2019 SURF AWARD RECIPIENTS

The Office of Undergraduate Research and Creative Activities is pleased to announce the Summer Undergraduate Research with Faculty (SURF) award recipients for summer 2019. Please join us in congratulating these students and their faculty mentors.

Summer Undergraduate Research with Faculty (SURF)

Student: Miranda Badolato    Mentor: Dr. Kathleen McInvale
Major: Exercise Science     Department: Health and Human Performance

A Social Network Analysis of Obesity in Northern Peru: An Examination of the Adult Social Networks
The goal of this research is to investigate the social influences on obesity in Peru, a country that has recently begun to experience the obesity epidemic. In high-income countries, such as the US, research studies reveal that there may be a relationship between an individual's risk of being obese and their social relationships. Researchers have found that adults who have obese partners and friends are more likely to become obese. This relationship has never been investigated in low or middle-income countries like Peru. To assess this relationship in Peruvian adults, researchers recruited participants from three villages in northern coastal Peru, an area in the country with a high risk for obesity. A team of trained researchers went door to door in the villages inviting people for participation and assessed their body mass index and body fat percentages. The team also interviewed the participants, asking them who they live with and who their closest friends outside of the home were. The participants also completed a survey that assessed their nutrition and physical activity behavior. A social network database will be created that will allow us to assess the relationship between social influences (friendships and family relationships) and an individual's risk of being obese. This research is important because it may reveal how social networks influence obesity; therefore, it may potentially allow researchers to develop obesity interventions using social networks in countries like Peru.

Student: Jordan Benton    Mentor: Professor Jesse Portillo
Major: Theatre and Dance     Department: Theatre and Dance

Developing a Lighting Design Process
The practice of design for the performing arts is based on multidisciplinary collaboration that works towards the creation of a fully realized production. Teaching design for the performing arts is difficult because we are not able to fully realize a design in the classroom. Certain design disciplines such as scenic and costume design are able to use drawings and scale models to visually communicate their ideas. Even with the aid of a light lab and computer renderings, lighting remains abstract and difficult to communicate. The most effective
way to teach skills and allow for individual artistic growth is through experience. This project will allow for a student to understand the daily work that is required to create, plan, and execute the lighting design for a complex production of a new musical, and provide the additional design documentation that is necessary for a long running production. This will require Jordan to fully analyze the developing and evolving script for the 41st annual production of Saturday’s Voyeur at the Salt Lake Acting Company. This process will flow into the development of a light plot and digital lighting studies to be used in the production. The student will then be involved in all aspects of the implementation of the lighting from focus, rehearsal, documentation, and revisions of the design. As the student interacts with professionals through the production and rehearsal process they will learn communication and problem solving skills through collaboration with theatre staff and the faculty mentor, in a professional context.

Student: Aidan Blankenship  
Mentor: Dr. Chris Fragile  
Major: Astrophysics  
Department: Physics and Astronomy

**Numerical Simulations of X-Ray Burst/Accretion Disk Interactions**

Neutron stars in binary systems (systems with two stars) can accumulate material on their surface by pulling it from the companion star. After sufficient material has accumulated, it can spontaneously combust, releasing a tremendous amount of X-ray radiation, an event called a Type I X-ray burst. The aim of this project is to study the interaction of this radiation with matter in orbit around the neutron star. We will do this by means of computer simulations, which will be compared to X-ray observations of neutron star binaries.

Student: Niamh Cahill  
Mentor: Dr. Wendy Cory  
Major: Biochemistry  
Department: Chemistry and Biochemistry

