19th ANNUAL
Undergraduate Research Symposium

Celebrating Research for 19 Years

March 22, 2018
9:00AM – 3:00PM
Reitz Union
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Welcome

Welcome to the 19th Annual University of Florida Undergraduate Research Symposium. Undergraduate research is one of the five areas of opportunity, (along with internships, service, leadership, and international experience), which students are encouraged to participate in during their undergraduate career.

Once again, a record number of undergraduate researchers will present posters this year. Three hundred and twenty-four posters and four performances will be presented. This group represents all UF colleges.

Thirty-five UF undergraduate researchers representing eight colleges have presented their work at professional conferences from Louisiana to Oregon, and Massachusetts to California. This year CUR sponsored 44 students who presented their research work at the 8th Annual Florida Undergraduate Research Conference at Eastern Florida College. Additionally, over 2000 students have taken advantage of the opportunity to register for the research courses offered by each College.

Each of these students has benefitted from mentoring provided by exceptional faculty and graduate student researchers. We thank them for their efforts on behalf of these students. Faculty mentors are listed following the abstracts.

We encourage you to visit the presentations, talk with the students about their research, and read the collection of abstracts.

Enjoy,

Anne E. Donnelly

Director, Center for Undergraduate Research

Over 400 Students and Faculty meet at the 1st Annual Undergraduate Research EXPO, Oct. 2018 at the Reitz Union co-sponsored by CURBS and Student Government
Undergraduate Research Symposium  
March 22, 2018  
Grand Ballroom, Reitz Union 2nd Floor  
Program in Brief

8:15 am - 9:00 am  
Group 1 Check in/ Poster Set Up

9:00 am - 9:15 am  
Welcome and Orientation  
*Dr. Anne Donnelly, Director, UF Center for Undergraduate Research*

9:15 am - 10:15 am  
Group 1A Poster Session

10:15 am - 10:30 am  
Live Performance: Dominique Baeta  
*Nadia Boulanger: In The Mist of the Stars*

10:30 am - 11:30 am  
Group 1B Poster Session

11:15 am  
Group 2 Check in

11:30 am - 11:45 am  
Live Performance: Haley Simmons  
*Polysémie: A somatic Approach to Cross-Cultural Communication*

11:45 am - 12:00pm  
Remarks, *Dr. Norton, Vice President For UF Research*

12:00pm - 12:15pm  
Announcement of Best Paper Contest Winners  
*Dr. Creed Greer, Managing Editor of the UF Journal of Undergraduate Research and Program Director for the University Writing Program.*

12:15 pm - 12:30 pm  
Take Down Poster Group 1  
Set Up Posters Group 2

12:35 pm - 1:35 pm  
Group 2A Poster Session

1:40 pm - 1:55 pm  
Live Performance: Sabrina Baeta,  
*The Lieder and sonntagsmusiken of Fanny Mendelssohn Hensel*

2:00 pm - 2:15 pm  
Live Performance: Aliya Miranda, Xander Herrera, Elisabeth Rios-Brooks, Holland Hall, and Zach Brown  
*Voices from the March ~a collaborative multimedia theatrical experience*

2:15 pm - 3:15 pm  
Group 2B Poster Session

3:15 pm  
Group 2 Breakdown
PRESENTER(S): Davis, Katherine  
AUTHOR(S): Katherine Davis, Mark Orazem  
FACULTY MENTOR: Mark Orazem  

**Influence of Geometry-Induced Frequency Dispersion on the Impedance of Rectangular Electrodes**

Three-dimensional finite-element simulations were performed to identify the characteristic frequency associated with the influence of electrode geometry on the impedance response. An expression for the characteristic dimension of the rectangular electrode was found that can be used to estimate the frequency associated with geometry-induced frequency dispersion. These results may serve to guide the design of rectangular-shaped sensors that employ impedance measurements.

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PRESENTER(S): Melendez, Laura  
AUTHOR(S): Laura Melendez, Eden Schoepflin, Dr. Jocelyn Wider  
FACULTY MENTOR: Jocelyn Widmer  

**Impact of Youth Engagement in Technologically Based Water Well Surveying: Punta Cana, Dominican Republic**

Efforts to address issues in resource-challenged contexts can often be disconnected from the realities on the ground. This is true for Verón, a sprawling, informal, urban area in the Punta Cana touristic region of the Dominican Republic. Despite good intentions, past projects in the region have been disconnected from social, cultural, and environmental dynamics of the community impacted.

To eliminate this disconnection, we took an interdisciplinary approach towards sustainable development. By capturing the spatial distribution of water points and their characteristics through youth engagement objectives, we promoted a foundation for development that promotes local participation in decision-making and regional policy development. With a team of local youth, this research inventoried household water point in Verón and captured GPS points, photos, and general characteristics associated with each water point. A training certification program was developed within cultural contexts in which youth participants were trained to conduct water wells surveys. Youth were observed throughout this certification process to understand how transferable skills of data collection could be beneficial for future educational or employment opportunities. A base layer of water-related infrastructure in the region was compiled from water points, to conduct appropriate spatial analysis, and communicate data to key decision-makers in the region.
Culture Through Color Perception in "West Side Story"

My project focuses on the use of color theory to clearly characterize members of rival ethnic gangs in the 1961 film adaptation of "West Side Story", which captured audiences with its groundbreaking innovation in choreography and music and earned praise from critics for delving into issues like immigration and gang-related violence. While much of the existing research focuses on the film’s references to vying cultures made explicitly through song and dance, this research instead focuses on the non-verbal representations of these cultures that are expressed through color in the film. By studying its iconic art direction and investigating audiences’ subsequent perceptions of characters, I argue that the colors featured in the costume designs are used to denote a culturally-charged power structure between the Jets and the Sharks. Based on close examination of various designs, its overall color palette, and published scholarship, I conclude that "West Side Story"’s non-verbal references are uniquely dangerous to its explicit references, as they subliminally promote harmful stereotypes and suggest that gang violence brings life to an otherwise drab city. Studying the connection between color theory and culture ultimately illuminates the historical roots of society's perceptions of colors and their seemingly inherent associations to certain traits.

A Simple Epidemiological Model for Human Immunodeficiency Virus Based On Erlang’s Method of Stages

This research is to select an epidemiological model for HIV that uses few parameters while fitting the world prevalence and death data well. Here we consider a set of models based on Erlang’s method of stages, including some with and some without social distancing. The use of stages is supported by biological studies which suggest that HIV passes through stages in each individual, although the exact number is not known. This set of models represents such stages by using a successive number of classes. To perform model selection, we compute R0 and use it to estimate initial values of the parameters in this model. We run thousands of iterations of a Nelder-Mead simplex search algorithm to determine the optimal values of parameters for each model and the error associated with each model. These errors are used to compute AICc values and then the AICc values are compared to select the most likely model. The selected model from this experiment contains the social distancing term as well as four infected classes/stages. We then perform identiability analysis and determine that the "true values" of the parameters for this model are uniquely determinable based on the data points.
Credit Default Swaps ("CDS") are contracts that insure one party against default in an underlying financial instrument, usually a bond. Therefore, the price of CDS reflects the perceived risk of default in an underlying financial instrument. This project applied Support Vector Machines ("SVMs") to the prediction of CDS price changes for several individual companies across time. Previous research applying SVMs to predicting CDS prices used historical CDS prices as model inputs. This project proposed and applied several new input variables. Tests over a period of several years, across a group of CDS time-series, indicate that a combined model which uses the new input variables in addition to historical CDS price changes outperforms models that only use historical CDS price changes.
The Lieder and Sonntagsmusiken of Fanny Mendelssohn Hensel
Throughout her lifetime, Fanny Mendelssohn Hensel was primarily known as a sister of the musical genius, Felix Mendelssohn, as a daughter of her distinguished parents, Lea and Abraham Mendelssohn and as the wife of her artistic husband, August Wilhelm Hensel. Today, Hensel is remembered for her remarkable musical talents and a wide breadth of compositions. Though often passed over as a woman in the nineteenth century, Fanny Hensel played a key role in the musical life of the city of Berlin. Hensel's musical voice was defined by her comprehensive musical education and through her Sonntagsmusiken (translated "Sunday Musicales"). In the next generation, British author Virginia Woolf shed light on the obstacles to a female artist's life. In the essay, A Room of One's Own, Woolf outlined the main elements necessary to create art: financial security and a room to one's self. For Hensel, financial security was ensured through her family, yielding for her a rich musical education. Hensel was given a private space for her creative work in an adjacent building called the Gartenhaus. This paper investigates how Fanny Mendelssohn Hensel's educational and performance opportunities shaped

Nadia Boulanger: In The Midst of the Stars
Nadia Boulanger was the French performer/teacher who changed the landscape of American music. Under the mentorship of her father, Ernest Boulanger and the tutelage of musical genius, Gabriel Fauré at the Paris Conservatory, Nadia Boulanger had an excellent education and earned high honors as a student of organ and composition. However, early in her life Boulanger decided to turn her full focus to teaching. Among her most outstanding American composition students are Aaron Copland, Walter Piston, Roy Harris, Philip Glass, and Virgil Thomson. Student testimonials and class notebooks shed light on her teaching. Nadia Boulanger taught with a combination of rigor and passion, successfully mentoring a generation of aspiring composers and performers. Her profound imprint on American music is recognizable in the fact that almost all American composers of note in the 20th century studied with Nadia Boulanger either in Paris or during her residency in Boston. It is possible to trace parallels between her education and compositional style, and her teaching of composition. This paper investigates how Nadia Boulanger taught, why she was successful, and how her early education affected her future as a composition teacher.
Polysémie A Somatic Approach to Cross-Cultural Communication

Assimilation into a foreign culture requires shedding one’s personal cultural understanding and habits, in order to embody another. Laban Movement Analysis can be applied to understanding the prominent body attitudes that exist within the desired culture, so that one may find themselves communicating with proficiency, and assimilating naturally to the environment. Laban Movement Analysis (LMA) is an analytical tool, developed by Rudolf von Laban, for understanding and communicating movement. Movement, being the foundation of life, is a universal aspect of human nature; it is the thread that binds, even when language divides. Using the principles of Body, Effort, Shape, and Space (BESS), one may analyze the body attitudes and communication practices of a specific culture, and compare it to that of one’s own prominent body attitudes. This practice of awareness and application is key to assimilation. The resulting work of this research, Polysémie, is a choreographic exploration of the use of LMA to decipher cross cultural communication.

Voices from the March ~ a collaborative multi-media theatrical experience

On January 18, 2017, students from University of Florida’s Samuel Proctor Oral History Program and Center for Gender, Sexualities, and Women’s Studies Research travelled to DC to document the Women’s March on Washington and the presidential inauguration. While there, they gathered over 150 interviews from people attending these momentous events in American history, and had life-changing experiences. Containing over 700 interviews, UF is the national repository for interviews collected at Women’s Marches worldwide. Working together to catalogue these interviews and evaluate and translate their own research, several students who went to DC have co-created a unique multi-media, live theatre performance telling their story, as well as sharing and analyzing the multiple, contrasting perspectives collected at Women’s Marches and the Trump inauguration. Conceived and directed by Jeffrey Pufahl, this unique peek into the diverse range of political, social, and personal viewpoints and experiences gives audience members an up-close and personal look into the fabric of American culture, critical oral history work as activism, women’s movements, and feminist intersectional activisms including Black Lives Matter, immigrant rights, and LGBTQ+ rights.
**Poster Abstracts**

**PRESENTER(S): Acosta, Sebastian**  
**AUTHOR(S): Sebastian Acosta, Yunlu Zhang, Dr. David Wei**  
**FACULTY MENTOR: David Wei**

**Synthesis and Characterization of Ag-Pd@ZIF-8 Heterogeneous Catalyst**

Palladium is one of the most active catalytic metals for hydrogenation reactions, due to its strong interaction with molecular hydrogen. However, the high temperatures and high pressures required to complete these reactions make palladium nanocrystals unsafe and uneconomical. Additionally, the nanoparticles easily aggregate under heating and, as a result, it impedes their catalytic performance significantly. Herein, we report the synthesis and characterization of a Ag-Pd@ZIF-8 heterogeneous catalyst. By integrating the localized surface plasmon resonance (LSPR) properties of silver nanoparticles, which converts light into heat through the photothermal effect, with the active sites of palladium nanocrystals, we propose that the catalyst will be able to provide an active surface for the hydrogenation of olefins, and is able to drive these reactions forward using light instead of conventional heat. To prevent aggregation at high temperatures, the alloy nanocrystals were encapsulated within a porous material, ZIF-8. All nanocrystals were characterized using Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), and Ultraviolet-Visible (UV-vis) Spectroscopy. Although SEM and TEM images show the growth of ZIF-8, further characterization needs to be performed to provide evidence for the successful encapsulation of the nanocrystals. Future efforts will focus on catalytic testing, and complete characterization of the material.

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**PRESENTER(S): Acuna Higaki, Adrian**  
**AUTHOR(S): Adrian Acuna Higaki, Nicole Pelletier, Jessica Cheung, Varsha Sundaresan, Ying Li, Benedetto Diciaccio, Victor T Lin, Lei Zhou**  
**FACULTY MENTOR: Lei Zhou**

**A Comparative Genomics Approach to Understanding the Roles of P53 Binding Sites**

Cancer is one of the leading causes of mortality worldwide, with over 8 million deaths per year. In more than 50% of cancers, the transcription factor P53 serves as a tumor suppressor which exerts anti-proliferative functions in response to oncogenic stressors. Through ChIP-Seq analysis, thousands of P53 binding sites in mammalian genomes have been identified, yet the functionality of these binding sites remains to be established. It is hypothesize that mutations or epigenetic silencing of non-coding regulatory sequences of P53 target genes play an extensively important role in cancers. By using Drosophila as a model organism, a comparative genomic approach to identify functional P53 binding sites is proposed. To do this, a library of significant P53 binding sites must first be established by looking at data obtained from RNA-seq and comparing them to our ChIP-seq data. Next, CRISPR-Cas9 will be used to generate Drosophila models containing mutations in the P53 binding sites near the pro-apoptotic genes Hid and Rpr. Selected adult flies containing the CRISPR-Cas9 induced mutations will undergo irradiation induced DNA damage to assess their functional importance. By using this approach we will discover functional roles of non-coding regulatory regions in tumorigenesis and contribute to apoptosis inducing cancer therapies.
Narrating Memory of the Spanish Civil War and Postwar in the Autobiographical Novels of Enriqueta Antolín

Recent Spanish visual and literary production has had a recurring theme of looking back into the country’s past, particularly its civil war and the dictatorship that followed. In terms of literary production, the historical novel is the genre of choice to explore this past. In this study, I investigated autobiographical works of fiction that question the past—specifically La gata con alas (1992), Regiones devastadas (1995), and Mujer de aire (1997) by Enriqueta Antolín, which function collectively as a trilogy as autobiography and autofiction (a mixture of fiction and autobiography) are underappreciated genres in Spain. The peculiar narrative form of Antolín’s trilogy, written in the second person from the perspective of a woman to her childhood double in the first two novels and again in the second person to her childhood love interest in the third, provide a new way of constructing memory by a constant questioning of one's own memory through a dialogue. This is an innovative means by which to access collective memory of the Spanish civil war and postwar, straddling between the national narrative constructed by the dictatorship and one's own newly constructed narrative.

Potential Transmission of Salmonella, E.coli, and Coliform bacteria in Wild Bird Feeders

Foodborne pathogens affecting human health can often be traced back to direct contact with wild animals or indirect contact through the animals’ environment. Small woodland songbirds are not among the wild animal species currently known to soil the environment sufficiently for humans to contract foodborne diseases, but millions of people interact with songbirds through the provision of bird feeders. We sampled bird seeds from 10 different feeders for the presence and quantity of Salmonella, E.coli, and total number of coliformes using traditional PCR method and QPCR methods. Using motion sensor camera data, we determined the species of birds who visited and their behaviors at the feeders. As of now, Salmonella has yet to be detected but minor amounts of E.coli have been found. Whatever our findings concerning feeders as potential microbial hotspots, we seek information that can lead to healthier interactions between wild birds and people.
Determining Vacuum Birefringence: Why Two Lasers Are Better Than One

Vacuum birefringence is a quantum effect that explains how different polarizations of light respond to strong magnetic fields in a vacuum. It was predicted by Heisenberg and Dirac in the late 1930s and has yet to be experimentally detected. While previous experiments have utilized high-finesse optical resonators, we are working on a completely new design to detect this effect. Our design uses two overlapping, orthogonally polarized laser beams to measure the relative phase difference between a reference path and one with rotating polarizations, which may experience oscillating phase shifts in vacuum in the presence of a magnetic field. To test the design, we developed a small-scale setup without cavities that can analyze different birefringent sources with the same principle. Our early results from testing mirrors show spatial variations in birefringence due to imperfect mirror coatings and show no correlation between the strength of a magnetic field applied parallel to the mirror's surface and birefringence amplitude. In addition to assisting in the selection of suitable components for the final design, our laser heterodyne polarimeter promises more sensitive results than previous experiments and may very well be the basis for the very first detection of vacuum birefringence.

Studying Individual Lytic KSHV Genes through the Manipulation of the KSHV Genome

Kaposi's sarcoma-associated herpesvirus (KSHV) is a cancer-causing virus in humans. In my research I used a recombinant KSHV clone termed BAC16, which may be maintained in bacteria. Using the homolog recombination system of bacteria, the KSHV DNA can be modified to make viral mutants to study the function of viral genes. In my experiments, I used a KSHV mutant in which RTA, a viral factor that induces the expression of lytic genes, is knocked out. We hypothesized that by inserting a constitutively active promoter in front of a lytic gene in the RTA mutant, a virus that allows the expression of individual viral genes independent of RTA can be created. To test this idea, a constitutively active CMV promoter was inserted in front of the lytic viral gene vIRF1 in the RTA knockout BAC16. A 3xFLAG epitope tag was also inserted before vIRF1 allowing the detection of vIRF1 by FLAG antibody. Afterwards, I transfected the recombinant BAC16 DNA into 293T cells and tested the expression of vIRF1. The results indicated that vIRF1 was expressed in absence of RTA thus our method is suitable to make KSHV clones in order to study the function of individual lytic genes in cells.
PRESENTER(S): Alvarez, Sara  
AUTHOR(S): Sara Alvarez, Andrea Lucky  
FACULTY MENTOR: Andrea Lucky

Effects of Cogongrass and Climate Change on Ant Communities

Cogongrass is an economically important plant invader in Florida. It was introduced to the USA from Southeast Asia, but has no value as forage and has substantial negative impacts because of its aggressive invasion of native landscapes. The impact of this invader on native ecosystems is expected to worsen under changing climate scenarios. This study investigates the effect of an experimental cogongrass invasion in long leaf pine savannah on the ant community over three years, and examines how the interaction of invasion and drought impact this important group. Ants are directly and indirectly dependent on plants for food and shelter and can serve as effective indicators of forest health. Results of the experiment revealed a sharp decrease in ant abundance and richness in both experimental and control plots. After three years, the Brachymyrmex patagonicus (dark rover ant) dominated the ant community regardless of treatment. These results reveal the unexpected influence of invasive insects. In this study, the arrival of ant invaders following community disturbance by plant invasion caused a collapse in the ant community within the experimental site. Whether this pattern is present at the landscape scale or is a result of the small size of this experiment remains to be determined.

PRESENTER(S): Amontree, Jacob  
AUTHOR(S): Jacob Amontree  
FACULTY MENTOR: Hugh Fan

Capillary Force Methods For Single Cell Transfer In Studying Circulating Tumor Cells

Circulating Tumor Cells (CTCs) in the peripheral blood provide crucial information for cancer prognosis along with monitoring treatment. As a result, a variety of methods have been developed to study CTCs. The critical parameter to assess the accuracy and validity of these methods is cell capture efficiency at low concentrations. However, producing samples in the range of 1-50 cells/mL is characterized by high systematic error from the inability to isolate single-cell outliers. To remedy this problem, commercial and private organizations have developed pump-driven, single-cell transfer (SCT) methods to accurately spike cells in a variety of mediums. Although a viable solution, these systems are costly, intricate, and require training for optimal use. We report our study on an alternative apparatus and method for low-cost, accurate, and reproducible low-concentration CTC spiking without the use of external pumping systems. We investigated the effects of surface membrane tensions induced by cellular aspiration and compared a range of tip/tumor cell diameter combinations to known stresses for rupture ensuring that our study does not affect the cell’s viability. In addition, we performed affinity-based CTC isolation using this apparatus to generate accurate concentrations ranging from 1-15 cells/mL.
New Competition: The Impact of House Sharing on Traditional Lodging Facilities

For the past 11 years, house sharing has demonstrated exponential economic growth and has become a major subsect of the hospitality industry. Beginning in 2006 with Airbnb, the house sharing market has risen to over five percent of the $500 billion hotel market (Kindergan, 2015). The significant and rapid rise of house sharing has caused competition discrepancies that local and federal governments are currently trying to resolve. As regulation and other aspects of competition face the rise of technology and new forms of commerce, governments are and will be evaluating aspects of competition to ensure fairness throughout the travel and leisure industry. This study is designed to analyze how the growth of house sharing has affected competition in the traditional real estate market for hotel and other traditional lodging facilities thus far and how the markets will continue to change in the future.

Consumer grade Brain Computer Interfaces as an augmented security measure for authentication

With the increasing demand for robust yet user friendly security systems, Electroencephalogram (EEG) authentication poses as a feasible solution. Current biometric identifications, such as finger print scanning, demonstrate the full capacity of a user specific authentication system. However, recent findings have demonstrated that these security measures can be circumvented. This research aims to assess BCI devices as a viable alternative to present biometric identifications. Particularly, can an individual be assigned their own unique profile that is accessible at any time and any location just by engaging with a particular stimulus.
Rwandan Architecture: Cultural Identity

Rwanda is an African nation currently experiencing rapid urban development, initiated and led by numerous foreign interests. In this climate of urbanization, architecture plays a significant role the shaping of the country. Yet Rwanda is a place in which, until the mid-2000s, architecture was a nonexistent profession. The need for professionals in this field was filled by foreign interests, including both international private firms and non-governmental organizations. This paper asks the question of how such foreign intervention begins to influence and change the cultural identity of the nation, and what can and is being done within the field of architecture to prevent this loss of culture. Specifically, this paper investigates the role of architectural education in this climate of development and foreign influence. The research draws upon primary sources such as articles, books, lectures and interviews to understand the approach to architectural pedagogy in Rwanda and how the system addresses the idea of cultural identity through architecture. Through my investigation I began to analyze the differences between the curriculum and student work produced in Rwanda and the United States, and revealed the challenges faced within the still-developing architectural education system. These investigations began to reveal the struggles of reconciling the desire to preserve the integrity of Rwandan culture and the pressures of a socio-political climate experiencing rapid growth.

Black Queer Perspectives: On American (White) Manhood!

Black masculinity is a complex concept with nuanced themes. It may be situated under the Black Studies umbrella which fosters interdisciplinary approaches which apply numerous concepts -some of which are grounded in history, queer theory, and performativity. Its relation to masculinity and queerness is not neutral or separate from the relation between whiteness/blackness or queer/straight. That oppression is manifested in diverse ways including intra-racial gender bias, homophobia, intra-racial, and erasure. Hegemonic masculinity privileges a few while subordinating and forcing oppressed groups, specifically black people, to negotiate survival. Contemporary struggles for Black Queer equality have often been ignored, trivialized and/or systemically veiled in academic and mainstream discourse. Queer justice activism has been more prevalent in society, but is often benefits queers who have white privilege and class privilege. The importance of understanding why the division exist needs to take a theoretical framework that privileges queer and feminist approaches to looking at histories cultural context and its paradigm shifts. By examining black masculinity and hegemonic masculinity, this study will illuminate the issues, challenges, and successes that hinder and/or help Black queer mental health. Specifically, this research takes a theoretical and historical approach to explore the background and meaning(s) of Black queer marginalization to understand how a marginalized groups experience, internalize, and perform acceptance of or resistance to hegemonic masculinity.
Review of Literature in the Problems of Malnutrition in Hospitalized Adult Patients

Purpose: The purpose of this study was to analyze a review current of literature on the problem of malnutrition in hospitalized adults and review evidence-based interventions that can be implemented to prevent the deterioration decomposition of malnourished patients who are hospitalized when hospitalized.

Findings: Malnutrition is associated with many adverse outcomes, including an increased risk of pressure ulcers, impaired wound healing, immune suppression and increased infection rate, muscle wasting and functional loss increasing the risk of falls, longer length hospital stay, higher readmission rates, and higher treatment costs.

Utilization of nutritional screening tools is a simple technique to rapidly identify patients at risk of malnutrition, which allows for dietary referrals and oral nutrition supplementation.

Discussion: Utilization of tools such as screening assessments when patients enter the hospital and the addition of oral nutritional supplements shows a decrease risk of morbidity and mortality in hospitalized patients. Early nutrition intervention supports lean body reserves by preventing or delaying protein and energy deficits and their impact on pressure ulcer risk and healing. Fundamental to the treatment of malnutrition is the identification of malnutrition or malnutrition risk. With the utilization of screening tools clinicians will now be able to use guidelines in risk assessments for pressure ulcers and nutrition assessments.

Probing Pge2 Receptors In Salmonella Typhimurium-Infected Thp-1 Macrophages By Using Pge2-Biotin Probe

PGE2 is a prostaglandin made from cell membrane lipids, and has four G-protein coupled receptors EP1, EP2, EP3, and EP4 (1). PGE2 plays a role in cell death, cell division, and cellular immune and inflammation response (7). To understand the use of PGE2 probe, and the response of PGE2 and its receptors after Salmonella Typhimurium infection, a pro-inflammatory which increases PGE2 release, THP-1 macrophages were infected with Salmonella Typhimurium (4). An optimization experiment using PGE2-biotin probe was first performed to identify PGE2 bound to receptors. PGE2 receptors have never been identified before by using a PGE2 derivative after a bacterial infection as most studies use antibodies which have limitations like low specificity. In the optimization experiment, PGE2-biotin probe was only able to produce a signal when added to the cell lysate (Figure 2). In next experiment, the THP-1 monocytes were infected, lysed and incubated with the PGE2-biotin probe. However, no unique signals were obtained after western blotting. In future infection experiments, I would use twice the number of THP-1 cells to account for lower protein concentration in infected cell lysate and a higher concentration of PGE2 probe. Lastly, a pulldown of PGE2-biotin bound to possible receptors by using streptavidin conjugated to agarose beads should also be performed to account for low receptor concentration.

Keywords: PGE2; THP-1 macrophages; Salmonella Typhimurium; PGE2-biotin probe; Lysis.
**The Lieder and Sonntagsmusiken of Fanny Mendelssohn Hensel**

Throughout her lifetime, Fanny Mendelssohn Hensel was primarily known as a sister of the musical genius, Felix Mendelssohn, as a daughter of her distinguished parents, Lea and Abraham Mendelssohn and as the wife of her artistic husband, August Wilhelm Hensel. Today, Hensel is remembered for her remarkable musical talents and a wide breadth of compositions. Though often passed over as a woman in the nineteenth century, Fanny Hensel played a key role in the musical life of the city of Berlin. Hensel's musical voice was defined by her comprehensive musical education and through her Sonntagsmusiken (translated "Sunday Musicales"). In the next generation, British author Virginia Woolf shed light on the obstacles to a female artist's life. In the essay, A Room of One's Own, Woolf outlined the main elements necessary to create art: financial security and a room to one's self. For Hensel, financial security was ensured through her family, yielding for her a rich musical education. Hensel was given a private space for her creative work in an adjacent building called the Gartenhaus. This paper investigates how Fanny Mendelssohn Hensel's educational and performance opportunities shaped her compositional voice and circumscribed her influence on 19th c. Berlin musical society.

**Nadia Boulanger: In The Midst of the Stars**

Nadia Boulanger was the French performer/teacher who changed the landscape of American music. Under the mentorship of her father, Ernest Boulanger and the tutelage of musical genius, Gabriel Fauré at the Paris Conservatory, Nadia Boulanger had an excellent education and earned high honors as a student of organ and composition. However, early in her life Boulanger decided to turn her full focus to teaching. Among her most outstanding American composition students are Aaron Copland, Walter Piston, Roy Harris, Philip Glass, and Virgil Thomson. Student testimonials and class notebooks shed light on her teaching. Nadia Boulanger taught with a combination of rigor and passion, successfully mentoring a generation of aspiring composers and performers. Her profound imprint on American music is recognizable in the fact that almost all American composers of note in the 20th century studied with Nadia Boulanger either in Paris or during her residency in Boston. It is possible to trace parallels between her education and compositional style, and her teaching of composition. This paper investigates how Nadia Boulanger taught, why she was successful, and how her early education affected her future as a composition teacher.
Factors that dictate perceived head of household in Gressier, Haiti in relation to water insecurity

In several areas in Haiti, water insecurity due to a lack of water infrastructure, contamination, and treatment has increased the incidence of water borne diseases. Women play a significant role in the management of resources in a household; however, in a recent review of critical literature, there was little information found regarding the role of women in household making decisions around water access. Women’s empowerment and agency are essential for improving health, education, and development, and is crucial to achieve sustained social and economic growth and development. Therefore, this study aims to assess the perceived empowerment of women within households surrounding water access and to identify the factors that predict perceived head of household. The study site consists of Gressier, a commune located 20 km west of Port-au-Prince in the Ouest Department of Haiti. A validated cross-cultural water insecurity survey was used for data collection from February through March 2018. Quantitative analysis included multivariate regression analysis using SAS statistical software was used to determine factors that influence perceived head of household. Data collection is currently still in progress for this study, however, results will be finalized prior to the conference.

Fabrication of CuInS2 Quantum Dot Light Emitting Diodes

While significant advances in the development of quantum dot light emitting diodes (QLEDs) have been reported, these devices are primarily based on Cadmium containing quantum dot materials. In this work, we fabricate single color QLEDs using CuInS2 quantum dots (CIS QDs) as an alternative material. Solution processed CIS QDs with multiple ZnS alloyed shells were synthesized to optimize their luminescent behavior. The light emitting diodes were fabricated based on typical device structure, using synthesized CIS QDs as the emissive layer in multilayer devices. Fabricated devices showed significant performance, with current efficiency of 14.7 cd/A and external quantum efficiency of 5.2%.
**Modulation of Host Defense through Protein-Protein Interactions**

One of the causal agents of Huanlongbing (HLB, or Citrus Greening disease) is the non-culturable pathogen Liberibacter asiaticus. This bacterium is transmitted by a psyllid vector and resides within the phloem of the citrus tree where it causes a systemic and deadly plant disease. Studying this disease relies on the understanding of biological processes and pathways involved in host-pathogen interaction. LotP, a novel protein, is induced >7 fold in infected plants relative to the infected psyllid. Through direct interaction with host chaperones this protein is thought to modulate the host stress-response. HSP90 was shown to localize around the phloem in afflicted citrus. Here we would like to show any possible interactions between LotP and HSP90. The main goal of this project is to clone HSP90, and follow its interaction with LotP in a β-galactosidase-based bacterial two-hybrid system. Due to ambiguous data that was found in the first system, we now look to perform another two-hybrid system to elucidate any true interactions between LotP and HSP90.

**Open Robotics: Facilitating Further Research**

In the last decade, tremendous breakthroughs have been made in robotics, artificial intelligence, mobile computing, and computer vision. It is easy for anyone to buy a smartphone or drone that uses some aspects of each of these disciplines, but interdisciplinary research being done in these areas is somewhat inaccessible due to the need to be able to work with both hardware as well as software and to use them together. Furthermore, developing probabilistic control systems such as spiking neural networks requires expertise in other areas. Researchers looking to implement robust new algorithms or architectures are faced with the challenge of creating original research, but also with the impasse of learning an entirely new discipline just to make their project a reality, such as robotics. This project aims to create a modular approach to robotics that anyone can easily replicate, regardless of discipline, to facilitate rapid growth in technical research especially pertaining to artificial intelligence. We will explore the hardware components, the software running, protocols, open-source libraries, and passing numerical data as feedback for the closed control system. In this light, controlling any robot can be as simple as returning a set of numeric values from a running program.
The Role of ZIP8 in Iron Metabolism During Iron Deficiency

The transmembrane metal-ion transporter ZIP8 (SLC39A8) is capable of transporting a number of metals including manganese, iron, zinc and cadmium. Mice with limited ZIP8 expression display severe anemia in utero, suggesting that ZIP8 plays a role in iron metabolism either in maternofetal transfer of iron or in erythropoiesis (Gálvez-Peralta et al., PLOS One, 2012). To investigate the role of ZIP8 in erythropoiesis in vivo, we disrupted the Slc39a8 gene in adult mice (ZIP8 KO) and subjected them to dietary iron deficiency. We found that ZIP8 KO mice, after 8 weeks on an iron-deficient diet, had significantly lower hemoglobin levels and plasma iron concentrations compared with wild-type mice. Analysis of tissue non-heme iron concentrations, an indicator of tissue iron stores, revealed that ZIP8 KO mice had significantly higher splenic non-heme iron concentrations than did wild-type mice, suggesting an impairment in iron recycling/utilization during iron deficiency. These data suggest that ZIP8 plays a role in iron metabolism during stress erythropoiesis in response to iron deficiency. Future studies will be needed to define the exact role(s) of ZIP8 and at which stage it functions in erythropoiesis.

Inhibitory Regulation of Inter-Temporal Decision Making Across the Lifespan

This research project sought to determine if GABA(B)R signaling in the prefrontal cortex (PFC) or basolateral amygdala (BLA) is causally linked to inter-temporal decision making in young adults and changed by aging. We tested the effects of infusing GABA(B) R-directed drugs into the PFC or BLA of young adult rats performing a delay-discounting task, measuring choice between small (1 food pellet), immediate rewards and larger (4 pellets) rewards delivered after delays ranging up to 60s. As delay increases, young adult rats shift to favor the smaller, immediate reward. Infusion of a GABA(B)R agonist into either the PFC or BLA increased choice for the small, immediate reward independent of delay whereas infusion of GABA(B)R antagonist was without uniform effect. In a separate cohort of young adult and aged rats, we used PCR to measure expression of Gabbr1 and Gabbr2 mRNA in PFC and BLA. We found that expression of both isoforms was significantly lower with age in the BLA while changes in PFC were not significant. These findings suggest that GABA(B)R signaling in the BLA is critical to inter-temporal decision-making in young adults and may relate to changes with age.
A Second Generation GABA(B)R Antagonists Improves Working Memory in Aging

Loss of memory function that depends on the medial temporal lobe is well-documented in the context of normal aging and of Alzheimer’s drug development programs. However, frontal lobe-dependent executive functions, including working memory and cognitive flexibility, also decline with age. Therefore, there’s a need to identify therapeutics that can enhance cognition in aging without producing impairing side-effects. GABA(B) receptor (GABA(B)R) antagonists are expressed throughout both medial temporal and frontal lobes and GABA(B)R-directed drugs show promise to enhance function across brain regions and cognitive domains. This study investigated whether CGP63360, a second generation GABA(B)R antagonist, could produce enhancement of executive functions in aged rats when delivered orally. First, CGP63360 was observed to improve working memory performance of aged rats. Next, the same aged rats were used to determine that the dose of CGP63360 that enhances working memory does not affect cognitive flexibility. This indicates that CGP63360 is orally active and efficacious in remediating age-related working memory impairment within a given dosing range. Though not effective at improving cognitive flexibility, neither did CGP63360 produce impairing side-effects. Ongoing work will determine if CGP63360 at different doses or in combination with other therapeutics can produce a broader range of positive cognitive effects in aging.

Identification of a novel enhancer/chromatin opening element associated with high-level γ-globin gene expression

The human β-globin gene locus is located on chromosome 11 and constitutes five β-type globin genes that are organized in a manner reflecting their expression during development; an embryonic ε-globin gene located at the 5′ end, followed by the two fetal γ-globin genes, and the adult β- and δ- globin genes at the 3′ end. A novel DNase I hypersensitive site (HS) located 4 kb upstream of the Gγ-globin gene (HBG-4kb HS) was targeted as a candidate for affecting expression of γ-globin. In the human erythroleukemia cell line K562, this site is occupied by transcription factors USF1, USF2, EGR1, MafK, and NF-E2; and exhibits histone modifications typical of enhancer regions. A synthetic zinc finger DNA-binding domain (ZF-DBD) was generated to target the HBG-4kb HS. The HBG-4kb ZF-DBD interacted with the target site in vitro and in the context of cells with high affinity and specificity. Direct delivery of HBG-4kb ZF-DBD to K562 and primary human erythroid cells resulted in a reduced association of the transcription factors identified and active histone marks present at and downstream of the HS site. Reduction in γ-globin gene expression was observed following introduction of the HBG-4kb ZF-DBD. The data demonstrate that the HBG-4kb HS site affects fetal γ-globin gene expression and extrapolation suggests that the site may act by opening chromatin in a directional manner.
**Controlled Manipulation of Protein Phosphorylation and Cell Regeneration with Light-Responsive DNA Aptamer Reactions**

Most cells in the human body respond to growth hormone, which binds to cell surface receptors and induces growth and replication for those cells. This study is focused on receptor tyrosine kinase (RTK), a cell receptor of growth hormone that phosphorylates downstream proteins inside the cells, leading changes in certain protein expression level that allows for cell growth and replication. Utilizing this pathway has become one of the most popular fields in regenerative therapy, however, uncontrollable cell growth would be oncogenic. In this project, a DNA reaction was designed to realize light-responsive switch between the activation/deactivation of the RTK participated signal pathway. The activation of RTK pathway requires the close proximity of the two receptor subunits when bound with the growth factor, which would be achieved by using the DNA aptamers of the Met protein and the formation of the double-stranded structure. The introduction of the PC-linker would allow the feasible cleavage in the DNA structure, causing the disassembly of the receptor pair. The reaction was monitored with FRET and gel-electrophoresis in solution, and flow cytometry on the cell membrane. The phosphorylation of the proteins would be analyzed with western-blotting and other cellular experiments. This design would offer a feasible, fast, and simple platform for controllable cell regeneration.

**Data Storage: An Underexplored Driver in Nonprofit Fundraising Success**

The scant research on fundraising education suggests fundraisers likely receive little if any training in donor database systems. Ineffective record keeping could negatively impact the nonprofit. The purpose of this exploratory, pilot study is to identify a) what training, if any, do fundraisers have in a database management, b) what challenges do fundraisers encounter when trying to manage donor databases, and c) what functions, if any, fundraisers would like to be able to do with donor databases but cannot. Interviews were conducted with eight fundraisers in North Central Florida (total invited to participate=45; 18% participation rate). Findings suggest software training is mainly transmitted through a fellow employee or supervisor. Most participants felt comfortable with day-to-day tasks, and would rank their skills at an above average even though their actual usage of the software was less than sophisticated.
Risk Preferences, GPA, and Demographic Factors as Predictors in Student Course Selection

This study describes how course selection varies with risk preferences, GPA, and other demographic factors. Students were recruited through an introductory macroeconomics class for extra credit to take an online survey consisting of a course selection procedure, a 5-trial adjusting probability discounting task, and a demographics survey. When considering the entire analyzed sample, no correlation was found between student course selection and risk preferences, but results did indicate that males may prefer harder courses, and as students increase in year, they tend to prefer easier courses. Results were also evaluated to determine what happens when you separate out individuals who made unusual choices from the rest of the sample. Future studies should attempt to replicate these results and seek to improve how course selection decisions are modeled to better understand the methodology behind these choices.

The Regulation of the Calpain/Calpastatin System in Diabetes Associated Hypertension

Hypertension can present before or after the onset of diabetes but regardless, it is an important risk factor for end-stage kidney disease. Almost half of patients with hypertension experience salt-sensitivity due to the up-regulation of the Epithelial Sodium Channel (ENaC) which results in sodium retention. Calpain is a protease that cleaves the Myristoylated Alanine-Rich Protein C-Kinase Substrate (MARCKS) after the effector domain keeping it at the plasma membrane. MARCKS sequesters Phosphatidylinositol 4,5-biphosphate which allows ENaC to maintain an open confirmation. We hypothesized that calpain is up-regulated and its endogenous inhibitor, Calpastatin, is down-regulated in diabetes-associated hypertension allowing for the up-regulation of ENaC activity in the aldosterone-sensitive distal nephron. Calpastatin-CFP adenovirus was used to overexpress calpastain in mouse cortical collecting duct (mpkCCD) cells. Calpain activity, MARCKS protein expression, and amiloride-sensitive transepithelial current decreased in mpkCCD cells overexpressing calpastatin-CFP compared to control cells. mpkCCD cells cultured in high glucose to mimic hyperglycemia resulted in increased MARCKS expression compared to cells cultured in normal glucose. Compared to healthy wild-type mice, hypertensive diabetic db/db mice demonstrated increased MARCKS protein expression in kidney cortex lysates and in urinary exosomes. Our results show that calpain activity, MARCKS expression, and ENaC activity is augmented in diabetes-associated hypertension.
Solar Cooking for Disaster Relief

Solar energy is arguably the most abundant resource in the world and enabling people to utilize this resource can be a powerful tool in elevating the standards of living in developing countries and disaster struck areas. Solar cookers are relatively simple to construct and can be cheaply produced and distributed. They have great potential in disaster and humanitarian relief situations, like what occurred in Puerto Rico and other Caribbean islands after the recent hurricane Irma. A solar cooker is easy to use and relies only on sunlight to work. In areas with limited electricity, it could provide a sanitary and effective way of preparing food, thus helping prevent diseases and malnutrition. Further, the use of a solar cooker could potentially reduce air pollution and respiratory illnesses from traditional cooking fires that burn wood or charcoal. A solar cooker uses sunlight to directly generate heat and therefore has a very high energy efficiency. In a preliminary test, two liters of water were heated to a temperature of over 60 deg.C within an hour. While this result can be further improved with optimization of the cooker, this temperature would still be sufficient to kill harmful bacteria and prepare a safe meal.

Microbial Determinants of Clostridium difficile Infection

Clostridium difficile is a prevalent nosocomial pathogen affecting especially patients taking broad-spectrum antibiotics. High cure rates of patients treated with fecal microbiota transplant (FMT) for recurrent C. difficile infection (CDI) suggest microbes that colonize the human intestines play a key role in protection against C. difficile; however, the specific components are not well understood. This project aims to develop and demonstrate the feasibility of a C. difficile challenge gnotobiotic mouse model where gut microbiota can be manipulated to examine their role in protection against CDI. Materials and methods required for the proposed model, including rodent housing, isolation, sample collection, bacterial culturing and enumeration, strain selection of C. difficile, and oral gavage, were established and optimized. C. difficile strains 630 and VPI 10463 were tested, and a method of scoring the histology of the cecum and large intestine was developed. Using the VPI strain, we showed that oral gavage with 100μL of fecal samples from 3 human donors was sufficient to protect ex-GF mice against challenge with lethal VPI. In future studies, we will begin to restrict gut microbiota diversity via heat or ethanol treatment to identify a resistant fraction of the microbiome that may provide protection against C. difficile challenge.
The Architectural Joint of the Hand

In modern day architecture practice, the role of the hand in the design process has been displaced by the advent of new technology. There is an inherent desire in practice to rely fully on the computer, which within its digital parameters removes the direct connection of the architect’s hand from the creative process. To create meaningful architecture, it is imperative to understand that the relationship of the architect’s hand in the design process is as critical as the relationship of the architectural joint to the project. To understand the hand, I approached it architecturally and rigorously studied its form and structure. At the same time, I studied several sculptors and artists, such as Richard Serra, Eduardo Chillida, Robert Morris and Eva Hesse who concentrated on the process over the final product. I created section drawings of select pieces and analyzed them with hand motions to study their forms. With these analyses, I created a material joint that explored different ways to “hold” masses and “join” different materials. With my hand analyses and material joints, I have understood the level of the “joint” at different scales: from the hand that makes the architecture to the actual structure that holds architecture together.

Age at Initial Marijuana Use is Associated with Subsequent Opioid Use Age in a Sample of Younger Adult Treatment-Seekers

Background: The “gateway” hypothesis suggests use of certain psychoactive substances is associated with subsequent use of additional substances. Although evidence in the general population remains mixed, gateway effects are rarely examined among individuals in treatment. Recent trends in marijuana legislation and opioid abuse indicate the utility of examining relationships in use patterns between these substances.

Methods: The sample included 604 inpatients at substance abuse treatment facilities. Participants provided demographic information and substance use histories, including marijuana and opioid use milestone ages. ANCOVA models were developed to describe relationships between ages of initial marijuana use and ages of regular use of pain medications. Models were subsequently applied to three additional opioid use milestones. Results: Preliminary analyses suggested that earlier initial use of marijuana was associated with earlier regular use of pain medication, but revealed an interaction with participant age. Thus, participants were split into older and younger cohorts. Subsequent analyses revealed associations between marijuana use age and opioid use ages among younger participants. Among older individuals, these relationships were detected only for narcotics use.

Conclusions: While “gateway” effects of marijuana use may be difficult to detect at the population level, these effects appeared substantial in the current sample of opioid users.
**Effect of Dioxygen Exposure on Hydrogen Peroxide Production by Bacillus subtilis Oxalate Decarboxylase in the Absence of Substrate**

Oxalate decarboxylase is a manganese dependent enzyme that catalyzes the breakdown of oxalate into carbon dioxide and formate using dioxygen as a cofactor. The role of dioxygen in the enzyme’s mechanism is still under investigation, but it is proposed to prepare the enzyme for catalysis by facilitating Mn oxidation at low pH. In doing so, dioxygen is expected to be reduced to superoxide, which undergoes acid-catalyzed dismutation to form hydrogen peroxide. This hypothesis is supported by new evidence that the concentration of hydrogen peroxide produced by resting enzyme at low pH is significantly higher in dioxygen saturated conditions than in dioxygen limited conditions.

