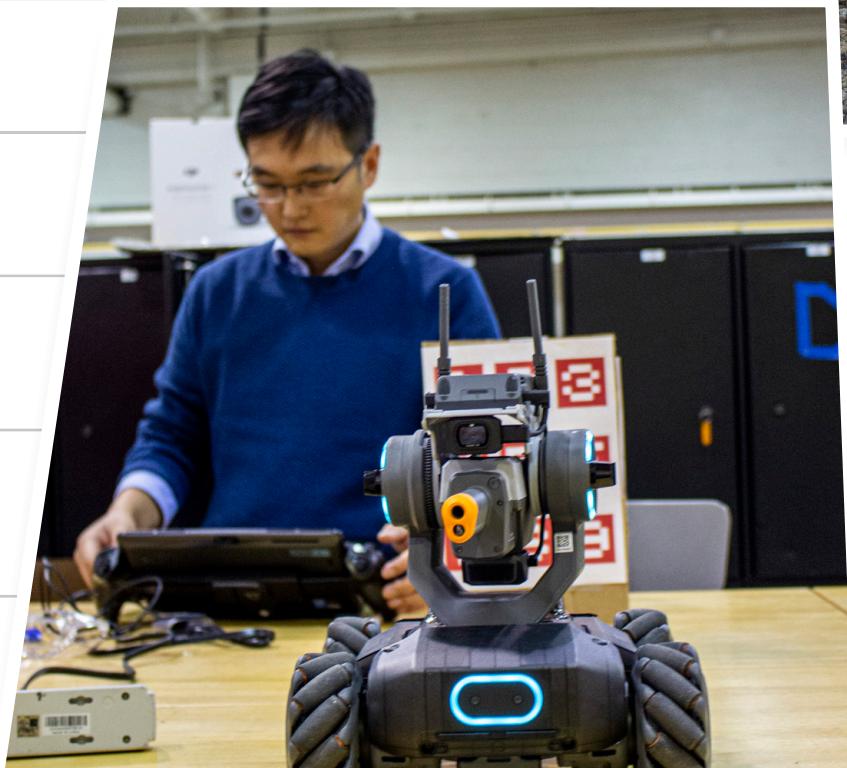




15TH ANNUAL  
**FACI**  
2020  
POSTER FORUM

# 15<sup>TH</sup> ANNUAL FOCI FOCUS ON CREATIVE INQUIRY



Learn More at  
[CLEMSON.EDU/CI](http://CLEMSON.EDU/CI)



The Focus on Creative Inquiry (FoCI) Poster Forum is an annual event in which Creative Inquiry (CI) teams can present their research and project accomplishments through posters and interactive displays. It is a celebration of student and mentor collaborations and accomplishments! Teams take this opportunity to develop and hone their communication skills.

In addition to student presentations, the Plenary Session highlights the recipient of the Phil and Mary Bradley Award for Mentoring in Creative Inquiry. The faculty award winner presents her or his experience as a mentor to undergraduate researchers as well as the overall research projects undergraduates participate.

After the Plenary, the winner of the annual Creative Inquiry Graduate Student Mentor Award and the winners of the poster contests are announced.

## WHAT IS CREATIVE INQUIRY?

Creative Inquiry is small group learning for all students, in all disciplines. It is the imaginative combination of engaged learning and undergraduate research – and it is unique to Clemson University.

In CI, small teams of undergraduate students work with mentors to take on problems that spring from their own curiosity, a professor's challenge, or the

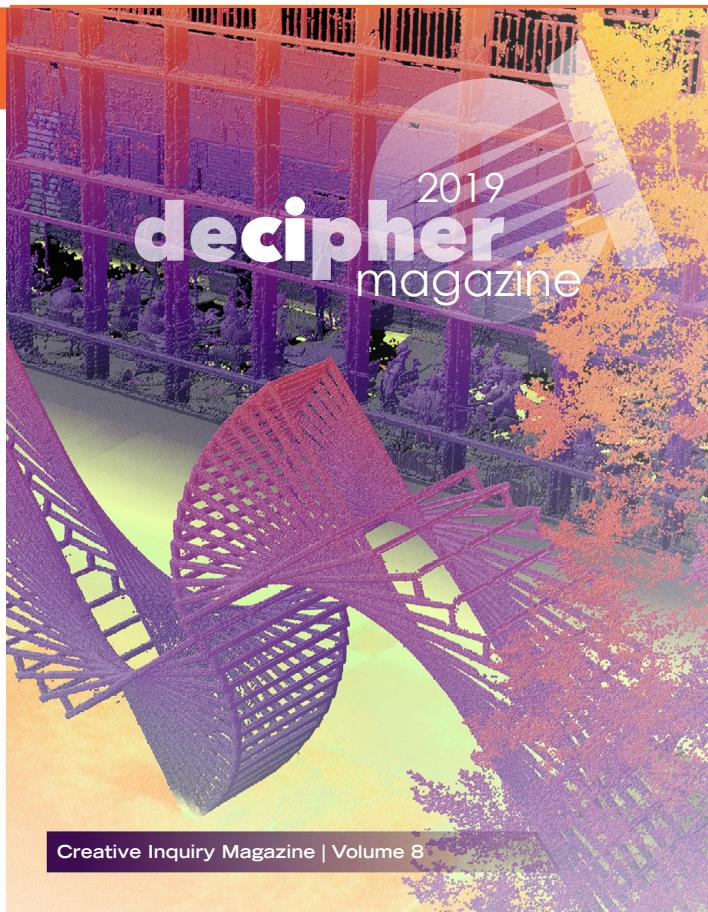
pressing needs of the world around them. Students take ownership of their projects. They ask questions, they take risks and they get answers.

Since its start in 2005, Creative Inquiry has supported more than 1,370 projects, enrolling more than 48,000 undergraduate students. Students may join CI teams as early as freshman year and continue through graduation and afterwards as graduate student mentors. They hone critical thinking and problem-solving skills as they learn to work in a team - sometimes as leaders, sometimes as followers. They develop communication skills as they present their work at professional conferences and to the external community, where they can address questions from experts and decision makers.

Creative Inquiry alumni praise their experiences for exposing them to real-world, work experiences not available in the classroom, providing hands-on research experiences, preparing them for their future careers and providing opportunities to work closely with faculty.

Indeed, Creative Inquiry is a campus-wide, cross-disciplinary culture that makes the Clemson experience relevant, engaging and extraordinary.





Read more *Decipher* articles on the *Decipher* Blog:  
[CI.CLEMSON.EDU/BLOGS/](http://CI.CLEMSON.EDU/BLOGS/)

## ABOUT *DECIPHER*

*Decipher* is written and produced by Clemson's undergraduate students to describe the accomplishments of their peers in Creative Inquiry projects. Each year, more than 3,500 Creative Inquiry students investigate topics ranging from children's literacy to medical microbiology to developing the next generation of solar cells. The *Decipher* student team selects approximately 30 projects to highlight in the magazine. The students interview, write, photograph and layout the spreads for the magazine.



## ACKNOWLEDGEMENTS

### CREATIVE INQUIRY COMMITTEE

We extend our thanks to the CI Committee for support and guidance throughout the year.

Margaret Condrasky, *Food, Nutrition and Packaging Sciences*

Mark Blenner, *Chemical and Biomolecular Engineering*

Steven Brandon, *General Engineering*

David Detrich, *Art*

Troy Farmer, *Forestry and Environmental Conservation*

JoAnna Floyd, *Research*

James Gaubert, *Marketing*

Alan Grubb, *History*

Bobby Hollandsworth, *Library*

Chad Navis, *Management*

June Pilcher, *Psychology*

David Knox, *Clemson Thinks2*

Michael Sehorn, *Genetics and Biochemistry*

Tzuen-Rong Tzeng, *Biological Sciences*

Ryan Visser, *Education and Human Development*

Holly Williams, *Honors College*

Juan Xu, *Institutional Research*

# THE WATT CENTER

Welcome to the Watt Family Innovation Center, Clemson University's newest and most versatile academic building which opened in January 2016. The Watt offers a setting and resources that promote cross-disciplinary interactions and collaborations among faculty, students and industry. The 70,000 square foot building harbors 191 high definition touch computer screens, 3D video walls, table and window whiteboards and more than 73 collaboration spaces. Software allows users to share screens and to communicate anywhere in the world via virtual connectivity. The Watt Center is Clemson's epicenter for innovation and cross-disciplinary engagement, making it the natural home for Creative Inquiry.

The Watt Center is the vision of Clemson alumnus and founding director, Dr. Charles Watt '59. His experience in education, government and industry molded his conviction that students should experience cross-disciplinary, collaborative environments, as well as depth of knowledge in their majors, to better prepare themselves for careers after graduation. He recognized

that students need breadth of understanding, entrepreneurial outlook, communication skills, critical thinking and the ability to work in diverse teams.

Thus the Watt Center is a building and a mission – to help students develop the skills they need by facilitating cross-disciplinary engagement opportunities and collaborations among industry partners, faculty and students. The Watt brings disciplines together in a collaborative environment to spark research and innovation.

The Creative Inquiry offices are housed in the Watt Center, emphasizing our commitment to interactive cross-disciplinary student research. All Creative Inquiry projects – and all Clemson's students – are encouraged to consider how they can use the Watt Center's unique technology to advance their projects. Students said it best, the Watt Center is an "Overall awesome facility [that] encourages higher learning, innovation and collaboration." on skills, critical thinking and the ability to work in diverse teams.



# PHIL & MARY BRADLEY

William P. ‘Phil’ and Mary Bradley are staunch supporters of Clemson and Creative Inquiry. They provided the first major gifts to Creative Inquiry for project support and to establish the Phil and Mary Bradley Award for Mentoring in Creative Inquiry. In 2016 they also created the award for graduate student mentors. They support CI because they see that it makes a difference for students and achieves results. “The projects we’ve seen so far are about real problems” says Phil, “and they are designed to find real solutions.”

The Bradleys have a long history with Clemson. Phil’s father attended Clemson in the 1930s. Phil was a Distinguished Military Graduate of Clemson, with a 1965 degree in industrial

management. Mary wed Phil in 1963 while he was a student at Clemson. They have two children. Phil has served Clemson as a member of the Clemson Foundation and the University Board of Visitors, including on its executive committee and as chairman in 2014-15. In 2015, Mary was named an Honorary Alumna for her lifelong devotion and demonstrated loyalty to her adopted school. In accepting the award, Mary stated, “As far as Phil and I are concerned, our whole life revolves around Clemson University.”

Phil and Mary continue to actively promote Creative Inquiry. As Phil says, “I tell the parents, ‘Get your kids involved in Creative Inquiry! It makes a big difference in their student-life.’”



# ABOUT THE AWARD

The Phil and Mary Bradley Awards for Mentoring in Creative Inquiry are presented each spring in recognition of outstanding work with undergraduate students. Nominations are accepted from student participants in Creative Inquiry team projects. In 2016, Creative Inquiry began formally recognizing the significant contributions of graduate students as CI mentors. The awards are made possible by generous gifts from Phil and Mary Bradley.

## AWARDS FOR MENTORING



### PREVIOUS FACULTY AWARD RECIPIENTS

- 2019 — Anastasia Thyroff, *Marketing*
- 2018 — Arelis Moore de Peralta, *Youth, Family and Community Studies & Languages*
- 2017 — Vladimir Reukov, *Bioengineering*
- 2016 — Michael Sehorn, *Genetics and Biochemistry*
- 2015 — Michael J. Childress, *Biological Sciences*
- 2014 — Heather Walker Dunn, *Animal and Veterinary Sciences*
- 2013 — Molly Kennedy, *Materials Science and Engineering*
- 2012 — John DesJardins, *Bioengineering*
- 2011 — Delphine Dean, *Bioengineering*
- 2010 — June J. Pilcher, *Psychology*
- 2009 — Karen Kemper, *Public Health Sciences*
- 2008 — Susanna Ashton, *English*
- 2007 — Mark Charney, *Performing Arts*

## GRADUATE STUDENT AWARD



### PREVIOUS RECIPIENTS

- 2019 — Kylie Smith, *Biological Sciences*
- 2018 — Christopher Mayerl, *Biological Sciences*  
Drew Morris, *Psychology*
- 2017 — Dotan Shvorin, *Industrial Engineering*
- 2016 — Alice Brawley, *Psychology*

# SCHEDULE OF EVENTS

---

## 1 APRIL - WATT ATRIUM

---

8am - 9:30am	Students Setup/Install Posters
10am - 12pm	Morning Poster Session
1pm - 3pm	Afternoon Poster Session

---

## 2 APRIL - WATT ATRIUM

---

8am - 9:30am	Students Setup/Install Posters
10am - 12pm	Morning Poster Session
1pm - 3pm	Afternoon Poster Session

3:10pm - 4:15pm

## PLENARY SESSION, WATT AUDITORIUM

Welcome - Dr. Barbara Speziale, *Director, Creative Inquiry*  
Featured Plenary Speaker - Dr. Anastasia Thyroff *Associate Professor, Department of Marketing*

**Award Announcements -**

Poster Competition Award Announcements

4:15pm - 5pm

Students Remove Posters

# WELCOME

## DR. BARBARA SPEZIALE

*Director, Creative Inquiry*

**B**arbara Speziale is the associate director for academic affairs in the Watt Family Innovation Center, a professor of Biological Sciences, and director of the Creative Inquiry program. She has been awarded more than \$15M in external grants for science research, outreach, and education. A recent award from the Arnold and Mabel Beckman Foundation supports Clemson's first Beckman Scholars program. The SC Life Education and Outreach program provided K-12 and undergraduate science enrichment activities for 17 years, supported by \$6.4M from the Howard Hughes Medical Institute Undergraduate Science Education Program. A \$1.9M grant from the National Science Foundation established Clemson's FIRST program to support students who are the first in their families to attend college. Her biological sciences research focuses on freshwater aquatic ecology.



## PLENARY SPEAKER

### DR. ANASTASIA THYROFF

*Associate Professor, Department of Marketing*

**A**nastasia Thyroff, Associate Professor of Marketing at Clemson University, received her MMR from the University of Georgia and PhD from the University of Arkansas. Dr. Thyroff researches complex market systems. Specifically, she analyzes consumers, culture, institutions and the markets they interact in. She is particularly interested in how consumers are impacted by market systems and the role of marketers in shaping and responding to market systems. Her three focus areas within market systems are sustainability, well-being and market formation and evolution. Dr. Thyroff's research has appeared in many top business outlets, including the Journal of Business Research, Academy of Marketing Science Review, Journal of Interactive Marketing, Journal of Consumer Affairs, and Marketing Theory. Some of her awards include Clemson University's Bradley Award for Mentoring (2019), College of Business Dean's Award for Student Engagement (2017), DSP Top Faculty Member (2016, 2015), the SMA Best Paper in Conference Award (2013), the SMA Solomon Best Paper in Buyer Behavior Track (2012), Outstanding Graduate Student Teaching Award (2012), and the Journal of Consumer Affairs Best Article Award (2011). Dr. Thyroff has been conducting research with students through Creative Inquiry since 2013. Since then, she has closely mentored forty students. Her students have presented corporate consulting work to Fortune 500 companies as well as at international marketing conferences such as the Society for Marketing Advances.



# 15TH ANNUAL FOCI ON CREATIVE INQUIRY

## POSTER #1

Analyzing the Effect of Coral Disease on Reef Fish Communities in the Middle Florida Keys

**Mentors:** Kara Noonan and Michael Childress, *Biological Sciences*

**Students:** Riley Garvey, Kristiaan Matthee

Coral reefs in the middle Florida Keys have been experiencing drastic changes due to natural and anthropogenic disturbances, with Stony coral tissue loss disease (SCTLD) being the most recent disturbance. SCTLD has caused significant declines in coral cover effecting the overall composition of reef tracts. Since the appearance of SCTLD, there have been no studies examining the effects that this disease has had on reef fish communities that depend on coral cover for food and habitat. This study investigates reef fish community response to the abiotic and biotic changes before, during, and after a SCTLD outbreak. To assess community response, ten sites in the middle Florida Keys were surveyed and recorded for community analyses, disease prevalence, and substrate composition. The reef fish community did not experience significant shifts in abundances but when the community was broken down into functional feeding groups, herbivores, corallivores, and piscivores changed over the three year period. Herbivores and predators, steadily increased over the three year period with herbivore abundances correlating with algal cover and predator abundances correlating with rugosity. Corallivores did not follow the same pattern. Butterflyfish abundances doubled in 2018. This shift corresponds with disease prevalence that went from 1.7% in 2017 to 20.9% in 2018, and decreased back to 2.5% in 2019. Although disease prevalence was a statistically significant indicator for increased butterflyfish abundance in 2018, disease prevalence was not correlated with butterflyfish abundance between sites.

## POSTER #2

Lobster Homing in Response to Displacement in the Florida Keys

**Mentor:** Michael Childress, *Biological Sciences*

**Student:** Coral Holt

In recent years, the development of acoustic telemetry has opened up the opportunity for tracking behavioral patterns in marine species under various conditions with increased ease. Acoustic telemetry has been especially useful in studying the movement and behavior patterns of lobsters due to their nocturnal behavior. Homing ability and the mechanisms under which this ability operates have been investigated using this technique. In this study, the homing behavior of juvenile Caribbean spiny lobsters (*Panulirus argus*) was tested, looking at the effects of displacement, size, and sex, on the net distance traveled and area of activity during the days following displacement. The results of this experiment indicate a significantly larger area of activity in nondisplaced lobsters than that of displaced lobsters on the day following displacement, possibly reflecting a meandering movement pattern in nondisplaced lobsters compared to the directional movement observed in displaced lobsters. In addition, a significant relationship between net distance traveled and area of activity was found in displaced lobsters but not in nondisplaced lobsters, potentially again reflecting these behavioral differences between the two experimental groups. The effects of size and sex and their relationship to each other remains unclear, with further experimentation and analysis necessary to determine the roles these variables play in homing ability. Also in future analysis, the directionality of movement will be analyzed, and comparative analysis between the homing behavior of the juvenile lobsters observed in this study and that of mature lobsters observed in previous studies will be conducted.

## **POSTER #3**

Comparing the Effects of Social and Monetary Feedback on Habit Breaking among Individuals Experiencing Depressive Symptoms

**Mentor:** Kaileigh Byrne, *Psychology*

**Students:** Hunter Willis, Stephanie Six

Humans are known for being creatures of habit; forming habits helps people find stability and comfort in the hustle of everyday life. Previous research indicates that monetary feedback appeals more to both individuals with and without depression than social feedback in terms of forming habits. However, the relationship between depressive symptoms and habit breaking remains an under-explored area of research. This study will investigate (1) whether social or monetary feedback leads to faster habit breaking and (2) whether depressive symptoms influence this relationship. A two-stage reinforcement learning devaluation task will be used to investigate responses to social and monetary feedback. Results indicated that monetary feedback was more incentivizing across all individuals and thus led to slower devaluation compared to social feedback. Furthermore, individuals experiencing higher levels of depressive symptoms exhibited higher devaluation scores, indicative of better habit breaking, under social feedback compared to monetary feedback.

## **POSTER #4**

Wettability of *Simulium innoxium* larvae silk

**Mentor:** Konstantin Kornev, *Materials Science & Engineering*

**Student:** Tiffany Yeung

Black flies are a family of aquatic insects with about 2,300 species in the order Diptera. They can be found throughout a wide range of environments, with each species having an optimum pH and temperature, and some species having an ability to tolerate pollution. The larval stage is mostly spent filter-feeding while attached to solid surfaces, such as rocks and vegetation, in flowing water. The larvae produce silk that is used for many purposes, such as attachment, “life lines”, and cocoons for their pupal stage. The silk is produced in their large, paired silk glands. In this study, the contact angle of the silk from *Simulium innoxium* larvae was measured using two methods with three different solvents: distilled water, hexane, and hexadecane. The first method was the drop on fiber method whereby micro droplets were sprayed onto silk strands gathered from the larvae, using forceps, and then analyzed. The second method was the capillary rise method. Larvae were hung from their silk strands and dipped into a cuvette where the silk’s meniscus was analyzed. From these experiments, it was found that the silk strand is hydrophobic.

## **POSTER #5**

An Exploration of Out-of-Classroom Experiences as they Relate to Students with Autism Spectrum Disorder

**Mentor:** Ryan Visser, *Education & Human Development*

**Students:** Ashley Blick, Hailley Burton, Chloe Doar, Rebecca Lamb, Leah Stone

Six education majors explored how elementary school field trip destinations (e.g., museums, aquariums) accommodate students with autism. Further, these students will provide classroom teachers with information to best plan a field trip for a class that has at least one student with autism. To this end, **Students:** (1) read literature and researched best practices regarding museums and accommodations for autistic children; (2) interviewed parents of autistic children, K-12 teachers, and special education faculty; (3) created a rubric containing best practices that would ideally be in place in a museum or aquarium; (4) visited several field trip destinations to compare best practices with location-specific practices; (5) interviewed the accessibility

directors who oversee accommodations; (6) created a reference guide for teachers who may be considering locations for class field trips. The guide takes the form of a “social story,” which is a tool used when working with people who have autism.

## POSTER #6

### Brain Health: Tips and Tools for Cognitive Wellness

**Mentor:** Kathleen Valentine, *School of Nursing*

**Students:** Kathleen Browne, Sherry Chen, Kate Spence, Nicki Zipparro

**Purpose:** Assess cognitive improvement in mild dementia patients over the course of 6 weeks using a socially interactive brain-health class intervention.  
**Methods:** Recruitment of 6 couples (one newly diagnosed dementia patient and one caretaker) via referral from Dr. Bailey at the Center for Success in Aging. Class intervention will include interactive activities of engagement and presentations about cognitive decline, lifestyle factors, and brain physiology. Montreal Cognitive Assessment, Zarit burden survey, AD-8 survey, pre-questionnaires, and post-questionnaires of both caretaker(s) and patients will be assessed to track presence of cognitive improvement.   
**Results:** Improved understanding of lifestyle factors that impact quality of life for newly diagnosed dementia patients and their respective caretaker(s). Perceived improvement in coping skills, quality of life, normalcy, and adaptive wellness.   
**Conclusion:** Implement pilot study within the Center for Success in Aging for adoption.

## POSTER #7

### Latitudinal Variation in Yellow Perch Growth across North America

**Mentors:** John Cannaday and Troy Farmer, *Forestry & Environmental Conservation*

**Students:** Olivia Balkcum, Caitlin Littlejohn, Hannah Mulligan, Savannah Seeber, William Sims, Fiona Noel Slater

Latitudinal variation in growth across a species range has been quantified for several sought-after sport fishes throughout North America but remains unexplored for other species that share similar ranges. Yellow perch (*Perca flavescens*) from the Savannah River, South Carolina are one of the southernmost known populations of this species, however growth rates have not been investigated for this species at the southern end of their range. We sought to 1) quantify yellow perch growth in South Carolina and 2) combine our length-at-age data with similar data from across the species range to understand how latitudinal variation and site-specific thermal regimes influence yellow perch growth across North America. Historical data on yellow perch were obtained from several populations across the species range in North America. We fit sex-specific von Bertalanffy growth curves to each population and regressed growth parameters against population-specific latitude and thermal metrics. Initial results indicate faster growth and shorter life spans in southern compared to northern populations. Fast growth and shorter lifespans could lead to higher levels of stochasticity in yellow perch recruitment at southern latitudes. This analysis provides important information for managers on yellow perch growth and life history traits across their range in North America.

## POSTER #8

### Implant Retrieval Program (CU-REPRO)

**Mentor:** Melinda Harman, *Bioengineering*

**Students:** Harper Abbott, Ben Black, Lauren Davis, Chad Eaton, Scott Eibel, Jenna Hines, Alexander Kullman, Elliot Mercado, Mary Beth Reno, John Sykes

Total joint replacements are widely successful, but a small percentage fail due to issues with the biomaterials and medical problems. The goal of the Implant Retrieval Program (CU-REPRO) is to assess trends in orthopaedic implant failures and critical variables in implant biomaterials and designs. This IRB approved program includes a repository of over 800 explanted joint replacements. We are pursuing four projects in 2019-20, including: 1) mechanical testing to compare three different surgical instruments used for hip replacement surgery; 2) visual assessments of shoulder implant damage related to difficulties during revision

surgery; 3) implementing modern database software to enhance the search capacity of our repository; and 4) creating a training protocol to accurately identify implant design features. These projects involve surgeons at Prisma Health in Greenville and Columbia, the Medical University of South Carolina, and the Florida Orthopaedic Institute in Tampa. CU-REPRO uses hypothesis driven research to understand implant performance and ultimately improve patient outcomes.

## POSTER #9

Mesowestern Blot: Simultaneous Quantitative Analysis of Hundreds of Sub-Microliter Cell or Tissue Lysate Samples

**Mentors:** Orrod Zadeh and Marc Birtwistle, *Chemical & Biomolecular Engineering*

**Students:** Laurel Denmark, Nicolina Slenkovich

Western blotting is a decades-old technique for analyzing proteins and their post-translational modifications that is highly sensitive and specific, but to date has been notoriously difficult to multiplex. The Microwestern array (MWA)<sup>1</sup> was developed as a meso-scale multiplexed Western blot, but requires an expensive and difficult to use piezoelectric pipetting apparatus that imposes strict, non-standard sample preparation requirements, large sample sizes and can be mechanically unreliable. Here, we designed a 3D printable gel-casting mold that enables highly multiplexed Western blotting with standard sample preparation, small sample sizes, and without piezoelectric pipetting, which we call Mesowestern. The polyacrylamide gel it produces contains 336 sample wells that each hold 0.5 microliters of sample arranged with 8 rows by 42 columns in a microplate footprint and can be loaded by hand. Proof-of-concept experiments using both infrared-fluorescent molecular weight protein ladder as well as cell lysate (RIPA buffer) demonstrated proteins loaded in Mesowestern gels were amenable to the standard Western blotting steps of gel electrophoresis followed by transfer to a membrane for imaging. Because the gel mold is 3D printable, users have significant design freedom for custom layouts and we expect that the technique could be easily adopted by the typical cell and molecular biology laboratory already performing Western blots.

## POSTER #10

Functional Medicine in the Treatment of Chronic Disease

**Mentor:** Caitlin Moore, *School of Nursing*

**Students:** Carly Berrios, McKenzie Hamilton, Maura Hyland

Functional medicine is a promising field in healthcare that provides an alternative treatment for chronic disease. Functional medicine treats the underlying causes of chronic diseases, such as lifestyle habits, environmental exposures, and genetics with individualized lifestyle programs, supplements, and medical foods. Functional medicine treats the whole-person to allow for an overall state of health and wellness, and not just the absence of disease. This poster focuses on three case studies that reveal the usefulness functional medicine has on the treatment of chronic disease and how health professionals can use it in their everyday practice.

## POSTER #11

Human Cancer Cells Induce More Pronounced Nitric Oxide (NO) Production in Macrophages than Non-Cancerous Cells

**Mentor:** Yanzhang Wei, *Biological Sciences*

**Students:** Hannah Allison, Jennifer Rumsey, Margaret Sulzbach

One of the hallmarks of cancer is that tumor cells create inflammatory conditions in the tumor microenvironment. This study examined the *in vitro* effects of non-cancerous human lung NL20 epithelial cells and cancerous A549 cells on nitric oxide (NO) production in human macrophage RAW 264.7 cells. RAW 264.7 cells were co-cultured with either NL20 or A549 cells without LPS and with LPS as positive controls. Griess assay was used to measure NO production by macrophages. The preliminary results showed cancerous A549 cells induce more pronounced NO production in RAW 264.7 cells than non-cancerous NL20 cells.

The assay was repeated using conditioned media from A549 and NL20 cultures. The results demonstrated that A549 conditioned media induced more NO production than NL20 conditioned media, supporting the conclusion that cell-cell contact is not needed to activate NO production in macrophages. Once more studies are conducted, these results could lead to a potential target in treating cancer.

## **POSTER #12**

Spiritual Experiences in Relationships: A Qualitative Study of the ‘Deep Bond’

**Mentor:** Randle Aaron Villanueva and Job Chen, *Psychology*

**Students:** Loren Myers, Janki Patel, Sarah Roberts, Jordyn Carroll, Anna Peterson, Audrey Ramey

Spirituality has so far been primarily studied at an individual level and often in the context of a religious/spiritual tradition. However, we believe that one can and often does acquire strong spiritual experience in a mundane and interpersonal context, such as with one’s best friend. The current study uses a semi-structured interview method to investigate the spirituality and mystic core in interpersonal relationships. The interview questions were informed by the theoretical framework of common core thesis that examines spiritual and mystical experiences at an individual level. We framed our questions to focus on the “unity” and meaning experienced in the relationships. Participants are n = 30 individuals who reported to have had a relationship in which they experienced a deep bond with the other person. This presentation will give an overview of this study, and discuss ways to conceptualize and empirically study ‘relational spirituality’ in a non-religious context.

## **POSTER #13**

Moral Disengagement and Prosocial Behavior

**Mentors:** Randle Aaron Villanueva and Job Chen, *Psychology*

**Students:** Nick Benson, Caroline Hess, Kyndra Holmes, Sid Simpson, Emma Walker, Saif Wani

Eminent social psychologist Albert Bandura (1996) proposed the Moral Disengagement Theory to explain how people do harm and live with themselves. Eight moral disengagement mechanisms were proposed. Whereas many studies have applied the theory to explain aggressive behaviors, scant research exists in testing the causal link between moral disengagement and anti-social behaviors. This study aims to manipulate moral disengagement mechanisms and examine effects on donating.

