm decreases as the velocity of the particles stray further from the β value of $1x10^{-3}$ in either direction (faster or slower). The focus of this project is on simulated particles with speeds of slower than β value of $1x10^{-3}$ and suggest improvements to the algorithm.

Poster: 29

Anna Claire Giffin

Major: Art

Faculty Mentor:
Dr. Kara Burns

Department: Art History

College: College of Arts and Sciences

Funding Source(s): SURF

NAGPRA Inventory and Policy at South

The Native American Grave Repatriation and Protection Act (NAGPRA) was passed through legislation in 1990 under George H.W. Bush. [In accordance with this law,] all museums and government-funded establishments must repatriate all Native American ancestral remains, funerary objects, and sacred objects to culturally affiliated Tribes. are subjected to this law. The University of Alabama Archaeology Museum has made 13% of our 70 individuals available for repatriation; the goal is to make them all available. For comparison, the University of Alabama Museums have made 79% of their 13,600 individuals available for repatriation (Propublica.com, Ngu). During the course of our research, it was discovered that we had many issues like recording and storage due to the past treatment of the individuals currently housed at our facility. These issues were noted and will be corrected during the NAGPRA process. The implementation of NAGPRA requires time, money, and knowledge of Indigenous cultures that many institutions do not have, which has caused issues for those completing NAGPRA work. The current research established a written policy for the proper care of and repatriation of Native American mortuary remains and funerary objects currently held in the curation facility at the USA Archeology Museum in compliance with the Native American Graves Protection and Repatriation Act (NAGPRA). There were two main priorities of this policy. First, to meet the wishes of and adhere to the beliefs of the tribes whose ancestors rest in the museum; thus, this policy was prepared through consultation with the Tribal Historic Preservation Officers (THPOs) Poarch Creek Band of Indian Tribe. Second, to correct any problems with the records regarding the remains and the storage of the remains in accordance with the new policy.

Poster: 30

Josue Guevara

Major: Modern Languages and Literature

Faculty Mentor:
Dr. Eleanor Ter Horst

Department: Modern & Classical Languages & Literature

College: College of Arts and Sciences

Concepts of time in "The Son" by Horacio Quiroga, "The Garden of Forking Paths" by Jorge Luis Borges

This research project examines the portrayal of time in "The Son" by Horacio Quiroga, "The Garden of Forking Paths" by Jorge Luis Borges, and Time and Free Will by Henri Bergson. The objective of my academic paper is to present a comprehensive and insightful analysis of the concept of time in the literary works by Quiroga and Borges, in relation to the philosophical ideas developed by Bergson. I have uncovered a connection between the fundamental concepts of time elucidated in Bergson's book, and the portrayal of time in the two short stories. Henri Bergson, a French philosopher, introduced two concepts of time: chronological time, and time as experience. Both concepts of time are evident in the story "El Hijo:" chronological time, as measured by clocks, and time as experience, referring to how we exist within time and our relationship with the changes in nature around us. Borges's "Garden of the Forking Paths" also contrasts objective time with our perception of reality. However, Borges describes time as the multiple possibilities of our actions and the potentials related to our inner experiences.

Poster: 31

Francis Guy

Major: Geography

Faculty Mentor:
Dr. Carol F. Sawyer

Department: Geography

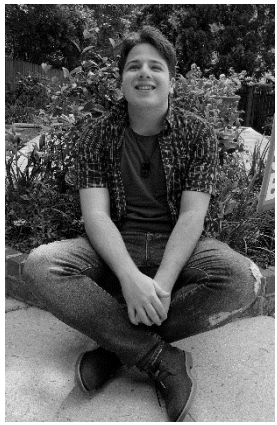
College: College of Arts and Sciences

Funding Source(s): SURF

Longitudinal Impacts of Trampling Along Alpine Trails

The purpose of this project was to measure the effects that trail use has on the alpine environment Olympic National Park, Washington, where data on the compaction of soil from foot traffic was obtained using the belt-transect method from two trails: Elk Mountain and Grand Valley. Data analysis showed no statistical significant difference between the two trails, but the intra-trail compaction rates were statistically significant (One-way ANOVA), indicating that trail compaction decreases on either side of the trail. Some areas along the Grand Valley Trail have secondary trails that have no obvious relationship to scenic points along the trail. There was evidence that showed one secondary trail was created to avoid an area of snowpack. The primary trail that was there is now entering a regrowth stage and is not very noticeable. Most of the secondary trails found appeared to be created for opposing hiker avoidance.

Poster: 32



Nabeel Hadad

Major: Chemical Engineering

Faculty Mentor: Dr. Kevin West

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Antimicrobial Dye Synthesis

The process of imparting antimicrobial properties into fabrics is a topic that is extremely beneficial in the medical field, military applications, and commercial uses due to the proximity of these fabrics to the human body. We focus on using N-halamines, which are recognized for their rechargeable and powerful microbial contact-killing properties. Inspired by reactive dye chemistry, a compound was designed using cyanuric chloride as a binding agent and cysteine as the linker to the intended N-halamine built off 5,5-dimethylhydantoin. This compound is comparable to a dichlorotriazine (DCT) dye, possessing water solubility and reactivity suitable for the industrial textile industry. The synthesized compound can be applied to fabric in a single reaction, avoiding complex processes and making it industrially viable.

We confirmed the synthesis of dye using NMR, FT-IR confirmed the attachment of dye to the fabric, and an iodometric titration was used to measure the uptake of chlorine. These validations ensure the effective chlorine loading, the capability of rechargeability, and overall storage stability of developed fabrics. A specialized antibacterial assay is utilized to affirm the contact-killing efficacy of the compounds, neither the hydantoin nor chlorination alone imparts any antibacterial activity to the fabric. This project is meant to dye fabrics to ensure bacteria growth is inhibited and can be re-energized multiple times, ensuring it's practical, durable, and effective in various real-world applications such as medical linen and athletic apparel.

Poster: 33

Ridge Ham

Major: Economics & Finance

Faculty Mentor:
Dr. Tristan Johnson

Department: Accounting

College: Mitchell College of Business

Funding Source(s): SURF

A Review of the Literature of How Openness/Intellect May Affect EPS Forecast Accuracy

We examine past research to gain insight into the relationship between the Openness/Intellect and EPS forecast accuracy. We also examine the literature to determine how the separate aspects of Openness and Intellect differentially predict forecast accuracy depending on the situation. Our research builds on prior knowledge about how different personality traits affect forecast accuracy.

Poster: 34

Sicily Hardy

Major: Biomedical Sciences

Faculty Mentor:
Dr. Allyson Shea

Department: Microbiology and Immunology

College: College of Medicine

Funding Source(s): SURF

Patient and Pathogen Diversity in Urinary Tract Infections

A urinary tract infection (UTI) occurs when bacteria enter the urethra and infect the urinary tract. In some cases, UTIs progress to severe outcomes such as urosepsis and pyelonephritis. UTIs are the second most frequent infectious disease worldwide, affecting a large patient population resulting in significant healthcare costs. Nationally, epidemiologic data demonstrates that UPEC accounts for 70-80% of UTI cases. Mobile, AL has greater racial and socioeconomic diversity compared to the national average. Non-biological factors such as socioeconomic status are known to influence disease outcomes. I hypothesized that because of Mobile's differing demographics, the incidence of UPEC will not reflect the national averages. My goal was to see if there was any predictive correlation between patient variables and the severity of disease outcomes. Colony PCR was used to screen for the DNA genome of clinical strains of UPEC (n = 24) patients to determine the toxigenicity. Furthermore, to assess the ability of UPEC strains to move via flagella, I completed three trials of motility assays. Results showed that the number of toxins carried in the genome correlated with patient sex and sepsis outcomes. Strains with a greater number of toxins in their genome were also determined to more frequently cause sepsis. Polymicrobial infections were associated with pregnant patients and/or increased body mass. These data suggest that further studies using an increased sample number are required to fully define the pathogenic profile and bacterial variance associated with diverse patient cohorts. Based on these findings, we can use pathogen/strain biology to predict patient risk and disease outcomes.

Poster: 35

Sicily Hardy

Major: Biomedical Sciences

Faculty Mentor:
Dr. Terrence Ravine

Department: Biomedical Science

College: Covey College of Allied Health Professions

Evaluating the Antibacterial Effectiveness of a Chlorine Rechargeable Aqueous Biocide Fabric Dye Using a Chromogenic Assay Detecting *Serratia marcescens* Pigment

Biocides are chemicals added to fabrics by textile manufacturers to inhibit bacterial growth, which increases their usable life and durability. A novel, rechargeable aqueous fabric biocide was developed locally. It consists of a colorless dye possessing a terminal chlorine "holder" molecule *N*-halamine. The *N*-halamine is subsequently "charged" with chlorine by exposure to a dilute solution of Clorox. Unbound chlorine is removed through successive washes. A chromogenic assay was also developed to screen dyed white cotton fabric for antibacterial activity. It takes advantage of the bacterium *Serratia marcescens* producing a red-orange pigment (prodigiosin) when grown at a temperature of 33°C. A bacterial suspension is made in nutrient broth, adjusted to a 1% McFarland turbidity standard, and distributed onto fabric samples. After 24-hours incubation at 33°C, development of a pink color on fabric samples indicates that the biocide did not inhibit *S. marcescens* growth. Alternatively, a lack of detectable color indicates that bacterial growth was inhibited. The primary study aim was to determine if either the dye or chlorination alone had any antibacterial effects. A secondary aim was to establish pH conditions providing for optimal chlorine loading of the hydantoin molecule. Results indicated that dye treatment and chlorination are both required for antibacterial activity. Furthermore, lowering the pH from 11.0 to 5.0 promotes greater chlorination of biocide-dyed fabric. Future directions include determining the lowest effective dye concentration needed to impart fabric with antibacterial activity. Finally, enhancing the chlorination process by further reducing the pH from 5.0 to 3.0.

Poster: 37

Benjamin Hines

Major: Chemical Engineering

Faculty Mentor:
Dr. Kevin West

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Funding Source(s): SURF

Thermophysical Analysis of Ionic Amines for Carbon Capture Applications

CO_2 capture and storage is a captivating topic for researchers due to its profound implications for environmental sustainability and future technologies. One currently used capture technology involves the use of an aqueous MEA (monoethanolamine) solution to chemically capture CO_2 and then allow for the separation and then subsequent regeneration of the amine. However, MEA is volatile and prone to oxidative and thermal degradation, which leads to solvent loss. Ionic amines have been shown to be a promising solution to these problems, potentially enhancing the stability and efficiency of CO_2 capture processes since they can theoretically be designed to select for these desired traits. This project seeks to analyze the thermo-physical properties of different ionic amines, particularly their solubility in water. The evaporation method was utilized for this purpose, saturating water with each amine within a specific temperature range. Thermo-gravitational analysis revealed critical temperatures at which the ionic amines began to degrade, and the temperature required for complete water removal. Preliminary results indicate significant variations in solubility and thermal stability among the tested ionic amines, providing valuable insights into their potential for improving CO_2 capture and storage processes. These findings hold promise for enhancing environmental sustainability and future technological advancements in carbon capture. Further research will explore the optimization of ionic amine selection and integration into capture systems for practical applications.

Poster: 36

Connor Holm

Major: Biomedical Sciences

Faculty Mentor:
Dr. Phoibe Renema

Department: Biomedical Sciences

College: Covey College of Allied Health Professions

Funding Source(s): SURF, American Society of Biochemistry and Molecular Biology (ASBMB)

The Effects of *Pseudomonas aeruginosa* ExoY on Executioner Enzyme Caspase 3/7 in Pulmonary Microvascular Endothelial Cells

The ubiquitous bacterium *Pseudomonas aeruginosa* (*P. aer*) is the most common cause of ventilator-associated pneumonia in intensive care unit patients. *P. aer.* utilizes a type III secretion system to inject various combinations of exoenzymes U, S, T, or Y into pulmonary microvascular endothelial cells (PMVECs) that line blood capillary walls allowing respiratory gas exchange. Of these, the presence of ExoY has been noted to block cell death during infection, while ExoS promoted cell death. We hypothesized that when present ExoY would counter the apoptotic effects of ExoS by blocking the activation of executioner caspase proteins 3/7. Caspase(s) 3/7 is the final enzyme activated in both the intrinsic and extrinsic apoptotic pathway. To quantify levels of apoptosis, caspase 3/7 was analyzed via flow cytometry using a fluorescent-labeled inhibitor of caspases (FLICA) probe. Activated cellular caspase 3/7 reacts and becomes irreversibly bound to the membrane permeable FLICA. Different *P. aer.* PAK strains expressing either exoenzymes STY (wild type), no ST or Y (null), or isogenic mutant strains expressing Y, S, SY, T, TY, ST, were utilized to infect cells. Infections were performed at a multiplicity of infection of 20:1 for 5.5 hrs with the FLICA probe added at 2.5 hours of infection. Post infection, cells were prepared for flow cytometry analysis to determine the percentage of caspase 3/7 positive cells as indicated by the intensity of detected fluorescent signal. Infections with isogenic strains SY and STY demonstrated significantly decreased intracellular caspase 3/7 activation compared to strains S and ST, which were significantly elevated from the control. This indicated that ExoY inhibits ExoS mediated caspase 3/7 activation in PMVECs within this infection model. Further investigation is required to determine the exact role ExoY plays in preventing caspase-initiated apoptosis.