**Investigating Meclizine Tablets for NASA Space Mission Planning**

NASA is planning for the first manned mission to Mars in 2033. There are many considerations involved in the planning of this mission, including not only the engineering and technical needs to enable this kind of deep space travel, but also the health and safety of the astronauts onboard. One important consideration related to human health and safety is the preparation of a medical kit that contains needed medications that will remain safe and effective for the 3-5 year Mars mission. It is currently unknown whether the medications that astronauts need will be stable beyond their expiration dates and after exposure to space radiation. Space radiation includes high-energy particles, gamma rays, and X-rays; the Earth is protected from this kind of dangerous radiation by its atmosphere. In this research project, a medication that is currently used by astronauts for motion sickness – meclizine, also known as Dramamine II – will be chemically analyzed after exposure to extreme conditions in order to begin to understand whether it will remain potent and continue to provide its expected therapeutic effect (anti-motion sickness) after exposure. Conditions will include high heat and humidity as well as exposure to dangerous radiation such as that found outside the Earth’s atmosphere. In addition, expired meclizine tablets will be chemically analyzed to determine whether the medication will still maintain its potency after its expiration date. The results of these studies will provide insight into whether meclizine is a stable drug that might remain safe and potent during the mission to Mars.
Preparation, Characterization, and Conformational Analysis of 1-sila-1-isocyanocyclopent-2-ene and its fluoro analogue

This project builds on prior research exploring five-membered carbon rings wherein one carbon atom is replaced by a silicon atom. These compounds are referred to as dihydroxilolos. Prior research indicated disagreements between the predicted structures of some of these silicon containing ringed compounds and their actual physical structure and energy. These compounds are obscure in terms of the knowledge base surrounding them and therefore much of the process consists of designing unique synthetic routs, or troubleshooting pathways that performed successfully only a few times. This research compares the molecular structure which was defined by the mathematical calculations with the actual molecular structure as confirmed by real-scientific analysis. Additionally, we gain insights into our understanding of molecular shapes and the analysis our overall capacity to accurately predict structures through continued synthesis and spectroscopic characterization (which utilizes electromagnetic radiation to provide information about the molecule’s structure). We can perform predictions repeatedly but we cannot know how accurate those predictions are until we make these compounds in the laboratory.

Synthesis of Surfactants and Drug Analogs for Polymerization Studies

A majority of the chemistry field is currently pushing for more “green” techniques and sources for materials. Academic and industrial groups are moving from petroleum sources to biological sources in an effort to advance the “Green Chemistry” movement. There are two significantly unique aspects to this project. One is biologically compatible materials will be used. Almost all current polyurethane materials are made using chemicals derived from petrochemicals. The major material in the final product by mass consists of a polyalcohol derived from a soy-based edible oil. By incorporating a drug into the polyurethane matrix, a material can be produced which slowly releases a drug under physiological conditions. Secondly, new drugs that have never been used for drug delivery purposes before using polymer delivery systems are being investigated. Previously in this study, a series of successful drug delivery materials were made from a series of active drug ingredients and novel biologically based surfactants were synthesized. Significant drug release was observed in the drug delivery media after having been exposed to physiological media. The project will continue this summer, specifically by developing a pro-drug based on the antibiotics nalidixic acid and Levoflaxacin and by exploring new synthetic approaches to surfactants to yield products with varying applications including type of drugs being released, rate of drug release, and overall composition of the material. In addition, long-term degradation studies of these materials will be performed to confirm their safety in biological environments, and the results will be monitored by spectroscopy.
Microbial Symbiont Metabolism and the Nutritional Benefit to Caribbean Marine Sponges

Sponges are a critical member of coral reef communities worldwide. In the Caribbean, sponges are more abundant than hard corals and are serving an increasingly important role as coral abundance decreases. Their success is likely driven by their close relationship with microbial (bacteria and archaea) communities living inside of them. These microbes may supplement the diet of sponges by supplying limiting nutrients like carbon and nitrogen; in exchange, the sponge host provides a safe place to live. Our hypothesis is that sponge species hosting photosynthetic symbionts are obtaining a nutritional benefit from these communities. Therefore, this project aims to assess the metabolism of photosynthetic symbionts within ten of the most abundant Caribbean sponge species and determine how these symbionts benefit their host through nutrient transfer. To conduct this research, we will use stable isotope “tracers” to label inorganic carbon and nitrogen compounds that can only be taken up by microbial symbionts. By measuring the concentration of this label within microbial cells, we can determine how efficient photosynthetic microbes are at fixing carbon and assimilating nitrogen. Likewise, as these microbes transfer nutrients to the host sponge, the concentration of these labels will increase in sponge cells. Therefore, the abundance of this label is a reliable estimate of the nutritional benefit that the sponge is obtaining from its symbionts. Overall, this research will increase our understanding of how symbionts influence sponge metabolism and will contribute valuable information about sponge and coral reef ecology.