## **POSTER #14**

Finding Your Voice: An Outdoor Recreation Camp for Middle School Girls

**Mentors:** Alexsandra Dubin and Denise Anderson, *Parks, Recreation & Tourism Management*

**Students:** Lawton Branham, Maggie Brewer, Ashlyn Brooks, Emma Buron, Rachel Diemer, Krysten Holland, Ann Lyons, Sarah Marsden, Erin McCoy, Caroline Meador, Erin Medlock, Callahan Perry, Katherine Pfeiler, Katherine Spires, Mallory Turnipseed, Madelene Williams  
Individuals who are highly physically active are more likely to have greater self-esteem, better body image, and increased physical activity self-efficacy. Currently, the average PE program provides less than 12% of the recommended daily amount of physical activity, with adolescent girls being the least active. Additionally, 80% of adolescents ages 12-17 drop out of organized sports, with girls dropping out earlier than boys (Slater & Tiggeman, 2010). Therefore, there is a need for programs that provide opportunities for adolescent girls to be physically active and to develop their sense of self-esteem and body image. Women who participate in recreation report becoming empowered to engage in a wider variety of activities (McNiel, Harris, & Fondren, 2012). However, little is known about the effects of outdoor recreation education in adolescent girls. The purpose of this research is to understand how participating in Finding Your Voice influences body esteem and physical activity self-efficacy. Preliminary data suggest this camp positively impacts those who attend, however since the camp will be held April 17th-19th, there is no data from this year to analyze.

## **POSTER #15**

Overcoming Barriers to Substance Use Recovery at Greenville Memorial Hospital

**Mentor:** Kaileigh Byrne, *Psychology*

**Students:** Haven Parker, Amber Wallace

8.4% of Americans suffer from a chronic, complex condition called Substance Use Disorder (SUD). While individual risk factors for relapse and barriers to recovery have been identified, there is no current design to systematically investigate how these factors holistically establish an individual's risk for relapse. This project's goal is to develop a model identifying risk factors for relapse and barriers to addiction recovery by studying the effectiveness of inpatient recovery coaching with the likelihood a patient will participate in recovery programs or seek healthier lifestyles post-discharge. It is hypothesized that recovery services implemented during the patient's hospital stay will aid in overcoming barriers to recovery. Results were found by administering an EEG, SST, and risk factor surveys on hospitalized patients with SUD. Patients were randomized into a control group or intervention group. Intervention included a recovery coach visit during hospitalization, while the control group received the standard of care only, without recovery coach visit. Follow-up surveys were given via telephone at 30-days, 60-days, and 90-days regarding progress. It is predicted that results will show inpatient recovery coach visits increase participation in post-discharge recovery programs. This is significant because to assign effective treatment plans to those with SUD, it is important to first assess risk factors for relapse and determine barriers to recovery.

## **POSTER #16**

K-12, College/University, and Mass Shootings: Similarities and Differences

**Mentor:** Robin Kowalski, *Psychology*

**Co-Author:** Chelsea Robbins

**Students:** Hailey Carroll, Kaitlyn Rubley, Andrew Cook, Tyler Hendley, Robyn Oakley, Emily Richardson, Leah Bourque, Catherine Chapman, Rachel Jones, Kelsey Fisher, Kate Tolleson  
Recent years have witnessed an increase in shootings at elementary, middle, and high schools, as well as universities and colleges. Increasingly, the media report mass shootings in movie theaters, such as Aurora, Colorado, concerts, such as Las Vegas, and bars, such as Pulse in Orlando. The death toll from many of these shootings is staggering, leading researchers to search for explanations for their occurrence. Are all of these shootings the same or are there critical differences depending on location that warrant different prevention/intervention approaches. To examine these questions, national databases for K-12, college/university, and mass shootings were examined. A few of the K-12 shootings met the definition for mass shooting (4 or more people killed; e.g., Sandy Hook; Parkland). Although there are some similarities in the shootings across the three types (e.g., most of the shooters are male), there are also significant differences (e.g., college and mass shootings are more often targeted than K-12 shootings). Implications of the findings for prevention/intervention programs will be discussed.

## **POSTER #17**

Aging and Technology: How Do Decisions and Perspectives about Online Privacy Change across the Lifespan?

**Mentor:** Kaileigh Byrne, *Psychology*

**Co-Author:** Reza Ghaiumy Anaraky, Human Centered Computing

**Students:** Hannah Barfield, Hannah Savereno, Triston Evans

Digital technology is continually transforming the way society communicates, receives information, and completes tasks. Although technology presents many benefits, it can also pose risks to privacy. With digital information sharing, there can be concerns or naivety surrounding the privacy and security of the data that is collected and shared. The purpose of this study is to characterize age-related differences digital privacy decisions. As part of the study, participants engage with several apps and decide which information they would like to disclose or withhold. Participants also rate how they perceive the benefits and risks of using the

apps. This study compares privacy decision-making across three different contexts: health contexts, financial contexts, and automotive contexts. Preliminary results suggest that in health contexts, but not financial contexts, older adults perceive greater risks for using the app than younger adults and are less likely to use the health app. No significant age-related differences in perceived benefits of app usage were observed.

## POSTER #18

Calling 9-1-1: What is the Subjective Experience of Calling for Help in a Medical Emergency?

**Mentor:** Cynthia Pury, *Psychology*

**Co-Author:** Brandon McIntyre, *Industrial/Organizational Psychology*

**Students:** Rylee Bryant, Ethan Butler, Andrew Chapman, Samantha Galloway, Kaelin Poli, Grayson Reimer, Jacob Weidner, Jaime Woodruff

9-1-1 dispatchers talk people through some of life's worst experiences, yet due to HIPPA and other privacy regulations, dispatchers rarely know the outcome of medical calls. They need to maintain a calm and reassuring presence in both serious emergencies as well as situations where 9-1-1 assistance, objectively, is not needed. They experience high rates of burnout and other consequences of occupational stress, and anecdotally find less reward in calls that are not true medical emergencies. We've partnered with an international provider of medical 9-1-1 training to examine the subjective experience of 9-1-1 callers in a medical emergency. We hypothesize that the psychological comfort provided by dispatchers to 911 callers is consistent across all acuity levels of medical emergencies. Initial data on subjective caller experience is presented; should our hypothesis be supported additional information about the good that dispatchers do for all callers can be used in training.

## POSTER #19

Thermoreversible Hydrogels for Sustained Drug Release in the Brain

**Mentor:** Jessica Larsen, *Chemical & Biomolecular Engineering*

**Student:** Connor Addy

Hydrogels, a network of crosslinked polymer chains, provide sustained drug release, and can be inserted into body cavities and adapt in shape. Also, some hydrogels are capable of thickening when heated, which sets them in place. The gel formulated in this study will be placed in the brain following tumor removal and release drugs over time to prevent cancer recurrence. We use NIPAAM-co-BMA, made up of N-isopropylacrylamide (NIPAAM) and butyl methacrylate (BMA) which lend thermoreversible properties with hydrophobic crosslinks, which can form or dissolve as temperature changes. Gel formulation and testing can be inconsistent, in which water loss and other changes occur during creation. This alters gel properties and makes testing significantly more difficult. This project consists primarily of optimizing gel properties by changing ratios of the different compounds composing the gel. The ideal gel will thicken under 37 degrees Celsius. Another important quality of the hydrogel are the mechanical properties, mimicking native brain tissue to prevent any damage due to modulus mismatch. Additionally, the gel must not leach any toxic compounds that can negatively affect the brain. The gel was heated from 25°C to 45°C at a rate of 2 minutes per degree. Gels with increased NIPAAM concentration, up to 25% greater, almost tripled in absorbance demonstrating that less light is passing through the gel due to its thickening. Qualitative analysis also demonstrates the thickening of the gel after heating, normally beginning on the outside as the gel gradually becomes more viscous in the center. Exploring alternative drug delivery methods that bypass the blood brain barrier's (BBB) selective permeability is important. Mechanical properties will be optimized for drug delivery applications. This gel will be tested in cell culture and animals to determine toxicity.

## **POSTER #20**

Plea Bargaining in Prohibition-era South Carolina

**Mentor:** Howard Bodenhorn, *Economics*

**Students:** James Brown, Caroline Capps, John McElhaney, Nick Rucker

Legal historians contend that plea bargaining was little used before the 1920s when federal Prohibition enforcement overwhelmed courts' capacity to adjudicate cases at trial. Contemporary observers and legal historians express concerns over the reliance on plea bargaining because shortened sentences may mitigate the deterrent effects of the criminal law, because plea outcomes are less transparent than public trials, and because a system of wide prosecutorial discretion may be subverted by political influence or personal prejudices. Using data from Greenville, South Carolina we investigate the extent to which state prosecutors negotiated pleas to dispose of criminal cases. We find that prosecutors secured a plea by agreeing to a charge less serious than that in the original indictment in just 13% of cases. Juries convicted defendants of a less serious crime in nearly 18% of cases. Prosecutors agreed to sentences for defendants that pled 85% of those imposed on defendants convicted at trial. Criminal defendants in Prohibition-era Greenville received modest benefits from pleading relative to standing trial. The question then is: why plea? We provide evidence that pleaders were more likely to be convicted at trial, all else equal, than defendants who went to trial. Although the plea discount was modest, defendants who pled were rational given that they face a greater likelihood of conviction and only modest sentence concessions.

## **POSTER #21**

Creative Play

**Mentor:** Carlos Barrios, *School of Architecture*

**Students:** Brandon Brown, Evan Budelmann, Lindsey Heath, Lincoln Loeffler, Emma Sargent, Adrianna Spence, Joe Whipple, Jacob Wiles, Tyler Yancey

This CI focuses on the use of toys to foster and develop the creative process in group activities. The poster will present findings from the exercises developed in the course of this project. Through in class exercises and readings we seek to understand the role of toys in creativity.

## **POSTER #22**

NextUp IV Invitational: Exhibition Planning, Communication and Installation

**Mentor:** Denise C Woodward-Detrich, *Art*

**Students:** Morgan Davis, Tiffany Oliver

What components are needed when preparing visual arts exhibitions for university campuses? Clemson Curates Creative Inquiry Team presented NextUp IV Invitational Exhibit. Now in its fourth year running, coordination of the exhibition requires multiple levels of programing and coordination. Clemson Curates engaged in planning, art selection, layout, framing, marketing and event planning. Our goal with the project was to communicate the processes, creative problem solving and content of works included in the exhibit. Clemson Curates Creative Inquiry Team developed and facilitated different programmatic elements to assist in communication and dissemination of information regarding artistic intent for our various audiences. What components are needed to mount an exhibition of work showcasing a diverse group of artists? What kinds of framing and display strategies are needed when hanging and displaying two and three-dimensional works of art? What kinds of interpretative materials are needed to assist audiences in understanding the content and research goals of visual artists? NextUp IV Invitational showcases a wide range of material usage, processes, forms and content within the exhibit. Clemson Curates Creative Inquiry Team prepared support materials to assist different audiences in acquiring a fuller understanding of the artists motivations, observational and technical skills artists utilize, and the content of their work through various communication platforms. Overall our research touched on the many different facets involved in exhibition planning, marketing, installation, information communication, artist research and project management. Through research, analysis and engaged practice Clemson Curates Creative Inquiry Team examined these questions.

## **POSTER #23**

Exploring the Health Effects of Electronic Nicotine Delivery Systems

**Mentor:** Chloe Greene, *Student Health Center*

**Student:** Emily Goude

Since the introduction of electronic cigarettes to the United States in 2006, their popularity has skyrocketed to the point of public health officials calling their use an “epidemic.” With the increasing options, availability, and ease of obtaining nicotine delivery devices, it is crucial to explore the adverse effects they have on the human body. The utilization of survey data in combination with medical case studies, medical journal articles, and Center for Disease Prevention and Control (CDC) data will allow the potential health implications of nicotine delivery devices to be dissected.

## **POSTER #24**

Study on Dating App Use and College Student Well-being

**Mentor:** McKenzie McNamara, *Student Health Center*

**Co-Author:** Brooke White

**Students:** Sydney Balcerzak, MadiSyn Currie, Randy Fang, Caroline Zissette, KT Yacu

Dating App usage among college students is becoming extremely common. With large numbers of students using dating apps it is important for us to ask what impact this use has on the well-being of college students. The creative inquiry team on college student well-being has focused a research study on the emotional, physical, and social well-being of college students who use dating apps over the Fall 2019 and Spring 2020 semesters. We collected participants using a snowball sampling method. Utilizing interviews and surveys, the creative inquiry team asked participants about their dating app usage focused on the areas of motivation, safety, sexual health, emotional impact, and social connectedness. We are still early in the review and reflection process and hope to provide an overview of our findings in this poster.

## **POSTER #25**

Genetic Interaction Screens using MuSIC

**Mentors:** Madeline McCarthy and Marc Birtwistle, *Chemical & Biomolecular Engineering*

**Students:** Nishi Patel, Charlie Haskell

Most cancers require combination therapy and while CRISPR-based technologies have greatly modernized biomedical science, CRISPR can only screen one gene at a time. For this reason, identifying human gene interaction effects of simple phenotypes on cancer cell growth remains difficult. As cancer is a fundamentally multigenic disease, multiple-genetic interaction screens on the genome-scale would significantly improve our ability to associate groups of drug targets to specific cancer types. Multiplexing using Spectral Imaging and Combinatorics (MuSIC) leverages the wide palette of currently available fluorophores and the mathematical power of combinatorics, by creating new independent probes from covalently linked 2 or 3-way combinations of individual fluorophores, where combinations give rise to unique spectral signatures. We propose MuSIC-based fluorescent protein barcodes for unbiased, CRISPR-based genetic interaction screening in single live cells that approaches genome-scale.

## **POSTER #26**

Dying a Slow Death: Patterns of Delayed Overstory Mortality Following Wildfire in the Southern Appalachians

**Mentor:** Donald Hagan, *Forestry & Environmental Conservation*

**Students:** Carson Colenbaugh, Brian Tate, Brayden Williams

Wildfires in late 2016 burned tens of thousands of forested acres across the southern Appalachian region. These events, unprecedented in recent history, created a unique opportunity to conduct important fire ecology research in affected areas. This project is a collaborative effort between Clemson and the US Forest

Service (Chattahoochee National Forest) in GA to assess the impacts of these fires. In 2017, we established a series of long-term vegetation monitoring plots, with the aim of documenting the patterns and drivers of overstory mortality in affected areas. While limited mortality was observed in the first 2 years after the fire, substantial mortality - across all size classes and for most species - occurred between 2018 and 2019. Here we speculate on some possible mechanisms behind this uptick in mortality.

## POSTER #27

Clemson Engineering Without Borders in El Serrano, Nicaragua

**Mentor:** Mark A. Schlautman, *Environmental Engineering & Earth Science*

**Students:** Sophia Hennessy, Sarah Catherine Rowell, Phillip Storie

Clemson Engineering Without Borders partners with a rural community in Nicaragua called El Serrano. Throughout this partnership, we have assessed their water system and infrastructure, designed a plan for improvement, and implemented the first steps of this plan. The project plan includes designing and building a bridge, creating a new water source, and improving the current water purification system. Each week, we come closer to completing these goals while developing a relationship with the community we are working with. This project combines classroom engineering with real world problem solving.

## POSTER #28

A Non Viral Episomal Vector System for Induced Pluripotent Stem Cell (IPS) Production

**Mentor:** Xianzhong Yu, *Biological Sciences*

**Students:** Alexa Rubenstein, Hannah McKee, Brooke Taylor

The goal of this research is to build a non-insertional episomal plasmid vector for induced pluripotent stem cells (IPSCs). The use of IPSCs allows scientists to bypass the ethical concerns that arise when utilizing embryonic stem cells. These induced pluripotent stem cells could potentially be used in therapeutic treatments for Parkinson's, Alzheimer's, and Sanfilippo Syndrome. In order to accomplish this goal, retroviruses were initially used. However, there are safety concerns for using retroviruses in human therapy. Instead, our CI team is building a nonviral episomal vector based on the phage T7 promoter and Semliki Forest virus (SFV) RNA replicase, which is expected to reduce or eliminate the risk of insertional mutagenesis while solving the problems of gradual loss of vectors from transfected cells when using regular plasmid DNA. Our preliminary results with murine embryonic fibroblast cells showed that the initial RNA transcripts could replicate and partition into progeny cells. ES like colonies were successfully induced with this vector system and the pluripotency of these colonies was confirmed by morphology, Alkaline phosphatase staining, and ES marker gene expression. The next step for this project is to establish protocols for differentiating IPS cells into different target cells for the potential therapeutic applications.

## POSTER #29

Using AP Psychology Exams to Assess University General Education Outcomes

**Mentor:** Benjamin R Stephens, *Psychology*

**Students:** Caroline Burgen, Julia Gilstrap, Shreya Sidhu

A "Signature Assignment" has been proposed as an assessment tool for general education classes. One solution for implementing this for a large class would be a multiple choice exam or essay assessment. Participants enrolled in Intro to Psychology were recruited via an online research system and randomly assigned to either complete the 1999 AP Psychology exam, or complete the 1999 AP Psychology essay questions. Two versions of essays and multiple choice quizzes were constructed evenly to ensure congruence and randomly assigned to participants. Participants were given either the essay or multiple choice portion of the exam and were randomly assigned either the A or B condition of either portion. The essay responses were independently scored by the researchers following the AP scoring guide. Disagreements were discussed to obtain agreement. The scores for the MCQ exam group at the beginning of the semester were significantly lower than the MCQ exam group at the end of the semester. The scores for the essay group at the beginning

of the semester were slightly lower than the essay group for the end of the semester, but this difference was not significant.

## POSTER #30

### Human Factors Forensic Analysis of Misstep, Trip, and Fall Incident

**Mentor:** Benjamin R Stephens, *Psychology*

**Students:** Madeline Davis, Calee Thigpen, Delaney Wallace, Kara Wolinski

A “misstep” occurs when one steps forward across a height change to a lower surface but does not anticipate a change in elevation. This experiment investigated a misstep in a classroom on Clemson University’s campus using Porath’s method of conspicuity angles. Upon investigation, it was found that the edge of the stage was too low in conspicuity for an individual engaged in teaching from the stage. Possible contributing factors include inattentional blindness; the failure to notice an unexpected object when attention is focused elsewhere. In this case, a lecturer maintains focus on the lesson rather than the step in front of them.

Researchers suggest adding visual alerts or removal of the entire stage as possible solutions to the misstep hazard.

## POSTER #31

### Collaborative Engineering Design Between Clemson University and Arusha Technical College

**Mentors:** William Richardson, Melissa McCullough, John D. DesJardins and Delphine Dean, *Bioengineering*

**Students:** Erin Coon, Robert Falconer, Sophia Hennessy, Emalie Houk, Illana Jamison, Lisette Jenkins, Amanda LeMatty, Christine Schultz, Ashlyn Soule, Diego Nigoa

This CI aims to improve global health while promoting collaboration with Arusha Technical College in Tanzania. Many of the health issues in low-resource areas can be challenged by collaborating with engineers and engineering students more familiar with the target medical environment. We designed a portable infant insulating and device for transport, a low cost kit to detect and prevent the distribution of falsified pharmaceuticals, and an umbilical cord care kit to reduce neonatal mortality due to infection. Additionally, we are creating an outreach module for elementary aged students using elephant dentures to spark an interest in bioengineering and collaborating with Arusha Technical College to gather data on medical device reprocessing methods in Tanzania to enable safe reuse of medical devices.

Funding provided by NIH R01 MH111366

## POSTER #32

### Determining Sedimentological Characteristics of Major Storm Deposits in Mangroves, Bahía Sucia, Puerto Rico

**Mentor:** Scott E. Brame, *Environmental Engineering & Earth Science*

**Student:** Zack Bopp

An analysis of sedimentological characteristics and foraminiferal composition of a sediment core collected from a coastal mangrove environment can reveal a tropical cyclone record for the area. Examining this record reveals different depositional environments. This approach was used to determine a paleostorm record for the southwest coast of Puerto Rico. A 45-cm sediment core was extracted near the mangroves in Bahía Sucia. The core was subsampled every 4 centimeters for a total of 12 samples. Sedimentological observations were made for each sample. Approximately 200 foraminifera were picked from each sample. Foraminifera/gram, mud content, porosity, agglutinated-to-calcareous ratio, and bulk density were calculated for environmental classification. A principal component analysis was performed to classify samples. Samples BS1-1A (surface) and BS1-12A (deepest) plot as outliers. BS1-8A and BS1-11A share a low agglutinated-to-calcareous ratio and low mud content. BS1-6A, BS1-7A, and BS1-9A share a high percentage of mud, high porosity, and high

bulk density. The remaining five samples have intermediate values that fall between the other two groups. The low agglutinated-to-calcareous ratio and low mud content of samples BS1-8A and BS1-11A indicate that they may be storm layers brought by a storm surge. Ocean shelf sediment typically has low agglutinated foraminifera, more sand (relative to mangroves), and less mud. The high mud content of samples BS1-6A, BS1-7A, and BS1-9A indicate deposition from rainfall runoff during a storm event. The intermediate values may indicate “normal” conditions in which the mangrove was not influenced by tropical cyclone activity. This data suggests that a combination of sedimentological and foraminiferal data can be used to understand storm histories recorded in mangrove environments.

## POSTER #33

### Development and Comparison of Fracture Aperture Measurement Devices for Monitoring Rock Stability at Caesars Head State Park, SC

**Mentor:** Scott E. Brame, *Environmental Engineering & Earth Science*

**Student:** Ryan Monico

Measuring rock fracture stability in dynamic, real world settings requires robust devices with high precision. The failure to have a reliable, consistent data collection system could lead to catastrophic rock falls with the potential to place humans and infrastructure at risk. This research considers the limitations and advantages conferred by previous designs with the goal of increasing reliability and reducing uncertainty. Analysis of first- and second- generation wire and rotary potentiometer designs indicated they were impacted by rockfall impacts or stretching. A linear potentiometer connected to a solid metal rod was proposed. A drop test device was constructed to make side by side comparisons of the old and new designs. We used three drop weights: 1 lb, 2 lb, and 3 lb to measure the effect of falling objects. This device verified that data collected by a wire extensometer connected to a rotary potentiometer was vulnerable to rockfall and other perturbations. We tested several solid rods connected to a linear potentiometer to find optimal reliability and weight reduction. The results indicated that an aluminum rod with a cross-section of 3/8" x 1" was optimal. Two linear potentiometer devices were installed adjacent to existing rotary potentiometer systems along the Rim of the Gap trail in Caesars Head State Park, S.C. The devices recorded data over the winter of 2019/2020. The linear potentiometers showed a one-to-one correlation between temperature and fracture aperture. The rotary potentiometers did not show consistent correlations between fracture displacement and temperature. Using these observations, the linear potentiometer system was determined to offer a distinct improvement over the wire and rotary potentiometers.

## POSTER #34

### Effects of Large Carnivore Reintroductions on Wildlife Community Dynamics

**Mentors:** David Jachowski and Laura Gigliotti, *Forestry & Environmental Conservation*

**Students:** Zoey Chapman, Juliana Humphreys, Abby Johanson, Logan Miller, Martha Stowasser, Sara Westwood

Large carnivores have experienced range contractions worldwide, but reintroduction programs have been successful in restoring carnivores to previously inhabited areas, which in turn can have cascading effects on ecosystems. We studied changes in wildlife community dynamics following a natural reintroduction of large carnivores, which occurred in 2018 when a new section of land was added to the Mun-Ya-Wana Conservancy in South Africa and lions and cheetahs were able to naturally recolonize the area. We collected camera trap data from 19 sites in the reintroduction area during the wet and dry seasons of 2018 and 2019, and identified species present in the photos. We used generalized linear models to analyze changes in species richness, relative abundance, and naïve occupancy over time. We found an increase in site-level species richness in the seasons following the reintroduction, as well as an increase in the relative abundance and naïve occupancy of several species. Our results indicate short-term changes in the wildlife community following the lion and cheetah reintroduction, and illustrate the importance of long-term monitoring to evaluate the success of reintroductions.

## **POSTER #35**

New Geologic Mapping, Petrographic Analysis, and U-Pb Geochronology Reveal the Volcanic History of Riverbed Butte, South-Central OR

**Mentor:** Scott E. Brame, *Environmental Engineering & Earth Science*

**Student:** Susan Elizabeth Allison

New geologic mapping, petrographic analysis, and zircon U-Pb geochronology are used to reveal the complex volcanic history of Riverbed Butte in Oregon. Previous mapping identified two units: an andesitic lava surrounded by an olivine basalt. This mapping determined relative ages for three distinct volcanic units. The oldest are mafic lava flows including olivine basalts, olivine-clinopyroxene basalts, and clinopyroxene-olivine basaltic andesite. Red oxidized scoria exposed in the southeastern portion suggest mafic lava flows originated here. This was followed by effusive eruptions of two dacite domes: a pyroxene-hornblende dacite and a hornblende dacite. The dacite units overlie the earlier mafic lavas and an irregular contact between these dacites suggest that the hornblende dacite may be younger and intruded into the older pyroxene-hornblende dacite. The dacites are devitrified and variably vapor phase altered. Riverbed Butte hosts a northeast dipping normal fault in the southwestern portion that cuts the mafic lava flows indicating that tectonic activity must have occurred after these eruptions. Exact dating with zircons was attempted to obtain U-Pb ages for the two dacites and a pyroxene rhyolite from neighboring Black Hills. Zircons were separated from the Black Hills rhyolite but were not found in the dacites. Obtaining a U-Pb age for the Black Hills rhyolite will give insights into timing of regional volcanism since the only previously reported age from the extensively vapor phase altered Black Hills rhyolite was obtained using less accurate K-Ar ages. Age dating from the Black Hills has important implications for determining the tectonic association of the region as a whole and whether the lavas here are closer in age to the lavas from subduction-related Cascade volcanism or the extension-related Northwestern Basin and Range volcanism.

## **POSTER #36**

Detrital Zircon Analysis of Southern South America to Identify Dust Production Pathways

**Mentor:** Scott E. Brame, *Environmental Engineering & Earth Science*

**Student:** Austin Bruner

Characterizing the dust production pathways of southern South America will help create more accurate climate models and further research on ocean nutrient cycling. The formation of dust production pathways consists of dust generation, transport, and deposition resulting from a sequence of sedimentary transport methods superimposed by climate, atmospheric, and near surface processes. Aridity, along with precipitation, rivers, and glaciers play equally important roles in dust creation. A Holocene-centric view of southern South American dust production sees the hyper arid basins of the Puna-Altiplano Plateau and the glaciated terrains of Patagonia as the primary dust producers. This Holocene-centric view neglects the impacts of Pleistocene glacial-interglacial cycles and their effects on humidity and other near surface processes that influence dust production and transportation. Fluvial, loess, eolian dune deposits, and paleosol sediment samples were collected for detrital zircon analysis using U-Pb geochronology. Zircons were separated from the samples using density and magnetic separation techniques. Extracted zircons were dated using the LA-ICP-MS at USC in Columbia. 100-300 individual zircons/sample were dated for statistical significance. A majority of the samples indicate high probability of Cenozoic age crystals. All of the samples, except one, contained relatively close detrital zircon age distributions. The data point towards two potential dust provenance signals in central and southern South America. Both potential signals may have played a fundamental role in late Pleistocene glacial-interglacial dust production. If proven correct, the presence of these two production pathways contradict the Holocene-centric view of southern South American dust production.

## **POSTER #37**

Determining the Failure Criterion of Additively Manufactured Cellular Materials

**Mentor:** Christopher Kitchens, *Chemical & Biomolecular Engineering*

**Students:** Jonathan Despeaux, Daquan Doctor, Christian Fingar, Luis Morales, Lee Ridlehuber, Zach Romanick, Lea Thomas

The SPECTRA cellular materials CI is exploring how applied tensile, compressive or shear loading drives the material properties and deformation of cellular materials. Cellular materials are composed of self-tessellating repeated structures with low relative densities causing them to be lightweight while retaining high stiffness to weight ratios. The CI designed and additively manufactured multiple types of honeycomb specimens to create a failure map to quantify how the ultimate strength of the cellular material changes with cell topology and loading direction, specifically tension, compression and shear. Manufactured specimens were speckled and loaded to failure while deformation of the cellular material was captured using Digital Image Correlation, a process where high resolution pictures are used to track displacements of paint “speckles” on the honeycomb surface as the specimen deforms. Digital Image Correlation can convert the local displacements to strains to give a visual representation of how the honeycomb specimen is deforming.

## **POSTER #38**

How do Long-Term Food Subsidies Affect Scavenger Species Richness and Diversity Over Time?

**Mentors:** David Jachowski, Stephen Harris and Courtney Marneweck, *Forestry & Environmental Conservation*

**Students:** Keller Brogdon, Cameron Forehand, Abby Good, Matthew Honeycutt, Thandi Nixon, Elyssa Sterneck, Kelsi Sullivan, Taylor Thompson

Camera trapping is increasingly used in wildlife research where some studies utilize bait to increase trapping efficiency. However, the long-term effect of food subsidies is not fully understood. Here, we investigated the effect of a long-term food subsidy on scavenger species richness and diversity in West Virginia. We used data from one camera trap operated for five consecutive winters baited with white-tailed deer carcasses. We extracted species richness and diversity, and performed a Mann Kendall test to investigate if there was a significant change in these variables over time. From 34831 photos, we identified 24 species (avian and mammalian). We found that species richness decreased significantly over time, likely due to dominant species monopolizing the resource and outcompeting subordinate. Although decreasing, species diversity did not significantly decrease over time. Our results show that long-term food subsidies can affect species composition, and further research is required to understand which species were affected. As reliable food subsidies become more common with urbanization, it is essential to understand their effect on ecosystems.

## **POSTER #39**

Locally Grown to Your Home

**Mentor:** Margaret Condrasky, *Food, Nutrition & Packaging Sciences*

**Co-Author:** Joel Hamilton, *Food, Nutrition & Packaging Sciences*

**Students:** Emily Anders, Nicole Hickman, Lindsey Messick, Kat Musial, Audrey McDonald, Caitlyn Meacham, Sydney Murin, Jessica Hardiman

The research being presented comes from a program called Produce Rx. This unique program serves individuals who live below the federal poverty line, are uninsured, and have a diet-related health condition (Diabetes Mellitus, Hypertension, etc.). Participants receive a nutrition prescription (Produce Rx). This consists of local produce and encourages a plant-based diet. This provides two servings of produce to last the participant fourteen days. Produce Rx puts the term “food is medicine” into action. Research has shown that the diet our program encourages has been effective in the management of diet-related diseases. Participants also receive nutrition education and a cookbook. The CI students worked in teams to present this cookbook.