Poster: 38

Pedro Infante

Major: Mechanical Engineering

Faculty Mentor:
Dr. Dhananjay Tambe

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Funding Source(s): SURF, Alabama Space Grant Consortium

A platform to automate manufacturing of hydrogel substrates for biological cells

The softness of their surroundings is very important to living cells. However, for cell researchers, it is remarkably difficult and expensive to make soft surfaces (or hydrogels) to grow the cells. Because of this, cells are usually grown on a surface that is about a million times stiffer, such as plastic or glass. In many cases, such practice is likely to produce misleading and false conclusions, costing taxpayers millions of dollars and researchers years of hard work. The goal of this project is to build a "hydrogel maker" machine that will make the making hydrogels easier. To build a hydrogel maker, we first divided the gel-making process into four broad steps. For each step, we have developed a stand-alone machine. Several of these stand-alone machines were put together to build the first-ever hydrogel maker. This hydrogel maker is designed to be low-cost, reliable, and based on open-source technology, so that anyone who studies cells will be able to use it. We expect that easier access to hydrogels will help advance the frontiers of basic science of cells, disease mechanisms, and novel treatments.

Poster: 39

Rachel Iweka

Major: Geography

Faculty Mentor: Dr. Fabien Cottier | Dr. Alex de Sherbinin

Department: Columbia University, Lamont Doherty Earth Observatory, and Columbia University's Center for International Earth Science Information Network

Funding Source(s): U.S. Dept. of Defense Minerva Research Initiative, Columbia University, National Science Foundation

Assessment of Conflict and Climate Induced Migration in Nigeria

Nigeria, a country of over 150 million, has faced lingering ethnic divisions, social inequalities, and climatic shifts. The Intergovernmental Panel on Climate Change (IPCC) has considered the country a climate hotspot likely to experience major environmental shifts in the 21st century. Temperature increases in the Sahel and tropical West Africa are expected to rise 3-6 degrees Celsius in expected projection by the late 2030s and early 2040s. Social vulnerability and economic fragility coupled with drought and environmental degradation provides grounds for groups like Boko Haram to thrive. The lack of economic opportunity has the potential to lead vulnerable young people to be recruited by armed groups. This can in turn lead to accelerated mass internal and cross border displacement. This research examines the association between climate change, conflict, and migration in Nigeria.

Quantitative data were obtained from the University of Sweden's Uppsala Conflict Data Program (UCDP), the Comprehensive Environmental Data Archive (CEDA), and the United Nations Office of International Migration Displacement Tracking Matrix (IOM DTM). Incidents of violence from non-state actors were compared to areas of origin for Nigerian migrants in 2020. In addition, areas of violence were compared to areas of climate variability using CEDA's Time Series CRU 4.06 deviations for temperature and precipitation.

It was determined that associations between climate change, conflict, and migration are plausible. Borno State in Northeastern Nigeria accounted for the highest density of migrants and the highest density of violence incidents. This area has also been impacted by climate variations. These associations can further impact associations with migration and violence. The culmination of economic fragility, drought, can lead to further exploitation by armed groups. However, further research should be conducted to ascertain the linkages between climate change and incidents of violence in West Africa.

Poster: 40

Cheyenne Jackson

Major: Economics & Finance

Faculty Mentor: Dr. Al Chow

Department: Marketing and Quantitative Methods

College: Mitchell College of Business

Funding Source(s): SURF

Healthcare Volatility vs. COVID-19

There are many different variables that investors, at least an experienced investor, will study when it comes to investing in the stock market. These variables include, but are not limited to, beta, historical prices, current prices, yield to maturity, dividend rates, fluctuation, financial analysis, and much more. One variable that is also heavily considered but may not always be thought about when investing is the condition of the world at the time. World events have a vital impact on the economy and on the stock market. If the world is not in a stable condition, it will be reflected in the stock market. COVID-19 is a prime example of a world event that caused the stock market to suffer to an extent. Even today, almost 3 and ½ years later, you can still see the impact of the COVID-19 pandemic in the stock market. This study focuses on the impact of the COVID-19 pandemic on the healthcare industry portfolios (healthcare, medical equipment, and drugs) their volatility, and their return on the market (Beta being the measure for this component). Data will be observed from two years prior to March 2020 and two years post March 2020. The findings in this study will be compared throughout the paper with the findings of the pilot study, which observed data from the book-to-market portfolios and the same timeframe.

Poster: 41

Jensen Jones

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Lionfish (*Pterois spp.*) diet and size distribution of Turneffe Atoll Belize

Red lionfish (*pterois spp.*) are members of the family *scorpaenidae*, native to the indo-pacific, and were introduced by humans into the Atlantic and Caribbean ecosystems. Since the mid-1980s lionfish have become invasive predators in the Atlantic, Caribbean, and Gulf of Mexico consuming prey items ⅔ the size of their bodies creating imbalance in reef food webs. Lionfish are efficient predators invading a variety of natural habitats, competing with native predator fish and consuming smaller fish. Lionfish are intimidating with their venomous spines and unique appearance which may deter potential predators and make them unrecognizable prey. In this survey, the reef system at Calabash Caye, Belize was surveyed to analyze the primary food sources of *Pterois spp.* Species were collected from varying sites in the region using spears. Specimens were then dissected and the stomach contents were recorded. The main prey we dissected from the Lionfish were wrasses and damselfish which are both cleaner fish, that could have a negative impact on the reef system. Fish sizes and location were cross examined to determine preferred prey items in each of the selected areas.

Poster: 42

Avery King

Major: Biomedical Sciences

Faculty Mentor:
Dr. Ryan Colquhoun

Department: Health, Kinesiology, and Sport

College: College of Education and Professional Studies

Funding Source(s): SURF

Examination of Sex-Differences in Neuromuscular Function following Acute Bouts of High- vs Low-Load Resistance Exercise

High-load resistance training (>70% 1 repetition maximum (RM)) is commonly believed to be the superior method for producing neuromuscular adaptation with a resistance exercise program. Recent research has shown that lower-load resistance training (<50% 1RM) could produce similar responses when taken to failure. However, nearly all the existing research has been completed in males, making it unclear if this holds true across sexes. The purpose of this investigation was to examine sex-differences in neuromuscular function and fatigue following acute bouts of high- vs low-load resistance training taken to failure. Ultrasound and EMG of quadriceps, maximal lower body strength, exercise performance, and body composition were the measures used to study these differences. The initial results of this investigation suggest that neuromuscular fatigue of the quadriceps is similar between low- and high-load conditions between sexes in resistance-trained subjects despite significantly more repetitions and total work being completed in the low-load condition. Specifically, MVIC strength declined similarly between conditions in both sexes, decreasing from Pre to PostSet1 and PostSet1 to PostSet2 but did not further decline from PostSet2 to PostSet3. Importantly, the fatigue does not appear to be due to changes in muscle excitation, as EMG amplitude did not differ from RPE at any time point in either condition or sex.

Poster: 43

Kerrington Kittrell

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Mentors for Minorities: The Use of Scientist Spotlight Posters in Biology Classrooms

Women and racially/culturally diverse students continue to be underrepresented within science, technology, engineering, and math (STEM) fields. While numerous mechanisms exist for this under-representation, environmental cues within STEM classrooms, stereotypical 'nerdy white male' depictions of scientists, and lack of exposure to diverse scientists may indicate who can and cannot be scientists. Previous work conducted in our lab group, has highlighted the disconnect between our diverse student body and the scientists the students were able to identify and whom they personally identified with. Specifically, we found that 71% of the surveyed students identified as women, but only 17% of the scientists named were women. In addition, only 41% of women surveyed personally identified with a female scientist. When students were asked to explain why they identified with their chosen scientist, nearly 20% of female students replied that their chosen scientist had also experienced marginalization in STEM based on their gender. To combat these results, we implemented a project in Ecology (BLY 300) classrooms where students were asked to spotlight a scientist they personally identified with. Students constructed a poster to spotlight scientific achievements but also highlighting the scientists' personal background, which were presented during the final week of the semester. Following the spotlight activity, the number of female scientists that students named doubled. The percentage of students who identified with a scientist of the same gender or race/ethnicity also significantly increased. Our simple intervention was able to increase student familarity with diverse scientists and allowed students to find scientists they personally identified with that matched their social and cultural identities.

Poster: 44

Angelina Ladner

Major: Marketing

Faculty Mentor:
Dr. Jennifer Zoghby

Department: Management

College: Mitchell College of Business

Generation Z's Ambivalence Towards Fast-Fashion

Consumers indulge in fast-fashion due to its budget friendly price tag. Generation Z consumers may desire low-price access to microtrends in order to keep up appearances on social media. Yet Generation Z consumers, more than other generational cohorts, express concerns about the damaging environmental impacts of fast-fashion. This project will explore the ambivalence of Generation Z consumers toward fast-fashion. It will include exploratory qualitative interviews with Generation Z consumers, as well as an exploratory quantitative survey. Exploratory qualitative and quantitative research results will be documented throughout the early stages of the project. The quantitative survey will be archived, and all survey results will be maintained for this project as well as potential future research. Later, a larger quantitative survey will be planned for Generation Z consumers across the United States. The research team will document its findings by compiling data into a research paper, research presentation, and poster. Other ideas for project documentation include, but are not limited to, social media posts and videos for social media platforms. The research team would like to share the results of the study with its target Consumer group through social media. This research topic serves the purpose of bringing awareness to the ambivalence many Generation Z consumers feel when deciding between cost efficient or environmentally beneficial practices.

Poster: 45

Jade Laffiette

Major: Biomedical Sciences

Faculty Mentor:
Dr. Alexandra Stenson

Department: Chemistry

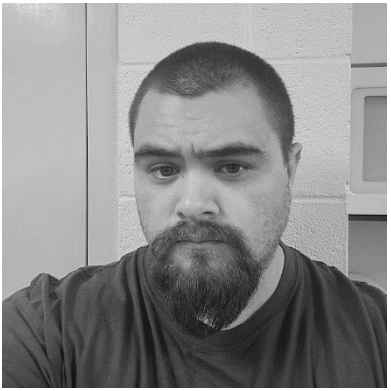
College: College of Arts and Sciences

Funding Source(s): SURF, National Oceanic and Atmospheric Administration

Identifying The Chemical Make-ups of Microplastics

An emerging threat to global water sources is microplastics, a problem that has become more prevalent since the rise of single-use plastics in the past century. Microplastics not only make freshwater more difficult to purify for drinking and consumption, but it also poses a threat to marine wildlife. Microplastics retrieved from aquatic environments are often so weathered and reduced in size from the elements that identification of the fragment is extremely difficult or even impossible. Donated household items such as water bottles, press-seal bags, and containers (whose polymer identities were already known) were tested using an instrument called Attenuated Total Reflection Fourier Transform Infrared (ATR FTIR) to determine if microplastics could be accurately assigned the polymer type and be further subdivided by “plastic type” (functionality and/or physical appearance). Resulting spectra and data were then compared to identify any trends when examining different microplastic characteristics (size, color, function, etc). Data and spectra suggested that certain polymers can be subdivided while other polymers can not. The findings of this project may help future researchers and scientists develop new technologies specifically designed to target specific microplastic types.