Tarot Portrait Print Series

Polyester plate lithography is a low-cost professional form of commercial lithographic printmaking. This method produces multiple copies of a unique image. Many contemporary fine art printmakers have adopted this medium in their work because it requires no toxic chemicals or solvents to create printed works. This method of printmaking is relatively new, having been invented in the 1990s. The last standard printmaking innovation occurred in 1798 when lithography was invented by Alois Senefelder. Current practice with this method is to work on a polyester plate with various drawing materials, baking the plate, treating the plate with a fountain solution mixture, and printing the image by hand on a traditional lithographic press. (Two are located in the printmaking studio at the College of Charleston.) For the proposed prints, I plan on recreating historical artists' work, exploring the artists' styles and techniques, and inserting my own interpretations and experiences in them. Additionally, this project will enable me to further experiment with polyester plates. I will document the prints with digital images, as well as the drawings that I complete for each print.
Sorption Behavior of PAHs to Tire Materials

Microplastics (particles <5mm) found in the environment are sources from two means: primary, which are manufactured to be small like those found in abrasive cosmetics, or secondary, which are fragmented from larger plastics like tires or litter. In addition to abundant sources, the chemical framework and large surface area of microplastics prompts their sorption of chemicals from the environment. So much so, that microplastics have been deemed a potential “Chemical Trojan Horse”. This research project will focus specifically on the sorption behavior of polycyclic aromatic hydrocarbons (PAHs) with tire microplastics, such as crumb rubber. Tire-derived microplastics are an understudied type of microplastic in the environment, but they’re likely to be highly abundant due to automobile use and connectivity of road surfaces with surface waters in the US. PAHs are a class of chemicals commonly sources as by-products of combustion, and known to be carcinogenic, as well as prosing other forms toxicity. “Native” PAHs may also be found within tire material due to the use of PAH-containing oils in tire production. In this research, we will measure concentrations of native PAHs and a spiked PAH in laboratory batch tests containing tire particles and water to understand how PAHs interact with tire materials. The results will allow us to calculate distribution coefficients that can be compared to other types of environmental particles. As an outcome, this study will help determine the role that tire material plays as a contaminant vector for PAHs.

The Effects of Burns on Swallowtail Butterfly Population Recovery

While the effects of burns in different ecosystems have been studied, the effects of controlled burns on flying insects in South Carolina’s longleaf forests have not been investigated. The Francis Marion National Forest has various burn sites that are in different stages of recovery. The effects of these burns may not seem to negatively impact large organisms, but for butterflies, exposure to intense burns at an immobile stage may kill the egg, larva, or pupa and prevent the population of adults from emerging the next season. With a focus on four species of swallowtail butterfly, the population recovery of butterflies can be better understood. Three of these species feed heavily on shrubs and herbaceous plants that are most affected by these burns. Additionally, one species that is very adaptable and relies on the trees that are less affected by controlled burns is also in focus to act as a control. Taking a count of species at different burn sites will help indicate which season of burn is most influential in swallowtail maturation. Additionally, the types of plants that inhabit the recovering burn sites are an indicator to what species of butterflies would be able to thrive in a location since caterpillars rely on specific host plants and adults rely on specific nectar sources. The study of seasonality of burns, host plants present, and flowers in bloom will be of great importance when looking at the significance of these data.
Alluvial Fan Evolution in the Santee River Basin Since the Last Glacial Maximum

The surface of the Coastal Plain of the Eastern United States retains a natural record of sea levels over the last several million years identified by ancient barrier islands, estuaries, and abandoned river systems in modern floodplains. Overprinted on this original surface, climatic changes through the glacial (cold, dry, low sea level) and interglacials (warm, moist, high sea levels), have had lasting impacts on the changing landscape. When northern North America was under massive ice sheets, the cold and dry savannahs of South Carolina were occasionally barren, allowing for dune systems and Carolina Bays to develop. As the temperature warmed from the last glacial maximum, multiple cold-dry and warm-moist cycles added their influence to the landscape. The steep-sided river valleys allowed for streams to develop and carve into the marine terraces, lengthening their path headward through the 20- to 40-foot valley walls. The sediment carried by these streams dumped onto the Santee River floodplain, leaving gently sloping pile of sediment at the base of the stream mouth called an alluvial fan. This study focuses on placing these alluvial fans into the geological context of the last ~10,000 years. By investigating the geological construction of the alluvial fans through the use of high-resolution mapping, subsurface analysis using ground penetrating radar and sediment coring, and using radiocarbon dating techniques, a clear understanding of their formation will be made. The research results will provide us a clear understanding of formation, timing, and under what climatic regime these important features formed.