They were engaged in the testing and standardization of (n=35) recipes with an emphasis on plant based entrees and side dishes. A nutrient analysis and sensory score was performed on each recipe with an emphasis on appearance, taste, texture, and aroma. These recipes meet the nutrition criteria for the project for sodium, calories, protein, and fat for the target population.

## **POSTER #40**

### **Soil Inventory of Private Lands in South Carolina**

**Mentors:** Christopher Post and Elena Mikhailova, *Forestry & Environmental Conservation*

**Students:** Christopher Gibson, Caitlin Littlejohn, Duncan Williamson

Most of South Carolina's land is currently owned by private families or individuals. The objectives of this study were to conduct soil inventories of private lands in various locations in South Carolina using the Web Soil Survey, to collect soil samples, to analyze these collected soil samples using Clemson University Agricultural Service Laboratory, and to make management recommendations. Various soil series were identified within the private lands and rated based on their suitability's and limitations (e.g., building site development, land classifications and management, vegetative productivity and waste management). Soil nutrient analysis recommendations are discussed to maximize agricultural productivity while minimizing environmental impact. The Clemson University Creative Inquiry Program supported this study.

## **POSTER #41**

### **Soil Judging Project**

**Mentor:** Elena Mikhailova, *Forestry & Environmental Conservation*

**Students:** Morgan Brownlee, John Clifton Chalk, Nicholas Crow, Shanice Finley, Jimmy Franklin, Kolin Fringer, Caitlin Littlejohn, Hannah Lukanic, Davis Motley, Jacob Wilson  
Soil Judging Project teaches students important skills for field identification of soil types, their properties, and interpretations for use. Soil Judging Project can be beneficial to students as well as government agencies and private sector. The objective of this study was to learn how to describe the soil morphological properties (e.g., horizons, texture, color, structure, consistency, and redoximorphic features), interpret soil profile properties (e.g., infiltration, hydraulic conductivity, available water, soil wetness class), identify site characteristics (e.g., position of site, parent material, slope, surface runoff, erosion potential), and classify soil. A Southeastern Region Soil Judging Handbook was used by students from various disciplines (e.g., business, accounting, etc.) to master the skills of soil description, identification and interpretation in the field. Soil Judging Project can significantly improve soil education and mitigate problems associated with land use management.

## **POSTER #42**

### **National Brick Research Center Mobile Application**

**Mentors:** Gary W Parker, Anne Jenkins, John Sanders and Randi Sims, *National Brick Research Center*

**Co-Author:** Kalpit Vadnerkar, *School of Computing*

**Students:** Ryan English

The National Brick Research Center (NBRC) provides services to producers and users of clay bricks and other ceramic materials (tile, mortar, and ceramics). The increasing popularity and efficiency of mobile devices has led to a need for the NBRC to have an application for its users. Through this creative inquiry, we attempted to tackle this need by developing a mobile application for the NBRC. Material Science and Engineering students were tasked with putting all of the technical and testing information available at the NBRC onto the app. The students in the Computer Science group worked to develop the format, structure, and back-end of the app with the help of Appypie.com. This consisted of creating all of the features, designing the layout and graphics, and linking the app to the existing websites of the NBRC. This

automation effort will reduce the work-load of the staff and deliver a degree of autonomy to the users. Students, Researchers and Industrial personnel can make use of this to satisfy their needs and conduct their operations more smoothly, and with more knowledge and clarity of what is actually done at the NBRC.

## POSTER #43

Development of Assistive Technologies for Use in K12 Archery Program

**Mentors:** Meredith Owen and John D. DesJardins, *Bioengineering*

**Students:** Sarah Bartro, Cristian Harris, Jordan Martin, Kaela O'Leary, Tyler Piel, Carol Stegura

The ARCHER Creative Inquiry was developed in collaboration with Anderson School District 4 to develop engineering solutions that will assist k-12 students with participation in the archery section of physical education (PE), a section that is now required at all Anderson4 schools. The goal of the Creative Inquiry is to develop a set of adaptive equipment that can be used by students with varying degrees of physical disabilities. Currently, devices are being finalized, based on testing and discussions with relevant Anderson4 personnel, for full time use in the schools. Devices include a universal base for bow support and an aim assist device. The universal base features a stand with a bow mount that allows for the ability to aim as well as the ability to lock the bow in a stable position. The aim assist device is designed to help students aim using vibrational feedback. Special acknowledgments to ASD4 for their time and the Clemson University Creative Inquiry Program for funding.

## POSTER #44

Comparative Body Shapes of Amphidromous Goby Fishes Living in Different Predator Regimes

**Mentors:** Richard Blob and Kelly Diamond, *Biological Sciences*

**Student:** Gill Griner

The evolution of morphological specializations across prey species might be driven by differences in the predators that prey encounter. Goby fishes provide a system that experiences a spectrum of predator regimes across different habitats, making them ideal for studying how such regimes relate to prey morphology. On the islands of Hawai'i and La Réunion, goby species that cannot climb live consistently with predators throughout their life. However, some species can climb waterfalls, which allows them to either live in predator-free (Hawai'i) or diminished-predator (La Réunion) habitats as adults. We expected to find distinct body shapes between species from different predator regimes, and measured these differences using geometric morphometrics. Fish living consistently with predators had deeper bodies that would be harder to consume than those that can climb. These results show how body shape relates to predation pressure across natural habitats.

## POSTER #45

Blood Pressure, Perception of Emotion, Risk Taking, and Social Anxiety

**Mentor:** James A McCubbin, *Psychology*

**Students:** Grace Hogan, Tevej Rhodes, Rachel Shaughnessy, Audrey Ulmer, Roe Willcox, Sophie Finnell, Anna Kadau

Mildly elevated resting blood pressure is a risk factor for hypertension, and is associated with dampened emotional responses. In turn, dampening of emotional responses may lead to increased risk-taking and psychosocial challenges. The present study examines the relationships among resting systolic (SBP) and diastolic (DBP) blood pressures, perception of emotion in facial expressions, financial risk taking, and social anxiety in 53 healthy, normotensive, volunteers. Higher SBP was correlated with increased risk taking, while decreased emotion perception was associated with higher social anxiety ( $p < .05$ ). In women, higher DBP was associated with decreased emotion perception, while higher SBP was related to higher social anxiety.

In men, higher DBP correlated with increased risk-taking behavior. Social anxiety appears to be associated with higher blood pressure and reduced accuracy in perception of emotional expression, but the potential mechanistic role of these factors in the development of hypertension will require additional research.

## POSTER #46

### Development of Recombinant Baculovirus Expression Vectors for Analysis of Mutualistic Virus Gene Regulation

**Mentors:** Matthew Turnbull, *Biological Sciences*, and Daniel Howard, *Microbiology*

**Students:** Rachel Carter, Meredith Cobb, Kelsey Miller, Alexis Yoh

While the majority of known viruses are parasitic and induce negative costs on their host, mutualistic viruses that increase fitness of their host are being increasingly recognized as common. Understanding the evolution and ecology of mutualistic viruses can aid in predicting evolutionary factors associated with pathogenesis in parasitic viruses. Here, we propose to study gene expression regulation of a mutualistic Polydnavirus. Polydnaviruses are a highly diverse family of viruses (>30,000 species predicted) which are associated with certain parasitoid wasps; the wasps require the Polydnavirus for successful exploitation of their larval lepidopteran host, in which the Polydnavirus induces immune and metabolic disruptions, while the Polydnavirus requires the wasp for transmission. Our goal is to examine evolution of Polydnavirus gene regulation across a range of susceptible-to-unsusceptible, ecologically-relevant host lepidopterans. To do so, we are generating recombinant baculoviruses which will express a red fluorescent protein (mCherry) under regulation of a very late viral promoter (p10) to serve as a marker for baculovirus infection, as well as a green fluorescent protein (sfGFP) under control of a putative Polydnavirus regulatory element. Relative promoter strength and timing will be examined by fluorescence plate reader in lepidopteran Sf9 cell line. Strength, timing and tissue specificity will be compared between recombinant baculovirus-infected susceptible and non-susceptible lepidopteran larvae. The studies will complement other CI investigations into Polydnavirus protein function, protein interaction partners, and ecological occurrence, and provide a platform for identification of host-specific regulation of Polydnavirus gene expression.

## POSTER #47

### Identification of Stem Cell Markers in Caterpillar Midguts

**Mentors:** Matthew Turnbull, Zilan Li and Richard Melton, *Biological Sciences*

**Students:** Ember Lewis, Dani McLaughlin

Caterpillars cause \$10s billions in lost agricultural revenue annually worldwide. Control is primarily via chemicals, which are expensive and have significant off-target effects, and through transgenic crops expressing Bt-crytoxins. While the latter are specific for caterpillars, evolution of resistance to crytoxins appears to be increasingly common in fields. Most studies of resistance identify mechanisms upstream of toxin-induced damage as critical, however replenishment of damaged gut cells by stem cells has also been identified as important. Gut stem cells also are required at each larval molt for growth, resulting in up to a 400x increase in gut cell number during juvenile development. Thus, a better understanding of stem cell regulation would be useful in controlling pest caterpillar populations. To date, caterpillar gut stem cells have been identified based on morphology and assumptions grounded in mammalian studies. We are developing markers for caterpillar gut stem cells, which will enable us to isolate and manipulate stem cells in future work. We propose to use fluorescence microscopy to determine correlation of cell size to esterase activity (reported to be higher in stem than mature cell populations), mitochondrial number (hypothesized to be higher in mature than stem cells) and mitochondrial membrane potential (hypothesized to be higher in mature than stem cells). The identified patterns will be used to characterize primary gut cell culture viability and population dynamics through time and after modification with known and proposed inducers of division and differentiation. These data will be used to design oral modifiers of caterpillar gut stem cell activity.

## **POSTER #48**

Chemotaxis in *Physarum polycephalum*

**Mentor:** V. Christine M. Minor, *Biological Sciences*

**Students:** Andra Cummings, Tristan Dover, Jeannette Fantone, Henry Morgan, Sabrina Salley, Faith Shupard

Our Creative Inquiry group is studying intracellular communication using plasmodial slime mold *Physarum polycephalum* as a model organism. *P. polycephalum* is unique as it has the ability to solve mazes but lacks the neural network typically associated with the cognitive function necessary to complete such complex tasks. Our goal is to determine how this organism is able to interact with the environment and itself. We 3D printed mazes in a nylon alloy to create a standard reusable design. Then, we observed the behavior of *P. polycephalum* in the maze to determine chirality and substrate sensing of food sources. To test substrate sensing we varied the amount of direct contact the food source had with the substrate and recorded the speed at which the maze was solved. *P. polycephalum* shows no signs of chirality and has the ability to sense the food through the substrate; however, we do not know if they can sense the amount of food present. The rate of maze solving decreases with more interruptions in the substrate. Our new goal is to use this information to further improve our understanding of the impact of nutrient source on the maze solving ability of *P. polycephalum*. Thank you to Creative Inquiry for supporting our research.

## **POSTER #49**

Infant Concussion Assessment Device

**Mentor:** Andrew T. Duchowski, *School of Computing*

**Students:** Harper Abbott, Anthony Alerre, Beckilyn Dorsey, Mara Hartsell, Anderson Schrader

The mission is to improve the quality of life for infants by developing an innovative product designed to help ER staff accurately diagnose concussions. Because infants are unable to communicate their cognitive, visual, or verbal state, ER doctors are unable to perform a concussion assessment and need a way to accurately diagnose concussions in patients 0-2 years of age. The Creative Inquiry (CI) team has built a small, portable device based on principles of Electro-OculoGraphy, or EOG. The EOG device measures eye movements of the wearer to assess whether there is any indication of concussion. Concussed patients will typically exhibit sporadic nystagmus eye movements. The CI team's prototype is built from a simple Arduino device that feeds into a laptop via USB cable. Software has been developed which is used to analyze the time series signal via differentiation to detect saccades. Work is continuing to evaluate the device against baseline measurements.

## **POSTER #50**

Amphibian Biodiversity in a Pendleton Woodland

**Mentor:** John R. Wagner, *Environmental Engineering & Earth Science*

**Students:** Jade Richard, Winter Widdifield, Priya Chokshi, Sydney Belt

Biological research has been conducted over a three-year period in a woodland area adjacent to Pendleton Elementary School in Pendleton, South Carolina. The woodland contains both a dryland and wetland ecosystem, and is home to a variety of animal species. The stream that runs through the study area is home to several different amphibian species, primarily frogs and salamanders. Clemson undergraduate students have sampled the stream at different times during the year and recorded the number and type of species found. One particular objective was to document the life cycle of the resident frog population by photographing and collecting eggs, tadpoles, and adult frogs. The results of this research were presented to elementary school students and incorporated into a "lifecycle of a frog" lesson plan designed to meet the second grade science curriculum standards.

## **POSTER #51**

Work Demands and Meaningful Work Experiences as Predictors of Fatigue, Stress, and Performance among Emergency Physicians: A Shift-Level Approach

**Mentor:** Thomas W. Britt Jr., *Psychology*

**Students:** Rebecca Kerr, Cavan Peters, Sophie Finnell, Delaney Wallace

Previous research has established that emergency physicians (EPs) are at an increased risk for burnout. However, limited research has focused on the factors that protect against burnout in EPs, especially across shifts. As a result, the current study aims to bridge this gap by assessing 40 emergency physicians over the course of 8 shifts. Pre-shift and post-shift measures include survey assessments of fatigue and sleep quality, shift demands, meaningful work experiences, overall shift ratings, salivary cortisol as an indicator of stress, and an objective fatigue test with a pupillometer. In addition, patient satisfaction data was collected in regards to physician performance. Data collection is currently ongoing, and preliminary results are being analyzed. This research, sponsored by an Impact Seed Grant from the Clemson University College of Behavioral, Social and Health Sciences, the Prisma Health Emergency Department, and the University of South Carolina School of Medicine, will allow for a better understanding of how meaningful work experiences affect the fatigue, stress, and performance of EPs.

## **POSTER #52**

Behavioral Rehearsal in Suicide Prevention Training among Resident Assistants

**Mentors:** Martha Thompson, *Public Health Sciences*, Kristi Bussell, *Student Health Center* and Heidi Zinzow, *Psychology*

**Students:** Grace Falgoust, Eleanore Fernandez, DeMarco Grayson, Rebecca Roth, Evangeline Sanders, Daniel Solomon

Suicide is the second leading cause of death among college students. Gatekeeper training for campus stakeholders entails education and skills training to promote efficacy in identifying and referring at-risk students to resources. We examined differences in knowledge and skills based on the addition of a behavioral rehearsal session to Clemson's standard gatekeeper training, with 48 resident assistants receiving the enhanced training and 20 receiving the standard training. We administered baseline and follow-up surveys and analyzed the data with repeated-measures ANOVA. There were no significant differential changes between the two groups in knowledge or behavior. However, both groups did significantly improve in knowledge and suicide prevention behaviors over time. Future research with a larger sample size would better determine the effectiveness of additional behavioral rehearsals in suicide prevention gatekeeper training.

## **POSTER #53**

Beyond Cute Sells: How Caretaking Moderates Engagement with Cuteness

**Mentor:** Oriana Aragon, *Marketing*

**Students:** Nick Shaarda, Nathan McDowell

Traditional approaches in marketing treat cuteness as a general method of facilitating consumer attraction to products. Within the predominant evolutionary paradigm, consumer attraction to cuteness is explained by the drive to care for and ensure the propagation of offspring (Lorenz, 1943). However, such an approach presupposes on universal parental motivations among adults of childbearing age, a presupposition that is increasingly mismatched with modern cultural norms (Schondelmyer 2017). Accordingly, the following research addresses the question of how different parental goals impact engagement with cuteness. Caretaking perceptions are also manipulated in order to examine their effect on product engagement. The results of the study found that parental motivation and perceptions of caretaking needs moderated their engagement with cuteness. Advertisers need to take into account parental motivations and how they portray babies prior to their usage in marketing material.

## **POSTER #54**

Assessing Growing Season Prescribed Burns to Control Chinese Tallow

**Mentors:** Gaofeng Wang, Bridget Blood and Calvin Norman, *Forestry & Environmental Conservation*

**Student:** Caroline Myers

Chinese tallow (*Triadica sebifera*) is a tree native to China and naturalized in the Southeast United States. Populations of Chinese tallow inhabiting favorable sites can outcompete native vegetation and negatively impact their regeneration, sometimes creating a stand-replacing monoculture. This study seeks to determine the effectiveness of prescribed burns in lowland hardwood and upland pine stands in Nemours Plantation in Beaufort County, SC, USA. We aim to determine if prescribed fire can be used to control Chinese tallow. Before burning, four 50-m transects in each forest type were randomly established. Chinese tallow falling within five meters of the transects were tagged and measured. Measurements included diameter at breast height, ground line diameter, height, developmental status (seedling, sapling, stump sprout, tree), live crown ratio, and vigor. Growing season prescribed fires were applied between March and May. Initial measurements following the prescribed burns showed Chinese tallow with less charring compared to native hardwoods, but the Chinese tallows were top-killed by the fire. Four months following burns, Chinese tallow has sprouted as stump sprouts, increasing the number of stems in each stand. Initial findings suggest that prescribed fire is not an appropriate control method for Chinese tallow.

## **POSTER #55**

Identifying the Impact of Movement and Air Disturbance in the OR

**Mentor:** Kevin Taaffe, *Industrial Engineering*

**Students:** Paige Fetchen, Sheala Hulbert, Marisa Shehan, Taliyah Smith, Mary Grace Stachnik

Over 50 million people undergo a surgical operation each year. A significant issue faced by many patients is a surgical site infection, which occurs when bacteria from the operating room enters an open wound on the surgical table. The purpose of this study was to identify factors that cause an increased buildup of microbes within the operating room during surgeries, in order to decrease the risk of infection. A study was designed in which settle plates were distributed around an operating room, at high and low levels, to collect samples of bacteria and fungi during multiple simulations of a total knee replacement surgery. Each run consisted of thirty minute prep and surgery phases and had either a high or low level of door opening times, door opening widths, and amount of staff movement. A control phase was also used to collect microbes for thirty minutes without any movement occurring in the operating room. Each member of the creative inquiry team watched videos of a specific staff member's role to then study and imitate during each scenario that was run. After the first set of trials were run, it was found that the prep and surgical phases consistently created higher microbial loads than the control phase, and a low number of door openings caused higher loads for fungi only. A second set of trials showed a significance in high and low levels of plates, staff movements, and door openings. Higher staff movement and longer door opening durations caused consistently higher microbial loads than short staff movements and durations. Lower level settle plates also showed a higher count, meaning that bacteria was falling and settling at ground level. In the future this work will be presented at Prisma Health System's monthly staff meetings to see how these findings can help improve surgical protocols.

## **POSTER #56**

Extended LaMer Synthesis of Substituted Ferrite Nanoparticles

**Mentor:** Olin Mefford, *Materials Science & Engineering*

**Co-Author:** Zichun Yan

**Students:** Emma Brandberg, Corey Kubat, Sarah Spence

Magnetic nanoparticles show great promise in a variety of biomedical applications such as magnetic hyperthermia treatment, drug delivery, and MRI contrast agents. These particles are useful because of their size-dependent and controllable magnetic properties. While traditional research has been done with iron oxide nanoparticles, researchers are now looking toward metal substituted nanoparticles in the hopes for even more magnetic property control. This project focuses on improving the synthetic method in producing variable composition manganese ferrite nanoparticles because these particles exhibit high and tunable magnetization. The extended LaMer synthetic technique is a new method that exhibits better size and composition control in the production of these particles. Particles were characterized by ATR-IR, TGA, AC Susceptibility, TEM, XRD, and AC Calorimetry.

## **POSTER #57**

Bamboo Reinforced Concrete

**Mentor:** Weichi Pang, *Civil Engineering*

**Co-Authors:** Lancelot Reres and Rob Smith

**Students:** Za'Cori Ross, Grace Brokaw, Tate Pouch, Courtney Templeton, Rebecca T. Cantley, Jake Burttram

The inspiration of this project is to determine the feasibility of bamboo as an alternative to steel rebar as reinforcement in concrete structures, specifically in underdeveloped communities. Bamboo is an abundant resource found in various parts of the world. However, there is little experimentation on its use as a building material. The purpose of this study is to determine the tensile strength of bamboo and how it is impacted by twisting of the specimen. The procedure for experimentation started with cutting 1-month aged bamboo into roughly  $\frac{1}{2}$  inch thick strips. These strips were cut down into 1 foot long sections. Three types of specimens were tested: nodal, twisted, and clear. This process was repeated five times to allow for more definitive results. The specimens were then sanded into 'dog bone' shapes with an edge to clamp onto (for tensile testing). This research would not be possible without the support of the Clemson Civil Engineering Department.

## **POSTER #58**

An In-Depth Examination of Physician Fertility History

**Mentors:** Zach Klinefelter and Thomas W. Britt Jr., *Psychology*

**Student:** Rebecca Lindgren

Health care workers face immense stress each day caring for patients in need. This experience is magnified for physicians within the emergency department as patients are in critical condition and desperate need. Such increased stress affects physicians physically as they stand on their feet for prolonged shifts, physiologically as they are exposed to various chemicals, and psychologically as they consider the lives of others in their hands. In some unfortunate cases, this stress follows them home. Research has shown that increased physical and psychological stress can increase the likelihood of issues during pregnancy, and these stressors are those that female health care workers face daily. However, little research has been done to identify how the high-stress environment of the emergency department impacts female fertility, the present study sent out an epoch-based questionnaire aiming to investigate the history of fertility success and failure during a physician's medical career. Attempts of conception, difficulty of conception, difficulties during pregnancy, and pregnancy outcomes were explored within the questionnaire for the time period before medical school up to present date. Female physicians from a large hospital system in specialties were invited to participate in order to distinguish key differences between emergency physicians and physicians in general. Responses from 303 female physicians representing 18 specialties were recorded. Results indicated

that emergency physicians were 2.8 times as likely to go see a doctor for fertility issues than other specialties. Emergency physicians were also 4.96 times as likely to receive intrauterine insemination than other specialties. The methods, key findings and implications will be discussed during this presentation.

## POSTER #59

### Disposable Point-of-Care Home Testing Platform for Metabolic Disease

**Mentor:** Renee Cottle, *Bioengineering*

**Students:** Chase Bailey, Pauline Bisaccio, Allen Khodab, Erin O'Neill, Tarah O'Sullivan, Keeghan Alexandria Shropshire

The motivation of the project is to develop a low-cost, disposable, stand-alone point-of-care diagnostic system to help caregivers of patients with glycine encephalopathy, which is a rare metabolic disorder characterized by the accumulation of glycine in body fluids and tissues. High levels of glycine in the body results in seizures and limited intellectual development. We envision that our assay will allow caregivers to monitor glycine levels at home, adjust the patient's drug treatment schedule, and improve the patient's quality of life. Specifically, we are formulating a colorimetric assay that involves a chemical reaction for quantifying the amount of glycine in urine using a spectrophotometer. We developed a procedure for measuring glycine and generated a standard curve correlating the absorbance levels and concentration of glycine in solution. In ongoing work, we will optimize our chemical reaction to detect physiological levels of glycine in urine.

## POSTER #60

### Using a Mixed-Reality Simulator to Provide Preservice Teacher Instruction in the System of Least Prompts

**Mentors:** Sharon Walters and Shanna Hirsch, *Education & Human Development*

**Students:** Marianne Beck, Margaret Huggins

Special education teachers are mandated to employ evidence-based practices (EBP) when providing instruction to students with disabilities (IDEA). One EBP that can be effective for students with a variety of disabilities is a system of least prompts (Hudson et al., 2014; SLP). This instructional method uses a prompt hierarchy rather than a single prompt to deliver supports to learners (Hudson et al., 2014). The instructor provides increased assistance until the student responds appropriately. As a result, learners are more successful, and the negative effects learners may experience from incorrect responses are decreased (NPDC on Autism Spectrum Disorders, 2010). Implementation of evidence-based practices (EBP) for diverse learners can be a challenge for preservice teachers (Vince Garland et al., 2016). Many preservice teachers do not receive adequate instruction in or opportunities to practice EBPs (Begeny & Martens, 2006) or do not get opportunities to use and generalize the practice into actual classroom settings (Scheeler et al., 2009). Mixed-reality simulation is a promising technology in teacher training (Larson et al., 2019) allowing teachers to practice instructional techniques with the added benefit of the ability to pause, reflect on, and practice teaching scenarios. In addition, simulated classroom environments provide opportunities to practice instructional techniques in a controlled, non-threatening environment. This presentation will share the results of a study comparing preservice teachers' ability to use a SLP. One group practiced the skill in a mixed-reality simulator and received instructional coaching. The other group received traditional instruction in a university classroom setting. Results compare changes in the ability to use a SLP and analyze participant perceptions of using the mixed-reality simulator.

## **POSTER #61**

Investigating a Two-Tiered EMS Model in Greenville County

**Mentors:** Kevin Taaffe and Vishnunarayan Girishan Prabhu, *Industrial Engineering*

**Students:** Courtney Connolly, Katie Harris, Hannah Megrew, JP Paul

An ambulance can be equipped with two levels of care: advanced life support (ALS) or basic life support (BLS). In the past, Greenville County has operated on a single-tiered model, meaning that all ambulances were equipped with both emergency medical technicians (EMTs) and paramedics for ALS needs. ALS trucks are more costly due to the greater amount of training, knowledge, and therefore salary required for paramedics. While paramedics are essential and useful in many situations, they are not needed for every emergency call. A new model was proposed, changing Greenville County to a two-tiered structure, with five of the twenty-five trucks to be only equipped with only BLS during the day, and four at night. In order to see the impacts of this change on patients and employees, a pre-assessment survey was created to gauge initial thoughts and concerns from EMTs and paramedics about the process. A post-assessment survey was also created to be presented to the same employees after the transition to see the strengths and weaknesses of the new structure. In the future, data will be analyzed to determine if this change has affected response time, patient survival, and other important statistics.

## **POSTER #62**

Profiling Sensitivity of Glioblastoma Cells to Anti-Cancer Drugs

**Mentors:** Marc Birtwistle and Deepraj Sarmah, *Chemical & Biomolecular Engineering*

**Students:** Matthew Birkley, Zain Kazmi, Wesley Meredith, Ian Weber

Glioblastoma is one of the fastest growing and deadliest of cancers. Our goal is to take into account the most important signaling molecules for glioblastoma growth and help build a network connecting these molecules. In order to inform this model, we perform drug-dose response experiments on glioblastoma cell lines, with drugs that are inhibitors of these signaling molecules. These assays are performed by applying a range of concentrations of drugs to U87 cells in a well plate and imaging. The IC<sub>50</sub> values obtained from these experiments should inform us about a phenotypically significant dose of drug. This drug dose can be used as perturbations to the signaling molecules in later experiments in constructing a computational network of the key signaling molecules in glioblastoma. So far, the results in this project include IC<sub>50</sub> values for 22 Drugs on U87 cells, along with phenotype effects on U87 cells seen through phase contrast imaging.

## **POSTER #63**

Impact of Carbohydrate Type and Preparation on Acarbose-Mediated Inhibition of the *Bacteroides* Starch Utilization System

**Mentors:** Kristi Whitehead, *Biological Sciences*, and Daniel Whitehead, *Chemistry*

**Students:** Drew Barnes, Jennifer Cabezas, Emily Hutchison, Olivia McGuirk

Type I diabetes (T1D) is an autoimmune disorder characterized by the destruction of  $\beta$ -cells in the pancreas. Research indicates that the onset of this response may be attributed to changes in gut microbes, particularly in the relative abundances of Bacteroidetes and Firmicutes. Our research focuses on reducing the abundance of *Bacteroides* through the inhibition of their starch utilization system (SUS). This inhibition could potentially delay or prevent the onset of T1D. Our previous results showed that when exposed to acarbose, an  $\alpha$ -amylase inhibitor, starch degradation and growth by *Bacteroides* species is inhibited. We have previously tested clinically relevant species, such as *Bacteroides dorei*, and have now shifted focus to *Bacteroides thetaiotaomicron*. The carbohydrate utilization capabilities are being investigated with an emphasis on different types of media preparation methods of potato starch to see if there is any effect on growth rates. Future directions include investigating other carbohydrate sources and the mechanism by which acarbose binds to the SUS.

## **POSTER #64**

*Lactobacillus reuteri* Metabolism and Growth in the Presence of Bile Salts and Artificial Sweeteners.

**Mentors:** Kristi Whitehead and Krista R Rudolph, *Biological Sciences*

**Students:** Reilly Burgin, Leah Gamble, Tori Lilly, Caitlin Costello, Clancy Kerr, Jessica Pittman

Microbes have significant roles in the human body, ranging from causing detrimental infections to helping maintain a healthy immune system. The goal of this study is to determine how a common gastrointestinal bacterium, *Lactobacillus reuteri*, impacts host metabolism through bile salt hydrolase activity and possible involvement in obesity. Bile salt hydrolase (BSH) activity impacts the host by mediating the initial reaction in the bacterial metabolism of bile acids, but the benefit to bacteria with this activity is unclear. In addition, certain dietary components, including artificial sweeteners, are known to impact the microbiota in ways that are not fully understood. We are investigating the roles of BSH activity and the potential impact of artificial sweeteners on *L. reuteri*. This research is important because understanding the interactions between microorganisms and the molecules within the gastrointestinal tract can lead to a better understanding of host health.

## **POSTER #65**

Engineering the Intervertebral Disc

**Mentor:** Jeremy Mercuri, *Bioengineering*

**Students:** Lindsay Hannah, Ladson Dubose, Beckilyn Dorsey, Nathan Aufderheide, Anna Kelly, Parker Liggett, Apoorva Mehta, Abigail Shaffer, Steven Wallace, Mario Krussig, Victor Cabrera Lumbrales

Intervertebral disc (IVD) degeneration is present in 80% of Americans, yet current treatments are palliative. Our two aims were: 1. Testing the cytocompatibility of a previously derived IVD xenograft scaffold from bovine caudal discs (bIVD) without bony endplates and 2. Creating a new novel decellularization protocol for bIVDs with endplates attached. Previously, a complete decellularization of bIVD was achieved without bony endplates, but undesired swelling occurred. The viability of the swollen, fully decellularized bIVD seeded with stem cells was tested via Live/Dead staining at 14 and 21 days post scaffold seeding. Additionally, the seeded scaffold's metabolic activity was measured via Alamar Blue at 4, 11, 18, and 21 days. The second aim was to decellularize a bIVD with endplates to prevent swelling using a modified protocol. This new protocol was analyzed using an H&E stain for cellularity and a FAST stain for microarchitectural structure retention. Together, testing the cytocompatibility and improving the mechanical properties of the bIVD could lead to the development of a tissue engineered replacement for patients suffering from IVD degeneration.