Poster: 46



Michael Lambert

Major: Chemistry

Faculty Mentor:
Dr. Larry Yet

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s): SURF

Synthesis of N-Heterocyclic Pyridine Phosphorous Ligands for use in Pd-Catalyzed Suzuki-Miyaura Reactions

Palladium catalyzed cross-coupling reactions have become a ubiquitous tool in the synthesis of previously inaccessible heteroaryl compounds because of the efficient, catalytic nature of the reaction. Development of novel monophosphine ligands to achieve the cross-coupling of substrates that were generally unreactive under standard conditions has developed into an extremely important area of research in the field of synthetic organic chemistry. The Suzuki-Miyaura cross-coupling reaction is a metal-catalyzed reaction between an arylboronic acid and a heteroaryl halide. Herein, we present a small library of 2,4-dichloropyridine derived phosphine ligands that may have future use as efficient auxiliary catalysts for the Suzuki-Miyaura cross-coupling reactions regarding site-selectivity of new carbon-carbon bond formations.

Poster: 47

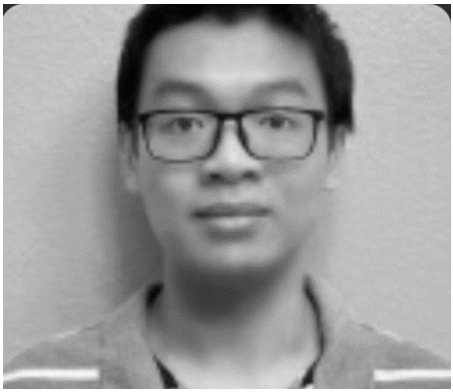
Hao Le

Major: Chemistry

Faculty Mentor:
Dr. Larry Yet

Department: Chemistry

College: College of Arts and Sciences



Funding Source(s): SURF

Synthesis of Pyridine Phosphorus Ligands

We synthesized pyridine phosphorus ligands. The ligands were created using Suzuki-Miyaura cross-coupling to synthesize a biaryl compound, which we referred to as the precursor, to which we attached various phosphine groups at different positions. The biaryl compounds were synthesized first from various arylboronic acids with 2,4-dichloropyridine. The precursors were purified then analyzed. Each biaryl compound were then used to attempt to create 3-4 different pyridine phosphorus ligands each. Some of the ligands were successfully produced and confirmed with NMR spectroscopy. The ligands that were synthesized successfully will be stored and then screened for activity in further cross-coupling reactions.

Poster: 48

Nicole Lemon

Major: Anthropology

Faculty Mentor:
Dr. Kelly Urban

Department: History

College: College of Arts and Sciences

Funding Source(s): SURF

Traditional Medicine in Rural Ghana and the Role of the Government And Healers in Integration

A question of pressing importance for the healthcare system in Ghana is the integration between biomedical physicians, who are out of reach for rural citizens, and traditional healers, who fill in the gaps in access for rural and non-rural citizens seeking care. Integration of these systems would allow for more acknowledgment and communication between providers, which in turn would improve the quality of care provided to all patients. To investigate the state of the healthcare systems in Ghana, I analyzed many scholarly (secondary) sources regarding traditional healing in Ghana to understand the importance of this form of care, as well as the relationship between traditional healers, biomedical physicians, and the Ghanaian government. I discovered that the World Health Organization created strategies to aid in healthcare integration, but it does not seem as though the Ghanaian government took these into account during their previous failed attempts at integration. The current scholarly literature attributes a tokenistic view to the government's actions but does not clearly explain the reasoning behind this view. The goal of this project was to determine if the topic was viable for further examination for my Honor's thesis, and this was achieved through the discovery of this gap in scholarly research. The primary sources I will find in the next stage of my thesis research could indicate a lack of genuine effort by the Ghanaian government to properly integrate two healthcare systems, which impacts the quality of life for many individuals seeking care whether in rural or urban Ghana.

Poster: 49

Alexia Manganti

Major: Exercise Science

Faculty Mentor:
Dr. Neil Schwarz

Department: Health, Kinesiology, and Sport

College: College of Education and Professional Studies

Funding Source(s): SURF

FIBER TYPE DETERMINATION OF SINGLE MUSCLE FIBERS FROM HUMAN SKELETAL MUSCLE TISSUE

PURPOSE: The purpose of this project was to establish a new laboratory protocol to isolate single skeletal muscle fibers and classify them based on their fiber type. METHODS: A skeletal muscle biopsy was collected from a study participant after obtaining informed consent. Immediately after collection, the biopsy sample was cleaned of blood and placed in a microtube followed by snap freezing in liquid nitrogen. Samples were then freeze-dried followed by dissection and isolation of single fibers under a stereomicroscope. Individual fibers were mounted on a gridded microscope slide by applying a small drop of distilled water and letting it dry fully. The microscope slides were submerged in a slide mailer with acetone for 3 min to permeabilize the fiber segments. After permeabilization, the slides were let dry and then submerged in a separate slide mailer containing antibody solution with primary antibodies directed against MyHC-I (BA-F8-s, 1:100) and MyHC-II (SC-71-s, 1:50). Next, the slides were submerged in a separate slide mailer containing secondary antibody solution with species- and subclass-specific secondary antibodies [Alexa-Fluor goat anti-mouse IgG2b 488(1:1000) and goat anti-mouse IgG1 647 (1:1000)] and incubated for 30 min in the dark. Fiber type identification was then performed using a digital fluorescence imager equipped with LED filter cubes for fluorophore visualization [EYFP) filter (Ex500/20, Em535/30) for Alexa-Fluor 488 and a Cy5 long pass filter (Ex620/60, Em665lp) for Alexa-Fluor 647] Each square was viewed sequentially in each channel at ×4 magnification followed by categorization of each fiber either as type I or type II based on the staining intensity in the two different channels. Fiber segments showing clear signs of specific binding in both channels (BA-F8 positive and SC-71 positive) were classified as hybrid fibers. RESULTS: This laboratory protocol successfully classified muscle fibers into Type I, Type II, or hybrid fibers. CONCLUSION: The project resulted in successful classification of fiber types of single muscle fibers using a high-throughput immunofluorescence technique.

Poster: 50

Lauren McAdams

Major: Biomedical Sciences

Faculty Mentor:
Dr. Amy Nelson

Department: Physiology and Cell Biology

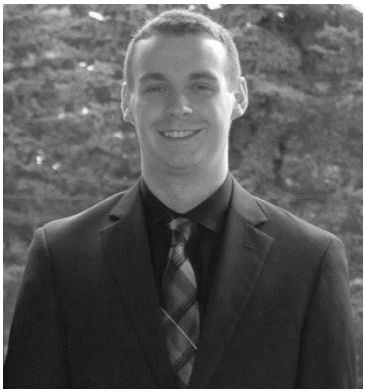
College: College of Medicine

Funding Source(s): SURF

The Effects of Pulmonary Infection of Glial Cells

Cognitive dysfunction has been witnessed after pulmonary (lung) infections such as pneumonia and COVID-19. Lung infections are also a risk factor for developing Alzheimer's disease; therefore, it is important that we research the relationship between lung infections and the brain. The brain is protected by the blood-brain barrier (BBB), which is highly selective. If this barrier is disrupted, harmful substances can enter the brain. When toxic material enters the brain, the cells can become reactive. They increase their production of proteins to allow the cell to increase its activity- this phenomenon is also a hallmark of Alzheimer's disease. In this study we investigated the effects of pneumonia on astrocytes and microglia- cells that support the health of the brain. To do this, we inoculated mice with saline (control) or bacteria (Pseudomonas). 24 or 48 hours later we collected the brain and thinly sliced it. The proteins of astrocytes and microglia were stained to visualize how the cells react to the lung infection. We found that astrocytes and microglia become reactive for at least 48 hours after infection. Previous studies found that the BBB is disrupted during pneumonia, here we find that glia are also reactive. This is relevant because breakdown of the BBB and reactive glia are seen in Alzheimer's disease. Knowing that lung infection causes BBB breakdown and activates glia allows us to target therapies to prevent negative effects of pulmonary infections on the brain.

Poster: 51



Evan McGlothen

Major: Biomedical Sciences

Faculty Mentor:
Dr. Ryan Littlefield

Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF

Inducible Co-Expression in *C. elegans*

Caenorhabditis elegans, is commonly used model organism due to its transparent body, ease of maintenance in a laboratory setting, and ease of genetic manipulation. Many essential processes have been discovered utilizing *C. elegans*. There are a multitude of human orthologs present within *C. elegans* making it an ideal specimen for researching functions of those genes as well as physiologic and biological processes. In 2011, the first virus found to naturally infect *C. elegans* was discovered. The orsay virus is a non lethal icosahedral virus with 180 subunits and T=3 symmetry. It primarily affects the intestines of these animals causing intermediate filament disorganization and nuclear degeneration. This primarily leads to lethargy and slowed progeny production. During previous experiments in which we tagged orsay virus-like particles with the fluorescent protein mCherry (mCh) it was found that the animals expressed extremely toxic levels of fluorescent. This lead to the animals becoming nearly nonmotile, dying prematurely, laying eggs that had halted development of progeny, and made it difficult to continue to isolate and stabilize the mutant strain. To prevent the over-expression of mCh, a mutant strain PD8120 will be utilized for injections instead of the normal N2 wild type. PD8120 is a smg-1 sensitive mutant that causes it to have temperature dependent nonsense-mediated decay. By utilizing trans-splicing, it should be possible to co-express the Orsay VLP's with a second mRNA that would be produced from the same precursor. At 16°C, the smg-1 gene will decay messages causing the worms to have little to no expression of mCh while at 25°C the worms would exhibit over-expression of mCh. This should prevent the worms from becoming sick and allow for creation of a stable mutant that could express VLP's by moving them to a higher temperature.

Poster: 52

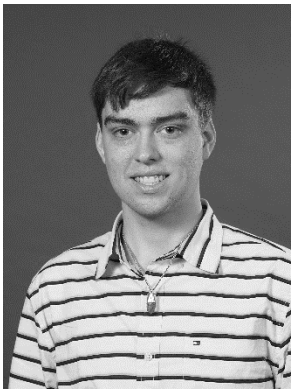
Alexander Mcnair

Major: Computer Science

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering



Funding Source(s): SURF

Evaluation of Pavement Performance Deteriorations in Wet and Hot Climate Zone Based on LTPP Data

Pavements are susceptible to degradation and vulnerability following high humidity and heavy inundation events. While some case studies have examined the effects of flooding on local roadways, there is a lack of understanding on the impacts of humidity and precipitation on the pavements. The primary objective of this research project is to assess the performance of different pavement types in the hot-wet climate region of Alabama, United States, particularly their ability to withstand damage caused by high precipitation and humidity. Data will be collected from the long-term pavement performance (LTPP) survey site provided by the Federal Highway Administration (FHWA). Utilizing the LTPP data, a Pavement Resilience Index will be developed to compare the resilience of various pavements and determine their performance under inundation. The study will explore whether any specific characteristics significantly impact pavement resilience. Three pavement types, namely asphalt concrete (AC), continuously reinforced concrete pavement (CRCP), and jointed plain concrete pavement (JPCP), will be evaluated. Initial findings indicate that CRCP exhibited longer performance compared to the other pavement types. ANOVA tests conducted on pavement characteristics were inconclusive due to inconsistent regression data or limited sample sizes, which is attributed to the scope of the project. Furthermore, the study identified several factors negatively impacting Alabama's asphalt road conditions, including traffic, high humidity, high temperature, and precipitation. These findings are essential for enhancing the understanding of pavement performance under inundation events and will aid in developing more resilient pavement designs for the hot-wet climate region.