**Comparison of Molecular Dynamics Interatomic Potentials in the Prediction of Dislocation Mobility**

The motion of dislocations is the primary mechanism for plastic deformation in metallic materials. To study dislocation motion, molecular dynamics simulations are commonly employed. In this work, the mobility of dislocations is computed using various embedded atom method (EAM) interatomic potentials. The velocities of straight dislocations with different character angles are calculated under an applied shear stress at a constant temperature. At low shear stresses, the mobility of a dislocation is a linear function of the shear stress due to phonon drag for all EAM potentials studied. At high shear stresses, the mobility of a dislocation is a nonlinear function of the shear stress for screw dislocations. For edge dislocations using the Liu et al. EAM potential, the velocity is constant instead of increasing. At very high applied shear stresses, edge dislocations exhibit a sharp increase in velocity, which occurs at a different applied shear stress for each EAM potential. This study provides a foundation for a wider study on the influence of local stress state on the mobility of dislocations, where the choice of interatomic potential is necessary.
Building Cultural Awareness: The Impact of an Online Educational Resource on U.S. College Students’ Stigmas and Predetermined Stereotypes of International Students

International Student Transitioning: Creating Technological Solutions to Aid International Undergraduate Students in the United States (Boucaud 2016), focused on assisting international students with their transition to American college life and culture using a technology-based intervention. In contrast, my current research addresses American students’ perspectives of international students and the cultures they represent. This research will identify the ideas American college students have of their international peers. After this identification, these 'stereotypes' will be used to build an online tool (i.e. course) to build cultural awareness among American college students. On July 31st of this year, Diverse Issues in Higher Education, a news organization focused on recording the national news and academic happenings of diversity in higher education, published an article titled 'Colleges Urged to Be Inclusive of International Students'. This article discussed the urge from education organizations such as Education USA to ‘begin to think of international students more as part of the overall student population and not as a separate group’ (Abdul-Alim, 2017). This study not only delves into the predetermined ideas college American students have of their international student peers but actually creates an online technological product to address this issue by building cultural awareness in college environments.

Preliminary examination of CLARITY processed African Spiny and C57BL/6 mouse brain tissue: A side by side comparison

Neuroprosthetic devices have great potential to improve the lives of amputees and those suffering from neurodegenerative diseases; however, one of the primary limitations of these devices is the foreign body response elicited at the tissue-device interface. This immune response ultimately leads to scarring of the surrounding tissue and a loss of functionality at the interface post-implantation. Recent efforts to mitigate this response and improve the longevity of these devices have involved the study of the body’s immune response to the device and design of the device itself. Making devices smaller and more flexible can impact the foreign body response, but the immune response that follows implantation is still of concern. Previous studies have found that the African Spiny (AS) mouse exhibits unique regeneration compared to that of other mammals. Showing rapid tissue regeneration, complete with vascularization, adipose tissue, hair follicles, muscle and nerve fibers, the Spiny mouse’s regenerative features are of interest to us in understanding neuroregeneration in the context of neuroprostheses. This project seeks to investigate the differences in foreign body response between the AS and C56BL/6 mouse species. Using immunohistological techniques and CLARITY tissue clearing, our preliminary work examines baseline morphological differences between the two species.
Fake News: Right-Wing Media Watchdogs in the 1980s

This project explores the growth of right-wing media watchdogs in American popular culture during the 1980s. While scholars have written extensively on popular right-wing media like Fox News, few have explored the right-wing media groups that precipitated politically-right networks. The growing popularity of these right-wing watchdogs in the eighties, and the favor they curried with the Reagan Administration, provides new insight into how these groups have influenced the U.S. and their lasting impacts today. I focus on the growth of three popular right-wing media watchdogs in the 1980s: Accuracy in Media, MediaWatch, and Media Bypass. Operating in tandem, under the guise of being non-partisan, these groups launched grass-roots campaigns to engage Republican citizens in actively challenging mainstream media. Once these groups gained significant power, marked by AIM producing and airing their own documentary about the Vietnam War on PBS, they began to gain political influence. By 1992, Patrick Buchanan launched his own watchdog newsletter, From The Right, and subsequently announced his candidacy for President. Buchanan’s coopting of the watchdog media model represents the mixture of politician and media outlet, which I claim has caused lasting effects on the American political landscape.

Stress-inducible retinal neuroprotective pathways and microglial phenotype depend on Toll-like receptor 2

Retinal degeneration is a common cause of irreversible blindness and involves the death of photoreceptors. Retinal degeneration often proceeds slowly, and useful vision remains in humans for many years. Studies have shown that stressed photoreceptors will cause retinal glial cells to secrete neuroprotective factors that slow the pace of degeneration, a process known as endogenous neuroprotection. During this process, stress-inducible endogenous neuroprotective pathways are constantly active, protecting photoreceptors from degeneration. Many of these pathways are dependent on Leukemia Inhibitory Factor (LIF), and the downstream activation of STAT3, two well-established neuroprotective factors. As LIF is induced at the onset of degeneration, we hypothesized that LIF induction depends on the recognition of damage associated molecular patterns (DAMP’s) via DAMP receptors. Toll-like receptor 2 (TLR2) is widely known to recognize DAMPs, and is a good candidate for regulating LIF expression. In this study, we show that TLR2 is necessary for protective stress responses and for normal microglial activation following stress.
The Unequal Impact: Race, Finances, and Mental Health Care Utilization

The current study seeks to examine the influences of race, specifically Black and White, as well as financial and insurance related predictors on the total number of patients receiving 24-hour inpatient hospitalization mental health care. An interactionist perspective was taken, with the hypothesis that race has a more significant effect when both race and finances are predictors. A regression model was created, including as independent variables the amounts of black, white, male and female patients, along with yes/no answers to the three dichotomous finance related predictors about a facility: accepting Medicaid, offering treatment at no charge, and utilizing a sliding-fee scale. The dependent variable was the total number of patients receiving 24-hour inpatient hospitalization mental health care at a facility. The model is significant and explains a majority of the variance in the total number of inpatients. The race and gender based predictors are very strongly significant, and none of the finance based predictors are significant. Further research should explore why race plays such a role in 24-hour inpatient hospitalizations so that interventions can be developed to make sure that patients are truly receiving care relevant to their symptoms.

Inadvertent Hypoxic Gas Mixtures during Low Flow Anesthesia, including High Fire Risk Cases

Anesthesia providers set fresh gas flow (FGF) and fraction of delivered oxygen (FDO2) on anesthesia machines based on patients' particular conditions, phase of the case, procedure type, surgical fire risk and preference. Surgical fires constrain FiO2 to ≤ 0.3 (30% O2); thus air (0.21) is sometimes used. Low FGF is attractive for its economic and ecological benefits. We explored whether low flow anesthesia at FDO2 0.3 or air (FDO2 0.21) results in inadvertent delivery of hypoxic inspired mixtures (FiO2 < 0.21) in the Aestiva (GE Healthcare, Madison, WI) anesthesia machine, and performed experiments to evaluate the FGF ≥ MV (minute ventilation) heuristic to prevent rebreathing as a secondary outcome. With FDO2 at 0.3 instead of air, significant dips in FiO2 also resulted in hypoxic inspired mixtures. Our results confirm (a) that the minimum FGF administered to a patient must be equal to or greater than MV to avoid rebreathing and (b) that FGF ≥ MV prevents delivering a hypoxic inspired gas mixture when the FGF is air.
Integration of Three-Dimensional, Mesh Generation into Florida Object Oriented Device, Process and Reliability Simulator

A three-dimensional, mesh generation feature was needed in Florida Object Oriented Device, Process and Reliability Simulator (FLOOXS) to run simulations more effectively. TetGen was tested utilizing sample structures that were result from the processing of Josephson Junctions. It was then determined that the features of the program were deemed capable of performing the necessary functions that were desired. TetGen was used to generate tetrahedral meshes with output files of .NODE and .ELE formats. These files were then converted utilizing C++ into coordinate and tetrahedral objects that are consistent with the necessary input formats of FLOOXS. Next steps include full implementation of mesh generation within source code, allowing for bidirectional information between FLOOXS and TetGen. Results will allow for improved visual representation of material during simulation, allowing for more effective communication of information.

The Effect of Music on the Behavior of Students with Autism

Autism is a neurodevelopmental disorder that affects one out of 68 children. Individuals with autism commonly exhibit difficulties in social interaction and deficits in communication. At the root of these difficulties is the tendency for individuals with autism to exhibit difficulties in imitation. Previous research has indicated the benefits of music interventions for improving social behaviors and linguistic ability in children with autism. However, while some literature exists regarding the effects of non-therapeutic musical engagement, it is largely centered around clinical applications of music, particularly music therapy. The purpose of this study was to examine the effects of non-therapeutic musical engagement on the behavior of students with varying severities of autism, employed in a music education setting. A participant observation methodology is being utilized, and observational data is analyzed via a directed content analysis method. Results to date indicate the potential for non-therapeutic musical engagement to improve symptomatic behaviors including joint attention, rhythmic imitation, prosodic imitation, and attuning, among students with autism in a musical context.
**The Role of SH2B3 in Type 1 Diabetes**

The hereditary cause of Type 1 diabetes (T1D) is linked to approximately 50 genes, including several that encode proteins whose purpose is to control the immune system. One of these immune genes, SH2B3, encodes the protein Lnk. Lnk regulates intracellular signaling pathways of immune cells including macrophages. Specifically, Lnk controls the strength of the signal that macrophages receive from other cells in the form of soluble signaling proteins called cytokines (or growth factors). Lnk is a negative regulator, so its job is to reduce the signal received from cytokines. We proposed that Lnk plays a key role in regulating how macrophages respond to cytokines in T1D.

There are two versions of the SH2B3 gene. The two alleles differ only in a single nucleotide resulting in a different amino acid at position 262. The protective version of Lnk has arginine (R) at 262 [Lnk-262R], but the T1D risk version has tryptophan (W) at 262 [Lnk-262W]. A cluster of macrophage activation genes are regulated by signaling pathways that interact with Lnk. These genes, STAT1, STAT2, STAT3, STAT5, IL12A, IL12B, JAK1, JAK2 and SH2B3 itself, would be expected to be expressed at higher levels in the absence of Lnk. Thus, we predict that the risk version of SH2B3/Lnk will result in higher expression of these genes, thus leading to unwanted macrophage activation in T1D. My project will test the predicted association between SH2B3/Lnk variants and expression of genes that regulate macrophage activation.

**Devising a Royalty Structure That Fairly Compensates a Franchisee for Its Contribution to Franchise Goodwill**

Franchise relationships become vulnerable when the distribution of goodwill comes into question. In disputes, a party to the agreement will make assertions according to what it wants out of the particular fight rather than facing the truth of the relationship. This has culminated in a fog around the nature of franchise goodwill. A franchise royalty structure could incorporate goodwill as a rigid part of the business and thereby make it transactable and understandable. The franchisee could benefit from fair compensation for its contribution to franchise goodwill. The franchisor could also benefit; by mathematically determining the level of a franchisee’s contribution to franchise goodwill, a franchisor could identify its free riding franchisees. A variable royalty structure could fluctuate according to a franchisee’s goodwill contribution (falling with contribution and rising with free riding). Part I of this research dissects the problem posed to the industry and relevant law. Part II details the franchise royalty structure and how it might be manipulated to accommodate goodwill. Part III discusses potential benefits, i.e., legal consistency and franchisee performance consistency. Part IV presents mathematical understandings of goodwill that may guide goodwill monetization to make it a transactable part of the business via the royalty structure.
The Effect of Prescribed Burning on Founding Queens

Ants are important to a forest community. They help disperse native plants, and control populations of other arthropod species. Prescribed burns are an important tool for forest management. They reduce the likelihood of uncontrolled forest fires by clearing out scrub and promote germination of native plants. However, there is little data about how prescribed burns affect the arthropod community. In this research, we looked at how prescribed burning affects founding queen habitat choice. To address this, we collected leaf litter samples from a longleaf pine plot, both before and after administering a prescribed burn to half of the plot in July 2017. Samples were collected along ten transects in each treatment (burned vs. unburned) both prior to and after the prescribed burn. Ten samples, consisting of 1 m² of leaf litter was collected every 5m along each 50m long transect. Queens present in samples were separated and identified to species. We tested the effect of the prescribed fire on number of total queens and queen species richness using separate one-way ANOVAs, with transects as blocks. While the results are not statistically significant, there is a trend showing greater queen number and species diversity of queen in the unburned plots.

How the Menstrual Cycle Impacts Women with Physical Disabilities; A Qualitative Study

The aim of this study is to gain a better understanding of the menstrual cycle and the impact on women with physical disabilities. The design of the study will be a qualitative research, by conducting an interview. The method of this study will be to interview women with physical disabilities from the ages ranging from eighteen to sixty, who have experienced a menstrual cycle. From previous research, there was a literature gap being that it focused on females with intellectual disabilities and not physical disabilities. Throughout history, one’s menstrual cycle was considered a taboo, which leads to lack of knowledge, awareness, and an overall health disparity. (Bushak, 2016) In today's society, the access to feminine hygiene products is difficult and expensive. Women spend about $18,171 over their lifetime to aid their menstrual cycle. (Kane, 2015; Altundag & Calbayram, 2015) For the participants in my study, I will be aiding them with a care package for their next menstrual cycle to reduce this health disparity. The results of this research would be for one to gain a better understanding and have awareness of the impact of the menstrual cycle on females with physical disabilities.
Effect of Common Salt Marsh Invertebrates on Ecosystem Productivity

In Southeastern United States salt marshes, spatial overlap of smooth cordgrass and ribbed mussel aggregations drive patterns in invertebrate diversity and primary production, decomposition, sediment accretion and other ecosystem functions. However, it is unclear whether increases in ecosystem functions, like primary production, that are observed on mussel aggregations are driven by the mussels themselves or the invertebrates they facilitate. We therefore conducted a field experiment to test how mussels and other common invertebrates mediate cordgrass growth and benthic algae biomass. We hypothesized that cordgrass biomass would be most dramatically enhanced where burrowing marsh and fiddler crabs overlapped with mussels due to their complementary effects on enhancing soil oxygen and nutrient availability and that the presence of fiddler crabs and snails would counteract the positive effects on benthic algae production. Our findings have important implications for understanding how interactions among common invertebrates mediate the productivity and blue carbon storage capacity of these coastal landscapes.

Priming Effects of Internet Search Results on Patient Knowledge of Thyroid Cancer Risks

Background. Thyroid cancer starts with a nodule, most of which are benign. In fact, about 30% of women are likely to get one in their lifetime. The news about a thyroid nodule might prompt thinking about cancer, and exposure to online health information can further amplify risk perceptions. For this exploratory study, we were guided by the social risk amplification framework and the following research question: To what extend online information sources about thyroid nodule prime health consumers to think about cancer.

Method. We conducted a content analysis of online information sources. First, we collected top 20 Google search results for “thyroid nodule.” Then, we used Nvivo analytic software to code data for the occurrence of terms nodule, cancer, biopsy, and surgery.

Results. Both words nodule and cancer appeared in all documents. "Biopsy" was in 60% of the search results. "Surgery" appeared in 75% of search results.

Discussion. These preliminary results show that health consumers learning about thyroid nodules will be primed to read about cancer. Furthermore, they will be exposed to invasive diagnostic and treatment options. Future studies should provide qualitative assessment of the descriptions of thyroid nodule risks and investigate audience engagement with information through page comments.
PRESENTER(S): Chen, Anthony
AUTHOR(S): Anthony Chen, Dennis Kramer
FACULTY MENTOR: Dennis Kramer

Following The Money: The Effect of Benacquisto Scholarship on Florida Post-secondary Institution Selection

In the year of 2014, the Florida Legislature implemented a new scholarship program for the graduating class of 2013-2014 and subsequent graduating classes. The Florida Incentive Scholarship, since renamed the Benacquisto Scholarship, was designed with the intention of retaining the top performing members of Florida graduating classes within Florida postsecondary institutions. Recipients of this scholarship receive an award equal to the institutional cost of attendance for an in-state student at one of six Florida colleges. The Benacquisto scholarship is a merit-based scholarship and is awarded to all seniors who are designated as National Merit Finalists by the National Merit Scholarship Corporation. This project seeks to answer two overarching questions: to what extent has the implementation of the Benacquisto Scholarship increased retention of Florida national merit finalists and to what extent does the presence of the Benacquisto scholarship affect graduating class characteristics such as GPA, SAT Score, PSAT Score etc. To this end, we will test for association between the Benacquisto scholarship’s implementation and any significant changes that have occurred to the characteristics of Florida’s high school graduating classes.

PRESENTER(S): Chen, Davie
AUTHOR(S): Davie Chen, Julio Duarte
FACULTY MENTOR: Julio Duarte

Relationship between NOS Gene Methylation and Heart Failure Outcomes

The nitric oxide synthase (NOS) genes play a key role in synthesis of nitric oxide, an important signaling molecule in the cardiovascular system. DNA methylation regulates gene expression and its regulation of NOS genes could impact heart failure (HF) outcomes. The aim of this project was to explore the relationship between DNA methylation and clinical outcomes in HF patients. Clinical data from the University of Illinois at Chicago Heart Failure Database, along with DNA methylation data obtained from Illumina Human Methylation 450K array were used in various survival analyses. The NCBI database and UCSC Genome Browser were used to determine the loci of the NOS1, NOS2, and NOS3 genes, with an additional 500kb on each end. In both the NOS1 and NOS2 gene regions, there does not appear to be an association between mean methylation and HF outcome, with neither having an adjusted p-value less than 0.05. However, the NOS3 region seems to show a possible trend in hospitalization outcomes (hazard ratio: 0.0001406 P=0.09) and death/hospitalization combined outcomes (hazard ratio: 0.0001743 P=0.08). Our data suggest that regulation of NOS3 expression by DNA methylation may play a role in adverse cardiovascular outcomes in HF patients, but further validation is needed.
A Comparative Genomics Approach to Understanding the Roles of P53 Binding Sites

Cancer is one of the leading causes of mortality worldwide, with over 8 million deaths per year. In more than 50% of cancers, the transcription factor P53 serves as a tumor suppressor which exerts anti-proliferative functions in response to oncogenic stressors. Through ChIP-Seq analysis, thousands of P53 binding sites in mammalian genomes have been identified, yet the functionality of these binding sites remains to be established. It is hypothesized that mutations or epigenetic silencing of non-coding regulatory sequences of P53 target genes play an extensively important role in cancers. By using Drosophila as a model organism, a comparative genomic approach to identify functional P53 binding sites is proposed. To do this, a library of significant P53 binding sites must first be established by looking at data obtained from RNA-seq and comparing them to our ChIP-Seq data. Next, CRISPR-Cas9 will be used to generate Drosophila models containing mutations in the P53 binding sites near the pro-apoptotic genes Hid and Rpr. Selected adult flies containing the CRISPR-Cas9 induced mutations will undergo irradiation induced DNA damage to assess their functional importance. By using this approach we will discover functional roles of non-coding regulatory regions in tumorigenesis and contribute to apoptosis inducing cancer therapies.

Class Dynamics in the Gulf Cooperation Council: Examining Kuwait, Bahrain, and Saudi Arabia

This paper will conduct a class analysis of the Bahrain, Kuwait, and Saudi Arabia as they exist in 2018. The current scholarship on the countries of the Gulf Cooperation Council (GCC) has neglected class as a means of analysis. By undertaking an analysis of the above three GCC countries through a class framework, the relevance of class as an effective tool of analysis within the Gulf context will be demonstrated. It is this paper’s task to re-introduce the concept of class to scholarship on the Arab Gulf, by creating a theoretical framework informed by historical data. This can be used to interpret contemporary data and draw conclusions about class dynamics and greater sociopolitical and economic dynamics in the Gulf. A definition of class and its theoretical background will first be established. Then the historical class structure of Bahrain, Kuwait, and Saudi Arabia will be traced, leading to an analysis of the contemporary class structure of the countries. Finally, the political implications of such a class analysis will be discussed.
Experimental Investigation of Ferrite-Core Antennas for Wireless Power Transmission

As the size of contemporary electronics continuously shrink, batteries continue to occupy larger portions of devices. An alternative method to powering these devices is wireless power transfer (WPT). The use of a WPT receiver system could potentially offer a size reduction when compared to batteries, however conventional inductive and resonant power transfer systems are difficult to miniaturize with the current approach. One potential solution is the use of ferrite cored antennas. Experiments with inductors using cylindrical ferrite cores were conducted to examine this solution. The ferrite antennas were successfully used to harvest power from a commercially available transmitter. Experiments measured performance of the receivers in terms of their maximum power draw and efficiency. Results showed that an antenna using a ferrite core could draw multiple watts of power at or above 50% total system efficiency with a commercially available WPT demo board operating at 6.78 MHz. Additional tests concerning the performance of antennas with varying core sizes and distance from the transmitter were also performed. Results indicate that ferrite antennas can potentially miniaturize WPT receivers, however they are still susceptible to the current limitations of the technology such as distance and orientation.

Methods, Techniques and Approaches to Post-War Architectural Reconstruction

This Research explores and evaluates similarities and differences between techniques and approaches to post-war architectural reconstruction. Moreover, the Research focuses on greater public reaction, understanding, acceptance and interaction with new design solutions, especially considering the population who was familiar and emotionally connected with the pre-war design. The main empirical method this research uses through case study by examining a variety of different architectural structures that were reconstructed after the armed conflicts. The Research is not limited to a single time period or a single geographical zone, but is rather combining the findings from various different cultural and regional environments. Case study examples include the examination of Dresden Frauenkirche (Germany), Atomic Bomb Dome (Japan), Neues Museum (Germany), Old Bridge (Bosnia and Herzegovina) and Cadiz Castle (Spain). The Study strives to extract the guiding principles of reconstruction, sorting them into several different overall techniques such are: faithful reconstruction, intervention, patching, passive monument creation and combination of these techniques. However, the research does not favor one technique over the other, but is rather offering a critical overview of their implementation and suitability for reconstruction by considering given cultural and social circumstances.
ATG and Antigen Combination Therapy in Type 1 Diabetes

The purpose of this study is to test a biomaterial based vaccine as a Type 1 Diabetes prevention method, using the mouse model of human Type 1, the Non Obese Diabetic (NOD) mouse. The study employs a polymer based micro particle, surrounded by a hydrogel matrix, which is used to release a combination of ATG and denatured insulin through a subcutaneous injection. This combination therapy should lower the incidence of diabetes in the mice treated by depleting disease-causing T cells at the same time as insulin is introduced, stimulating tolerance induction and preventing the onset of diabetes, which usually occurs between 12 and 20 weeks in the NOD mouse.

This study found that the expected results did not occur and that the group treated with the ATG/insulin combination therapy did not show a significant reduction in diabetes incidence when compared to the control group. We suspect this error came from the ATG drug received for this project being ineffective. Further studies will employ an analogous hydrogel surrounded micro particle that will use a combination of insulin and anti-CD3, which is a drug that is shown to stimulate a tolerant response similar to that induced by ATG.

Effect of Kinase Inhibitors on DAXX and FASN Localization in Triple-Negative Breast Cancer

Triple-negative breast cancer (TNBC) is characterized by its lack of estrogen receptors (ER), progesterone receptors (PR), and human epidermal growth factor receptor 2 (HER2) amplification. Patients with this aggressive, invasive form of breast cancer (BC) have a nearly one in three chance of relapse within five years of chemotherapy. The poor prognosis associated with TNBC acts as an impetus for researchers to discover better, more targeted treatment options, one method of which is using the TNBC cell line MDA-MB-231 (a p53 mutant, Rb wildtype line) to investigate the effects of various novel small-molecule kinase inhibitors. Kinases are involved in phosphorylating a large variety of molecules active in signaling transduction pathways, the cell cycle, and apoptosis, or mediated cell death. In particular, inhibitors to certain kinases act on the cellular localization of two proteins of interest: death domain-associated protein 6 (DAXX) and fatty acid synthase (FASN), and as a result, the proliferative abilities of TNBCs.
Assessment of Diffusion Mobilities in HCP Mg-Li-Al Alloys

Software such as ThermoCalc is commonly used in alloy design as a database of information for different alloy systems. This study focuses on generating data about the kinetics of Mg-Li-Al systems to be made more accessible using such software for future alloy design using this system. Samples of Mg, Mg-Li, Mg-Al, and Mg-Li-Al were first analyzed using inductively-coupled plasma (ICP) optical emission spectra (OES) to determine the absolute composition of the alloys. Diffusion couples were formed between samples of Mg//Mg-Li, Mg-Li//Mg-Li-Al, and Mg-Al//Mg-Li-Al. Then, electron probe microanalysis (EPMA) and auger electron spectroscopy (AES) were used to analyze line scans across the diffusion profiles in each diffusion couple.

Judging Validity & Reliability of Health Information Online

Health information can be very helpful but with so much information online it may be hard to distinguish accuracy. Previous research has suggested that many people are relying on their personal knowledge to find valid and reliable sources (Nagy & Freifeld, 2014). People tend to research vague symptoms to find illness or diseases not known to them, and they may fall victim to faulty research techniques and the inability to judge validity and reliability. The aim of this study is to understand the thought process internet users are using to judge the validity and reliability of online health information. The participants explained the process of how one chooses the most valid and reliable source on the Internet. This research develops a set of useful guidelines for future internet searchers to use when finding health information on the internet and judging its reliability. This study will inform internet users how to understand inaccuracy in health information found online and how to find accurate health information online.
Assessing dietary shifts in Burmese Python (Python bivittatus) within southern Florida

Globally, invasive species are quickly coming to the forefront of ecological studies and conservation. The Burmese python (Python bivittatus) is a well-known and established invasive species in southern Florida that is affecting biodiversity. Burmese pythons in Everglades National Park, an area with a well-established population, are linked to the severe mammal declines seen in the region. Due to these changes in available prey species, we expected to find temporal and spatial shifts in prey species composition in the python diet. Data on Burmese python diet have been collected through necropsies of individuals collected throughout southern Florida, from the southern end of Everglades National Park, north to southwest Naples. Prey species from the digestive tract contents of 715 individual pythons collected from 2009 to the present have been identified. We used these data in comparative statistical analyses to evaluate temporal and spatial shifts in prey species composition. Prey species range from Hispid Cotton Rats (Sigmodon hispidus) and Great Egrets (Ardea alba) to Alligators (Alligator mississippiens) and Bobcats (Lynx rufus). A better understanding on how invasive pythons use prey biodiversity as they expand their range and establish new populations is essential to long-term management of threatened and endangered species within this landscape.

Impact of Socioeconomic Status and Adverse Childhood Experience on Food Choice: A Literature Review and Methodology

Low socioeconomic status (SES) is a risk factor for Adverse Childhood Experiences scores (ACEs). Strong correlation between ACEs and subsequent health outcomes, including disordered eating, obesity, and behavioral risks, has been established and documented. However, much of this data consists of self-reported eating behavior, which is frequently under- or misreported. Moreover, the mechanism by which this occurs has had limited investigation. This project aims to lay a framework regarding disordered eating behavior and caloric intake in experimentally-manipulated social status conditions amongst Hispanic adolescents. This study is unique in that it employs a stress paradigm that enables the quantification of objectively measured caloric intake during high- or low-stress social status conditions. This data can then be analyzed both to determine the extent to which ACEs predict specific food choices, and to characterize the relationship between ACEs and disordered-eating behavior in Hispanic adolescents. Because research is ongoing, this presentation will consist of a discussion of experimental methodology and a review of scientific literature in order to contextualize experimental efforts and results.
High Impact Practices and Non-cognitive Outcomes: Beyond Retention and Grade Point Averages to a Motivated and Engaged Citizenry

College Learning for the New Global Century (AAC&U, 2007) suggested meaningful 21st century educational experiences, or high impact practices, can lead to positive learning and development outcomes. Research indicates positive effects on persistence, degree completion, and academic achievement with regard to these practices, especially for students from underserved populations. Yet, the goal of college education might be to impact all students in less easily quantifiable ways. This research explored the effect of high-impact practices on creating a skilled, knowledgeable, and compassionate citizenry by examining students' self-esteem, self-efficacy, motivation and intent to positively impact the world post-graduation. Two hundred thirty-eight students from a major public university and representing different disciplines participated in this survey research. The results suggest differential effects of high impact practices on these variables. Studies on the less visible effects of the curricula can inform university practices in preparing students for the new global century and civic engagement.

Bowel Habits and Quality of Life Differ Between Two Phases of the Menstrual Cycle

Little is known as to how the menstrual cycle affects gastrointestinal function and quality of life (QOL) in young, healthy women. This study sought to characterize gastrointestinal function and symptoms and digestion-associated QOL (QOL-DA) during two phases of the menstrual cycle (menstrual phase, days 1-3; mid-luteal phase, days 21-23). Healthy women aged 18-35 years (n=54) who took oral contraceptives were recruited for the 5-week observational study. Stool frequency (number of bowel movements/3-day phase) and average consistency measured by the Bristol Stool Scale (BSS) were assessed daily. The Gastrointestinal Symptom Rating Scale (GSRS) and an in-house survey measuring QOL-DA were completed weekly (higher scores correlate with lower QOL). The median (25%, 75%) proportion of stools above a BSS score of 4 (looser stools) was 0.33 (0.00, 0.52) during the menstrual phase versus 0.06 (0.00, 0.33) during the mid-luteal phase (p=0.029). The median QOL-DA score during the menstrual phase was 18 (12, 28) versus 14 (10, 19) during the mid-luteal phase (p=0.031). Stool frequency and GSRS scores were not different between phases. Bowel habits appear to differ between phases of the menstrual cycle and suggest a lower QOL during menstruation. Further characterization is needed to determine to what extent QOL is affected.
**PRESENTER(S):** Contreras, Joyce  
**AUTHOR(S):** Joyce Contreras, Giselle Rosel, Xinxin Zhu, Hongen Zhang, Qingping Yang, Daniel Gibson and Gregory Schultz  
**FACULTY MENTOR:** Gregory Schultz

**Reduction of Planktonic and Biofilm Bacteria in Pig Skin Explant Model by Topical LAE Formulation**

Evaluated the effects of novel formulations containing lauryl arginate ethyl ester (LAE) on killing planktonic bacteria and mature biofilms of bacteria grown on an ex-vivo model of chronic skin wounds. Sterile porcine skin explants with deep partial thickness wounds were inoculated with 50ml of Pseudomonas aeruginosa (PA01) or Staphylococcus aureus (SA113) suspension culture containing 4x 10^6 CFU then incubated at 37°C for 30 min followed by exposure to one of four treatments (PBS, Vehicle gel, 5% LAE gel and 1% LAE gel). Total bacterial CFU measured after 24 and 48 hours of incubation at 37°C. Inoculated explants were cultured for 3 days at 37°C to develop mature biofilms then wiped with sterile gauze and exposed to the same four test treatments, and total biofilm bacterial CFU were measured after 1, 2, and 3 days of exposure. The 1% LAE reduced the levels of total PA01 bacteria about 2-logs by day three, while completely killing the biofilms from the first day. The 5% LAE formulation totally kills planktonic and biofilm of PA01 and SA113 bacteria on day two and three, while the 1% LAE formulation is less effective.

**PRESENTER(S):** Cook, Tyler  
**AUTHOR(S):** Tyler Cook, Keith Willmott  
**FACULTY MENTOR:** Keith Willmott

**A Morphological Study to Resolve Species Limits in Taygetis laches and Relatives**

The Amazon and Central America have a diverse fauna of butterflies in the satyrine genus Taygetis. The goal of this project was to identify genitalic and wing pattern differences for reliable species identification and correct application of existing names, through dissection and study of specimens from the Neotropics. Dissection of the male genitalia, which often differs between closely related species of butterflies, revealed species-specific patterns such as spine-like hairs on the valvae and a thicker base to the brachia in some species. West of the Andes, five preliminary groups became apparent based on genitalic and re-examined wing pattern characteristics. East of the Andes, three preliminary groups were sorted based on genitalic characteristics. Among these eastern groups, two had spine-like hairs present on the valvae with the third lacking this characteristic. These hypothesized groups differed from those based initially on wing pattern, and this study should help pinpoint reliable characteristics for species identification. Further research is underway to refine diagnostic characters, integrate morphological and DNA sequence data, apply existing names, and identify whether any species will need farther description. Results will enable museum curators and field workers to have a better understanding of species diversity and identification of these poorly-known butterflies.
Gender-Specific Adaptations of Diaphragm Myofibers in a Murine Model of CMT1A

Charcot-Marie-Tooth disease type 1A (CMT1A) is a hereditary peripheral neuropathy characterized by progressive demyelination and distal muscle weakness. Abnormal expression of peripheral myelin protein 22 (PMP22) has been linked to CMT1A and is modeled by Trembler J (TrJ) mice, which carry the same leucine to proline substitution in PMP22. More recently, patients have expressed discomfort and difficulty during sleep suggesting disease involvement of the respiratory system. Here, we performed analysis on the diaphragm from normal (WT) and TrJ mice to determine the impact of CMT1A disease progression on the primary inspiratory muscle. Analysis of diaphragm myofiber morphology was performed in adult (male/female; N=5/group) WT and TrJ mice. CSA for TrJ (m) was significantly higher than CON (m) (p<0.0001). In comparison, overall CSA difference was not statistically significant between TrJ (f) and CON (f). Compared to CON (f), TrJ (f) animals display a lower frequency of small caliber fibers (<60um) and a right shift in myofiber size is revealed in TrJ (m) compared to CON (m) animals. Our findings in Trembler J mice expand the target(s) of disease pathogenesis to more critical systems (i.e. respiratory) and warrant further elucidation of potential dysfunction as a result from PMP22 overexpression.

The Effects of Cosmic Radiation on Seeds

As the bounds of human exploration continue to expand outwards, longer missions through deep space are becoming more realistic. However, due to spatial and mass limitations, this travel will require a productive and self-sustaining food source. Live plants provide crew members with fresh, nutritious food, along with improved air quality and comfort. However, such an environment presents several obstacles to plant growth, including microgravity, hypoxia, hypobaria, and, at the forefront, ionizing radiation. Galactic Cosmic Radiation comprises high energy, high charge (>2+) ions causing genomic damage and phenotypic abnormalities. The Cosmic Radiation Exposure System for Seeds (CRESS) project seeks to explore the effects of ionizing radiation on seeds of Arabidopsis Thaliana. A tray of 250,000 seeds was sent to the Brookhaven National Lab and exposed to heavy ion radiation. Following exposure, seeds were planted on media in conjunction with a control group, and screened for phenotypic aberrations after a 14-day growth period. Irradiated seeds showed both a significantly lower germination rate and a higher frequency of microgrowth (p < .05). The overall frequency of phenotypic abnormalities was also higher in the experimental group (p < .05), suggesting that further research is necessary to understand the protection of biological material through space.
Using a Recursive Kernel Learning Machine for Low-Sample Face Detection

Many machine learning algorithms, like Convolutional Neural Networks (CNNs), have excelled in image processing tasks; however, they have many practical limitations. For one, these systems require large datasets that accurately represent the sample distribution in order to optimize performance. Secondly, they are unable to transfer previously learned knowledge when evaluating data from slightly different sample distributions. To overcome these drawbacks, we propose a recursive kernel based approach for image processing using the Kernel Adaptive Autoregressive Moving-Average algorithm (KAARMA). KAARMA minimizes the amount of training data required by using the Reproducing Kernel Hilbert Space to build inference into the system. The recursive nature of KAARMA additionally allows the system to better learn the spatial correlations in the images through one-shot learning. We demonstrate the usefulness of KAARMA for low sample image classification on a small face dataset consisting of 10 Japanese face models expressing a variety of emotions.

Group Diversity's Impact on Individual Decision-Making Under Conditions of Uncertainty

This research uses social identity theory to understand how the degree of group diversity and individual motivation to conform impacts individual conformity and cognitive dissonance (McKimmie, 2015; Milch, Weber, Appelt, Handgraaf, & Krantz, 2009). Results from previous research suggest that factors such as requirements for consensus, forcing a decision, and group interaction all impact conformity and resulting cognitive dissonance (Matz & Wood, 2004; Fontanari, Bonniot-Cabanc, Cabanc, & Perlovsky, 2017). Our hypotheses are that individuals making decisions as part of a group exhibiting a high degree of homogeneity will be more likely to conform and will feel a greater level of cognitive dissonance as a result. Our objectives are to 1) measure the impact of group diversity on an individual’s conformity to group opinions, 2) identify individuals' reasons for conformity, and 3) identify whether an individual’s motivation to conform and the amount and type of diversity in the group affect cognitive dissonance. We are collecting data from student organizations at general body meetings. Students engage in a decision-making activity in groups to measure conformity and then evaluate their choice. Data collection procedures are currently underway; preliminary data analysis suggests results have implications for organizations promoting diversity to foster creativity and innovation.
Weathering Intensity and Geochemical Comparison Between Two Distinct Regions in Western Greenland

As glaciers advance, fine-grained sediment is created with the potential for increased chemical weathering due to augmented physical weathering. These sediments can contribute nutrients, solutes, and radiogenic isotopes to the world’s oceans, which could impact atmospheric CO2 exchange, primary productivity, and records of past ice sheet activity. Previous studies demonstrate weathering variations across watersheds in western Greenland that are attributed to either exposure age or precipitation. This study adds a new region farther south that has higher precipitation, different lithology, and a range of exposure ages. Using bedrock, bedload, and water samples major and trace element geochemistry has been evaluated. The analysis illustrates that the bedload composition is variable, reflecting the heterogeneity of the bedrock. Water analyses suggest preferential weathering of trace carbonate minerals that release the Mg and Ca ions. The weathering indices show that weathering is more variable inside each watershed than between watersheds. In order to better understand differences in weathering between watersheds, other cations should be evaluated that potentially change in greater extents.

Overexpression of MIST-1 in Mesenchymal Stem Cells Induces Amylase Expression

Saliva produced by salivary acinar cells provides biological functions critical for oral health. Patients with Sjögren’s syndrome or radiation therapy for head and neck cancer suffer from extreme dryness of the mouth due to acinar cell loss. Mesenchymal stem cells (MSC) have provided a promising tool to regenerate damaged organ tissues. Previous research identified six key transcription factors expressed in differentiating mouse MSCs into salivary precursors in a co-culture system. The aim of this study was to examine the roles of Muscle, Intestine and Stomach Expression 1 (MIST-1), in the induction of salivary precursor cell markers in MSCs. cDNA of MIST-1 was amplified by PCR with primers that contain sequence for XhoI and HindIII restriction sites at 5' and 3' ends, respectively. MIST-1 cDNA and pcDNA3.1/BioID/Myc vector (Addgene) were digested with the restriction enzymes. The purified MIST-1 cDNA was cloned into the vector by ligation. Positive E. Coli colonies were selected after transformation. MSCs were transfected with the correctly ligated-plasmid DNA. cMyc-tagged MIST-1 recombinant protein expression was detected in the nucleus by immunocytochemistry. Amylase, which serves as an acinar cell marker, was expressed in the cytoplasm of MIST-1 transfectants; however, the expression level was relatively low. In conclusion, MIST-1 was successfully overexpressed in MSCs, which resulted in the induction of amylase protein expression and will be further characterized to determine the critical roles of MIST-1 in driving MSCs into salivary epithelial precursors.
A Run for Your Honey
-Colony Collapse Disorder, or CCD, is a phenomenon where worker bees abandon the hive, queen, and nurse bees and do not return. Without the worker bees to sustain them, the hive collapses. There are several reasons for CCD, but no real solutions. Ancient texts are filled with more than just tales of epic heroes, but chronicles and information on daily life and common practices, including maintenance of bees. There was mention of decline in bee populations in the works of Lucius Junius Moderatus Columella. The purpose of this research was to examine the works of Columella and evaluate the type, origin, remedies, and results of this ancient Roman bee epidemic and compare it to the current CCD. Research found that while there was a mass disappearance or death in bees during that time, there was not enough information to determine if it was a similar phenomenon of CCD, or a different one entirely. However, Columella went into detail in how to cure sick, dying, and seemingly dead bees with special diets. This opens up the possibility of fluctuations in bee populations in other time periods and, with further research, these methods may prove beneficial in strengthening current bee populations.

Fungal Endophytes in Florida Hardwood Hammock
-Endophytes are fungi that live inside of plants and cause no symptoms of disease. It is unknown whether certain endophytes are more less abundant in certain seasons or if endophyte populations on the host plant increase or decrease over time. The purpose of this research is to investigate whether, where, and when the fungal endophytes being studied produce fruiting bodies, the variation of endophytes through the seasons, and host specificity. It is predicted that there will be temporal changes in endophyte populations, and that due to the lack of stressful conditions in a Florida hammock ecosystem, these species will be host-specific.
Exploring Microsporidia as a Biological Control Method for Plant-Parasitic Nematodes

Microsporidia are unicellular spore-forming parasites related to fungi. Their hosts include humans, insects, and animals. Microsporidia are commonly found in soil environments, but do not infect plants. It is unknown whether microsporidia infect plant-parasitic nematodes (PPN), but they are well documented parasites of nematodes in other niches. The purpose of this project is to determine if microsporidia parasitize PPN, which could be a novel biocontrol method. The presence of microsporidia in suppressive soil samples that have PPN but do not show signs of plant damage was confirmed through PCR. The microsporidia DNA was then sequenced to examine the differences between both non-suppressive and suppressive soils in shallow and deep depths. The differences may explain the antagonistic effect of microsporidia on nematodes or insect pests. In addition, several species of nematodes in the J2 stage were inoculated with 0.5 uM and 1 uM microspheres, which are the approximate size of microsporidia. Using fluorescent microscopy, the microspheres were observed within nematodes. It is plausible microsporidia infections can limit the parasitic nature of the nematodes without causing harm to economically important plants.

Novel Helicobacter Species in Gopher Tortoises

The genus Helicobacter are spiral shaped bacteria in the phylum Proteobacteria. They have previously been associated with disease in animals, including reptiles. Two gopher tortoises (Gopherus polyphemus) presented to the University of Florida between 2012 and 2016 with nasal discharge, depression, and weight loss. Cytologic examination of nasal discharge found uniform populations of spiral shaped bacteria. Sequencing of the 16S rRNA gene revealed this to be a novel Helicobacter species. Select additional genes were amplified from this bacteria using polymerase chain reactions and sequenced. Phylogenetic analyses of the organism, development of a qPCR for sensitive, specific, and quantitative detection, and application of this assay to a collection of tortoise nasal wash samples are underway. This process will provide initial characterization of this novel organism and develop diagnostic assays.
**CubeSat GNC Ground Simulation**

Accurate preflight testing environments for navigational procedures involving CubeSats are vital in bridging the gap between theoretical numerical simulation and the actual implementation of orbital flight. A CubeSat is a miniaturized satellite composed of multiple 10x10x10 cm units. These satellites are gaining popularity for their use of commercial off-the-shelf parts and low-cost development, and are used by academia and industry alike. A 3DOF experimental testbed was developed to simulate a CubeSat rendezvous and docking (R&D) maneuver using a new algorithm for proximity operations using the State Dependent Riccati Equation (SDRE) based on differential algebra (DA) for computational benefit. To mimic the computational capabilities of a CubeSat, the Tyvek Intrepid peripheral interface board will be executing the simulations. This board has been used in numerous small satellite missions including IPEX, LightSail, and ExoCube missions. It is a realistic representation of the hardware on which these algorithms will be executed. The rest of the testing environment is composed of an epoxy test floor, translational robotic component simulating zero gravity motion, and PhaseSpace tracking to record position data. This testing procedure is expected to successfully simulate the control and navigation solutions established by this algorithm and future solutions, particularly in CubeSat systems.

**Genetic Dissection of Sire Conception Rate in US Jersey Cattle**

Fertility is an important economic trait in dairy cattle. Due to bull subfertility, reproductive performance remains suboptimal in most herds, resulting in economic losses for the dairy industry. Our main objective was to dissect the genetic architecture of sire fertility in US Jersey cattle. The dataset included 1.5k Jersey bulls with sire conception rate (SCR) records and 96k single nucleotide polymorphism (SNP) markers spanning the whole genome. The analysis included whole-genome scans for additive and non-additive effects, and subsequent functional enrichment analyses using KEGG Pathway, Gene Ontology (GO) and Medical Subject Headings (MeSH) databases. The association analyses identified ten 1.5 Mb SNP windows associated with Jersey bull fertility, accounting for roughly 7% of the SCR additive genetic variance. Several candidate genes annotated in these regions are known to be directly involved in spermatogenesis, sperm differentiation and capacitation, and fertilization. The non-additive scan revealed three putative fertility genes with marked recessive effects. The gene-set analysis also identified functional terms known to be related to male fertility. Overall, our results contribute to the identification of genomic regions and pathways underlying sire fertility in Jersey cattle, which may point out new strategies for improving sire fertility via marker-assisted selection.
Chitosan as an Oral Phosphate Binder: Improving Efficacy

For patients with Chronic Kidney Disease, dietary restrictions and dialysis treatments are often insufficient to prevent hyperphosphatemia - an increase in serum phosphate concentration that can cause further health problems including cardiovascular complications. To combat hyperphosphatemia, patients can take oral phosphate binders that are designed to interfere with the absorption of phosphate within the small intestine. The options currently on the market have drawbacks including side effects and significant cost. Therefore, there is a need for a safe and cost-effective alternative that decreases the financial burden placed on patients. Chitosan is obtained through the deacetylation of chitin, the second most abundant polysaccharide behind cellulose. Common sources of chitosan include the shells of crustaceans. The structure, biocompatibility, and low cost of chitosan could make it a good alternative to oral phosphate binders currently available. This project investigates the phosphate binding capacity of chitosan and potential methods for improving phosphate binding, including transient acid exposure, degree of deacetylation, and functionalization.