## **POSTER #66**

High-Performance Cluster Computing: Engaging Young Scientists and Engineers in the 21st Century Laboratory

**Mentor:** Jon Calhoun, *Electrical & Computer Engineering*

**Students:** John Hollowell, Cavender Holt, Jacob Neighbors, Sarah Placke, Sansriti Ranjan, Nikolas Heitzeg

Parallel computing allows a program full access to the computational capabilities inside a single computer or across a networked cluster of computers. As a result, large-scale computing is a fundamental tool for researchers in many fields of science and engineering (e.g., business, chemistry, physics, biology) to model and simulate complex phenomena that are impossible in normal laboratory settings. This Creative Inquiry (CI) is dedicated to opening up parallel computing to all levels of undergraduates in relevant fields of computational science and engineering. In this CI, we explore how high-performance computing (HPC) systems impact various disciplines, how HPC systems are constructed, what it takes to program

parallel applications, how to run parallel applications on an HPC system, and how to measure and optimize application performance. This CI is intended to introduce undergraduate students from various STEM disciplines to parallel computing early in their undergraduate experience. Skills and knowledge gained through hands-on activities, research, and trainings will prepare students for undergraduate research, provide skills to help students stand out and succeed in graduate school, and provide students an opportunity to test their skills against teams from all over the world at the annual Supercomputing Conference's Student Cluster Competition. Each year the annual competition's scientific domain changes (e.g. geophysics, bioinformatics, molecular dynamics, hydrology, climate); therefore, this CI is open to STEM majors who can serve as domain scientists to help interpret scientific results produced by the HPC applications.

## POSTER #67

Team Research in Computational Environments

**Mentors:** Nathaniel McNeese and Beau Schelble, *School of Computing*

**Students:** Jack Carroll, Dylan Cathapermal, Rafael Dejesus, Casey Hird, John Lineberger, Sarah Morrison, Stephen Russell, Mari Kilgus

The teams that humans utilize to complete tasks have come to deeply rely on and integrate technology. The technology today's teams use when completing tasks can involve things like artificial intelligence, communication tools like Slack, and shared file storage services like Google Drive. This creative inquiry focuses on how humans work together with these new technologies, with a specific focus on the dynamics and processes within human-autonomy teaming, autonomy being in the form of artificial intelligence. The research conducted throughout this semester involves comprehensive literature reviews to produce relevant frameworks and models for human-autonomy teaming, proprietary experimental platforms that allow humans and AI to work together on tasks to study real teams. These studies investigate team cognition in human-autonomy teams, the effects of working memory on performance, and combative AIs effect on teammate perceptions. The results of this research create a number of frameworks that enable a much deeper understanding of how humans & AI come together to accomplish work in a variety of fields. Experimental results also show how team cognition is formed differently in human-autonomy teams, and combative AI are viewed negatively by human teammates. The research projects conducted with this creative inquiry allow engineers, designers, and practitioners to gain a greater understanding of the technology individuals use in teams, or team up with. This then allows teams to become more effective, efficient, and productive through the greater understanding of how humans team with technology.

This research is funded under NSF Award #1829008 and the Clemson University Creative Inquiry program.

## POSTER #68

Campus Cockroaches of Clemson

**Mentor:** Sharon Bewick, *Biological Sciences*

**Students:** Christian Dempster, Catelyn Henry, Zoe Koechling, Connor McPherson

We have been studying cockroaches around a variety of buildings on campus. This has involved mark-recapture to try to estimate cockroach abundance and (in the future) movement patterns. In addition, we have collected several cockroaches that we are in the process of preparing in order to sequence their microbiomes. Ultimately, our goal is to understand whether cockroaches form metapopulations around campus buildings, and whether this metapopulation structure has any perceivable effect on the bacterial taxa that the cockroaches harbor.

## POSTER #69

Increasing Genomic Stability and Antibody Titer using Mammalian Artificial Chromosomes

**Mentors:** Xiaoming Lu, Mark Blenner and Marc Birtwistle, *Chemical & Biomolecular Engineering*

**Students:** Katia Ashy, Baylee Westbury

A Mammalian Artificial Chromosome (MAC) is a circular exogenous chromosome that contains DNA replication origins and a functional centromere, and therefore is replicated during S-phase and separated into daughter cells during mitosis. MACs also do not contain transposable elements that underlie many genetic rearrangements. Thus, an advantage of a MAC compared to random or site-specific integration is that mAb genes are likely not as susceptible to the effects of CHO chromosome instability, or even epigenetic mechanisms that can also reduce or silence mAb production. Furthermore, MACs provide a much higher degree of transgene design freedom, and thus may improve mAb gene copy number, stoichiometric balance (light/heavy chain) and consequently titer and productivity. We propose that a Gibson Assembly edited MAC will retain copy number over time due to its ability to replicate and exist separately from the CHO genome. We will measure this ability using relative and absolute quantitative PCR methods at certain time points over a multiple month period.

**POSTER #70****Autonomous Control of a Micro Aerial Vehicle (MAV)****Mentor:** Yiqiang Han, *Mechanical Engineering***Students:** Phillip Do, Dane Wang, Alexander Krolicki, Duncan Mccain, Nate Powers, Brandon Wingard

Electric-powered Vertical Take-Off and Landing (VTOL) technologies are around the corner and ready to be applied to commercial applications, such as unmanned delivery, emergence response, survey and patrolling, etc. Autonomous control of an Unmanned Air Vehicle for a package delivery mission is specifically considered in this project. The objective of this project is to design, simulate, and test a UAV to perform package delivery missions solely based on vision navigation and autonomous control techniques. This presentation will emphasize the simulation technique developed during this study. A “hardware-in-the-loop” testing approach was adopted. The control board and radio controller were connected to a virtual testing environment to interact with different test conditions. Dynamic response feedback can be used for testing different autonomous control algorithms. The hands-on programming and testing practices can also be applied to many other interdisciplinary projects such as self-driving car researches.

**POSTER #71****AI Enabled Aerial-Ground Coordination for Off-Road Vehicles****Mentor:** Yiqiang Han, *Mechanical Engineering***Co-Author:** Ishan Sharma**Students:** Raylan Dawkins, Chad Eisele, Connor Willoughby, Nicholas Kilbarger, Alexander Krolicki, Harnish Makkar

In this project, through hands-on experience, undergraduate students at Clemson University studied the new frontier of autonomous control for off-road vehicles. A team of 8 students from the Mechanical Engineering, Industrial Engineering, and Computer Science departments worked as a team in designing and testing a tracked off-road vehicle. This project required students to develop a research vehicle that could autonomously traverse over a rugged off-road environment. The students learned by experimenting with different hardware configurations and coding control algorithms by themselves. In the first iteration, students used only a lidar sensor to map and localize the tank within its environment simultaneously. They worked with adapting the low-level motor controller to the path planning algorithm to accurately control the tank through adverse situations such as a cluttered environment under snow weather. In a second iteration, students combined the lidar sensor with a stereo camera to improve the accuracy of the path planning. The introduction of a camera also enabled students to use computer vision techniques to detect objects and make decisions based on the surrounding environment. Capability of aerial-ground coordination between unmanned MAV and the tracked vehicle will also be demonstrated. This project provides students the opportunity to explore several end-to-end training solutions for controlling autonomous ground vehicles in a variety of environments, which will prepare students for future industries and careers in AI.

## **POSTER #72**

### **Surfactant Effects on Microfluidic Contraction and Expansion Flows**

**Mentor:** Xiangchun Xuan, *Mechanical Engineering*

**Co-Author:** Mahmud Raihan, *Mechanical Engineering*

**Students:** Sean Hekker, Ryan Barrett, Michael Dacus

Microfluidic devices have been extensively employed lately for chemical synthesis, biological analysis, and environmental investigations due to their simplicity, time-efficiency, and cost effectiveness. Depending on the objective, both Newtonian and non-Newtonian fluid solutions are used to manipulate various types of particulates in channels of different shapes in these devices. While preparing the particulate suspensions, surfactants are often added to reduce the aggregations (among particles) and adhesions (to channel walls). Polysorbate 20 is a popular nonionic surfactant that has been used in many microfluidic experiments recently. Its influence on the flow pattern has been regarded to be insignificant. But our investigation in a planar expansion-contraction passage with deionized water and Xanthan Gum solutions has revealed substantial differences between the flows with and without the surfactant. We observed that the vortices formed in the expansion contraction region of the channel, due to the pressure drop, vary significantly in size and intensity depending on the presence of the surfactant. The two fluids have been studied at different flow rates along with the effect of Xanthan Gum concentration on the phenomenon. These findings can help understand and manipulate the circulations with more control which are regularly exploited for particle focusing, sorting, separating, and collecting in microfluidic tools.

## **POSTER #73**

### **Development of Functionalized Sutures for Medical Applications**

**Mentors:** Adam Samuta, *Biomedical Engineering*, and Jorge Rodriguez, *Mechanical Engineering*

**Students:** Sophia Hennessy, Katherine Magee, Nicole Meilinger, Brendan Tobin, Olivia Wozniak, Katelyn Franck, Ethan Veideman

Sutures are used in an array of medical applications, but it was not until recently that these have been specialized for specific purposes. To improve the effectiveness of sutures, nanofibers/proteins are being spun onto the surface of sutures giving rise to specific responses in the body. Our group has developed a mechanism for the fabrication of these functionalized sutures. Scanning electron microscopy has been used to analyze the characteristics of the micro structure of the coated surgical sutures. Moreover, characterization of the mechanical characteristics of the coated sutures is being performed. Our device allows for consistent samples of these wrapped sutures for use in future research exploring the possibilities presented by specialized surgical sutures.

## **POSTER #74**

### **Motion Sickness Coping in Pilots: Lessons Learned from Online Forums**

**Mentor:** Sarah Beadle, *Psychology*

**Students:** Scout Clark, Lydia Henderson, Jenny Hensley, Grace Powell

The purpose of this study was to examine trends in online postings regarding motion sickness coping strategies among pilots. Pilots were the focus of this study because they are susceptible to motion sickness due to the gravitational forces and other environmental factors experienced during flight. Motion sickness involves a wide array of autonomic symptoms resulting from motion of a person and/or his or her surroundings. These symptoms range in severity and duration. Various coping strategies exist to combat the symptoms of motion sickness. One hundred and thirty-nine comments from Reddit forums specifically about motion sickness coping strategies for pilots were analyzed. A total of 6 themes were applied in reported coping strategies: cognitive, behavioral, environmental, equipment, pharmacological/dietary, and schedule. Two new themes were added: control of the plane and specific maneuvers that were sickening. The two most popular codes were pharmacological/dietary and schedule-based coping methods. Pharmacological

was mentioned when questioning whether a certain medication was permitted or discussing the use of ginger as a natural method. Using online data to analyze trends in coping strategies is more time and cost-effective than conducting laboratory-based work involving motion sickness, especially in pilots. The data also allow researchers to see what has been successful to pilots and what has not been successful to help motion sickness while in real flights, not just simulations. In the future, these strategies could be applied to flight training to better prepare pilots and inform them of ways to cope with or prevent the onset of motion sickness.

## POSTER #75

Bike Clinic Physical Activity Intervention in Afterschool Elementary Students Improves Self-Efficacy and Bike Safety Knowledge

**Mentor:** Karen A Kemper, *Public Health Sciences*

**Co-Author:** Brian Helsel

**Students:** Katie Gaddy, Katherine Grant, Kristina Jones, Emily Martin, Caroline Morrison, Leila Sconyers, Ashleigh Elizabeth White

Tiger Time, an afterschool program promoting physical activity, healthy eating, and positive youth development, is part of a 21st Century Community Learning Center grant partnership with Monaview Elementary School. Working mainly with low-income Hispanic children, Tiger Time implemented a Prisma Health sponsored bike clinic to fourth and fifth graders ( $n = 29$ ) to teach safety rules, proper helmet wear, traffic scenarios, and health/transportation benefits. A cross-sectional retrospective pre-post survey was administered to assess outcome measures of confidence levels and biking knowledge. Analysis revealed statistically significant increases in the children's self-efficacy in riding a bike alone (mean difference = -2.5;  $p = 0.0015$ ) and for learning a new skill (mean difference = -3.24;  $p < 0.0001$ ), as well as increased knowledge in biking rules/safety. Given the results, the program successfully completed its purpose of increasing student's biking safety knowledge and confidence.

## POSTER #76

Mitochondrial Genomics of Marine Invertebrates

**Mentor:** Juan Antonio Baeza Migueles, *Biological Sciences*

**Students:** Isabelle Conrad, Abby Craft, Cameron Keyser, Shannon Leonard

This digital artifact will explain how students engage in critical thinking while annotating assembled mitochondrial genomes of various marine invertebrates.

## POSTER #78

Pathways to Graduate Education

**Mentors:** Sara Hanks, *Office of College Preparation & Outreach*, Jerad Green, *Gantt Multicultural Center*, DeOnté Brown, *New Student & Family Programs*, and Cherese Fine, *Charles H. Houston Center*

**Students:** Charlese Minder, Kinsey Meggett, Nicolas Mekdara

Pathways to Graduate Education is a program to engage underrepresented undergraduate students in robust research and exploration of graduate education opportunities. The students in the CI are engaging in the graduate education process while participating in the development and implementation of a research project. This CI encourages students to be active participants in developing a research project, around social justice, applicable to their respective fields.

Learning Outcomes:

Outcome 1: Understand the importance of research

Outcome 2: Distinguish between various research methods

Outcome 3: Apply core research methods to investigate a problem

**Outcome 4: Demonstrate competency in navigating graduate school admissions process**  
Students are working on three qualitative research projects around Black first-generation students, underrepresented students in a mentoring program, and students in a study abroad program.

## **POSTER #79**

The Effects of Low Dose X-Ray Radiation on Vascular Smooth Muscle Cells in Vitro

**Mentors:** Delphine Dean, *Bioengineering*, and Endre Takacs, *Physics and Astronomy*

**Students:** Natalie Anderson, Ashley Babinchak, Connor Bates, Leah Brown, Zion Lesesne, Isabella Manigault, Justin Napolitano, Andrew Rifkin, Jack Rottman, Ryan Stepp

The Clemson Radiation CI is a multidisciplinary team containing bioengineering, genetics, biology, and physics majors. Our most recent research has revolved around the use of x-rays at varying doses and dose rates to irradiate Vascular Smooth Muscle Cells. Our hypothesis is that the rate at which cells are dosed with ionizing radiation has an impact on their reaction to that dose. To determine this, we measured cellular proliferation that correlates to the number of cells present. We also performed other assays including Live-Dead, immunofluorescence, real time polymerase chain reaction to determine if other aspects of the cell phenotype are impacted. The results of our experiments so far have indicated that these cells do respond differently to different x-ray dose rates. Our results could have broad implications. Everyone experiences some radiation through normal exposure routes, such as CT scans and X-rays, which are common and assumed safe. Our goal is to learn the effects these tests have on human cells, as well as if there is a way to improve these tests to be safer for those who receive them.

## **POSTER #80**

Concealable Identity Disclosure at Work

**Mentors:** Cynthia Pury, *Psychology*, and Brandon McIntyre, *Industrial/Organizational Psychology*

**Students:** Benjamin Eubanks, Yuuki Garcia, Madison Lenz, Alexis Puri, Leah Bourque, Lanitra Ferguson

Our CI team started the semester by coding several columns of qualitative data regarding individuals' experiences with disclosing or concealing their concealable stigmatized identities in the workplace. This data was used as part of a logistic regression analysis to guide future research on employee identity disclosure. These results are currently being used to develop a scale that assesses identity disclosure behaviors. As a team we have come up with a four-factor scale measuring disclosure behaviors: active concealment, passive concealment, explicit disclosure and implicit disclosure. Along with this, the initial study revealed a criterion deficiency in previous disclosure measures where disclosure intent was not adequately considered. Our scale intends to differentiate actual exhibited disclosure from an individual's willingness to disclose. This distinction could be crucial for understanding employee's decisions regarding disclosing their concealable identity.

## **POSTER #81**

Brain Tips: Smart & Savvy Student's Guide to a More Successful Life

**Mentor:** June Pilcher, *Psychology*

**Students:** Sam Landwehr, Carson Matsick, Emily Powell, Kyle Thayer, Emma Winterlind, Stephanie Six

Brain Tips analyzes contemporary, academic journal publications, and circulates summaries of our major findings across our three social media platforms, Facebook, Twitter, and Instagram, for daily readers. With new research being published year-round, our posts are a valuable and effective means of keeping both scholarly and casual research inquirers up to date with current findings in numerous realms of study including psychology, health, and genetics without excessively demanding their time and effort. Brain Tips

is committed to exposing the increasing numbers of social media users to the forefront of social scientific research, by actively seeking out promotion from schools, tutoring centers, and other academic institutions. The team, established in 2014 and formerly recognized as Clemson Smart & Savvy Students, decided to rebrand to Brain Tips this semester to appear more marketable and professional; as well as, to accompany our heightened interest in promotion by other relevant organizations. As a CI team, we strive to publish new ideas and information on our established platforms to provide our readers with the tools to improve their quality of life.

## POSTER #82

Choosing Between The Pathways Towards A Life Well-Lived

**Mentors:** Cynthia Pury and Natalie Vanelli, *Psychology*

**Students:** Mari Kilgus, Lindsey Neville, Beth Ounanian, Anna Peterson, Elenah Rosopa

Using the outline provided by Haybron (2013), this research focuses on multiple pathways to a life well-lived, including Outlook, Autonomy, Relationships, Goal Orientation, and Contact with Nature. These pathways inherently presume that there are differences that affect which sources of happiness are more relevant to an individual across different situations. The circumstances of daily life often preclude every pathway being pursued at once. In other words, people must choose which course of action to pursue, which pathway is more important than others. For example, while on the job, a person may need to choose between assisting a co-worker or completing their work. Later, they may need to decide between staying late or leaving on time for a planned dinner date. We frequently need to determine what pathway will best lead to happiness and pursue it, with the expected impact on happiness presumed to play a role in decision-making. This poster will present research currently being conducted that examines how individuals make choices between two pathways towards happiness and if a person's decisions reflect their value of that pathway. We presume that different valuations of pathways may influence the choices that people make when pathways conflict with one another. The scenarios developed for this project will accomplish this by examining how individuals allocate value to the choices they make when faced with situations in which, for example, they can take a higher-paying job in a distant city or remain geographically to family and friends.

## POSTER #83

Cardiac Tissue Culture Platform with Improved Mechanical Stimulation

**Mentor:** William Richardson, *Bioengineering*

**Co-Authors:** Samuel Coeyman, Jonathan Heywood

**Students:** Kendall Bedard, Matthew Dimond, Hannah Finlon, Jake Masters, Caroline Peak, Natalie Rodrigues, Avery Savoie, Kamryn Stem

Less than 0.1% of experimental medical therapies pass clinical trials, wasting billions of dollars and many years of testing. In vitro testing offers a low-cost, high-throughput approach to pre-screen therapies, and a handful of current designs can test 3D heart micro-tissues in vitro. However, none of these designs subject the tissues to mechanical constraints experienced by myocardial cells in the body. To fill this need, we aim to develop a heart tissue culture platform that provides a much more reliable in vitro screening tool by recreating the mechanical energetics of cells as they would naturally experience. We are designing our construct to pull against a movable piston-head, thereby displacing the piston-head, increasing fluid pressure in the chamber, and actively pumping fluid out of the chamber into a circulation flow-loop. Currently, we have designed, built, and tested a range of hydraulic components (valves, resistors, capacitors), and we have fabricated and tested a range of biological tissue components (myocytes, fibroblasts, matrix proteins).

## **POSTER #84**

Big Girls Don't Cry: The Effect of Crying on Autonomic and Subjective Stress Responses

**Mentors:** Sarah Sanborn and Jennifer Bisson, *Psychology*

**Students:** Katherine Blackwood, Doris Clark, Natalie Claypool, Emily Luce

The cry is an important signal from child to parent. However, it is an aversive stimulus that can lead to parent stress. Physiologically, stress is related to increased electrodermal activity (EDA) and heart rate (HR). In response to cries, non-parents show a greater increase in HR compared to parents, and males display a greater increase in HR than females. There are few studies exploring changes in EDA, and no studies have explored subjective stress and physiological responses to tantrums. Sixty-six undergraduate students (44 females and 22 males) participated in the study. Each participant was presented with a 15-second, black baseline video clip, 4 video clips of infant crying, and 4 video clips of tantrums. Each infant crying and tantrum video was 30 seconds long. After each video, participants had 10 seconds to rate how (subjectively) stressed they felt while Empatica's E4 bracelets recorded EDA and HR. While there were no gender differences in participants' responses to tantrums, the males were more physiologically reactive to infant cries than were females. In the future, we will analyze the effect of negative vocalizations on participants' heart rate.

## **POSTER #86**

Wood Duck Use and Production in Artificial Nest Boxes: Clemson University Undergraduate Research in Piedmont Region, South Carolina

**Mentors:** Emily Miller, Jacob Shurba, and Nicholas Masto, *Wildlife and Fisheries Biology*, Richard Kaminski, *Baruch Center*

**Students:** Jason Andrews, Stephanie Braswell, Richard Coen, Lucas Downs, Jess Eidson, Frederick James, Jonathan Mackey, Jeffrey Mitchum, Cole Shealy, Clyde Zoubian

The wood duck (*Aix sponsa*) is the state duck of South Carolina and a top harvested waterfowl species.

Wood ducks nearly were extirpated in the early 20th century from market hunting and loss of habitat. Since, wildlife managers have erected hundreds of thousands of nest boxes in North America to mitigate loss of natural tree cavities as nest sites. Evaluating wood duck use and duckling production from nest boxes was identified in 2018 as a research priority by partners of the Atlantic Coast Joint Venture of the North American Waterfowl Management Plan. As part of a Clemson Creative Inquiry undergraduate research course, 45 boxes on Clemson's Experimental Forest (CEF) have been monitored annually since 2018. Our objectives are to: 1) establish protocols for monitoring and maintaining nest boxes in the CEF for future researchers, 2) determine nest box use ( $\geq 1$  egg) and successful reproduction ( $\geq 1$  egg hatched and ducklings' exodus), 3) identify variables that predict probability of use of nest boxes and successful production, and 4) derive recommendations to locate boxes optimally in the CEF and elsewhere for wood duck use and production. We monitored boxes from January through summer, collected use and reproductive data, and measured box and habitat variables that may influence use of boxes and duckling production. Preliminary logistic regression analyses indicated that probability of use of boxes by wood ducks increased with location of boxes over water instead of on land. We are continuing regression analyses to generate models that predict significant ( $a = 0.05$ ) use of and success of clutches of eggs.

## **POSTER #87**

Improving the Automotive Hail Damage Claim Process Using 3D Scanner Technology

**Mentors:** Rachel Anderson, *Academic Success Center*, and Todd Schweisinger, *Mechanical Engineering*

**Co-Author:** Muhammed Kose, *Mechanical Engineering*

**Students:** Persia Ghotbi-Taheri, Hunter Harkins, Robert Page, Jakob Weber, Jared Gaidjunas, Josh Kelley, Duruo Yang, Cal Battaglia, Camryn Emory

In 2018, hail damage accounted for 74% of all weather claims which caused over \$100,000,000 in gross

damages. The current process for hail detection and damage estimation is an outdated, inefficient, and time-consuming process. The process requires using experienced inspectors and involves sending them to the site to physically inspect and record hail damage based on a dent sizing chart. The damaged components are then deemed as undamaged, in need of repair, or in need of replacement. In order to streamline the process, Ally insurance is looking into the utilization of 3D scanning technology to increase the hail damage assessment efficiency. To achieve this goal, the team was split into three different sub-groups, which were determined to be the most important factors of the project. These sub-groups consist of the Software, 3D Scanner Hardware, and Cost/Time Analysis. Preliminary scanning tests with the available hardware and software show that it is possible to detect hail damage with the use of a 3D scanner. Future plans include meeting with industry leaders in 3D scanning technology to determine its potential. The purpose of the Focus on Creative Inquiry poster is to demonstrate the research and progress that has been made on the project. This gives fellow undergraduate students an opportunity to learn about the importance of creative inquiry research.

## **POSTER #88**

A Pedagogical Description of a Research Program for Healthcare Students to Understand the Maternal Experience of Recovering from Substance Use Disorder Through Qualitative Storytelling

**Mentors:** Heide Temples and Mary Ellen Wright, *School of Nursing*

**Students:** Emily Guthrie, Colton Hunter, Rebekah Lannamann, Haley McKee, Olivia Chafe, Elizabeth Johnson, Jennifer Rumsey, Brooks Woody, Lauren Drum, Kelly Edwards, Carla M. Lautenschlager, Molly Yost

Among pregnant women in US, 5.1% reported nonmedical opioid use in 2016. The purpose of this innovative research program for healthcare students is to promote the understanding of the maternal experience of pregnancy or parenting with Substance Use Disorder. We recruited participants in recovery centers for qualitative storytelling research. A designated phone was used for mothers to call to tell their stories of addiction anonymously. The students transcribed the stories, performed thematic analysis and the faculty performed validation. Themes were identified on how to support addiction recovery. Results were disseminated to health professionals, communities, and legislators influencing service delivery via a published book, 8 conferences, 3 manuscripts, and letters. A foundation was created to return book royalties to support research. This pedagogical model is an exemplar for educating students to investigate health issues. Financial support was from Atlas.ti and Creative Inquiry.

## **POSTER #89**

Living Alongside Alligators: Characterizing Human-Alligator Relationships in South Carolina Coastal Communities

**Mentors:** Cathy Jachowski and Anje Kidd-Weaver, *Forestry & Environmental Conservation*

**Students:** Colleen Goff, Lexi Greulich, Carissa Tice, Caitlyn Ward

American alligators (*Alligator mississippiensis*) are large, predatory reptiles that live in the southeastern United States. Where residential areas overlap alligator habitat, alligators and humans can become habituated to each other. While alligator attacks are rare, habituation increases the risk of injurious human-alligator interactions, especially when alligators associate humans with food. Our objective was to investigate the relationship between urbanization and alligator habituation in five communities along the South Carolina coast. We conducted flight distance surveys to measure how close alligators will allow humans to approach them before they flee. We found that flight distance decreased as the percentage of developed land use increased. These results suggest that alligators living in more urban areas are more habituated towards humans than alligators living in less urban areas. These results will be used in future research to develop new strategies for managing alligator behavior in residential areas.

## **POSTER #90**

EWB-Bridge Project Nicaragua

**Mentors:** Mark A. Schlautman and Jerry Wylie, *Environmental Engineering & Earth Science*

**Students:** Reece Etiemble, Sheala Hulbert, Nayoung Kim, Daniel Ludden, Sam Mccown, Kevin Stine, Jacob Vander Leest

El Serrano, Nicaragua is a rural community of about 3,000 people. The rainy season in Nicaragua lasts six months from May to October. El Serrano is divided by a river that floods during the rainy season, making it dangerous to cross. The community members have constructed a rudimentary bridge consisting of two tree logs with cement poured over it. With termite and water damage affecting the bridge, we can predict it will not last another year. Because the river separates the school from the community members, Clemson's EWB Bridge Team found it necessary to construct a sound pedestrian bridge that will make it safe for crossing. Our first trip was in 2016, where we found this problem and collected pictures and data. EWB members discovered the dilapidated bridge was dangerous for the children to cross as it had no way to prevent them from falling off. To begin tackling the problem, the team took what crossbed data we collected on our water filtration trip, as well as soil samples and rainfall data to begin the design process. With the help of Matt Johnson, a hydraulic engineer, the team is working on HEC-RAS to conduct flow data for the river. Getting advice from different professional engineers has given us different options to consider for the design of our bridge. The team is focusing on making sure the bridge will not be affected by the flooding of the river and does not disrupt the existing traffic in the town. The team's best structural option at the moment is a single span pedestrian bridge raised several feet above the bank of the river. In order to find what resources are available to us and the feasibility of the different design options we have, the team is planning to travel May 2020. Today, the Clemson EWB Bridge Team is working to solidify our design, finish hydraulic and soil calculations, and collect possible contacts for materials and machinery on our next travel trip.

## **POSTER #91**

Fatty Acid Uptake in an Evolutionarily Ancient Eukaryote, *Trypanosoma brucei*

**Mentor:** Kimberly Paul, *Genetics & Biochemistry*

**Students:** Solangie Pulido Gomez, Alex Loayza, Briana Vollbeer

*Trypanosoma brucei*, the parasite causing African Sleeping Sickness, alternates between mammal and tsetse fly hosts. In *T. brucei*, fatty acids (FAs) are needed to anchor surface glycoproteins that are key for survival. *T. brucei* makes its own FAs or takes them from their host. While FA synthesis is partially characterized in *T. brucei*, the molecular mechanisms of FA uptake are unknown. *T. brucei* diverges from other eukaryotes, in that it lacks predicted homologs to known FA transporters. To characterize FA uptake, we used an assay that monitors uptake of fluorescent BODIPY-conjugated FAs by flow cytometry. BODIPY-FA uptake is saturable, temperature-sensitive, chain-length dependent, and differentially ATP-dependent between insect and mammalian stage parasites. Two known inhibitors of FA uptake in other organisms, Triascin C and Grassofermata, impaired BODIPY-FA uptake in *T. brucei*, and inhibited parasite growth in culture. Our current data are consistent with FA uptake being an essential process that occurs via a facilitated diffusion and trapping mechanism that is distinct between life cycle stages.