Poster: 53

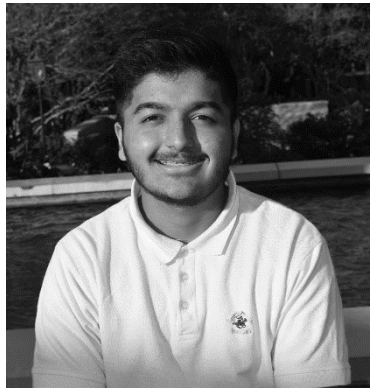
Dev Mehta

Major: Biomedical Sciences

Faculty Mentor:
Dr. Terrence Ravine |
Dr. Casey Brock

Department: Biomedical Sciences | Occupational Therapy

College: Covey College of Allied Health Professions



Associations Between Two *Bacillus* Species and Thermoplastic Materials Used to Make Orthotic Immobilization Splints

Patients with burns, open soft tissue trauma, or surgical wounds wear orthoses to immobilize the affected area. Orthoses can become contaminated with bacteria. *Bacillus* is a gram-positive, spore-forming bacteria that has been recovered from orthotic material. *B. cereus* and *B. megaterium* were similarly recovered from patient immobilization masks worn during radiation therapy treatment. Hydrophobic *B. cereus* spores demonstrated an increased affinity for hydrophobic thermoplastic material used to produce these forms. Hydrophobic attractions favor adherence between *B. cereus* spores suspended in aqueous suspension and thermoplastic material. Water contact angles (WCA) are used to define the hydrophobic nature of thermoplastic materials. The WCA, determined by the sessile drop technique, showed that the material surfaces were mostly similar. Suspensions of either *B. cereus* or *B. megaterium* were separately applied to target squares drawn on Klarity and NC Beige splint materials. Squares were sampled at defined time intervals, and the number of recovered bacteria was determined. There was no significant difference in the number of either *B. megaterium*, or *B. cereus* recovered from either material at any time interval. However, a downward trend was seen over the 4-week sampling period in the number of bacteria recovered from the Klarity material, while an upward trend was noted in the number of bacteria recovered from the North Coast Beige material. Both bacteria were more easily removed from the NC Beige material during sampling, whereas both bacteria were more difficult to remove from the Klarity material. This suggests a change in bacterial adhesion occurred between both materials over time.

Poster: 54

Gina Mejia

Major: Early Childhood Studies

Faculty Mentor:
Dr. Nicholas Stanley

Department: Speech Pathology and Audiology

College: Covey College of Allied Health Professions

Funding Source(s): SURF

Effects of Personality Type on Cochlear Implant Use, Quality of Life, and Perceived Auditory Experience

The purpose of this study is to determine how the “Big Five" personality domains (Agreeableness, Extraversion, Conscientiousness, Negative Emotionality, and Open-Mindedness) and facets of cochlear implant (CI) users influence barriers to CI use, quality of life, and hearing ability. Twenty-six adult cochlear implant (CI) users (M = 49.35 years) completed an online survey which include demographic questions, the Big Five Inventory (BFI-2) questionnaire, Cochlear Implant Use Questionnaire (CIUQ), Cochlear Implant Quality of Life (CIQOL-10), and the twelve question Speech, Spatial, and Qualities of Hearing Scale (SSQ-12). Statistical analysis was conducted using Kendall's tua-b correlation to determine the relationship between the BFI-2 (domains and facets) and the CIUQ, CIQOL, and SSQ12. Results revealed three things: 1) greater levels of extraversion, sociability, and energy level were associated with higher CIQOL-10 scores, 2) higher levels of responsibility and lower levels of depression were associated with higher SSQ-12 scores, and 3) lower CIUQ scores were associated with higher CIQOL-10 and SSQ-12 scores. While not statistically significant, trending data suggested that higher levels of assertiveness and energy level were associated with lower CIUQ scores. Findings from this study suggest that CI users who report higher quality of life are more likely to be extraverted and have fewer barriers to CI use. Additionally, perceived hearing ability is associated with responsibility and depression in CI users.

Poster: 55

Nathaniel Mirly

Major: Meteorology

Faculty Mentor:
Dr. Jake Wiley

Department: Meteorology

College: College of Arts and Sciences

Funding Source(s): SURF, Alabama Space Grant Consortium

Winter UHI effect on Snowfall in St. Louis, Missouri

Urban Heat Islands (UHI) are localized meteorological phenomena characterized by urban areas featuring warmer temperatures than their surrounding areas. It is important to study the effects of UHI because over half the world's population currently resides in urban areas with 68% of the world's population being estimated to live in urban areas by 2050.The effects of UHI on summertime precipitation events are well documented. However, there is little to no research on their effects on wintertime precipitation events. This research investigates a wintertime UHI case-study of a synoptic snowfall event that occurred over the St. Louis, Missouri, metropolitan area February 4-5, 2014. The effects of the St. Louis UHI on this event were investigated by performing numerical simulations using the Weather Research and Forecasting (WRF) model. Two model simulations of the event, one with urban land cover and one without, were performed allowing for direct analysis of the influence of land cover on UHI processes.

Poster: 56

Abby Mock

Major: Chemical Engineering

Faculty Mentor:
Dr. David Forbes

Department: Chemistry

College: College of Arts and Sciences

Funding Source(s):
Department of Chemistry, USA Foundation, Honors College and NASA

A Versatile Approach Toward the Assembly of Diazirine Functionality Utilizing BMIDA

Our research focuses on a cost-effective approach which minimizes synthetic overhead when assembling compounds with diazirine functionality. The goals are to prevent the surplus use of ammonia in the formation of the diaziridines and use an IKA Electrosyn 2.0 in the oxidation of diaziridine. Success with either specific aim will significantly reduce the synthetic overhead currently observed. Diazirine functionality plays a vital role in a vast number of applications. Two of interest to us include diazirine functionality as a next generation propellant and as a photoaffinity label. With the latter, this strategy plays a vital role in drug discovery and biomedical research as it allows researchers to study, understand, manipulate, and control complex biological systems. Moreover, previous research has shown that diazirine functionality has the potential to be used as propellants, so this project also aims to explore the energetic properties of this functionality and develop a deeper understanding of their physical properties. Preliminary data has shown limitations with scope and low to moderate levels of conversion. Our current approach has as a focus, a cross-coupling reaction where scope is only limited by the pairing of N-methyliminodiacetic acid boronate ester (BMIDA) and substrate.

Poster: 57

Juanita Monteiro-Pai

Major: Chemistry

Faculty Mentor:
Dr. Marie Migaud

Department: Pharmacology

College: College of Medicine

Funding Source(s): SURF

Synthesis of Hyper-Oxidized NAD Derivatives

Cellular energy metabolism is complex, and NAD, or nicotinamide adenine dinucleotide, plays a huge role as an organic redox cofactor, driving metabolic reactions. The abundance of pathways dependent on NAD has led to an increase in the studies of NAD and its precursors. As a result, NR, or nicotinamide riboside, is now a nutraceutical taken to increase levels of NAD in the body. NR is a precursor to NAD inside cells. Metabolites with the same molecular formula as NR are found in urine and blood. Yet, NR is usually associated with these species in extracellular regions although NR is not stable extracellularly. Therefore, it is important to establish whether these metabolites could be species other than NR when studying NAD metabolism and turnover. Such isomers of NR include the three isomers of the 2'-deoxy-PYR series, also known as the 2'-deoxy-pyridone ribosides, which could be mistaken for NR. The 2'-deoxy-PYR are proposed to be byproducts of the hyper-oxidation of NAD. Although the 2'-deoxy-PYR molecules can be envisaged as derivatives of the known naturally occurring 2 ,4, and 6 isomers of the pyridone ribosides PYR series, these deoxy-riboside species have never been synthesized. It is hypothesized that it could be a substrate for DNA polymerases. Because they are potentially biologically relevant, to test if these species are present in biological specimens, the synthesis of these molecules are of the utmost importance. There we sought a synthetic route to the 2'-deoxy-PYR isomers, and successfully completed their synthesis.

Poster: 58

Jarod Morris

Major: Chemical Engineering

Faculty Mentor:
Dr. Brooks Rabideau

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Funding Source(s): SURF

Melting point predictions of thermally stable ionic liquids using a machine learning approach.

Thermally robust ionic liquids hold promise as high temperature solvents, heat transfer fluids, and high-performance lubricants. These ionic liquids, inspired by thermoplastics like PEEK and PES, incorporate peraryl functional groups that lend them high thermal stability, however they often have melting points greater than 100 °C. A broad liquid range is usually desirable in most applications, so finding thermally robust ILs with lower melting points would significantly enhance their applicability. In this study, machine learning models are developed to make predictions of melting points for these thermally stable ionic liquids using a process called quantitative structure-property relationships (QSPR). The methodology used to model these ionic liquids was adapted from a previous study [Paduszyński et al., Journal of Molecular Liquids, 344, 2021] that examined multiple different machine learning techniques in depth. Modeling was performed on the large and diverse set of 929 ionic liquids from this study, then on a set of 53 thermally stable ionic liquids, then on the combined data set. The performance of each model was evaluated using 10-fold cross validation and the calculation of Q2, which measures the predictive capacity of the model. This cross validation only considered the predictions of thermally stable ionic liquids since that is the overall intent of the modelling. From this cross validation, it was found that the model trained on both sets of data and had no outliers removed showed the greatest predictive capability (with a Q2 of .6764) for thermally stable ionic liquids. This model is then used to predict ionic liquids from the thermally stable family with low melting points.

Poster: 59

Julia Nelson

Major: Mechanical Engineering

Faculty Mentor:
Dr. Michael Francis

Department: Physiology and Cell Biology

College: College of Medicine

Funding Source(s): SURF, Research and Scholarly Development Grant by the University of South Alabama Office of Research and Economic Development

Blood Flow Measurement Using Temperature Response to Radio Frequency Heating in Humans

Measuring blood flow in the skin has useful clinical applications. Conditions like Peripheral Artery Disease and Raynaud's Phenomenon, as well as burn wound analysis, require an assessment of perfusion to the affected areas. Current technology for blood flow measurement is limited by cost, sensitivity, and patient accessibility. We are developing a noninvasive, portable device (REFLO) that uses low-power radio frequency radiation to measure blood flow based on the rate of skin temperature change. We have tested this methodology *in vivo* using rabbit pinnae, an accepted model for human skin, and *in silico* with a computer-generated flow model. Human subject experiments were conducted under a protocol approved by the University of South Alabama Institutional Review Board. REFLO recorded the temperature of a ~1cm^2 area of skin during a 3-minute heating period followed by a 3-minute natural cooling period. This was performed under baseline flow, occluded flow, and post-occluded flow. We hypothesized that REFLO could distinguish between low, normal, and high flow based on differences in skin heating rates. Analysis of our preliminary data supports the hypothesis that the heating time constant can be used to distinguish between baseline and post-occlusion, and the cooling time constant can be used to distinguish between occlusion and both baseline and post-occlusion. We are refining our methodology to better distinguish between each flow condition and improve device consistency.

Poster: 60

Noah Nelson

Major: Biology

Faculty Mentor:
Dr. Juan Luis Mata

Department: Biology

College: College of Arts and Sciences

An Initial Survey of the Boletes from Fish River Nature Preserve

Boletes are a special kind of mushroom inside of the Kingdom Fungi that are distinguished from other mushrooms by their uniquely pored hymenium, as opposed to a gills. Many boletes are ectomycorrhizal, meaning they are mutualists with vascular plants, and thus beneficial to the overall health of the terrestrial ecosystem. Some are well-known for their edibility and are of economic importance. In the United States 59 genus level clades comprising 290 operational taxonomic units have been described with the southeastern US and Gulf Coast region being less researched and recorded. In Alabama, only 56 species have been reported so far. The Fish River Nature Preserve (FRNP) is located south of Fairhope in Baldwin County, and was recently purchased by the South Alabama Land Trust Conservation group. This property includes an upper level section with a tract dominated by oaks and another by pines, which is fire-controlled, and one near the river dominated by palmetto palms. This project aims to answer the questions: “How many bolete species can be recorded in FRNP?” and “How many bolete species in FRNP have been reported in other places of Alabama?” So far 26 specimens have been collected at the FRNP and Mobile County. All specimens have been brought to the campus lab for technical descriptions, including imaging, and storage. Microscopic work will include the measurement of spores. Currently, there are 5 suspected collections of Gyroporus castaneus & four of Leccinellum albellum.

Poster: 61

Vanessa Neve and Emily Drinkard

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle |
Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences

Variation in Species Composition of Fish Across Spatial Gradients in Mangroves

Studies support that coral reefs in the Indo-Pacific are a determining factor in the species richness found in fringing mangrove habitats. Our main objective was to conduct species richness analysis on fringing mangroves in relative distance to the Turneffe Atoll. We used unbaited, underwater video cameras to quantify fish communities in fringing mangroves by analyzing twelve videos from each location. Sample site distances ranged from 0.5km to 8km from the main barrier reef. The data collected did not support our hypothesis, because we found that species richness increased as we moved further away from the main reef. There is an understanding that the seascape at Turneffe Atoll is unique and complex, along with the fringing mangroves relative to coral reefs which the Indo-Pacific is known for. We did unexpectedly discover isolated coral heads throughout the lagoon. This may explain the wide distribution of coral reef fishes, even at sites in the mid-lagoon, furthest from the main barrier reef. There are more factors to consider, which may further explain why our data demonstrated increased species richness towards the middle of the Atoll.