Validating Sigma One Receptor Antibodies to Investigate the Knockout Phenotype

Recent reports have called into question the specificity of multiple antibodies targeting the Sigma-1 receptor (SIG1R), a cellular chaperone protein being studied as a therapeutic target for numerous neurological and non-neurological disorder. Thus, we established a standardized battery to test the specificity of multiple commercial antibodies and two novel antibodies generated in collaboration with encore Biotechnology. To analyze the antibodies using western blotting, we trialed different protocols specifically designed to detect SIG1R in tissue samples. We ultimately were able to reproducibly detect SIG1R in tissue at the expected molecular weight, with no band present in the samples from transgenic SIG1 knockout mice using a single commercially available antibody (Invitrogen). As our next step, we chose to verify proper subcellular localization of SIG1R in cultured dopamine neurons using this antibody. Consistent with the published literature on SIG1R, the staining revealed a distribution of staining that was peri-nuclear and formed puncta near the plasma membrane. Immunolabeling of cultured dopamine neurons with other available antibodies failed to reproduce this localization pattern. Future directions include verification of the Invitrogen antibody’s specificity in SIG1R knockout cultured dopamine neurons, and examination of SIG1R labeling in tissue of both wild-type and knockout mice.
**PRESENTER(S):** Dreyer, Kathleen  
**AUTHOR(S):** Kathleen Dreyer, David Hibbitts  
**FACULTY MENTOR:** David Hibbitts

**Graphene Support Effects on Palladium Catalyzed Reactions**

Palladium catalysts are often anchored to a support, such as graphitic carbon, to increase their overall surface area and facilitate catalytic reactions. There is a potential for interaction between the support and catalyst, which can affect such reactions. At a certain palladium size threshold, it is hypothesized that the effects of the support on reactions are negligible. To determine this threshold, the Pd catalyst size (via number of atoms and layers) and shape (ranging from hemispherical to spherical) were varied. Also, the graphene support was functionalized to different extents to test its effect on the catalytic reactions. Initially, adsorption reactions of H*, O*, C*, OH*, and CH* onto supported Pd were tested to determine the effects of catalyst shape and size on adsorbate binding energy. Periodic density functional theory calculations were used to determine these binding energies on bare Pd, and Pd on both pure and functionalized graphene. These tests revealed that particles ~100 atoms or fewer show large shifts in adsorbate binding energy from pure to functionalized graphene. This binding energy shift indicates that there are major changes in the catalytic behavior of adsorption reaction sites, meaning that sites near the Pd-graphene interface might be affected by the support.

**PRESENTER(S):** Duerr, Nathan  
**AUTHOR(S):** Nathan Duerr, Andrea Lucky, Bethany Taylor  
**FACULTY MENTOR:** Andrea Lucky

**Ant Phylogeny Mobile**

The study of phylogenetics can often prove difficult for students unfamiliar with the field. Accurately visualizing, reading, and writing phylogenetic trees is especially challenging. To help combat this difficulty, we created a mobile for use as a classroom tool to represent the current phylogeny of ants (Hymenoptera: Formicidae) down to the subfamily level. The ability to see and touch a phylogenetic tree is useful for students in visualizing the relationships between the organisms because each node of the phylogenetic tree can rotate on the mobile while still depicting the same phylogeny.
Isolation, Microaggressions, And Racism: Black Engineers in Technology Companies

Diversity in the technology industry continues to lag despite increasing scrutiny. In addition to lack of representation, the climate for underrepresented minorities in these companies is poor. One recent study found that 37% of those who left their companies did so because of unfairness or mistreatment, with many others identifying unfairness as a contributing factor. Our goal is to understand the racialized experiences of Black engineers and how they navigate the varied climates in their companies. The analysis was conducted through critical narrative analysis to understand the meaning behind the engineers’ life experiences. The engineers discussed several issues in their narratives including lack of diversity and support for minorities in the workplace. Through this project we would like to help others gain a better understanding of the experiences of Black engineers in the technology industry. The results gained from this project will be used to make diversity issues in the workplace more apparent to senior officials in companies so that they can reconsider the way they approach diversity.

A Longitudinal Study on the Effects of Peripheral Inflammation on Cognition

Aging is associated with cognitive decline, which is hypothesized to be impacted by inflammation seen in neurodegenerative diseases such as Alzheimer’s Disease. The purpose of this study was to investigate the effects of peripheral inflammation, initiated in adulthood, on the progression of cognitive deficits with advancing age. Male F344 Brown Norway Hybrid young (6 months, n = 16) animals were injected either with vehicle or lipopolysaccharide (LPS) at 1 mg/kg once a week for 7 weeks. All animals underwent testing on episodic spatial memory version of the Morris Water Maze at 12 and 18 months. The water maze task at 12 months (6 months post-treatment) did not show a significant difference in memory between groups, however, testing at 18 months (12 months post treatment) showed a trend (p = 0.06) for a decline in episodic spatial memory for LPS treated groups. The novel location recognition task 12 months post-treatment did not show a significant difference between LPS and vehicle groups. The subjects then underwent an inhibitory avoidance task. Vehicle animals exhibited good memory (24-hr), whereas 3 of 8 LPS rats exhibited impaired memory. In conclusion, these results suggest that peripheral inflammation contributes to the progression of cognitive decline with aging.
A Guide to Sustainable Communities: Auroville

The purpose of this research paper is to study Auroville as an architectural, social and economic experiment with an objective to take concepts and methods of value and replicate them in other cities and communities. This research relied on many books written about sustainable communities. Most of these books had a special focus on the case of Auroville India. I managed to get a clear understanding of what makes Auroville a successful experiment and a good example for all sustainable communities to follow. Its greater goal is to unify humanity under the flag of sustainable development. In order to do that, Auroville offers a platform to further the advancement of appropriate technologies and experiment with minimalism and self-sufficiency. A free platform for experimentation; its goal is to craft a sustainable lifestyle without restrictions and bureaucracy; starting in an un hospitable land, Auroville offered its residents a space free from religious, hierarchical and political barriers. This resulted in a successful community setting a precedent for the whole world to follow.

Neural Network Tracing with Fluorescent Dextran and Electrical Stimulation of Vagus Nerve

The work herein seeks to establish a quick and quantifiable neural network tracing method using fluorescent dextran and electrical stimulation. The vagus nerve, or cranial nerve X, controls various sympathetic and parasympathetic functions. Vagus nerve stimulation (VNS) is used to treat epilepsy and has neuroprotective effects. Identifying which central nervous system (CNS) targets are affected by VNS is important to understand how therapeutic benefits are achieved. Most neural network tracing methods are often leaky, resulting in off-target staining, and usually take days or weeks to achieve. Furthermore, conventional tracing methods do not provide a quantifiable measure of neural activity. Neurons are energetically demanding and uptake sugar in relation to how active they are. By perfusing fluorescent dextran (MW 10,000) through the common carotid artery, while simultaneously stimulating the vagus nerve with a cuff electrode, we measured increased fluorescent-dextran uptake in afferent neural pathways extending from relevant brainstem nuclei (nucleus tractus solitarius (NTS) and spinotrigeminal tract). Increased dextran-fluorescence was observed in various brainstem nuclei and cortical areas.
**PRESENTERS:** Elliot, Grant  
**AUTHORS:** Grant Elliot  
**FACULTY MENTOR:** Pierre Ramond

**Some Examples of Holographic Quantum Error Correcting Codes on Higher Dimensional Qudits**

It was recently shown that quantum codes constructed from a network of perfect tensors serve as toy models for the bulk/boundary correspondence. These perfect tensors can be constructed from Absolutely Maximally Entangled (AME) states. Recent literature has shown that AME states exist for a variety of different qudits. In this paper we analyze some specific examples of holographic quantum codes arising from perfect tensors acting on higher dimensional qudits.

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**PRESENTERS:** Emas, Madison  
**AUTHORS:** Greg Stitt, Abhay Gupta, Madison N. Emas, David Wilson, Austin Baylis  
**FACULTY MENTOR:** Greg Stitt

**Scalable Window Generation for the Intel Broadwell+Arria 10 and High-Bandwidth FPGA Systems**

Emerging FPGA systems are providing higher external memory bandwidth to compete with GPU performance. However, because FPGAs often achieve parallelism through deep pipelines, traditional FPGA design strategies do not necessarily scale well to large amounts of replicated pipelines that can take advantage of higher bandwidth. We show that sliding-window applications—an important subset of digital signal processing—demonstrate this scalability problem. We introduce a window generator architecture that enables replication to over 330 GB/s, which is an 8.7× improvement over previous work. We evaluate the window generator on the Intel Broadwell+Arria10 system for 2D convolution and show that for traditional convolution (one filter per image), our approach outperforms a 12-core Xeon Broadwell E5 by 81× and a high-end Nvidia P6000 GPU by an order of magnitude for most input sizes, while improving energy by 15.7×. For convolutional neural nets (CNNs), we show that although the GPU and Xeon typically outperform existing FPGA systems, projected performances of the window generator running on FPGAs with sufficient bandwidth can outperform high-end GPUs for many common CNN parameters.
Telomere length shortening in early childhood in the Democratic Republic of the Congo

Telomeres are repetitive noncoding DNA sequences at the ends of chromosomes that serve as a buffer for nucleotide loss during cell replication. Numerous studies have found associations between decreasing telomere length, normal aging, and psychosocial stress. Based on relatively few longitudinal studies and comparison of single time point studies, it appears that telomere shortening occurs most rapidly during the first four years of life. However, there are no longitudinal studies of telomere length during this period of early childhood starting at birth. Our study characterizes telomere shortening in a population of children, exposed to extreme prenatal maternal stress, starting at birth and continuing until four years of age.

Blood samples were collected at birth from 100 children living in the Democratic Republic of the Congo with multiple follow-up samples collected at time points ranging from one month to four years after birth. Relative telomere length was determined using qPCR T/S ratio methodology. Data were analyzed using growth curve analysis to create a baseline growth curve for telomere shortening between birth and four years of age. The effect of prenatal maternal psychosocial stress on offspring telomere length through early childhood was also tested. This study is the first to provide longitudinal telomere length data during early childhood and to investigate the effect of maternal stressors on the telomere shortening process.

Effects of Social Media Use on Millennials’ Perceptions of Community Leaders

Acknowledging that social media use is ever growing and increasingly used to communicate with constituents, this article investigates the notion of the effect that a community leader’s social media activity has on young adults’ perceptions of leadership. Utilizing a qualitative analysis of research related to young adults’ relationship with politics juxtaposed to a quantitative analysis of a Qualtrics survey of 100 people between 18 and 24 years of ages’ self-evaluated trust of community leaders on social media, the research illustrates that perception of community leaders is not significantly improved through use of social media.
Nocel Phantom Construction Methodology For Proton Therapy Dosimetry Studies

The purpose of this project was to utilize computer aided design software and 3D printing to more efficiently construct an anthropomorphic phantom to be an exact replica of the International Commission on Radiological Protection reference 10-year-old, compared to previous methodology. This phantom will be used to conduct dosimetry reduction studies in proton therapy. All 5mm molds were successfully created, utilizing an alignment system that is integrated into the phantom construction. The dowels work as expected and the soft tissue, bone, and lungs were successfully cast, ultimately leading to a successful construction that is ready to be tested.

Nuclear Irregularity in MEF due to Migration and/or LMNA

Cancer cells develop irregular nuclear shape which affects gene expression. How these cancer cells develop irregular nuclear shape is not well known. We hypothesized that the nuclear irregularity could be caused by softened nuclei and/or forces generated by cell migration and the cytoskeleton. MEF WT and Lamin A null cells (Lamins are known to provide rigidity to cell nuclei) were seeded on dishes and allowed to migrate for 2, 24, or 48 hours before fixation. The irregularity of the nucleus was measured by several methods: Elliptical Fourier Coefficient (EFC), Circularity, Roundness, Solidity, and 2D irregularity. We have conducted three experiments. The absence of lamin A/C appears to cause no discernible effects on nuclear shape irregularities. More experimental replicates must be done to confirm the experiment result.
Assessing the Relationship between the Enhanced Gait Variability Index and Falls in Persons with Parkinson's Disease

Parkinson’s disease (PD) is a progressive movement disorder with cardinal motor symptoms including tremor, rigidity, and gait (walking) deficits. Gait deficits like slow, shuffled steps and sporadic freezing may lead to an increased number of falls and contribute to poor quality of life. Spatial temporal parameters (STP) of gait, such as step length, stride time, and stride width, can be measured using pressure mats, and variability within these parameters can evaluate disease progression. The Enhanced Gait Variability Index (EGVI) uses five STP to quantify patterns of gait variability and provide a single numerical value that clinicians can use. Scores >100 indicate variable gait and <100 indicate rigid gait. Our purpose was to assess the relationship between EGVI and falls in persons with PD. A retrospective review of a clinical database that included STP determined from self-selected walking trials over a pressure mat was conducted. Participants were categorized by how often they fall (never, rarely, monthly, weekly, daily). A modest correlation using Spearman’s rank-order was found between fall frequency groups and EGVI (r=-.349, p<.001). Unexpectedly, as frequency of falls increases, EGVI decreases. Possibly, frequent fallers are adopting less variable strategies to prevent falls, but this should be investigated further.

Comparative Genetic Structure of Three Tree Species in a Highly-fragmented Savannah Landscape

Dispersal underlies many key demographic and evolutionary processes, including rescue effects, the presence of inbreeding depression, colonization, and range expansion. Understanding how different dispersal strategies are affected by increasing landscape heterogeneity is thus critical to predicting the long-term viability of fragmented populations. In this study, I compared the genetic structure of three savannah tree species with differing seed dispersal ecologies: marula (Sclerocarya birrea) is primarily animal-dispersed; leadwood (Combretum imberbe) is wind-dispersed; and knobthorn (Acacia nigrescens) is gravity-dispersed. We further separated each tree species into three age classes to compare heterozygosity and levels of inbreeding over time. Our results show limited trends of genetic isolation by distance for each species across an area of 90 kms, indicating historically high gene flow. Of these, S. birrea demonstrated the strongest trend and was also the only species in which outbreeding was observed. Outbreeding was not observed in the youngest age class, which could indicate recent development of barriers to dispersal or instead be due to inadequate sample size. Ultimately, further research is necessary to better understand the extent to which dispersal affects persistence over time.
Structural and Functional Characterization of the Colibactin Resistance Gene clbS

Colibactin is an uncharacterized secondary metabolite produced by certain strains of E.coli bacteria present in the human gut. It induces the double-stranded DNA breaks in eukaryotic cells promoting tumor formation under host inflammatory conditions. The colibactin binding site or mechanism of action is currently unknown. The biosynthetic gene cluster, consists of several nonribosomal peptide synthetase (NRPS), polyketide synthase (PKS), hybrid NRPS/PKS and also a transporter and resistance gene associated with the colibactin gene cluster. The biosynthetic process is composed of a prodrug mechanism in which the inactive genotoxin is transported to the periplasm, cleaved, and refined to the active form. The colibactin resistance gene clbS, protects the host bacteria from the genotoxic effects of colibactin. We recently solved 2.0 Angstrom crystal structure of ClbS. Based on the structural information and preliminary biochemical studies, we showed that ClbS is a DNA binding protein. Currently, we are investigating the DNA binding specificity of ClbS using Systematic Evolution of Ligands by Exponential Enrichment (SELEX). Additionally, we also aim to co-crystallize ClbS with the consensus DNA motif obtained using SELEX. Understanding the DNA binding sequence of ClbS could provide insight on the colibactin binding site and mechanism of genotoxicity.

Developing the Magnetic Capture of the Interferon-Gamma Biomarker in an Osteoarthritic Rat Knee

Early detection of osteoarthritis (OA) is critical to slow the progression of this maladaptive joint disease. Molecular biomarkers in the joint (synovial) fluid may indicate the state and severity of OA. Our laboratory developed a magnetic capture technology proven to be more effective than prior techniques for biomarker collection from animal joints. Interferon-gamma (IFN-γ) is currently being investigated and developed as a potential biomarker for magnetic capture technology. The capture and quantification of IFN-γ will lead to better characterization of OA's disease model. The development of a biomarker for the magnetic technology requires characterizing various parameters of the biomarker. Adjusting the conditions for the magnetic collection of the IFN-γ biomarker include: optimizing the amount of particles injected, the time needed for particles to collect the biomarker, an amount of antibody per particle, and pH for biomarker release. We were able to optimize the maximum load of interferon-gamma antibodies on particles, antibody affinity to the biomarker, and the post-release conditions for the interferon-gamma biomarker. Before moving towards in vivo conditions, further determination is needed in other parameters, such as time needed for the antibody to bind to the biomarker and the optimal pH for biomarker release.
Diaphragm Remodeling in a Rodent Model of Glycogen Storage Disease Type II

Pompe disease is a glycogen storage disease caused by the absence or deficiency of a single gene that codes for acid-alpha glucosidase (GAA), which breaks down glycogen in the lysosome. Progressive glycogen accumulation in lysosomes is a hallmark feature of Pompe disease and leads to the disruption of cellular architecture, metabolism and ultimately results in neuromuscular failure. Respiratory failure leads to patient dependency on mechanical ventilation and increase risk of morbidity and mortality. The purpose of this study was to determine if progressive glycogen accumulation impacts myofiber phenotype and morphology in Pompe diaphragms. Myofibers were isolated from wild-type (WT) and Pompe (Gaa/-) rat diaphragms at 5 months of age. Overall, a leftward shift in myofiber cross-sectional area (CSA) was observed along with a significant decrease in CSA of Gaa/- diaphragms (1058 ± 97.89µm²) when compared to age-matched WT diaphragm myofibers (1707 ± 110.4µm²) (P=0.0131). Phenotypic analysis of diaphragm myofibers revealed a significant decrease of Type IIb/x muscle fibers in Gaa/- rats (P=0.0006). Our data suggest that Type IIb/x fibers are selectively susceptible to loss and disease-related atrophy. Determination of the mechanism which leads to the precipitous loss of a specific myofiber phenotype in the Pompe diaphragm warrants further investigation.

Testing Drivers of Allopatric Speciation in Amazonian Plants

The origins of biodiversity in Amazonia are poorly understood. Uncovering patterns of speciation within clades of Amazonian plants may provide insight into the origins of biodiversity in Amazonia. Following modern synthesis, it has been thought that the predominant mode of speciation is allopatric, where populations are separated by large environmental barriers such as mountain ranges, habitat or climate barriers, etc. In Amazonia, large environmental barriers are located along the perimeter of the “core Amazon”. The core Amazon has presumably strong river barriers; however, no strong evidence has been found to indicate that river barriers are necessarily isolating mechanisms for plant taxa. We tested whether there was a signal of more allopatric speciation along the periphery of the core Amazon, and more sympatric or parapatric speciation within the core by investigating the spatial distributions of 68 sister species pairs from the Miconiaeae, Lecythidaceae, and Bignoniacaeae clades as they relate to major environmental barriers in Amazonia. We developed approximate ranges for each species and calculated the area of range overlap for each pair to determine which pairs exhibited complete, or nearly complete, allopatry. We then analyzed the spatial relationship between each pair of ranges and their location relative to the core Amazon.
Assessing Dietary Intake in Hispanic Adolescents

Childhood obesity has been increasingly prevalent, with nearly one-third of children considered either overweight or obese. Obesity is a risk factor for multiple health conditions. Health disparities exist across racial/ethnic groups, with Hispanic youth having among the highest rates. A randomized controlled trial (RCT) is currently being conducted to investigate the effects of experimentally manipulated social status on energy balance in Hispanic American (HA) adolescents. In this RCT, eating behavior among 150 HA participants aged 15-21 is assessed using food weights, self-reported dietary intake, and completion of the Eating Attitudes Test (EAT-26). In the first portion of the study, participants consume a standardized breakfast and are then randomly assigned to either high or low social status that is simulated using a rigged game of Monopoly. After the game, participants are given an ad libitum buffet meal of which total consumption is measured through pre- and post-weight calculations. Each participant is sent home with a food diary and instructed to record all foods/drinks consumed for a period of 24 hours. All foods/drinks consumed during the study visit as well as foods/drinks reported using the 24-hour food diary are then input into Nutrition Data System for Research (NDSR), a dietary analysis program, where nutrient breakdowns are provided. The results of this study will allow us to characterize eating behavior and dietary intakes in Hispanic adolescents.

Compliance to TeachBack Protocol in Improving Patient Satisfaction Measures and Reducing Variation in Care

Ineffective communication between the patient, caregivers, and clinicians yields many preventable medical complications. This condition is exacerbated within Neuromedicine populations due to their high prevalence of cognitive impairments. TeachBack is a patient-centered initiative to ensure a clear and open line of communication between the patient and provider, thus reducing variation in patient care. The chunk-and-check methodology is employed by clinicians to deliver patients a “chunk” of information in plain language and “check” that they can relay it back in their own words. Providers are evaluated on body language, introduction of the method, and whether TeachBack is provided in the domains of: expectations, medications, pain management, patient assistance, and activities after hospitalization. These ratings are collected and given to providers monthly on a scorecard. 73 TeachBack observations were conducted among 22 providers in ambulatory settings with results indicating that 32% of providers introduced the concept of TeachBack to patients before implementation, 76% discussed follow-up appointments while utilizing TeachBack, 89% offered user-friendly patient education materials, and 84% effectively used plain language as opposed to medical terminology. Increased adherence to TeachBack protocol indicated higher Press Ganey patient satisfaction outcomes, and the implementation of the protocol reduced 30-day all-cause and related readmission rates.
PRESENTER(S): Gaines II, Dale
AUTHOR(S): Dale Gaines II, Michael Sexton, Jiangeng Xue
FACULTY MENTOR: Jiangeng Xue

Large Single-Crystal Hybrid Organic-Inorganic Perovskites for High-Energy Photodetector Applications

The United States Department of Energy has elucidated a need for low cost, high-energy detectors capable of detecting high energy radiation from nuclear materials, resulting in increased national security. The purpose of this project is to fulfill this need by growing thick semiconducting crystals and exploring possible device architectures for photodetectors with high responsivity and detectivity. Organometallic halide perovskites have seen recent use in optoelectronic devices such as photovoltaics, photodetectors, light-emitting diodes, and lasers due to their desirable electronic and optical properties. In specific, methylammonium lead triiodide (MAPbI3) seemed to be an especially viable candidate for this project because of its long carrier lifetimes and easy solution processability. An optimization study of an inverse-temperature crystallization process has resulted in centimeter-sized single crystals of MAPbI3 suitable for use in devices. Following this, various contacts were selectively thermally evaporated onto the surface, and the resulting devices were characterized using current-voltage measurements in the dark and under exposure to light.

PRESENTER(S): Garcia, Armin
AUTHOR(S): Armin Garcia, Jessica Schrier, Genesys Giraldo, Mitchell Knutson, Christopher Janus
FACULTY MENTOR: Christopher Janus

Abnormal Accumulation of Manganese in the Brain Impairs Motor Behavior in Mice

Manganese (Mn) is a cofactor in many enzymes, making it an essential nutrient required for normal growth and physiological processes. This trace element is available in most plant-derived foods, whereas animal-based foods are nearly free of Mn. While dietary deficiency has not been reported, exposure to higher levels of Mn and its abnormal accumulation in the brain leads to a parkinsonian-like disorder known as manganism. We recently published a characterization of a mouse model of manganism, which shows compromised Mn homeostasis due to a loss of function mutation in the Slc39a14 gene (Jenkitkasemwong et al. (2018) PNAS). The knockout Slc39a14-/- mice show dysfunction in Mn homeostasis with consequent aggregation of Mn in the brain and impairment in motor behavior. In the present study, we extended the characterization of this model focusing on anxiety and cognitive behavioral domains. We confirmed that the Slc39a14-/- mice showed compromised motor performance compared to their wild type controls at older ages than previously published. Additionally, we report that the mice manifested decreased anxiety-like behaviors and faster acquisition of Pavlovian associative learning as evaluated in fear conditioning tests.
Never Black and White: Representing Black Women in Revolutionary France

My research focuses on Marie-Guillémine Benoist’s "Portrait of a Black Woman," exhibited in the Paris Salon of 1800. This remarkable picture of a free woman of African descent was painted in the decade between the first abolition of slavery in the French colonies in 1794 and Napoleon’s reinstatement of it in 1804. I address the question of what we can make of the existing visual and literary representations of black women in this period, and how these representations can be used to understand something of the kind of experience or role the women had in French society. In the absence of firsthand accounts by black women themselves, I explore the conditions of their existence, ideologies that shaped their experiences, and the varying range of representations of them made by whites. Through close readings of a selection of portraits and early nineteenth-century novels by white European women, I demonstrate that their visual and literary representations of black women treat the latter sympathetically as compelling and multifaceted subjects. Rather than representing them in terms of cultural stereotypes that were typical of the time, women like Marie-Guillémine Benoist, Isabelle de Charrière, and Claire de Duras presented their black subjects as beautiful women capable of feeling a range of emotions, experiencing hardships, analyzing interpersonal dilemmas, and pondering over complex notions of identity and race.

Effects of human alpha-1 antitrypsin on the health span of Drosophila Melanogaster

In humans, the human alpha-1 antitrypsin protein (hAAT) is an important protease inhibitor, which prevents enzymes produced by inflammatory cells from unnecessarily damaging healthy tissues. Although inflammation is an important and necessary process needed to protect the body against pathogenic threats, it occurs with less regulation as an organism ages (Franceschi, 2007). This persistent inflammation is suspected to cause nearly all diseases associated with aging like cardiovascular disease and type II diabetes (Franceschi & Campisi, 2014). It has been previously demonstrated that there is a significant increase in the lifespan of Drosophila Melanogaster when human alpha-1 antitrypsin (hAAT) is introduced as a transgene (Yuan, 2017). My research project would elucidate the role of hAAT on the health span of transgenic Drosophila and ultimately allow for the evidence-backed predictions of possible human responses. This assay will quantitatively measure the locomotor activity of Drosophila at different age points (5 days, 15 days, etc.) by placing the flies in thin tubes and having equally-spaced infrared beams detect interference.
Measuring Cognitive Function Improvement of Young Adults with Intellectual Disabilities after a Fitness Intervention Using the Grocery Shelving Task

Background: Populations with intellectual disabilities (PIDs) often exhibit shortness of breath when performing activities of daily living. Studies show exercise improves cognitive function. However, few cognitive assessments for PIDs exist. The grocery shelving task (GST) is used as an upper body endurance test for COPD patients. This study’s purpose is to measure the effectiveness of a fitness intervention on improving the upper body endurance and cognitive function of young adults with IDs using GSTs.

Methods: About 15-30 PIDs, aged 18-22, participated in a one-hour fitness intervention twice a week, for 6-8 weeks between Fall 2015 to Fall 2017. GSTs were taken before and after the intervention. Analysis involved paired sample t-tests. Results: The study found no significant difference between semesters. However, we found a significant decrease in GST time between Fall 2016 posttest the Fall 2015 pretest results, M = -24.98 sec, 95% CI [-45.72, -4.24], t(19) = -2.52, p < .05. Similar results found for Fall 2017 posttest and Fall 2016 pretest. Discussion: Although this study produced no significant results, the GST group times improved as time progressed. Current research efforts will assess the effects of a new intervention improve cognitive function and upper body endurance among the participants.

Virtual Experiences for Dyslexia Awareness

Dyslexia is a learning disability that is characterized by difficulties in word recognition and decoding capabilities. Children with dyslexia who do not receive special education or treatment tend to have major difficulties in language comprehension in the future, impacting their everyday life including job opportunities. The project Virtual Experiences for Dyslexia Awareness (VEDA) targets the professionals and teachers who are speaking to parents about their child’s dyslexia in order to ensure that the parent is acquiring all of the necessary information they need to make changes that assist their child’s education appropriately. The simulation being developed places a Virtual Human (VH), the child’s parent, in front of the user. The user must then type the appropriate phrases and questions to communicate with the VH, filling up the percentages of the certain subtopics they must cover. After the simulation they will be shown a progress report so that the educators may hone their skills of communicating with caregivers even further. The ultimate objective of the simulation is to ensure that children with dyslexia are getting the resources they need to help them overcome the phonetic barriers that they face.
Chronic Stress Recapitulates Age-Related Changes to Working Memory and PFC Receptor Complement

Age-related impairment of working memory, a short-term form of memory that depends on the prefrontal cortex (PFC), is proportional to changes in expression of NMDA receptors (NMDARs) and GABA(B) receptors (GABA(B)Rs). It is not known, however, how the aging process influences receptor expression in PFC. As the PFC is enriched for glucocorticoid receptors, it is possible that accumulating effects of stress and glucocorticoids modulate PFC excitatory/inhibitory signaling and weaken working memory. To test this hypothesis, we trained rats to perform an operant delayed response task, to characterize working memory. After achieving baseline performance, equal numbers of rats were assigned to either control (unstressed; UNS) or chronic variable stress (CVS) treatment groups. CVS rats were exposed to an unpredictable schedule of twice daily stressors. Both CVS and UNS rats continued to test daily on the delayed response task. At the end of 21 days, working memory performance of CVS rats was significantly worse than UNS rats. Using PFC tissue harvested from experimental animals, we compared NMDAR and GABA(B)R subunit levels by Western blot. Here we observed that CVS led to a marginal loss of NMDAR subunits and a significant loss of GABA(B)R subunits.

Evaluating AAV Tropism for Neonatal Mouse Cerebellum

The cerebellum is a vital area of the brain that receives sensory information and helps regulate motor movements such as posture, balance, coordination, and speech. More recently the cerebellum was discovered to play a role in emotion as well. Damage to the cerebellum and loss of some of these functions can occur as a result of neurodegenerative disorders, such as Alzheimer’s Disease. Problems with coordination that occur in later stages of Alzheimer’s have been linked to amyloid plaque build-up in areas of the brain, including the cerebellum. Adeno-associated virus (AAV) has the potential to be a successful gene therapy for Alzheimer’s disease as well as many other neurodegenerative disorders. AAV is a non-pathogenic virus that has been used as a tool in gene therapy and in creating isogenic human disease models. Recombinant AAV (rAAV) is used for gene delivery because it can target specific tissue types through rAAV transduction. There are different serotypes of AAV that may have different efficacies in different areas of the brain. The purpose of this study was to compare AAV1, AAV5, AAV6, and AAV8 and evaluate each AAV serotype tropism in the cerebellum.
Postural and Motor Dysfunctions in a Mouse Model of Manganism

Manganese (Mn) is an essential trace mineral that plays a role in growth, bone formation, and other physiological processes. In humans, exposure to excess manganese can result in manganese accumulation in the brain as well as in neurological and motor disturbances resembling a parkinsonian-like disorder known as manganism. SLC39A14 is the metal transporter responsible for Mn homeostasis, and mutations in the Slc39a14 gene have been associated with elevated Mn concentrations in the blood and brain. Brain manganese accumulation in Slc39a14-/- mice was associated with motor deficits in a variety of motor tasks. Additionally, most Slc39a14-/- mice also displayed postural abnormalities, like torticollis. Consequently, we investigated whether this postural defect could compromise the performance of mice in the administered locomotor tests. In this study we compared the performance of Slc39a14-/- mice that showed torticollis with the performance of the Slc39a14-/- mice without signs of torticollis and with the performance of the control, wild type mice. The results of our comparative analyses across a variety of locomotor tests demonstrate the unequivocal locomotor impairment of Slc39a14-/- mice, regardless of the presence of torticollis, but do not provide any compelling evidence that torticollis significantly confounded the locomotor performance of Slc39a14-/- mice in the tests.

Is male testes size affected by female quality?

Historically, the size disparity between sperm and egg cells (anisogamy) led scientists to believe sperm is cheap, allowing males to mate almost indiscriminately. However, sperm is rarely transferred as a single unit and males bear certain costs from producing the ejaculates necessary to fertilize females. These costs may cause males to be choosy, strategically investing more in ejaculate production with higher quality mates. Here we investigate this in Narnia femorata, by testing if males grow their testes if given the opportunity to mate with a higher quality female. The testes mass of males paired with high quality females (reared on nutritious cactus fruit) were not significantly different to those of males paired with low quality females (reared without fruit). However, males kept alone had significantly higher testes masses than males paired with a female. We also investigated if testes size fluctuated over time in each treatment. Males were terminated and dissected every two days for 16 days but no clear pattern in testes mass was found based on termination day. The results clearly show that mating reduces testes mass, suggesting that ejaculate transfer is a considerable investment for males, regardless of the quality of female they are paired with.
Characterization of Novel Plasma-Ionization Source for Real-Time Breath Analysis

Breath analysis has the potential for noninvasive, rapid, inexpensive, and portable disease diagnosis. Real-time breath analysis techniques would greatly benefit from an ambient ionization source that efficiently ionizes a wide range of relevant breath molecules. This project aims to characterize a novel low-voltage enclosed dielectric barrier discharge (DBD) ionization source for the analysis of molecules in breath. Mass spectra were collected using a Thermo Scientific LCQ Deca mass spectrometer. Various volatile organic compounds and plasma gases were analyzed. The ionization source consist of a cylindrical dielectric material sheath surrounding the plasma generation space and stainless steel tube that is held at ground. A brass ring affixed to the outside of the dielectric sheath functions as the high-voltage electrode. The ionization source is enclosed against the front of the MS to allow for control of the plasma gas with temperature and pressure held at ambient conditions. Sample gases flow through the inner stainless steel tube, while the plasma gas fills the enclosed source. In preliminary experiments, the plasma gas affected the ionization efficiency of the plasma source. Carbon dioxide produced dramatically lower signal intensities for the analytes tested when compared to compressed air, while argon showed improved results.

Behavioral Analysis of Rodent Models of Tauopathy

Mutations in tau protein lead to enhanced aggregation of tau in a class of dementias related to Alzheimer’s disease (AD), known as tauopathies. To understand how these mutations lead to neurodegeneration in AD, we overexpressed different tau variants in the brains of nontransgenic (NTG) mice and a mouse model of AD. We aged these mice and used a battery of tests to assess their behavior. We used Rotarod to test for general motor coordination; Y maze to test spatial memory and contextual fear conditioning (CFC) to test associative learning. Results were analyzed using 2 way Anova. Because body weight might correlate with their performance, mice were weighed regularly. We found that NTG mice expressing different tau variants perform equally well in rotarod and Y maze tests. A double mutation bearing tau variant caused impairment in the CFC test (p<0.001). In CRND8 mice that develops Alzheimer-type Aβ plaques, overexpression of this specific variant also led to CFC impairments, though the results are not statistically significant as limited mice were tested. This part of the project is still ongoing. Understanding how tau aggregation leads to behavioral impairment will enable us to understand the neurological basis of AD type neurodegeneration.
Foreign Body Response Examination in the Peripheral Nervous System to Implanted Tissue-Engineered Electrical Nerve Interfaces.

The development of working interfaces between technological devices and the nervous system can expand the clinical capability of devices to support patients with conditions such as missing limbs, blindness, deafness, or neurological disorders. In the case of an amputee, modern prosthetics are being developed that require a higher information bandwidth with the peripheral nervous system to provide sensory feedback and motor control to patients that better mimics natural movement and control. The Tissue-Engineered Electronic Neural Interface (TEENI) is a novel device that houses a flexible, bidirectional electrical interface that addresses this bandwidth problem. Our research here focuses on the uniformity of the foreign body response to this device. A stereotypical foreign body response (FBR) was observed in the area surrounding implanted device. To characterize the variability of the FBR to the TEENI, devices were implanted in the sciatic nerves of fourteen rats. After 6 weeks the devices were explanted and histological analysis was performed. From the histological data, statistical analysis was performed on various metrics that described the FBR across the animal cohort.

Impact of galactose on the physiology of Porphymonas gingivalis

Porphymonas gingivalis is a known etiologic agent of chronic periodontal disease that has the necessary enzymes encoded in the chromosome to metabolize glucose, yet in recent studies it has been shown to have little to no impact with P. gingivalis. In order to cause disease, dental pathogens like P. gingivalis need to internalize and catabolize carbohydrates. Salivary proteins are covered in carbohydrates, including galactose, which is the primary reason we are investigating its effects on the physiology of P. gingivalis. To characterize the physiology of P. gingivalis strain W83 and its derivatives we inoculated them with TSBHK and varying amounts of galactose (.1%, .5%, .01%) at different times in the bacterial growth phases. As a result, we showed that in different Porphymonas gingivalis strains, there was a noticeable increase in optical density when galactose was added. All strains tended to swell up in stationary phase and factors like intracellular carbohydrates, capsule presentation and O-LPS were not affected by the addition of galactose. Overall, the effect seems to be due to a general stress response with a small increase in intracellular sugar and no apparent change in protein production.
PRESENTER(S): Gough, Elle  
AUTHOR(S): Elle Gough  
FACULTY MENTOR: Christopher McCarty

Identifying Victims of Human Trafficking on International and Domestic Flights

This research aims to determine if the current protocols on International and Domestic flights regarding persons traveling against their will can lead to the identification and intervention for victims of human trafficking. Research will be conducted through a Qualtrics survey, in addition to article reviews. The results will draw from the quantitative data gathered from participants inside the flight and TSA industries as reported in the survey. The research will thus reflect on how the flight industry is currently handling situations of human trafficking on flights, and how these methods can be improved.

PRESENTER(S): Graydon, Elizabeth  
AUTHOR(S): Elizabeth Graydon, Adam Huys, Stephanie Karst  
FACULTY MENTOR: Stephanie Karst

mTOR Signaling Pathway’s Affect on Human Norovirus Replication

Human norovirus (HuNoV), the leading cause of gastroenteritis worldwide, currently has no antivirals or vaccines. Historically, the greatest impediment to the development of antivirals and vaccines towards HuNoV has been the inability to culture the virus. Recently, our lab discovered that B cells support HuNoV replication in vitro. To enhance the robustness of viral replication in the B cell system, we generated a single gene B cell knockout library using a genome-scale CRISPR-Cas9 knockout lentivirus library to identify genes that influenced viral replication. This screen identified several candidate genes that function in the mammalian target of rapamycin (mTOR) signaling pathway, which is well-established to affect numerous other viruses. From this data, we hypothesized that manipulation of the mTOR signaling pathway would lead to enhanced HuNoV replication. To test this, we examined the effects mTOR inhibitors had on HuNoV replication. Our preliminary study using rapamycin to inhibit the mTOR pathway led to a decrease in HuNoV replication by 35%. These preliminary results suggest that the mTOR pathway is involved in HuNoV replication, specifically that inhibition of the pathway leads to a decrease in HuNoV replication. We are optimistic that augmenting the mTOR pathway will lead to an enhanced HuNoV replication.
Assessing the Effects of Dance on Menstrual Symptoms

Dance has the potential to be an effective approach for reducing menstrual symptoms. Physical activity and mindfulness have been found to reduce menstrual symptoms. While there are limited findings on dance and menstrual symptoms, there are studies that suggest a need for more research. The current study is designed to assess the potential impact of dancing on menstrual pain among University of Florida dance majors and minors. Surveys administered over a three-month period of time are being used to evaluate participant’s physical, emotional, and behavioral symptoms during the first three days of their menstrual cycle with measurement points before and after participation in a dance class. At its endpoint, the study will evaluate the change in physical, emotional, and behavior symptoms and to determine if dance has the potential to be an effective method for menstrual symptom relief.

Evidence of Multiple Beam Interactions in the Ionosphere Observed during HAARP Experiments

The nonlinear interactions that occur between multiple high power radio waves in the lower ionosphere are experimentally investigated at the High Power Active Auroral Research Program (HAARP) Observatory in Gakona, Alaska. The interactions are evidenced by the generation of extremely low frequency/very low frequency (ELF/VLF, 500 Hz - 10 kHz) radio waves at specific frequencies. Both of the high power radio waves are amplitude modulated, and the side lobes of the two waves are shown to strongly interact and produce ELF/VLF waves at discernably different frequencies. Based on the observations, we are able to quantify the relative importance of high power radio wave interactions that occur in the ionosphere. We demonstrate that the amplitude of ELF/VLF waves decreases by either 6 or 12 dB per interaction order, depending on the type of interaction that produced the ELF/VLF wave.
Evaluating a Mouse Model of Duchenne Muscular Dystrophy at a Young Age with Magnetic Resonance Imaging and Spectroscopy

Background: Duchenne muscular dystrophy (DMD), an X-linked disorder, leads to progressive muscle weakness, and ultimately results in premature death. With many ongoing clinical trials, there is a need for objective biomarkers to detect disease progression and the efficacy of potential interventions. The aim of this study was to compare mdx and wild-type mice in lower hind limb at different stages in the disease process, using 31P-magnetic resonance spectroscopy (31P-MRS) including a young age.

Methods: 10 mice (5 mdx and 5 controls) were tested at the age of 4 weeks and at age of 16 weeks in this study. 31P-MRS was used to measure resting energetic status, including phosphodiesters (PDE), inorganic phosphate (Pi), phosphocreatine (PCr), and ATP in lower hindlimb muscles. Data were analyzed using a two-tail t-test and significance was set at p<0.05.

Results: Significant differences were observed between mdx and control mice for PCr/γATP at 4 weeks of age and in Pi/PCr and PDE/ATP at 16 weeks of age.

Conclusion: This preliminary data shows that 31P-MRS can be used as a sensitive biomarker to detect disease progression at different stages in dystrophic mice.

Detection of Tfap2 Family Proteins in Developing Mouse Teeth

Mammalian teeth develop from two tissues, dental mesenchyme and dental epithelium. The dental mesenchyme is composed of cells derived from the neural crest, a cell population which forms early in development and goes on to form many structures in the developing embryo, including teeth. Many genes are necessary for proper tooth development. AP-2 transcription factors are involved in cell proliferation and apoptosis during neural crest development and it is known that transcription factor AP-2 alpha (Tfap2a) is necessary for craniofacial development in mice. The research question we are addressing is: are AP-2a, AP-2b, and AP-2c proteins present in neural crest-derived cells during tooth development? We have already ascertained the presence of Tfap2a and Tfap2b mRNA in developing mouse teeth. Subsequently, we need to confirm the location of these protein products, AP-2a and AP-2b, as well as a related protein, AP-2c. We employ immunohistochemistry (IHC) to detect proteins on histological sections from wild-type and transgenic embryonic mouse heads. In these transgenic mice, neural crest-derived cells fluoresce green and IHC reveals red fluorescent AP-2 proteins. In wild type mice, we have documented the presence of AP-2a protein in the molar epithelium and we are currently examining AP-2 proteins in transgenic mice.
Engineering Zinc Finger Proteins to Block Transcription of Disease-causing DNA Repeat Expansions

Amyotrophic lateral sclerosis (ALS) and myotonic dystrophy (DM) are neuromuscular disorders caused by tandem repeat expansions in DNA. After transcription, repeat expansions of (GGGGCC)<sub>n</sub> and (CTG)<sub>n</sub> in DNA for ALS and DM, respectively, produce repeat-containing RNA that gain several toxic functions including protein sequestration and aberrant translation to form aggregating peptide repeats. Through the design and implementation of selective DNA binding proteins, we hope to achieve a transcription "blockade" to prevent the production of toxic repeat-containing RNA. Our aim is to engineer zinc finger (ZF) proteins that will specifically recognize, bind and repress transcription of (GGGGCC)<sub>n</sub> and (CTG)<sub>n</sub> repeats. Using online bioinformatics software, ZF domains predicted to bind to the repeats of interest were identified. DNA encoding the domains was cloned into bacterial expression vectors for protein production. Protein was induced and purified from bacterial cells. Initial electrophoretic mobility shift assay (EMSA) and in vitro transcription assay results for the purified ZFs show selective binding to repeats and reduced expression of the CTG repeat expansion. After optimization of protein production, we will test direct delivery of engineered ZF proteins in patient cells. Targeting RNA toxicity in ALS and DM using engineered ZF proteins provides a novel therapeutic strategy to explore.

Reducing our Dependence on Synthetic Antibiotics by Targeting Instances of Food-borne Illness and Alternative Treatments

The World Health organization issued a warning in 2017 stating that at the rapid pace at which bacteria are evolving to become drug-resistant, deadly “superbugs” were like. The root of this problem lies in the misuse of antibiotics. A major contributor to the misuse of antibiotics is food-borne illness. This experiment compared the antibacterial properties in natural products as an alternative to synthetically produced antibiotics against common food-borne pathogens. We aim to not only educate the public about the growing problem of antibiotic resistant strains of bacteria but, to also present an accessible solution. We chose specific natural antibacterial products that are culinarily compatible with the food that the pathogen tends to spread through. The methodology of our experiment mimicked routines that every day people could seamlessly incorporate into their meal preparation routines. Our findings showed that the ability of natural antibiotics to inhibit bacterial growth is comparable to synthetic antibiotics. The application of the findings of this experiment will greatly reduce food-borne illness and the over-prescription of antibiotics. As a result, this will reduce the rate at which we are creating antibiotic-resistant bacteria.
Effects of Rab10 Protein Overexpression on Beta-amyloid Protein Plaque Formation

Alzheimer's disease, a major leading cause of death, is characterized by the accumulation of beta-amyloid protein plaques between the neurons of the brain. The hallmark toxic plaques are formed from abnormal processing of the amyloid precursor protein, which is widespread in the central nervous system. To further explore how beta-amyloid plaques build up in the brain, this study focuses on the effects of the protein Rab10, which in a previous paper, was shown to increase amyloid beta peptide production by up to 40% in a cell line. To study the influence of Rab10 in the brain, we created AAV vectors that will allow us to over-express Rab10 in mouse models relevant to Alzheimer's disease. We will evaluate the brains of the mice to determine how overexpression of Rab10 affects their disease course.