## **POSTER #92**

The Effects of Low Concentrations of Ethanol on *Caenorhabditis elegans* Healthspan

**Mentor:** Min Cao, *Biological Sciences*

**Co-Author:** Maxime Bilodeau, *Microbiology*

**Students:** Karishma Khunger, Kyle Russi, Thomas Eckert, Courtney Rucker

Chronic ethanol use has many negative effects, however, in low doses, it could be beneficial. Previous studies from our lab and others have shown that low concentrations of ethanol can increase the lifespan of *Caenorhabditis elegans*, a nematode model, however, that does not mean the *C. elegans* are healthier. The purpose of this study is to demonstrate the effects of ethanol on *C. elegans*' healthspan. Physiological indices

such as fecundity, locomotion, gut colonization, and protein solubility are being evaluated. Our preliminary data showed that there is no significant difference in the brood size between the ethanol-treated worms and the control worms. We are currently working on ethanol's effect on protein solubility and gut colonization. Our hypothesis is that ethanol-treated *C. elegans* will display less gut colonization and increase protein solubility in aged worms. This study may help unravel some beneficial effects of moderate consumption of ethanol not only in the *C. elegans* system but also in higher-order organisms.

## POSTER #93

Mary Bruce Project: Shining the Light on Hidden Figures in Tropical Medicine Research

**Mentor:** Kimberly Paul, *Genetics & Biochemistry*

**Students:** Hunter Gentry, Aimey Jimm, Samah Malik, Katherine Armstrong

The turn of the last century was marked by a “golden era” in tropical medicine. Doctors and researchers working in Colonial Africa and the tropics made major discoveries, including determining the causes of malaria, sleeping sickness, and schistosomiasis. However, the contributions of numerous hidden figures, including those of women and native Africans, to the history of tropical medicine are largely untold.

Moreover, the impact of colonial biomedical research is still felt into the present day. Mary Bruce, the wife of British Army doctor David Bruce, worked alongside her husband as he discovered the cause of undulant fever in Malta, and cattle disease and sleeping sickness in South Africa. Many of Bruce’s papers feature illustrations by Mary Bruce, and in some papers she is listed as an author, which raises the question of what role did Mary play in her husband’s great discoveries? Expanding out from Mary Bruce, what role did other “hidden figures” play in these landmark discoveries? The Mary Bruce Project seeks to answer these questions and tell the stories of these unsung contributors to the history of tropical medicine and microbiology.

## POSTER #94

The Microrheology of Active and Passive Microtubule-Based Networks Measured with

Optical Tweezers

**Mentors:** Joshua Alper and Ashok Pabbathi, *Physics & Astronomy*

**Student:** Megan Keech

Microrheological measurements can quantify the viscoelastic properties of passive and active engineered biological filamentous networks, gels, and matrices, which define their potential applications in biomedical devices. The optical tweezer is a microscope-based instrument that uses a laser to trap beads and, with careful calibration, both measure and apply pN-scale forces across nm-scale distances to the trapped beads. They have been used to make microrheological measurements at length scales corresponding to bead size. In current protocols, the bead size is assumed to have no effect on measurements; however, we have observed data variations that strongly suggest this assumption leads to significant inaccuracies in the measurements using large beads, requiring changes to the existing models used to interpret the data. In particular, our results demonstrate a significant deviation from the modeled linear region of both the force-bead displacement relationship and the sensitivity of bead position detection. By resolving these issues, we expect our system will be able to quantify the passive and active properties of engineered microtubule-motor protein networks.

## POSTER #95

Unraveling the Mystery of the Rare Rocky Shoals Spider Lily

**Mentor:** Althea Hagan, *Forestry & Environmental Conservation*

**Students:** Katie Baucom, Christiana Huss, Madison Lasala

*Hymenocallis coronaria* (Rocky Shoals Spider Lily) is a threatened species endemic to Georgia, Alabama, and South Carolina. The purpose of this research is to study two existing populations of Rocky Shoals Spider Lilies along Stevens Creek in McCormick, South Carolina. One of the populations is healthy and thriving

while the other has decreased in extent and vigor over the last 20 years. Following South Carolina's Adopt-A-Stream water quality testing and habitat protocols, information on the quality of water was collected at both sites. An EPA macroinvertebrate rapid bioassessment was also done to further analyse habitat and water quality differences. Data on hypothesized herbivory impacts was collected by placing a game camera at each site. The goal of the project is to identify the driver of the reduction of extent and vigor in the Rocky Shoals Spider Lily population by comparing it to the healthy population. We hypothesize that one or more of the following variables; herbivory, water quality, or habitat quality are driving the decline in Rocky Shoals Spider Lily on Stevens Creek. Identifying the reason for the stunted growth could help determine the environmental parameters needed for a healthy population. In the future we hope to identify new sites for Rocky Shoals Spider Lily, based on the parameters identified in this research.

## POSTER #96

Creating and Probing Neuron Circuits with a Combined Optical Tweezer Microelectrode Array (MEA) System

**Mentors:** Joshua Alper, *Physics & Astronomy*, and Marshall Trout, *Electrical & Computer Engineering*

**Students:** Andrew Billings, Shira Karni, Devante Kee-Young, Alexis Taylor

Neuronal circuits are small networks of neurons that perform cognitive functions like learning and processing data by carrying and transmitting electrical signals. There is significant experimental data on how single neurons and large neuronal networks with hundreds or thousands of cells function when isolated from the entire brain. Additionally, there has been beautiful theoretical and computational work done describing how the properties of single cells could lead to emergent phenomena in circuits. However, tangible, easily manipulated simple neuron circuits have not previously been built and tested in vitro. We present novel combined microelectrode array (MEA), to both stimulate and measure the electrical response of circuits, and optical tweezer (OT), to directly manipulate neurons into the desired circuit geometries, instrument to build and test in vitro neuronal circuits. We demonstrate how direct manipulation of the neurons with the MEA-OT is feasible and that single neurons can be placed directly onto MEA electrodes. These results suggest that our novel MEA-OT instrument will enable research on the mechanisms of single neurons, i.e., how their cytoskeletal structures and synaptic strengths, and how they lead to emergent phenomena in simple circuits, extensive networks, and ultimately, the brain.

## POSTER #97

Makerspace Standard Operating Procedures - Greenville Zoo Service Learning

**Mentors:** Todd Schweisinger, *Mechanical Engineering*

**Co-Author:** Kelsey Sheaffer

**Students:** Emily Petty, James Wilson, Elizabeth Glowacki, Perry Hopper, Anthony Jones, Amelia Kemble

This semester, The Makerspace Creative Inquiry researching Standard Operating Procedures, invited students from Clemson's College of Agriculture, Forestry and Life Sciences (CAFLS) to create enrichment for the orangutans at the Greenville Zoo while also continuing in the CI's goal of creating and perfecting Standard Operating Procedures. Enrichment is a way for zoos to stimulate natural foraging and hunting behaviors the zoo animals would exhibit in the wild. Enrichment also provides something for the animal to do and keep them from getting bored within their enclosures.

In the Makerspace CI, the CAFLS students are learning to use the Clemson Makerspace to design and create a puzzle feeder for the orangutans at the Greenville Zoo. Using the Standard Operating procedures designed in the last semester's Makerspace Creative Inquiry, CAFLS students along with engineering students are learning to use different machines within the Makerspace. Two CAFLS students within the CI have partnered directly with the Primary Asia Zookeeper from the Greenville Zoo to design this puzzle feeder. The working idea for this puzzle feeder is to have a series of rings inside of each other that can spin. The rings will each have two holes in them. The goal is for the orangutan to turn the rings to line up the holes so

that the feeder will drop a treat straight through the holes. The team is currently in the design process with constant communication with the Zookeeper for feedback. Already, the team has 3D printed multiple small scale designs and created different designs. The creative inquiry team plans to have a final/working design by the end of the semester.

## POSTER #98

**Knockdown and Tagging of Axonemal Dynein Light Chain 2 to Facilitate Understanding of the Directional Flagellar Motility of *T. brucei***

**Mentors:** Subash Godar and Joshua Alper, *Physics & Astronomy*

**Students:** Ethan Lopez, Madison Ragland, Valerie Hinsch

*Trypanosoma brucei* are kinetoplastid parasites that cause African Sleeping Sickness, a fatal disease with limited treatment possibilities. They rely on unique tip-to-base flagellar beating mechanisms powered by a team of axonemal dynein motor protein complexes for virulence. We identified two putative outer arm dynein protein complex light chain 2 (LC2) homologs in *T. brucei* and constructed a tetracycline (tet) inducible interfering RNA plasmid by PCR amplification of the 3'UTR of the putative LC2, ligation of the PCR products into pGEM-T Easy plasmids for validation and amplification, and cloning of these 3'UTRs into the pZJM plasmid. After transformation of the pZJM-LC2-RNAi plasmids into trypanosome cells, we aim to observe the LC2-knockdown motility phenotype and rescue it with LC2 tagged with purification, biotin-binding, and eGFP tags in an expression plasmid (pXS2-LC2::BCCP::eGFP). Not only will this enable us to purify the outer arm dynein complexes for subsequent biochemical and biophysical quantification, but also it will give us a better understanding of the role of LC2 in trypanosome motility. In a parallel effort, we are also using CRISPR-Cas9 to both knockout and tag the endogenous copies of the trypanosome LC2 proteins. We will use RT-qPCR to determine the efficacy of both CRISPR-Cas9 and RNAi and use high-speed microscopy to quantify the effects of LC2 on trypanosome cell motility. Ultimately, we expect these results to provide insight into molecular mechanisms of directional flagellar motility in *Trypanosoma brucei* and to inform motility-targeted drug development.

## POSTER #99

**Study While Moving: FitDesks Provide an Alternative Study Method without Negatively Affecting Emotional Well-being**

**Mentor:** June Pilcher, *Psychology*

**Students:** Arya Soman, Logan Dorsey, Ben Ginsberg, Samantha Galloway, Emily Walker

The purpose of this study was to examine if FitDesks had an impact on emotional well-being in college students over the course of the semester. A total of 59 Clemson undergraduate participants were separated into FitDesk (n=27) and Non-FitDesk (n=32) groups. They were asked to study a total of two hours on their assigned desk in the library each week for eight weeks. They completed check-in and check-out forms before and after each study session. Pre and Post surveys that measured various subjective measures, such as stress, anxiety, happiness, etc. were also completed at the beginning and end of the study. Results from repeated measures ANOVAs showed that there was not a significant difference between FitDesk and Non-FitDesk groups in Stress ( $p=0.143$ ) or Anxiety ( $p=0.068$ ) from Pre to Post. There was a significant difference between happiness scores in the first half versus the second half of the study ( $p=0.005$ ) with the FitDesk group having slightly better scores than the Non-FitDesk group. These findings suggest that FitDesks can be used as an alternative study method without negatively affecting emotional well-being.

## **POSTER #100**

Genetic Origins of Craniofacial and Pigmentation Variation in Cichlid Fish

**Mentor:** Kara Powder, *Biological Sciences*

**Students:** Cassia Michael, Victoria Debrock

Cichlid fish have undergone extreme adaptive radiation resulting in diverse craniofacial morphology and pigmentation features. Craniofacial variation has contributed to their specific feeding mechanisms and ecology. Pigment plays a role in camouflage, communication, and sexual selection. To investigate phenotypic differences between species of African Cichlids and discover the underlying genes, craniofacial and pigment variation were analyzed. In order to examine craniofacial variation, the faces of 21 parental cichlids (*Labeotropheus fuelleborni* and *Labidochromis caeruleus*) with distinct feeding strategies were quantified with linear measurements and geometric morphometric shape analyses. These two species significantly differed (all  $p < 0.014$ ) in head depth and eye size. In order to quantify pigment variation in these cichlids, 16 parents from *Aulonocara koningsi* (distinct barring pattern along the anterior-posterior axis) and *Metriaclima mbenji* (darker, more uniform pigment) were measured using Photoshop and FIJI. Accordingly, these species are statistically different ( $p < 0.042$ ) in the number, width, and degree of barring. These traits are currently being investigated in the >360 F2 hybrid offspring from each pair. Future directions include quantitative trait loci mapping to determine the genetic basis of these craniofacial and pigmentation differences. Given that the molecules and genes used during vertebrate development are highly conserved, the identification of the genes involved in cichlid variation will enhance understanding of development and provide insight into the genetic basis of craniofacial and pigment defects in humans, such as cleft palate and melanoma.

## **POSTER #101**

Managing Meltdowns: A Content Analysis of Public Advice on ASD Meltdowns

**Mentor:** Jennifer Bisson, *Psychology*

**Students:** Macy Calvasina, Meg Fritsch

Using the Facebook page of Autism Speaks, a leading autism advocacy organization in the United States, 75 articles were systematically sampled from a total of 899 articles posted on the subject of meltdowns or related terms. Employing a content analysis of these articles, this study's aim was to determine causes, behavioral characteristics, and environmental contexts for meltdowns in children with autism spectrum disorder (ASD). Nine articles were no longer available through the Facebook page and an additional 8 articles were eliminated because they were duplicates. This yielded 58 articles for analysis, with an average of 77 user comments per article. For each article, meltdown triggers were considered, the frequency of specific behaviors was noted, and the frequency of various environments was recorded. Bystander impressions and intervention were also documented. This content analysis will provide a way to characterize and predict ASD meltdowns in order to assist caregivers or individuals on the spectrum with predicting and managing meltdowns.

## **POSTER #102**

Entangled Learning: Deep Learning in Community

**Mentor:** Laurel Ann Whisler, *Academic Success Center*

**Students:** R.J. Catanzaro, Yugantar Gera, Ann Lyons

Exploring Entangled Learning (EL) to support collaborative self-directed learning (SDL) is the high-level inquiry. We applied EL to our learning in two projects for coaching others to build capacity for self-directed learning, including developing LearningLab as a resource-rich environment for collaborative SDL. Methods include templated documentation of learning and ePortfolio. Reflecting made us more aware of what we were learning and how the learning was happening. Initial assessment indicates that the structure of the EL framework holds promise for effectively supporting SDL to be focused and rigorous. LearningLab results suggest that the guided learning template, loosely based on EL, is perceived by students as helpful for focusing and structuring learning. The LearningLab space likewise appears initially to support collaborative

learning. Formal assessment is ongoing. We gratefully acknowledge the support of the Academic Success Center, Boyd Foundation, and PebblePad.

## POSTER #103

### Carbon Nanotube Reinforced Carbon Fiber Composites

**Mentor:** Garrett Pataky, *Mechanical Engineering*

**Co-Author:** Andrew Cannon

**Students:** J. Flores Govea, David Matthews, Connor Murrell, Andres Argenal, Adam Wilkie  
The goal of the research is to better understand the mechanics of carbon fiber composites and how carbon fiber embedded with carbon nano-tubes will perform in tensile, 4-point bending, and the residual strength after damage compression testing. The two types of carbon fiber being compared are the control, IM-7, an aerospace grade carbon fiber manufactured by Hexcel, and the nano-stitch carbon fiber, manufactured by Hexcel with carbon nano-tubes imbedded by N12 Technologies. Each carbon fiber sample is created using the manufacturer's recommended curing process. The samples are varied by number of laminae of carbon fiber in the layup, 8 plies and 12 plies, and the stacking orientation of the plies to adjust the strength. The two stacking sequences are either all unidirectional or quasi-isotropic for approximately in-plane isotropy. For the tensile and 4-point bending experiments, we expect to see a 10-15% increase in the interlaminar strength of the nano-stitch specimens when compared to the control specimens. A collaborator at NC State tested a series of layups by impacting them at supersonic speeds with ping pong balls. In order to measure the degradation due to the impact, a compression residual stress experiment will be performed. The nano-stitch specimens are expected to have an increased residual strength over the control specimens. All testing results will be compiled into a database and analyzed to determine the extent of the potential increase in strength attributed to the interlaminar stiffening due to the carbon nanotubes.

We would like to acknowledge Hexcel Corporation and N12 Technologies for providing the material used in this study. In addition, we thank Dr. Mark Pankow at NC State University for performing the high velocity impact experiments.

## POSTER #104

### How Helpful are Current Standard Medical Record Form Entries for Determining Certainty and Severity of Lumbosacral Pain in Military Working Dogs?

**Mentor:** Jeryl Jones, *Animal & Veterinary Sciences*

**Students:** Sydney Murphy, Bailey Pedersen

Lumbosacral (LS) pain is an important cause of loss of active duty status in military working dogs (MWDs). Diagnosis of LS pain is supported by historical signs such as reluctance to perform working tasks, behavioral problems, pain on palpation of the LS region, and/or hind limb lameness. When an MWD is referred to a veterinary specialist for treatment, historical signs can sometimes be collected from the dog's handler. However, the handler assigned to the dog at the time of presentation may be unaware of the previous handler(s)' observations. Medical record entries are therefore an important resource for veterinary specialists. The objectives of this retrospective study were to evaluate the helpfulness of entries on standard MWD medical record forms for determining certainty and severity of LS pain in MWDs. Visual analog scale scores were independently recorded by 2 veterinary specialists experienced in treating MWDs. For both observers, median scores for the Physical Exam Form were significantly lower than all other components ( $n=48$  dogs). Median scores for the Rehabilitation Form were significantly higher than other components. Based on all available medical record forms, median scores did not differ between observers for severity of LS pain but significantly differed for certainty of LS pain. Findings from this preliminary study can be used as background for future research studies evaluating the effectiveness of medical record form entries for guiding treatment planning in MWDs with suspected LS pain.

Research sponsors are the Clemson University Creative Inquiry Fund, and the South Carolina Center of Biomedical Research Excellence for Translational Research Improving Musculoskeletal Health (SC TRIMH, NIH P20GM121342). Authors also acknowledge Kris Murray, Delaina Allegretti, Dr. Bess Pierce, and Dr. Nic Cabano for assistance with data collection in this project.

## **POSTER #105**

A Mouthful of Fry and Eggs: Does Mouth-Brooding Influence Head and Body Shape Evolution in Cichlid Fishes?

**Mentors:** Samantha Price and Olivier Larouche, *Biological Sciences*

**Students:** Saanga Alikhail, Bailey Benton, Myles Davoll, Delaney Freehill, Dominique Gross, Anand Loganathan, Nicole Nelligan

Cichlidae, a diverse family of fishes, have repeatedly evolved a variety of parental care strategies that are associated with trade-offs between head-shape and hydrodynamic efficiency. We therefore hypothesized that cichlids with different parental care behavior will also differ morphologically. Specifically, we predicted that mouth-brooders will have larger mouths and heads to accommodate the eggs/fry, whereas nest-guarders will exhibit deeper bodies to aid in abrupt acceleration. We compared the effect of parental behavior on morphology in 62 African and 99 South American species. Data on parental care were gathered from Fishbase and the literature. Head, body and mouth measurements were taken on specimens at the Smithsonian museum. Phylogenetic comparative methods were used to test for significant differences between species based on parental behavior. Preliminary results do not support our hypotheses, instead revealing nest-guarders have larger mouths.

This work was supported by the National Science Foundation DEB 1830127.

## **POSTER #106**

Informing Medical Device Design and Reprocessing through Human Factors Engineering and User Validation

**Mentors:** Melinda Harman and Zachary Hargett, *Bioengineering*

**Co-Authors:** Manuel Gutierrez, Satya Kalidindi

**Students:** Jacob Jordan, Corbin Goodwin, Bevin Kumar, Mark Livingstone, Chandler Sizer  
The long-term goal of this Creative Inquiry (CI) is to introduce the tools and techniques used in human factors engineering and to apply those skills to medical device design. Learning content is facilitated through lectures, case studies, and industry collaboration. This CI consists of 5 undergraduate students from the Industrial Engineering and Bioengineering departments. Currently, there are four undergraduate student-initiated projects ongoing. Project topics include reprocessing of BVMs in low-resource settings, the usability of ostomy devices, ESU grounding pad reuse, and how risk assessments can inform design decisions. For the BVM reprocessing team, students are looking at the current protocol for decontamination in Tanzania and looking at the variability in the way it is written. This team aims to find the areas of variability in the current protocol, and develop a more clear one in order to ensure the devices are properly being reprocessed. The team working with ostomy devices is partnered with a local start-up company, Stomagienics. This team is working closely with Stomagienics to conduct studies on the effect of their product, the Stomagenie, in hopes to establish it as a device that genuinely improves the lives of ostomates. The ESU grounding pad team's mission is to create a device and protocol for testing the grounding pads prior to surgery to ensure pad reusability. Their device aims to provide a test mechanism to establish substantial evidence that the reused grounding pad is of equivalent integrity to that of a new grounding pad. The final student team is working to show if a risk assessment tool can help inform design decisions. The project goal is to perform a sensitivity study on the risk analysis by varying the design inputs.

## **POSTER #107**

Set in Motion: The Effects of Bouncy Bands on “Off-Task” Motor Behavior in Children with Dyslexia

**Mentors:** Sarah Sanborn, June Pilcher, and Jennifer Bisson, *Psychology*

**Students:** Hanna Kent, Rebekah Holsenback, MaKensey Klaasmeyer, Austin Oldenburg, Lauren Schmidt, Tory Wilkison

Bouncy Bands are elastic bands that attach to students’ desks-<http://bouncybands.com>-that allow students the opportunity to release energy through mild physical activity without leaving their desks. Researchers have shown that physical movement in the classroom can result in increased attention and memory. The purpose of this study was to evaluate the effect of Bouncy Bands on “off-task” motor behavior in children during a silent sustained reading task. Participants were 22 (15 males and 7 females) students in two classrooms from a school for children with Dyslexia. Student behaviors were recorded (via video camera) for approximately 30 minutes each day for 8 weeks. The recordings for a subset of the days were later coded for “off-task” motor behavior (i.e., any motor behavior, in the upper half of the body, that did not pertain to silent sustained reading.) Any differences in “off-task” motor behavior due to the presence of Bouncy Bands will be reported.

## **POSTER #108**

Laser Microdissection Optimization to Analyze Tumor Microenvironment in Breast Cancer

**Mentor:** Heather Dunn, *Animal & Veterinary Sciences*

**Students:** Sabrina Carrel, Alyssa Davenport, Savannah Finley, Megan Johnson, Caroline Kennedy, Soline Mcgee, Hannah Oswalt, Shelby Smith, Amber Stone

The tumor microenvironment has been implicated in human breast cancer maintenance and progression. Microenvironments vary among different tissue types, and methods used to separate the microscopic populations for independent sequencing can be beneficial in further evaluation of how specific cells influence cancer initiation progression and metastasis. Laser microdissection (LMD) allows for the collection and analysis of selected cell populations. The purpose of this study was to develop a procedure for LMD of formalin fixed paraffin embedded (FFPE) tissue samples in order to analyze the changes in the tumor microenvironment of Triple Negative Breast Cancer (TNBC) and how this environment influences cancer development. RNA-seq data obtained from the luminal and extracellular matrix cell populations have been compared using bioinformatic analysis in order to elucidate genetic expression changes that occur in TNBC. Results have identified 3,541 common genes, 39 genes unique to the extracellular matrix, versus 17919 genes exclusive in the luminal environment. Research continues to compare different breast cancer subtypes to better understand molecular mechanisms involved in breast cancer progression.

## **POSTER #109**

Early Activation and Late Resolution of the Unfolded Protein Response in Highly Productive CHO Cells

**Mentors:** Mark Blenner, Marc Birtwistle and Dyllan Rives, *Chemical & Biomolecular Engineering*

**Students:** Julia Martone, Sierra Gurtler, Tara Richbourg

Chinese hamster ovary (CHO) cells are common protein production platforms due to efficient post-translational modification machinery and endoplasmic reticulum (ER) quality control; however, secretion levels needed for industrial cell lines can lead to an imbalance in ER homeostasis. Accumulation of improperly folded proteins is a particularly challenging bottleneck in cell line engineering and initiates the unfolded protein response (UPR). This research aims to demonstrate higher specific productivity results in unavoidable ER stress by measuring the UPR in cell lines engineered for high-levels of recombinant protein production. To determine if highly productive lines have been selected for the ability to overcome

ER stress, thapsigargin, an ER stress inducer, was supplemented in fed-batch culture of two CHO cell lines, one producing immunoglobulin G (IgG) and one producing erythropoietin (EPO-Fc). Western blot and quantitative polymerase chain reaction (qPCR) were used to investigate the UPR time course, correlated to product titer. In comparison to the production controls, both CHO cell lines exhibited earlier activation of UPR pathways. Bispecific antibodies are particularly difficult-to-express therapeutic products. In order to correlate ER stress with bispecific antibody production, four different antibodies (two monospecific and two bispecific) were transformed into CHO-S cells. Batch culture was monitored for seven days. Once again, western blot and quantitative polymerase chain reaction (qPCR) were used to investigate the UPR time course, correlated to product titer. Surprisingly, ER stress pathways were not activated during production of three of the antibodies, possibly due to low transformation efficiencies.

## POSTER #110

### Building an Academic Dashboard

**Mentors:** Marisa Orr, *Engineering & Science Education*, Haleh Brotherton, *Industrial Engineering*, and Baker Martin, *Engineering & Science Education*

**Student:** Becca Spilka

Many students in engineering are unaware that a particular career path can be achieved with a variety of engineering degrees. For example, a student can pursue a career in quality engineering with a degree in Mechanical Engineering, Industrial Engineering, or Materials Science & Engineering. As part of an NSF-funded project, we have developed a prototype Academic Dashboard to put students in the driver's seat of their education. The Dashboard gives students the knowledge and tools they need to choose and succeed in an optimal degree path. We selected Excel with VBA as the platform for the Dashboard prototype based on the needs of the project and capabilities of the CI team. The prototype we developed accepts user inputs for GPA and DMCI (Decision Making Competency Inventory) score. The Dashboard can retrieve research results from a website we created. It then provides dynamic feedback to the user on their inputted data in relation to the information retrieved. Additionally, the Academic Dashboard accepts inputs for the current semester, courses, study times, and grades. The dashboard also plots study times and expected grade. This visual representation provides students with the ability to track their habits and encourages more self-regulated behavior. Eventually, we would like the Dashboard to easily interact with other academic sites such as iROAR and Canvas. However, developing the dashboard within Excel allows us to demonstrate the potential for such a tool. We also created a user development guide which allows others to understand the VBA code to modify and expand the features of the Academic Dashboard in the future. In its final form, the Dashboard will provide feedback for students related to their grades, decision-making competency, interests, study habits, and more, supporting students to be self-regulated learners and decision-makers.

## POSTER #112

### Improvement of Vacuolar Proton Pump for Enhanced Salinity Tolerance in Transgenic Plants

**Mentor:** Hong Luo, *Genetics & Biochemistry*

**Students:** Katherine Benza, Mitchell Angove, Megan Douglass

Salinity is one of the major abiotic stressors that severely affects plant growth, causing a significant loss in crop yield. Of the various adaptation mechanisms evolved in different plant species for salt tolerance, proton pump mediated sodium sequestration into the vacuole is an effective process that not only leads to detoxification of  $\text{Na}^+$  in the cytosol, but also increases water uptake into cells. The vacuolar  $\text{H}^+$ -pyrophosphatase is one of the proton pumps that functions to create an electrochemical gradient across the vacuole membrane by pumping protons out of the vacuole in order to uptake ions and other metabolites. This function helps to protect the cytoplasm from toxicity. In this study, we have cloned and functionally characterized *PvAVP1-1* and *PvAVP1-2*, the two genes encoding the vacuolar  $\text{H}^+$ -pyrophosphatase from a highly salt-tolerant plant, seashore paspalum (*Paspalum vaginatum*). Transgenic *Arabidopsis* plants overexpressing *PvAVP1-1* and *PvAVP1-2* exhibit enhanced tolerance to both salinity and drought stress,

indicating the critical role these two genes play in regulating the plant stress response. The data obtained from this research provides information to develop novel biotechnology strategies to genetically engineer crop species for enhanced performance under adverse environmental conditions, leading to improved agricultural production.

## POSTER #113

Production of Recombinant Spider Dragline Proteins for Novel Materials Development

**Mentor:** William R Marcotte Jr, *Genetics & Biochemistry*

**Students:** Jacob Wood, Kadie Hudson, Cameron Keyser

While much is known about one of the strongest and most flexible biomaterials, spider silk, there still exists a lack of understanding on the basic biochemistry of spider silk fiber formation. The purpose of this study is to further understand the molecular processes that spider's use to convert a soluble and liquid protein into an insoluble fiber. Specifically, much remains to be discovered about how the N terminal domains of the spider fibroin proteins contribute to the spider's fiber self-assembly process. Currently, our group is interested in determining if covalent cross linking between protein molecules contributes to spider silk assembly and fiber strength. This research is important because a better understanding of the self assembly process will enhance efforts that might lead to new fibrous materials.

## POSTER #114

Measurement of Sound Frequency and Intensity of the Motion/Sound Infant Seat

**Mentors:** Susan Sullivan, *School of Nursing*, Vincent Blouin, *Materials Science & Engineering*, and Mary Ellen Wright, *School of Nursing*

**Students:** Natalie Duffin, Kelly Edwards, Nina Kremser, Kate O'Sullivan

Purpose: The pilot study's purpose is to assess the sound frequency and intensity of an infant motion/sound seat in a controlled environment to determine baseline measurements, to inform future study implementation in the hospital setting. Background/Significance: Non-pharmacologic treatment for infants perinatally exposed to substances includes a low stimulation environment.. The MamaRoo® is a commercially available motorized infant motion/sound seat commonly used to comfort these infants.. Research Questions: What are the sound frequency and intensity measurements in the MamaRoo® as heard by the infant for each sound and motion setting in a sound controlled environment? Methods: The research is a quantitative, exploratory, descriptive study using the MamaRoo® to measure sound frequency and intensity in a recording studio. Results: Overall, the sound intensity levels of all settings of the Mamaroo® are between 5 and 10 decibels. Conclusions and Implications for Practice: When added to the ambient noise in-situ, the sound may exceed tolerable levels for infants who suffer from withdrawal, which is the next phase of the study.