Poster: 62

Anita Nguyen

Major: Biomedical Sciences

Faculty Mentor:
Dr. Glen Borchert

Department: Pharmacology

College: College of Medicine

Funding Source(s): The NSF Grant 2137138 awarded by the Division Of Molecular and Cellular Bioscience

Stress Response of *Salmonella* though sRNA-Mediated Regulation

Small noncoding RNAs (sRNAs) play a variety of roles in gene regulation, including post-transcriptional regulation, RNA processing, and protein translation. Our project aims to determine the relation between the expression of specific sRNAs as a stress response with *Salmonella enterica Typhimurium*. *Salmonella enterica serovars* are Gram-negative, bacillus bacteria that are known to cause gastrointestinal illness. Exposure to cellular stresses such as starvation triggers *Salmonella enterica Typhimurium* to form significant subpopulations of relatively metabolically dormant cells known as “persisters.” These persisters are capable of prolonged survival in harsh, stressful environments, and their formation creates a major challenge to the development of more effective antibiotics. However, the genetic mechanisms that drive persister cell formation are not yet well defined. We hypothesize that the ability of *Salmonella enterica Typhimurium* to adapt to stressors, like desiccation and carbon starvation, is regulated via the expression of specific sRNAs. Through western blot analysis and ChIP PCR assays, we have found that several sRNAs commonly induced during short-term stress exposures were expressed from promoters transcribed by the RNA polymerase (RNAP) Sigma subunit RpoS, and conversely, that many other sRNAs commonly induced during long-term stress exposures are expressed from RpoE-dependent promoters. Our research project has built the foundation for investigating the role of sRNAs in persister cell formation through determining if specific differentially expressed sRNA, MicF, directly inhibits RpoE expression. Our goal is to gain deeper insights into the regulatory networks governing persister cell formation in Salmonella.

Poster: 63

Claudia Nguyen

Major: Chemical Engineering

Faculty Mentor:
Dr. Kevin West

Department: Chemical and Biomolecular Engineering

College: College of Engineering

Funding Source(s): SURF, Office of Naval Research

Property Measurements of Aqueous Ionic Amines

As climate change continues to worsen throughout the world, there is a drive to develop more efficient and sustainable methods to mitigate its impact through carbon dioxide scrubbing and other carbon capture technologies. Carbon dioxide scrubbing directly captures carbon dioxide emissions from industries or power plants before they are released into the environment. The emissions captured can be utilized or stored for other uses. However, carbon dioxide scrubbing faces numerous challenges such as the degradation of the solvent and corrosion of the equipment using it. Property measurements of these aqueous ionic amines (AIA) include density, solubility, and viscosity. The aqueous ionic amines tested included sodium taurate, sodium homotaurate, sodium n-methyl taurate, trimethylamine taurate, and trimethylamine homotaurate. These were all assessed for their densities at different mass percentages over a temperature range of 20-80°C. These data properties need to be determined for design and optimization purposes in industrial usage. Establishing these properties would also allow for the development of better and more efficient solvents to be used for carbon capture. Consequently, insight can be gained into the behavior of AIAs and present opportunities for improving their general performance as carbon capture solvents.

Poster: 64

Kevin Nguyen

Major: Biomedical Sciences

Faculty Mentor:
Dr. Glen Borchert

Department: Pharmacology

College: College of Medicine

Funding Source(s): SURF

MicroRNA-Directed Translational Repression is Mediated Through an ALU Riboswitch

The ability of microRNAs (miRNAs) to regulate gene expression through inhibiting translation has been known for over 20 years. How miRNA binding inhibits the translation of mRNAs remains largely enigmatic. In contrast, how the signal recognition particle (SRP) inhibits the translation of mRNAs is well-established. All secreted and membrane-destined proteins encode a signal peptide that constitutes the first part of the nascent protein to exit the ribosome. Signal peptide recognition by the SRP signal domain causes the SRP RNA to bend 90º and insert its Alu Domain into the ribosome where, through making tRNA-like contacts, it halts translation by preventing the association of any further tRNAs. Interestingly, in primates, SRP Alu domain sequences are found in many human 3'UTRs, and we find these Alu domain sequences are frequently exposed upon miRNA binding. Consequently, this study delves into the regulatory role of Alu sequences in translation and how miRNA binding may drive mRNA translational inhibition. Excitingly, our findings clearly demonstrate that Alu Domains embedded in mRNA 3'UTRs exert an influence on protein expression. However, the precise mechanism behind Alu Domain-mediated regulation remains uncertain. Future investigations will involve dissecting the sequences driving mRNA translational repression. Such knowledge holds promise for enhancing our understanding of gene expression and its modulation by Alu elements.

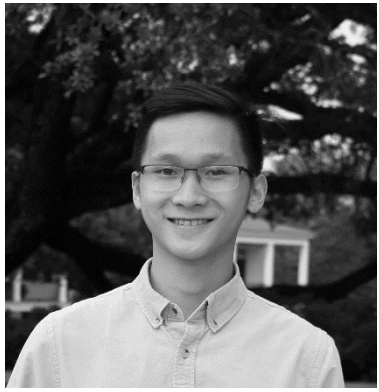
Poster: 65

Paul Nguyen

Major: Chemical Engineering

Faculty Mentor:
Dr. Jerelle Joseph

Department: Chemical and Biological Engineering - Princeton University



Funding Source(s): NSF, Princeton Center for Complex Materials REU

A computational approach for modeling highly-charged biomolecular coacervates

Membrane-less organelles, or biomolecular condensates, are dynamic compartments in cells made up of proteins and nucleic acids. Condensates play critical roles in cell function, including transcription and translation, cell signaling, genome organization, and more. As such, abnormalities associated with condensates have been linked to various diseases, including ALS, cancers, and neurodegenerative disorders. This project studies condensates from a computational perspective. By using molecular simulations, we can examine these systems at high resolutions not possible for experimentalists. Additionally, many models struggle to properly account for the balance in electrostatics versus other non-bonded interactions, as most studies focus on charge-neutral residues. By attempting to replicate experimental results (Choi et al. 2021), we hope to identify deficiencies in the multiphasic π-π (Mpipi) model we used. In combination with the Large-scale Atomic/Molecular Massively Parallel Simulator (LAMMPS), we hope to gain a better understanding of the biophysics governing condensate behavior.

Poster: 18

Ethan Ott

Major: Mechanical Engineering

Faculty Mentor:
Dr. Carlos Montalvo

Department: William B. Burnsed Jr. Mechanical, Aerospace, and Biomedical Engineering

College: College of Engineering

Funding Source(s): SURF, AIAA, Alabama Space Grant Consortium

Autonomously Throttleable Hybrid Rocket Engine

The goal of our SURF was to design, construct, and test an autonomously throttleable hybrid rocket engine for use in a high powered sounding rocket. A hybrid rocket engine is a type of engine that uses both solid and liquid propellant in order to produce thrust. Our design utilizes a solid paraffin wax fuel grain that is housed in the engine's combustion chamber and liquid nitrous oxide which is pumped in under high pressure to facilitate combustion. As the combustion gasses expand and pressurize the chamber, the gasses are forced through a converging diverging nozzle, lowering the pressure while increasing the speed of the exhaust. By regulating the amount of nitrous oxide that flows into the combustion chamber, the thrust of the engine is altered. Through the use of a "feedback loop" system, we can modify the engine's thrust output over time to optimize the launch vehicle's flight and accurately reach a specific altitude. This will be done through our Autonomous Throttling Controller. The ATC will measure live pressure, acceleration, and orientation data to predict the rocket's flight path and altitude. It will then calculate a difference between the simulated altitude and our desired altitude and determine what changes in the thrust are needed to correct the difference. The ATC will then open or close the control valve accordingly. This change in flow rate will directly change the thrust output of the engine. This process will repeat until the motor is finished burning.

Poster: 66

Samantha Oyler

Major: Psychology

Faculty Mentor:
Dr. Erica Ahlich

Department: Psychology

College: College of Arts and Sciences

Intergroup Contact, Beliefs About Gender, and Trans Prejudice

Gordon Allport first proposed the Intergroup Contact Theory in 1954. According to his theory, contact between ingroup and outgroup members, under certain conditions, would lead to positive effects, specifically the reduction of prejudice. Since then, this theory has been expanded to include members of other majority/minority groups. Preliminary research suggests intergroup contact has positive effects for reduction of anti-trans prejudice. To date, focus has largely been on the mechanisms driving changes in attitudes and intentions towards trans individuals through intervention. It is unclear whether this intervention might also promote the acquisition of more nuanced sociocultural understanding about gender, which could explain reduction of trans prejudice. This Honors Thesis Project will test the hypothesis that there is a parallel mediating effect of 1) beliefs about gender and 2) attitudes towards trans individuals in the association between imagined intergroup contact and behavioral intentions towards trans individuals.

Data are currently being collected using an experimental design. Participants are randomly given either a control prompt (imagine an outdoor scene) or are asked to imagine interacting with a gender minority member for two minutes. Then, they answer questionnaires gender beliefs, attitudes towards transgender individuals, and behavioral intentions towards gender minorities. The final sample size will be 190. The poster presentation will describe analysis of preliminary results collected thus far (n = 58).

Poster: 67

Madison Parks

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Impacts of Disturbance on Soil Analyses in the Mobile-Tensaw Delta

The Mobile-Tensaw Delta is home to one of the most biodiverse ecosystems in the United States. This 260,000 acre delta of interconnected wetlands, rivers, and creeks is subject to both natural and anthropogenic disturbances including flooding, tropical storms, water contamination, and habitat destruction. These short- and long-term disturbances play a large role in maintaining biodiversity as well as regulating soil health and ecosystem function. To understand how novel disturbance within the Mobile-Tensaw Delta impacts soil properties, we took soil cores prior to disturbance implementation, 6 months after, and 12 months after disturbance from upland and lowland sites at Jacinto Port Alabama Forever Wild property. Within our soil cores, we measured soil carbon content, soil pH, soil salinity, and soil moisture. Overall, we found large seasonal variation within our soil properties and our disturbance led to a significant drop in soil carbon content and soil moisture, although we have found no change in soil pH or salinity following disturbance. Our work demonstrates how novel disturbance can alter soil properties within an ecosystem that is maintained via high disturbance regimes.

Poster: 68

Emily Parrish

Major: Biology

Faculty Mentor:
Dr. Jeremiah Henning

Department: Biology

College: College of Arts and Sciences

Funding Source(s): National Science Foundation Subaward

Ghosts in Glass: Ghost Crabs as Judges of Glass Sand for Coastal Restoration

A football field-sized area of land is lost to erosion every 100 minutes in coastal Louisiana, resulting in thousands of square miles of lost coastline over the last 100 years. This drastic loss of coastal land highlights the dire need for coastal restoration in the Northern Gulf Coast. An unexpected solution to this sediment loss may solve two major environmental issues at once. Millions of tons of glass waste enter America's landfills each year. Rather than routing glass to a landfill, it can be crushed to create sand and gravel for coastal restoration. Our goal is to determine whether glass sand is a viable option for coastal restoration by testing its impact on a critical indicator organism in coastal dune ecosystems, the Atlantic Ghost Crab (*Ocypode quadrata*). Responses will be recorded over 10 weeks from live-trapped ghost crabs for Dauphin Island, Alabama. The groups of crabs will be distributed between three treatments (full beach sand, half beach sand and half glass sand, and full glass sand). In order to compare the stress responses of each treatment, the crab's initial carapace widths and weights will be collected as well as final carapace widths, weights, reproductive investment, stomach dimensions, and stress hormone levels (Crustacean Hyperglycemic Hormone). If the crabs are not more stressed in the glass sand, then there is potential to use it for large-scale restoration efforts both locally and globally.