The Impact of Fetal Exposure to the Obesogenic Compound DOSS on the Mouse Gut Microbiome

In recent years, there has been a continual increase in the rates of certain diseases such as Crohn’s disease, obesity, and diabetes, all of which affect the metabolism. There is no definitive cause for these increases, but some suggested causes include an individual’s genetics, lifestyle choices and changes, exposure to certain chemicals, and heritable genetic changes. Another factor that has only recently been taken into serious consideration is the effects brought about by the human microbiome. The human microbiome consists of the collection of microscopic organisms that can be found in the gut, skin, and a number of other places in and on our bodies. It is extremely diverse and may have direct impacts on an individual’s health. Alterations to the composition of this microbiome in mouse guts have been shown to both bring about changes in metabolism and also changes in response to metabolic diseases. This indicates that this area of study may lead to both treatments and diagnoses for these diseases. The Spyropoulos lab at MUSC has laid the foundation for this analysis to take place through their work with the chemical DOSS, which they demonstrated is capable of bringing about a number of disorders consistent with obesity in mice models. Here we intend to investigate whether the mouse gut microbiome plays a role in the ability of DOSS to cause metabolic diseases in mice exposed to DOSS both in utero and as adults.
**Expression and Purification of the Endothelial Nitric Oxide Synthase Heme Domain R367K Mutant**

Time and again you hear about harmful molecules that should be avoided. But have you ever heard of a dangerous molecule that you actually need? Nitric oxide (NO), a toxic gas similar to carbon monoxide, is just that molecule. In fact, it was awarded Molecule of the Year in 1992 for its surprising role as a neurotransmitter, vasodilator, and anti-cancer agent. So how this toxic molecule delivers Dr. Jekyll’s effect and not evil Mr. Hyde’s has always been puzzling since its discovery. The enzyme nitric oxide synthase (NOS) produces NO in vivo by converting the molecule L-Arginine into L-citrulline and NO but exactly how this is done is not well understood. There are several cofactors that are needed by NOS in order for the reaction to produce product; one of them is called tetrahydrobiopterin (BH4). Without BH4, the reaction does not produce product and reactive oxygen radicals are formed instead. But the exact role of the BH4 is unknown. We believe that one key factor in understanding how NOS produces NO lies in understanding how BH4 binds to NOS and what it is doing during catalysis. Our studies focus on probing the role of BH4 by spectroscopic and X-ray crystallography studies. Uncovering the role of BH4 could provide insights into how NOS produces a toxic gas in a perfect orchestration as to provide essential biological functions like neurotransmission or cardiac blood flow.

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**Biases in Interpretation and Memory among Family Members**

A substantial body of work demonstrates that parent-guided reminiscing fosters the development of children’s autobiographical remembering skills. Through these exchanges, young children learn how to structure and share their memories in narrative form (Fivush, Haden, & Reese, 2006; Ornstein, Haden, & Hendrick, 2004). Children also depend on parents to help them evaluate the past (Fivush, Berlin, Sales, Mennuti-Washburn, & Cassidy, 2003). Yet very little is known about how variations in the ways that parents frame and guide conversations about earlier events may shape how children come to interpret and remember personal experiences. To examine these issues, we carried out two studies (Principe, Cibischino, & Greenberg, 2017; Principe, Greenberg, Shymanski, & West, 2019) to explore how variations in the ways that mothers frame memory-sharing conversations about past emotional events shape how young children interpret and remember their experiences. Results indicate that mothers who focus on the negative when reminiscing with their children are more likely to have children who interpret ambiguous events in a negative manner and are biased towards remembering such events in negative ways. These findings offer insight into processes that contribute to the development of negative interpretation and memory biases that have been linked to emotional disorders. In the proposed study, we aim to extend this line of research by examining whether relations between mothers’ framing of experience and their children’s interpretation and memory for experience persists into young adulthood.
A Robust, Highly Accurate, and Efficient Isogeometric Collocation Method for Phase Filed Models