## POSTER #115

Kratom

**Mentor:** Mary Ellen Wright, *School of Nursing*

**Students:** Melissa Dubose, Claire Ginsberg, Abby Parkison, Shatasia Pringle, Madison Sherbondy

Purpose: The purpose of the systematic review is to analyze the current evidence of effects of prenatal Kratom exposure on the mother and infant. Background: Kratom (*Mitragyna speciosa*), a plant native to Southeast Asia, contains the alkaloids which can produce stimulant effects in low doses and some opioid-like effects at higher doses when consumed and is sold legally and regulated in the United States. Exposure to substances in pregnancy can cause consequences for mothers and babies. Research Question: What is the current evidence of the effect of prenatal Kratom exposure on the mother and infant in the postpartum period?

Method: A systematic review was conducted of cases of Kratom use in pregnancy and infant outcomes.

Results: Current evidence shows case reports of infant withdrawal symptoms from prenatal Kratom exposure. Conclusion: Further research is needed on the effects of the legal use of Kratom during pregnancy.

## **POSTER #116**

Characterization of Mid-Atlantic Estuarine Betaproteobacteria and Influential Environmental Factors on Abundance and Gene Expression

**Mentor:** Barbara Campbell, *Biological Sciences*

**Students:** Brady O'Boyle, Megan Zeaser

Microorganisms are contributors to ecosystem function in a variety of habitats. The Delaware Bay and Chesapeake Bay are estuaries where marine and freshwater mix, providing a salinity gradient that leads to environmental stratifications like salinity. These conditions structure the diversity of microbes which are influenced by environmental factors. Here, we investigate the relationship between environmental factors on bacterial functional potential and activity using metagenomics and metatranscriptomics. Samples were collected from the Delaware and Chesapeake bays and characterized based on location, season, salinity, size fraction, and time of day. The samples were assembled into eleven metagenome assembled genomes (MAGs) belonging to the taxa Betaproteobacteria, which were further divided into three pan-genomes based on phylogenetic clustering. Common pathways among the Betaproteobacteria MAGs included one-carbon metabolism, oxidative phosphorylation, and carbon fixation. This taxonomic group has a methylotrophic role, with several genes within the RuMP cycle for carbon fixation. A common gene across all MAGs was proteorhodopsin, suggesting a photoheterotrophic role in both groups. Differences in abundance and gene expression of the different MAGs were observed under different environmental parameters, mainly season and salinity. Changes in MAG abundance among samples was related to change in season, indicating that environmental factors influence microbial composition and activity.

## **POSTER #117**

Analyzing Age Distribution of Accidental Deaths in Pickens County

**Mentor:** Katherine Weisensee, *Sociology & Anthropology*

**Students:** Keegan Beane, Lily Haeberle, Catelyn Henry, Krista Leonard, Malenah Lewis, Michel McClure, Sophia Messervy, Lily Rusthoven, Keegan Tetrault

Accidents that result in death occur around the world every day, including right here in Pickens County, South Carolina. The data used is obtained from the Pickens County Coroner, which is input into an ArcGIS database. With data ranging from 1970-2005, there are currently 524 cases of death in which the manner of death was due to either motor vehicle accidents, suicide, or homicide. Our data is consistent with the Center of Disease Control and Prevention (CDC) trends of death around the state of South Carolina, with accidental deaths being the most numerous followed by suicides, then homicides. The goal of the study is to determine in what age range does each manner of death occur most frequently and whether the age ranges within each manner of death align with the national age ranges.

## **POSTER #118**

Positive Behavior Interventions and Supports Films: A Comparison Study of Engagement and Instructional Films

**Mentors:** Shanna Hirsch, *Education & Human Development*, and Alex Carlson, *Special Education*

**Students:** Hailley Burton, Brenna Carter, Cameron Gentry, Jered McConnell, Deavin Rencher, Hannah Snelgrove

Positive Behavior Interventions and Supports (PBIS) is a multi-tiered framework implemented in schools, focused on supporting student academic and behavioral outcomes. In Tier 1, universal behavior supports are implemented to set positive school-wide expectations for all students. Individualization is a key feature of PBIS. For example, each school is able to determine the way in which they wish to (1) teach behavioral expectations and (2) promote a safe and inclusive learning environment. Each year, Clemson hosts a PBIS Film Showcase to screen a selection of films. In the PBIS Films Creative Inquiry, we screened 90 films from

two categories: Instructional and School Engagement. For this presentation, we will compare the categories of films. A summary of our findings and implications will be provided.

## POSTER #119

### Genetic Diversity and Activity of Chemoautotrophic Clam Symbionts

**Mentor:** Barbara Campbell, *Biological Sciences*

**Co-Authors:** Mir Alvee Ahmed and Nichole Giani

**Students:** Erin Walker, Michelle Baldassare

Lucinid clams have chemoautotrophic endosymbionts in their gills. These gammaproteobacteria symbionts are known to oxidize sulfur and fix inorganic carbon for their host. However, the diversity of these symbionts in three hosts from the Bahamas are not as well understood and warrant further investigation. 16S rRNA gene analysis indicated the taxonomy of the primary symbiont was *Candidatus Thiodiazotropha*. Metagenomic analysis then grouped the samples into four *Ca. Thiodiazotropha* pangenomes which were not clustered based on location or host. Two genes, *rpoD* and *sqr6*, were then chosen to determine if sulfur oxidation is differentially used in the environment. *Sqr6* codes for a sulfide quinone reductase which promotes the oxidation of sulfide and *rpoD* codes for RNA polymerase sigma factor, a gene transcript used for normalizing the data. Through the use of qPCR, standard curves were created and will be used for further analysis of the presence and quantity of the gene transcripts.

This work is supported by the National Science Foundation's (NSF) Dimensions of Biodiversity Program (DEB 1342763) and Clemson's Creative Inquiry program.

## POSTER #120

### Up All Night to Get Lucky? Coyote, Deer, and Rabbit Diel Activity in South Carolina

**Mentors:** David Jachowski, Alex Jensen, Michael Muthersbaugh and Elizabeth Reghi Saldo, *Forestry & Environmental Conservation*

**Students:** Austin Amick, David Jen, Robert Mueller, Caroline Myers, Vanessa Patch, Brinton Shinn, Kevin Stoner

Predator-prey interactions are complex and influenced by various factors, including temporal activity patterns of each species. Studying the temporal activity patterns of predators and their prey will further our understanding of predation risk for prey species. Coyotes are a novel top predator in the Southeast and have been shown to be effective white-tailed deer fawn predators in the region. Identifying coyote diel activity patterns in relation to their prey diel activity patterns, specifically deer and rabbits, could provide insight into coyote prey selection during fawning season. Our objectives were to quantify coyote, deer, and rabbit diel activity patterns during fawning season, and compare the degree of activity overlap between coyotes and these two prey species, separately. We hypothesized significant overlap between predator diel activity and prey diel activity. In order to quantify activity, we deployed an array of 93 wildlife cameras across 15,000 acres of managed loblolly, hardwoods, and pasture fields in the Piedmont region of South Carolina. We identified the species in these photographs and the time the photo was taken using the photo management software digiKam. To compare the degree of activity overlap between our focal species, we calculated the coefficient of overlap between coyotes and deer and coyotes and rabbits during May 2019. We expect coyote temporal activity to be directly related to prey temporal activity with a coefficient of overlap over 0.5, with all three species having peaks in activity during dawn and dusk. As opportunistic predators, coyotes may be hunting at night to increase the odds that they will encounter deer or rabbits. We thank our collaborators South Carolina DNR, USDA Forest Service, Davis Land and Timber, and Quality Deer Management Association for funding and logistical support of this research.

## **POSTER #121**

Engineering *Yarrowia lipolytica* for pinocembrin synthesis

**Mentors:** Mark Blenner and Vijaydev Ganesan, *Chemical & Biomolecular Engineering*

**Students:** Will Burnette, Patrick Dayton

Flavonoids are secondary plant metabolites with antimicrobial, anti-inflammatory, antioxidant, and anticancer activities. Pinocembrin is a simple flavonoid that can be used to produce complex flavonoids such as chrysin. We report for the first time the de novo synthesis of pinocembrin in yeast by changing the gene source for CCL from *Scutellaria baicalensis* to *Petroselinum crispum*. We further increased the titer by increasing pre-cursor supply. We identified ARO3 to be feedback inhibiting phenylalanine and ARO4 to be feedback inhibiting tyrosine through growth experiments. We knocked out ARO3, ARO4 and overexpressed different feedback inhibition resistant mutant versions of ARO4 to remove feedback inhibition. The mutants were identified through the crystal structure of model yeast *S. cerevisiae* ARO4 and sequence alignment with *Y. lipolytica* ARO4. Finally, we identified the rate-limiting genes in the shikimate pathway and overexpressed them to further increase flux through the shikimate pathway. We monitored the accumulation of intermediate cinnamic acid and pinocembrin to validate the impact of modifications.

## **POSTER #122**

Decoding the Meltdown- What Makes Shopping Stressful for Kids on the Spectrum?

**Mentor:** Jennifer Bisson, *Psychology*

**Students:** Illiana Hebda, Audrey Hartis, Lauren Greene, Halle Freedman, Alexandra Doubles, Karsyn Ivey, Kacie Tobias, Caroline Walpole

Parents of children with Autism Spectrum Disorder (ASD) report more stress than parents of typically developing children (Hayes & Watson, 2012), and one particularly stressful environment for these families is the grocery store (Greenwald, Williams, and Seniuk, 2013). As part of a larger study, parents of children with ASD were asked to report stressors, triggers, and coping strategies when grocery shopping with their child. Parent responses are being qualitatively coded to more fully understand the experience of shopping with a child on the spectrum.

## **POSTER #123**

Mathematical Models Created from Natural Language Text Recapitulates Experimental Ligand-Receptor Dynamics

**Mentors:** Cemal Erdem and Marc Birtwistle, *Chemical & Biomolecular Engineering*

**Students:** Andrew Billings, Kathleen Buda, Haley Hilliard

Our team works to create models and run simulations of drug and drug combinations on cell line models, predominantly with respect to cancer. We work with the software called Integrated Network and Dynamical Reasoning Assembler (INDRA), a python package developed for automated model assembly. Here, we mostly utilize INDRA's ability to turn structured natural language text into executable mathematical models. To do so, we use Jupyter Notebook, an open-source web-based application to generate and run python codes. We generate models of biomolecular interactions by writing excerpts of text, reading into INDRA, generating the underlying statements, converting them to network topologies, and exporting the computational model of hormones and their receptors. To visualize the final network, we use another software called RuleBender. So far, we have replicated ligand-receptor cooperativity results from our original work on pan-cancer modeling of signaling pathways. More python code has been written to run and evaluate the models one at a time. We are able to set and then optimize the parameters determining the rate of the reactions, as well as the initial concentrations of the species involved. By doing this, we can ensure our model closely matches the literature while still representing realistic reactions. By continually expanding the body of work to develop larger cascades and analyzing these models to match earlier work, we will create one of the most comprehensive mechanistic models in the literature.

## **POSTER #124**

Utilization of Doppler Ultrasonography for the Study of Fetal Development in Sheep

**Mentors:** Eric Walker, *Public Health Sciences*, and Celina Checura, *Animal & Veterinary Sciences*

**Students:** Katherine Atkinson, Natalie Boulos, Emma Crowfoot, Hannah Friend, Sophia Jackson, Camila Silva, Shelby Lubowicki

Intrauterine growth retardation (IUGR) is a condition in which the developing fetus is smaller than it should be for its gestational age. In addition to the obvious problems for neonates and infants, the Barker hypothesis proposes that IUGR has a causal relationship to the origins of coronary heart disease, hypertension, and non-insulin-dependent diabetes in adult life. Restricted blood flow to the placenta and fetus is one of the causes of IUGR. Sheep are frequently used to study fetal development as a model for human disease; therefore, Doppler ultrasonography was performed on pregnant ewes to compare blood flow parameters between fetuses from different genetic backgrounds. Twenty Suffolk ewes were randomly assigned to either a Suffolk ram or a Texel ram. Only ewes carrying twins were used for the study. Doppler ultrasound exams were performed at 60, 90, and 120 ( $\pm$  3) days after breeding. Placental, fetal, and maternal blood flow velocities and vessel diameter were measured in the umbilical artery, fetal aorta, and maternal femoral artery. Gestational age and weight at birth were recorded. Data analysis is pending at the time of submission. Correlations between placental, fetal, and maternal blood flow, and birth weight will be studied. The two genetic groups will be compared. Using birth weights, individuals suffering IUGR will be identified and their blood flow parameters will be considered retrospectively and compared to the rest of the population. Through this pilot study, the technique used to record blood flow parameters was validated and a reference database for the study of IUGR in this sheep model will be established.

## **POSTER #125**

Evaluating Water Quality and Stream Characteristics of Six & Twenty Creek and Eighteen Mile Creek: Influents for Lake Hartwell, Anderson, South Carolina

**Mentor:** David Ladner, *Environmental Engineering & Earth Science*

**Students:** Scott Kimball, Lyndsi Laufenberg, Alexis McFadden, Hillary Tapia, Matt Yandle

Located between Clemson and Anderson, SC, the Six & Twenty Creek and Eighteen Mile Creek are important watersheds for Lake Hartwell, and eventually the Savannah River. Although smaller than neighboring streams nearby such as the Seneca River, possible contaminants in runoff from surrounding agricultural sites and farmland could impact ecosystems downstream. South Carolina DHEC, in an effort to involve the community and monitor an even greater number of streams, created the Adopt-a-Stream program with Clemson University.

The South Carolina Adopt-a-Stream program is made up of trained volunteers that record data on the water quality and characteristics of streams across the state. The data gets entered into the database where DHEC monitors the data and if the numbers need to be rechecked they will contact the volunteers back out to resample. If the numbers are still hinting at possible water contamination or any other possible factors, DHEC will send out a crew to inspect the site more intensely. Participating in the Adopt-a-Stream program allows us to provide useful information to the state, as well as landowners nearby, and help protect the streams in the long run. We collect data on physical, chemical, and bacterial properties such as air and water temperature, pH, dissolved oxygen, water hardness, and conductivity. After on-site testing, E.Coli counts are made in the laboratory. Using graphs, we monitor the relationships between the parameters that we test and monitor their correlations and relationships.

## **POSTER #126**

Teamwork Makes the Dreamwork: Training Today's Student on Effective Teamwork

**Mentor:** Claire Dancz, *Engineering & Science Education*

**Student:** Allison Urove

Today's organizations require collaboration in the form of teamwork. The ability to work in team settings is also a critical component of college education. Despite this, not all students have positive teamwork experiences and are afforded the opportunity to broaden their understanding of the contributing elements to teamwork. Effective teams produce greater results and experience more success when they leverage the instinctive talents of team members. We investigate in this study a teamwork training approach to build awareness around conative instincts and personal attributes that contribute to efficient teamwork operations. Prior to the teamwork intervention, participants took the Kolbe A™ Index assessment that evaluates individual conative instincts or their innate problem solving approach. A Kolbe Certified Consultant used the Kolbe A™ Index results to place participants on synergistic and conflict teams. Synergistic teams were built with even distribution of conative instincts across the team. Conflict teams were built with an overabundance of conative talent in single areas and missing methods for other conative instincts, described as conative cloning. Participants took part in a two hour workshop where they were instructed to engage in a teamwork exercise with their assigned teammates. This exercise required participants to use their conative instincts to solve a problem as a team. Following the workshop, the Kolbe Certified™ Consultant delivered personal interpretations for each individuals' Kolbe A™ Index results and all participants engaged in an after action review of the teamwork exercise to develop an understanding of conative instincts and teamwork operations. The results from this study have informed the development of a classroom teamwork training model to support teamwork in undergraduate courses.

## **POSTER #127**

Simulation of History Force on Microparticles under Optical Force Microscopy

**Mentors:** Lucas Schmidt and Zhi Gao, *Bioengineering*

**Students:** Robert Gradel, Habib Rafka, Shenghao Tan, Thomas Fair, Junkai Yang

We used optical tweezers to manipulate a microparticle in solution with nano and micro accuracy, in which we observed a phenomenon similar to static friction that resists the initial motion of solid objects on a surface. This phenomenon resulted in a larger optical force required to trap a microparticle. We hypothesize that this phenomenon is caused by a hydrodynamic inertial history force. Here we report our investigation on the effect of history force on microparticle trapping and escape under optical tweezers using computer simulation and experimental evaluation. The results indicated history force has significant impact at the beginning of the particle motion, however decreases exponentially over time, and the maximum trapping velocity (above which the optical tweezers will not be able to propel the microparticle) is affected by history force. Our simulation suggests the history force accounts for our observation, and larger optical force is required to drive a particle to reach a moving velocity than that to maintain the particle a constant moving velocity of the same value. This work was supported primarily by the National Science Foundation through EPSCoR Program under NSF Award # OIA-1655740

## **POSTER #128**

Yield and Digestibility of Conventional and BMR Pearl Millet with Different Establishment Dates or Harvested at Different Maturities

**Mentor:** Matias Aguerre, *Animal & Veterinary Sciences*

**Co-Author:** Madeline Oskey

**Students:** Lauren Pope, Allyson Duvall

The main objectives of these studies were to evaluate the yield and digestibility of conventional and BMR (log lignin) pearl millet (PM) with different establishment dates or harvested at different maturity stages. A second objective was to evaluate the impact of mixing PM with cowpea (annual summer legume) on measured

variables. Two trials were conducted in field plots (1.5 m x 6.1 m) as randomized complete block designs with a split plot arrangement of treatments. In trial 1, two varieties of PM (conventional and BMR) were planted at two different dates (14d apart) and harvested at early heading stage. In trial 2, two varieties of PM (conventional and BMR), mixed or not with cowpea were harvested at PM boot or heading stages. Samples from both trials were analyzed for 30-h in-vitro NDF digestibility (IVNDFD as % NDF). In trial 1, dry matter yield was numerically lower for BMR compare with conventional PM (4,255 vs. 3,875 kg/ha, P=0.16), but delaying establishment significantly ( $P < 0.01$ ) reduced DM yield by 23%, regardless of PM variety. Compared to the conventional variety, PM with the BMR trait had higher IVNDFD (66.3 vs. 63.6%,  $P < 0.01$ ). In Trial 2, DM yield was 8.3% lower for BMR compare with conventional PM (3,266 vs. 3,875 kg/ha, P=0.07). Similarly, mixing PM with cowpea tended to also reduce DM yield by 8%. Harvesting at heading stage numerically increased DM yield by 5.3%. Pearl millet with the BMR trait had a higher IVNDFD, regardless of mixing it or not with cowpea (64.6 vs. 60.0%;  $P < 0.05$ ). More mature PM resulted in a 7.3% lower IVNDFD (59.9 vs. 64.8%;  $P = 0.04$ ). Results of this studies suggest that BMR PM is more digestible than conventional but at expenses of lower DM yield. Planting date and plant maturity are important tools to manipulate PM yield and quality but mixing cowpea with PM had small effects on quality at expenses of yield.

## POSTER #129

Taking Context Seriously: Socialization around Economic Inequality

**Mentor:** Ethan Busby, *Political Science*

**Students:** Ansley Birchmore, Ayana M. Gaines, Josh Holmstrom, Breanna Pittman, Terrence Singleton, Caitlyn Van de Meulebroecke

Economic inequality in the United States has reached levels not seen since the early 20th century. Children are not immune from the effects of economic inequality; like other forms of inequality, parents play a major role in children's socialization. However, little is known about how parents teach their children about economic inequality. What messages do parents send to children, both through the things that they say and that they do? Drawing from psychological and developmental theories, we take a dual approach considering the explicit and implicit socialization of children. We have developed a research design that documents the things parents report teaching their children and can then be linked to information about the parents' social networks and the places where children spend their time. To date, we have developed the survey, created a method to geocode key responses, determined what geographic data to consider, and learned the analytical tools needed to answer this question.

## POSTER #130

Restoration of Oyster Reefs in the ACE Basin

**Mentors:** Caye Drapcho and Libby Flanagan, *Environmental Engineering & Earth Science*

**Students:** Carolyn Kearns, Allison Barrera, Natalie Whitaker, Colin Richter, Ean Tucker,

Rachel Burger, Freddy Nocella, Natalie Dell, Gianfranco Esteves

The Ashepoo, Combahee and Edisto (ACE) Basin, is a natural fishery for the eastern oyster. Here, the natural oyster reefs have been depleted. Oysters are a keystone species that provides habitat for other organisms living in the water and improve water quality through filter feeding of algae and other suspended particles. They also protect the shoreline, shielding them from boat wakes and waves that lead to erosion. The decline in the oyster population has been caused by over-harvesting as well as destruction of habitat. Currently, a common method for oyster reef restoration efforts involves placing recycled oyster shells into plastic mesh bags that are used as a solid surface for oyster spat attachment. However, as the oyster population continues to decline, the amount of available shells declines as well, leading to the necessity for a new method. Our goal is to evaluate oyster spat attachment on different coatings of wire used in crab trap construction as a potential substrate, and to design a low-cost and low-labor installation method. The specific goal of this experiment is to determine oyster spat attachment levels of four different surface treatments of the wire.

## **POSTER #131**

Engineering a Highly Sensitive and Modular Reaction Cascade Biosensor

**Mentor:** Mark Blenner, *Chemical & Biomolecular Engineering*

**Student:** Hayden Tharpe

Detection of certain substances has always been an important focus, however, as weapons technologies continue to advance, the detection of Chemical and Biological Warfare Agents (C&BWAs) has become increasingly critical. This project seeks to develop a new biosensor detection strategy that amplifies stoichiometric molecular binding events into quantitative outputs through enzymatic activity. The focus is to engineer two separate single-chain variable fragment (scFv) protein pairs, one that can detect Protective Antigen (PA), a cell-binding protein of Anthrax, and another pair for trinitrotoluene, commonly known as TNT. These biosensors could be used to quickly identify minute amounts of Anthrax and TNT through a cascading reaction system in the future. This advancement can further our ability to identify chemical and biological weapons of mass destruction in a timely manner to lessen their threat.

## **POSTER #132**

Review of University Support for Students Using Dating Apps

**Mentor:** McKenzie McNamara, *Student Health Center*

**Co-Author:** Brooke White

**Students:** KT Yacu, Sydney Balcerzak, Caroline Zissette, Randy Fang, Madisyn Currie

This semester the alcohol and other drug creative inquiry team has partnered with the Creative Inquiry Team on College Student Wellbeing to look at the impact dating app use has on the well-being of college students. The Creative Inquiry Team on College Student Well-being focused a research study on the emotional, physical, and social well-being of college students who use dating apps over the Fall 2019 and Spring 2020 semesters. We assisted in the data collection process through supporting interviews and surveys, focused on the areas of motivation, safety, sexual health, emotional impact, and social connectedness. We are also supporting in the review and reflection process. In this poster we will reflect on the findings of this survey and will review and provide suggestions for Clemson University policies, activities, and initiatives.

## **POSTER #133**

A Genetic Approach to Unravel Major Regulators of Lipid Accumulation in *Camelina*, a Promising Oilseed Crop

**Mentor:** Haiying Liang, *Genetics & Biochemistry*

**Students:** Kayed Al Dahabi, Logan Browning, Emily Powell, Claire Smith, Nicolas Glisson, Tommy Ryan, Allie Randazza

*Camelina sativa* is a member of Brassicaeae that contains 8%–43% oil and 27–32% protein in its seed.

Camelina oil has a unique profile with over 50% of the fatty acids polyunsaturated. Further, the oil can be used not only for industrial purposes, but also for human nutrition and pharmaceuticals. Compared to other oilseed crops, such as rapeseed, camelina has a number of advantages, including a higher tolerance to drought, cold temperatures, diseases, and insects, as well as the ability to grow on poorer quality farmland with a requirement of little management. Moreover, camelina has a short life cycle of 85 to 100 days, and can be genetically modified with ease. In recent years, camelina has gained tremendous attention as a promising oilseed crop and has emerged as a model species for oil biosynthesis and regulation. Currently, the project is working on generation of binary vectors for camelina transformation. Target genes include LEAFY COTYLEDON1 (*LEC1*), *LEC2*, ABSCISIC ACID INSENSITIVE3 (*ABI3*), and *FUSCA3* (*FUS3*). The ultimate goals are to reveal the regulation mechanisms of oil biosynthesis and provide strategies to improve oil yield and quality in camelina.

## **POSTER #134**

A Deep Dive Into *AluY* – the Youngest *Alu* Subfamily in Old World Monkeys and Apes

**Mentor:** Miriam Konkel, *Genetics & Biochemistry*

**Students:** Caroline Corley, Zari O'Connor, Nathan Bruns

Transposable elements have the ability to move around the genome and create new insertions. The primate-specific Aluelement, a SINE (Short INterspersed Elements), is the most successful transposable element in primates by number, with more than 1 million insertions in the human genome. *Alu* elements can be grouped into three major subfamilies based on the presence and absences of diagnostic substitutions.

The youngest family in the lineage leading to human is *AluY*, which arose prior to the radiation of apes and Old World monkeys more than 25 million years ago. In this project we pursued a comparative analysis investigating the *AluY* content of ten different species of apes and Old World monkeys, with the goal of better understanding *Alu* content both across species and across different genome assemblies. Generally, more recent assemblies show a higher number of full-length *AluY* elements compared to older assemblies, indicating that the quality of a genome assembly plays an important role regarding the assessed presence of *AluY* elements. Next, we investigated mobilization dynamics of *AluY* in the lineage leading to human.

Here, we find evidence for *AluY* propagation until at least very recently. This indicates that *AluY* has been active until on the order of 25 million years ago in at least some species. Intrigued by this finding, we further investigated young *AluY* subfamilies (e.g. *AluYa5*) in humans with evidence for ongoing mobilization in the human population, toward determining if these subfamilies harbor further subfamily structure. We identified a number of smaller subfamilies within *AluYa5*, indicating ongoing subfamily evolution and a greater diversity of *AluY*-derived subfamilies with ongoing mobilization. We underline that genome quality assembly impacts the estimate of *Alu* density in genomes.

## **POSTER #135**

Effective Altruism

**Mentor:** Stephen Satris, *Philosophy & Religion*

**Students:** Caleb Hylkema, Nielly Bevis, David Brophy, Shania Green, Bella Parise, Rex Stancliff, Kamryn Stem, Jesse Tindal

Effective Altruism is a movement which uses reason and evidence to determine how to most effectively help others. Its primary focus is to determine which cause areas have the greatest potential to improve human and animal wellbeing, and then allocating resources to those areas. It is also concerned with figuring out which careers are the best to pursue to have the largest impact, as well as which charities do the most good per dollar donated. In our Creative Inquiry, we have critically evaluated the core ideas and principles of Effective Altruism, as well as done in-depth research into some of the movement's key findings, including which cause areas, careers, and charities it deems the most effective. We will present some of the central ideas of the movement, including how to evaluate effective causes by the three criteria of scale, tractability, and neglectedness, and will present some of the key practical implications of effective altruism, including what the world's biggest problems are, and what charities to donate to and careers to pursue to help solve them.

## **POSTER #136**

Something Very Fishy: A STEAM Program for Elementary Schools

**Mentor:** Michael Childress, *Biological Sciences*

**Students:** Nicolette Fisher, Blake Howell, Amy Kowal, Caroline Ranney, Lily Rogers, Grace Rypkema, Courtney Westcott

The oceans are in trouble and they need our help. That is the message our Something Very Fishy STEAM program brings to thousands of upstate elementary school children. Our approach is to engage children in a musical theatre adventure under the sea where a cast of marine critters and a determined marine biologist seek answers to what is happening to our oceans. The program ends with a call to action and an imaginary eco-tour of the Florida Keys. Here our CI student docents bring to life careers such as coral biologist,

SCUBA instructor, dive engineer, national park ranger, sea turtle biologist, and marine animal veterinarian at stations that engage the children in arts and science careers related to saving the planet. Highlights include meeting the puppets and actors, transplanting a coral to the coral reef, and holding live marine invertebrates. Here we present some of the preliminary results of our program assessment suggesting that our SVF STEAM exhibit has a positive change on the children's view of the ocean and their potential future careers. Because "together we are, stronger by far".



# CLEMSON STUDENT RESEARCH FORUM

## POSTER #137

Hopefulness in Physical Therapy Patients Throughout Different Stages of Injury Recovery

**Author:** Halle Freedman, *Psychology*

Physical therapy has been a beneficial tool in helping injured persons achieve successful recovery.

Literature on physical therapy has discussed its benefits toward physical rehabilitation, but little work has been done on the mental progression of these patients through treatment. This PSYC 3100 was designed to explore the relationship between patients' completed number of physical therapy sessions and their hopefulness levels at different stages of recovery. The findings were limited to 69 physical therapy patients ( $N = 69$ ) who responded to an email survey containing the Adult Hope Scale. The project found a significant difference between hopefulness levels at 4 or less sessions and 20+ sessions and a non-significant difference between each other session groups. The data uncovered supported the hypothesis that over the duration of physical therapy, hopefulness levels in recovery fluctuate; however, hopefulness levels at the completion of therapy are higher than those at the level of initial therapy.

This research was overseen by Eric McKibben and has gone through addition IRB review/approval.

## POSTER #138

Towards Nanoparticle-Mediated Delivery of CRISPR Cas9 Protein for Regulating Therapy

**Authors:** Sara Edgecomb, Christopher Rovero, *Chemical Engineering*, Shoaib Iqbal, *Engineering, Computer, and Applied Sciences*, and Jessica Larsen, *Chemical & Biomolecular Engineering*

The need for effective methods to treat neurological diseases is rising. Protein Cas9 is a gene-editing tool that could improve treatment of these disorders. Its versatility provides potential for application in many disorders with long lasting effects. In this project, we have designed and optimized ribonucleic protein complexes (RNPs) for gene knockdown in MCF10A-CLOVER cells (fluorescent expressing). Four guide RNAs (gRNA) were tested in complexation with Cas9 for gene knockout efficiency. Electroporation was used for cellular uptake with RNPs. Using fluorescent microscopy and flow cytometry, gene knockout was confirmed through analyzing the decrease in fluorescence. All gRNAs successfully altered the expression of the fluorescence in MCF10A-CLOVER cells with oligos1 gRNA presenting a 64% knockdown.

Determination of optimal RNP for gene knockdown is ongoing.