Poster: 69

Suhas Patil

Major: Biomedical Sciences

Faculty Mentor:
Dr. Debanjan Chakroborty

Department: Pathology

College: College of Medicine

Funding Source(s): Breast Cancer Research Foundation of Alabama (BCRFA), Mitchell Cancer Institute (MCI)

Investigating the effect of WNK lysine deficient protein kinase 1 (WNK1) inhibition in breast cancer

In the United States, breast cancer (BCa) remains the most common cancer and the second leading cause of cancer related deaths in women. The American Cancer Society estimates that in 2023 there will be 297,790 new cases of invasive BCa, 55,720 of ductal carcinoma in situ and about 43,700 women will die from the disease. The highly metastatic nature of BCa cells accounts for the poor prognosis and high mortality. The study seeks to identify the role of with-no-lysine protein kinase 1 (WNK1), a serine threonine kinase primarily associated with blood pressure and electrolyte balance in the body, in BCa progression. WNK1 expression is not only high in BCa but is also associated with worse prognosis and reduced overall survival. However, the exact role played by WNK1 in BCa is not clearly understood. Using publicly available databases, immunohistochemical and western blot analysis, our study identified that WNK1 is strongly expressed in BCa cells and fibroblasts, the most abundant cell types in BCa tumor microenvironment. Using murine BCa cells and mouse embryonic fibroblasts, our study further identified that inhibition of WNK1 with specific WNK1 inhibitors significantly affects the growth of cancer cells and fibroblasts. Based on the above results, we believe that targeting WNK1 in BCa has a huge potential on impacting its progression. Our findings will be confirmed in vivo where we will investigate the effect of WNK1 inhibition on tumor growth with a focus on cancer associated fibroblasts and BCa cell interaction using murine models of BCa.

Poster: 70

Sarah Beth Pierce

Major: Biology

Faculty Mentor:
Dr. Jason Strickland

Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF, CONACYT (FORDECYT-PRONACES 1715618/2020 and PRONAII 303045)

Testing for Alternative Splicing in Blacktailed Rattlesnakes

Alternative splicing is the process of exons joining together in various combinations during transcription, ultimately creating different proteins from the same gene. The end result of this process is an increase in phenotypic variation. Alternative splicing has been found in some snake venom protein families but is likely more common as it would increase the protein diversity in the snake's venom arsenal. Alternative splicing may be a mechanism that leads to the known venom variation within and among species. To test the prevalence of alternative splicing in snake venom, we sequenced reference-level PacBio genomes and Isoseq transcriptomes from 5 lineages of Black-tailed Rattlesnakes. Black-tailed Rattlesnake venom is known to vary dramatically within and among species and they have all of the protein families common in pitviper venom. By comparing the full-length mRNA sequences to the venom genes, we found evidence for alternative splicing. Alternative splicing is a poorly studied genetic mechanism and the simplicity of the genotype-to-phenotype map for snake venom can help us understand the process further.

Poster: 71

Kyndall Ransom

Major: Chemistry

Faculty Mentor:
Dr. Joshua L. Keller

Department: Health, Kinesiology, and Sport

College: College of Education and Professional Studies

Funding Source(s): American Physiological Society, SURF

Sex- and Age-related Differences of Skeletal Muscle Tissue Oxygenation in Response to a Vascular Occlusion Test

Purpose: Near-infrared spectroscopy (NIRS) measures skeletal muscle tissue oxygenation (StO_2, %) and reveals sex- and age-specific differences during vascular occlusion tests (VOT). However, it's unknown if sex differences persist across the lifespan. Therefore, our purpose was to test the hypothesis that the degree of sex differences will be maintained across different age groups.

Methods: 83 participants were categorized by sex and age: young (19 – 40 yr), midlife (41 – 64 yr), and older (≥65 yr). Each completed a VOT (3 min rest, 5 min ischemia, and 3 min reperfusion) to determine rate of desaturation, re-saturation and maximal oxygenation (StO_2max). 2-way between factor ANOVAs were conducted and mean ± SE were presented. A $p \leq 0.05$ was considered significant.

Results: For downslope, the significant interaction ($p=0.015$) was decomposed using three follow-up t-tests indicating midlife men desaturated significantly faster than midlife women (-0.139 ± 0.01 vs. -0.097 ± 0.01; $p<0.001$). There was only a significant main effect of Age for StO2max such that it progressively decreased across the lifespan (83.9 ± 0.706 > 80.9 ± 0.680 > 77.8 ± 0.695; $p<0.05$). There was not a main effect of Sex for StO2max ($p=0.084$). There was no significant ($p>0.05$) finding for upslope.

Conclusions: The only sex difference observed was that men desaturated faster than women during midlife. Notably, StO_2max appeared to be more sensitive to age-related physiological changes. These findings may be provoked by differences in muscle mass and quality. Future studies should evaluate these results and consider using post-ischemic StO_2max as a biomarker of healthy aging.

Poster: 72

Carly Ray

Major: Computer Engineering

Faculty Mentor: Dr. Jinhui Wang

Department: Electrical and Computer Engineering

College: College of Engineering

Funding Source(s): SURF

Uses of Edge and Cloud Computing in IoT Devices

As Internet of Thing devices continue to evolve, so do the type of computing these devices can do. The same device's function can change based on whether it utilizes cloud computing or edge computing. Cloud computing is when the main processes of the program are sent to servers on the Cloud. These servers usually have higher capabilities and can process more complicated process than the original devices can. Edge computing is when the computing is done entirely on the device itself, or the edge of a network. The main goal of this project was to demonstrate the different uses of edge and cloud computing using the same device. Both types of computing were utilized in two different experiments using a Raspberry Pi.

Poster: 73

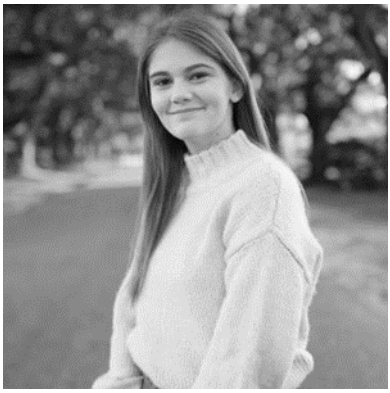
Allison Reed

Major: Criminal Justice

Faculty Mentor:
Dr. Alexis Rockwell

Department: Political Science and Criminal Justice

College: College of Arts and Sciences



Funding Source(s): SURF

Events to record: An examination of required activation for body-worn cameras

There has been a lot of research on the effectiveness of body-worn cameras in policing including the impacts that body-worn cameras have on police officers, individual citizens, and the community. Results from prior literature show that police body-worn cameras are only sometimes highly effective. This project investigates why police body-worn cameras may not be effective by examining the required activation policies. Data for this project derive from the 2016 Law Enforcement Management Administrative Statistics - Body-Worn Camera Supplement (LEMAS-BWCS) study conducted by the Bureau of Justice Statistics. The main components of these data are the required events officers are to record, according to their policies, which are compared with complaints against officers, officer actions, and financial impact. This illustrates how required events to be recorded can impact agencies and external factors. This research has the potential to impact the policing field by highlighting areas in current body-worn camera policies that can be adjusted to improve effectiveness. Recently, there has been a high demand by many communities for the implementation of body-worn cameras to increase police accountability. For body-worn cameras to increase police accountability, they must be effective.

Poster: 74

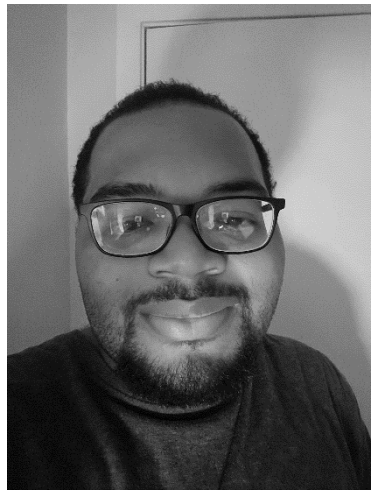
Jacinto Rendall

Major: Computer Science

Faculty Mentor:
Dr. Joanna Furno

Department: Mathematics and Statistics

College: College of Arts and Sciences



Funding Source(s): National Science Foundation under Grant No. 2213516

How fair is the game Ctrl?

Ctrl is a 3d block placing game to be played by 4 players in a circle. The main objective of the game is to place your color blocks in such a way that your blocks are the most visible when viewed from the 5 main angles of the cube. You also get a flag which can block the other players from putting a piece there. Board games like ctrl are meant to be fun, fair, easy to learn and hard to master, but there are a couple of reasons to doubt the fairness. A special rule making the player who recommends the game goes first leads to the hypothesize that the player going later in the turn order will have an advantage over those before. So to truly test the fairness of the game a simulation of the game was made in C++. And the conclusion from the simulation is that the player going 3rd has a higher win rate while the player going first has the lowest which partially supports the hypothesis

Poster: 75

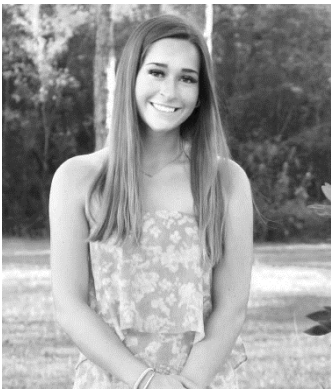
Lilly Richardson and Vierra Wright

Major: Biology

Faculty Mentor:
Dr. Juan Luis Mata

Department: Biology

College: College of Arts and Sciences



A preliminary list of *Cantharellus* species for Mobile County, AL.

Chanterelles are mushrooms belonging to the genus *Cantharellus* within the *Phylum Basidiomycota*. Because they are considered one of the best edible forest mushrooms, their international commercial value exceeds a billion dollars annually. The most easily recognized chanterelles are those having shades of yellow or orange, but colors can range from white, red, to brown. The pileus often has an infundibuliform shape with irregular lobed margins and a smooth, dull surface, with a fertile underside that is not truly gilled, but rather smooth, veined or ridged. The fertile underside is a key feature in distinguishing the chanterelles from true gilled mushrooms. The position of the stipe is often central and similarly colored to the pileus. Chanterelles often grow in clusters under woody trees. They are considered mycorrhizal meaning they have a mutualistic symbiotic relationship with vascular plants, especially hardwoods, in which they assist with the tree's intake of water and nutrients. There are around 90 described *Cantharellus* species worldwide, about 40 species in the US, and seven species reported in the state of Alabama. The main objective of this project is to determine how many Cantharellus species are present in MobileCounty. Based on 29 collections from five different locations so far we report at least seven species with *C. altipes* reported in most sites followed by *C. lateritius*.

Poster: 76

Eddie Rodriguez

Major: Civil Engineering

Faculty Mentor:
Dr. Shenghua Wu

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF, KW Plastics & H.O. Weaver Asphalt Plant, Alabama Space Grant Consortium

Rheological Evaluation of Rutting Behavior in Waste Plastic-Modified Asphalt for Sustainable Pavement Design

In light of the escalating challenge posed by plastic waste accumulation and the imperative for sustainable transportation infrastructure, this research investigates the efficacy of utilizing waste plastics, namely High-Density Polyethylene (HDPE) and Polypropylene (PP), as modifiers for asphalt binders. Traditional asphalt pavements often succumb to rutting under the strain of traffic and temperature fluctuations, leading to uneven surfaces. To address these issues, this study examines the rheological behavior of unaged asphalt binders with varying percentages of HDPE and PP. The findings highlight the positive impact of HDPE and PP as modifiers, showcasing enhanced rutting resistance through increased G*/sinδ values. Additionally, the high-temperature performance of the modified binders demonstrates improvement with rising plastic content, as verified by Dynamic Shear Rheometer (DSR) tests. MSCR tests further underscore the enhanced elasticity and rutting resistance of the modified binders. This investigation underscores the potential of HDPE and PP waste plastics as sustainable enhancements for asphalt binders, paving the way for more durable and eco-friendly pavement designs.

Poster: 77

Devyn Roh

Major: Civil Engineering

Faculty Mentor:
Dr. Kaushik Venkiteshwaran

Department: Civil, Coastal, and Environmental Engineering

College: College of Engineering

Funding Source(s): SURF

Phosphorus Removal and Recovery

Phosphorus (P) is an important constituent of all living organisms. However, excess P causes pollution in stormwater and threatens aquatic ecosystems, aquatic wildlife and the health of humans. Excess P causes eutrophication, an overgrowth of algae leading to loss of oxygen, and water quality issues. Therefore, there is an essential need to develop P removal, recovery and reuse techniques for improved environment sustainability. Some current removal technologies can only remove a limited amount of P and are not effective during high velocity storms. Additionally, there are no current established methods to recover P from stormwater.