Reverse Payment Settlements in the Midst of Actavis

There is a natural tension between the Patent Act, which confers legal monopolies on inventors, and the Sherman Act, which is intended to protect and promote competition. Following a threat of generic entry, pioneer firms often file patent infringement suits. In many instances, the suit is settled. Ordinarily, the defendant pays the victim in a suit. In many pharmaceutical cases, however, the patentee pays the prospective infringer, making the payment reversed. Antitrust challenges to reverse payment settlements have been confused due to a lack of Supreme Court guidance regarding this practice. In 2013, the Supreme Court did not fully embrace the opportunity for clarification and guidance in its FTC v. Actavis, INC. opinion. In the wake of this ambiguity, this paper serves to evaluate variations in settlement decisions and examine their economic consequences. Although policy suggestions are complicated, it was found that a close analysis of reverse payments deters firms from making suspicious payments. It is also found that the first generic that successfully defeats the patent owner should hold the 180-day exclusivity to reduce the incentive to settle. While these solutions will not fix all threats to competition in the pharmaceutical industry, it is a significant start.
Understanding the Needs of Incoming College Freshmen: The Parent Perspective

In the last few years, there has been an increase in reported difficulties related to adjusting to college. While work has been done to analyze how college students perceive themselves related to several domains, such as mental health and physical fitness, there is little research to examine parental perception of college student functioning during the transition into college. Furthermore, there is reason to believe that students may differ in their perceived readiness for college based on their gender and socioeconomic status (SES). Using an anonymous survey, this study examined the extent to which 714 parents of students at the University of Florida perceived their college student as being prepared for university life on the domains of time management, social and emotional functioning, and general life skills. ANOVA analyses were conducted to determine group differences. Overall, significant differences by gender were found, with female students outscoring their male peers in many areas, as reported by their parents. Surprisingly, very few significant differences were found based on SES. Where there were differences, the low SES group outperformed their high SES counterparts. As universities consider the needs of incoming students, they may wish to be more intentional with how they target specific populations.

Targeting the Akt Pathway in Small Cell Lung Cancer

This year, 234,030 Americans are expected to be diagnosed with lung cancer, with small cell lung cancer (SCLC) comprising 10-15% of cases. SCLC initially responds well to standard-of-care cisplatin chemotherapy; however, cisplatin-resistant SCLC (CR-SCLC) relapses within 5-15 months, and patients with relapsed SCLC have a median survival of 2-6 months. Furthermore, the roles of PTEN and the PI3K-Akt pathway are becoming increasingly important in SCLC. Thus, an investigation into new drug targets for CR-SCLC and PTEN-deficient SCLC is warranted. This study compared the Akt pathway in CR-SCLC and PTEN-deficient SCLC cell lines developed from genetically-engineered mouse models (GEMMs). We developed a CR-SCLC cell line with five-fold increased resistance to cisplatin compared to the naïve parental control. Furthermore, mTOR-inhibitor Everolimus was evaluated in CR-SCLC and PTEN-deficient cell lines. Phospho-Akt and phospho-p70 expression was increased in CR-SCLC and PTEN-deficient cell lines compared to PTEN-wildtype, cisplatin-naïve SCLC cell lines. Interestingly, PTEN expression dropped in CR-SCLC cell lines. Additionally, Everolimus inhibited cell growth in CR-SCLC and PTEN-deficient cell lines more than controls. This study characterized three novel SCLC cell lines identifying signaling pathway alternations involved in cell growth and metastatic potential, revealing new potential therapeutic approaches for CR-SCLC and PTEN-deficient SCLC.
A Bilingual Benefit to Bouba Kiki? How Language Experience Modulates Performance on Sound Symbolism Tasks

Some words have sound-symbolism, a property in which a word's phonemes or sounds are linked to their meaning. This association allows non-speakers of languages to guess the meaning of unfamiliar foreign words at a rate greater than chance. Previous research has shown that people demonstrate sensitivity to nonwords that feel inherently round and sharp (e.g. “maluma” and “takete”) by matching them to rounded and angular shapes. While these effects are documented in children and adults, no study has examined how language experience affects bilinguals' performance on sound-symbolism tasks. This study investigates if Spanish-English bilinguals exhibit an advantage over English monolinguals in three sound-symbolism tasks. One task required choosing the meaning of an unfamiliar foreign word from an English antonym pair (round or sharp). The second task assigned sound-symbolic labels to round and jagged shapes. The third task indirectly tested participants’ awareness of relationships between shapes and vowel sounds. I hypothesize that bilinguals’ access to multiple sets of phonemes and familiarity with maintaining multiple representations for singular concepts, will lead to higher accuracy on these tasks. If found, these results will demonstrate the importance of sound symbolism to language development and another domain in which bilinguals possess a cognitive advantage.

Social Media for Clinical Trials

Social media has become one of the most useful tools for two-way communication. Facebook and twitter can be used to connect patients with clinical trials more effectively.

Three different message strategies will be tested on three different audiences. The three message strategies are: altruistic, informational and narrative. The three audiences we will test are: patients, loved ones and physicians. The effectiveness of each message strategy will be evaluated for each audience using two different metrics. Those metrics are clicks, which are visits to the desired web page; and engagement, which includes audience interaction with content such as shares, likes, retweets and comments. Hopefully this will lead to a future where patients are much more easily connected with needed clinical trials.
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Development of a reporter to identify small molecules for mitochondrial biogenesis

Retinal degeneration is a diverse family of diseases affecting the vision of over 9 million people in the US. Currently, there are limited treatment options available for patients suffering from these diseases. Mitochondrial dysfunction has been linked to the pathogenesis and progression of many forms of retinal degeneration. Therapies that promote healthy mitochondria and stimulate mitochondrial biogenesis have the potential to slow the rate of degeneration. In this study, we describe the development of a reporter that is based on the Tfm gene. This gene is known to be involved in the replication and transcription of the mitochondrial genome. This reporter will ultimately be used in a drug screen to identify pharmaceutical compounds that can stimulate mitochondrial biogenesis.
Evaluating AAV Capsids and Promoters Combinations to Transduce Various Cell-Types in the Mouse Brain

The CNS is composed of many different cell types, including neurons, microglia, oligodendrocytes, astrocytes, and neuroglial progenitors. Being able to deliver a transgene to each of the different cell types is a valuable tool for the scientific community with both basic research and therapeutic applications. rAAV vectors have emerged as powerful tools to transduce the CNS. Here we undertook a systematic study to examine how rAAV vectors utilizing different promoters could lead to cell-type specific transduction in the brain. SYN and NSE promoters are designed to target neurons, CD68 promoter to target microglia, MBP promoter to target oligodendrocytes, the nestin promoter to target neuroglia progenitor cells, GFAP and BLBP promoters to target astrocytes, and the minTK promoter targets all cells. Notably, the minTK promoter was used to enable larger cDNAs to be inserted into the rAAV vector. Neonatal mouse pups (p0) were injected in the brain ventricle with rAAV vectors expressing EGFP under control of the various promoters. All rAAV vectors were packed into AAV8 capsids except for those using the CD68 promoter that were packaged using an AAV6 triple mutant capsid (Y731F/Y705F/T492V). We compared transgene expression by immunostaining for EGFP at 15 and 30 days of injection.

The Investigation of Embedded Effort Measures Using the Children’s Memory Scale (CMS)

Effort testing is an essential component of pediatric neuropsychological assessments to validate test results. They are a necessary measure to ensure the patient’s performance is reflective of their potential ability. Previous research has been largely limited to adult populations, with an absence of effort research in children. Studies in adults indicate the usefulness of multiple measures of effort throughout assessment. Embedded measures can improve effort testing. This study aimed to investigate novel, embedded effort measures using a recognition task on the CMS, and to compare the usefulness of the new effort measures to an established embedded effort measure, the Reliable Digit Span (RDS). The CMS Word Pairs 2 Delayed Recognition (CMS WP-DR) was analyzed for clinical use as an embedded measure of effort.
Effect of Harvesting Frequency on Microalgal Productivity

Many factors contribute to algal productivity including availability of light and nutrients, pH, temperature, algae species, and retention time. The objective of this study was to evaluate the effect of harvesting frequency on microalgal productivity. Microalgal polycultures were maintained in two 1000-L outdoor raceway ponds with periodic addition of nutrients, an on-demand supply of carbon dioxide for pH control and carbon addition, and removal of 50% of the biomass during regular harvest intervals. Representative samples were collected (in triplicate) during harvest and evaluated for pH, temperature, and total and volatile suspended solids (VSS). Predominant algae genera were identified using light microscopy. Algal productivity was calculated based on the accumulation of VSS over the specific algal growth period (i.e. time between harvests) and is expressed as gVSS/m²-day. The results indicate that when the harvesting frequencies were increased from 2 to 3 to 4 times per week, average productivity increased from 8.3 to 11.7 to 16.1 gVSS/m²-day in Pond A and from 9.0 to 13.3 to 16.3 gVSS/m²-day in Pond B. Thus, nearly twice as much biomass can be produced from microalgal ponds when harvesting frequencies are increased from 2 to 4 times per week.

Sex Differences in the Acute Analgesic Effects of a Sub-Intoxicating Dose of Alcohol

Scant literature addresses the acute analgesic effects of sub-intoxicating alcohol intake and potentially critical underlying factors. We examined sex as a potential moderator of alcohol analgesia, and the association between subjective alcohol effects and perceived pain. Healthy volunteers (N=12; 6 women) between 25-45 years of age completed two sessions: placebo and moderate alcohol (.065 g/dL target BrAC). Participants completed the Subjective Effects of Alcohol Scale (SEAS), which measures High+ ("lively"), High- ("aggressive"), Low+ ("mellow"), and Low- ("dizzy") feelings from alcohol use. Heat pain threshold and tolerance was assessed, and participants indicated perceived beverage-related relief from pain. Effects of sex, dose, and their interaction on threshold, tolerance, and relief were evaluated. Finally, sex was tested as a moderator of the association between SEAS factors and pain relief. Results indicated a significant sex X condition interaction for pain threshold; alcohol significantly increased pain threshold for women, but not men. Across participants, alcohol produced significantly higher ratings of relief than placebo. Finally, women, but not men, showed a strong positive relationship between High+ feelings and relief. Although preliminary, results indicate alcohol intake produces increased heat pain threshold and significant pain relief. Furthermore, sex/gender is an important consideration in investigations of alcohol analgesia.
**Visual feedback manipulation during split-belt walking**

We adapt to changes in the walking environment (locomotor adaptation) through predictive motor actions and sensorimotor feedback. Vision provides feedback to the locomotor system on a step by step basis and to help with route planning to a destination. The purpose of this study was to better understand the effects of visual feedback conditions on locomotor adaptation. Participants walked on a split-belt treadmill under three conditions: asymmetric belt speeds (2:1 split; adapt), symmetric speeds (washout), and then asymmetric speeds again (re-adapt). Participants were randomized to one of three groups: complete visual feedback occlusion, lower visual field occlusion, and no visual impediment. A series of repeated measures MANOVAs were used to examine the influence of group and walking condition on gait parameters. The complete visual occlusion group walked with larger gait asymmetry during washout and re-adapt compared to the no impediment group, and walked with larger step length and double support time variability compared to other groups. These results indicate partial visual field occlusion does not significantly affect locomotor adaption, whereas complete occlusion produces robust aftereffects but results in equivalent or worse retention during re-adapt. Overall, visual feedback manipulation had little effect on locomotor adaptation and retention during re-adapt.

**Swimming up the Land Bridge: The Dispersal and Evolution of the Drum Aplodinotu**

The purpose of this study is to identify and analyze specimens of a new taxon of drum fish that was found at the Montbrook fossil site, a late Miocene (5.5 – 5 MYA) locality a few miles south of Williston, FL. Morphological comparisons to modern drum taxa indicate that this is an ancestral freshwater drum, Aplodinotus new species., and the earliest example of the genus in North America. This suggests that the earliest members of Aplodinotus arrived as a part of the Great American Interchange using ancient river systems, yet the modern freshwater drum, Aplodinotus grunniens, evolved in North American river systems. Furthermore, the presence of this drum at the Montbrook site serves as a useful indicator of both the decreasing salinity of the region as well as the changing mollusc fauna, a primary food item of the drum family. The GABI typically describes dispersals of extinct mammals; the current study is novel because it describes the northward dispersal of a bony fish taxon.
The Effect of Snorkeling Tourism on Fish Perception of Risk in Quintana Roo, Mexico

Fear in animals influences their risk-taking behaviors. Since this feeling impacts how an animal conducts itself, it can be inferred that it can affect their fitness. It is known that the presence of spearfishing can make fish act more cautiously, but it’s unclear if the effect is the same with snorkelers. Snorkel based tourism has increased dramatically in Quintana Roo, Mexico over the past several years. While it is clear that an increase in snorkel tourism has had a detrimental effect on the health of the reefs, what is still unclear is how a high volume of snorkelers is affecting fear in fish inhabiting the coral reefs. To gauge fear in fish, we measured the flight initiation distance (FID) of several herbivorous fish species by approaching fish and measuring the distance at which they fled from the approaching snorkeler in two different bays in Akumal, Quintana Roo, Mexico. We hypothesize that fish further from the tourism hotspot will have a significantly larger FID than fish closer to hotspots. We will also evaluate whether fish in Jade Bay also demonstrate behaviors that display higher levels of fear, such as traveling in groups and hiding in refuges upon approach by snorkelers.

Viruses Can't Take the Heat

Viruses are the most diverse and abundant “forms of life” on Earth. They significantly impact human health and are integral to ecosystem functions. Developing our understanding of viral evolution and infectivity requires improved knowledge of basic life history features which govern their persistence (i.e., survival, growth and reproduction). Here we examine the effect of temperature on virus mortality (i.e., decay) rate across diverse environments and genome types (dsDNA, ssDNA, etc.). Temperature is a known primary determinant of virus decay rate. Establishing a general relationship between temperature and decay will provide a basis for assessment of other possible decay factors. We find that across all species, virus survival decreases about 2-fold per 10°C increase in temperature, and this explains about 67% of the variation. There are three proposed hypothesis for the observed relationship: decay rate is proportional to DNA decay rate, decay rate is proportional to virus multiplication rate and decay rate is proportional to host decay rate. Once we established the temperature-decay relationship, we compared the proposed hypotheses. Based on preliminary analyses it seems that DNA decay is an unlikely explanation for the observed pattern but that a co-evolutionary pairing of viral and host decay rate is possible.
Effects of acute exposure to cannabis smoke on working memory

Cannabis is the most widely used illicit drug in the United States and worldwide, and cannabis use is reported to cause cognitive impairments. Studies in animal models show that acute administration of delta-9-tetrahydrocannabinol (THC, the primary psychoactive component of cannabis) or synthetic cannabinoid receptor type 1 (CB1) agonists can impair performance on cognitive tasks that depend upon the hippocampus and prefrontal cortex. Given that the primary route of cannabis use in humans is through smoking, however, there is comparatively little research in animal models that has investigated this route of administration. The primary goal of these experiments was to determine how acute exposure to cannabis smoke affects performance in a delayed response working memory task in rats that depends upon the integrity of the prefrontal cortex. A secondary goal was to determine whether any such effects differ in males and females, as there are reported sex differences in sensitivity to cannabinoids.

Black Women’s Empowerment and Health Ministries in the African American Church: A Research Review

Historically, black women have been exploited and discriminated by the institution of medicine, due to their intersectional place in society as both black and female. This research analyzed black women’s relationship with medicine from the Antebellum period to today and their present role in health ministries (HMs). Due to historical oppression and a lack of cultural competency/sensitivity in medicine and growing health disparities in the black community, HMs were created. This research focuses on HMs’ black women’s engagement in HMs and empowerment.

Methods
Nine articles focusing on the black church, empowerment, and health ministries were reviewed. Key phrases such as “African American Health Ministries and “Black Church and Health” were examined using Google Scholar. Additionally, focused on black women’s health history (e.g., Jenkin Schwartz’s Birthing a Slave) were analyzed.

Results
Evidence from the existing literature suggests that black women are more proactive members and hold more leadership positions in HMs than men. As a result of their participation, they are more likely to obtain relevant health information.

Conclusion: The historical and present significance of the African American church makes the Church an ideal setting for health interventions. HMs are essential in empowering black women. HMs allow black women to reclaim their health culture and challenges traditional gender roles in the church. This research indicates more studies are necessary on African American churches’ HMs.
**Is There Feminism in Saudi Arabia?**

The use of the word feminism might be problematic in trying to describe women’s movement in Saudi Arabia because of historical and social factors associated with the feminist movement. Feminism is a movement that developed out of Western context and discourse, therefore it might not properly describe what is taking place in Saudi Arabia. A comparison between women’s movements in Saudi Arabia and the Western feminist movement reveals important differences. This, however, does not mean that Saudis are not preoccupied by the theme of justice as it pertains to gender issues. The aim of this research is thus to challenge the view that Saudi women have no agency and to explore the ways they seek to shape their society and challenge oppressive systems from within their own culture and worldview. This research will discuss why feminist theory may not be the ideal, and certainly not the only system that can address oppressive systems in non-Western societies, including Saudi Arabia. Additionally, this research will describe and analyze the ways in which Saudi women are working towards defining their own views of equity and creating women’s movement within their society.

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**Immersed in Sweetness: Using Virtual Reality to Explore Perils of Sugar Overconsumption**

Sugar overconsumption is a major health risk that adversely affects both physical and social well-being. Much of the information about the dangers of overconsumption is only available through traditional communication mediums like text, which makes it less accessible and comprehensible to the public. One promising medium for conveying the effects of sugar and influencing health behaviors is virtual reality (VR). The Media Effects and Technology Lab (METL) is conducting two experiments to study the efficacy of VR simulations in influencing attitudes and behaviors towards overconsumption of sugar. These studies aim to test the effectiveness of communicating sugar overconsumption through various medium platforms (text, video, VR). Previous VR-based interventions have suggested that behavioral changes can be obtained by allowing users to make choices in an interactive VR environment and then providing impactful visualizations of the resulting futures arising from their choices. METL has built an immersive and interactive VR simulation (with the option to vary the levels of user interactivity), a video, and a text document that illustrate both long and short-term effects of sugar overconsumption. Messages disseminated with these media platforms are being evaluated currently through two research studies to examine effects on attitudes, cognitions, and behaviors.
Impregnating Activated Carbon with Iron Salts to Increase Hydrogen Sulfide Removal

Hydrogen sulfide (H2S) emissions from landfills negatively impact surrounding communities. In addition to an unpleasant, rotten-egg odor, inhalation of the gas can cause respiratory distress and irritation. Peak emissions are released from C&D landfills through the decomposition of gypsum drywall. Current removal technologies are costly and often ineffective. The goal of this research was to develop a cost-effective method geared toward H2S removal. Preliminary research revealed an increase in adsorption capacity through the addition of iron salts, FeCl3 and FeSO4, to activated carbon at a 5:1 carbon to iron ratio. To evaluate the effect of heat treatments on iron oxide formation, and subsequent adsorption capacity, samples were divided into heat treatment groups of 250ºC, 450ºC, and 650ºC. Samples were flushed with 100 ppm of H2S under N2 at 250 ml/min for two hours. Over this time duration, samples subjected to higher temperature heat treatments showed increased adsorption capacity. All heat treated samples demonstrated higher adsorption compared to the baseline non-heat treated samples. Additional research will be conducted to assess the effect of heat treatments above 650ºC.

Analysis of ATG Batch Variability towards Understanding of Low-Dose ATG Mechanism in Type 1 Diabetes

Type 1 Diabetes (T1D) is an autoimmune disease caused by T cell-mediated destruction of the insulin-producing beta cells in the pancreas. Loss of beta cells results in inadequate glucose regulation. Numerous immunotherapeutic approaches have been utilized in clinical trials for individuals with T1D. We have been involved in trials utilizing the FDA-approved immunomodulatory agents anti-thymocyte globulin (ATG, trade name: Thymoglobulin) and granulocyte colony stimulating factor (GCSF, trade name: Neulasta). These agents are capable of long-term C-peptide preservation in a subset of treated individuals; however, the mechanism of drug action remains elusive. To understand the benefit observed in clinical trials, it was necessary perform functional studies using a mouse version of ATG, mATG. Production of mATG resulted in significant differences in batch efficacy (3 batches) in two different mouse models of disease. Batch 1 was most effective in disease prevention in both models (Figure 1). Analysis of in vitro coating assays utilizing Batches 1, 2, and 3 show a population of lymphocytes and granulocytes bound by Batch 1, but not by Batch 2 and 3. Understanding of mATG binding properties in the context of the model organism will help to clarify how ATG may be acting in the human population.
Devices: Where did these protons come from? Rhizosphere acidification in acid-loving plants

Soil pH is a major factor mediating plant performance and ecological fitness. Plants modify rhizosphere pH through nutrient uptake and root exudation. Previous studies show when soil pH is high, plants acidified their rhizosphere via H+-ATPase-mediated proton extrusion (direct acidification). Additionally, ammonium uptake lowers rhizosphere pH (nutrient uptake-related acidification). These processes are relevant for acid-loving plants, yet the relative contribution of each of these processes to plant performance has not been investigated. We hypothesized that ammonium uptake plays a greater role than H+-ATPase-mediated rhizosphere acidification in Vaccinium spp. To test this hypothesis, we used Vaccinium corymbosum interspecific hybrids as a model for acid-loving plants. We grew rooted cuttings in hydroponic solution containing nitrate, ammonium, or glutamine as the N source, comparing rhizosphere pH to plants transiently grown without N. We found that N form was a significant driver of rhizosphere pH. Ammonium uptake led to rhizosphere acidification while nitrate uptake led to alkalization. Ammonium uptake down-regulated the activity of NR, limiting the effect nitrate uptake has in rhizosphere pH. In absence of N, pH was also lowered, suggesting direct rhizosphere acidification occurred. Altogether, these results suggest nutrient uptake-related rhizosphere acidification plays a pivotal role in soil adaptation of Vaccinium corymbosum.

Characterization of Hafnium-Zirconium Oxide Thin Films for Nonvolatile Ferroelectric Memory Devices

Ferroelectric nonvolatile memory devices serve as a potential alternative to traditional FLASH nonvolatile memory devices because of their lower write power and much greater cycling endurance. However, ferroelectric memory devices typically have a lower storage capacity than traditional devices. Thus, there is a need to improve the scalability of ferroelectric nonvolatile memory devices. In this study, Hafnium-Zirconium Oxide (HZO) thin films were investigated by measuring the polarization of the devices as a function of cycling through the hysteresis and PUND measurement techniques. It was found that the thin films with a metal-ferroelectric-metal (MFM) structure had much greater retention than the thin films with a metal-ferroelectric-semiconductor (MFS) structure. These findings suggest that the MFM thin films serve as a possible candidate for the development of ferroelectric nonvolatile memory devices. Furthermore, this study serves as a starting point for causes of device fatigue within HZO thin films.
Deep Brain Stimulation in Essential Tremor: Tremor and Dysmetria in the Upper and Lower Limb

Essential tremor (ET) is a common movement disorder in humans. Its hallmark symptom is a 4-8 Hz action tremor of the upper limbs. Deep brain stimulation (DBS) can reduce tremor amplitude and improve quality of life. However, it remains unknown whether DBS improves tremor and accuracy of goal-directed movements. Here, we test whether DBS reduces upper and lower limb tremor and dysmetria (movement error) in ET. Nineteen ET patients treated with DBS and 10 healthy controls performed goal-directed movements with the wrist and ankle joint. ET performed the session twice, once with DBS on and once with DBS off. We quantified tremor and dysmetria of the goal-directed movements. When DBS was off, ET exhibited greater tremor and dysmetria than healthy controls for the wrist and ankle joints (all P<0.05). Turning DBS on, reduced the tremor amplitude of the wrist (P=0.04) but not the tremor of the ankle (P = 0.66) during goal-directed movements. However, DBS did not reduce dysmetria for neither the wrist (P = 0.3) nor ankle (P = 0.08). Our findings suggest that although DBS can reduce the tremor of the upper limb, it has no significant effect on lower limb tremor or upper and lower limb dysmetria.

RFI Mitigation for Ultra-wideband Radar

Radio frequency interference (RFI) sources such as commercial radio/TV broadcasts, cell phones, etc. may severely hinder the performance of ultra-wideband radar systems due to the bandwidth shared by the RFI sources and the radar pulse. Fortunately, the signal energy of typical RFI is concentrated in narrow frequency bands, lending the RFI removal task to a sparsity-inducing estimation approach. Two novel, hyperparameter-free methods, CLEAN+BIC and SPICE (SParse Iterative Covariance Estimation), exploit the RFI's known structure to construct an estimate of the interference, which is then subtracted from the record, thus yielding an estimate of the radar echo. Their performance is compared to other contemporary methods in a simulated interference environment consisting of an actual RFI recording that has been scaled and added to a clean radar signal.
Comparison of phytophthora nicotianae isolates from Ecuador and Costa Rica reveal similar origins

Phytophthora, meaning plant destroyer, is a genus of oomycetes that has caused environmental and economic damage across the globe. It is comprised of over 100 known species and hundreds more are believed to exist. P. nicotianae can be found in various habitats such as watersheds, vegetables, herbs, forest trees, mountain ecosystems, and recycled irrigation water. In Costa Rica and Ecuador, there have been occurrences of heart rot disease in pineapple caused by P. nicotianae. This disease has led to reduced crop yields as well as increasing pest management costs.

The objective of this study was to determine the genetic variation between P. nicotianae causing pineapple heart rot disease in Ecuador and Costa Rica. Due to a history of exporting pineapples from Costa Rica to Ecuador, I hypothesized that the genotypes of the pathogens from the two countries would be similar. Thirty isolates were collected from Ecuador and thirteen were obtained from Costa Rica. After DNA was extracted from the samples, the cox2 mitochondrial gene was sequenced and compared among isolates. Thus far, results from gene sequencing support the hypothesis that the pineapple root rot in Ecuador originated from Costa Rica. Microsatellite genotyping will be conducted to confirm this result.

Viscous Effects of Ethylene Glycol in the Electrodeposition of Copper in a Cu-Cu Electrochemical System

Electrodeposition is the process by which metal ions are deposited by reduction onto a cathode surface. Different instability phenomena affect how these patterns form and which morphologies are observed. Surface tension plays an important role in the formation of patterns. As such, this paper seeks to understand the changes in pattern morphology that should be observed in an electrochemical cell when changing the surface tension of the electrolyte solution by changing its viscosity. Surface tension and viscosity are known to be related, and as one changes the other should change as well. Ethylene glycol has been chosen for the purposes of this experiment. When added in a weight percent basis to the electrolyte solution, changes in morphology were indeed observed. Reduction in dendrite formation, and more defined patterns were found. Overall, it was observed that as ethylene glycol increased in weight concentration, viscosity increased, ion conductivity decreased, lower current outputs were observed, and dendrite formation reduced due to a decrease in mass convection.
PRESENTER(S): Karg, Josh  
AUTHOR(S): Josh Karg  
FACULTY MENTOR: Susan O’Brien

Sexual, Social, and Economic Liberation; The Struggle of Female Football in Nigeria

My research focuses on female football (soccer) in Nigeria. The questions that were of importance to me centered around how these women become successful with many obstacles, and how women’s football benefits Nigerian society as a whole. To properly evaluate the situation, I traveled to Nigeria with my mentor, Dr. O’Brien, and conducted interviews with players, coaches, and administrators of the Nigerian Football Federation. I supplemented these interviews with analysis of archived Nigerian newspapers regarding women’s football and the inclusion of scholarly articles about the subject. Nigerian women’s football is regarded as the best on the African continent, the obstacles they face include discrimination based on gender and sexuality, social and religious factors limiting the participation, and lack of financial support from private and government sectors. The sport can allow these women to secure financial security and bring international attention to Nigerians. As women’s soccer continues to grow across the globe, these Nigerian women can provide new international recognition for their success while continuing to expand the opportunities for women outside of traditional gender roles in sport.

PRESENTER(S): Kellaher, Grace  
FACULTY MENTOR: Chris Hass

Gender Differences in Gait during Forward Walking, Backward Walking, and Obstacle Crossing in Older Adults

Older adults’ (OA) reduced ability to adapt walking patterns puts them at risk for falling. Backward walking (BW) and obstacle crossing (OBS) are complex walking patterns requiring specific stepping strategies to maintain balance. More women fall each year than men, yet few studies evaluate gender differences in performance of these complex tasks. Therefore, we sought to determine if men and women perform complex walking tasks differently. Fifty-four OA walked under three conditions: forward walking (FW), BW, and OBS. Three-dimensional kinematics were recorded. Gait speed, step length, and step width were analyzed in a repeated measures MANOVA. Significant Gender×Task, Gender, and Task main effects were observed. Follow-up testing identified a significant interaction for gait speed and step length. Gait speed was not different between genders in any task. Compared to FW, men took shorter steps in BW and longer steps in OBS, and women took shorter steps in BW and maintained step length in OBS. Both increased step width during OBS and BW compared to FW, and increased step width during BW compared to OBS. Men and women demonstrated different stepping strategies during adaptive locomotor tasks. Using this knowledge, future studies should aim to predict falls based on these stepping patterns.
**PRESENTER(S):** Kelly, Marie  
**AUTHOR(S):** Marie Kelly, Tyler Fernandez, Xiao Rui Yang, Lei Liu, Sylvain Doré  
**FACULTY MENTOR:** Sylvain Doré

**Attenuated Spatiotemporal Reactive Astrogliosis Contributes to the Nrf2-Dependent Neuroprotection by Korean Red Ginseng against Cerebral Ischemic Damage**

The Nrf2 is an astrocyte-enriched transcriptional factor that regulates endogenous neuroprotection mechanisms for inflammation and oxidative stress. Our previous study indicated that Korean Red Ginseng (Ginseng), a widely used herbal medicine, protects against sensorimotor deficits after cerebral ischemia through Nrf2 pathway. In this study, the goal is to test whether Ginseng could prevent the deteriorative progression of lesion size in the early stage of cerebral ischemia (0-3 days), and whether reactive gliosis contribute to such effect in an Nrf2-dependent fashion. Adult Nrf2-/- and wildtype control (WT) mice were pretreated with Ginseng via gavage once-a-day for seven days before permanent distal middle cerebral artery occlusion (pdMCAO). Lesion volumes, astrocytic and microglial activation were determined by immunohistochemistry. Our results showed that ginseng pretreatment reduced ischemic lesion volume (36.37±7.45% on day 3) and attenuated the aggregation of reactive astrogliosis in a spatiotemporal pattern but not in microglia activation an effect which was lost in the Nrf2-/- mice. In contrast, Nrf2 deficiency mice exhibited exacerbated ischemic condition compared to WT controls. This indicated that the attenuated reactive astrogliosis contributes to the Nrf2 pathway related neuroprotection against acute ischemic outcome and substantially long-term sensorimotor deficits in the context of ischemic stroke under pdMCAO.

**PRESENTER(S):** Kennedy, Kelly Ann  
**AUTHOR(S):** Ann Kennedy, John Lai, Damian Adams  
**FACULTY MENTOR:** Damian Adams

**Palm Beach County Ecosystem Valuation Survey: Implications for Policy Decisions Regarding Natural Areas Program**

Palm Beach County’s Natural Areas Program is a valuable public conservation program intended to enhance ecosystem services like flood protection and reduced water pollution as well as offer nature-based activities such as hiking, bird-watching, and environmental education. For policy-makers, it is necessary to have current information about how constituents prefer to fund the program. In this study, a survey was used to analyze whether residents value ecosystems and how they prefer to pay for the Natural Areas Program. The analysis of ecosystem preferences focused on three primary habitats: forests, wetlands, and scrubs. Approximately 1,500 responses were collected online and through mail surveys during the summer of 2017. Using cross-tabulation and chi-squared summary statistics, we identified trends among residents’ preferences. Results suggest that while 51% of people older than 45 years old prefer to live near forest habitats, a majority of 57% would not support increasing taxes for the program. This suggests that though residents over 45 years of age value ecosystems protection, their support is limited perhaps by economic reasons. Identifying what limits public support for this program helps policymakers tailor the program to fit constituents’ desires. This research can ultimately increase funding for ecosystem conservation through the Natural Areas Program in Palm Beach County.
**PRESENTER(S):** Kepezhinskas, Nikita  
**AUTHOR(S):** Nikita Kepezhinskas, David Foster  
**FACULTY MENTOR:** David Foster

**Geology and Petrology of Bay Islands (Honduras): Implications for Geodynamic Evolution of the Southwest Caribbean**

Subduction zones are areas of immense tectonic complexity. Understanding these geologically active structures requires insights into many different geological environments and related rock complexes: sedimentary basins, high pressure metamorphics (eclogites, blueschists, granulites), syn- and post-kynematic granitoids, magmatic rocks related to ridge subduction (adakites), oceanic plateaus, ophiolites (both dismembered and intact), island arc and back-arc assemblages, as well as material off-scraped from subducting and overriding plates and accretionary wedges. Often, these rock units are amalgamated into tectonically mixed mélange composed of boudinaged material from the subducting oceanic lithosphere and overriding plate sources.

Detailed field and petrologic work conducted in 2017-2018 suggests that the Bay Islands (Honduras) provide a unique opportunity to investigate an unusually diverse accretionary complex composed of high-pressure metamorphic rocks, various mafic and ultramafic rocks, as well as metasedimentary rocks. Additionally, on the island of Guanaja, a newly discovered unit bearing striking resemblance to a dismembered ophiolite suite is of particular interest as ophiolites often mark boundaries (sutures) between major lithospheric plates (in this case, boundary between North American and Caribbean plates).

**PRESENTER(S):** Kirwan, Savannah  
**AUTHOR(S):** Savannah Kirwan, Regina Rodriguez, Dr. David Mazyck  
**FACULTY MENTOR:** David Mazyck

**Graphene Oxide’s Surface Chemistry Enhancement For Mercury Removal From Aqueous And Gas Phase Streams**

Graphite is a naturally occurring material that contains large quantities of carbon and is composed of parallel layers known as graphene sheets. By reacting graphite with an oxidizer, graphite oxide is produced which further separates the graphene oxide sheets and alters the surface of the sample. Specifically, different forms of graphite oxide can be synthesized using various oxidizing agents including hydrogen peroxide, nitric acid and hydrogen. The synthesis method employed will determine the molarity of the oxidizer within the different graphite oxide samples and allow one to actuate how the addition of unique oxygen functional groups affects the surface area and porosity of the graphene oxide sheets and respectively there adsorption abilities. Similar to activated carbon, graphene oxide sheets have a large specific surface area which allow the material to remove trace amounts of mercury from both the air and water. Particularly, the added oxygen functional groups have been proven to be an important component for mercury removal. This research quantified the effectiveness of different forms of graphene oxide at removing mercury from both the air and water phase and then analyzed any correlations that exist between the results.
Simulating Nerve-Tissue Heating due to an Implantable Neuroprosthetic Device

One way to improve control and acceptance of sensorized prosthetic limbs is with the implementation of a bi-directional interface for peripheral nerve stimulation as well as recording. Stimulation provides sensory feedback for future implementations in a prosthetic arm. The implantable multimodal peripheral recording and stimulation system (IMPRESS) is an intraneural interface technology supporting a high-density transverse intrafascicular multichannel electrode (hd-TIME). In order to become available for human testing the electrode cannot cause the surrounding nerve and muscular tissue to have a temperature change of more than ~1% of the initial temperature. Using COMSOL’s AC/DC and heat transfer modules the current output of the hd-TIME electrode was simulated to determine the temperature increase through the surrounding nervous tissue. This is done through electrothermal coupling allows for the simulation of the joule heating caused by the current injection into the surrounding tissue. We determined that the temperature would only change by ~0.001%. This model can be used for predictive modeling of tissue heating through various nerve-electrode configurations.

The Effect of Parsing Preference on the Conflict Adaptation

This study aims to investigate whether conflict experienced during sentence parsing can have an effect on the resolution of a subsequent non-linguistic conflict. For example, when listening to a sentence like “I see the mother of the boy that is laying down,” the listener can obtain two conflicting meanings. In this sentence, either the mother (the first noun phrase) or the boy (the second noun phrase) can be laying down as the grammar does not indicate a particular parsing. Based on their linguistic experience, people are biased regarding which noun phrase they most frequently associate the relative clause with. By creating sentences that can only be parsed using participants’ least preferred method, we will create sentence processing conflict. Each sentence will be followed by trials of a Flanker task to measure if dealing with the linguistic conflict can facilitate conflict resolution in the Flanker trials. Our study finds that conflict resolution in one task affects the other, and sentences which required participants’ less preferred parsing method led to more efficient conflict resolution in the following task compared to trials with sentences that matched the participants’ preferred parsing. Therefore, the enhanced resolution of conflict resulted in shorter response times in incongruent versus congruent Flanker trials than when people processed sentences using their attachment parsing bias.
Long Term Behavioral Effects of Cannabis Smoke in Rats

Marijuana is the most widely used illicit drug in the United States. As debate over its legality continues, it is important to study and understand the effects and consequence of its use. This project investigates the long term behavioral effects of adolescent marijuana exposure. Specifically, whether being exposed to marijuana at a young age will cause long term anxiety, depression, or loss of cognition. This study involves work with rats who are grouped and given three varieties of treatment in their adolescence. The first group of rats received no treatment, and acted as a control group. The second group of rats was given a placebo, and the final group was exposed to cannabis smoke in a smoke room at the McKnight Brain Institute. In the final trial, there were only two groups of rats, one was injected with a THC mixture, and the other was inject with a Vehicle (control) mixture. Each group of rats was half male and half female. Once the rats have grown to maturity, they are subjected to a series of tests to test their anxiety, depressive-like symptoms, and cognition. The results imply that there is no significant effect on the rats’ behavior by the cannabis.

Formation-Based Morphometry and Correlates with Repetitive Behavior in Children with Autism Spectrum Disorder

Restrictive repetitive behavior (RRB), such as insistence on sameness, self-injury, motor stereotypy, compulsions and rituals, are seemingly purposeless patterns of behavior that occur with high frequency and interfere with normal behaviors. RRB is diagnostic for autism spectrum disorder (ASD) and present in other neurodevelopmental disorders, including Rett syndrome, Fragile X syndrome, and Prader-Willi syndrome. Neuroimaging studies in ASD and other developmental disorders with RRB have shown alterations in cortico-basal ganglia circuitry, but the extent to which these differences relate to RRB is not well-characterized, especially in samples including females with ASD. We used magnetic resonance imaging (MRI) data obtained from the National Database for Autism Research (NDAR) to identify differences in brain morphology between children with ASD (n=95) compared to typically developing (TD) controls (n=97), ages 10 to 18 years, with approximately equal numbers of male and female participants in each group. Using deformation-based morphometry we found evidence of altered basal ganglia and cerebellar morphology in children with ASD. In addition, we explored correlations between brain morphology and RRB in children with ASD using scores from the Autism Diagnostic Interview – Revised (ADI-R). This study provides novel findings regarding neuroanatomy associated with RRB in ASD, and extends prior research to females with ASD.
Application of Hierarchical Codes to Build Towards Critical Thinking in a Materials Science Laboratory Course

Critical Thinking is a primary learning outcome that many higher-education institutions struggle to foster in classrooms and laboratory settings. This project seeks to measure critical thinking through student recognition of elements that define critical thinking in Materials Engineering, to measure the success of embedding these elements in student laboratory activities, and to evaluate student actions/reactions to these activities. For this study, students enrolled in the Sophomore level laboratory course take on-line surveys to see if they can identify aspects of critical thinking (CT) in lab procedures. Free-response questions probe varying aspects of CT to understand and evaluate student perspectives. This study will verify the application of codes previously developed to expand the understanding of what critical thinking means in engineering, how specific activities can build CT, and whether students recognize activities that require CT elements. Currently, the coding system for CT identification is being restructured to a hierarchical organization that involves parent/sibling/child nodes. This will allow for a fundamental understanding of current CT schemas of students to develop activities that address lapses in critical thinking abilities. Results indicate that activities can be mapped for CT using codes, and that the cognitive complexity of codes are reflected within the lab experiments.

Social Effects on Code-Switching

Code switching is defined as the practice of alternating between two languages within the same conversation. Studies recording bilinguals’ event-related potentials (ERPs) while processing sentences with code-switches have found brain wave components different from those normally found when processing other language-related anomalies. Most research on the processing of code-switches ignores the fact that code-switching is a social phenomenon, and is only licensed in contexts where all conversation partners are bilingual. The current study investigates whether a bilingual processes a code-switch differently in the presence of a monolingual than a bilingual. We record brain waves (EEG) from Spanish-English bilinguals while they read English and English-Spanish sentences silently in the presence of an English monolingual confederate in one session, and in the presence of a bilingual confederate in another. Event-related potentials are compared between the onset of the code-switch and the onset of the comparable non-switch word in the English-only sentences. Data collected thus far suggest that processing code-switches with a monolingual present elicits a larger posterior positive brain wave component than when a bilingual is present, suggesting that comprehension of code-switches is sensitive to the language knowledge of others present.
An AAV Capsid Library Displays High Transduction Efficiency in Primary Human Gliomas

Glioblastoma Multiforme (GBM) is both the most common and aggressive type of brain cancer that develops in adults. Gold standard therapy consisting of maximal resection, chemotherapy, and radiation offer patients a median survival of 12-15 months (American Brain Tumor Association). Novel therapies are desperately sought after, but many potential therapeutics have severe systemic side effects and lack the ability to cross the blood-brain-barrier. This project explores wild-type and novel adeno-associated virus (AAV) vectors as a potential strategy for the delivery of biologic therapies directly to the brain tumor environment. Using a hanging drop cell culture technique, I screened the transduction of 29 different enhanced green fluorescent protein (EGFP)-containing AAV capsids across 15+ primary human gliomas. I found high transduction efficiencies by recording EGFP expression in the cell lines 72 hours post-transduction using a fluorescent microscope. Each cell line displayed its own unique susceptibility to the various AAV capsids, creating a "fingerprint" of relative transduction efficiencies. This data has catalyzed the progression of the project to now explore AAV transduction of GBM in vivo in mouse models.

Design and Application of MATLAB Graphical User Interface to Measure Chronic Performance of Intracortical Microcoils

Electrical neuromodulation via deep brain stimulation (DBS) has been used to treat a variety of conditions such as Parkinson’s Disease and Essential Tremor. Current implantable electrical prostheses, however, tend to become less reliable over time due to the brain’s foreign body response (FBR) which increases impedance and decreases performance over time. Unlike standard microelectrodes, magnetic microcoils have the potential to bypass the FBR due to tissue permeability to magnetic fields, potentially increasing chronic reliability. Here, we focus on addressing this possibility through a longitudinal study of rats implanted with micromagnetic neuroprostheses. For this study, we use a conditioned avoidance behavioral assay that consists of training rats to stop licking a water source in response to an auditory stimulus. The amplitude of the sound is gradually reduced to determine the auditory thresholds of each rat. This testing was accomplished via MATLAB software; we then created a MATLAB Graphical User Interface to simplify and increase accessibility of the program. After training, the rats will be implanted with a microcoil in their cortices and the external stimulus will be replaced by intracortical stimulation. Thresholds from the implant will be monitored over time to determine the longitudinal performance of this new generation of neuroprostheses.
PRESENTER(S): Kurosu Jalil, Myra
AUTHOR(S): Myra Kurosu Jalil, Justin Keister, Anthony Yin, Dr. Chelsey Simmons
FACULTY MENTOR: Chelsey Simmons

Stretching Device for Mechanical Cellular Stimulation

Cells respond to mechanical changes such as applied strain in their microenvironments. We are interested in studying how Acomys, or spiny mouse, cells respond to these mechanical stimuli. The spiny mouse is unique in that its skin does not scar while healing, and we hypothesize that applying strain to Acomys cells will activate molecular pathways that are part of the cells’ unique, non-scarring behavior. We designed A Live Biomimetic Real-Time Actuator (ALBRTA) to fit under a microscope and stretch cells. ALBRTA is a mini tensile tester designed to accommodate soft materials such as flexible silicone constructs. Constructs with cells seeded on them are clamped down at each end and pulled apart using two high-precision stepper motors to apply tension using an Arduino microcontroller. The device has been calibrated so that a known strain field can be applied to the silicone constructs, and thus to cells seeded on them. The device has been used to stretch and observe normal mouse cells and will be used on Acomys cells to apply cyclical strain and observe the resulting effects.