Cellular uptake studies were performed on MCF10A cells using nanoparticles composed of polyethylene glycol and polylactic acid polymers (PEG-PLA). The nanoparticles effectively encapsulated F-BSA (fluorescent protein) at an average size of 102.3nm and a standard deviation of 0.781nm, making the system small enough to penetrate the blood-brain barrier. MCF10A cells were cultured and incubated with nanoparticles, then stained for imaging. Fluorescent imaging of the cells yielded evidence of the PEG-PLA nanoparticles containing F-BSA successfully entering the cells.

Delivery of Cas9 with nanoparticle mediated RNP gave no conclusive results due to solvent interference with protein structure. In conclusion, new methods for solvent-free nanoparticle formation while encapsulating RNPs are being explored and results from the electroporation and nanoparticle mediated RNP delivery will be compared to determine therapeutic gene knockdown effect of polymersomes in neural cells.

## POSTER #139

### The Role of Reappraisal on Action-Based Decisions

**Authors:** Aminah Roberts, Human Factors and Njisane Adesegun, *Psychology*

The purpose of this study was to examine whether individual differences in self-reappraisal, response to situational reappraisal, and trait neuroticism can influence action-based decision-making in high-threat situations. Action-based decision-making under threat was measured using a first-person shooting task that has been widely used in past research. Participants decide to shoot or not shoot a target based on whether or not it is armed. An opportunity for situational reappraisal was presented with the target changing or staying the same distance. Results demonstrated that situational reappraisal did not increase decision accuracy. However, self-reappraisal as an emotion regulation strategy was useful in decision accuracy. Neuroticism, on the other hand, was not a significant predictor of performance. The results from this study may have implications regarding the usefulness of coping strategies in aiding decision-making under high-stakes situations versus the influence of engrained individual characteristics and the opportunity for reappraisal.

## POSTER #141

### The Gender Difference in Sex Education

**Authors:** Bruce King, Savannah Burke, and Taylor Gates, *Psychology*

In a survey of instructors of human sexuality courses at 58 US universities and colleges, for 51 institutions the female/male ratio of enrolled undergraduate students ranged from 2/1 to 38/1, and typically 3/1 to 6/1. Most courses were offered in departments of psychology or health, which usually have high F/M ratios for majors. However, the high F/M ratios in sexuality courses could not be explained entirely by departmental or institutional F/M ratios, and were not related to the size of the course, the gender of the instructor, or the geographical area of the country. It is concluded that men are much less likely than women to enroll in a college sexuality course. Many instructors expressed concern about the high F/M ratios and some attributed it to stereotypes about masculinity. Research indicates that masculine ideologies result in many boys having a negative attitude about sex education. Many university men believe that they already know enough about sex, but there was some evidence that men were more likely to enroll when courses were offered on-line, allowing for some degree of anonymity and privacy.

## POSTER #142

### Influence of Social Support, Injury Guilt, and Recovery Resources on Student-Athletes' Concussion Experiences, Emotional Distress During Recovery, and Attitudes Towards Concussion

**Author:** Linnea Bacon, *Psychology*

While concussions within high school and collegiate sports have recently become a public health issue of much concern, one topic receiving more attention is the influence of concussion on student-athlete mental health. This study evaluated the correlates of the psychological consequences of concussion, including social support, athletic identity, sport motivation, and access and satisfaction with resources. This study also explored the sociological factors contributing to the perpetuation of concussion stigma among collegiate and high school student-athletes. Ninety seven high school and 21 collegiate student-athletes completed measures of depression, trauma-related guilt, sport anxiety, athletic identity, social support, and sport motivation. Student-athletes were also surveyed on the resources they received during concussion recovery, the social pressures experienced during recovery, and perceived concussion stigma. Results indicated that student-athletes with a history of concussion experienced more sport anxiety, depression, and were less satisfied with received social support than student-athletes without concussion.

## **POSTER #143**

### Choosing Rapidly: The Interaction of Time Pressure and Lineup Type in Identification Decisions

**Authors:** Brenner Thompson, Paige Kennett and Kaileigh Byrne, *Psychology*

Recent research on lineup identifications have focused on ways that identification accuracy can be improved upon through the administration of the lineup. This study investigated how time pressure may exert different effects on identification accuracy and confidence in simultaneous compared to sequential line-up types.

Identification decisions were judged in target-present lineups under different levels of time pressure.

Participants were randomly assigned either low time pressure or high time pressure. In addition, they were also randomly assigned to either a simultaneous or sequential lineup display. It was predicted that time pressure would exert an effect on simultaneous lineups, but not sequential lineups. However, the results demonstrated that time pressure did not significantly affect eyewitness identification decisions. Instead, the results revealed that in the sequential lineup, but not the simultaneous lineup, participants reported being more confident in their decisions but were less accurate in identifying the perpetrator. This makes for a dangerous combination because people can be confidently wrong in accusing someone of committing a crime when this type of lineup is used.

## **POSTER #144**

### The Effect of Anthropomorphism on the Endowment Effect

**Authors:** Marissa Splendore, Stacey Slice and Kaileigh Byrne, *Psychology*

The endowment effect is the increase of perceived value ascribed to an object when one owns the object.

Previous research demonstrates that individuals can be endowed by physical objects and perceive them as more valuable when they own them. In the current study, we will examine whether providing an object with a human-like name, an anthropomorphic feature, influenced the endowment effect. Participants (sellers and choosers) will be introduced to the item in two different ways: in one group, the item will be introduced with non-anthropomorphic, objective label ("Keychain Model K21") and in the other group, the item will be introduced with a human-like name ("Adelaide"). Results are expected to demonstrate that participants in the anthropomorphic group will declare a significantly higher price for the keychain than participants in the non-anthropomorphic group. The overall results are also expected to be consistent with previous findings on the endowment effect: sellers will price the item significantly higher than choosers. Moreover, sellers who are endowed with anthropomorphic label of the keychain ("Adelaide") may declare a higher selling price for their keychain over all other groups (anthropomorphic choosers and non-anthropomorphic sellers and choosers).

## **POSTER #145**

### Correlation of Neuroinflammation and Lysosomal Hydrolase Upregulation in Co-Culture of Fibroblasts with Astrocytes

**Authors:** Chloe Champion, *Biochemistry*, Zoe McNelis, *Genetics*, and Jessica Larsen, *Chemical Engineering*

Annually 50 million Americans are affected by neurodegenerative disorders, yet the pathogenesis of these disorders is largely unknown and the availability of non-invasive diagnostic tools is poor. There are three mechanisms that lead to neurodegeneration neuroinflammation, impaired autophagy, and mitochondrial dysfunction. Previous research found that there is an upregulation of lysosomal hydrolases in these disorders, but it is unknown where on the cellular pathway this upregulation occurs. The goal of this project is to study the effects of neuroinflammation on lysosomal hydrolase activity to gain insight on the cellular mechanisms of neurodegeneration.

GM1 Gangliosidosis is the model of neurodegeneration used in experimentation. Normal and diseased feline skin fibroblasts, NSV3 and GM1SV3 respectively, were cultured in complete media containing TNF- $\alpha$ , a proinflammatory cytokine, and used in enzyme assays and ELISA. The fibroblasts were not able to uptake TNF- $\alpha$  efficiently and did not elicit a response in lysosomal hydrolases. This is due to fibroblasts lacking

immune cells that can surmount a response; in order to combat this the fibroblasts will be co-cultured with astrocytes in future studies. The astrocytes have the ability to elicit a microglial response to inflammation. With this information, the relationship between neuroinflammation and lysosomal hydrolase upregulation can be determined. Lysosomal hydrolase levels have the potential to be a universal biomarker for neurodegenerative diseases, which in turn can lead to earlier diagnosis and treatment for the often deadly diseases.

## POSTER #146

### Microparticle Focusing Using Ratchet Structure for Biological Applications

**Authors:** Amir Malekanfard, Apollo Wolfersberger, Wuzhou Zu and Xiangchun Xuan,  
*Mechanical Engineering*

Microfluidic devices have been increasingly used over the past two decades for numerous chemical, biomedical, and environmental applications because of the advantages like reduced cost, increased efficiency, and portability over their macroscopic counterparts. Moreover, the interest in the ability to control and predict the motion of particles in microfluidic devices has been increasing, where a precise transport and placement (e.g., focusing, trapping, and sorting) of particles in microchannels is often involved in these devices. Among the various particle handling approaches, the electric field is the method of choice in microfluidic systems because of the ease of operation and integration. Induces dielectrophoresis is a preferred method among various label-free particle sorting methods since it generates an electric field gradient, while it is easy to fabricate (compared to other methods like e-DEP based devices). In this work, we were able to focus particles in a single streamline located in the centerline of a microchannel using various ratchet structures. It was studied how the design of the ratchet will affect the focusing capabilities of the microchannel, experimentally, analytically, and numerically. Moreover, the effect of the electric field and particle size on the focusing capabilities has been investigated. Finally, the test was performed on yeast cells instead of polystyrene particles, as a demonstration for potential biological application of this work.

## POSTER #147

### Invertebrate Response to Burning in a Managed Tidal Impoundment in Coastal South Carolina

**Author:** Christiana Huss, *Environmental and Natural Resources*

Invertebrates are a vital source of food for bird and fish populations in managed tidal impoundments (MTIs). It is common practice in South Carolina to perform controlled burns on these MTIs to set back plant succession and remove undesirable plants. The purpose of this study is to explore the impact of prescribed fire on invertebrate populations in MTIs. To test this, we took ten benthic core samples from an MTI that received a prescribed fire and ten samples from a control MTI four days after the burn (December 2018), eight months after the burn (August 2019), and twelve months after the burn (December 2019). We then compared invertebrate density, diversity, and abundance between the two sites. Directly after the prescribed fire in December 2018, the burned MTI had 101 invertebrates while the control MTI had 26. The burned MTI value is significantly higher with p value = 0.0399. For all other months, there was no significant difference between invertebrate abundance, diversity, or density. These results show evidence that prescribed fires do not negatively impact invertebrate populations in MTIs.

## **POSTER #148**

### Cellular Delivery of Enhanced Polymersomes with Encapsulated Neuron-Regenerating Peptides

**Authors:** Cheyenne Brady, Austin Evers, *Chemical Engineering*, Jessica Larsen, *Chemical & Biomolecular Engineering*, and Jess Tetterton, *Biochemistry*

Introduction: Nerve cell damage is repaired within the Peripheral Nervous System (PNS) by translation of mRNA using neurotrophic factors. However, this translation isn't successful within the Central Nervous System (CNS). Specifically, RasGAP SH3 domain binding protein 1 (G3BP1) forms stress granules, preventing nerve regeneration. To breakdown stress granules, peptides from different domains of G3BP1 have been developed, with one peptide able to limit stress granule formation. However, the blood-brain and nerve-blood barriers prevent small molecules and drugs from entering the brain and nervous system, which limits the effectiveness of free peptide injections. Nanoparticles made from amphiphilic di-block copolymers can protect and deliver the peptides past these barriers using Apolipoprotein E (ApoE), which targets the blood-brain barrier. This can improve CNS delivery and help nerve regeneration. Additionally, by understanding the cellular uptake methods and intracellular degradation employed by polymersomes, nanoparticle properties can be fine tuned to improve targeted delivery.

## **POSTER #149**

### Land Cover Change and Ecosystem Services Assessment

**Author:** Christopher Post, *Forestry & Environmental Conservation*

Urbanization can lead to ecosystem services (ES) losses. The objectives of this study were to identify ecosystem services providers and beneficiaries in Anderson County (SC), and determine spatial and temporal changes in these services from 2001 to 2016. Classified land cover data for 2011 and 2016 was download from the Mult-Resolution Land Characteristics Consortium (MRLC) website. Land cover extent for each of the types of identified land cover was determined by analysis in ArcMap 10.7 and land cover types were classified as either ecosystem service providers or beneficiaries. Overall, there was a large increase in medium intensity and high intensity developed land cover categories, and a reduction in hay/pasture, deciduous forest and barren lands. The monetary value of urban development do not take into account the ecosystem service values that are lost. Spatial and temporal analyses of land cover can identify critical locations with the most ecosystem services loss.

## **POSTER #151**

### Development of a Vehicle Design Tradespace Analysis Using a Formula SAE Vehicle as a Case Study

**Authors:** Jonathan Vogel, *Mechanical Engineering*, Justin Roberts, *Industrial Engineering*, Abhishek Rao, *Mechanical Engineering*, Derek Moore, *Mathematical Sciences*, Caitlin Lebegue, *Industrial Engineering*, Michael Cloer, and William McCormack, *Mechanical Engineering*

This project presents an approach for developing a trade space analysis to generate and optimize design concepts for a Formula SAE competition vehicle. For this exercise, the vehicle was discretized into four primary subsystems: Aerodynamics, Chassis, Powertrain and Suspension. These subsystems were parametrically linked to a full vehicle model and evaluated at four distinct levels of abstraction, starting from basic vehicle architecture and ending with detailed subsystem designs. A lap time simulation was developed to evaluate a vehicle concept based on the predicted amount of points it would score in each FSAE competition Dynamic Event. The final product is a vehicle design cohesively optimized to maximize competition performance. The successful of this case study outlines opportunities for integrated vehicle design across multiple segments in the auto industry. The Clemson FSAE team would like to thank Dr. Christiaan Paredis for his guidance and support carrying out this project.

## **POSTER #152**

Control of *Nicotiana tabacum* Plant Response to Environmental Stresses

**Authors:** Katherine Benza, *Biochemistry*, Megan Douglass, *Biological Sciences*, and Mitchell Angove, *Genetics*

Changing environmental conditions have created a demand for crops that respond efficiently to adverse environmental conditions. Biotechnological approaches to genetically manipulate the expression of various stress-related genes in transgenic plants provide great opportunities to produce new cultivars with enhanced plant performance under environmental adversities. Two microRNA (miRNA) genes, microRNA528 (miR528) and microRNA396 (miR396), a vacuolar H<sup>+</sup>-pyrophosphatase gene, AVP1, and a SUMO E3 ligase gene, SIZ1 have all been implicated in regulating plant response to abiotic stresses. The gene miR528 has been shown to interfere with AsAAO and COPPER ION BINDING PROTEIN1, both of which are involved in nitrogen starvation and salinity response in creeping bentgrass. MiR396, in rice, is significantly downregulated during drought stress. AVP1 is upregulated in the highly salt-tolerant seashore paspalum (*Paspalum vaginatum*) plants. Finally, rice SIZ1 has been shown to increase plant fitness under phosphate starvation, increased heat, and drought conditions. Because of their promising roles in abiotic stress responses, we have cloned their homologs from *Nicotiana tabacum* to study their effect on plant stress response in transgenic tobacco plants. Our preliminary results show that overexpression of these genes leads to an overall enhanced plant performance under various environmental stresses, suggesting that simultaneous manipulation of these genes in transgenic plants would synergistically impact plant stress response, improving agricultural production.

## **POSTER #153**

The Association of Butterflyfish and Stony Coral Tissue Loss Disease in the Middle Florida Keys

**Authors:** Thomas Fair, *Bioengineering*, and Kara Noonan, *Biological Sciences*

Since 2014, coral reefs in the Florida Keys have been experiencing an outbreak of a new disease known as stony coral tissue loss disease (SCLTD). Previous studies have observed a change in the behavior and abundance of foureye butterflyfish (*Chaetodon capistratus*) in response to the emergence of coral disease. These findings may be of concern to reef managers because some studies have suggested that butterflyfish may influence the progression of coral diseases. This study hopes to examine the abundance and foraging behaviors of four butterflyfish species in the Florida Keys National Marine Sanctuary, during and after the emergence of SCLTD. Sixty coral heads (20 healthy, 20 diseased, and 20 dead) were tagged, photographed, and observed for butterflyfish association using time-lapse photos and AGRRA visual surveys. Our study found that the average abundance of butterflyfish was significantly higher during the disease outbreak. On individual coral heads, foureye butterflyfish occurrences were significantly higher on diseased versus dead corals while the other butterflyfish species were found consistently across healthy, diseased, and dead corals. Behavioral observations of butterflyfish feedings suggest that foureye butterflyfish feed more often in the presence of a diseased coral than on healthy or dead corals. Neither abundance nor feeding frequency were related to coral disease progression or coral mortality. Therefore, future studies should examine the degree to which butterflyfish foraging influences coral resilience to disease.

## **POSTER #154**

How to Stalk a Butterflyfish: Personality Differences in Foureye Butterflyfish Feeding and Foraging Behaviors

**Authors:** Rachel Radick, *Biological Sciences*, Emma Crowfoot, *Animal and Veterinary Science*, and Kara Noonan, *Biological Sciences*

Foureye butterflyfish (*Chaetodon capistratus*) have been observed in the Florida Keys in higher abundances near corals affected by stony coral tissue loss disease (SCLTD) than healthy corals. These corallivorous fish may be vectors of the disease as they preferentially feed on diseased hard corals in comparison to healthy corals. Evaluating the individual variation between feeding behaviors is critical in understanding their

role in the transmission of disease. This study analyzed foureye feeding and social behaviors in field and laboratory settings in the middle Florida Keys in order to examine this fish's potential effect on disease transmission. Foureye butterflyfish were observed and recorded in the field, then were analyzed for their feeding, movement, and social behavior. Solitary foureye butterflyfish preferred hard corals over other substrates and more often than fish in social groups, while groups of three or more preferred soft corals over other substrates and more often than other social groups. In the laboratory experiment, individual foureye butterflyfish were placed in tanks with a diseased coral fragment to analyze their activity patterns and feeding preferences. Behavioral states and bite rates varied by individual fish while fish feeding location and coral tissue type varied by individual coral. Future studies are needed to determine if there is a link between these feeding preferences and coral disease transmission.

## **POSTER #156**

Finite Element Computational Modeling Applied to Orthopaedic Implants

**Authors:** Samantha Kodikara and Angela Grujicic, *Bioengineering*

As of 2018, over 650,000 primary total knee replacement (TKR) surgeries are performed each year in the United States. The primary cause of failure aside from infection is implant loosening due to corrosion and wear of the implant. The objective of my research is to study mechanically assisted corrosion evaluated using a computational model of TKR implants. The main mechanical factors that contribute to corrosion in TKR implants are stress, which leads to fretting wear, and micromotion, which leads to the disruption of the stable oxidized layer on the implant surfaces. Previous work in our lab used a generalized model and showed that implant geometry was a key factor in predicting behavior associated with corrosion. My work will expand on this project by utilizing an implant-specific model. The outputs generated by the simulation will be compared to explants to validate the model's capability to predict corrosion patterns on actual failed TKR implants. The significance of this research approach is that it links computational model predictions to the behavior of biomedical devices.

## **POSTER #157**

Postoperative Shoulder Implant Analysis (CU-REPRO)

**Authors:** Ben Black, Chad Eaton, Jenna Hines and Wilson Sykes, *Bioengineering*

The need for shoulder replacements is on the exponential rise. Correspondence to procedural growth, the prevalence of revision procedures is increasing. The most prevalent etiology leading to revision is glenoid component loosening. Despite the failure occurrence on the glenoid side, humeral components are often required to be removed during revision shoulder arthroplasty. Humeral stem extraction can lead to high complication rates for revision shoulder arthroplasty. Intraoperative fractures relating to humeral extraction can cause harm to patients and initiate various extraneous complications. To mitigate risk to the patient associated with humeral implant removal, physicians must further understand the current device implanted in the patient to determine progressive operative steps.

In collaboration with the Florida Orthopaedic Institute, a study was initiated to determine the level of difficulty for humeral stem removal. The study is a three stage analysis to determine the key factors that are relevant to predict humeral stem removal difficulty in Hemiarthroplasty (HA) and Total Shoulder Arthroplasty (TSA). Factors were examined in the preoperative, intraoperative, and postoperative processes. The main goal of this research was to gather evidence postoperatively to validate the positively linear correlation of retrieved humeral stem implant damage and surgical difficulty to assist surgeons in planning for shoulder arthroplasty.

## **POSTER #158**

ESRI Story Map about Soil Forming Factor: Biota

**Author:** Luyao Xu, *Wildlife and Fisheries Biology*

ESRI Story Maps are increasingly being used in education. The purpose of this study was to create an ESRI Story Map “Soil Forming Factors: Biota” for educational purposes. Soil order and land cover type maps for Oconee County, SC were utilized in the newly developed ESRI Story Map. Oconee County contains three soil orders and fifteen land cover types. Specific learning objectives were listed on the top of each story map page and throughout the learning materials. Each story map page contains written and visual explanations of the learning material and examples of applications. ESRI Story Map “Soil Forming Factors: Biota” is enhanced with interactive exercises, quiz, and quality assessment. ESRI Story Map “Soil Forming Factors: Biota” can be a valuable addition to the eLearning resources.

## **POSTER #159**

Typical Associations Between Soil Orders and Land Cover Types for Pickens County, South Carolina

**Authors:** Gursel Cakir, *Forest Resources*, and Elena Mikhailova, Christopher Post, *Forestry & Environment Conservation*

Spatial and temporal analysis of land cover types (e.g., vegetation, water, urban infrastructure, etc.) is essential in environmental management. The objectives of this study were to map typical associations between soil orders and land cover types for Pickens County, SC, between 2001 and 2016. There are fifteen land cover types and three soil orders (Entisols, Inceptisols, and Ultisols) within the study area. The dominant soil order in Pickens County is Ultisols. In 2016, the predominant land cover type was deciduous forest (39%), followed by mixed forest (16%), hay/pasture (13%), and developed open space (10%). Pickens County experienced remarkable changes in the land cover types between 2001 and 2016 with increases in developed areas of high (29%) and medium (39%) intensity, and decreases in barren land (-8%), hay/pasture (-6%), woody wetlands (-4%), deciduous forest (-4%), and evergreen forest (-1.5%). Future research can use this information for ecosystem services analysis with regards to the ecosystem services providers and beneficiaries.

## **POSTER #160**

The Role of Interface Solute Segregation in Grain Growth of Nanocrystalline Metals

**Authors:** Annie Barnett, Michael Cox, *Mechanical Engineering*, Derek Moore, *Mathematical Sciences*, and Fadi Abdeljawad, *Mechanical Engineering*

Owing to their small crystal size, nanocrystalline (NC) metals are characterized by unique combinations of properties that render them an attractive choice in many engineering applications. However, NC metals suffer from an intrinsic instability, their crystals rapidly grow during processing or under operating conditions. Recent experimental findings suggest grain boundary (GB) solute segregation as a mechanism to thermally stabilize the grain structures of NC metals. Herein, we employ atomistic simulations to investigate the impact of GB segregation on grain growth kinetics in NC alloys. Simulation studies of NC platinum-gold alloys clearly show sluggish grain growth due to gold segregation to platinum GBs. Further, our results highlight the paramount role that triple junctions, i.e., regions where three GBs meet, play in mitigating grain growth in NC alloys. On the whole, our results highlight the need to account for triple junctions as key micro-structural features in NC alloys.

## **POSTER #161**

### Applications of Cognitive and Social Development Theory in Pediatric Type 1 Diabetes Case Management

**Author:** Andrew Stephens, *Applied Health Research and Evaluation*

Type 1 diabetes (T1D) can occur at any age but is most commonly diagnosed between infancy and late 30s. The SEARCH for Diabetes in Youth study estimated that in 2009 about 18,436 U.S. youth were newly diagnosed with T1D. Approximately 70% of these youths were non-Hispanic Whites, 17% were Hispanics, and 11% were non-Hispanic Blacks. T1D is associated with an increased risk for several health problems including cardiovascular diseases, epilepsy, retinopathy, and thyroid autoimmunity. Studies in Norway found that despite improved diabetes care, mortality remains three to four times higher among those with childhood-onset diabetes compared with the general population. When looking at case management as a whole in regard to diabetes, many problems can be seen with the current management plans and limitations can be seen in the methods used to educate diabetics on their condition. When looking at future paths to take to improve diabetes case management a few can be proposed including evidence-based case management, case management methods that address low health literacy and numeracy and using various psychological behavior theories to see how this adolescent population can be best addressed. What can be seen from this paper is that these new methods have great potential in helping to treat diabetes and more research should be done in order to determine which combinations of treatment are most effective in this age group.

## **POSTER #162**

### Building Your Inner World: A Workbook for Promoting Mental Health Literacy

**Author:** Eunice Cho, *Biological Sciences*

The purpose of this project was to create a workbook that promotes mental health literacy in children and young adults in a personal, inclusive, and non-didactic fashion. After conducting a literature review on health literacy (specifically, the different types and their determinants and outcomes), we focused on the domain of mental health. We then created a workbook ("A Room of One's Own: A Guide to Building Your Inner World") which aims to help the reader build a strong self-esteem, sense of self, and toolbox of coping skills for stress and emotion management. The workbook manuscript was reviewed by three sixth grade teachers, who provided content-based feedback. The manuscript was then developed into an e-book. The e-book will be made available to the public once additional feedback has been received and final revisions have been made.

## **POSTER #163**

### A Taste of the Power of the Raspberry Pi

**Authors:** John Mcadams and D. Jonah Lamothe, *Mechanical Engineering*

In today's society, successful integration of hardware and software is essential for the operation of numerous systems, small-scale, and large-scale devices. One of the supporting technologies is a small programmable single-board computer known as the Raspberry Pi. This relatively simple, affordable device is applicable for a large array of applications. As a team, we have elected a pen plotter concept that converts digital images to drawing through the means of motors, linkages, and other supplementary parts. Although this is a straightforward application of the Raspberry Pi, the learning opportunities as well as the hands-on experience we have gained from developing this system is significant. As engineers starting the profession, this project enables us to experience how hardware-software systems enhance everyday life to make various tasks convenient or simply more interesting. This project actively demonstrates our experience in this regard.

## **POSTER #164**

### Investigating the Role of Phosphofructokinase in *Entamoeba histolytica*'s Metabolism Through Kinetic Characterization

**Authors:** Lizzie Huntley, *Biochemistry*, and Jin Cho, *Biochemistry and Molecular Biology*

*Entamoeba histolytica* is an intestinal parasite that causes amoebiasis and results in symptomatic disease in 90 million people per year. While most cases are mild, severe cases leading to liver abscess have resulted in up to 100,000 deaths per year. This amitochondriate parasite lacks many essential biosynthesis pathways, including oxidative phosphorylation and the tricarboxylic acid cycle, and cannot synthesize purines, pyrimidines, or most amino acids. The parasite is presumed to depend on a modified glycolytic pathway that uses pyrophosphate (PPi)-dependent phosphofructokinase (PFK) to generate three net ATP per glucose molecule. Interestingly, *E. histolytica* encodes four PFKs, with only one being PPi-dependent and the others utilizing ATP. We have produced and purified the four recombinant PFKs to analyze their enzymatic activities through kinetic characterization.

## **POSTER #165**

### Developing a Tire Model for Computational Simulators

**Author:** Derek Moore, *Mathematical Sciences*

The tire is the link between the vehicle and the road; its characteristics ultimately determine driving performance. Tire forces and moments are critical for understanding vehicle dynamics; accurate representation of these variables is required to build an effective vehicle simulation tool. The Clemson Formula SAE team previously modeled these components using cubic spline interpolation of tire data. However, accurate evaluations of splines are limited to the test intervals used by the Tire Testing Consortium (TTC). For instance, the TTC uses three camber angles (0, 2, and 4 degrees), and a limited range of normal forces (50 - 250 lbs). In this work, we fit the data using a Magic Formula Tire Model, which uses 18 distinct tire parameters. We see a reduction in error over cubic spline interpolation, and we can predict over a wider range of input values. We provide images of the fitted data and describe the GUI developed to allow the team to manipulate future tire data.

## **POSTER #166**

### Feasibility Trial to Evaluate a Palliative Care Intervention Utilizing Community Health Workers to Facilitate Delivery of Home-Based Palliative Care in India

**Author:** Sarah Ann Kenneson, *Health Science*

In India, there is an increased need for palliative care, especially in rural areas like Kolkata where there are limited medical resources. This research addressed the need for palliative care through an interventional training program. The study investigated the feasibility and potential sustainability of delivering palliative care through community-based navigators. The navigators ( $n=5$ ) received training about the importance and delivery of palliative care. Then, selected patients ( $n=10$ ) with late-stage cancers received at-home palliative care through weekly assessments. The patients suffered mainly from pain, gastrointestinal issues, and diet problems. The results indicated that the navigators most often recommended altering or adding medications and referring them to a hospital. This feasibility trial supports the potential use of community-based navigators to provide palliative care in rural settings.

The research was sponsored by the Medical University of South Carolina Center for Global Health.

## **POSTER #167**

The Effect of Water Flow Point, Season, and LEED Building Character on Microbial Community Composition

**Author:** Jill Walton, *Microbiology*

LEED certified buildings, such as those on Clemson University's campus, have water conservation mechanisms that increase water stagnation and decrease the flushing of water in the potable water system, leading to potentially increased microbial growth in the plumbing system. To investigate whether the water conservation mechanisms change the abundance and presence of microorganisms, microbial communities in samples from LEED buildings and non-LEED buildings' potable plumbing systems were tested. To determine the microbial community composition in each sample and to compare the samples based on building, season, flow time-point, LEED certification level, faucet type, and building type, 16S rRNA sequencing and analysis was performed. Initial results show that *Mycobacterium* spp. and *Legionella* spp. had a significant increase in abundance when compared in LEED buildings versus non-LEED buildings. These initial findings provide evidence for a larger public health issue concerning potable water in both LEED buildings and non-LEED buildings.

## **POSTER #168**

Assessing Specific Patient Characteristics and Provider Preferences to Design Tailored Motivational Interviewing Approaches for Patients with Uncontrolled Hypertension

**Authors:** Georgia Hunt, *Health Science*, and Karyn Jones, *Communications Studies*

Question: How can patient-provider communication be assessed and improved using a combination of individual level data and provider preferences?

Purpose: To use developed survey results to tailor medical practitioners' approach to patient-provider communication with hopes to increase medication adherence for patients with hypertension

Study Design: A mixed method study, composed of a quantitative survey and a qualitative semistructured interview.