The focus of research is to develop an iron amended non-woven geotextile to remove adequate amounts of P and to demonstrate controlled P recovery for beneficial reuse. Commercial non-woven polypropylene geotextiles were procured and amended with iron nanoparticles using established chemical precipitation methods (FE-Geotext.). A series of P adsorption and low-pH desorption experiments were conducted to demonstrate P removal and recovery. Samples were analyzed for P using the Standard Ascorbic Acid Method.

The P adsorption experiment demonstrated P removal within the first few hours. Meaning that, the FE-Geotext. is able to remove P very quickly. The FE-Geotext. provided a P adsorption capacity of 2 to 6 mg P/g of FE-Geotext.. This is comparable to other iron-based medias. In the P recovery experiment, the FE-Geotext. was able to adsorb and release equivalent amounts of P. The FE-Geotext. shows good potential for reuse based on these results.

Poster: 78

Angela Russ

Major: Mechanical Engineering

Faculty Mentor:
Dr. Ryan Littlefield

Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF

Measurement of myofilament lengths in wildtype and mutant *C. elegans* nematodes using CRISPR-Cas9 gene editing.

Models for muscle formation currently rely on proteins that are not in all animal groups. New models are being developed, with our research focusing on length regulation of muscle thin filaments. Thin filaments are responsible for muscle contraction, with their length being linked to the force produced. Thin filaments are arranged around thick filaments that are composed of myosin, and the thin filaments are capped by the protein tropomodulin (tmod) at their ends. Myosin has "head" regions that protrude from the heavy chain and interact with the thin filaments chemically. Our hypothesis is that the myosin heads help regulate thin filament length by serving as attachment points for the thin filament to grow along. To test this, we chose to make two novel muscle formation models with *c. elegans* worms using CRISPR-CAS9. One of the strains made has a green fluorescent marker to show the tmod at the ends of the thin filaments, while the other strain has this and a mutation that removes the myosin heads located under the endpoints of the thin filaments. The two strains have been imaged using a Nikon Airyscan microscope that can provide high-resolution images of the marked tmod in both strains. An analysis of the locations will show if there are differences in the tmod spacing between the strains with mutant and unedited myosin. The implications of these results and potential models for thin filament regulation will be discussed as well to add to the ongoing research in this field.

Poster: 79

Kurt Schmitkons

Major: Geography

Faculty Mentor:
Dr. Gabriel de Oliveira

Department: Earth Sciences

College: College of Arts and Sciences

Non-English Language Usage in the Gulf Coast States

Locating regions with high populations of Americans speaking a first language other than English is important for providing resources such as translated documents, language support on websites, and English language courses. The U.S. Census Bureau collects data on speakers of various languages, but little analysis is done with this data. The decennial report accompanying each census only includes national totals of speakers, and few more in-depth analyses have been published by the federal government in recent years. The purpose of this study was to observe the numbers of speakers of the six most spoken languages in the United States, other than English, according to census data from 2011. Data of the number of speakers of each language per state collected between 2009 and 2013 was used to compare the amount of language usage in each of the Gulf Coast states. Analysis showed that Spanish is the most spoken language other than English across all five studied states, matching increased migration of Spanish speakers to the United States. French was the second most spoken language in states with a historical French presence, while in other states Chinese or Vietnamese came second. This also matches increased migration from across Asia to the United States.

Poster: 80

Erin Schreck

Major: Biomedical Sciences

Faculty Mentor:
Dr. Natalie Bauer

Department: Pharmacology

College: College of Medicine

Funding Source(s): SURF

The Role of Inflammatory Cells in the Sex Dimorphism of Pulmonary Arterial Hypertension

Pulmonary Arterial Hypertension (PAH) is a disease associated with high blood pressure specifically in the lung circulation. Symptoms include dyspnea and cyanosis, and the mean survival post-diagnosis is 2.8 years without treatment. PAH can be characterized by accumulating vascular damage which results in lesion formation causing a decrease in the diameter of vessels, obstruction of flow and ultimately increased pressure on the right heart leading to failure. These lesions define an arteriopathy that is a hallmark of PAH which are, in part, dependent on infiltration of inflammatory cells into the vascular wall. PAH presents uniquely in males and females with females being diagnosed more often than males, but with males having a much worse prognosis than females. We recently reported that in the SUGEN/Hypoxia model of PAH, there is increased circulating monocyte chemoattractant protein (MCP-1) and granular macrophage-colony stimulating factor (GM-CSF), indicative of macrophage-driven infiltration. Further, we found that CXCL-10 was increased in females, indicative of T-cell infiltration that may be protective rather than detrimental to arteriopathy formation. We hypothesized that males would exhibit macrophage expression in the vascular wall, whereas females would have T-cell infiltration. Following histological staining of both male and female samples, our preliminary data suggests females exhibit more T cells and males exhibit more macrophages, which has presently supported our findings in our cytokine analysis. This data suggests unique inflammatory cell phenotypes that correlate with sex in PH.

Poster: 81

Peter Sherman

Major: Mechanical Engineering

Faculty Mentor:
Dr. Martin Frank

Department: Physics

College: College of Arts and Sciences

Funding Source(s): SURF, Alabama Space Grant Consortium

Increasing Magnetic Monopole Detection Efficiency via Beta Analysis Model

The search for the elusive fundamental particle, the magnetic monopole, has stumped researchers for decades for a few key reasons. The first is that magnetic monopoles are theorized in many fundamental theories which attempt to join the fundamental forces. These Grand Unification Theories (GUTs) provide pivotal explanations of how the electromagnetic force may be joined with the strong and weak nuclear forces; however, many GUTs rely on the existence of the magnetic monopole. Researchers have yet to detect these particle repeatably, but nobody knows exactly why. Some theories say that the reason we don't see them is because so few we created during the big bang, but others predict that their supermassive nature leads to insanely high energies, which are too high to create in particle accelerators. The third reason for why they are so perplexing in nature is that they seemingly defy universal symmetry due to the existence of an electric charge. One of the groups looking for this particle is Fermilab in Illinois with the help of their far detector in Ash River, Minnesota. By using a 15mx15mx60m detector along with data analysis algorithms, we are able to peer into the universe to see what we find. While algorithms already reaching high levels of efficiency, there are gaps in the detection methods when measuring particles of different speeds. My research is to determine what can be done to increase the detection efficiency of these particles at speeds of around 5x10^-3.

Poster: 82

Irelynn Smith

Major: Biomedical Sciences

Faculty Mentor:
Dr. Tuan Tran

Department: Biology

College: College of Arts and Sciences

Evaluating the common duckweed (*Lemma minor*) as an alternative aquatic host and model infection model for the bacterial wilt pathogen, *Ralstonia solanacearum*.

Ralstonia solanacearum is a plant pathogen that causes bacterial wilt disease in major crops such as tomatoes and potatoes. Recently, this bacterium was discovered in floating pennywort (*H.ranunculoides*) and Pennsylvania smartweed (*P. pennysylvanicum*), two previously unsuspected aquatic plants (1). Common duckweed (*Lemna minor*) is an aquatic plant with a high level of resilience and short doubling time (5-7 days). *L. minor* has previously demonstrated its capability as a versatile high-yield infection model for other types of pathogenic bacteria (2). Given this newfound branch of possible aquatic hosts, our goal is to evaluate duckweed as an infection model for *R. solanacearum* infection. This study demonstrates that common duckweed (*c.duckweed*) can serve as a host and worthwhile model for the observation of *Ralstonia solanacearum* (*R.solanacearum*) pathogenesis. In order to establish common duckweed as a potential host for this pathogen, we developed an infection assay in which *c.duckweed* was placed into a water-based solution containing the bacterium then placed into a growth chamber. After three days post inoculation, the plants were surface sterilized, homogenized, and dilution plated. The results of this study indicate that Lemna minor can serve as a host to *R.solanacearum* and a potential model for the further observation of Ralstonia pathogenesis.

Citations:

(1.) Hong, J. C., Momol, M. T., Jones, J. B., Ji, P., Olson, S. M., Allen, C., Perez, A., Pradhanang, P., & Guven, K. (2008). Detection of Ralstonia solanacearum in Irrigation Ponds and Aquatic Weeds Associated with the Ponds in North Florida. Plant Disease, 92(12), 1674–1682. https://doi.org/10.1094/pdis-92-12-1674

(2.) Thomson, E. L., & Dennis, J. J. (2013). Common duckweed (Lemna Minor) is a versatile high-throughput infection model for the burkholderia cepacia complex and other pathogenic bacteria. PLoS ONE, 8(11). https://doi.org/10.1371/journal.pone.0080102

Poster: 83

James Smith

Major: Meteorology

Faculty Mentor:
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Department: Earth Sciences

College: College of Arts and Sciences

Funding Source(s):
NSF-EPSCoR

Temperature and Radiation Sensor Performance During Lightning Events

The South Alabama Mesonet is a network of 26 research-grade fully automated weather stations. In reviewing data from the station at Fairhope, AL, it was noticed that, surrounding heavy rainfall events, temperature and/or radiation values showed distinct spikes. 81 cases were identified with these spikes, day and night. Over 2/3 of these cases showed downward spikes in temperature. The sensor manual states that unstable measurements can occur during electromagnetic interference, so we posited that nearby lightning strikes were the cause of these spikes. Level II WSR-88D radar reflectivity data was obtained for all cases. Radar data was unavailable for 6 cases. For the remaining 75 cases, nearby storm cells with high reflectivity values, indicating thunderstorm activity, were identified. Data was received from Vaisala including lightning strike locations and times within a 100 km radius of the Fairhope station. This data will be compared with the times of the 81 spike cases, and the percentage of cases where lightning occurred very close to the station will be compared to the results from the radar analysis. No prior research appears to have been done on this specific topic. Should it be found that lightning is indeed causing these outlying data points, it will confirm that these spike issues are transient, not due to sensor failure, avoiding technician dispatch, saving time and financial resources. Knowing the source of the spikes will allow the data to be removed during the quality control process without the entire record becoming suspicious.

Poster: 84

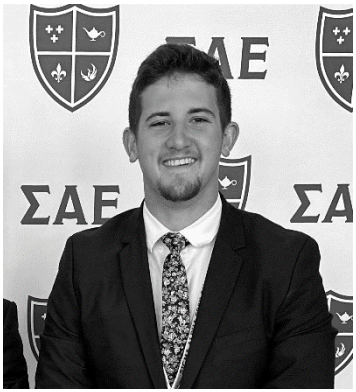
Tabor Smith and Taylor Brady

Major: Marine Sciences

Faculty Mentor:
Dr. Amy Sprinkle |
Dr. Ronald Baker

Department: Stokes School of Marine and Environmental Sciences

College: College of Arts and Sciences



Funding Source(s): Study Abroad

Rates of Herbivory in Patch Reefs and Surrounding Seagrass Communities

Seagrass beds have large effects on energy and nutrient flow to nearby habitats. Grazing on these beds are commonly thought to be minimal globally due to a decrease in large marine vertebrate herbivore populations. However, grazing near coral reefs from invertebrates and herbivorous fish plays a large role in returning nutrients and energy to the reef. Sand “halos” bordering reefs display this grazing pressure near-reef. Understanding spatial variability of herbivory can aid in quantifying the role of seagrass beds in supporting energy transfer in coupled seagrass-reef habitats. To quantify grazing rates and herbivore community composition, standardized Thalassia testudinum leaves were tethered to 4 set distances (15m into the reef, the edge of the reef, and 15 and 30m out of the reef) at 2 sites and camera surveys deployed at patch reef sites in Turneffe Atoll, Belize. Ultimately, 1 site showed a slow decrease in grazing further from the reef traveled, while the other site showed a complete drop of herbivory once the edge of the reef was reached. For species composition, the number of unique species decreased with distance from reef, but there was similarity in presence of wrasses at almost all sites. Studying the herbivory rates will help ecologists to better comprehend the interactions between plants and herbivores, as well as ecosystems. The information collected can be vital for gauging the health and durability of natural ecosystems

Poster: 85

Emma Tonsberg

Major: Psychology

Faculty Mentor:
Dr. Erica Ahlich

Department: Psychology

College: College of Arts and Sciences

Disordered Eating Help-Seeking in College Students: A Theory of Planned Behavior Perspective

The Theory of Planned Behavior (TPB) suggests that attitudes toward help-seeking, perceived social expectations about help-seeking, and prediction of personal control over help-seeking, can predict help-seeking intentions and behaviors. However, previous research has largely focused on formal help-seeking (ex. psychologists). The current study examined TPB separately for formal and informal sources of help-seeking specifically related to disordered eating. 134 undergraduate college students (64.7% female, 63.9% White, AgeM = 20.27) provided online information on disordered eating symptoms, subjective norms, perceived behavioral control, attitudes toward help-seeking, help-seeking intentions, and formal (ex. physician) and informal (ex. friend) help-seeking behaviors. Linear regression analysis revealed that perceived behavioral control (B = .062, p = .474), subjective norms (B = .063, p = .484), attitudes toward help-seeking (B = .128, p = .154), and disordered eating symptoms (B = .167, p = .059) did not significantly predict help-seeking intentions. However, as hypothesized based on the TBP, help-seeking intentions did significantly predict help-seeking behavior for informal sources of help, (B = .192, p = .027) and were trending toward significance for formal sources, (B = .170, p = .051). The Theory of Planned Behavior was not fully supported in this sample. Compared to help-seeking attitudes, subjective norms, and perceived behavioral control, the level of disordered eating symptom severity was the strongest predictor of help-seeking intentions, and the only predictor that fell in the marginally significant range. Future work should identify ways to enhance intentions to seek help related to disordered eating, as students with greater help-seeking intentions did appear to more often utilize treatment.