PRESENTER(S): Laforest, Larissa
AUTHOR(S): Larissa Laforest, Pablo Allen, Sonia Diyaljee, Hailee Smith, Dieu Tran, Alex Winsor, Adam Dale.
FACULTY MENTOR: Pablo Allen

Taking the Fight to the Enemy: Host-parasite Interaction Effects on Body Size in Novel Ranges

Host-parasite interactions are pervasive in nature. Like predators, parasites are vital in maintaining ecological stability by controlling population size. Thus, ecosystems are threatened when infested by invasive organisms unbound by their natural enemies. A documented consequence of escaping parasitic pressures is an increase in body size which enhances a species’ ability to disperse and exacerbates its invasiveness. We questioned whether the re-establishment of a host-parasite interaction would decrease the hosts’ size, using the Southern Mole Cricket, an invasive species introduced to the U.S. from South-America free of natural enemies. In the 1980s, as part of its integrated pest management program, the University of Florida introduced the mole cricket’s natural enemy, a parasitic nematode (Steinernema scapterisci) that attacks them in their native range. Evidence suggests that these nematodes precipitated the decline of invasive mole crickets during the subsequent decades. In this study, body size between mole crickets from before (1980) and 30 years after (2017) the introduction of the nematodes to the novel range was compared. Our data suggests that Southern mole crickets’ body size did not change significantly since their interactions with their old enemy was re-established. However, a significantly higher number of females were infected as opposed to males.
Concrete 3D Printer: A New Era in Building Construction

Concrete 3D printing is a relatively new technology that could create a new era in the construction industry. Construction challenges are cost, sustainability, and completion time. Concrete 3D printing improves upon these three issues by saving material and labor costs. This innovative technology leads to rapid build times. Concrete 3D printing also reduces waste, therefore helping contribute to a sustainable planet. While some concrete 3D printers are in use, the innovation is far from perfected and far from ubiquitous. The researchers therefore, are building a low-cost prototype of a 3D concrete printer that may be used for instruction and for further research and development. This prototype is currently in the design and development phase. Using SolidWorks, the parts were modeled and dimensioned to scale. Researchers built the three-cubic foot aluminum structure for the prototype. The program code is currently being written in Arduino to be used in conjunction with an Arduino processor. After coding is complete, cement and aggregate testing will commence. The specifications and designs for this concrete 3D printer will be open source. This will permit others to further enhance the design or to modify it to fit specific construction applications.

Supercritical Ethanol: The Super Hero Selective Lignin Depolymerization

The vast majority of carbon based liquid chemicals and fuels are derived from petroleum, a geographically constrained, finite resource that causes negative environmental impacts. Therefore, it is of paramount importance to develop cost-effective methods of converting renewable carbon sources to liquid chemicals and fuels. Lignocellulosic biomass is one of the most sustainable forms of renewable carbon due to its low-cost, abundance, and independence from food markets. In this project, we aims to develop a two-stage process to selectively produce lignin-derived phenolics from lignocellulosic biomass through catalytical depolymerization of lignin. We choose two agricultural residues sweet sorghum and sugarcane bagasse as feedstocks due to their low value and abundant availability in Florida State. In the first step of this process, lignin in intact biomass is selectively depolymerized to low molecular weight phenolics using biomimetic Fenton catalyst under supercritical ethanol, but leaving intacted cellulose as valuable byproducts. Second step of this process is to upgrade the produced phenolic oil to reduced phenolic precursors via traditional ethanol reforming catalysts, which enables the direct use as drop-in hydrocarbon fuels. This process enables the production of high value phenolic monomers that are currently produced from petroleum from low cost and renewable lignocellulosic biomass.
**PRESENTER(S): Lasaga, Virgilio**  
**AUTHOR(S): Virgilio Lasaga, and Angelos Barmpoutis**  
**FACULTY MENTOR: Angelos Barmpoutis**

**Multi-Modal Visualization of 3D Models through Non-Photorealistic Shaders**

With the rise of 3D digital scanning to duplicate and distribute cultural artifacts to the masses, the need for versatile digital platforms that allow for easy and affordable visualization of digitized artifacts has increased. Using the Neat OS web platform and the OpenGL Shading Language (GLSL) in a web browser, the creation of computer graphics shaders for 3D models using GLSL within the Neat OS scripting tool for online viewing of 3D assets was explored. Through this pipeline, it is possible to allow users obtain a better understanding of a 3D model’s surface attributes using GLSL shaders in an online 3D viewer.

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**PRESENTER(S): Laux, Veronica**  
**AUTHOR(S): Veronica Laux, Keun Cho, Nathan Wallace-Springer, David Clark, Kevin Folta, Thomas Colquhoun**  
**FACULTY MENTOR: Thomas Colquhoun**

**Effects of Light Quality on the Growth of In Vitro ‘Gator Glory’ Cuttings**

Vegetative propagation through in vitro systems is one method by which plants can be commercially produced. During production, there are opportunities to manipulate environmental conditions to optimize the growth of the plants. Light quality, the wavelengths that compose light, is one factor that can be altered to promote favorable growth. This study aimed to observe the effects of different narrow-bandwidth wavelengths on the growth of in vitro ‘Gator Glory’ coleus cuttings using red, blue, and green light-emitting diodes. Coleus shoot tips were placed into petri dishes containing Murashige and Skoog growing medium, and the plates were placed under the different light treatments. Cuttings under the red light treatment demonstrated improved root and shoot growth compared to the control white fluorescent light treatment. Exposure to the blue light treatment led to compact growth forms and graying of the older leaves. A combination of green and red light significantly enhanced several favorable growth factors, including leaf length and dry weight. The results suggest that a combination of red and green light could be used to enhance the growth of in vitro ‘Gator Glory’ cuttings.
Plasmon-Enhanced Photocatalytic CO Oxidation in Au@UiO-66 under Visible Light

Gold Nanoparticles (AuNPs) encapsulated in Metal-Organic Framework (MOF), Au@MOFs are emerging as heterogeneous photocatalysts that exhibit high stability, size selectivity and catalytic activity. However, even to this date, very little attention has been paid to the role of the LSPR (localized surface plasmon resonance) effect of AuNPs in these catalysts. This phenomenon is the collective electron charge oscillation in metallic nanoparticles excited by light. In this study, gold nanoparticles (AuNPs) were encapsulated in UiO-66, a MOF made up of [Zr6O4(OH)4] clusters with 1,4-benzodicarboxylic acid primarily used for its gas properties, to observe whether the photothermal effect from the AuNPs would enhance the oxidation of CO under light irradiation. The photothermal effect is one of the three plasmon enhancement effects (LSPR) that is generally observed during the photoexcitation of material resulting in the generation of heat. The purpose of this study was to experiment and observe whether the photothermal effect would play a role in the conversion and efficiency from CO to CO2 by observing it under high temperatures and under different intensities of light irradiations.

The TIP41 Protein as a Target for Breast Cancer Treatments

TIP41 is a cytoplasmic protein and potential treatment target for breast cancers. TIP41 inhibits protein phosphatase 2A (PP2A), which is a serine/threonine phosphatase and a known tumor suppressor. PP2A inhibits cell division and survival signaling pathways, which causes potentially cancerous cells to undergo cell death. Therefore, TIP41 is hypothesized to promote the survival and proliferation of cancer cells. We used an X-ray crystal structure of the TIP41/PP2A complex and in silico molecular docking to identify compounds predicted to competitively bind to the PP2A binding pocket of TIP41, and thus block the TIP41/PP2A interaction. MDA-MB-468 human breast cancer cells were transduced with adenoviral vectors encoding epitope-tagged versions of PP2A (His6-PP2A) and TIP41 (FLAG-TIP41). The cells were then lysed and the extracts were mixed with compounds that scored highly in docking screening. Anti-FLAG-agarose beads were used to isolate TIP41 and TIP41-containing complexes. The samples were subjected to immunoblot analysis to determine which compounds disrupted the TIP41/PP2A interaction. Losartan, a common blood pressure medication, blocked the interaction. However, Losartan was only effective at concentrations too high to be used in vivo. Future efforts will employ medicinal chemistry to identify Losartan derivatives that more potently block the TIP41/PP2A interaction.
**Effects of Executive Functioning Boosts on Sentence Processing**

Studies on syntactic priming show that reading two similarly-structured, complex sentences results in increased speed with reading the second of the two sentences (Tooley & Traxler, 2010). Additional studies show that performing a mentally challenging activity unrelated to sentence structure, such as a Stroop task, increases cognitive functioning and results in faster, more efficient reactions to an unrelated task (Hsu et al., 2014). In the current study, we aim to replicate the above findings with different types of sentence ambiguities and to see if boosting cognitive control can influence syntactic priming. In the Stroop task, participants determine whether a color word in black font (e.g. "red") describes the font color of another word (e.g. "blue" in a colored font). By combining syntactic priming with a Stroop task, we can determine if difficult sentences are easier to comprehend when preceded by a difficult task not involving sentence structure. Through evaluation of participants' reading times, we anticipate greater ease of reading primed sentences that have been preceded by a difficult Stroop task. This will illustrate how language processing and other cognitive functions are related and will provide further insight into the nature of syntactic priming.

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**Functionality of Shape Memory Polymer Cuff Electrodes In vivo**

Shape memory polymer (SMP) nerve cuffs are a new electrode technology that are able to be custom formed to very small diameter nerves in situ. These cuffs have not been extensively tested in vivo and it is important to evaluate their functionality before chronic implantation in humans. When materials are inserted into the body, a foreign body response forms around the implant which over time, for electrical interfaces, increases impedance. As this tissue forms around the device, the response prevents the movement of ions around the electrode site, hindering the ability of the device to transfer charge. Impedance measurements can be used as one test to assess the performance of electrodes and measure the development of the foreign body response in vivo. In Lewis rats, Qualia SMP cuff electrodes were implanted around the vagus nerve and the electrode was connected to a delrin head cap. Low current was delivered to an awake animal up to three times per week and the impedance was measured between 10 and 100,000 Hz. The impedance data shows that the Qualia cuffs are viable and stable after four weeks of implantation. This indicates that these novel cuff electrodes may be suitable for delivery of current in sub-chronic implantation.
Scavenging of Reactive Oxygen Species by Manganese Dioxide Nanoparticles in Cytokine-Challenged Joint Cells

Osteoarthritis (OA) is a chronic low-grade inflammatory disease affecting approximately 27 million Americans. It is associated with the increased presence of cytokines, including IL-1b, resulting in increased reactive oxygen species (ROS) production. High levels of ROS within the joint can lead to oxidative stress, characterized by cell death and cartilage matrix degradation. Therefore, targeting ROS and oxidative stress serves as a potential OA therapy. Manganese dioxide is currently being explored in application to other inflammatory diseases, as it catalyzes the breakdown of hydrogen peroxide (H2O2), a reactive oxygen species. We have demonstrated that 5 μg/mL MnO2 nanoparticles (NPs) scavenges 65% of 100μM H2O2. We hypothesize that through the addition of MnO2 NPs, ROS concentrations in treatment media of IL-1b-stimulated chondrocytes will decrease compared to without the NP treatment. To test this hypothesis, bovine chondrocytes were treated for 18 hours with 10 and 20 ng/mL IL-1b in combination with 1 and 5 μg/mL MnO2 NPs. Colorimetric assays were used to measure ROS concentrations. Results have shown an increased scavenging or breakdown of H2O2 with increased MnO2 NP concentration, indicating that MnO2 NPs could be used to effectively limit ROS concentrations and oxidative stress in OA.

Network Approaches to Analyze the Dynamics of Financial Markets

Analyzing financial markets requires gathering large amounts of data which can be difficult to analyze or draw conclusions from. The purpose of this paper is to investigate possible network approaches used to help break down large amounts of financial data. To analyze data, a market graph must be constructed with nodes and edges. Creating a market graph has been used to analyze financial instruments, and prices fluctuations of stocks over a large period. Nodes represent specific data points like stock prices at an instance of time. Creating the edges can be accomplished through many different approaches including correlation coefficients, power law, and minimum spanning tree. Pearson’s correlation coefficient can be used to relate a set of two data points and can be further filtered through a minimum threshold value. The power law graph is another unique way to relate data points to one another. The power law graph creates edges among nodes by considering a probability and the binomial distribution. The power law graph has powerful implications on network analysis because it concludes that the degree distribution, the number of connections a node has to other nodes, is represented as an exponential relationship. A minimum spanning tree is a hierarchical method used to analyze market graphs. A minimum spanning tree clusters data by partitioning data appropriately. Overall, many methods are defined to establish a market graph depending on the purpose of the data analysis.
**Association Between Asthma Medication Adherence and Patient-Provider Collaboration**

Asthma is a significant pediatric public health concern, with 8.4% of children in the U.S. diagnosed with asthma. Pediatric asthma morbidity is consistently linked to medication non-adherence. Medication adherence has been shown to be influenced by patient-provider interactions. The aim of this study is to examine the relationship between medication adherence, using both objective and subjective reports, to patient-provider collaboration in adolescents with uncontrolled asthma. Thirty adolescents ages 12 to 15 were interviewed along with their caregivers using the Family Asthma Management System Scale (FAMSS). Adherence data were collected via pharmacy refill reports and scores on the FAMSS adherence rating subscale. Patient-provider collaboration was assessed using the corresponding subscale from the FAMSS interview. Pearson correlations were conducted to examine the relationships between both measures of adherence and patient-provider collaboration. There was no significant association between adherence measured with pharmacy refills and patient-provider collaboration (r = .27, p = .176). A significant correlation was found between medication adherence, as measured by the FAMSS ratings, and patient-provider collaboration (r = .53, p = .003). These findings suggest that more collaborative patient-provider relationships may be linked to higher medication adherence among adolescents with uncontrolled asthma.

**Feasts and Famine: Modern Misconceptions of the Ancient Roman Diet in the Bay of Naples**

There is a popular misconception of the diet of poor Romans. This belief is that the diet of the poor was unvaried and unhealthy, consisting of mostly porridge, cereals, and bread. It exists throughout all modern popular culture, from books and articles to television shows and movies. This misconception is the result of a lack of archeological and osteological evidence of the poor’s diet and the perceived dichotomy between the rich Romans and those who could not afford luxury. Without substantial archeological evidence, this misconception comes from literature. Food is a popular topic in Roman satire, but its use is often misunderstood.

Rather than used as historical evidence, the food depicted in the satires should be read as symbolic of the character serving or consuming the food. The organic waste of a block of shops and apartments inhabited by poor Romans and the analysis of skeletons from Herculaneum suggest an alternative to the traditional assumption of the diet of poor Romans. The recent archaeological findings suggest that the working-class Romans inhabiting the Bay of Naples were in fact much healthier than is commonly believed.
Determining the Effects of Biochanin A Additive on Rumen Protozoa

The objective of this study was to quantify rumen protozoal population and diversity to determine the effects of the Biochanin A (BCA) additive on the rumen protozoa. This study is part of a larger experiment analyzing the effects of BCA treatment in preventing a large pH drop in the rumen during a subacute ruminal acidosis (SARA) challenge. 12 rumen-cannulated Holstein steers were adapted to a diet for a 3-week period. Following the adaption period, cows were treated with BCA during a 2-week sampling period. In total, the cows received one of four treatment diets; (1) Conventional Corn Silage (CC); (2) Brown Midrib (BMR) corn silage; (3) CC + BCA; or (4) BMR + BCA. Rumen samples were collected 5 times throughout the duration of the 2-week sampling period. Samples were fixed with 50% formalin and stained with brilliant green dye to quantify and identify the protozoal species. Preliminary results indicate no effect from BCA with respect to protozoal population or diversity, collect of further results is currently on-going to confirm the preliminary data.

Determination of Wind Out-of-Plane Failure Capacity of Plywood and OSB-clad Walls Systems

Roof sheathing has been the subject of study for many wind engineers due to the high probability of being subjected to large uplift loads during intense wind occurrences. Meanwhile, wall sheathing has gone overlooked and usually assumed to have the same capacity of roof sheathing. The goal of this study is to determine the static out-of-plane wind capacity of wall sheathing on wood framed construction because currently there is no data available for wall sections that represent a typical wall section built in practice in the US. The current study uses a monotonic static wind with a step-and-hold to test panels to failure. The mean capacity attained after testing 10 samples of plywood and 10 samples of OSB sheathing was 4.21 kPa (88 psf). This capacity value along with its coefficient of variation, will provide a resistance model for inclusion in component-based damage prediction models. The performance of wall sheathing is compared to roof sheathing with the development of fragility curves that show the likelihood of failure of a structural sheathing panel for a given wind speed. It was shown that roof sheathing panels have a higher probability of failure when compared to wall sheathing panels.
**The Hues of History: Colorism in America**

Eurocentric beauty standards have dominated society for decades. In modern society, skin lightening creams and skin bleaching products are a flourishing, multi-billion dollar industry. However, not everyone can achieve those standards and people within the Black community are often faced with the pressure of conforming to the larger hegemonic society, allowing for the manifestation and internalization of colorism. In this study, colorism and terminology relating to it will be defined, examine the historical underpinnings of colorism, analyze the manifestation and internalization of colorism in the black community, and assess the psychological repercussions thereof.

**Hurricane Orlando - An Analysis on the Effects of High School Education After Mass Puerto Rican Migration to Orlando post Hurricane Maria.**

This project seeks to highlight the educational impact to Orange County schools by Puerto Rican students arriving to Orlando as a result of Hurricane María. Furthermore, this project seeks to analyze the attempt of Orange County’s educational system to adapt to the ever-evolving number of Puerto Rican students enrolling in school systems and why educational improvements are necessary for Puerto Ricans’ successful transition into mainland life. The project will focus on English as a Second Language (ESL) programs in the county and how they have adjusted to the large influx of Puerto Rican students coming after María. The method behind this research will be to interview school administrators and get their experiences on how they have adjusted. To conclude, this project will analyze the efficiency of such programs and what needs still must be met to create opportunities for displaced Puerto Rican citizens.’
**Optogenetic Rehabilitation Enhances Recovery Following Peripheral Nerve Injury**

Physical inactivity, neuromuscular disease, and peripheral nerve injury result in skeletal muscle atrophy and weakness. Exercise can combat these features; however, when contractile dysfunction reaches advanced stages, exercise becomes limited. Optogenetics may serve as a non-invasive method to target neuromuscular activation and enhance skeletal muscle through activation of a light-sensitive ion channel, channelrhodopsin-2 (ChR2), following sciatic nerve injury. Expression of ChR2 was localized to the left tibialis anterior muscle using an adeno-associated virus (AAV) vector encoding ChR2. At 28 days post-AAV administration, animals were randomized to the following groups: 1) nerve injury/AAV/training, 2) +nerve injury/AAV/-training, 3) +nerve injury/+AAV/+training. Animals receiving training were anesthetized via isoflurane and subjected to 30-minute stimulation bouts at 100 Hz, 5 days/week, 2 weeks. In situ force-frequency measurement of the TA, body weight, left and right TA weight, and left sciatic nerve were collected for subsequent analyses. Results show AAV animals demonstrated muscle contraction of the TA upon LED stimulus throughout the training regimen. AAV animals demonstrate enhanced NMJ re-formation compared to animals receiving nerve injury and no training. This effect is localized to the site of AAV administration and may serve as an alternative to exercise based therapy for conditions which result in muscle atrophy.

**Odorranalectin Analogs for Improved Intranasal Opioid Peptide Delivery to Brain**

Studies show potential for intranasal administration of peptides to bypass the Blood-Brain Barrier, exploiting transit along the olfactory nerve. This study seeks to improve this strategy by coupling an amino acid sequence with odorranalectin (OL) protein as a drug carrier. OL analogs coupled to DADLE, an opioid peptide with analgesic properties, and to three novel opioid peptides were synthesized and found to retain high affinity for the opioid receptors. Following intranasal delivery into mice, we analyzed in vivo activity of OL alone, DADLE-OL, and the three novel opioid-OL peptides. Blood, olfactory nerves, and brains analyzed for parent peptides or biotransformation products demonstrated metabolic stability of the OL-analogs, and fluorescently tagged DADLE-OL displayed rapid transit along the olfactory nerve into the brain. In a mouse 55°C warm-water tail flick assay, all four OL-analogs dose-dependently increased latency to tail-flick prevented by opioid receptor antagonist pretreatment, confirming opioid agonist activity correlating with transit into the brain, which was not present in OL-alone-treated mice. OL-alone and OL-analog-treated mice demonstrated no difference from saline-treated mice in the rotorod locomotor assay. In summary, effective intranasal absorption and transit of these OL-analogs along the olfactory nerve presents novel opportunities to administer peptides directly to the brain.
Assessing the Relationship between Levels of Depression and Dietary Intake in Hispanic Adolescents

In 2011, the NIH Obesity Task Force Strategic Plan recommended research priorities that included identification of "psychosocial factors [implicated in] weight gain, energy intake, and energy expenditure [that account for the] increased risk of obesity in high-risk populations, including racial and ethnic minorities [and] economically disadvantaged groups." Relative to other ethnic groups, Hispanic American (HA) adolescents have the highest prevalence of obesity (1), increasing their risk of type 2 diabetes and cardiovascular disease (CVD) (2-4). Given the established relationship between socioeconomic status (SES) and obesity (5), the increased prevalence of obesity in HA may be due, in part, to the lower SES demonstrated in Hispanic families (6). However, there is limited research examining the mechanistic relationships underlying obesity risk and social standing. Thus, a randomized controlled trial (RCT) is being conducted to investigate the relationship between experimentally manipulated social status, dietary intake, and CVD risk factors of HA adolescents. In this study, data from the RCT including anthropometric measurements and the Beck Depression Inventory II will be assessed to examine the extent to which different levels of depression relate to weight status and dietary intakes in experimentally manipulated high and low social status conditions.

Controlled Spacecraft Re-Entry of Drag De-Orbit Device (D3)

The University of Florida Advanced Autonomous Multiple Spacecraft (ADAMUS) lab has developed a drag de-orbit device (D3) for cube satellites, which are affordable systems for demonstrating attitude and orbit control. By modulating the D3 drag area, orbital maneuvering can be performed, and the host satellite can be made to de-orbit in a desired location. This poster details the design, manufacturing, and testing of the D3, which consists of four deployers, which is a re-tractable tape-spring boom that provides a variable drag area of 0.5 m². Each deployer is actuated independently using a brushed DC motor to drive the boom. An encoder affixed to the deployer measures the distance that the boom travels and the number of rotations it takes to reach that distance. All manufacturing of the D3 device is performed in-house using a CNC milling machine and manual lathe. Testing of the D3 consists of thermal testing, fatigue testing, and vacuum testing, which are also discussed in this poster.
Dengue Dynamics and Student Movement in Rural Mexico

Dengue is one of the most important mosquito-borne diseases worldwide, with nearly 400 million infections annually across over 100 countries. We know that human population movement is one of the main drivers of transmission; however, it is not well understood how dengue persists in countries like Mexico despite dry, cool winters that are not favorable for transmission. Additionally, very few studies have explored the rural population contribution to dengue transmission in Mexico, which may play an important factor in reintroducing disease to more populous areas. This project aims to determine the effect of human population movement on the transmission of dengue in Yucatan, Mexico, and better understand the dynamics in rural and urban areas. We have analyzed the synthetic population of 1.8 million people in Yucatan moving between 375,000 households and 100,000 workplaces and schools from Hladish et al. We found that students in rural areas frequently travel long distances of 15 kilometers or more daily, which may drive introduction of dengue to otherwise isolated populations. We will utilize an agent-based dengue transmission model to test whether reducing travel through a policy intervention (such as adding more schools) would significantly reduce the overall transmission rate of dengue.

Molecular Studies of Human Schwannomas

Schwannomas are benign Schwann cell tumors that can occur in dominant conditions of NF2 (neurofibromatosis type 2) or schwannomatosis. NF2 is caused by germline mutations in the NF2 gene. In schwannomatosis, the SMARCB1 and LZTR1 genes are involved in these mutations. Early studies found deletions of multiple genes, which causes tumors to form. Schwannomas are difficult to treat because surgery involves cutting into the affected nerves. The tumors are known to cause deformities, substantial pain, and death. There are no drug therapies, and there is a lack of understanding about schwannomas. My plan is to help characterize these tumors to better understand the underlying genetic changes, which will be helpful in developing therapies. First, I’ll examine the NF2, LZTR1 and SMARCB1 genes to identify any mutations. My work will involve PCR of exons from DNA, followed by sequencing, or sequencing of cDNA from RNA samples. I will also do a loss of heterozygosity study using polymorphisms in/near those genes to look for deletions. We will perform exome sequencing on the tumor cells and analyze the data to identify any variants. Future plans include investigating whether the genes are epigenetically silenced, or testing to inhibit cell growth.
Rufus Nims: A Miami-Based Architect

Midcentury modern architecture took root after the Second World War as numerous technological advancements allowed for open house plans with the increased use of glass, which led to a reconfiguration of indoor-outdoor relationships. Rufus Nims, a Miami architect (1913–2005), hybridized emerging ideas of midcentury modernism with climatic design that emerged after the Second World War. Rufus Nims took tropical architecture and combined modern aspects to experiment with homes that had disappearing walls and that could be comfortable in the hot and humid climate of Florida. This paper will analyze Rufus Nims’ role in Florida Tropical Architecture, comparing the use of indoor-outdoor relationships with the broader Midcentury modern architecture in the United States. Further, this study will assess how Rufus Nims used tropical architecture design strategies in South Florida, such as screened-in porches, disappearing walls, and landscape integration. The paper argues that Rufus Nims’ architectural ideas were based on emerging redefinition of the indoor-outdoor relationship as was evident in the broader Midcentury modern movement and Florida Tropical Architecture.

Obtaining Light Curves of Ultra-Magnetic B Stars with the Evryscope All-Sky Telescope

There are currently only 5 known stars which possess rigidly rotating magnetospheres (RRM). These rare, fast-rotating stars are thought to trap circumstellar material in their high magnetic fields, and as a result have periodic variations in brightness which manifest in the star's light curve. We describe a method for time series analysis of two of these sources (HR 5907 and HR 7355) using PRESTO, a search-and-analysis software suite originally designed for finding pulsars. We reduce data obtained from Evryscope, a telescope that monitors a 8,000 square degree field with a time resolution of two minutes. We present the results of our analysis procedure on a set of sample data, and discuss the potential for obtaining light curves from our two target stars pending the coming release of Evryscope data on the region of the sky in which the stars are located.
Case Study Investigations and Design-Build Proposal in Gisenyi, Rwanda

This research evaluates architectural responses to peace-building and modernization in Rwanda since the 1994 genocide. It proposes a collection of case studies and analyzes the effectiveness of architectural methods that respond to specific programs while maintaining a sensitivity to the political and cultural climate. It identifies the conceptual and practical logic behind design through the selection of local material, empowering unskilled workers, responding to the context, and establishing a positive relationship with members of the community. As an additional frame of reference, this research analyzes the design-build pedagogy at the University of Florida School of Architecture in order to understand practical implication in Rwanda. These projects collectively serve as a reference for proposing a small-scale design-build initiative with local Rwandan members of a pottery and dance cooperative in Gisenyi, Rwanda, where the University of Florida Arts in Medicine Program has identified a need for improving and building upon the existing facilities.

Atrocities on the Amazon: The Diplomatic Struggle for Human Rights in the Putumayo Region of Peru

In 1907, a Peruvian newspaper published reports of atrocities against indigenous populations forced to extract rubber for the Peruvian Amazon Company, a company headquartered in London that employed Barbadian workers. In 1910, British diplomat Roger Casement travelled to the region to investigate the allegations with the express purpose of protecting the Barbadians, British subjects. Yet Casement also observed the cruelty of company agents in torturing the Indians, and he labeled it slavery. His report prompted a long diplomatic struggle to bring the perpetrators to justice and alleviate the suffering of the Indians. The British government initiated extensive communication with the Peruvian government, advocating changes to this system of slavery. The correspondence reveals the challenge of protecting human rights in a commercial but remote region. The British government also involved the United States in diplomatic pressure, but the Peruvian government continued to make empty promises, failing to enforce justice. Finally, the British government published Casement’s report in 1912, leading to international outcry. However, Peru lacked the capacity and political will to reform the system. By 1913, many of those responsible for the worst atrocities remained unpunished as World War I and the collapse of the Peruvian rubber industry shifted attention elsewhere.
Novel anti-tau scFvs as therapeutics for Alzheimer’s Disease and other Tauopathies

The microtubule associated protein tau forms intracellular inclusions in multiple brain disorders such as Alzheimer’s Disease (AD). Studies have shown that tau also exists in extracellular fluids, and that a subset of extracellular tau species can seed intracellular tau pathology via prion-like propagation. We hypothesized that antibody-based therapies may neutralize extracellular tau to prevent the spread of tau pathology. The Golde/Levites laboratories have generated several single-chain variable fragments (scFvs) from antibodies targeting phospho-tau. Only the PHF1 scFv, specific for pSer396/404, was efficacious in mouse models of tauopathy. Targeting other epitopes on tau may improve efficacy, so we generated scFvs from four novel antibodies that target various phosphorylated and non-phosphorylated epitopes of tau. We cloned these scFvs into mammalian expression vectors for transfection in HEK-293T cells. We confirmed their expression via western blot and tested their ability to bind tau using enzyme-linked immunosorbent assay (ELISA). All four scFvs were expressed in the cell lysate, however, only one of them (2D1-1) was secreted and bound its correct epitope (pTau T205). Further characterization in cellular tau aggregation models will point to the best scFv for testing in animal models of tau pathology and will hopefully lead to a candidate drug for clinical studies.

Simulating the Effects of Mechanical Stress on Hall-Effect Sensors

Mechanical stress affects semiconductor devices of all types but the mechanisms for understanding and predicting the effects of stress are not well known. Stress is often introduced to a system during the packaging process of integrated circuit fabrication. Stress effects can have negative impacts on the accuracy of devices such as Hall-Effect sensors, which measure a potential difference produced across the device in the presence of a magnetic field. Mechanical stress is known to change the intrinsic resistance of the device, which can cause it to produce inaccurate readings of magnetic field intensity. The University of Florida and Texas Instruments Inc. are studying the effects of mechanical stress on measurements produced by Hall-Effect sensors with the goal of creating more accurate and reliable devices, as well as to apply these findings to other semiconductor devices such as bipolar junction transistors. Experimental data in this area has been produced by the research team over the past year. The current goal of the project is focused on simulating the behavior of the devices using Sentaurus Device, a Synopsys finite volume analysis program, to better understand the results seen in experiments and to develop solutions for creating more accurate devices.
**Mouse Background Affects Blood Pressure Regulation by the Circadian Clock Protein Per1 in Aldosterone-Dependent Models**

Hypertension is the leading risk factor for cardiovascular disease. Humans experience a blood pressure (BP) rhythm resulting in a 10-20% dip during their resting period and individuals who fail to maintain this dip are termed non-dippers. The circadian clock genes PERIOD, BMAL1, CLOCK, and CRYPTOCHROME are necessary to maintain this rhythm. The goal of this study was to determine the BP phenotype of Per1 knockout (KO) mice on a salt-sensitive 129/sv/s1s4 background. 129/sv/s1s4 mice were implanted with radiotelemetry devices and monitored for 24-hours on a control diet, followed by a high salt (HS) diet, and further challenged with a treatment of an aldosterone analogue desoxycorticosterone pivalate-salt (HS/DOCP). The 129/sv/s4 Per1 KO mice on a HS/DOCP diet experienced a 9-mmHg increase in BP compared to those on control diet (P<0.01, n=8). The KO mice had a 2.4-mmHg decrease in amplitude (P=0.01), whereas the WT mice did not exhibit a significant decrease in amplitude. Similarly to the C57/BL6 mice previously studied in our lab, the Per1 KO mice on a 129/sv/s1s4 background developed non-dipping hypertension in response to the HS/DOCP treatment. This data implies that the loss of Per1 leads to non-dipping phenotype when challenged with a HS/DOCP treatment in 129/sv/s1s4 mice.

**Clarifying the Taxonomy of the Taygetis virgilia Species Complex**

Butterflies and moths are one of the most numerous and diverse groups of species on our planet, yet much of their biology and evolution remains unknown. My research contributes to the study of butterfly evolution, and more specifically on the genus Taygetis, a diverse group of large Neotropical butterflies with about 30 species. I studied specimens of one of the largest and most variable species, Taygetis virgilia. I attempted to clarify how many different species are in this group based on a study of geographical distribution, genitalic structures, DNA sequences, and wing pattern. First, I photographed and compared wing patterns of specimens and grouped them by similarities. Next, I dissected the abdomen and used a stereomicroscope with drawing tube to draw and compare the structure of the genitalia of the male specimens. Additionally, I performed DNA extraction, amplification and PCR to obtain COI DNA sequences for each specimen. The research that I conducted will help determine how many species are present in the complex and how to quickly and reliably identify these species based on wing pattern, enabling curators in museums to curate their collections and gather data about the distribution of these species, and field researchers to study them.
Tripartite Interaction of a Putative Bacterial Helicase YoaA, HolC, and SSB, Involved in Repairing Blocks to DNA Replication

It has been estimated that 20,000 DNA damaging events occur within a cell daily. Although cells have efficient repair pathways, some DNA damage does not get repaired and is encountered during DNA replication. Cells have to conduct special mechanisms to either fix the damaged DNA during replication or bypass the damage and fix it later. Genetic studies in Escherichia coli, a model organism, have recently revealed that a cell conducts a repair pathway that requires at least two proteins, HolC and YoaA, to give cells tolerance to DNA damage created by a chain terminator 3’-azido-3’-thymidine (AZT). HolC is a protein a subunit of DNA polymerase III holoenzyme whose only known function is to bind SSB. Based on sequence analysis the yoaA encodes a DNA helicase in the XPD family of iron-sulfur (Fe-S) containing helicases. The goal of this project is to express the YoaA protein in soluble form and characterize its biochemical activities to determine what the functions of YoaA are in rescuing blocked replication forks. We have subcloned the yoaA gene into different expression vectors to express YoaA with and without affinity tags, and to co-express YoaA with HolC. Our initial results will be presented.

The Ketogenic Diet as a Treatment for Age-Related Cognitive Deficits in Rodents

Although the human average life expectancy is increasing, age-related declines in cognitive function can decrease quality of life in older adults. These declines can be partly attributed to age-related decreases in the ability to appropriately metabolize glucose. Therefore, we investigated the use of ketogenic diet (KD) to mitigate these deficits by bypassing the need for glucose utilization. KDs are high in fat and low in carbohydrates, which shifts to reliance on glucose for the primary energy substrate to fat-derived ketone bodies. Thus, KDs provides the brain with an alternative energy source. Male rats (n = 10 young; 9 aged) were placed on a KD or control diet (CD) and subsequently trained to do an object-place paired association (OPPA) task in an asymmetrical figure-8 shaped maze. This task requires rats to associate an object with a particular spatial location and is known to require several brain regions that are among the first to decline with age. Rats on the KD learned to alternate throughout the maze more quickly and also acquired the OPPA task rule in fewer days than CD rats. These findings are important because they demonstrate that the KD can improve cognitive outcomes, which can be directly translated to humans to potentially alleviate cognitive decline with age.
Practitioner-Suggested Voluntary Psychiatric Hospitalization from a Feminist Therapy Perspective

This study explores the phenomenon of “practitioner-suggested voluntary psychiatric hospitalization,” or the gray area in between voluntary and involuntary admission into psychiatric inpatient treatment in which patients with a status of voluntary feel that they have been persuaded into admission, generally by practitioners who have the authority to admit them involuntarily. Some scholars discuss this phenomenon in terms of power, indicating that what a practitioner views as a suggestion may be interpreted by a patient as coercion due to an unequal balance of power within the psychiatric setting. However, despite these discussions of power, there is little research on how individuals of marginalized identities may be affected by practitioner-suggested hospitalization, and that which exists is largely inconclusive. This study seeks to address this gap in the literature by interviewing five therapists who operate under the theoretical orientation of feminist therapy, which focuses on the intersections of social identities such as race, gender, and sexual orientation while promoting an egalitarian therapeutic relationship. The study will discuss the experiences and professional opinions of feminist therapists regarding practitioner-suggested voluntary psychiatric hospitalization, along with analyzing any emerging themes and discussing future implications.

Gamma-glutamyltransferase 6 is a novel regulator of oncogenic herpesvirus lytic reactivation in cancer cells

Kaposi’s sarcoma-associated herpesvirus (KSHV) is one of the known human oncogenic viruses. KSHV maintains dormancy in the human body, but can regularly reactivate and amplify itself, propelled by the well-known essential viral transcription factor called RTA. We hypothesized that RTA induces the expression of specific human factors, which may be critical for the viral gene expression and replication. After a genome-wide analysis in our laboratory, we identified several potential RTA targets during lytic reactivation in KSHV infected cancer cells. In our follow-up study, we confirmed that several of these human genes are also induced by RTA in other infected as well as uninfected cell types, highlighting them as core RTA-inducible human genes. We chose to further investigate one of these RTA-induced human genes: Gamma-glutamyltransferase 6 (GGT6). GGT6 belongs to the membrane-bound GGT family of proteins, but it lacks key residues normally required for enzymatic activity within the GGT family and its function is uncharacterized. Using shRNA knock down experimentation, we found that depletion of GGT6 reduced viral gene expression, viral production, and infectivity. Our findings establish a critical role for GGT6 as a key player for oncogenic viral production, thus revealing it as potential target for future clinical studies.
Evaluating the Anti-Proliferative and Cytotoxic Activity of a \([D\text{-}Trp]CJ_{15-208}\) Derivative

The c-Myc oncoprotein is often overexpressed in cancer cells and can contribute to tumor growth. The macrocyclic tetrapeptide, \([D\text{-}Trp]CJ_{15-208}\), has been reported to act as a promising lead compound for cancer treatment by targeting c-Myc levels and inhibiting proliferation. In an attempt to optimize the therapeutic activity of \([D\text{-}Trp]CJ_{15-208}\), a chemical modification was made, replacing the proline with hydroxyproline (Hyp) to form \([D\text{-}Hyp, D\text{-}Trp]CJ_{15-208}\). The addition of a hydroxyl group can be used to make biochemical probes, which is useful in optimizing potential treatments for prostate cancer. In this study, we investigate the effects of the modification on anti-proliferative and cytotoxic activity, through a comparison of \([D\text{-}Trp]CJ_{15-208}\) and its derivative. Cell proliferation and viability was determined using the Millipore MUSE Cell Count & Viability Assay. Preliminary results suggest that both \([D\text{-}Trp]CJ_{15-208}\) and \([D\text{-}Hyp, D\text{-}Trp]CJ_{15-208}\) inhibit growth of the PC-3 prostate cancer cell line in a dose-dependent manner after a 48 hour treatment. Further testing is needed to determine if \([D\text{-}Hyp, D\text{-}Trp]CJ_{15-208}\) has similar effects on c-Myc protein levels.

Identification of Novel Growth Regulators in Plant Populations Expressing Random Peptides

The need for new herbicidal compounds, that selectively target certain plants as opposed to others, is steadily increasing due to the demand for environmentally friendly chemicals within agriculture, and the increasing of weeds’ chemical resistance. This project utilizes rapidly screened populations of Arabidopsis thaliana in libraries where individual plants have been transformed to induce a small, novel, random cyclical peptide (RCP) that has the potential to disrupt the plant’s growth and development. This allows for the screening for lethal phenotypes of multiple plants or peptides. These phenotypes are assumed to have been caused by the insertion of the RCP. These molecules, constructed from a degenerative DNA oligonucleotide sequence PCR reaction, could be essential for the creation of new herbicides. Currently, around 25,000 seedlings have been selectively screened on minimal media and Kanamycin, since the vector contained a Kanamycin resistance gene. It was confirmed that the plant contains the RCP insert with microscopic fluorometric detection of GFP that was also included in the vector. Almost 400 seedlings that were underperforming, vitrified, and GFP-positive were extracted for the peptide DNA. The next step is to re-clone these peptides using Agrobacterium into healthy plants and confirm reproducible lethal phenotype.
All Optical Brain Machine Interface for Rodents

Brain machine interfaces (BMIs) are used as assistive devices to help disabled persons regain their functionality and autonomy. Non-invasive BMIs use EEG signals, which are limited in bandwidth and provide limited stimulation as rudimentary feedback. Invasive BMIs provide more direct feedback to the central nervous system that is information rich, with the limitation that they require surgical intervention. In this project, we seek to create an all-optical bidirectional BMI for rodents to provide artificial sensation that can replace or augment natural sensation. We aim to study the underlying neural plasticity mechanisms and to optimize the stimulation design in order to speed up learning.

Do Students Perceive that Participation in HOSA Develops the Skills Needed for Careers in Health Care?

This research study analyzes the multifactorial relationship between participation in vocational preparation program Health Occupation Students of America (HOSA) and students’ perceived readiness to enter various fields of health. As a division under the Florida Department of Education, HOSA’s primary aims involve (1) promoting interest in health careers and (2) enhancing the delivery of quality health care to all people. A comprehensive survey addressing aspects of family background, demographics, and preparedness/perception of entering the field of health was distributed to all chapters of Florida HOSA via online platform Qualtrics. Over 15,000 student members of HOSA were invited to participate and at the end of data collection approximately 400 completed surveys were analyzed. The major limitation of this study was the low response rate (2.7%). Results proved the program to be highly effective with 90% of students feeling prepared to enter the field of health. However, when it came to assessing students’ awareness of concepts such as cultural competence, answers were far more scattered---suggesting a potential gap in real world application of program knowledge. While the results did not yield statistically relevant findings, results may serve as a foundational basis for evaluating the effectiveness of similar programs.
A Drug-Turnable Gene Therapy for Broad-Spectrum Protection Against Retinal Degeneration

Retinal degenerations are a large cluster of diseases characterized by the irreversible loss of retinal neurons that currently impacts the vision of 9.1 million people in the US. This number is expected to rise as the population ages. Neurotrophic factors, which elicit broad-spectrum protection against a variety of insults, have been proposed as potential therapies to slow or prevent degeneration in patients suffering from these diseases. While this has had success, the inability to control neurotrophic factor expression has been a major limitation. To address this problem, we developed a drug-regulated neuroprotective factor named Retinal Protective Factor 2 (RPF2) that consists of a synthetic neurotrophic factor fused to the E. coli DHFR destabilization domain. In this study, we show that AAV delivery of RPF2 can protect photoreceptor structure and function in multiple degenerating mouse models. This therapy’s broad-spectrum use could function as a standalone therapy or as an adjunct to a gene replacement therapy to preserve a degenerating patient’s vision. In addition, our data suggest that the modular design can be used to regulate the expression of other AAV-based transgenes, which would facilitate the development of many new therapies for retinal degenerations and beyond.

Correlation between HIV-1 Tat Protein Exposure, Neuroinflammation and Increased Opioid Consumption

The HIV-1 Transactivator of Transcription (Tat) protein elevates neuroinflammation and dopamine in the brain while increasing cocaine reward. Accordingly, we hypothesized that mice exposed to Tat protein would demonstrate elevated levels of dopamine and neuroinflammation concordant with the potentiation of increased morphine consumption in a two bottle choice (TBC) assay. The controlled expression of Tat protein in the iTat mouse was confirmed by Western blot analysis following induction with a doxycycline (Dox) promoter. Analysis of the mouse brain found significant increases in microglial activation and dopamine and DOPAC levels in the prefrontal cortex and nucleus accumbens. iTat mice demonstrated Dox-dose-dependent increases in voluntary consumption of morphine in the TBC, growing consistently significant after a 7 day Dox treatment and with effects lasting up to a week after Tat induction. Prophylactic treatment with the anti-inflammatories indomethacin or dexamethasone prevented these effects, as did SPP1 KO/iTat mice possessing deficient microglia, confirming a neuroinflammatory mediation of Tat-induced increased morphine consumption. In conclusion, the data suggests that expression of HIV-1 Tat protein suffices to potentiate the rewarding effects of morphine through the increase of neuroinflammation and dopamine in reward pathways, suggesting a biological mechanism by which HIV infection may increase vulnerability to opioid abuse.
The Effect of Snorkeling Tourism on Fish Perception of Risk in Quintana Roo, Mexico

Fear in animals influences their risk-taking behaviors. Since this feeling impacts how an animal conducts itself, it can be inferred that it can affect their fitness. It is known that the presence of spearfishing can make fish act more cautiously, but it’s unclear if the effect is the same with snorkelers. Snorkel-based tourism has increased dramatically in Quintana Roo, Mexico over the past several years. While it is clear that an increase in snorkel tourism has had a detrimental effect on the health of the reefs, what is still unclear is how a high volume of snorkelers is affecting fear in fish inhabiting the coral reefs. To gauge fear in fish, we measured the flight initiation distance (FID) of several herbivorous fish species by approaching fish and measuring the distance at which they fled from the approaching snorkeler in two different bays in Akumal, Quintana Roo, Mexico. We hypothesize that fish further from the tourism hotspot will have a significantly larger FID than fish closer to hotspots. We will also evaluate whether fish in Jade Bay also demonstrate behaviors that display higher levels of fear, such as traveling in groups and hiding in refuges upon approach by snorkelers.