Many processes in engineering and natural sciences involve the evolution of interfaces towards a thermodynamic equilibrium. Propagating cracks or domain walls are classical examples of moving interfaces within solids, while biomembranes are soft material interfaces evolving in a fluid. Phase-field modeling refers to a particular mathematical description of a system with evolving interfaces. The key idea is that interfaces are described by a smoothly changing phase field. The phase field is governed by a partial differential equation, which tracks the diffuse interfaces and encodes the interfacial physics at once. The systems are inherently nonlinear equations with higher-order spatial derivatives that account for the interfacial forces. Moreover, the higher-order terms are scaled with a small coefficient (the interface thickness) that makes the equations singularly perturbed in nature. Phase-field models, thus, bring a new set of challenges for numerical simulations, such as, for example, stiff semi-discretization, stable time-stepping algorithms and the treatment of sharp internal layers, [1,2]. This project focuses on modeling, simulation, and analysis of high order nonlinear partial differential equations-based phase-field models. In particular, we propose to design a highly accurate, efficient and robust isogeometric collocation method for the numerical simulation of Cahn-Hillard phase-field equations. This research would also involve learning and developing the necessary mathematical backgrounds and knowledge of numerical tools (such as conservative methods, isogeometric methods, and collocation methods) to do research in the area of Computational Mathematics.

Eudora Welty-Frank Lyell Correspondence, 1931-1977

This summer, two undergraduate students will assist Dr. Eichelberger in assembling a book manuscript consisting of letters between Eudora Welty and Frank Lyell. The student researchers will read through the transcribed letters, research important details in the correspondence, and help Dr. Eichelberger select letters for the final manuscript. The letters were written over a span from the 1930s to the 70s, and they are between Welty, an important American writer, and Frank Lyell, a friend from her hometown who became a college professor. The letters consist of personal experiences, but also commentary on historical events as well as arts and popular culture. Scholars are particularly interested in Welty's correspondence because she discusses her personal, creative process. Students will begin by reading Welty's published works and biography before discussing which letters to include and which topics to research. After compiling enough information, students will work with the mentor to write footnotes and begin the proofing process. To start proofing, one student will read Welty's letters aloud while the other checks the transcription for accuracy. This project will culminate in a final manuscript to be published by University Press of Mississippi. While the students complete their individual research, the mentor will be writing an original introduction and drafting a proposal for the press. The mentor will share this work with the students and solicit their advice on presenting Welty's correspondence while engaging a more general audience.
**Darkness in Wonderland: Child Psychology and the Golden Age of Children’s Literature**

In a honeybee hive, necessary tasks such as cleaning and finding food are divided between different individuals. Most jobs inside the hive are accomplished by the worker nurses, who because they barely leave the hive, are not active fliers. On the other hand, the foragers’ job is to find food and bring it back to the colony. The foragers are going back and forth between the hive and flowers, so they are very good fliers. The workers start their life cycle as nurses, then transition into a forager based on the needs of the colony. Major changes occur to enable the worker bee to make this transition, including weight loss, increase in metabolic and immune activity, and depressed ovary activity. In addition to these changes, modifications of the muscle proteins have been documented, mainly focusing on shifting from one isoform of a protein to another. The changes in proteins enable increased flight ability. The shift in isoforms is often the result of a process known as alternative splicing when the coding for protein isoforms is generated at the RNA level. Understanding this process and its regulation at the molecular level is the goal of this proposal. We will use molecular biology techniques to investigate the difference in alternative splicing factors between nurses and foragers. Knowing which splicing factors are turned down or overproduced during the transition will provide a basis for a molecular dissection of this process critical not only in honeybee life process, but in many organisms including humans.