Methods: A comprehensive telephone survey addressing specific patient characteristics was administered to a stratified random sample of 20 patients with uncontrolled hypertension from the PRISMA Internal Medicine Clinic. Patient surveys will be quantitatively analyzed to enable statistical comparisons of relationships between variables of interest. Another survey was administered as an in-person interview to a convenience sample of 6 medical residents within the PRISMA Health Internal Medicine Clinic. This survey addressed the residents' self-efficacy, behavioral characteristics, outcome expectancies, environmental factors, and observational learning capabilities concerning their patient-counseling strategies. The resident interviews will be analyzed using a constant comparative method of coding.

Results: The data is still being collected. The results will be reported from Social Cognitive Theory and other frameworks based on the survey responses.

## **POSTER #169**

CU Fall Risk Pilot Study of Middle-aged Adults

**Author:** Abigail Coskrey, *Health Science*

Falls are a well-established health concern for individuals of ages greater than 65 years, especially as the average life expectancy continues to increase. While the prevalence of falls has been found to nearly triple between ages 40-44 and 60-64 years, research on this age group is lacking. The purpose of this pilot study is to investigate the results of screening adults for fall risk in middle age using current methods. Preliminary data was collected on a convenience sample of 16 Clemson University employees ages 45 to 65 years. Each participants' relative fall risk was measured through background information, clinical measurements, assessments of functional movement and a balance scale. Study results indicate that further studies with adjusted methods and measures as well as larger sample sizes should be carried out to understand how to target early prevention of falls. By further examining this age group, essential findings may be revealed in

order to improve fall outcomes across the lifespan.

This study would not have been possible without the efforts of Dr. Karen Kemper, Dr. John T Long, and Jacob Spencer.

## POSTER #170

### Rings of Fire: Reconstructing a Fire History of the Blue Ridge Escarpment

**Authors:** Charles Baker, *Forest Resource Management*, Carson Colenbaugh, *Horticulture*, Conner Estes, Brian Tate, Brayden Williams, *Forest Resource Management*, Margaret Wise, *Wildlife and Fisheries Biology*, and Donald Hagan, *Forestry & Environmental Conservation*

Prior to the fire exclusion period of the early 1900s, fires burned frequently across eastern North America. Lightning ignitions were common in many areas, and Native Americans strategically used fire in various capacities in order to shape grassland and forested landscapes. Contrary to the early belief of the “pristine New World,” evidence shows that fires, including those lit by humans, were a driving force of the landscape and plant communities of the Appalachian mountains prior to European settlement. Some researchers further suggest that fire frequency increased after the arrival of Europeans. Despite this growing body of knowledge, little is known about the historic fire regimes of the Blue Ridge Escarpment, the southeastern terminus of the Appalachians and one of the雨iest regions in North America. Through the analysis of old-growth stands, fire scars, and tree rings, it is possible to bring the fire history of the Blue Ridge Escarpment to light, both adding to the volume of knowledge regarding historic fire regimes of the United States and providing land managers with a stronger scientific basis to inform the use of prescribed fire as a restoration tool.

# STUDENT DIRECTORY

STUDENT	POSTER #	STUDENT	POSTER #
Abbott, Harper	8, 49	Birkley, Matthew	62
Abdeljawad, Fadi	160	Bisaccio, Pauline	59
Addy, Connor	19	Black, Ben	8
Adesegun, Njisane	139	Blackwood, Katherine	84
Ahmed, Mir Alvee	119	Blick, Ashley	5
Al Dahabi, Kayed	133	Bopp, Zack	32
Allerre, Anthony	49	Boulos, Natalie	124
Alikhail, Saanga	105	Bourque, Leah	16, 80
Allison, Hannah	11	Brady, Cheyenne	148
Allison, Susan Elizabeth	35	Brandberg, Emma	56
Amick, Austin	120	Branham, Lawton	14
Anders, Emily	39	Braswell, Stephanie	86
Anderson, Natalie	79	Brewer, Maggie	14
Andrews, Jason	86	Brogdon, Keller	38
Angove, Mitchell	112, 152	Brokaw, Grace	57
Argenal, Andres	103	Brooks, Ashlyn	14
Armstrong, Katherine	93	Brophy, David	135
Ashy, Katia	69	Brown, Brandon	21
Atkinson, Katherine	124	Brown, James	20
Aufderheide, Nathan	65	Brown, Leah	79
Babinchak, Ashley	79	Browne, Kathleen	6
Bailey, Chase	59	Browning, Logan	133
Baker, Charles	170	Brownlee, Morgan	41
Balcerzak, Sydney	24, 132	Bruner, Austin	36
Baldassare, Michelle	119	Bruns, Nathan	134
Balkcum, Olivia	7	Bryant, Rylee	18
Barfield, Hannah	17	Buda, Kathleen	123
Barnes, Drew	63	Budelmann, Evan	21
Barnett, Annie	160	Burgen, Caroline	29
Barrera, Allison	130	Burger, Rachel	130
Barrett, Ryan	72	Burke, Savannah	141
Bartro, Sarah	43	Burnette, Will	121
Bates, Connor	79	Buron, Emma	14
Battaglia, Cal	87	Burton, Hailley	5
Baucom, Katie	95	Burttram, Jake	57
Beane, Keegan	117	Butler, Ethan	18
Beck, Marianne	60	Cabezas, Jennifer	63
Bedard, Kendall	83	Cabrera Lumbrieras, Victor	65
Belt, Sydney	50	Cakir, Gursel	159
Benson, Nick	13	Calvasina, Macy	101
Benton, Bailey	105	Cannon, Andrew	103
Benza, Katherine	112, 152	Cantley, Rebecca T	57
Berrios, Carly	10	Capps, Caroline	20
Bevis, Nielly	135	Carrel, Sabrina	108
Billings, Andrew	96, 123	Carroll, Hailey	16
Bilodeau, Maxime	92	Carroll, Jack	67
Birchmore, Ansley	129	Carroll, Jordyn	12

<b>STUDENT</b>	<b>POSTER #</b>	<b>STUDENT</b>	<b>POSTER #</b>
Carter, Rachel	46	Dimond, Matthew	83
Catanzaro, RJ	102	Do, Phillip	70
Cathapermal, Dylan	67	Doar, Chloe	5
Chafe, Olivia	88	Doctor, Daquan	37
Chalk, John Clifton	41	Dorsey, Beckilyn	49, 65
Chapman, Andrew	18	Dorsey, Logan	99
Chapman, Catherine	16	Doubles, Alexandra	122
Chapman, Zoey	34	Douglass, Megan	11, 152
Chen, Sherry	6	Dover, Tristan	48
Cho, Eunice	162	Downs, Lucas	86
Cho, Jin	164	Drum, Lauren	88
Chokshi, Priya	50	Dubose, Ladson	65
Clark, Doris	84	Dubose, Melissa	115
Clark, Scout	74	Duffin, Natalie	114
Claypool, Natalie	84	Duvall, Allyson	128
Cloer, Michael	151	Eaton, Chad	8
Cobb, Meredith	46	Eckert, Thomas	92
Coen, Richard	86	Edgecomb, Sara	138
Coeyman, Samuel	83	Edwards, Kelly	88, 114
Colenbaugh, Carson	26, 170	Eibel, Scott	8
Connolly, Courtney	61	Eidson, Jess	86
Conrad, Isabelle	76	Eisele, Chad	71
Cook, Andrew	16	Emory, Camryn	87
Coon, Erin	31	English, Ryan	42
Corley, Caroline	134	Estes, Conner	170
Coskrey, Abigail	169	Esteves, Gianfranco	130
Cox, Michael	160	Etiemble, Reece	90
Craft, Abby	76	Eubanks, Benjamin	80
Crow, Nicholas	41	Evans, Triston	17
Crowfoot, Emma	12, 154	Evers, Austin	148
Cummings, Andra	48	Fair, Thomas	127, 153
Currie, Madisyn	24, 132	Falconer, Robert	31
Dacus, Michael	72	Falgoust, Grace	52
Davenport, Alyssa	108	Fang, Randy	24, 132
Davis, Lauren	8	Fantone, Jeannette	48
Davis, Madeline	30	Ferguson, Lanitra	80
Davis, Morgan	22	Fernandez, Eleanore	52
Davoll, Myles	105	Fetchen, Paige	55
Dawkins, Raylan	71	Fingar, Christian	37
Dayton, Patrick	121	Finley, Savannah	108
Debrock, Victoria	100	Finley, Shanice	41
Dejesus, Rafael	67	Finlon, Hannah	83
Dell, Natalie	130	Finnell, Sophie	45, 51
Dempster, Christian	68	Fisher, Kelsey	16
Denmark, Laurel	9	Fisher, Nicolette	136
Despeaux, Jonathan	37	Flores Govea, J	103
Diemer, Rachel	14	Forehand, Cameron	38

# STUDENT DIRECTORY

STUDENT	POSTER #	STUDENT	POSTER #
Franck, Katelyn	73	Harkins, Hunter	87
Franklin, Jimmy	41	Harris, Cristian	43
Freedman, Halle	122, 137	Harris, Katie	61
Freehill, Delaney	105	Hartis, Audrey	122
Friend, Hannah	124	Hartsell, Mara	49
Fringer, Kolin	41	Haskell, Charlie	25
Fritsch, Meg	101	Heath, Lindsey	21
Gaddy, Katie	75	Hebda, Iliana	122
Gaidjunas, Jared	87	Heitzeg, Nikolas	66
Gaines, Ayana M.	129	Hekker, Sean	72
Galloway, Samantha	18, 99	Helsel, Brian	75
Garcia, Yuuki	80	Henderson, Lydia	74
Garvey, Riley	1	Hendley, Tyler	16
Gates, Taylor	141	Hennessy, Sophia	27, 31, 73
Gentry, Hunter	93	Henry, Catelyn	68, 117
Gera, Yugantar	102	Hensley, Jenny	74
Ghaiumy Anaraky, Reza	17	Hess, Caroline	13
Ghotbi-Taheri, Persia	87	Heywood, Jonathan	83
Giani, Nichole	119	Hickman, Nicole	39
Gibson, Christopher	40	Hilliard, Haley	123
Gilstrap, Julia	29	Hines, Jenna	8
Ginsberg, Ben	99	Hinsch, Valerie	98
Ginsberg, Claire	115	Hird, Casey	67
Glisson, Nicolas	133	Hogan, Grace	45
Glowacki, Elizabeth	97	Holland, Krysten	14
Goff, Colleen	89	Hollowell, John	66
Good, Abby	38	Holmes, Kyndra	13
Goodwin, Corbin	106	Holmstrom, Josh	129
Goude, Emily	23	Holsenback, Rebekah	107
Gradel, Robert	127	Holt, Cavender	66
Grant, Katherine	75	Holt, Coral	2
Grayson, DeMarco	52	Honeycutt, Matthew	38
Green, Shania	135	Hopper, Perry	97
Greene, Lauren	122	Houk, Emalie	31
Greulich, Lexi	89	Howell, Blake	136
Griner, Gill	44	Hudson, Kadie	113
Gross, Dominique	105	Huggins, Margaret	60
Grujicic, Angela	156	Hulbert, Sheala	55, 90
Gurtler, Sierra	109	Humphreys, Julianne	34
Guthrie, Emily	88	Hunt, Georgia	168
Gutierrez, Manuel	106	Hunter, Colton	88
Haeberle, Lily	117	Huntley, Lizzie	164
Hagan, Donald	170	Huss, Christiana	95
Hamilton, Joel	39	Hutchison, Emily	63
Hamilton, Mickenzie	10	Hyland, Maura	10
Hannah, Lindsay	65	Iqbal, Shoaib	138
Hardiman, Jessica	39	Ivey, Karsyn	122

<b>STUDENT</b>	<b>POSTER #</b>	<b>STUDENT</b>	<b>POSTER #</b>
Jackson, Sophia	124	Kullman, Alexander	8
James, Frederick	86	Kumar, Bevin	106
Jamison, Illana	31	Lamb, Rebecca	5
Jen, David	120	Lamothe, D Jonah	163
Jenkins, Lisette	31	Landwehr, Sam	81
Jimm, Aimey	93	Lannamann, Rebekah	88
Johanson, Abby	34	Larsen, Jessica	138, 148
Johnson, Elizabeth	88	Larsen, Jessica	142, 145, 145,
Johnson, Megan	108	Lasala, Madison	145, 147, 157,
Jones, Anthony	97	Laufenberg, Lyndsi	157, 157, 157
Jones, Karyn	168	Lautenschlager, Carla M	95
Jones, Kristina	75	Lebegue, Caitlin	125
Jones, Rachel	16	LeMatty, Amanda	88
Jordan, Jacob	106	Lenz, Madison	151
Kadau, Anna	45	Leonard, Krista	31
Kalidindi, Satya	106	Leonard, Shannon	80
Kaminski, Richard	86	Lesesne, Zion	117
Karni, Shira	96	Lewis, Ember	76
Kazmi, Zain	62	Lewis, Malenah	79
Kearns, Carolyn	130	Liggett, Parker	47
Keech, Megan	94	Lindgren, Rebecca	117
Kee-Young, Devante	96	Lineberger, John	65
Kelley, Josh	87	Littlejohn, Caitlin	58
Kelly, A'nnna	65	Livingstone, Mark	67
Kemble, Amelia	97	Loayza, Alex	7, 40, 41
Kennedy, Caroline	108	Loeffler, Lincoln	106
Kenneson, Sarah Ann	166	Loganathan, Anand	91
Kennett, Paige	143	Lopez, Ethan	21
Kent, Hanna	107	Lubowicki, Shelby	105
Kerr, Rebecca	51	Luce, Emily	98
Keyser, Cameron	76, 113	Ludden, Daniel	124
Khodab, Allen	59	Lukanic, Hannah	84
Khunger, Karishma	92	Lyons, Ann	90
Kilbarger, Nicholas	71	Mackey, Jonathan	41
Kilgus, Mari	67, 82	Magee, Katherine	14, 102
Kim, Nayoung	90	Makkar, Harnish	86
Kimball, Scott	125	Malekanfar, Amir	73
King, Bruce	141	Malik, Samah	71
Klaasmeyer, MaKensey	107	Manigault, Isabella	146
Kodikara, Samantha	156	Marsden, Sarah	93
Koechling, Zoe	68	Martin, Emily	79
Kose, Muhammed	87	Martin, Jordan	14
Kowal, Amy	136	Martone, Julia	75
Kremser, Nina	114	Masters, Jake	43
Krolicki, Alexander	70, 71	Masto, Nicholas	109
Krussig, Mario	65	Matsick, Carson	83
Kubat, Corey	56	Matthee, Kristiaan	86

# STUDENT DIRECTORY

STUDENT	POSTER #	STUDENT	POSTER #
Matthews, David	81	Murphy, Sydney	7
Mcadams, John	1	Murrell, Connor	39
Mccain, Duncan	103	Musial, Kat	104
Mcclure, Michel	163	Myers, Caroline	103
McCormack, William	70	Myers, Loren	39
Mccown, Sam	117	Napolitano, Justin	54, 120
McCoy, Erin	151	Neighbors, Jacob	12
Mcdonald, Audrey	90	Nelligan, Nicole	79
Medowell, Nathan	14	Neville, Lindsey	66
McElhaney, John	39	Nigoa, Diego	105
McFadden, Alexis	53	Nixon, Thandi	82
Mcgee, Soline	20	Nocella, Freddy	31
Mcgrew, Hannah	125	Noonan, Kara	38
Mcguirk, Olivia	108	Oakley, Robyn	130
Mcintyre, Brandon	61	O'Boyle, Brady	153, 154
McKee, Haley	63	O'Connor, Zari	16
McKee, Hannah	18	Oldenburg, Austin	116
Melaughlin, Dani	88	O'Leary, Kaela	134
McPherson, Connor	28	Oliver, Tiffany	107
Meacham, Caitlyn	47	O'Neill, Erin	43
Meador, Caroline	68	Oskey, Madeline	22
Medlock, Erin	39	O'Sullivan, Kate	59
Meggett, Kinsey	14	O'Sullivan, Tarah	128
Mehta, Apoorva	14	Oswalt, Hannah	114
Meilinger, Nicole	78	Ounanian, Beth	59
Mekdara, Nicolas	65	Page, Robert	108
Mercado, Elliot	73	Parise, Bella	82
Meredith, Wesley	78	Parker, Haven	87
Messervy, Sophia	8	Parkison, Abby	135
Messick, Lindsey	62	Patch, Vanessa	15
Michael, Cassia	117	Patel, Janki	115
Mikhailova, Elena	39	Patel, Nishi	120
Miller, Emily	100	Paul, JP	12
Miller, Kelsey	159	Peak, Caroline	25
Miller, Logan	86	Pedersen, Bailey	61
Minder, Charlese	46	Perry, Callahan	83
Mitchum, Jeffrey	34	Peters, Cavan	104
Monico, Ryan	78	Peterson, Anna	14
Moore, Derek	86	Petty, Emily	51
Morales, Luis	33	Pfeiler, Katherine	12, 82
Morgan, Henry	151, 160, 165	Piel, Tyler	97
Morrison, Caroline	37	Pittman, Breanna	14
Morrison, Sarah	48	Placke, Sarah	43
Motley, Davis	75	Poli, Kaelin	129
Mueller, Robert	67	Pope, Lauren	66
Mulligan, Hannah	41	Post, Christopher	18
Murin, Sydney	120	Pouch, Tate	128

<b>STUDENT</b>	<b>POSTER #</b>	<b>STUDENT</b>	<b>POSTER #</b>
Powell, Emily	149, 159	Rypkema, Grace	117
Powell, Grace	57	Salley, Sabrina	133
Powers, Nate	81, 133	Sanders, Evangeline	136
Pringle, Shatasia	74	Sargent, Emma	48
Pulido Gomez, Solangie	70	Savereno, Hannah	52
Puri, Alexis	115	Savoie, Avery	21
Radick, Rachel	91	Schmidt, Lauren	17
Rafka, Habib	80	Schrader, Anderson	83
Ragland, Madison	154	Schultz, Christine	107
Raihan, Mahmud	127	Sconyers, Leila	49
Ramey, Audrey	98	Seeber, Savannah	31
Randazza, Allie	72	Shaarda, Nick	75
Ranjan, Sansriti	12	Shaffer, Abigail	7
Ranney, Caroline	133	Sharma, Ishan	53
Rao, Abhishek	66	Shaughnessy, Rachel	65
Reimer, Grayson	136	Sheaffer, Kelsey	71
Reno, Mary Beth	151	Shealy, Cole	45
Reres, Lancelot	18	Shehan, Marisa	97
Rhodes, Tevez	8	Sherbondy, Madison	86
Richard, Jade	57	Shinn, Brinton	55
Richardson, Emily	45	Shropshire, Keeghan Alexandria	115
Richbourg, Tara	50	Shupard, Faith	120
Richter, Colin	16	Shurba, Jacob	59
Ridlehuber, Lee	109	Sidhu, Shreya	48
Rifkin, Andrew	130	Silva, Camila	86
Robbins, Chelsea	37	Simpson, Sid	29
Roberts, Aminah	79	Sims, William	124
Roberts, Justin	16	Singleton, Terrence	13
Roberts, Sarah	139	Six, Stephanie	7
Rodrigues, Natalie	151	Sizer, Chandler	129
Rogers, Lily	12	Slater, Fiona Noel	3, 81
Romanick, Zach	83	Slenkovich, Nicolina	106
Rosopa, Elenah	136	Slice, Stacey	7
Ross, Za'Cori	37	Smith, Claire	9
Roth, Rebecca	82	Smith, Rob	144
Rottman, Jack	57	Smith, Shelby	133
Rovero, Christopher	52	Smith, Taliyah	57
Rowell, Sarah Catherine	79	Solomon, Daniel	108
Rubenstein, Alexa	138	Soman, Arya	55
Rubley, Kaitlyn	27	Soule, Ashlyn	52
Rucker, Courtney	28	Spence, Adrianna	99
Rucker, Nick	16	Spence, Kate	31
Rumsey, Jennifer	92	Spence, Sarah	21
Russell, Stephen	20	Spilka, Becca	6
Russi, Kyle	11, 88	Spires, Katherine	56
Rusthoven, Lily	67	Splendore, Marissa	110
Ryan, Tommy	92	Stachnik, Mary Grace	14

# STUDENT DIRECTORY

STUDENT	POSTER #	STUDENT	POSTER #
Stancliff, Rex	144	Walker, Erin	99
Stegura, Carol	55	Wallace, Amber	13
Stem, Kamryn	135	Wallace, Delaney	119
Stephens, Andrew	43	Wallace, Steven	15
Stepp, Ryan	83, 135	Walpole, Caroline	30, 51
Sterneck, Elyssa	161	Walton, Jill	65
Stine, Kevin	79	Wang, Dane	122
Stone, Amber	38	Wani, Saif	167
Stone, Leah	90	Ward, Caitlyn	70
Stoner, Kevin	108	Weber, Ian	13
Storie, Phillip	5	Weber, Jakob	89
Stowasser, Martha	120	Weidner, Jacob	62
Sullivan, Kelsi	27	Westbury, Baylee	87
Sulzbach, Margaret	34	Westcott, Courtney	18
Sykes, John	38	Westwood, Sara	69
Tan, Shenghao	11	Whipple, Joe	136
Tapia, Hillary	8	Whitaker, Natalie	34
Tate, Brian	127	White, Ashleigh Elizabeth	21
Tate, Brian	125	White, Brooke	130
Taylor, Alexis	26	Widdifield, Winter	75
Taylor, Brooke	170	Wiles, Jacob	24, 132
Templeton, Courtney	96	Wilkie, Adam	50
Tetrault, Keegan	28	Wilkison, Tory	21
Tetterton, Jess	57	Willcox, Roe	103
Tharpe, Hayden	117	Williams, Brayden	107, 45
Thayer, Kyle	148	Williams, Madelene	26
Thigpen, Calee	131	Williamson, Duncan	170
Thomas, Lea	81	Willis, Hunter	14
Thompson, Brenner	30	Willoughby, Connor	40
Thompson, Taylor	37	Wilson, Jacob	3
Tice, Carissa	143	Wilson, James	71
Tindal, Jesse	38	Wingard, Brandon	41
Tobias, Kacie	89	Winterlind, Emma	97
Tobin, Brendan	135	Wise, Margaret	70
Tolleson, Kate	122	Wolfersberger, Apollo	81
Tucker, Ean	73	Wolinski, Kara	170
Turnipseed, Mallory	16	Wood, Jacob	146
Ulmer, Audrey	130	Woodruff, Jaime	30
Urove, Allison	14	Woody, Brooks	113
Vadnerkar, Kalpit	45	Wozniak, Olivia	18
Van de Meulebroecke, Caitlyn	126	Xu, Luyao	88
Vander Leest, Jacob	42	Xuan, Xiangchun	73
Veideman, Ethan	129	Yacu, KT	158
Vogel, Jonathan	90	Yan, Zichun	146
Vollbeer, Briana	73	Yancey, Tyler	24, 132
Walker, Emily	151	Yandle, Matt	56
Walker, Emma	91	Yang, Duruo	21



# MENTOR DIRECTORY

MENTOR	POSTER #	MENTOR	POSTER #
Aguerre, Matias	128	Flanagan, Libby	130
Alper, Joshua	94, 96, 98	Ganesan, Vijaydev	121
Anderson, Denise	14	Gao, Zhi	127
Anderson, Rachel	87	Gigliotti, Laura	34
Aragon, Oriana	53	Girishan Prabhu, Vishnunarayanan	61
Baeza Migueles, Juan Antonio	76	Godar, Subash	98
Barrios, Carlos	21	Green, Jerad	78
Beadle, Sarah	74	Greene, Chloe	23
Bewick, Sharon	68	Hagan, Althea	95
Birtwistle, Marc	9, 25, 62, 69, 109, 123	Hagan, Donald	26
Bisson, Jennifer	84, 101, 107, 122	Han, Yiqiang	70, 71
Blenner, Mark	69, 109, 121, 131	Hanks, Sara	78
Blob, Richard	44	Hargett, Zachary	106
Blood, Bridget	54	Harman, Melinda	8, 106
Blouin, Vincent	114	Harris, Stephen	38
Bodenhorn, Howard	20	Hirsch, Shanna	60, 118
Brame, Scott E.	32, 33, 35, 36	Howard, Daniel	46
Britt Jr., Thomas W.	51, 58	Hylkema, Caleb	135
Brotherton, Haleh	110	Jachowski, Cathy	89
Brown, DeOnté	78	Jachowski, David	34, 38, 120
Busby, Ethan	129	Jenkins, Anne	42
Bussell, Kristi	52	Jensen, Alex	120
Byrne, Kaileigh	3, 15, 17, 143, 144	Jones, Jeryl	104
Calhoun, Jon	66	Kemper, Karen A.	75
Campbell, Barbara	116, 119	Kidd-Weaver, Anje	89
Cannaday, John	7	Kitchens, Christopher	37
Cao, Min	92	Klinefelter, Zach	58
Carlson, Alex	118	Konkel, Miriam	134
Checura, Celina	124	Kornev, Konstantin	4
Childress, Michael	1, 2, 136	Kowalski, Robin	16
Condrasky, Margaret	39	Ladner, David	125
Cottle, Renee	59	Larouche, Olivier	105
Dancz, Claire	126	Larsen, Jessica	19
Dean, Delphine	31, 79	Li, Zilan	47
DesJardins, John D.	31, 43	Liang, Haiying	133
Diamond, Kelly	44	Lu, Xiaoming	69
Drapcho, Caye	130	Luo, Hong	112
Dubin, Alexandra	14	Marcotte Jr, William R.	113
Duchowski, Andrew T	49	Marneweck, Courtney	38
Dunn, Heather	108	Martin, Baker	110
Erdem, Cemal	123	McCarthy, Madeline	25
Farmer, Troy	7	McCubbin, James A.	45
Fine, Chereese	78	McCullough, Melissa	31
		McIntyre, Brandon	80
		McNamara, McKenzie	24, 132
		McNeese, Nathaniel	67
		Mefford, Olin	56

<b>MENTOR</b>	<b>POSTER #</b>	<b>MENTOR</b>	<b>POSTER #</b>
Melton, Richard	47	Walker, Eric	124
Mercuri, Jeremy	65	Walters, Sharon	60
Mikhailova, Elena	40, 41	Wang, Gaofeng	54
Minor, V. Christine M.	48	Wei, Yanzhang	11
Moore, Caitlin	10	Weisensee, Katherine	117
Muthersbaugh, Michael	120	Whisler, Laurel Ann	102
Noonan, Kara	1	Whitehead, Daniel	63
Norman, Calvin	54	Whitehead, Kristi	63, 64
Orr, Marisa	110	Woodward-Detrich, Denise C.	22
Owen, Meredith	43	Wright, Mary Ellen	88, 114, 115
Pabbathi, Ashok	94	Wylie, Jerry	90
Pang, Weichiang	57	Xuan, Xiangchun	72
Parker, Gary W	42	Yu, Xianzhong	28
Pataky, Garrett	103	Zadeh, Orrod	9
Paul, Kimberly	91, 93	Zinzow, Heidi	52
Pilcher, June	81, 99, 107		
Post, Christopher	40		
Powder, Kara	100		
Price, Samantha	105		
Pury, Cynthia	18, 80, 82		
Reghi Saldo, Elizabeth	120		
Richardson, William	31, 83		
Rives, Dyllan	109		
Rodriguez, Jorge	73		
Rudolph, Krista R	64		
Samuta, Adam	73		
Sanborn, Sarah	84, 107		
Sanders, John	42		
Sarmah, Deepraj	62		
Schelble, Beau	67		
Schlautman, Mark A.	27, 90		
Schmidt, Lucas	127		
Schweisinger, Todd	87, 97		
Sims, Randi	42		
Stephens, Benjamin R.	29, 30		
Sullivan, Susan	114		
Taaffe, Kevin	55, 61		
Takacs, Endre	79		
Temples, Heide	88		
Thompson, Martha	52		
Trout, Marshall	96		
Turnbull, Matthew	46, 47		
Valentine, Kathleen	6		
Vanelli, Natalie	82		
Villanueva, Randle Aaron	13		
Visser, Ryan	5		
Wagner, John R.	50		

# OPPORTUNITIES & EVENTS

There are a lot of opportunities to interact with Creative Inquiry throughout the year. CI is proud to present the following Opportunities for CI Team Leaders and both CI and all Clemson University students. Check online for more details.

## CORPORATE CI

The Corporate Creative Inquiry program allows industries to engage intelligent, creative Clemson undergraduates in industry-relevant projects and in doing so contribute to building the workforce of the future. A Clemson University faculty member will mentor the undergraduate team as they work on the project. Some projects may be co-mentored by an experienced graduate student. At the discretion of the company, selected students may be offered internships at industry sites.



## CARR FAMILY ENDOWMENT

Each year applications will be accepted for the Carr Family Endowed CI. This award will provide additional funding for up to one year to enhance eligible research projects. New or existing CIs are eligible to apply. Projects must focus on one or more of the following areas:



*Rural Economic Development  
Rural Community/Business Development  
Fruit, Vegetable/Crop production  
Production Agriculture Industries*

## SUMMER CI

CI mentors are invited to apply for awards to support undergraduate student salaries for eight weeks in early summer (May 6-June 30). Eligibility is restricted to undergraduate students who will not graduate earlier than December 2019. Preference will be given to students that were enrolled in a Fall 2018-Spring 2019 CI project OR are preregistered for Fall 2019 projects. Submit an application online.

# CONTACT

## CORA ALLARD-KEESE

Associate Director, Creative Inquiry  
Watt Family Innovation Center  
Clemson University, Clemson, SC 29634  
Phone: 864-656-0721  
Email: callara@clemson.edu

## BARBARA SPEZIALE

Associate Director for Academic Affairs,  
Watt Family Innovation Center  
Director of Creative Inquiry  
Professor of Biological Sciences  
Phone: 864-656-1550  
Email: bjspz@clemson.edu

# STAFF

Tullen Burns, Program Coordinator  
Lindsay Hobbs, Administrative Assistant  
Julie DuBose, Accounting and Fiscal Analyst  
Sagar Thakur, Web Developer



# FOLLOW CI



@ciclemson



ciclemson



@ciclemson



**CLEMSON.EDU/CI**