Humic Substance Fertilizer Derived From Biorefinary Waste

We are focusing on utilizing bio-refinery waste to build a structure commonly found in organic compost. Mimicking the functional groups of the phenolic’s found in bio-refinery waste will allow for the fertilizer to increase not only total size and yield but also increased plant resilience to contamination and stress factors. This fertilizer would be built from a byproduct that is commonly burned for energy. The low value makes the feed stock an inexpensive and highly excusable.
Setting the Mood for Raffaelea lauricola

Laurel wilt, a disease caused by the fungus Raffaelea lauricola, was first reported in Georgia in 2002. Since its introduction, this disease has caused the death of nearly 500 million trees throughout the southeastern U.S. This disease affects members of the Lauraceae family, which includes species such as Persea borbonia (redbay) and Persea americana (avocado). Surveys of R. lauricola isolates and its vector, the redbay ambrosia beetle (Xyleborus glabratus), from the southeastern U.S. have shown that this pathogen and its vector are propagating clonally, which suggests that this epidemic could have been the result of a single introduction. The beetle and fungus were most likely introduced from Taiwan, where there are genetically distinct populations of R. lauricola. Although sexual reproduction of the fungus is unknown, two distinct mating types (MAT1-1 and MAT1-2) have been characterized from collections from Asia, which suggests the potential for sexual recombination. The major objective of this research was to observe whether artificial pairings of isolates representing opposite mating types would result with sexual recombination and perethicia development. Isolates of the two, opposite mating types were paired in vitro on nutrient-poor and nutrient-rich media amended with sticks of sterile wood, according to published protocols for other fungi of the Ophiostomatales.

Generation of Antibody Escape Mutants in Adeno-associated Virus Serotypes 8 and 9

Adeno-associated virus (AAV) is a non-pathogenic virus with many potential uses in gene therapy. Gene therapy refers to the procedure of using a vector, in this case a virus, to introduce a corrective gene product into a patient. Adeno-associated virus serotypes 8 and 9 are both widely studied as therapeutic vectors, treating Hemophilia B and Pompe disease, respectively. One challenge that AAV faces is the presence of pre-existing antibodies against AAV. We aim to alter the surface of the virus such that antibodies capable of neutralizing infection can no longer bind, increasing the efficacy of delivery. Monoclonal, anti-wildtype AAV antibodies were complexed with the virus and the residues of interaction between virus and antibody mapped via cryo-electron microscopy and image reconstruction. Within these areas of interaction, mutations are introduced to the viral capsid using PCR, to prevent antibody binding to the surface. We then confirm capsid formation via negative stain EM and antibody escape via native dot blot. In AAV serotypes 8 and 9, we produced mutations against a panel of anti-wildtype AAV antibodies. We then tested these antigenic escape variants for their ability to maintain infectivity compared to their parent serotypes, as well as escape recognition from neutralizing antibodies.
Culture Density and Harvest Productivity of the Alga Oedogonium

As the planet is faced with depletion of its natural resources, alternative and sustainable energy sources are becoming increasingly sought after. Research on the growth of algae has revealed their potential as a fuel source for bioenergy applications, their use as an animal feed, and their ability to remove nutrients from wastewater treatment plants. Two 1000 L raceway ponds were inoculated with the filamentous algae, Oedogonium sp., to determine their growth patterns in an outdoor environment with temperature and pH fluctuations. Discovering the optimal conditions for the growth of Oedogonium sp. could lead to their ease of cultivation for sustainable purposes in the future. An additional two 1000 L raceway ponds were inoculated with diverse microalgal species to compare their growth and productivity to the filamentous Oedogonium sp. The pond cultures were harvested and sampled to determine culture density (mgVSS/L) and biomass productivity (gVSS/m2-day) over weekly periods. During colder winter months, Oedogonium sp. were found to change their morphotype, growth slowed, and the cultures transitioned to a maintenance mode. With warmer temperatures, harvest productivity increased slightly as the cultures entered a growth phase. The algae cells became greener, and their morphology reverted to long, thin filaments.

What I Saw: Personal Accounts of Concentration Camp Liberators

What I Saw explores the narratives of concentration camp liberators, that is, U.S. Army veterans who were among the first to come across these notorious sites of the Holocaust. This project analyzes elements the veterans' interviews have in common, such as the notion they were not previously aware of the camps. What I Saw additionally discusses qualities that were unique to each veteran's story, including the trouble with which some veterans had in recounting the traumatic experience of liberation relative to others. What I Saw also attempts to draw conclusions about how these stories fit into the context of Holocaust remembrance, the living memory for which is rapidly fading away.
The Florida Keys paleo-reef tract: constraining reef evolution and the relative sea-level history during the Last Interglacial

One means of placing empirical constraints on the projected rates and magnitude of future sea-level rise is to draw upon evidence of ice sheet dynamics and sea-level rise during past episodes of warming. During the Last Interglacial period, global mean temperature was similar to the present, making it an interesting time period to examine in this context. Here, we revisit some of the Last Interglacial marine fossil reef sequences exposed in the Florida Keys to constrain the evolution of sea-level during this highstand. Previous studies here have focused on assessing the peak sea-level position and dating fossil corals, which appear to have experienced open-system behavior of U and Th isotopes during diagenesis. To further constrain the local history of sea-level, we are examining the carbonate sedimentology and geochemistry of drill cores from the upper Keys. We are developing detailed core-logs of the six new cores, and combining X-ray diffraction, stable isotope, and thin section analyses to assess preservation before conducting additional U-series dating of some of the fossil corals. Several of these cores exhibit abrupt transitions in preservation, and contain well-developed exposure horizons. Future efforts will focus on ascertaining episodes of subaerial exposure and dating the timing of these transitions.

Impact of Activated Carbon Functional Groups on Water-Phase Mercury Capture

Powdered activated carbon (PAC) has been an attractive approach to remove impurities in water and air treatment technologies. Recent studies have shown that this removal performance is mostly reliant on its surface chemistry rather than its physical properties (porosity, surface area). PACs with nearly identical physical properties, such as surface area, but differing quantities and types of oxygen functional groups were tested for mercury capture. Waters each containing an initial dosage of 100 ppb of mercury were mixed with variously treated and untreated PACs at a dosage of 10 ppm. Over a 24-hour period, these samples were analysed for total mercury, filterable mercury, soluble mercury, and Hg adsorbed onto the various treated PACs. Because some of these PACs have been chemically treated with acid to increase oxygen functional groups, this may alter the water contact pH. The goal of this research is to further study the removal kinetics of Hg adsorption in the water matrix. Through this, the performance of post-treated activated carbons with carboxylic, lactonic, carbonyl, and phenolic oxygen functional groups will be better understood. Furthermore, Hg binding mechanisms will be characterized through sorbent and matrix characteristics.
The Differential Effects of Georgia’s Exact-Match Voter Registration Algorithm

Are some groups of individuals more likely to have their voter registrations rejected when election administrators use an exact-match algorithm to verify their identities across databases? In 2016, the state of Georgia admitted to cancelling or placing into pending status the applications of some 35,000 individuals because they failed its exact-match voter identification procedure. After a legal challenge by voting rights groups and a settlement, the Georgia Secretary of State abandoned the exact-match policy it used to verify new applicants due to the alleged prevalence of false negatives—the failure to match the same individual across two data files. Drawing on public records, we analyze whether Georgia’s exact-match procedure used to verify voter registrations has disparate effects on racial and ethnic minorities, as recorded on the state’s voter file, including previous registrants flagged as non-matches when they updated their registrations. After many years of lawsuits around the country challenging various voter file maintenance mechanisms, we focus on a case study that can assess the efficacy of a court mandated settlement on turnout and voting rights.

The Prediction of Noise from Turbulent Boundary Layers Attached to Porous Media

Turbulent boundary layers exist within all flows involving aerospace flight vehicles and radiate acoustic sound waves that can alter the vehicle structure and performance. Introducing porosity into the boundary layer affects the radiated acoustic waves that are generated from the boundary layer. A semi-empirical mathematical model is developed to predict and analyze the acoustic radiation from turbulent boundary layers over porous media. Acoustic predictions are conducted for four subsonic Mach numbers without a pressure gradient. In addition, five porosities, liner depths, and porous turbulent length scales are explored. The turbulent kinetic energy and meanflow are quantified for the non-porous cases and validated with experimental data. Finally, the predictions of acoustic radiation are compared to the non-porous acoustic predictions in order to evaluate the change in sound pressure level.
Automation in FAIMS-MS Data Processing using R

R, a statistical computing language, was used to automate the processing of field asymmetric ion mobility spectrometry-mass spectrometry (FAIMS-MS) data and facilitated detailed graphs where Excel failed in efficiency. FAIMS-MS data were collected as multidimensional raw files from a MassHunter or Xcalibur software platform containing a series of mass spectra of a sample collected over time. The raw files were converted to an mzxml format using MSConvert to generate a uniform file regarding the original software platform used. Mzxml files were loaded into the developed R script followed by the extraction of selected mass-to-charge (m/z) values with its correlating intensities based on experimental parameters. The processed data were automatically plotted to display the intensity of the selected m/z values against the ramped compensation field, an important FAIMS parameter. This step was performed repeatedly for all measured compensation fields. Utilizing Excel to manually process FAIMS-MS data and construct the necessary graphs takes hours. With R, entering the experimental parameters, modifying the graph layout, and executing the script, takes only minutes depending on the number of m/z values and selected files being analyzed. Adopting this developed R Script in the standard workflow greatly increased the efficiency of processing FAIMS-MS data.

Purification of AAV3B for Antibody Epitope Mapping

Adeno Associated Viruses (AAVs) are promising vectors for gene delivery, a method whereby recombinant viral vectors containing a transgene of choice are introduced into cells to treat disease. One serotype, AAV3B, has potential for use in hepatocellular carcinoma (HCC) since the virus’s use of human hepatocyte growth factor receptor (HGFR) as a cellular coreceptor allows it to effectively infect human liver cancer cells. HCC is the most common type of liver cancer in the world and is a leading cause of cancer-related death globally. However, the high rate of pre-existing neutralizing antibodies within the human population due to prior AAV exposure limits success of AAV3B. Therefore, variants of AAV3B capable of antibody escape are desired to improve gene delivery efficacy.

This project aimed to design and test recombinant AAV3B vectors that can escape recognition from neutralizing antibodies and to investigate AAV3B interaction with HGFR. Purified HGFR were obtained prior to experimentation. The four antibodies tested were HL2383, HL2381, ADK8, and ADK 8/9. AAV3B vector and the monoclonal antibodies were purified using affinity chromatography, concentrated by centrifugation, and confirmed by SDS-PAGE and negative stain electron microscopy. AAV3B variants are being produced for testing escape. Our most recent results will be presented.
Risk Scores in Medicine
Current, massive amounts of clinical data from electronic health records are being underutilized. One of the ways this data can be used is in the development of risk scores for medical procedures. The goal of the project is to analyze the current methods for risk analysis using this data. Specifically, the methods used to calculate risk of complications after major surgeries are studied and considered in relation to one another. These methods use data recorded during major surgical procedures and attempt to predict certain postsurgical complications. A number of probabilistic methods are considered, as is literature concerning both their effectiveness and ways in which the methods can be improved. We consider the predictive ability of these methods and analyze their effectiveness in predicting postoperative complications.

Minority Stress and Life Meaning Among Bisexual Adults: The Role of Religiosity
A wealth of research has found that sexual minority stress among bisexual individuals is negatively associated with well-being outcomes, but little research has been conducted on possible ameliorating factors in these links. The current study explored the relationship between sexual minority stress – specifically heterosexist discrimination, expectations of rejection, and internalized homophobia – and life meaning among 365 bisexual individuals. Additionally, we sought to examine the potential moderating role of religiosity. We used structural equation modeling with an unconstrained latent variable interaction approach. Practical implications and directions for future research are discussed.
**Oral Care in Children with Cystic Fibrosis**

The purpose of this pilot study was to investigate oral care in children with cystic fibrosis and the relationship between their oral and respiratory care. This study explored the following associations: 1) Beliefs held by families with CF about oral care and its correlation with self-reported oral health status 2) Patient's level of oral health and his/her respiratory health, and 3) CF symptom acuity and children's fears of going to the dentist or frequency of going to the dentist. Data was collected through surveys assessing self-reported dental care and oral health status, and review of respiratory health from patients' medical records. Hypotheses included: (I) children with CF whose parents report thinking that oral health is important would have better oral health (II) there is a relationship between self-reported oral healthcare, and (III) there is an association between CF symptoms and children's anxiety about going to the dentist. While the findings of this study were not statistically significant, weak associations between each of the variables testing the hypotheses were found. All findings appear to support the hypothesis, but should be further investigated to offer concrete evidence of the relationship between beliefs of oral care and respiratory health in children with CF.

**A Comparative Genomics Approach to Understanding the Roles of P53 Binding Sites**

Cancer is one of the leading causes of mortality worldwide, with over 8 million deaths per year. In more than 50% of cancers, the transcription factor P53 serves as a tumor suppressor which exerts anti-proliferative functions in response to oncogenic stressors. Through ChIP-Seq analysis, thousands of P53 binding sites in mammalian genomes have been identified, yet the functionality of these binding sites remains to be established. It is hypothesize that mutations or epigenetic silencing of non-coding regulatory sequences of P53 target genes play an extensively important role in cancers. By using Drosophila as a model organism, a comparative genomic approach to identify functional P53 binding sites is proposed. To do this, a library of significant P53 binding sites must first be established by looking at data obtained from RNA-seq and comparing them to our ChIP-Seq data. Next, CRISPR-Cas9 will be used to generate Drosophila models containing mutations in the P53 binding sites near the pro-apoptotic genes Hid and Rpr. Selected adult flies containing the CRISPR-Cas9 induced mutations will undergo irradiation induced DNA damage to assess their functional importance. By using this approach we will discover functional roles of non-coding regulatory regions in tumorigenesis and contribute to apoptosis inducing cancer therapies.
**Functional Characterization of the IgG-degrading Protease IdeMC**

Numerous human autoimmune diseases and organ transplant rejections are mediated by IgG, the most abundant humoral immunoglobulin of humans. With the discovery of IdeS, an IgG protease of Streptococcus pyogenes, researchers are able to remove self-targeting IgGs from humans via enzymatic digestion. The unique specificity of IdeS makes it difficult to study, as the enzyme will only degrade human and rabbit IgG. Our lab has discovered that the canine pathogen Mycoplasma canis synthesizes a similar enzyme, dubbed IdeMC. This study focused on determining the functional characteristics of IdeMC using Western blots. Preliminary results demonstrated that IdeMC displays protease activity against canine IgG in a dose-dependent and time-dependent manner, and that the substrate specificity of IdeMC is species-specific. It was also shown that Mycoplasma cynos, a relative of M. canis, did not demonstrate protease activity against IgG, suggesting that the IdeMC enzyme is unique to M. canis. Since IdeMC acts like IdeS, this may allow IdeMC to be used 1) to treat canine immune-mediated diseases and 2) in conjunction with canine models to study the effects of IdeS on humans and autoimmune diseases.

**Addressing Time Poverty In the Dominican Republic Through Public Transportation**

In the Dominican Republic the public transportation system is vital to the mobility of lower income groups of people. In the informal urban area of Verón, the transportation system is especially important to individuals and families of modest means who traverse the dangerous urban context during their commute to work in the resorts of Bávaro And Punta Cana. A needs assessment survey conducted in the summer of 2016 revealed wide dissatisfaction among those who depend on the public transportation system for their commute to work, school, or to get around town. With a large rate of dissatisfaction for a system that plays a vital role in the mobility of a large proportion of the population of this region, this study sought to map the transportation system of motorcycles, vans, and buses of varying sizes, of different routes, and stops, to understand how it works and potentially how it could better meet the needs of the people who use it. The data gathered was used to identify the gaps in the system that lead to large swaths of the population being inadequately serviced. With this information, along with the application of GPS technology in buses, the transportation system in Verón could be improved to be more complete, transparent, time efficient, and economical.
Improving Electrodynamic Dust Shield Efficiency for Solar Energy Applications

For the first time, a laboratory test method was introduced to evaluate the electrodynamic dust shield (EDS) efficiency using aerosol deposition in the cyclic-operation mode, intended to assess the EDS performance under simulated real-world operating conditions. Sieve deposition and the single-operation mode were also used for comparison. Single-operation EDS efficiency was higher with the sieve deposition method, but the results had similar trends between the two dust deposition methods. A significant finding is that, using aerosol deposition, the cyclic-operation efficiency continually decreased as the number of cycles increased, which can be approximated with a “dead dust” hypothetical scenario. With sieve deposition, the cyclic-operation EDS efficiency fluctuated and maintained a relatively higher average value, which partly resembles a “regenerated dust” hypothetical scenario. The very low cyclic-operation efficiency with the aerosol deposition method, in comparison to that with the sieve deposition method, suggests that further research is critically needed for evaluating the efficacy of soiling mitigation solutions for solar energy applications in dusty environment. Another focus is on improving EDS efficiency through optimizing wave function and dielectric material selection, as well as testing the effectiveness of pollen mitigation by EDS action.

Does methamphetamine increase HIV-Tat induced cell injury?

Human Immunodeficiency Virus, HIV-1, is a virus that attacks the immune system. It destroys T-helper cells in the blood and microglial cells in the brain. Studies have shown that individuals with HIV tend to abuse methamphetamine. Even after exposure to antiretroviral therapy, HIV-1 Tat, a protein that promotes HIV transcription, is still present in human cells and adversely affects cell viability. While there have been many studies that individually look at HIV-1 Tat and methamphetamine, currently there are no literature in which looks at the combined effects of HIV-1 Tat and methamphetamine. While HIV-1 Tat and methamphetamine are cytotoxic by themselves, this study will determine whether or not co-exposure to both methamphetamine and HIV-1 further increases cell injury. I will use the dye, acridine orange, to investigate this in microglia and HEK cells to look at RNA intensity and DNA size, examine neuronal injury in dopaminergic neurons, and examine these effects in the animal model. This study will not only demonstrate whether these two combined groups will have an additive or synergistic effect, but also allow us to determine which form of cell death these groups undergo.
**PRESENTER(S): Philip, Drake**  
**AUTHOR(S): Drake Philip, Katrina Grau, Alexa Roth, Stephanie Karst**  
**FACULTY MENTOR: Stephanie Karst**

Characterization of Murine Norovirus Entry Mechanisms

Though noroviruses (NoVs) are the leading cause of gastroenteritis, there is no effective vaccine. This is partly due to their ability to antagonize generation of long-term protective immunity. As such, a primary goal of our lab is to identify key viral factors which drive immune antagonism. Previous work revealed that the murine norovirus (MNV) minor capsid protein, VP2, is critical for antagonizing the induction of protective immunity. As a viral structural protein, VP2 likely influences the process of viral entry into permissive cells. We hypothesized that VP2 regulation of viral entry contributes to its regulation of immune response in the infected cell. This is supported by recent work with yellow fever virus in which it was revealed that a structural protein regulates cellular entry in a manner that shapes the host immune response. However, our results do not support a correlation between differences in virus entry and differences in immune outcome. In the course of these studies, we made the observation that serum blocks viral attachment. My findings show this to be true for two different MNV strains and in three of five permissive cell lines. Future studies will aim to identify the inhibitory factor in serum.

**PRESENTER(S): Porcelli, Emily**  
**AUTHOR(S): Emily Porcelli, David Brice, Dr. Gill Diamond**  
**FACULTY MENTOR: Gill Diamond**

The Effect of Topical Vitamin D on the Inflammatory Response of Gingival Epithelial Cells

Objective – Numerous Americans suffer from periodontal disease, which is a terrible oral infection caused by numerous etiological agents, one being Porphyromonas gingivalis. It is known that Vitamin D has both anti-inflammatory and anti-bacterial properties. The objective for this project was to determine whether vitamin D can prevent P. gingivalis infection of oral epithelial cells in a 3-dimensional model.

Materials and methods – A 3-dimensional culture system was used as a more physiological relevant model for gingival tissue. From bottom to top was collagen, NIH 3T3, then OKF6/tert-1, all fed from a liquid media underneath. Cells were treated topically with different forms of Vitamin D for 6 hours, followed by exposure to P. gingivalis. At different time points, after initial infection, live bacteria were quantified via cfu counts and RT-qPCR.

Results – Cells within the model were infected at an MOI of 2.75, despite the desired MOI being 100. Subsequent cfu counts of input virus and experimental treatments yielded borderline undetectable counts. Similarly, RT-qPCR results echoed the fact that the infection was too dilute to be accurately measured. Conclusion – Further testing will be done because, based on literature, Vitamin D is still a potential target for periodontal disease research.
The Strong Black Woman Stereotype, Stress Management and Coping Strategies among African American female college students

The Strong Black Woman Stereotype (SBWS) is a cultural perception that African American women are naturally, emotionally strong, mentally resilient, self-contained, and self-sacrificing. The purpose of the study is to gain understanding of how African American female undergraduates cope with stressful experiences at the University of Florida (UF) and whether characteristics of the “Strong Black Woman” phenomena are present in their coping strategies. Stress can be understood as a physical and emotional reaction that people experience as they encounter changes in life. Stress can be a major issue for college students as they concurrently live with a variety of academic, personal, and social pressures. This research is important because African Americans are least likely to seek mental health counseling and heightened levels of stress have been associated with increased headaches, sleep disturbances, anxiety, depression, common cold and compromised cardiovascular health.

High-Yield Production of Streptomyces Natural Products by Synthetic Biology Approaches

Streptomyces scabiei 87.22 is well-known for its production of plant-pathogenic virulence factors, thaxtomins, which are biodegradable and have already been approved by the United States Environmental Protection Agency as low risk herbicides. The development of new herbicides is crucial, as no new class of herbicide has been introduced to the agricultural use in the recent decades and weeds are rapidly building resistance to currently available herbicides. However, S. scabiei does not produce thaxtomins in large enough quantities for agricultural applications. This project uses synthetic biology approaches to increase the yield and minimize the cost of thaxtomins. The thaxtomin gene cluster from S. scabiei 87.22 was cloned and expressed in the genetically tractable host S. albus J1074. The production of thaxtomins and nitrotryptophan analogs were observed using LC-MS analysis. When culturing the engineered S. albus J1074 in the minimal medium TMDc, the yield of the most abundant and herbicidal analog, thaxtomin A, was 10 times higher than S. scabiei 87.22, and optimization of the medium resulted in the highest yield of over 170 mg/L. These results indicated that S. albus J1074 has the potential to cost effectively produce thaxtomins and thereof, fostering their agricultural applications.
Biokinetic Modeling and Implementation of Alpha Particle Decay for Tumor Dosimetry Studies

Accurate tumor dose estimates are essential in creating the most effective and safest radiation treatments and also in the construction of dose-response models in radiation therapy. It is important to understand that finding the best dose estimate goes hand-in-hand with implementing dose reduction strategies to reduce the likelihood of development of secondary cancers. The first part of this project was aimed at evaluating five of the most commonly administered radiation examinations to assess the dose distributions to the various organs in the body. Weight fractions for tissue, bone, blood and organs were initially obtained for a list of source organs and were implemented into a phantom, a computerized model of a child or adult, and radiation dose calculations were made. In the second part of this project, absorbed dose fractions were determined using alpha particles of energies ranging from 10 keV to 10 MeV in 100% bone and 100% soft tissue compositions. Monte Carlo simulations were used in determining the effects of tumor shape on these absorbed fractions. The Monte Carlo simulations are being performed and conclusions of under or over-radiation will be made once completed. Dose improvement strategies will then be explored.

Cryogenic Screen Database Development for Flow through Screen Pressure Drop of Liquid Acquisition Devices

The objective of this experiment is to characterize the performance of screen meshes used in cryogenic liquid acquisition devices (LADs) and to contribute cryogenic data to an existing database of influential factors for LAD screens. Future space travel depends on the ability to refuel vehicles with single-phase cryogens in microgravity conditions. The screens in LADs act to filter vapor bubbles while allowing the liquid to pass through. Vapor bubbles may still enter if the pressure drop across the screen exceeds the bubble point pressure of that screen. In this experiment, gaseous nitrogen (GN2) is flowed through a screen, while the pressure drop across the screen and the flow rate is measured. The pressure drop can be correlated to the mass flow rate through two parameters obtained through curve fitting a modified Reynolds number and non-dimensional friction factor. A total of 13 screens of various weaves and coarseness were tested. Success of the curve-fit is quantified by the root-mean-square (RMS) error. The RMS error for all tests ranged from 0.06 to 10.11, but averaged only 1.65, which shows the curve fit was moderately to highly successful. This success of the GN2 tests takes crucial steps toward successful cryogenic (LN2) tests.
Genetic Loss of the Metabolic Sensor AMPK Results in an Accelerated Aging of the Retina

The retina is a highly metabolic tissue which has high energy demand to maintain normal function and cell survival. One of the important energy metabolism regulation pathways is AMP-activated protein kinase (AMPK), which is conserved in most of eukaryotes. The focus of this project was to investigate the role of AMPK signaling in the retina. We used neural retina-specific knockout mice to determine if deletion of the AMPK pathway will affect photoreceptor cell function and survival. We found neural retina-AMPK knockout mice had normal retinal structure. Retinal function was normal at very early age. However, over time cone function was reduced followed by reduced rod function. At 12 months of age, there were extensive changes in retinal morphology. Expression of genes involved in mitochondrial biogenesis and fatty acid metabolism was deceased at 6 months, but there was no change in anti-oxidant defense genes. This suggests AMPK plays an important role in maintaining retinal function and survival in normal aging.

Evaluation of AAV Tropism for Mouse Choroid Plexus

The choroid plexus is composed of specialized epithelial cells that produce cerebrospinal fluid. The choroid plexus lies within the ventricular system of the brain. Delivery of transgenes that encode secreted proteins to the choroid plexus would enable the protein to enter the CSF and circulate widely to the brain. We evaluated how several rAAV capsid serotypes transduce the choroid. Capsid serotypes 1, 5, 6, and 8 were evaluated. To track expression, rAAV vectors encoding a EGFP protein driven by the CBA promoter were utilized. The vector pseudotyped with the various capsids was delivered to the lateral ventricles of mice at PO. Both standard purified viral preparations were evaluated as well as rAAV that were used directly following concentration of the media during rAAV vector production. AAV1 provided the most effective expression within media. AAV5 displayed very little expression in viral and media. AAV6 was heavily expressed virally as multiple branches of epithelial cells formed. AAV8 demonstrated the weakest expression virally. AAV1 expression on ependymal cells, provide the most effective method of protein transduction. Embryonic stem cells may be incorporated in proteins. Creation of new tissues from embryonic stem cells within the CP to regulate CSF, may prevent Alzheimer disease’s symptoms.
Contribution of Muscle IGF-1 Production to Body Composition

Insulin like Growth Factor 1 (IGF-1) can promote muscle hypertrophy, increase muscle regeneration, and protect against age related atrophy, which is evident in transgenic mice with muscle specific production of IGF-1 (mIgf1+/-) (Musaro, Antonio Et al. 2001). The mIgf1+/- mice also have lower food consumption than would be expected by their elevated levels of muscle mass, accompanied increased insulin sensitivity, heightened glucose uptake, and overexpression of GLUT 4 receptors in the cell membranes (Christoffolete, Marcelo Augusto, et al., 2015). The purpose of our study is to determine if high levels of IGF-1 in muscle alters body composition, as defined by lean body mass in relation to total body weight, over a lifespan. Genotypes of male and female mice were confirmed by polymerase chain reaction amplification of DNA from tail biopsies. EchoMRI™ technology allowed for measurement of whole body fat, lean, free water, and total water masses in live animals. We conclude that Mlc/IGF female transgene mice exhibit a significantly higher lean body mass percentage (80.7%) compared to c57 wildtype mice (74.4%). Clinical significance of this study pertains to advances in treatment of metabolic disease including but not limited to type two diabetes.

Exosomes and Hypertension: How The Contents of Exosomes Ultimately Affect ENaC Activity

Urinary exosomes are nano-sized vesicles secreted from kidney cells. They contain biomarkers and signaling molecules useful in identifying kidney associated diseases like salt-sensitive hypertension and the mechanisms of their pathogenesis. We hypothesized that dietary sodium augments the production and content of urinary exosomes to negatively regulate calcium influx and positively regulate sodium reabsorption in the aldosterone sensitive distal nephron. First, we isolated and characterized exosomes from two groups of mice, maintained on either a high salt (HS) or normal salt (NS) diet. Since decreasing intracellular calcium upregulates epithelial sodium channel (ENaC) activity, we investigated how these exosomes affect calcium influx. We loaded mouse cortical collecting duct cells (mpkCCD) with the calcium reporter dye, Cal520AM, and challenged them with either HS or NS exosomes. HS exosomes suppressed calcium influx relative to NS exosomes. Later, we discovered HS exosomes contain increased sphingomyelins over NS exosomes and that introducing exogenous sphingomyelins to mpkCCD cells mimicked the effect of HS exosomes. Future directions aim to investigate which calcium influx mechanism these sphingomyelins affect, extending the understanding of salt-sensitive hypertension and potentially leading to novel therapeutics.
Family-based testing for contribution of TYRP1 gene polymorphisms to the risk of vitiligo

Vitiligo is a disease that occurs when the immune system attacks the melanocytes in the skin, causing loss of pigment ("white" spots). The main areas affected by vitiligo are the hands, knees, feet, elbows, mouth and eyes. There are no cures for the disease, just light therapies that must be maintained to see results, and are rarely completely effective. Vitiligo has a profound effect on the psychosocial aspects of affected children and adults. Our lab is trying to identify susceptibility genes, as vitiligo can run in families. Tyrosinase-related protein 1 (TYRP1) is an enzyme involved in melanin synthesis, and so its gene is a logical vitiligo candidate. For my research project, I am genotyping three single-nucleotide polymorphisms in TYRP1 (rs 2733832, rs 2762462, and rs 1408799) in affected families to look for an association between these variants and the onset of vitiligo. I am using PCR followed by restriction digests and DNA sequencing to identify the variants in each family member. Evaluation of co-segregation of gene variants with occurrence of vitiligo in these families will provide a test of whether TYRP1 is a vitiligo susceptibility gene.

Where Are All the (Straight White) Male Dancers?

There is a gaping hole in the demographic of the American dance world, both in mainstream performative and informal settings, and that missing group is straight white men; those who do fill that demographic are often those who began dancing much later in life than their female, colored, or gay counterparts. I hypothesize the lack of numbers in this demographic is due to two major factors: a homophobic and insecure view of dance and how men must act and behave in dance, and a lack of a culture of dance inherent to their demographic, or at least one devoid of appropriation; I also hypothesize straight white men begin dancing as young adults because their misconceptions of dance are reasoned with and become resolved as boys mature into men in our society. The research proved there to be even more causes and layers to this fear of or disinterest in dance in straight white men, including: the ever-changing definitions and interpretations of masculinity; the level of association of dance with femininity, male homosexuality, and infantility; and race and culture as sources of separation, inspiration, and diversity in styles, education, and environments of dance.
**Student Compost Cooperative – Reducing UF’s Carbon Footprint**

Composting is a natural decomposition process in which organic wastes decompose into a nutritious soil amendment. Nutrients in organic wastes such as food scraps, spoiled fruits and vegetables, garden wastes, and yard trimmings can be recovered and recycled for use in agriculture, horticulture and urban gardening. Not only does compost enrich the soils with organic matter and improve water retention, it also significantly reduces landfill disposal of organic waste and demand for commercial fertilizers, thereby reducing society’s reliance on fossil fuels and paving the path toward a sustainable future. The Student Compost Cooperative (SCC) is a cross-disciplinary outreach program established by the Soil and Water Sciences Department, UF-IFAS, that fosters sustainability and nutrient upcycling through composting and sustainable gardening. The SCC hosts educational demonstrations and hands-on activities, promotes collaboration among other on-campus organizations, and strives to popularize sustainability and composting through social media. The SCC also provides free garden plots for students at the BioEnergy and Sustainable Technology (BEST) Laboratory, and encourages them to compost their food waste and use the finished product for their own organic gardens. All students and staff are invited to participate in the SCC to make the UF campus a more sustainable community.

**A Socio-Linguistic Analysis of African-American Vernacular English at the University of Florida**

Can African-American Vernacular English (AAVE) be used as a tool for power in the African-American community at UF to claim identity and cultural relevance? Language is an important method in gaining social and cultural capital in communities where people are otherwise excluded or marginalized due to cultural differences. AAVE creates a collective identity that represents the African-American community at UF both culturally and linguistically. My purpose is to draw attention to the legitimacy of AAVE as a dialect in the African-American community at UF.

The methodologies employed in this investigation will include open-ended interviews and online surveys. These surveys and interviews will provide context to further understand students’ cultural backgrounds who use AAVE. Understanding how AAVE is used at UF will provide insight into the lives and potential struggles of African-American students. Organizations and clubs serve as a platform for African-American students to foster a collective cultural identity, tied together through the use of AAVE. If as a collective body, we seek to understand different peoples and cultures we can further cultivate a healthy inclusive environment. I aim to further our understanding of the people and the world around us to become a more inclusive Gator Nation.
The Graceful Tree Conjecture

In graph theory, a tree can be defined as a minimally connected graph. In other words, a tree is a collection of vertices and edges such that there is a path between any two vertices and the removal of any edge disconnects the graph. A tree on \( n \) vertices is considered to be graceful if one can label the vertices using \( \{1, \ldots, n\} \) such that each label is used a single time, and when the edges are labelled using the difference between their endpoints, the labels \( \{1, \ldots, n-1\} \) are also used a single time. While it has been conjectured that all trees are graceful, the proof has evaded mathematicians for around half a century. Despite this difficulty, progress has been made by showing that particular types of trees are graceful. We will examine potential approaches to the topic using adjacency matrices.

The role of macrophages in skin regeneration in African spiny mouse (Acomys spp.)

While most mammals are unable to recover from skin wounds without the generation of scar tissues, African spiny mouse (Acomys spp.) has displayed the ability to heal from skin wounds in a scar-free manner and regenerate all the tissues removed. The exact mechanism involved in wound regeneration has yet to be fully understood. It has been hypothesized that macrophages, a phagocytic cell in the immune system, may play a role in the wound regeneration process. To test this hypothesis, we administered clodronate liposomes, a compound which selectively kills phagocytic cells including macrophages. Circular incisions were made on the dorsum of African Spiny mice and Mus mice as controls, and the wounds were injected with clodronate liposomes on day 0, 2, 4, 9. Mice were allowed 14, 21, and 35 days to regenerate and the wounds were fixed, stained and analyzed for macrophage with immunohistochemistry. In spiny mice, we observed a halting of wound closure caused by clodronate, but the controls showed complete wound closure, reepithelization and regeneration. Surprisingly, it was also observed that macrophages were still present in African spiny mice despite treatment with clodronate. We are currently analyzing the results from the Mus wounds treated with clodronate.
PRESENTER(S): Robusto, Brian  
AUTHOR(S): Brian Robusto, Leilani Zeumer, Laurence Morel, Ph.D.  
FACULTY MENTOR: Laurence Morel

Effect of the Expression of the Lupus Associated Pbx1-d Isoform on Mesenchymal Stem Cells (MSCs) in a Mouse Model of Lupus

Systemic Lupus Erythematosus (SLE) is an autoimmune disease that causes chronic inflammation. It is mostly found in women and can manifest itself in many ways. In previous experiments, it has been discovered that mesenchymal stem cells (MSCs) from a lupus-prone mouse strain (Sle1a1) express a defective allele of Pbx1 (Pbx1-d), a gene that controls stemness in MSCs. Sle1a1 MSCs grow faster, differentiate quicker into osteoblasts than the B6 control, and have impaired immunosuppressive function. This data together with a significant decrease in the expression of genes associated with stemness and an increase in expression of genes associated with differentiation suggests that the Pbx1-d allele disrupts the immunoregulatory functions of MSCs. This could lead to lupus pathogenesis. We aimed to see if Pbx1-d expression in Sle1a1 MSCs increased the expression of genes promoting inflammation and activated the innate immune system. 26 genes were selected that showed an expression fold change greater than 2 in RNA sequencing as compared to B6 control MSCs. We also investigated the metabolism of the MSCs, as cells with increased inflammatory functions display an enhanced metabolism. We compared the glucose metabolism and mitochondrial respiration between B6 and Sle1a1 MSC.

PRESENTER(S): Rodrigues, Carol-Anne  
AUTHOR(S): Carol-Anne Rodrigues and Verity Blevins  
FACULTY MENTOR: Lisa Huang

The Architectural Joint of the Hand

In modern day architecture practice, the role of the hand in the design process has been displaced by the advent of new technology. There is an inherent desire in practice to rely fully on the computer, which within its digital parameters removes the direct connection of the architect’s hand from the creative process. To create meaningful architecture, it is imperative to understand that the relationship of the architect’s hand in the design process is as critical as the relationship of the architectural joint to the project. To understand the hand, I approached it architecturally and rigorously studied its form and structure. At the same time, I studied several sculptors and artists, such as Richard Serra, Eduardo Chillida, Robert Morris and Eva Hesse who concentrated on the process over the final product. I created section drawings of select pieces and analyzed them with hand motions to study their forms. With these analyses, I created a material joint that explored different ways to “hold” masses and “join” different materials. With my hand analyses and material joints, I have understood the level of the “joint” at different scales: from the hand that makes the architecture to the actual structure that holds architecture together.
Organic Solar Cells for Flexible, Colorful Applications

In recent years, the development of organic photovoltaic devices has skyrocketed, opening the alternative energy field to solar generation beyond the restrictions of traditional silicon solar cells. Unlike silicon cells, organic solar cells can be tuned in color, transparency, and flexibility of material, broadening the application area and markets. Furthermore, their potential for low-cost fabrication using solution processing methods allows for large-scale applications. Recent efforts have been made to integrate solar energy generation into everyday products, such as roofs, windows, synthetic grass, polymers, and even clothing. In this work, we have studied the effects of solvent additives and post-processing treatments on the color and performance of P3HT:ICBA organic solar cells for their future large-area manufacturing. The results show that the active layer is highly sensitive to the addition of solvent additives and annealing may be used to improve the performance of the organic solar cells.

Measuring Trophic Structure in Hard-bottom Habitats of the Florida Keys to Determine the Success of Sponge Community Restoration

Phytoplankton blooms in the Florida Keys have led to the devastation of hard-bottom sponge communities and the migration of many motile animals out of the region. In an attempt to restore these communities, sponge cuttings have been outplanted on sites throughout the Middle Keys to ‘jumpstart’ the return of sponges and in turn the ecological function of these communities. Each location was assigned four separate site treatments in combinations of two variables, sponge biomass (high or low) and sponge diversity (high or low). One metric we are measuring to gauge the return of ecological function is the trophic structure of the restoration sites. At each site, representative organisms from each trophic level (e.g., primary producers, grazers, detritivores, carnivores) were collected by hand for stable isotope analysis. The distribution of these isotope values will then be compared between the site treatments and controls (unrestored and non-impacted sites). Treatments most similar to the non-impacted sites will be considered most effective. This work is currently in progress but preliminary results will be available by the time of the meeting.
Reduction of Planktonic and Biofilm Bacteria in Pig Skin Explant Model by Topical LAE Formulation

Evaluated the effects of novel formulations containing lauryl arginate ethyl ester (LAE) on killing planktonic bacteria and mature biofilms of bacteria grown on an ex-vivo model of chronic skin wounds. Sterile porcine skin explants with deep partial thickness wounds were inoculated with 50ml of Pseudomonas aeruginosa (PA01) or Staphylococcus aureus (SA113) suspension culture containing 4x 10^6 CFU then incubated at 37°C for 30 min followed by exposure to one of four treatments (PBS, Vehicle gel, 5% LAE gel and 1% LAE gel). Total bacterial CFU measured after 24 and 48 hours of incubation at 37°C. Inoculated explants were cultured for 3 days at 37°C to develop mature biofilms then wiped with sterile gauze and exposed to the same four test treatments, and total biofilm bacterial CFU were measured after 1, 2, and 3 days of exposure. The 1% LAE reduced the levels of total PAO1 bacteria about 2-loggs by day three, while completely killing the biofilms from the first day. The 5% LAE formulation totally kills planktonic and biofilm of PA01 and SA113 bacteria on day two and three, while the 1% LAE formulation is less effective.

Defining the Tropism of various rAAV serotypes within the Brain Ventricular System

The brain ventricular system consists of four interconnected cavities (ventricles) in the brain. They contain specialized ependymal cells involved in the production of cerebrospinal fluid (CSF). Targeting the ependymal cells lining the ventricles is an attractive target for gene therapies producing a secreted protein. We have utilized four different capsid serotypes of rAAV (1,5,6, and 8) along with four different promoters: CBA, GFAP, BLBP, and Nestin to generate 16 rAAV vectors that all express EGFP. We focused on rAAV8 because of its success in transduction of the mouse neonatal brain after the p0 injection. We observed rAAV tropism within the lateral ventricles by detecting EGFP expression using immunohistochemistry after 15 days of rAAV intraventricular injection into a neonatal mouse (p0). After 15 days, we found that rAAV tropism was most apparent with rAAV8 using the CBA promoter. The ventricle’s cells were heavily stained and distinguished from the other tissues of the brain. To validate that the virus is transducing the radial glia, we’ve decided to continue the study through a colocalization experiment using antibody cell markers.
Using the Digital Clock Drawing Test to Identify Subtle Cognitive Differences in Older Adults with Mild Cognitive Impairment

Background: The clock drawing test is a cognitive assessment tool requiring a person to draw the face of a clock, put in all the numbers, and set the hands to 10 after 11. A modernized approach is the digital clock drawing test (dCDT) which records drawing behaviors 82 times per second. We aimed to: 1) investigate cognitive contributions of three dCDT variables, 2) explore how individuals with mild cognitive impairment (MCI; possible prodromal dementia) differed on these three dCDT variables relative to non-MCI peers. Methods: In this federally funded prospective observational investigation requiring IRB approval and consent, participants completed the dCDT and neuropsychological measurements of processing speed, reasoning, language, and declarative memory. dCDT variables of interest: total clock drawing time (TCT), time in seconds from drawing the clock circle to the next stroke (post clock face latency; PCFL), time in seconds to place the first clock hand (preFHL). Analyses: Correlation and group comparisons. Results: 1) Participants (n=151; age>60). TCT associated with every cognitive domain (r’s = -.452 to -.342, p’s < .001), PCFL with memory and processing speed (r’s = -.258 to -.207, p’s < .013), and preFHL with no domains. 2) MCI (n=28) were significantly slower in TCT (~10 seconds slower; p<0.002), and PCFL (p=0.02). Conclusion: Subtle dCDT behaviors provide meaningful information about cognitive function.

Understanding How Temperature Fluctuations and Household Microhabitats Impact Transmission Suitability for Malaria and Dengue

Vector-borne diseases are infections resulting from pathogens and parasites in human populations, transmitted by vectors such as mosquitoes, ticks, and fleas. Temperature plays a large role in the transmission of vector-borne diseases, and many studies have aimed to determine the effect that global, seasonal, and even daily temperature differences have on the human risk of contracting one of these diseases. Our goal was to describe an even more detailed temperature driven risk across the year by measuring more temperature-specific areas and determine where and when people are at higher or lower risks for contracting disease. The air temperature data we collected from houses in Machala, Ecuador, and Gainesville, Florida help to describe the behavioral strategies of mosquitoes (where in/outside of the house they fly) and how these behaviors help them adapt to the temperature differences. In Gainesville during the rainy season, two different times during the day, 9:00 and 19:00, provide perfect transmission suitability, with little distinction between indoor and outdoor conditions. Overall, data showed that outdoor conditions are more conducive to transmission, likely due to cooler indoor temperatures, especially during the summer (rainy season).
Computing Dephasing Times for Parallel Replica Dynamics

Parallel Replica Dynamics (ParRep) has proven to be a powerful method for accelerating dynamic simulations of atomistic systems, which are potentially vital to the study of chemicals and materials at the nanoscale. However, this method is currently inextensible to biomolecular systems. This is a consequence of the inability to predict the time, known as the dephasing time, for ensembles of replicas to relax within conformational states. In this work, we use a 'vicious walker' model of competing populations to motivate the development of a novel algorithm for predicting this dephasing time. Furthermore, we enhance this method with a support vector machine (SVM) protocol and demonstrate its effectiveness on both toy models and small biomolecules.

Mitochondrial bioenergetics and expression profiling in rat dopaminergic cells following exposure to itraconazole

Mitochondria are direct targets of chemicals in our environment. Itraconazole, a fungicide, is part of the larger triazole family, a subclass of theazole antifungal agents. To learn more about the potential interaction between itraconazole and mitochondrial bioenergetics, rat immortalized dopaminergic N27 cells were treated for 24 hours and 48 hours with one dose of either a solvent control, or one of 0.25, 2.5, or 25 µM itraconazole. Cells treated with 25 µM for 48 hours showed increased apoptosis (caspase 3 activity) relative to control cells. There was no indication of cytotoxicity or decreased cell viability. Following treatments, viable cells were subjected to a mitochondrial stress test using the Seahorse XFe24 extracellular flux analyzer. Cells treated with 25 µM itraconazole demonstrated significantly lower basal and maximal respiration compared to the solvent control. To determine the mechanism associated with impaired bioenergetics, we measured the expression profiles for transcripts related to mitochondrial function. None of the transcripts tested were altered by itraconazole, thus modulation of these transcripts appears not to be a mechanism related to decreased bioenergetics. Future work will examine the effects of propiconazole, an environmental azole, on mitochondrial bioenergetics and gene expression to better understand the mechanism of these fungicides.
Generation of FVIII-Specific Chimeric Antigen Receptor (CAR) Tregs to Suppress Inhibitor Development in Hemophilia A Mice

Hemophilia A is an X-linked clotting factor disorder in which patients have a deficiency in coagulation factor VIII (FVIII). The development of inhibitory antibodies in hemophilia A patients who receive FVIII replacement therapy demand new therapies for tolerance. Chimeric antigen receptors (CAR) are recombinant molecules that combine antigen binding and T-cell signaling functions by redirecting immune reactivity toward a chosen antigen. We combined the specificity of CAR technology with regulatory T cell (Treg) therapy to produce FVIII specific Tregs. We did this by complexing the single-chain antigen recognizing variable fragments of a human FVIII antibody to primary and co-stimulatory T cell signaling domains (CD3ζ and CD28), then inserting the CAR molecule into Tregs to generate FVIII specific CAR-Tregs. We tested for FVIII specific activation and proliferation of FVIII CAR-Tregs in vitro. Antigen recognition and signaling by CAR-Tregs may also result in activation-induced cell death (AICD) of the transduced cells. To help find a balance between activation and AICD of the CAR-Treg, we made a series of mutations in the Immunoreceptor Tyrosine-based Activation Motifs (ITAMs) of the CD3ζ domain, by site-directed mutagenesis. This has provided us a superior cell-therapy for immune tolerance to hemophilia. We will test for prevention of inhibitory antibody formation by adoptively transferred CAR Tregs in mice. Inhibitors will be generated by once weekly injections of FVIII and inhibitory titers in treated and untreated mice will be tested by ELISA and the Bethesda assay.