**Was Massive Volcanism Responsible for Rapid Climate Change and Extinction in the Early Cenozoic?**

Volcanism is thought to be the driving force behind most intervals of ancient climate change and extinction events through Earth history. The Paleocene-Eocene thermal maximum (PETM; ~55 million years ago) is widely considered to be the closest analogue to modern climate change due to the abrupt warming of the planet and accompanied extinction event associated with this interval. Several mechanisms have been proposed to have caused the PETM: volcanism, asteroid impact, release of greenhouse gases from the oceans, release of greenhouse gases from wetlands, wildfires, and/or a combination of these factors. Recent evidence suggests that a massive volcanic province in the Atlantic Ocean caused the PETM, as many locations display an enrichment in the amount of mercury (Hg) deposited in marine sediments during this time. Mercury enrichment in sediments, however, can also be caused by factors other than volcanism. This study aims to generate Hg concentrations from a suite of locations on the New Jersey shelf, which represents a transect from shallow marine environments to deep marine environments. The previous study observed Hg enrichments from locations close to land, which is not surprising because it is known that Hg concentrations in sediments are partially a function of how far from land the location is. These new locations will result in a more nuanced understanding of Hg cycling during this important interval in Earth’s history, and potentially link sedimentary Hg contents with widespread soil and rock erosion, wildfires, and/or redox changes, rather than volcanoes.
**Darkness in Wonderland: Child Psychology and the Golden Age of Children’s Literature**

Frustration-stress resulting from reward loss is a trigger for problematic alcohol consumption in humans. Previous research in our laboratory has demonstrated that transitions from favorable-to-unfavorable reward contexts (i.e., negative incentive shifts) engender voluntary alcohol consumption in rats. Rats pressed a lever 100 times in order to earn food pellets. The size of the reward (either large or small) alternated within the same experimental session. The transition from a just-received large reward to a signaled upcoming small reward engendered a period of non-responding (i.e., a pause) and consumption of a concurrently available ethanol solution. The proposed research extends these findings in several ways. First, our previous research prepared ethanol in a sucrose solution in order to establish drinking. As this complicates an interpretation of drinking, sucrose will not be used in this proposed research. Second, we will investigate how removing signals associated with the upcoming large or small rewards modulates alcohol consumption. Finally, we will examine sex differences in alcohol consumption.

**Horror and Hope: Reproductive Justice in Ireland, Past and Present**

In May 2018, Ireland voted in a public referendum to repeal the Eighth amendment, a constitutional ban on abortion. The resulting discussions and debates focusing on choice and autonomy create a timely opportunity to study the emerging reproductive justice movement in Ireland. This project draws on document analysis and interviews with activists to investigate women’s reproductive health, including contraception, pregnancy and childbirth. One of the most unique aspects of this project, distinct from other research on Irish women and reproduction, is the long-term goal to foster a process of mobilizing the community to achieve social change by lifting the barriers that stifle women’s voices.

**Necromancy, Spirit Channeling, and other Wifely Duties: the Psychic Love Story of George Hyde-Lees and W. B. Yeats**

Irish Modernist W. B. Yeats is most prominently known for such early works as “The Lake Isle of Innisfree” which elevated folklore as part of a revival of localized artistry in the face of British sovereignty. Later on in his life however, the mystical aspects of his poetry evolved into an explicit fascination with the occult, and Yeats’ poetry became more abstract and esoteric. Yeats scholarship has generally regarded these works to be intellectually inferior to the more accessible experimentation of his early and mid-life oeuvre, but in recent years more genuine effort has been put into understanding these works and of their own merit as a search for meaning in line within the bounds of literary Modernism as a whole. Understanding these artifacts, however, requires a study of the influence of his wife George Hyde-Lees. In addition to study of the later works from a more New Critical perspective, focusing only on the closed ecosystem of the texts themselves, a great deal of work will be put into understanding how the relationship between Yeats and his wife functioned not only as a
romantic bond, but a creative, spiritual, and explorative partnership – leading to the creation of such popular poems as “The Second Coming” just as directly as it created the massive philosophical, historical, astrological, and poetic credo of “A Vision:” one of his most inaccessible works. I will look to unpublished manuscripts of Yeats’ work containing annotations by Hyde-Lees, as well as drafts of her own work and letters to her husband to investigate all of the aforementioned issues with an inclination towards a more feminist reading of the biography of George Hyde-Lees – hoping to clear her name as less of a hapless spiritual vessel leading Yeats to create his masterworks but as a collaborator of arguably equal creative merit, ultimately written out of the narrative as wives of famous men tend to so often be.