Poster: 86

Ashley Van Matre

Major: Psychology

Faculty Mentor:
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Department: Psychology

College: College of Arts and Sciences

Funding Source(s): SURF

Technoference: The effects of media interference on caregiver and child mental health in children with and without Autism Spectrum Disorder

Some research exists examining the interference of caregiver and child technology use on the parent-child relationship (aka technoference). However, further understanding of the effects of technoference on caregiver mental health and child behavior is needed. Previous research in young children supports that the quality of the parent-child relationship is likely negatively impacted by high levels of family media engagement. For children with autism spectrum disorder (ASD), child media usage has been found to be related to increased levels of problem behavior. This study examines the effects of technoference on caregiver and child well-being in families of children with and without ASD. A sample of 50 caregivers of children with and without ASD (aged 3-8) reported on technological interferences in parenting (e.g. technoference), caregiver strain, depression, daily hassles, and child emotions and behaviors. Pearson's correlations were calculated among the main study variables and a t-test was performed to assess technoference score differences between families with and without ASD.Caregiver strain, depression, and daily hassles were all significantly related to technoference. Child emotional and behavioral difficulties were also significantly related to technoference. Results suggest there is a direct relationship between the way technology interferes with parenting and the well-being of caregivers of children with and without ASD. Technoference also appears to have a direct impact on child emotional and behavioral problems. Additionally, technoference appears to be equivalent across families of children with and without ASD

Poster: 87

Aaron Wiggs

Major: Biology

Faculty Mentor:
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Department: Biology

College: College of Arts and Sciences

Funding Source(s): SURF

Anthropogenic Disturbances and the effect on Ghost Crab (*Ocypode quadrata*) Burrow Architecture

Ghost Crabs are environmental engineers that also serve as bioindicators of humans impact on coastal beach ecosystems. The Atlantic ghost crab, *Ocypode quadrata*, is a common and abundant species ranging from Rhode Island to Brazil that serves as a crucial prey item for coastal birds and mammals. This semiterrestrial invertebrate excavates burrows as a means for shelter in sandy environments. Burrow construction is an energetically costly process that is affected by different environmental stressors such as predation, beach morphology, and human disturbance. To better understand how *O. quadrata* burrow architecture responds to increased coastal urbanization and tourism, we collected ghost crab burrows from seven sites from across the Northern Gulf Coast region that differ in their levels of human impact. Casts were measured for volume, angle of inclination, complexity and other variables that have been found to be impacted by human disturbance in previous studies. Overall, we found that ghost crab burrow volume, burrow depth, and burrow complexity have shifted across levels of human impacts. Further, at three sites in coastal Mississippi with extreme human impact, we struggled to find enough burrows in order to sample burrow architecture, thus highlighting the precarious position of these indicator species in a rapidly urbanized landscape. Our study highlights the critical role that human impacts have on animal behavior of a critical indicator species.

Poster: 88

Kimberlyn Williams

Major: Psychology | Philosophy

Faculty Mentor:
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Department: Psychology

College: College of Arts and Sciences

Funding Source(s): SURF

Actuarial Prediction of ADHD Using Neuropsychological Data

Attention-Deficit/Hyperactivity Disorder (ADHD) is the most common psychiatric diagnosis in children and is becoming a frequent psychiatric diagnosis in adults. ADHD is a clinical diagnosis based on self-reported symptoms which makes accurate diagnosis challenging. Actuarial prediction has been demonstrated to be more accurate than clinical judgment. The current study explored an actuarial approach to predicting ADHD based a comprehensive battery of neuropsychological tests. This project utilized test data from Meyers' Neuropsychological Battery (MNB) to develop a logistic regression model to accurately predict diagnosed ADHD cases (n=85) from control cases (n=189). The obtained model correctly identified 83.3% of overall cases. The model had 67.2% accuracy in identifying ADHD cases and 90.3% accuracy in identifying control cases. Future research will focus on further refining the model to develop an ADHD prediction algorithm. Additionally, an interesting finding of the current model was that significant predictor tests in the model are not typically associated with cognitive deficits in ADHD which may lead to an ADHD prediction algorithm that is robust to malingering.

Poster: 89

Carla Zohlandt

Major: Biology

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Dr. Juan Luis Mata

Department: Biology

College: College of Arts and Sciences

A Comparative Study of Mycelium Growth on Hallucinogenic Fungi (*Psilocybe*)

Psilocybe cubensis is a mushroom mostly known for its toxicity. Psilocybin, is the psychoactive tryptamine that causes hallucinations in humans. While it is technically illegal to possess psilocybin-mushrooms in the USA, it remains a popular recreational item. This species has been reported growing in tropical regions around the world, including the US Gulf Coast. The fruiting bodies have a conical to convex, brownish colored cap, gray to purplish gills, and a grayish stipe that will stain blue when bruised. *P. cubensis* is a saprotrophic fungus growing on decayed substrates, such as bovine manure. We grew nine Psilocybe strains on three nutritional agar media: PDA, MEA and MEA fortified with dog food, to test the correlation of mycelium growth and media type. Strain growth was determined by measuring the mycelium extension diameter over a period of 15 days or until the mycelium reached the petri plate boundary. Growth rates and means were then calculated and compared. Results showed that all strains grew best in fortified MEA. There was a significant difference in growth among five "Xico" strains, but no significant difference between all strains. Strains that have been handled for a longer period of time, such as "Makilla Gorilla'' seem to be better adapted to artificial media compared to newly acquired strains such as Psilocybe "aztecorum", which had the slowest growth. An additional source of protein and amino acids, in the form of dog food, makes an excellent way to boost mycelium growth for the ultimate purpose of growing mushrooms.

Poster: 90

Genevieve Batman

Major: Exercise Science

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College: College of Education and Professional Studies

Funding Source(s): SURF, Alabama Space Grant Consortium

Resistance Training Elicits Sex-Specific Improvements in Cognition, but Not in Brain Blood Flow

Alzheimer's Disease (AD) is a debilitating neurodegenerative disease. Previous investigations have suggested that physical activity, with emerging data related to resistance training, can prevent and/or delay the onset of AD. PURPOSE: Our purpose was to determine which modality of resistance training elicited the greatest acute change in various cognitive domains and cerebral blood flow via the internal carotid arteries (ICA). METHODS: We recruited 20 healthy college-aged (22 ± 4 yrs) adults (11 male, 9 female) who completed 3 randomized, volume-equated experimental visits (30%1RM, 30%1RM+Blood Flow Restriction, 70%1RM) after bilateral leg extension one-repetition maximum (1RM) and baseline cognition were quantified. RESULTS: All measured outcome variables increased in response to exercise. The 2-way mixed factorial ANOVAs for cognitive scores indicated that there were no significant ($p>0.05$) interactions, but for cognitive flexibility and executive function, there were main effects of Sex. The women demonstrated a significantly greater increase in cognitive flexibility (16.0 ± 7.6 vs. 6.1 ± 10.8 au; $p = 0.010$, 95% CI $X\Delta = 10.6 – 21.4$) and executive function (15.9 ± 7.1 vs. 6.2 ± 9.5 au; $p=0.003$, 95% CI $X\Delta = 3.6 – 15.8$) than the men. For the exercise-induced increases in ICA blood flow, there was not a significant interaction or any significant main effects between conditions. CONCLUSION: This suggested that regardless of type, resistance training yields acute cognitive improvements, which furthermore may be augmented in females.

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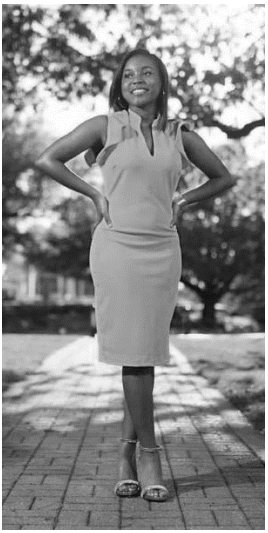

Avarie Lambert

Major: Criminal Justice

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College: College of Arts and Sciences

Funding Source(s): SURF

Blame Attribution of Sexual Assault by Race and Gender

Events in recent years have greatly influenced the extent to which citizens perceive and understand the scope of sexual assault. In part this has been part of rapidly changing attitudes toward sexual minorities, and in part this has resulted from the reckoning over high profile celebrity cases of sexual assault related to the “Me Too” movement and others. While there has been much research into attitudes toward victims of sexual assault for many years, the rapidly changing nature of the phenomenon requires that we continue to investigate how citizens process the information with which they are presented. This project seeks to understand the extent to which our society maintains double standards when assessing the sexual assault victimhood on the dimensions of gender, sexual orientation, and race. In particular we perceive a need to more closely investigate the interactions of these identities. How much does public perception vary in relation to the blame worthiness of victims with different genders, race, or sexual orientation to their own sexual assault? These questions may be answered with original survey experiments using vignettes both on a national sample provided by Qualtrics and Mechanical Turk, and a sample of students at South Alabama.

Poster: 92

Alyssa Foster

Major: Geology

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College: College of Arts and Sciences

Funding Source(s): SURF

Soil Lead Concentrations of Mobile, AL Community Gardens

Community gardens in Mobile, AL play a crucial role in promoting local food production, fostering a strong sense of community, and building social connections among residents. Gardens provide access to fresh and healthy produce, which is especially valuable for those who might not have such access otherwise. Additionally, community gardens contribute to environmental sustainability by creating green spaces, supporting biodiversity, and reducing food transportation distances.

Since community garden sites are limited to available land, which may have a history of variable land use in urban settings, legacy pollutants like lead may be present in soils. Lead can be found in soil due to natural occurrences, historical industrial activities, vehicle emissions, lead-based paint deterioration, agricultural practices, improper waste disposal, and atmospheric deposition. Exposure to lead poses a considerable health risk, particularly for children who may inadvertently ingest or inhale lead-contaminated soil or eat contaminated produce. Here we present data on the distribution of lead in community garden soils collected throughout Mobile, Alabama. We measured lead concentrations in 131 topsoil samples (0-10 cm sampling depth) from 10 community gardens. Samples include in situ soils and raised garden bed soils. The average lead concentration is 119 µg/g, with a standard deviation of 251 µg/g. The highest concentration measured was 635 µg/g. We measured 7 samples between 400-650 µg/g which were above the U.S. Environmental Protection Agency (EPA) currently sets a lead limit of 400 µg/g in residential soils.

Our results indicate that 5 of the 10 gardens surveyed have samples exceeding the limit for residential. Overall, soil lead concentrations in community gardens in Mobile are within safe ranges for growing food crops. Nevertheless, further sampling, assessment of new garden sites, and proactive management of lead levels in community garden soil should continue, ensuring the ongoing safety and well-being of the community members who use these gardens for food production and social engagement.

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