Safety of Acute Intranasal Oxytocin Administration in Healthy Adults

Oxytocin (OT) has been implicated in a variety of physiological and psychological processes. Currently, the safety of intranasal OT within female and older populations are not well documented. To address this gap, we conducted a randomized, double-blind experiment to examine the safety of a single-dose administration of 24 international units (IU) of intranasal OT or placebo (P) among 48 young and 54 older adults. Participants were screened for physical and cognitive health during an initial phone call. During the first in-person visit, participants underwent a health review and blood draw. The second study visit included MRI eligibility testing, various self-report measures, saliva sampling, and self-administration of OT or P. Approximately 45 minutes after self-administration, participants underwent neuroimaging. Participant reported any side effects after the scanning. One week after the full study visit, participants were contacted to assess any side effects experienced since then. Analysis of self-report data show that participants in the OT vs. P group did not differ in the number of side effects reported, suggesting that a single-dose intranasal OT is tolerated well in females and older individuals. These findings provide support for an emerging line of research on OT intervention in aging within larger clinical trials.
A Supervised Learning Approach for Real Time Vital Sign Radar Harmonics Cancellation

Vital signs radar has proven to be an interesting and useful tool; however it is still limited by a few key problems. One of these is the generation of harmonics due to nonlinearities arising from the large signal amplitude of respiration when compared to that of heartbeat. As a result, harmonics arise in the spectrum which confound accurate measurement of either. The gamma filter is a supervised machine learning based approach that offers a calibration-free and computationally efficient solution for many nonlinear filtering applications. Here, it is demonstrated for the first time as a tool for real-time heart rate estimation using the baseband signal from a non-contact vital sign signal measured from a 5.8-GHz quadrature Doppler radar. Experimental results show that the proposed filter for removing respiration harmonics can accurately measure heart rate even if it is weak or overwhelmed by the respiratory movement.

Perfect Muscle Regeneration in the African Spiny Mouse (Acomys)

In humans and most mammals, a scar remains even after a wound has healed completely. However, the African spiny mouse (Acomys) is the only known adult mammal in the world that is capable of scar-free tissue regeneration. The regenerative capabilities of Acomys are being studied by comparing it to a normal lab mouse (Mus). After an ear skin wound, Acomys fully regenerated skeletal muscle. To further study Acomys’ muscle regeneration abilities, we focused on the tibialis anterior, a leg muscle also found in humans. The muscles of both Acomys and Mus were injected with snake venom to induce a wounding and regeneration response. After giving the mice 3 weeks to regenerate, they were again injected. This was repeated for a total of 5 injections with a 3-week healing period between each injection. In Acomys, the muscles regenerated almost perfectly. In Mus, however, high amounts of scarring were observed. Furthermore, we noticed large numbers of fat cells had appeared in the muscle. This finding was unexpected, but humans who suffer from Duchenne muscular dystrophy similarly have their muscle cells replaced by fat cells. Continued study of Acomys will help us to better understand this debilitating disease and regeneration overall.
PRESENTER(S): Sannegowda, Rachna  
AUTHOR(S): Rachna Sannegowda, Desiree Lussier, Natalie C. Ebner, Yenisel Cruz-Almeida  
FACULTY MENTOR: Yenisel Cruz-Almeida  

Cerebellar White Matter Volume is Associated with Clinical and Experimental Pain in Older Individuals with Musculoskeletal Pain  

Musculoskeletal pain in older adults is significantly associated with mobility-related disability, but the neurobiological mechanisms underlying mobility limitations are not well-understood. The cerebellum plays a key role both in motor and pain processing and increased cerebellar activity has been associated with pain. Therefore, the aim of the present study was to determine the associations between cerebellar white matter (WM) volumes and musculoskeletal pain in older individuals. Participants (n=40) over 60 years of age filled out the Graded Chronic Pain Scale (GCPS) to assess pain intensity. A T1-weighted MPRAGE was obtained to determine cerebellar WM volume. Participants underwent assessments to determine pain thresholds as measures of acute pain processing, and a behavioral pain inhibition paradigm as a measure of pain modulation. GCPS Intensity was negatively correlated with WM volume in the cerebellum in both hemispheres (Right: r= -0.49, df=25, p= 0.008, Left: r= -0.52, df=25, p=0.005). Lower cerebellar WM volume was significantly associated with greater thermal detection thresholds and heat pain thresholds after adjusting for age, body mass index, and total intracranial volume. Finding that lower cerebellar WM volume was associated with higher self-reported chronic pain intensity and lower thermal pain detection, but not pain modulation, may be explained by dysregulated, compensatory mechanisms.

PRESENTER(S): Santiago, Juliet  
FACULTY MENTOR: Gordon Mitchell  

Mechanisms constraining spinal neural plasticity: Impact of intermittent hypoxia dose on p38 MAP kinase phosphorylation  

Brief exposures to low levels of oxygen (low-dose intermittent hypoxia (IH); <15 episodes/day) can induce lasting improvements in breathing, suggesting a potential therapy for disorders that impair breathing. However, inflammation impairs/constrains these functional benefits by a p38 MAP kinase dependent mechanism. Importantly, sleep apnea, a disorder which is highly prevalent in neuromuscular disorders, is characterized by high-doses of IH (> 15 episodes/hour) and is known to lead to chronic inflammation. We will compare expression of p38MAP kinase using immunohistochemistry in rats exposed to normoxia, low-dose (therapeutic) and high-dose (pathogenic) IH. Understanding the impact of varying doses of IH on inflammation is crucial for the development of methods to restore breathing capability. This research will guide future clinical trials regarding the safety and effectiveness of using IH as a rehabilitative therapy.
Expression and Characterization of YoaA, a Putative Helicase in Bacteria, Involved in Repairing Blocks to DNA Replication

The structure of DNA is constantly being challenged by chemicals that are naturally present in cells. It has been estimated that 20,000 DNA damaging events occur within a cell in a 24 hour period. If those damages do not get fixed, the genetic code will be altered and chromosomes may break. This issue is addressed by cell mechanisms where the damaged bit of DNA is removed and the undamaged DNA strand is used as a template to remake the damaged strand. However, there is some damage that does not get repaired prior to DNA replication. In this case, cells have to conduct special mechanisms to either fix the damaged DNA during replication or bypass the damage and fix it later. Our collaborators in the Lovett laboratory at Brandeis University, recently discovered a pathway that allows cells to overcome DNA damage caused by 3’-azido-3-thymidine (AZT). Through their research came the discovery of yoaA, a gene that gives tolerance to AZT. Based on its sequence, the yoaA gene encodes an iron-sulfur (Fe-S) helicase. Human cells contain four such helicases that are involved in human repair. The goal of this project is to express the yoaA protein in soluble form and characterize its biochemical activities and function in relation to repairing blocked replication forks. We will do this by determining 1) whether yoaA is a DNA helicase and what are the best substrates for yoaA and 2) how HolC affects yoaA activities.

Situational Analysis for STEM Communication

As scientific research progresses and technology continues to play an increasingly important and integrated role in our daily lives, we must respond by evolving alongside the technology by understanding how these new innovations work and why they’re necessary. Typically, those developing technology and conducting scientific research do not prioritize public understanding. However, by bridging the gap between the science behind new technological advancements and the public, highly technical information is translated into an easily understandable value proposition. This study evaluates the loss of communication in the transfer of technical information from scientists to non-scientists. The ultimate goal is to build a mutually beneficial relationship between the engineering department at UF and the STEM Translational Communication Center (STCC), creating a public relations “firm” for the engineering department (and eventually also for outside national high-tech companies). The first step to any effective communication plan is research. As such, this project serves as a situational analysis of the need for science communication within the academic community. I will report on my interviews with professors, graduate students, and faculty members in the UF STEM community to evaluate the key barriers to effectively communicating STEM research to community stakeholders.
Propofol Waste in Anesthesia and Sustainable Solutions

Pharmaceutical waste is a detriment to both healthcare cost and prosperity of the environment. In anesthesia practice, consciousness of the environment and economic elements are vaguely communicated to clinicians. In some institutions, Propofol, with a Persistence-Bioavailability-Toxicity (PBT) score of 9 (0-9), is disposed insufficiently, leeching into the environment. In other institutions, Propofol must be returned to pharmacy, leading to proper disposal, but incurring additional cost. Our goal was to collect and extrapolate data of the waste of Propofol at UF Health for a two week period in regards to volume and cost. Cost analysis was based upon $0.11/ mL value for Propofol drug cost and $0.02/mL for disposal in Cactus PharmaLock. A 23,756 mL volume of Propofol was wasted; extrapolated annually, 617,664 mL estimated to be wasted. This wasted volume results in a $2,518.17 cost for wastage of drug itself and $451.37 cost for disposal; extrapolated annually, these costs would increase to $65,472.42 and $11.735.61, totaling to $77,208.03 for the disposal and waste of drawn up, but unused Propofol. Based upon this data, provider education, orientation, and signage on anesthesia carts will be implemented in an effort to reduce Propofol waste and create a sustainable culture in the operating room.

Impact of Youth Engagement in Technologically Based Water Well Surveying: Punta Cana, Dominican Republic

Efforts to address issues in resource-challenged contexts can often be disconnected from the realities on the ground. This is true for Verón, a sprawling, informal, urban area in the Punta Cana touristic region of the Dominican Republic. Despite good intentions, past projects in the region have been disconnected from social, cultural, and environmental dynamics of the community impacted.

To eliminate this disconnection, we took an interdisciplinary approach towards sustainable development. By capturing the spatial distribution of water points and their characteristics through youth engagement objectives, we promoted a foundation for development that promotes local participation in decision-making and regional policy development.

With a team of local youth, this research inventoried household water point in Verón and captured GPS points, photos, and general characteristics associated with each water point. A training certification program was developed within cultural contexts in which youth participants were trained to conduct water wells surveys. Youth were observed throughout this certification process to understand how transferable skills of data collection could be beneficial for future educational or employment opportunities. A base layer of water-related infrastructure in the region was complied from water points, to conduct appropriate spatial analysis, and communicate data to key decision-makers in the region.
Abnormal Accumulation of Manganese in the Brain Impairs Motor Behavior in Mice

Manganese (Mn) is a cofactor in many enzymes, making it an essential nutrient required for normal growth and physiological processes. This trace element is available in most plant-derived foods, whereas animal-based foods are nearly free of Mn. While dietary deficiency has not been reported, exposure to higher levels of Mn and its abnormal accumulation in the brain leads to a parkinsonian-like disorder known as manganism. We recently published a characterization of a mouse model of manganism, which shows compromised Mn homeostasis due to a loss of function mutation in the Slc39a14 gene (Jenkitkasemwong et al. (2018) PNAS). The knockout Slc39a14-/- mice show dysfunction in Mn homeostasis with consequent aggregation of Mn in the brain and impairment in motor behavior. In the present study, we extended the characterization of this model focusing on anxiety and cognitive behavioral domains. We confirmed that the Slc39a14-/- mice showed compromised motor performance compared to their wild type controls at older ages than previously published. Additionally, we report that the mice manifested decreased anxiety-like behaviors and faster acquisition of Pavlovian associative learning as evaluated in fear conditioning tests.

Understanding the Effects of Distance of Shelter on Sargassum Consumption in Akumal, Mexico

Despite the high diversity of herbivorous fish species on coral reefs, relatively few herbivorous fish consume mature macroalgae, which can become dominant on degraded reefs. Herbivorous fish tend to rely on safety and shelter that reef habitat provides, which could restrict their foraging capacity to a limited area. Our research focused on the consumption rates of sargassum spp. as it relates to distance from the nearest shelter. Our hypothesis states that the consumption of macroalgae occurs at a higher volume closest to the shelter. Coinciding with this, we created a study that reflects the consumption of macroalgae, in this case sargassum spp., in relation to the nearest shelter reef using assays at two reef sites in Akumal Bay and Jade Bay in Akumal, Mexico. Preliminary analyses suggest a correlation between distance from shelter and Sargassum consumption, though additional data collection will determine whether our herbivory is limited spatially in this habitat.
Public Health Messaging in Veron, Dominican Republic

The purpose of this project was to create effective public health programming that focused on prevention techniques of the most common health issues of Veron’s child population. In May 2017, the Foundation Grupo Puntacana opened a new children’s clinic in the informal urban area of Veron. Through the Oscar de la Renta Pediatric Clinic in Veron, we created public health messages to play in the waiting room. We collaborated with the clinic doctors, had informal conversations with community members and leaders, and observed the operations of the clinic to gain a better understanding of the community. Through visiting various areas of Veron, we filmed children and parents for our prevention video to demonstrate effective preventative techniques in the cultural context and setting of Veron. Our goal was to create videos that encompass cultural sensitivities of the region as well as convey a clear health education message to parents and guardians. After the videos were created, we presented the videos to the doctors, various community members, and Foundation Grupo Puntacana representatives.

The Effect of Snorkeling Tourism on Fish Perception of Risk in Quintana Roo, Mexico

Fear in animals influences their risk-taking behaviors. Since this feeling impacts how an animal conducts itself, it can be inferred that it can affect their fitness. It is known that the presence of spearfishing can make fish act more cautiously, but it’s unclear if the effect is the same with snorkelers. Snorkel based tourism has increased dramatically in Quintana Roo, Mexico over the past several years. While it is clear that an increase in snorkel tourism has had a detrimental effect on the health of the reefs, what is still unclear is how a high volume of snorkelers is affecting fear in fish inhabiting the coral reefs. To gauge fear in fish, we measured the flight initiation distance (FID) of several herbivorous fish species by approaching fish and measuring the distance at which they fled from the approaching snorkeler in two different bays in Akumal, Quintana Roo, Mexico. We hypothesize that fish further from the tourism hotspot will have a significantly larger FID than fish closer to hotspots. We will also evaluate whether fish in Jade Bay also demonstrate behaviors that displays higher levels of fear, such as traveling in groups and hiding in refuges upon approach by snorkelers.
Using stable isotope ratios to evaluate seasonal dietary breadth in Oryzomys palustris sanibeli

The Sanibel Island rice rat (SIRR; Oryzomys palustris sanibeli) is a subspecies marsh rice rat endemic to Sanibel Island, currently listed as a Species of Special Concern in the state of Florida. Rice rats inhabit Sanibel’s interior freshwater marshes and exterior mangrove swamps, and seasonal movement between these areas is presumed. I examined stable isotope ratios (13C/12C and 15N/14N) of SIRR guard hair samples and samples of potential diet items to determine the influence of seasonality (summer or winter) and habitat utilization on trophic level and niche breadth. I used Levene’s test for homogeneity of variance to test hypotheses regarding whether SIRR dietary niche breadth varied seasonally. Analysis showed that dietary niche breadth partially varied between summer and winter samples (13C/12C p=0.068, 15N/14N p=0.018), showing that SIRR diet was more diverse during summer flood periods than during dry winter periods. Their dietary isotopic ratios were found to partly overlap with that of an animal prey base (13C/12C p=0.065, 15N/14N p=0.042), but showed no overlap with a plant prey base (13C/12C p=0.001, 15N/14N p=0.01). These findings increase SIRR rank within the food web above that of primary consumers.

Heartwood Homes and How Redevelopment Impacts East Gainesville

Like many cities in the South, Gainesville still bears the impact of racial segregation, with Main Street acting as the line of demarcation between the wealthier, white, West side, and the historically poorer, black, East side. A 2011 Census report identified Gainesville as the city with the fifth-widest income gap in the country. A new 34-single family home redevelopment project, set in the historic Lincoln Heights neighborhood, presents a fascinating case study on redevelopment. The site that this project takes place on details a story of public housing, redlining, and segregation dating back to the 1960’s. By contextualizing evidence of changing neighborhood indicators in East Gainesville, it is possible to evaluate what the social and economic impacts of redevelopment are on the affected neighborhood and community. Using a historical perspective, contextualizing census data, and analyzing prior academic research on income-mixing and redevelopment, creates a lens through which redevelopment can be evaluated in East Gainesville neighborhoods.
A Modified Bone Demineralization Process for a More Osteoinductive Scaffold for Grafting Large Non-Union Fractures

Bone has an innate capacity for regeneration. However, there exists a critical defect size past which secondary intervention is required to mend the bone. The most common treatment for bone voids is bone engraftment. However, grafts are limited in their size and success by restrictions in revascularization. A successful bone graft should be both osteoinductive and angiogenic. Previous studies have shown that a human placental matrix (hPM) derived protein complex is potentially capable of achieving this. To test it in 3D culture, scaffolds must be developed. Our scaffold of interest is demineralized cancellous bone from distal porcine femur. Demineralization is commonly achieved using hydrochloric acid (HCl). HCl is preferred since it is fast and inexpensive. However, its strength may disturb natural biological structure and function of the scaffold. To improve demineralization and biological functionality, we pretreated the samples with a decellularizing agent sodium dodecyl sulfate (SDS). Data shows that SDS-pretreated samples have lower residual calcium levels than untreated samples, and this suggests that SDS improves demineralization. The biomechanics of the scaffolds before and after cell seeding will be noted. The effect of hPM and osteogenic medium on the recellularization and remineralization of the scaffolds will be observed in the future.

Going “Green” in the Delivery Supply Chain: Evidence and Insights

Given increased consumer interest in green products and practices, this paper will focus on examining sustainable practices within the shipping, packaging and delivery supply chain. “Green” shipping, packaging, and delivery focuses on transporting products from providers (e.g., manufacturers, retailers) to customers to reduce CO2 emissions, landfill waste, and overall negative impact to the environment. For example, (a) the use of electric powered vehicles in the delivery supply chain has the potential to reduce CO2 emissions; and (b) using recycled cardboard or materials that are biodegradable would reduce landfill waste. This paper examines the potential benefits of these green practices in the delivery supply chain. Our results are that a case can be made for use of electric-power vehicles and their potential benefit to reduce CO2 emissions in an environment where power generation in non-coal based. In other words, using electric cars in all delivery supply chains isn’t always a solution; firms must recognize the significant impact of the power generation process in their operating area. From a packaging perspective, there is documented consumer interest on using environmentally friendly material for consumer products. However, depending upon the market segment size, this might not always result in better financial outcomes for companies.
Analyzing the Thermal History of the EET14076 Meteorite Using (U-Th)/He Dating Techniques

The thermal histories of meteorites can provide insight regarding their original parent body formation conditions as well as their cosmic transit history before atmospheric ablation and ultimately surficial impact. EET14076 is an acapulcoite, a primitive achondrite that has lost its chondritic texture due to partial differentiation processes, while at the same time having nearly chondritic composition. Analyzing individual phosphate grains in the meteorite using uranium-thorium/helium dating techniques can help better constrain the low-temperature thermal history for EET14076. The ages for all of the grains were found to be at a wide spread between 350±9.9 and 3,906.6±117.6 million years of age. A more detailed analysis for each of the phosphate grains is required in order to understand this wide spread, as factors such as grain size, shape, composition, the amount of helium 4 retained in each of the grains, and the amount of excess cosmogenic helium 3 present for each grain can affect and alter the (U-Th)/He age, and ultimately our interpretations regarding the meteorite’s thermal history.

The Struggles and Successes of Working with African Grey Parrots (*Psittacus erithacus*): Pattern Recognition and The Preposition “In”

Prepositional phrases make up a key component of human language; understanding prepositional phrases helps humans communicate spatial information. The comprehension of spatial relationships between objects is not restricted solely to *Homo sapiens*; for most animals, a measure of spatial understanding would be beneficial for survival. We demonstrate the different age-based abilities of Congo African Grey Parrots (*Psittacus erithacus*) to not only understand the basic concept of “In” but also their abilities to comprehend increasingly complex visual (stacked cups) patterns. We presented colored cups stacked in different orders to the parrots, and asked them to distinguish between the different patterns (pick blue IN yellow vs yellow IN blue). The study demonstrated that an older African Grey Parrot (23 years old) was better than a younger parrot (4 years old) at answering experimental trials and transferring the concept tested to other colors of cups. The data suggest that both Griffin (the older Grey) and Athena (the younger Grey) were able to develop an understanding of the concept of “In” in cup stacking selection tasks. This study could be used as a precursor for other studies testing other prepositions (e.g. out, over, under), other patterns, or as a precursor for recursion.
Accessible Viscometry: Glucose Syrup / Water Binary Mixtures can be Interrogated using a Chocolatier Ladle Viscosity Cup Set

Viscosity is a fundamental intrinsic fluid property with impacts on fluid behavior familiar in daily life. If viscosity were easy and inexpensive to quantify over a large range, its measurement could anchor engaging, hands-on educational laboratory experiments relevant at both high schools and colleges. Unfortunately, calibrated systems yielding absolute quantitative results like Oswald viscometers are infeasibly expensive. Less expensive systems like Ford cups (for automotive lubricants) and Shell cups (for spray paint) remain proprietary and non-quantitative. Proof-of-concept is demonstrated that viscosities of binary water / glucose syrup mixtures can be accurately and quantitatively interrogated using a low-cost Viscosity Cup set. The cups are built from a commercially-available set of four stainless steel chocolatier’s ladles with a hole machined at the bottom of each. Viscosity is calculated by measuring fluid drain time. Increasing ladle volumes across the set facilitates measurable, overlapping, and repeatable drain times over the continuous range of calibration fluid viscosities from pure water (~0.89 cP) to pure glucose syrup (~1400 cP). Since the two fluids are infinitely miscible, viability of the method is proven via bounding experiments that yield repeatable drain times of pure water and pure glucose syrup from the largest and smallest volume cups respectively.

Can Economic Interdependence Predict Support Among EU-Member States for Sanctions Against Russia?

The EU led the transatlantic response to impose economic sanctions on Russia for its involvement in Ukraine. I seek to evaluate the effect of economic interdependence between sender and target states on the likelihood of the imposition of sanctions. Generally, International Relations literature argues that the states with high levels of bilateral economic interdependence are less willing to engage in conflict or take steps to damage the trading relationship. Interdependence, therefore, should negatively affect the willingness of states to impose economic sanctions. My analysis of the discourse of Members of the European Parliament debating the imposition of sanctions on Russia in 2014, however, demonstrates that economic interdependence could not predict EU member-states' stances towards their sanctions on Russia, except in cases of extremely high levels of interdependence. This suggests that the economic interdependence argument might not always be valid, but it becomes important only after the level of the relationship surpasses a certain threshold. The policy implications of this research for transatlantic security indicate that if transatlantic organizers of sanctions regimes seek to maintain unity among partners, then the organizers of such regimes possibly should consider aid to participant states that stand to lose a great deal of trade from the imposition of sanctions.
**Polysémie A Somatic Approach to Cross-Cultural Communication**

Assimilation into a foreign culture requires shedding one’s personal cultural understanding and habits, in order to embody another. Laban Movement Analysis can be applied to understanding the prominent body attitudes that exist within the desired culture, so that one may find themselves communicating with proficiency, and assimilating naturally to the environment. Laban Movement Analysis (LMA) is an analytical tool, developed by Rudolf von Laban, for understanding and communicating movement. Movement, being the foundation of life, is a universal aspect of human nature; it is the thread that binds, even when language divides. Using the principles of Body, Effort, Shape, and Space (BESS), one may analyze the body attitudes and communication practices of a specific culture, and compare it to that of one’s own prominent body attitudes. This practice of awareness and application is key to assimilation. The resulting work of this research, Polysémie, is a choreographic exploration of the use of LMA to decipher cross cultural communication.

**Mindtrack: Using Brain-Computer Interface to Translate Emotions into Music**

The present work describes Mindtrack, a Brain-Computer Musical Interface that uses real-time brainwave data to allow a user to expressively shape progressive music. In Mindtrack, the user wears an electroencephalogram (EEG) EMOTIV Insight headset. The raw EEG data is converted into brain wave components, followed by high-level EEG characteristics (such as emotion) that are used to control the music's tempo and key signature. Other musical parameters, such as harmony, rhythm and melody are specified by the user. Tempo and key are calculated according to the emotion detected from the EEG device. In Mindtrack, the brain is the sole instrument used to translate emotions to music. Mindtrack has the potential to increase the quality of life for persons with physical impairments who still desire to express themselves musically. Furthermore, Mindtrack can be used for music therapy, recreation, and rehabilitation.
**PRESENTER(S): Smith, Romae**  
**AUTHOR(S): Romae Smith, Jasmine Mack, Linda Cottler**  
**FACULTY MENTOR: Jasmine Mack**

**Getting Young People into Health Research: What Matters?**

When conducting studies, it is very important for researchers to have a representative sample of the population in question. Failure to conduct studies with representative samples lead to results that are not generalizable to the entire population. While studies have addressed the trends and characteristics of certain groups who are underrepresented in research studies, there is limited research on the lack of participation of adolescents and young adults and the sociodemographic factors that may be associated with those who are unwilling to participate in research studies. Chi-square analyses and multiple logistic regression were conducted to determine how various sociodemographic factors are associated with research perceptions and the willingness to participate in health research among members of the community engagement program, HealthStreet. Findings show that young people are more risk averse than older individuals when it comes to the level of risk associated with a particular type of health research study.

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**PRESENTER(S): Soares, Georgia**  
**AUTHOR(S): Georgia Soares, Awilda Rosario, Pedro E. Cruz, Sanjana Bhargava, Raquel Gil, Amanda Hernandez, Sana Mahmood, Catalina Mejia, Kimberly Menezes, Odinaka Osigwe, Ramona Parkash, Neal Patel, Gia Paterno, Abraham Quader, Ankitha Reddy, Lauren Rostkowski, Dan T**  
**FACULTY MENTOR: Todd Golde**

**Targeting the Dentate Gyrus with rAAV Vectors**

Neurodegenerative diseases, such as Alzheimer’s, have been associated with abnormal adult neurogenesis—the generation of new neurons in the brain. Radial glia and neuronal stem cells within the sub-granular zone of the dentate gyrus (DG) contribute to adult neurogenesis. Thus, delivering transgenes to this area to manipulate neurogenesis is of broad interest to the field. To target radial glial within the DG, we used rAAV vectors encoding a EGFP transgene driven by the CBA, Nestin, GFAP, and BLBP promoters, as radial glial cells express these proteins normally. The rAAV vectors are purified from either the cell lysate or the media and then injected into the lateral ventricles of newborn mice. We find that the rAAV8 capsids showed the strongest transduction of cells compared to the other capsid serotypes (rAAV1, 5, or 6). However, the rAAV6 capsid resulted in a more localized transduction of radial glia within the DG area. The Nestin promoter drove the highest expression of EGFP. We are currently conducting co-localization studies of EGFP with radial glia cell markers to more accurately determine if radial glia are being transduced.
Stress-Strain Relationship of Silicon-Germanium Superlattice with Misfit Dislocations

The purpose of this study is to develop the stress strain relationship of the silicon-germanium super lattice and to determine the effects of misfit dislocations. In addition, this study looks to develop a methodology to characterize stress-strain relationships on an atomistic level using molecular dynamics simulations. Multiple variables affect the stress-strain relationship including the strain rate, the number of layers, and the boundary conditions applied. In order to define the suitable conditions for the study of the superlattice and to understand the effect of materials interfaces, especially interfaces with misfit dislocations, a much smaller scale simulation of a silicon single crystal is first simulated to determine the effects of these different variables. Dislocations in previous experiments have resulted in stress drops, so the same is expected when a dislocation nucleates in the simulation of single crystal Si. The interaction of a threading dislocation with the misfit dislocations in the Si/Ge interfaces will then be investigated. To properly characterize these affects, future studies must use more layers on the Si/Ge superlattice due to varying results. This work is expected to provide a fundamental understanding of the role of interface misfit dislocations on the mechanical properties of the Si/Ge superlattices.

Safety of Acute Intranasal Oxytocin Administration in Healthy Adults

Oxytocin (OT) has been implicated in a variety of physiological and psychological processes. Currently, the safety of intranasal OT within female and older populations are not well documented. To address this gap, we conducted a randomized, double-blind experiment to examine the safety of a single-dose administration of 24 international units (IU) of intranasal OT or placebo (P) among 48 young and 54 older adults. Participants were screened for physical and cognitive health during an initial phone call. During the first in-person visit, participants underwent a health review and blood draw. The second study visit included MRI eligibility testing, various self-report measures, saliva sampling, and self-administration of OT or P. Approximately 45 minutes after self-administration, participants underwent neuroimaging. Participant reported any side effects after the scanning. One week after the full study visit, participants were contacted to assess any side effects experienced since then. Analysis of self-report data show that participants in the OT vs. P group did not differ in the number of side effects reported, suggesting that a single-dose intranasal OT is tolerated well in females and older individuals. These findings provide support for an emerging line of research on OT intervention in aging within larger clinical trials.
Design Loads and Pier Responses for Side-On Barge Impacts on Bridges

Bridges spanning navigable waterways are susceptible to impact by vessels such as barges and must be designed to resist collisions. In the US, codified provisions are utilized along with waterway traffic characteristics in estimating equivalent static forces to bridge piers. In current provisions, bridges must be designed to withstand both direct, (head-on) and glancing (side-on) impact forces, with side-on impact forces assumed equal to 50% of head-on impact forces. Research conducted subsequent to the advent of vessel collision design provisions illustrated that dynamic phenomena should be accounted for when designing bridges for head-on impacts. Design-oriented computational tools have been developed that enable practicing engineers to quantify dynamic barge impact loads and time-varying bridge responses for a variety of collision scenarios. While previous studies have focused on head-on impacts, the current study concentrated on characterizing side-on impact loads and resulting bridge responses. Impact parameters including impact angle, barge flotilla configuration, and impact initiation location are explored in analyzing scenarios across various bridge models, leading to identification of design-relevant impact scenarios. An alternative to current design provisions for side-on impact is proposed, which: 1) Incorporates dynamic phenomena; 2) Entails use of designer-friendly computational tools; and, 3) Indicates conservatism relative to sophisticated approaches.

Physical Property Determination in a Two Fluid System

In this poster I will present findings, made by way of experimentation, regarding measurement of physical properties of two fluid systems across a range of temperatures. The properties measured include density, kinematic viscosity, and interfacial surface tension. For each property, the measurements are affected by the composition of the system’s two liquid phases, which change with temperature. Various methods of property determination were investigated, and preliminary results were used to choose the most suitable method. From this point, experimental curves were tabulated using the most appropriate techniques. Correlations were fit to the experimental data and will be presented here. Additionally, a brief overview of electrostatically forced Faraday instability in small geometries will be provided as context for the usefulness of this work.
**PRESENTER(S):** Stefano, Michael  
**AUTHOR(S):** Michael Stefano, Debra Lynch Kelly  
**FACULTY MENTOR:** Debra Lynch Kelly

**The Development of a Brochure to Increase Awareness about Chimeric Antigenic Receptor (Car) T-Cell Therapy**

Background: Hematopoietic cell transplantation (HCT) is a standard treatment for many hematologic conditions. Gene therapy is the transplantation of genetic material into cells to replace defective or missing genetic material. A breakthrough therapy is Chimeric Antigenic Receptor (CAR) T-cell therapy. In 2017, two CAR T-cell therapies were approved by the US FDA. One for children and young adults and one for adults. With the wide-reaching implications of CAR T-cell use, education is essential.

Methods: Information about CAR T-cell and public understanding were obtained using PubMed and interviews with experts in HCT.

Result: There was a positive perception (65% to 85%) regarding gene therapy. About 78% expressed approval of gene therapy to reduce risk of developing fatal diseases. There is a gap in public understanding of gene therapy indications, use, and side effects.

Conclusion: Education is needed to increase awareness of gene therapy, particularly CAR T-cell therapy, to patients and to healthcare providers. This author, with assistance from medical experts has developed a brochure to improve health literacy about CAR T-cell therapy. As well, a second brochure is forthcoming. This author is in an excellent position to educate patients and other health care providers about this innovative, life-saving therapy.

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**PRESENTER(S):** Steinbach, Douglas  
**AUTHOR(S):** Douglas Steinbach  
**FACULTY MENTOR:** Ghatu Subhash

**Characterization of dynamic properties of Silicon Carbide/Silicon Carbide composite tubes.**

Due to recent advancements in manufacturing Silicon carbide (SiC) composite tubes are a viable competitor to zirconium carbide as nuclear cladding. The safety and effectiveness of SiC must be shown in a multitude of areas to replace zirconium carbide as nuclear cladding. This research seeks to characterize the fracture toughness and dynamic yield stress of SiC/SiC (SiC fibers in a SiC matrix) tubes. Five types of tubes (two monolithic and three woven) were tested. Twelve samples of each type were tested to failure in a Charpy Impact test. Twenty samples of each type of tube were tested in the split Hopkinson pressure bars in a radial (10 samples) and axial (10 samples) orientation. Lastly 5 of each of the woven types of tubes were tested in dynamic four point bending.

The tests showed that the woven had greater fracture toughness but lower dynamic yield stress which is likely due to matrix failure. The woven tubes did not completely fail as they yielded so they still appeared to out perform the monolithic tubes which shattered. Based on these results the woven SiC/SiC tubes can be compared to zirconium carbide on their mechanical properties under dynamic conditions.
**Electrothermal MEMS Mirror Scanning LiDAR**

The use of Light Detection and Ranging (LiDAR) has become more prevalent as the desire for vehicles to have awareness of their environmental surroundings has increased. Currently, many LiDAR systems rely on mechanically complex sets of rotating mirrors to accomplish 3D scanning. This approach limits how small these systems can become. However, the use of MEMS (MicroElectroMechanical Systems) mirrors overcome such limitations and further the miniaturization of LiDAR systems. This project demonstrates the implementation of an electrothermal, Al-SiO2 MEMS mirror for use in beam steering in a 3D scanning time-of-flight (ToF) LiDAR system. The results of this project demonstrated the feasibility of using an electrothermal MEMS mirror for beam steering in a LiDAR system.

**Antibiotic Activity of Propolis Available on the Market**

With the increase of antibiotic resistance in many pathogens, it is important to research and develop alternative methods of killing harmful microbes. Propolis, commonly known as “bee glue,” is a substance composed of resins that bees acquire from trees and flowers to support and protect their hive from pathogens. Current research suggests that propolis has anti-bacterial, anti-fungal, and anti-oxidant properties. This project focused on the anti-bacterial properties of three brands of propolis available on the market (Y.S Eco Bee Farm, Pon Lee, and Apiario) against four bacteria: E. coli, S. aureus, P. aeruginosa, and L. acidophilus. We predicted that the three different brands of propolis would show activity against all four bacteria but stronger activity against the gram-positive bacteria based on previous research. Using the Kirby-Bauer disc diffusion method for antibiotic testing, each brand was tested twice against each strain of bacteria. The results suggested that Pon Lee was the most effective brand tested as it showed activity against all bacteria tested. All brands showed more activity against the gram-positive bacteria. With more research, propolis has the potential to supplement or even reduce antibiotic use in both medical and agricultural fields.
Understanding the effect of weather patterns on predator-prey dynamics is essential to conservation and ecology management. The Florida snail kite’s (Rostrhamus sociabilis) survival is directly linked to the hydrology of central and southern Florida wetlands — which are mainly affected by rainfall patterns. Recent dry-downs of the wetlands have raised concern, but data examining the impact on kites and their prey is limited. Kites feed on native Florida apple snails (Pomacea paludosa) and, since it became established in the early 2000s, the exotic island apple snail (Pomacea maculate). In May 2017, 66% of Florida was experiencing drought, but heavier-than-normal rainfall in mid-June resulted in only 15% being considered “abnormally dry.” This study examines how these extreme weather patterns affected the snails and how kites were consequently affected. We surveyed the two snail species throughout May and June, recorded changes in abundance, and determined its correlation to kite reproduction. We found that with the onset of rains, snail kites began breeding almost immediately in palustrine wetlands (lacking flowing water) whereas the impact on kites in lacustrine wetlands (with flowing water) wasn’t as prominent. These results show how species rapidly respond to abrupt changes in weather, potentially benefiting the recovery of endangered species.

The Effect of pH Adjustment on Mercury Removal Performance by Powdered Activated Carbon

Mercury (Hg) is a toxic, natural occurring element that can contaminate aquatic and atmospheric systems naturally or by anthropogenic sources. Powdered activated carbon (PAC) adsorption has been an effective approach in removing contaminants, such as organic matter and heavy metals, from terrestrial systems due to its high porosity and rich surface chemistry. Previous research shows that PAC adsorption can depend heavily on its surface functionality and that functional groups can be added to its surface to enhance its adsorptive capability.

According to Byrne (2009), at different pH levels, concentrations of different Hg(NO3)2 and water species are present in different quantities. The goal of this study is to understand the influence of various water-based mercury species on mercury removal performance by untreated and treated PAC. This was done by altering the pH of solutions containing 100 ppb of Hg(NO3)2 to a pH below 2 with 0.5 M Nitric Acid. Each solution received a 10 ppm PAC dosage and was mixed for 24 hours. These samples were later analysed for total, filterable, and soluble mercury, and mercury adsorbed onto the PACs. A better understanding of untreated and treated PAC mercury removal performance at various pH levels can be accomplished through this study.
Age-Related Susceptibility in Cyber Social-Engineering Attacks

A rapidly aging population, combined with age-related changes in decision making, means that fraudulent activities targeting older adults is emerging into a public health epidemic. Technological advances are opening novel avenues for fraud, such as phishing emails that lure the user into visiting websites that procure personal information or malicious downloads. These attacks can apply life domains (e.g., health, finances) and psychological weapons of influence (e.g., scarcity, reciprocation). We adopted an age-comparative approach to examine use and efficiency of domains and weapons in social-engineering attacks. Study 2 recorded browsing activity of both age groups over 21-days during which phishing emails that systematically varied in domains and weapons were simulated. Older women were the most vulnerable group to phishing. Further, young but not older adults adjusted their susceptibility as the study progressed. While young adults were most susceptible to scarcity, it was reciprocation for older adults. There also was a discrepancy, particularly among older users, between self-reported susceptibility awareness and behavioral susceptibility. These results advance understanding of age-related susceptibility in social-engineering attacks with potential to inform development of preventative tools and policy change to reduce victimizations among aged individuals.

Efficient Synthesis of ABC Star Polymers Utilizing a “Graft-From” Approach

Controlled radical polymerization methods have been used to synthesize star polymer architectures in which a single core has multiple polymeric ‘arms’ extending outward from the center. An ABC star polymer with a 2,4,6-trichloro-1,3,5-triazine (TCT) core, in which A, B, and C are distinct polymer chains obtained via different polymerization methods, will be synthesized. The end product will be a TCT star polymer with A = poly(dimethacrylamide) (PDMA), B = polystyrene (PS), and C = poly(lactic acid) (PLA) via reversible-addition fragmentation chain transfer (RAFT) polymerization, atom-transfer radical polymerization (ATRP), and ring-opening polymerization (ROP). The “graft-from” approach coupled with the chemoselectivity of TCT demonstrates an orthogonal and modular route to polymers with interesting architectures. Successful synthesis is verified by size-exclusion chromatography, nuclear magnetic resonance, and viscometric analysis.
Testing the Drift Barrier Hypothesis

Most mutations in the genome are either deleterious or neutral, and only a minority tend to be beneficial. The rate and spectrum (types) of mutation accumulation vary at many hierarchical levels, from germline to individual cells. Both of two pre-eminent theories of mutation rate evolution, Kimura’s cost-of-fidelity and Lynch’s drift-barrier, assume that given enough time, mutation rate reaches an equilibrium value. Although the raw number of deleterious mutations comes to an equilibrium, there could be many types of these mutations – base-substitutions, insertion-deletions, and copy number variations. To test if the mutation spectrum in closely related species varies in natural populations, we created mutation accumulation lines from C.Remanei, and C.Brenneri. We allowed mutations to accumulate in the near absence of natural selection for ~100 generations through single population bottlenecks, which minimize competition between sibling lineages and render selection ineffective. We found the C.Remanei mutation rate to be 9-fold that of C.elegans, which is a widely-studied, closely related species. This result is consistent with the greater genetic variation that is found in C.Remanei, although it could still be an artifact of a poor reference genome, which we plan to address using our own reference genome for future work.

Simulation of Hot-Electron Effects with Multi-Band Semiconductor Devices

The semiconductor industry relies on advanced modeling techniques to develop the next generation of devices. These modeling techniques require numerically solving well established nonlinear differential equations that collectively tell the story of device physics- including equations for electron continuity, hole continuity, and Poisson’s equation for electrostatic potential. In some scaled semiconductor devices and materials, the electric field is high enough to excite electrons and scatter them into higher energy conduction bands. Materials with certain energy band structures are highly susceptible to scattering that can significantly degrade device response. Today’s numerical models make use of an empirical relationship between electron velocity and electric field that doesn’t handle scattering very well. Modeling is difficult because we do not have a-priori relationships between velocity and field and this need to be developed in advance of numerical solutions for device response. To understand these issues, we have explored and modeled several additional phenomena, including the Fermi-Dirac integral distribution, multiple band energy levels, and carrier temperature due to heat generation and conduction in the semiconductor lattice, resulting in a more physically-sound approach. These additions were implemented and demonstrate an increased accuracy in computing quasi-Fermi levels and increased likelihood for convergence as compared to conventional models.
Influence of Family History of Alcoholism on the Analgesic Effects of Alcohol in Social Drinkers

The analgesic effects of alcohol may be a potent negative reinforcer for future alcohol consumption. Family history of alcoholism may be one factor that predicts the intensity of alcohol’s analgesic effects, and consequently its potency as a negative reinforcer. To study this, we measured pain response to a thermode placed on the forearm of healthy social drinkers (N=12; 50% women) when given a sub-intoxicating dose of alcohol vs. placebo (non-alcoholic beverage) and analyzed how this differed between individuals with (FH+; n=5) and without (FH−; n=7) family history of alcoholism. Using repeated measures ANCOVA controlling for expectation of alcohol analgesia, we found no significant effect of family history on pain threshold or pain tolerance. However, we found a statistically significant difference in ratings of lingering pain 15 sec after removal of the thermode (i.e., 15s after-sensation). FH+ participants gave a significantly lower 15s after-sensation rating when given alcohol (Malc=0.39) vs. when given a placebo (Mplac=1.60; p=.02; Cohen’s dz=1.10). The FH− group showed an opposite trend (Malc=.83 vs. Mplac=.31; p=.18; Cohen’s dz=.91). Our findings provide preliminary evidence that alcohol may serve as a stronger reinforcer in FH+ individuals by dampening lingering pain.

Male testes growth in response to access to females under monogamous and polygamous condition

Bateman’s gradient states that males who mate more will increase their chances of siring offspring. Based on the Coolidge effect, males who are introduced to a novel female will increase investment for a female. One way males can invest in reproduction is through sperm production and/or sperm quality, increasing their chance of fertilization. Males may grow their testes to increase sperm production, a costly task. Here, we assessed the extent to which the leaf-footed bug (Narnia femorata) would invest in testes when presented with the same or novel female with and without time constraints. We predict polygamous males with constant access to novel females will grow the largest testes. Males were separated into four treatments consisting of two different mating systems (polygamy and monogamy) and female companionship times (24 hours a day or for 3 hours every fourth day) over a 16-day period. Contrary to our prediction, our results indicate that polygamous males that are allowed unlimited access to novel females have the smallest testes. On the other hand, males with limited access to females have the largest testes, regardless of female novelty. Therefore, increased mating opportunities appear to lead to testes reduction (possibly via sperm depletion), not testes growth.
**The Art-Science Experiment**

The created portfolio explores the area of academic art and how it can be translated into the fields of fine art and biological science. The works were created to further understand how art is used in scientific exploration today compared to that of antiquity. During the period of enlightenment, science and art were codependent. Studio art was employed as a form of research and communication. In light of this, the artistic pieces were created in the Entomology and Nematology Lab at the University of Florida. The works of art encompass a diverse range of species, scales, and functions. The works were designed to serve three purposes: life size models were printed and painted to serve as decoys for reproductive research; medium scale models were distributed to international geocaches to gage public opinion on arachnids; and large scale models were utilized as educational tools. The range of models serves different functions but they all answer to principles of art. Thus defining the interdisciplinary nature of art as it relates to scientific study.

**The Everyday Life Experiences of Transgender Students at the University of Florida**

This research centers on the everyday life experiences of transgender students of color at the University of Florida. Understanding these experiences can help educators, policy makers, and relative stakeholders at UF address the day-to-day needs of trans* students in the classroom, throughout the campus, and as Gainesville residents. Indeed, the implications of my research address campus climate issues and University of Florida’s own vision, practice for diversity, equity, and inclusion. Often, when we think about diversity and inclusion we see race and demographics. However, educators are only beginning to incorporate gender identity and expression as a diversity issue, which means that the needs of queer students generally speaking and transgender students specifically are historically overlooked and neglected.