Student: Casey Roche  
Major: Psychology  
Mentor: Dr. Amy Kolak  
Department: Psychology

**Potential Lifelong Consequences of a Self-Focused Society**

Is the current generation of emerging adults more entitled, lazy, and less prepared for adult life than previous generations? In Jean M. Twenge’s book Generation Me, she claims that the millennial generations self-focus will be their downfall. This project seeks to either support or refute that claim by facilitating an understanding of the relationship between the personality construct of narcissism and the characteristics that define emerging adulthood. Prior research has indicated that the self-focused tendencies of emerging adults may influence or correlate with their levels of narcissism. Emerging adulthood has the capacity to relate to narcissism through its traits of identity exploration, self-focus, and optimism. It is a period of an adult’s life in which they are engaged in schooling, job training, and fostering interpersonal relationships. Through an online platform that distributes surveys to a diverse sample, a narcissism and emerging adulthood survey will be given to a large sample of participants that span a wide range of ages in order to examine the associations between the five features of emerging adults and narcissism. We believe that we will find that the self-focused tendencies of emerging adulthood may lead to slightly higher narcissism levels in that group of individuals, but that the narcissistic flux will not extend past that period of an adult’s development.

Student: Isabella Rupert  
Major: Biology  
Mentor: Dr. Allison Welch  
Department: Biology

**Costs of Compensatory Growth Following Salinity Stress in Toaf Tadpoles**

The habitats of many freshwater organisms are undergoing significant degradation as a result of human activities. One such impact is the salinization of freshwater environments due to road salt runoff, agricultural practices, and sea level rise. Elevated salinity can be detrimental and even deadly to freshwater organisms. Amphibians are especially vulnerable to these changes, and tadpoles exposed to elevated salinity have been observed to show decreased survival or, in milder cases, suppressed growth and delayed development, which can increase the risk of predation and delay reproductive maturation. When environmental stressors are alleviated during development, organisms may experience a period of compensatory growth allowing them to “catch up” in size. Although compensatory growth is predicted to come at some cost, these costs are poorly understood. Several studies have observed compensatory growth in tadpoles following a period of transient stress, including two studies involving salinity stress. However, very little is known about the potential costs incurred as a result. Our study seeks to assess the potential costs, before and after metamorphosis, associated with a period of compensatory growth in tadpoles following a transient salinity
stress. By exposing tadpoles to elevated salinity for 8 days, and then observing their behavior and growth in the subsequent weeks, leading up to and following metamorphosis, we will evaluate potential adverse effects of compensatory growth. This information is integral to understanding how increased salinity affects the long-term persistence of amphibian populations, and will be important for developing conservation strategies for freshwater organisms at risk of increased salinity.

Student: Samantha Sommers
Mentor: Dr. Julia Eichelberger
Major: English, Creative Writing
Department: English

**Eudora Welty-Frank Lyell Correspondence, 1931-1977**

Two undergraduate students will work alongside their mentor in creating a manuscript of Eudora Welty’s and Frank Lyell’s written letters. Both students will learn more about Eudora Welty through her literary work, biographies, and previously documented letters. Through this process, students will be able to understand more Welty’s life and work. Having this knowledge will be useful when trying to understand letters that may be harder to read and clarify within the context. Knowing more about Welty’s personality and writing style will be useful when trying to understand the ideas, witty jokes, and statements about her current society found in the letters. Students will also do historical research on the time Welty lived to help readers better understand the letters. This research will provide context and further explanation of any ideas that are shared easily, and with little details, between the two friends in their letters. Students will help create and provide footnotes for the final manuscripts so that readers can easily follow and understand the contents and significance of Welty’s letters. Each student will also be allowed to provide input of how to take the large amount of letters, containing over 270,000 words, and condense them into just 65,000-75,000 words, while still capturing the relevance and entertainment of all letters. By developing a larger understanding of who Welty was and her literary works, students will be able to fulfil a personal goal of developing intellectually.