This project uses a mixed methods approach. By replicating the national survey Injustice at Every Turn, national queries on the lives and experiences of transgender Americans will be taking into account in formulating a 35 question survey. By using one-on-one interviews transgender students at UF can speak authentically about their lives. These narratives help reveal the day-to-day, or what I call “life experiences,” of transgender students at UF and may speak to experiences and nuances that surveys may not always capture.
Street Style: A Costume for Daily Life

Through documentary video format, my project will uncover the thought processes that go into the creation of personal style. Analyzing the ways in which fashion in film has developed, can street style be classified as another form of costume? Upon interviewing various members of The University of Florida, street style seems to serve as an expression of self-identity, reflecting a visual response to societal expectations. This project will explore the characteristics of street style that relate to the ones that constitute the costumes we see for characters in cinema.

Force Generation in Prosthetic Hand Devices

The process of 3D printing prosthetic hands has been used to make prosthetics more widely available by lowering the cost. However, many of these devices are not mechanically tested once they are constructed and they may not achieve their intended function. This study quantifies the efficiency and magnitude of mechanically activated grip strength in a 3D printed prosthetic hand. A rig stabilized the hand on a dynamometer at an angle such that added weight created a constant downward force and engaged the grip. We tested the hypothesis that the presence of the hand would act as a friction device and propagate less force on the dynamometer when engaged than weights alone. The results supported the hypothesis and can aid in classifying the function of the hand for certain tasks such as holding a cup. This study can inform new designs to improve the efficiency of grip strength in similar devices. Furthermore, quantitative data on the strength of the fingers can better inform how custom hand devices will be suited to specific tasks.
Malnutrition Delays Onset of Sexual Behavior and Slows Secondary Sexual Organ Growth in Pest Fly

An important question is, how do animals know when it is time to start reproducing? Insects need a nutritious diet to fuel reproduction, and a protein-rich diet can accelerate the timing of sexual maturity. Understanding the factors that may speed up sexual maturation could improve the Sterile Insect Technique (SIT). SIT involves releasing sterile male flies into a field to compete with wild males, preventing wild female reproduction. Tephritid fruit flies are major economic pests that are controlled by SIT. In SIT, sterile males must be able to display proper sexual calling behavior. For tephritids, this includes pheromone releasing displays such as bulging of pleural and anal glands and wing fanning. The frequency of these displays increases when protein is added to an adult tephritid’s diet. Few studies have examined the morphological changes that accompany maturity. In male Caribbean fruit flies, Anastrepha suspensa, the salivary gland is used by males to produce pheromones and attract females. I hypothesize that dietary protein accelerates the growth of the salivary gland allowing earlier calling behavior. I found that diet and age are significant predictors of salivary gland size, and salivary gland volume is a significant predictor of calling behavior, confirming my hypothesis.

King Richard III: How a Man Becomes a Monster

History is notorious for being written by the victors, often to the detriment of truth. The losers are usually portrayed as small and insignificant to the course of history. However, such erasure can happen to the greatest and most influential people, even kings. King Richard III is perhaps one of the most infamous kings to wear the English crown. He has been depicted as a ruthless, power hungry villain by famous humanists such as Thomas More, and immortalized as a deformed monster by William Shakespeare. For over five hundred years, historians have commonly agreed with More’s and Shakespeare’s verdicts. It was not until recently that supporters of Richard took up the king’s case to truly examine the evidence against him. Some historians now see Richard, not as evil monster, but as man responding to a political crisis. Less clear, however, is the process by which the image of Richard III as England’s ‘Black Legend’ actually came into being. In this paper, I intend to trace the origin of that extremely negative assessment of both the man and his reign. My goal is to show how the image of the Duke of Gloucester as a monster is largely a literary construct.
PRESENTER(S): Tiu, Chriselle  
AUTHOR(S): Chriselle Tiu, Peter DiGennaro, Noor Abdelsamad  
FACULTY MENTOR: Peter DiGennaro

Nematode Parasitism Using Plant Peptides  
The effects of nematode parasitism are expensive and agriculturally devastating. The Root-knot nematode establishes a parasitic relationship with plants by manipulating host developmental processes to form feeding sites. Little is known about the molecular mechanisms behind RKN parasitism and a lack of sustainable control strategies has been developed. RKN feeding sites are created through plant cellular proliferation and differentiation developmental programs. Normal plant development is controlled by hormones, including peptides like CLE (CLAVATA3). Plant CLEs are divided based on gross function and are responsible for the development of the plant’s vascular system and speciation. RKN genomes encode both types of CLE which may allow the nematode to manipulate both plant cellular differentiation and proliferation to form feeding sites. This research project will aim to understand the role of nematode derived CLE mimics in altering plant development by measuring gross and cellular plant phenotypes and any antagonistic or agonistic effect these peptides have on nematode fecundity. With the use of null mutants for known plant CLE receptors, this research will identify the molecular pathways used by nematode peptide mimics to elicit disease. The results of this research will increase our understanding of RKN parasitism and lead to new sustainable control strategies.

PRESENTER(S): Tran, Dieu  
AUTHOR(S): Dieu X. Tran, Sonia I. Diyaljee, Alex M. Winsor, Pablo E. Allen, Adam G. Dale, Naomi J. Ector, Diane Petit-Bois, Jeffrey T. Quinn, Adam C. Ranieri, Jaime A. Sanchez, Hailee M. Smith, and Christine W. Miller  
FACULTY MENTOR: Christine W. Miller

One and done: Long-term sperm storage in the cactus-feeding bug, Narnia femorata (Hemiptera: Coreidae)  
Female sperm storage is common across a wide taxonomic range. The temporal separation of mating and fertilization has several benefits for females. It enables sperm selection from multiple males, but can also allow females to temporally and spatially delay fertilization until the proper environmental conditions are found. In this study, we investigated the extent and possible function of sperm storage in the polygamous cactus-feeding bug, Narnia femorata. To determine the viability of stored sperm over time, we tracked life-long fecundity of females exposed to varying levels of male access. We exposed females to four treatments: one male for one week, one male for one week with further exposure to the same male later in her life for an additional week, one male for the duration of her life, or two males for the duration of her life. Our results indicate that females produce viable offspring during their lifespan from a brief mating encounter with a single male. Egg production and fertility rates did not differ across treatments, suggesting that time of exposure and number of mates has no effect on N. femorata fecundity. Sperm storage is therefore likely an adaptation to the patchy spatial-temporal distribution of adequate resources.
Stylistic Distinctions: Northern and Southern Moche Ceramics

The Moche civilization developed in the Prehispanic North Coast of Peru during 100-800 CE and was divided into two zones, the Northern and the Southern Moche. This body of research compares face neck vessels that originate from the last phase of Moche ceramics, Moche IV (400-600 CE). Face neck vessels are characterized by their anthropomorphic imagery, bulbous form, and narrow neck. The majority of the vessels in this discussion originate from monumental funerary complexes for the elite. By comparing vessels produced contemporaneously by Northern and Southern Moche polities, I have developed a set of standardized distinctions in form, shape, and finishing techniques in ceramic production from each group. Using these stylistic distinctions, I argue that two face neck vessels from the Harn Museum of Art, which have an unknown provenience, originate from Moche IV in the Southern Moche region. In the process, I will discuss burial practices, the concept of dualism in Moche culture, the significance of mold technology and thereby its implications for Moche funerary practice. My essay will serve as a reference tool for categorizing Moche ceramics, which could help future researchers, museum curators, and registrars who are unfamiliar with the regional pottery differences.

Lateral Entorhinal Cortex Inactivation Does Not Inhibit Object-Place Associative Memory

Cognitive decline manifests in many older adults not afflicted by neurodegenerative disease. As the aged population continues to grow, so does the importance of understanding the physiological effects of aging. The lateral entorhinal cortex (LEC) is critically involved in higher cognitive function, and is the major input pathway to the hippocampus, which is affected early in Alzheimer’s disease. While lesion studies in rats have shown that the LEC is needed for associative recognition memory, it is not known the extent to which LEC activity is critical for adaptive behaviors that decline in older adults. The current study sought to better define the biological mechanisms of memory decline by examining the role of LEC activity in supporting performance on an object-place paired association task, which is exquisitely sensitive to detecting cognitive decline in old animals. Rats were trained on this task and then surgically implanted with guide cannulae bilaterally in the LEC to reversibly inactivate the right and/or left LEC with muscimol. No significant deficit on the task was found with unilateral or bilateral inactivation of LEC. Thus, while the LEC may be necessary for the acquisition of object-place associations, once these associations are learned the region is no longer critical.
Cities and Climate Change: Adaptation Strategies

The impact climate change is having on the Earth is irreversible. A report by the United Nations’ Intergovernmental Panel on Climate Change concludes that “continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system.” This is particularly relevant for urban areas as large cities are responsible for consuming two-thirds of the world’s energy and creating over 70% of global CO2 emissions. While many cities have made strides in the mitigation of CO2 emissions with the investment of renewable energies, technology optimization, and carbon capping, mitigation strategies are no longer enough. Cities must start to identify climate change adaptation strategies to combat rapidly changing environmental conditions. The work of urban resiliency is becoming increasingly prevalent. Despite the biophysical vulnerabilities of urbanism, cities are the world’s future. According to the 2016 United Nations census, 54% of the world’s population lived in urban areas and this number is expected to increase to 66% by 2050. As the majority of humans will live in cities, so must the solution for climate change adaptation. This research project will identify and analyze current climate change adaptation strategies being implemented by cities around the world.

Functionalized Anti-Tau scFvs as Novel Therapeutics for Alzheimer's Disease and Other Tauopathies

The microtubule-associated protein tau forms intracellular inclusions in multiple brain disorders such as Alzheimer's Disease (AD) and Frontotemporal dementia with parkinsonism-17 (FTDP-17). Studies have shown that tau also exists in extracellular fluids and a subset of extracellular tau species can, via prion-like propagation, seed intracellular tau pathology. Both passive and active immunotherapies are currently being tested which are hypothesized to neutralize extracellular tau to prevent the spread of tau pathology. The Golde/Levites laboratories have generated single-chain variable fragments (scFvs) specific to hyper-phosphorylated tau and shown them to be efficacious in mouse models of tauopathy. We have explored improving the efficacy of these scFvs by fusing them to functional domains such as immunoglobulin Fc domains and a novel collagen-based multimerization domain. We fused our most effective scFv (PHF1) identified to date to each of these domains and tested whether these functionalized scFvs are able to reduce the formation of insoluble tau to a greater extent than the parent scFv in a cellular model of seeded tau aggregation. Additionally, we are currently testing the scFvs in ex vivo organotypic brain slice models of tau aggregation to determine if they are more effective at reducing neuronal tau inclusions and tau-induced neurodegeneration.
Improving the Mechanical Properties of Shape Memory Polymers Using Gibbsite Nanoplatelets

Shape memory polymers (SMP) are a class of materials that change shape in response to an external stimulus, such as heat or light. SMP’s have a wide range of industrial applications, including biomedical devices. Our research group is interested in a specific category of SMP’s, called cold-programmed SMP’s. These SMP’s respond to pressure and chemical vapor, eliminating the need for heat that limits the response speed of many thermoresponsive SMP’s. However, our cold-programmed SMP’s are too brittle for use in industry. This paper investigates the inclusion of Gibbsite nanoplatelets, a hexagon shaped nanoparticles roughly 200 nm in size, into the synthesis process and its effect on the shear strength and transmissive properties of the doped SMP. First, samples of Gibbsite were prepared and analyzed with scanning electron microscope experiments to verify that Gibbsite was obtained. To test how Gibbsite affects the mechanical properties of SMP samples, a 5% weight sample of Gibbsite was added to the usual 3:1 ratio of comonomer (SR610, SR415) that is used for synthesizing SMP. After processing the Gibbsite doped SMP sample, we observed the mechanical strength to be improved, while retaining the original properties of the SMP. This observation was confirmed with nanoindentation tests.

A Basic Understanding of Proton Exchange Membrane Water Electrolysis

Proton Exchange Membrane (PEM) Water Electrolyzers have the potential to be commercially produced and sold as renewable energy adapters. PEM Water Electrolyzers use renewable energy electricity to power electrolyzers to split water molecules into pure H2 (hydrogen) and pure O2 (oxygen). The pure hydrogen is much easier to store than renewables like solar and wind energies, making it an ideal power source for homes and businesses. The purpose of this research is to explore and attain a basic understanding for PEM Water Electrolysis. The decomposition of water and the functions and materials used for each part of the electrolyzer will be discussed in detail. We will look at ways to increase PEM efficiencies by decreasing the permeation of elements other than hydrogen (specifically methanol) through the membrane to determine what is disallowing the PEM Electrolyzer from being ready for commercial usage. The following steps of this research would include a further understanding on the electro polarization and potential of water before lab experiment on proton and ion conductivities is to be organized.
The Political Memory of Cuban Heroine, Mariana Grajales Cuello, 1800-2000.

This project looks at the politics of memory in regards to Cuban heroine, Mariana Grajales Cuello, better known as the Mother of Cuba. Grajales served as a mambisa who cured the wounded and encouraged the mambises to return to battle during the Cuban Ten Years Wars for independence against Spain. The research focuses on exploring the creation of Grajales’ memory during the 19th century and traces its political development during and shortly after the Cuban Revolution of 1959. In order to do this, the project relays on an interdisciplinary methodology including the examination of narratives/discourses, as well as, examples of material culture through the 19th and 20th century. Additionally, the topic draws from Kimberlé Crenshaw’s Theory of Intersectionality to better understand how being both a woman and a person of color affected the memory of the Cuban icon. The paper will show how her memory has been used for different political purposes throughout the years and how her legacy has changed depending on different political moments in Cuba.

Genotype by Environment Interaction in the U.S. Cynodon Germplasm Collection for Bermudagrass Stem Maggot

Bermudagrass (Cynodon spp. L.) is an important warm-season perennial grass grown for forage and turf in Southeastern U.S. The bermudagrass stem maggot (Atherigona reversura; BSM) is a new invasive fly species, which has caused a significant economic impact due to the reduction in forage yield and quality. The objective of this study was to calculate genetic parameters in a set of 286 bermudagrass genotypes for BSM resistance across the southeastern U.S. (Citra and Ona, FL; Tifton, GA) across multiple years, and the correlation between leaf width and BSM damage. The experiment, established in 2014, was designed as a row-column with two replicates and augmented representation of the cultivars. The population was evaluated in Florida for BSM damage on a scale of 0 to 9 (scale: 0 = no visible damage; 9 = more than 90% damage) and in Georgia from a scale of 0 to 5. Linear mixed models with repeated measures were implemented in ASReml. Broad sense heritability (H2) for BSM resistance ranged from 0.14 to 0.53 for analyses performed by location, while H2=0.20 for the multi-location model. Genotype by measurement correlation (rB) was 0.74 for analyses by location in Tifton and Citra, indicating stable genotypic performance for BSM resistance across measurements. Likewise, the high correlation (rB =0.87) for the multi-location model shows that genotypes performed similarly across locations. Hence, there is genetic variability for BSM susceptibility in the population.
Anaerobic Fluorescence of Propionibacterium strain University of Florida 1

Propionibacterium freudenreichii University of Florida 1 (P. UF1), isolated from breastfed human preterm infants, is investigated by our lab in mice to determine its potential as a lifesaving probiotic for infants fed formula. We seek to understand P.UF1 cross talk with the immune system and gut microbiota in vivo by inserting a fluorescent gene into the P.UF1 genome and observing fluorescence. The PpFbFP gene (FMN based anaerobic fluorescence gene) was transformed into P. UF1 via being cloned into P. UF1- E. coli shutter vector pYMZ, generating plasmid pYMZ-P4-PpFbFP which expressed His6-tagged PpFbFP gene under control of P4 promoter. P.UF1 was found to produce propionate, eliciting a decrease in inflammatory cytokines, sustaining regulatory T cells (Treg cells), and markedly mitigating necrotizing enterocolitis (NEC) in neonatal mice. We developed a method to label P. UF1 bacterium by incorporating fluorescence gene, FMN-based fluorescence gene (FbFP). Expression of PpFbFP fluorescent gene was confirmed by qRT-PCR and Western blot. To gain meaningful insight on the function of the bacterium, the next step is to develop an inducible system for P. UF1 by using FbFP as a reporter gene.

Phase Amplitude Coupling Trends in Epilepsy Patient ECoG Data

Brain waves are a representation of synchronized neuronal activity and are characterized by their frequency and amplitude. Phase-amplitude coupling (PAC) is a phenomenon that occurs when the intensity (amplitude) of a high frequency brain wave corresponds to a particular phase of a low frequency brain wave. Thus, there is a synchronization of phase in a slow rhythm and amplitude in a faster rhythm that can occur on a local and/or on a broad scale across the brain. This investigation used data that was obtained in an experiment conducted by Gunduz et al in 2011, using four human subjects with intractable epilepsy that underwent temporary placement of subdural electrodes for electrocorticography (ECoG) readings. ECoG data was taken during each step of an attention task and the data from one patient was used to calculate the “modulation index”, which quantifies PAC, locally in all implanted electrode channels. This showed exaggerated coupling in the motor and parietal cortices in specific frequencies during attentional shift, before movement, and during movement. Current and future work is directed towards calculating PAC broadly, across various channels rather than locally, in each channel. Discovering trends in PAC may explain the motor anomalies associated with many basal ganglia diseases.
Intermediacy in Aristotle’s Ethics

In the Nicomachean Ethics, Aristotle defines virtuous action as characteristically intermediate or as a mean. It is unclear how to interpret this “doctrine of the mean.” Aristotle uses it primarily as a conceptual tool, to divide up actions and dispositions into three classes. On the triadic picture Aristotle offers us, one can fail either by doing too much or too little. Virtue falls in between these two kinds of failure and hence is intermediate. The way this account offers us an understanding of the nature of virtue and its relation to moral failure is very important for the theoretical completeness of Aristotle’s ethics. However, modern scholars often dismiss the mean, as it does not seem to capture much of what can go right or wrong in our actions than questions of amount. In this paper, I will argue for a weaker understanding of the mean that focuses on less on amount and more on alternative understandings of the concept of excess and defect. The aim of my account will be to redeem what I take to be a sloppily introduced but extremely useful concept which is needed to make the Ethics complete.

Monte Carlo: From Gambling to Radiation Transport

Modern Monte Carlo methods were invented by Stanislaw Ulam while working on the Manhattan project in the 1940s. Since then, these methods have been widely adopted for use in the nuclear and radiological science community because of the ease with which Monte Carlo methods may be used to simulate radiation and particle transport. In this paper, the underlying mathematical concepts of Monte Carlo methods and their implementation are examined. A general proof of the Monte Carlo method is presented, followed by a discussion on the implementation of Monte Carlo methods for radiation and particle transport utilizing high performance computing. This discussion includes an examination of linear congruential random number generators and parallel Monte Carlo algorithms. The results of these algorithms as applied to problems of varying computational difficulty with a varying number of cores are presented and analyzed.
Automated Polishing Process for Knee Prostheses

Magnetic abrasive finishing (MAF) has been shown to polish a Co-Cr knee prosthesis in a manner that reduces the surface roughness to less than 5 nm Sa without disturbing the form accuracy of the workpiece. However, the MAF process has not seen widespread practical use because of the long lead time required to prepare workpiece holders that match specific prosthetic designs, to provide a magnetic flux across the workpiece. Therefore, the objective was to develop a tool path and an automated polishing system for the knee prostheses that uses MAF to achieve a consistent and uniform surface roughness for different sized knee prostheses. To achieve this goal, the universal workpiece holder called the Squishy Bag, was developed, and utilized with a 5-axis CNC machining center to conduct polishes on the knee prosthesis. Different tool paths were constructed using g-code for the 5-axis CNC machining center to polish the various regions of the knee. The use of the MAF with different types of abrasives and magnetic particles will be tested on this region to obtain a consistent surface roughness of approximately 5 nm. The feed rates and polishing times were optimized to reduce the lead time of polishing the knee.

A Study of Organic Food Labeling In the United States Compared to Denmark

Organic farming practices produce foods that avoid manufactured fertilizers, pesticides, growth regulators (GMOs), and livestock additives. The definition of what is considered organic in the United States is that 95 percent of the ingredient list must be free of synthetic additives and must not be processed using industrial solvents. The goal of the study was to compare organic labeling and certification between the United States and Denmark. The hypothesis is that labeling and regulation will be similar because the food economy is built on a global scale. Researching organic labeling was required in both the United States and Denmark. A study of one food item from each section of the US food pyramid was completed. Then, labeling data was collected in both Danish and American grocery stores. The work required visiting three grocery stores in both countries. The results were organic labeling requirements are different in the US and Denmark. Denmark has a much more stringent level of organic certification, store labels of studied products confirm these differences. The study demonstrated that organic labeling, is very complicated in both the US and Denmark, and there is not a common standard of organic labeling and certification between these two countries.
Inadvertent Hypoxic Gas Mixtures during Low Flow Anesthesia, including High Fire Risk Cases

Anesthesia providers set fresh gas flow (FGF) and fraction of delivered oxygen (FDO2) on anesthesia machines based on patients' particular conditions, phase of the case, procedure type, surgical fire risk and preference. Surgical fires constrain FiO2 to \( \leq 0.3 \) (30% O2); thus air (0.21) is sometimes used. Low FGF is attractive for its economic and ecological benefits. We explored whether low flow anesthesia at FDO2 0.3 or air (FDO2 0.21) results in inadvertent delivery of hypoxic inspired mixtures (FiO2 < 0.21) in the Aestiva (GE Healthcare, Madison, WI) anesthesia machine, and performed experiments to evaluate the FGF \( \geq MV \) (minute ventilation) heuristic to prevent rebreathing as a secondary outcome. With FDO2 at 0.3 instead of air, significant dips in FiO2 also resulted in hypoxic inspired mixtures. Our results confirm (a) that the minimum FGF administered to a patient must be equal to or greater than MV to avoid rebreathing and (b) that FGF \( \geq MV \) prevents delivering a hypoxic inspired gas mixture when the FGF is air.

Lysosomal-targeted anti-tau intrabodies as novel therapeutics for Alzheimer’s Disease and other Tauopathies

Tau, a microtubule associated protein, forms intracellular inclusions in diverse brain disorders such as Alzheimer’s Disease (AD) and Frontotemporal dementia with parkinsonism linked to chromosome 17 (FTDP-17). Previous publications have demonstrated the potential of intracellular recombinant antibody fragments (intrabodies) as novel therapies by blocking intracellular protein aggregation within the cytoplasm. Further, the Golde/Levites laboratories have generated intrabodies specific for hyper-phosphorylated tau (P-tau) and shown them to be efficacious in mouse models of tauopathy. We have explored improving the efficacy of these intrabodies by fusing them to functional domains, which hypothetically target intrabody bound tau for lysosomal degradation. We fused our most effective intrabody (CP13i) identified to date to a chaperone-mediated autophagy motif (CMAM) that targets proteins to autophagolysosomal pathway. This functionalized intrabody, CMAM-CP13i, reduced the formation of insoluble tau to a greater extent than the parent intrabody in two distinct cellular models of tau aggregation. The CMAM-CP13i is now being tested in ex vivo brain slice tau aggregation models to determine if it is more effective at reducing neuronal tau inclusions and tau-induced neurodegeneration. Further, we continue to test both novel tau-targeting intrabodies and other functionalization motifs, in order to identify the most optimal functionalized tau-targeting intrabody.
Reducing toxicity of welding fume particles via amorphous silica evaluated by direct in vitro aerosol exposure

Despite the current safety protocols involved in arc welding, the production of toxic metal fumes as byproducts poses serious health risks to industry workers. The addition of tetramethysilane (TMS) to the welding process aids in reducing the toxicity of welding fumes through the encapsulation of particles in silica to contain their reactive metal surface. In this study, the toxicity of welding fume particles with different amounts of silica coating was assessed to determine if the addition of TMS effectively reduced the toxicity in a human lung cell model. An innovative particle to cell exposure system is employed, which utilizes a particle growth mechanism that condenses water vapor onto the surface of the welding fume particles and increases the particle size, allowing the fume particles to directly deposit into the cell model. Particles were deposited immediately after generation to determine toxicity as compared to the classical environmental toxicity method where generated particles are collected on filters and exposed to cell culture after generation, a significantly different pathway from within the welding industry. Both the use of TMS and the innovative cell culture toxicity analysis are applicable to the development of a welding technology which significantly reduces health risks for industry workers.

Automated Image Analysis Method to Quantify Neuronal Response to Intracortical Microelectrodes

Intracortical microelectrodes (IMEs) have a wide variety of applications ranging from monitoring single neuron activity to providing a brain-machine interface technology to alleviate the suffering of individuals with devastating neurological disorders. However, the lack of functional reliability has been a major limitation for long-term experiments and clinical implementation. The loss of functionality of IMEs is associated with the formation of glial scar surrounding the implant and a loss of nearby neurons. The quantification of the cell types involved, especially in experiments with large datasets, is a challenging and a time-consuming process. Here we present an optimized, automated method to count cells using FIJI and bin them into desired intervals using Matlab for quantification purposes. Histological sections stained with antibodies to target neuronal nuclei were used to optimize the process. Raw images obtained using confocal microscopy were opened in FIJI and different parameters for image filtering and thresholding were compared to obtain an optimal image for particle analysis. We then compared automatically counted cells with manually counted ones and achieved similar results. Automation reduces variability by processing and analyzing all images with identical settings. This workflow allows several options for customization and provides easily reproducible results while saving time and effort.
Optimizing the Polyol Synthesis of Permalloy Microparticles

Permalloy is an alloy consisting of 80% nickel and 20% iron. This alloy displays unique magnetic properties that could be exploited in biomedical applications such as cell activation. The synthesis of Permalloy nanoparticles via a polyol method has been described in literature. However, the synthesis of Permalloy particles whose dimensions are on the micron scale has not been studied. In order to produce Permalloy particles that are a micron in size, the synthesis parameters must be tuned to optimal values. Using factorial design of experiment, the required temperature and cation to anion ratio to produce micron sized Permalloy particles was investigated.

Functional analysis of β-globin locus control region hypersensitive site 2-associated noncoding RNA

The hemoglobin molecule is a tetramer composed of two α and two β-globin chains. The β-globin Locus Control Region (LCR) consists of several DNase I hypersensitive sites (HSs) that bind to erythroid and ubiquitously expressed transcription factors and function as enhancers. In addition, RNA Polymerase II (Pol II) synthesizes non-coding, enhancer RNAs (eRNA) from the LCR HSs that may regulate β-globin gene expression.

We aim to further understand the role of LCR HS2 and its associated eRNA in regulating β-globin expression. Previous data from the laboratory suggests that LCR-associated eRNAs may participate in long-range regulation of β-globin gene expression. We also found that eRNAs remain associated with the β-globin gene locus. Recent studies have shown that the Integrator complex is involved in processing eRNAs. We hypothesize that termination of eRNA transcription releases Pol II which is then transferred to the globin gene promoters. To study this hypothesis, we created stable and inducible INT11 knockdown cell lines. INT11 is the endonucleolytic subunit of the Integrator complex. By functionally assessing LCR-HS2 associated non-coding RNA, we aim to gain better insight into the regulation of the β-globin locus which may lead to new strategies to treat hemoglobinopathies.
**PRESENTER(S):** Watson, Rachel  
**AUTHOR(S):** Rachel Watson, Patricia Prade, James Cuda, Carey Minteer  
**FACULTY MENTOR:** James Cuda

**Oviposition preferences and development of Calophya sp. on male and female Brazilian peppertree plants**

Brazilian peppertree (BP), Schinus terebinthifolia Raddi (Anacardiaceae), is a dioecious shrub introduced into Florida from Argentina, Brazil and Paraguay in the 1840s. Since its introduction, BP has become one of the most aggressive and widespread invasive species in Florida, invading over 700,000 acres of both disturbed areas and conservation habitats. A potential biological control agent for BP was found in Brazil feeding on BP. Calophya sp. Burckhardt (Hemiptera: Calophyidae) is a leaf galling insect that reduces the growth of BP. The objective of this experiment was to test for differences in Calophya sp. oviposition, gall formation, and adult emergence between male and female BP plants. Twenty Calophya sp. adults were placed in a cage containing 1 male and 1 female BP plant. The number of eggs, nymphs, and adults per plant were counted after 5, 15, and 30 days from oviposition, respectively. There was no preference in oviposition, gall formation, and adult emergence between male and female plants. However, the number of eggs and nymphs on female plants was higher, and male plants had a higher number of adult emergence. Our results demonstrate that Calophya sp. can have a similar reproductive success on both male and female plants.

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**PRESENTER(S):** Weimer, Alexander  
**FACULTY MENTOR:** Chris Hass

**Gender differences in dual-task behavior and their relationship to static balance, strength, function, and cognition**

One predictor of fall-risk in older adults (OA) is an inability to balance concurrent motor and cognitive demands (e.g. walking while talking), known as dual-task behavior. Interestingly, more women fall each year than men, yet few studies evaluate gender differences in dual-task behavior. The purpose of this study is to examine gender differences in dual tasks in OA and evaluate contributing factors to performance. Twenty-nine age-matched men and women walked in three conditions: normal walking, walking while reciting alternating letters of the alphabet (recitation), and walking while reciting words from an assigned category (fluency). Spatiotemporal and stability gait outcomes were used to assess group differences along with maximal ankle and knee strength. Costs from single to dual task performance in walking during recitation and fluency were calculated. A two (gender) by two (condition) repeated measures MANCOVA analyzed differences in dual-task costs and included ankle and knee strength as covariates. Fluency and recitation had significantly greater costs, but no other significant differences were observed. Thus, other factors such as physical activity and cognitive ability should be evaluated as potential contributors to gender differences in fall-risk.
Immersed in Sweetness: Using Virtual Reality to Explore Perils of Sugar Overconsumption

Sugar overconsumption is a major health risk that adversely affects both physical and social well-being. Much of the information about the dangers of overconsumption is only available through traditional communication mediums like text, which makes it less accessible and comprehensible to the public. One promising medium for conveying the effects of sugar and influencing health behaviors is virtual reality (VR). The Media Effects and Technology Lab (METL) is conducting two experiments to study the efficacy of VR simulations in influencing attitudes and behaviors towards overconsumption of sugar. These studies aim to test the effectiveness of communicating sugar overconsumption through various medium platforms (text, video, VR). Previous VR-based interventions have suggested that behavioral changes can be obtained by allowing users to make choices in an interactive VR environment and then providing impactful visualizations of the resulting futures arising from their choices. METL has built an immersive and interactive VR simulation (with the option to vary the levels of user interactivity), a video, and a text document that illustrate both long and short-term effects of sugar overconsumption. Messages disseminated with these media platforms are being evaluated currently through two research studies to examine effects on attitudes, cognitions, and behaviors.

Marie... or Matthew? The Images of Marie de France as the Apostle Matthew

In this presentation, I shall address the striking visual links between images of the famed medieval poetess Marie de France and depictions of Saint Matthew, Apostle to Christ and author of the first gospel of the New Testament. I will analyze the possible saintly allusions that are present in these renderings of Marie de France, and assess the implications of these powerful connections. This analysis will ultimately investigate what these remarkable images say about Marie, and seeks to open further discussion on how the society of the Late Middle Ages perceived the masterly and mysterious female author of the Lais and Fables.
**Novel Experimental Component of Introductory Chemical Engineering Course**

Students of chemical engineering generally do not enroll in a lab course until their Junior or Senior year. In the Fall 2017 semester, professor Narayanan introduced a lab component to ECH 3023, the course on material and energy balances that introduces chemical engineering students at the University of Florida to many first principles of the discipline. Two experiments - batch filtration and tank draining - were addressed in the classroom and the students were given a pre-lab assignment and asked to re-derive much of the theory and to make predictions before running the experiments. The experiments allowed students to make and test predictions "in real life", enhanced problem-solving skills by requiring students to apply mass and energy balances to new systems, and reinforced understanding of fundamental course concepts, for instance by providing students with excellent visualizations of both steady-state and transient systems. The evaluations revealed that introducing experiments with higher level concepts (in this case, fluid mechanics) benefits learning, but that new concepts should be given more attention to ensure that students grasp the fundamentals of these high level concepts to apply them in the case of interest.

**AAV-mediated gene delivery to treat Xeroderma Pigmentosum – Cockayne Syndrome (XP-CS) in vivo**

Cockayne Syndrome (CS) is a rare disease characterized by neurodegeneration and premature aging. CS is caused by mutations in genes involved in DNA repair mechanisms. One of these mutations affects the XPG protein, which is encoded by the ERCC5 gene. There is no disease altering treatment available for CS. The aim of this project is to develop an adeno-associated virus (AAV) treatment for CS and study its impact upon the progression of the disease in a knockout-based mouse model following intravenous injections of AAV9-CMV-coERCC5 vector as compared to healthy (WT) and untreated (XPG-/-) controls. We hypothesize that coERCC5 gene therapy will correct the neurodegeneration observed in XPG-/- mice. XPG-/- mouse pups (2 days old) and adults (6 weeks old) were treated with various doses of AAV9-CMV-coERCC5. Untreated XPG-/-, treated XPG-/-, and WT mice were evaluated weekly by neurological, physical, and behavioral examinations for up to 30 weeks. Mice were euthanized upon reaching a moribund state or at 30 weeks and tissues were harvested for further analyses. Thus far, data show improvements in several evaluations, and upregulation of coERCC5 gene expression for all AAV-treated groups. Further analyses are in progress to evaluate the extent of improvement from gene therapy for CS.
Rhizobium-Legume Nitrogen-Fixing Symbiosis in Alfalfa and Medicago Truncatula

Sinorhizobium meliloti is a gram-negative bacterium that can be found in the soil or on the root of certain legumes genera and it forms a nitrogen-fixing symbiosis with legumes such as Medicago (alfalfa and annual medics), Melilotus (sweet clover), and Trigonella (fenugreek) species. This is displayed by the presence of root nodules on the roots of the subsequent plants. The nitrogen-fixing symbiosis between S. meliloti and legumes converts nitrogen into ammonium which then can be used for host plants’ nutrition and growth. Hfq is a RNA-binding protein that controls gene expression and has been demonstrated to play a role in symbiosis. This research presents us the information of gene expression of 6 small RNAs in Hfq mutant related to wild type and we discuss the potential role of small RNAs involvement in Hfq mediated gene expression that controls rhizobium nitrogen fixation symbiosis. We hope to identify a genetic pattern for RNA gene expression that acts as a genetic marker to predict the genes that will be expressed in other plants inoculated with the S. meliloti. Quantitative PCR techniques used to identify the small RNA sequences that are present in the mediation of Hfq in the plant strain will be utilized in the qPCR of alfalfa (Medicago Sativa) sprouts. We hope to identify similarities in the RNA presented to identify markers that can be used to inoculate other plants later down the road.

Redirection of systemic RNA-NP vaccines toward lymphoid organs enhances antitumor immunity

Despite aggressive chemotherapy and radiation therapy, glioblastoma (GBM) remains nearly universally fatal. We recently showed that dendritic cells (DCs) prolong progression free and overall survival in GBM patients (Mitchell et al, Nature 2015). However, complexity and cost limit cell-based vaccines. Alternatively, systemically administered nanoparticles bearing tumor antigen-encoding mRNA (RNA-NPs) provide low cost, potent immunotherapeutic delivery of tumor antigens. Previous experiments in our lab demonstrated that RNA-NPs mediate regression of murine intracranial melanoma (Sayour et al, OncoImmunology 2017). However, antitumor immune responses may be limited by significant particle clearance in lung due to positive net charge. We hypothesized that reducing RNA-NP charge would enhance antitumor immunity by increasing particle localization to lymphoid organs. Cholesterol was added to RNA-NPs to generate cholesterol-bearing RNA-NPs (Chol-RNA-NPs). The effect of charge on antitumor immunity was evaluated by tracking tumor growth in subcutaneous tumor model. Chol-RNA-NPs enhanced T cell priming of bone marrow derived DCs (BMDCs) in vitro. After systemic administration, cholesterol decreased particle uptake in the lungs and increased numbers of antigen specific T cells in lymphoid organs. Chol-RNA-NPs then reduced tumor growth in a subcutaneous tumor model. Future work will include treatment and MRI based tracking of RNA-NPs labelled with iron oxide.
Analyzing the Growth of Marine Bacteria Using Various Sulfur Sources in Minimal Media

Most marine bacteria reduce sulfate to sulfide for the synthesis of cysteine and methionine. Due to the high oxidation state of sulfate, this process is energetically expensive. Therefore, some marine bacteria turn to pre-reduced sources of sulfate found in their environment such as dimethylsulfoniopropionate (DMSP), a metabolite found in algae that acts as an osmoprotectant. Previous studies have shown that as marine bacteria metabolize DMSP, the climatically active gas dimethyl sulfide (DMS) is released into the atmosphere thus greatly contributing to the biogenic sulfur cycle. In order to further elucidate the metabolic pathway in marine bacteria that results on the production of DMS, we sought to investigate their growth on organic sulfur sources. By comparing the growth of different strains of marine bacteria in minimal media enriched with DMSP, methylmercaptpropionate (MMPA), and the amino acids cysteine and methionine, we observed that sulfur source dependence varies upon bacterial strain, while some exhibit growth in the presence of reduced sulfur, others were observed to prefer sources of sulfate.

Effects of Reunification on LGBT Movements: Case of Taiwan and South Korea

I comparatively analyze the rates of LGBT mobilization in Taiwan and South Korea. I chose these countries because of relatively similar historical backgrounds. In 2017, Taiwan’s top court ruled in favor of same-sex marriage and issued that parliament has two years to amend laws for same-sex couples. This will make Taiwan the first Asian country to recognize same-sex marriage. While South Korea has not yet recognized civil unions or same-sex marriage, South Korea does prohibit discrimination based on sexual orientation. Thus, this scholarship examines the different variables for variations of LGBT mobilization in Taiwan and South Korea. To examine the variations between the movements, I will be testing the structural, cultural, and economic differences in Taiwan and South Korea that led to the differences in mobilization. I find that international influence from neighboring countries largely affects LGBT mobilization. An image of a progressive democracy resonates strongly in Taiwan because those who are pro-independence would adopt LGBT policies to distance itself from a threatening China. While an image that separates South Korea from North Korea doesn’t push South Korea to adopt LGBT policies. As a result, this article contributes to the international aspect of social movement literature.
FET Super-regenerative Detector for NQR Detection

The Super Regenerative detector is recreated with the modern solid-state Junction Field Transistor (JFET), a high input impedance and low-noise alternative to the Vacuum Tube, to detect nuclear quadrupole resonance signals. A super regenerative oscillator was chosen because of the need for higher sensitivity and variation of transconductance level with RF level. Furthermore, with super regenerative oscillators it is possible to search over broad range of frequencies. This is done by using tuning capacitors in the tank portion of the circuit. The level of regeneration can also be altered to allow the circuit to be more sensitive by piston tuning the feedback capacitor. Using a 60Hz modulated voltage and a varactor diode to modulate capacitance and search for frequency we were able to observe high Signal to Noise ratios in NaClO3 35Cl NQR.

Korean Red Ginseng Pretreatment Protects against Long-term Sensorimotor Deficits after Ischemic Stroke likely through Nrf2

The Endogenous neuroprotective mechanisms play key roles in the functional recovery after ischemic brain damage and are therefore compelling targets for stroke preventive and therapeutic strategies. Nrf2 is an astrocyte-enriched transcriptional factor that serves as a master regulator of endogenous defense systems against oxidative stress and inflammation. Korean Red Ginseng (Ginseng), one of the most widely used herbal medicine, has exhibited a promising protective effect against various neurological disorders. Our study aimed to determine whether Ginseng extract pretreatment would attenuate sensorimotor deficits and improve long-term recovery after ischemic stroke through the Nrf2 pathway. Adult Nrf2−/− and matched wildtype control (WT) mice were pretreated with Ginseng via gavage once daily for 7 days prior to permanent distal middle cerebral artery occlusion (pMCAO). Neurobehavioral tests were performed over 28 days. Using an optimized method for assessing sensorimotor deficits, we found that Ginseng pretreatment significantly reduced sensorimotor deficits and promoted long-term recovery but not under Nrf2 deficiency, while Nrf2 deficiency exacerbated the post-ischemia functional deterioration, suggesting this recovery was, at least partly, owe to Nrf2 activation. These findings indicate that oral consumption of Ginseng in humans may have similar efficacy for pre-ischemic intervention that impedes the ischemic cascade and ultimately facilitates functional recovery.
Mass Incarceration in Florida: Examining A Crisis

This research examines the history of mass incarceration in Florida between 1960 and 2010. During this roughly fifty-year time span, Florida’s incarceration rate has risen exponentially and the state currently has a prison population of over 100,000 people—the third highest rate in the nation. In Florida’s prison system Whites are underrepresented while Blacks are overrepresented. Currently, Blacks make up sixteen percent of Florida’s state population and should be similarly represented in the prison population. However, in 2016 blacks made up approximately forty-seven percent of the prison population. Racial disparity in rates of incarceration is an issue throughout the entire United States and is not unique to Florida. However, the disparity in Florida is especially significant since Florida has some of the worst felon disenfranchisement laws in the nation; millions of Black Floridians no longer have the right to vote as a result of their former status as felons. An analysis of this issue shows that the racial disparity in incarceration rates is a result of racist practices and policies that unfairly target Black people. With the onset of the war on drugs that began in the early 1970s the Black prison population has increased exponentially and blacks will continue to be overrepresented if effective anti-racist criminal justice policy changes are not implemented.

The Relationship between Subjective Social Status and Body Fat Percentage in Hispanic Adolescents

Obesity rates are substantially higher among Hispanic adolescents than that of their non-Hispanic white counterparts. To date, a great deal of research has focused on the relationship between socioeconomic status (SES) and its relationship to obesity-related outcomes. However, one’s subjective social status (SSS) has been found to be a more significant predictor of health outcomes in non-Hispanic black and white adolescents than traditionally used measures of SES. Additionally, the relationship between SSS and obesity-related outcomes in Hispanic adolescents have yet to be determined. The study objective is to assess the relationship between SSS and body fat percentage in Hispanic adolescents (n=150; ages 15 to 21; BMI of 18.5-40 kg/m2). Participant’s data are obtained from a study currently underway. A telephone screening is utilized to determine eligibility for the study, identify parent’s highest level of education (SES), and the participant’s SSS. SSS is assessed with the MacArthur Youth Scale of SSS. Eligible participants attend a study visit where body fat percentage is obtained with a BOD POD®. By identifying the possible association between adolescent SSS and body fat percentage, prevention and treatment methods within this population could result by identifying a psychosocial factor not yet considered in the contribution to obesity.
**PRESENTATION: Yudewitz, Noah**  
**AUTHORS:** Lucas (Ke) Luo, Noah Yudewitz  
**FACULTY MENTOR:** Douglas Spearot  

**Atomistic Simulation of Shock Wave Propagation in Polyethylene Glycol Diacrylate Hydrogel**

Hydrogel materials consist of physically or chemically crosslinked hydrophilic polymer chains dispersed in water. They are important in biological engineering because they have similar properties to tissues such as cartilage. Shock waves are disturbances that travel faster than the speed of sound in the medium of travel, which can abruptly alter the temperature and density of a substance. To simulate shockwave propagation through polyethylene glycol diacrylate (PEGDA) hydrogels of varying water concentrations, molecular dynamics simulations are conducted using LAMMPS. The interactions of particles are modeled via the use of interatomic potentials. PEGDA models of 13 and 23 monomers containing roughly 1 million atoms are constructed with a crosslinking algorithm. Simulations are conducted at piston velocities of 250 m/s, 500 m/s, and 1000 m/s for several concentrations of water in each PEGDA model, and the hydrostatic pressure due to a shockwave is calculated. A logarithmic relationship was observed from curve fitting methods. The trend shows increasing pressure with decreasing amount of water concentration, and the magnitude of this increase is amplified at higher piston velocities. This relationship has no obvious shift due to changing of PEGDA monomer chains.

**PRESENTATION: Zhong, Andy**  
**AUTHORS:** Andy Zhong, Glen Walters, and Toshikazu Nishida  
**FACULTY MENTOR:** Toshikazu Nishida  

**Characterization of Hafnium-Zirconium Oxide Thin Films for Nonvolatile Ferroelectric Memory Devices**

Ferroelectric nonvolatile memory devices serve as a potential alternative to traditional FLASH nonvolatile memory devices because of their lower write power and much greater cycling endurance. However, ferroelectric memory devices typically have a lower storage capacity than traditional devices. Thus, there is a need to improve the scalability of ferroelectric nonvolatile memory devices. In this study, Hafnium-Zirconium Oxide (HZO) thin films were investigated by measuring the polarization of the devices as a function of cycling through the hysteresis and PUND measurement techniques. It was found that the thin films with a metal-ferroelectric-metal (MFM) structure had much greater retention than the thin films with a metal-ferroelectric-semiconductor (MFS) structure. These findings suggest that the MFM thin films serve as a possible candidate for the development of ferroelectric nonvolatile memory devices. Furthermore, this study serves as a starting point for causes of device fatigue within HZO thin films.
## Faculty Research Mentors

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<td>Lauren</td>
<td>Berkow</td>
<td>Department of Anesthesiology- College of Medicine</td>
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<td>Seunghee</td>
<td>Cha</td>
<td>Department of Oral &amp; Maxillofacial Diagnostic Sciences</td>
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