Student: Karlee Stinson
Mentor: John Sieverdes
Major: Exercise Science
Department: Health and Human Performance

**Obesity in Kidney Transplant Patients**

Obesity is related to a number of chronic disease conditions including heart disease, diabetes, disability, and reduced life expectancy. One notable obesity-related condition includes chronic kidney disease where kidney function declines until a transplant is needed. The two primary conditions that cause kidney disease is high blood pressure and diabetes and are related to lifestyle patterns. After a kidney transplant, there is evidence that patients return to their previous health patterns and begin to gain weight. Weight gain due to lifestyle decisions may compromise the health of the new kidney and induce premature kidney graft loss due to high blood pressure, high blood sugar, and other medical factors that are unknown at this time. This project will include a retrospective study and key informant interviews to investigate the current amount of weight patients gain after a kidney transplant and the factors associated with their status. In collaboration with two transplant physicians (Drs. Rohan and Nadig) and a transplant Researcher (Dr. Taber), clinical data will be sourced from the Medical University of South Carolina’s Transplant Center Records. Dr. Sieverdes will oversee the collection, data analyses, provide student mentorship, interview development and execution of the project. The results of the project will be disseminated through abstracts at a local and international level leading to one to several manuscripts. Outcomes of this project will provide preliminary data for collaborative grant development to investigate programs that limit post-transplant weight gain and obesity-related conditions.
**Potential Herbivory by Bonnethead Sharks (Sphyra tiburo) in South Carolina and Florida Coastal Habitats**

Sharks have always been considered carnivores, but the Bonnethead Shark has recently been discovered to possibly include marine vegetation in its diet and therefore could be considered an omnivore. This is unheard among shark species. This research project will investigate potential ingestion of aquatic plants by Bonnethead Sharks in Florida and South Carolina, by examining stomach contents already collected by different State agencies. South Florida coastlines have abundant shallow lagoons filled with seagrasses, while the Lowcountry has muddy estuaries that have no seagrasses. The data from Florida and South Carolina shark stomachs will be compared to determine whether Bonnethead populations in these regions exhibit differences in their diets, and specifically focus in the abundance of plant matter in their stomachs. These results will lead to a better understanding of the ecology of Bonnethead Sharks in the Atlantic Ocean and provide comparison from two different areas where this species is very abundant. The information gathered from this research will help inform efforts in both of these states to manage the species as a natural resource.

**Frequency and Context of Social Media Usage and its Relationship with Mental Health and Substance Use Outcomes**

As social media use continues to increase, particularly among college students, there has been more scholarly interest in exploring the relationship between frequency and context of social media use and student health and well-being. Prior research has shown that college students regularly use social media platforms to post alcohol- and drug-related content (Boyle et al., 2016), and disclose mental health concerns (Moreno et al., 2011). However, findings have been inconsistent with regard to the health effects of social media use. Consistent with social norms theory, exposure to substance-related content on social media normalizes substance use and has been associated with increased consumption of substances such as alcohol and tobacco (Fournier, Hall, Ricke, & Storey, 2013). Additionally, research suggests that disclosures of depressive symptomology on social media may normalize experiences of sadness and depression, thus generating dialogue around mental health concerns. However, evidence also indicates that frequent social media use may be related to negative mental health outcomes. The purpose of this study is to explore how college students’ use of social media influences their substance use behaviors and mental health outcomes and whether these relationships vary by gender. As an extension of ongoing efforts to evaluate the effectiveness of a social norming campaign at the College, this research will draw on data collected from the 2019 Student Health Survey to assess students’ addiction to social media, problematic internet use, motivations for social media use, and the impact these factors may have on student substance use and mental health status.
Impact of Episodic Stellar Activity on Planet Evolution

The formation of planets in a protoplanetary disk has been researched with respect to a variety of constraints. Studying the formation of planets allows us to learn more about our own origins, as well as trends that appear in other planetary systems. This information allows scientists to look for potentially habitable planets in other systems. The proposed project is unique in its approach to the study. Early stellar activity of the star over a short period of time will be studied to investigate how the flux of stellar activity impacts the early formation of planets around the parent star. Photometric and spectroscopic methods will both be utilized in the implementation of the project. Photometry is the measurement of the overall large-scale radiation of the star, while spectroscopy is measuring the relative brightness of radiation at a specific wavelength. Both are integral to the project, but analyzing the spectroscopic data I collected in Chile, in addition to archived data, will be my main focus.