



11TH ANNUAL

APRIL 9, 2021

# UNDERGRADUATE RESEARCH SYMPOSIUM

# WELCOME

Welcome to the **Eleventh Annual Undergraduate Research Symposium**.

We are excited to host you in this virtual setting for a second year in a row and are proud of all the student presenters and their faculty mentors. This year was especially difficult for our faculty and student scholars. The pandemic challenged us to think outside the box to identify creative ways to continue in research. Thanks to all the mentors and student researchers who persisted. We proudly showcase their efforts this year in both synchronous oral and asynchronous poster sessions. This year we are offering cash prizes for first place oral winners in all categories, thanks to the **generous donation of Dr. Eric Shaw, Emeritus Professor, College of Business**. We are grateful to Dr. Shaw's support of the Undergraduate research initiative.

All participants are encouraged to browse the Agenda for the day as well as the Symposium Abstract Program to determine which sessions you would like to participate in.

Oral/Performing Arts Sessions and the Panel lunch session will be hosted in Zoom breakout sessions on Friday, April 9th, and we have created Canvas Modules for Poster/Visual Arts Sessions. The canvas site will be open from Friday, April 9th - Monday, April 12th to maximize your ability to participate in scholarly discussion. For canvas, to easily navigate the full course, please click on "Modules" on the left side of your screen, and follow the course by clicking "next" at the bottom of your screen at the end of each module.

You can also view our newly launched 2020-2021 Florida Atlantic Undergraduate Research Journal and showcase videos of our [2021 Undergraduate Researchers of the Year](#), where they share their research endeavors.

We hope you enjoy sharing and learning about the exciting research and inquiry projects our undergraduates and their faculty mentors have been working on.

The OURI team also wanted to say a special thanks to all the OIT staff who helped us make this virtual experience as wonderful as possible and to the AD Henderson/FAU High team for their assistance with this Symposium booklet.

Sincerely,

The OURI Team

# SPECIAL THANKS

A.D. Henderson University School and FAU High School

Division of Research

Faculty Judges

Faculty Mentors/Advisors

Office of Information Technology (OIT)

OURI Faculty Liaisons & Peer Mentors

Undergraduate Studies

University Communications

University Libraries

# Attention Students!

**Have you been involved in research or scholarly activities? Share your experience!**

## Submit your work to the Undergraduate Research Journal!

The Florida Atlantic Undergraduate Research Journal (**FAURJ**) is a peer-reviewed journal published online annually to:

- **Showcase** high quality undergraduate research
- **Teach** younger students of the standard of research
- **Promote** inquiry-based activities at FAU

Eligibility:

- research conducted by an undergraduate
- research mentored by FAU faculty member
- research compliant, if necessary

For complete information please visit the website:  
[http://fau.edu/ourj/ug\\_research\\_journal.php](http://fau.edu/ourj/ug_research_journal.php)

**Application Deadline: May 28<sup>th</sup>**

Questions? Email: [fauurj@gmail.com](mailto:fauurj@gmail.com)

## Become a Peer Mentor!

### Applicant Eligibility

- Good Academic Standing at FAU
- at least one semester of documented research or scholarly experience

### What's in it for you? You will:

- earn a stipend toward your scholarly activity.
- gain experience in leadership and teamwork.
- guide, mentor, and inspire your peers.
- expand awareness of undergraduate research at FAU.
- plan and host workshops to expand the research culture.
- have tons of fun!

For complete information and application process visit:  
[http://fau.edu/ourj/peermentor\\_program.php](http://fau.edu/ourj/peermentor_program.php)

**Application Deadline: May 28<sup>th</sup>**

Questions? Email: [ourj@fau.edu](mailto:ourj@fau.edu)

# AGENDA

## 11<sup>th</sup> Annual Undergraduate Research Symposium (Virtual) Friday April 9<sup>th</sup>, 2021

Time	Event	Location
8:45 – 9:00 a.m.	Bring your Coffee or Tea and login	Zoom
9:00 – 9:10 a.m.	Opening and Welcome by Provost Danilowicz	Zoom
9:15 – 10:15 a.m.	Oral Presentations concurrent breakout Sessions 1-5	Zoom
10:30 – 11:30 a.m.	Oral Presentations concurrent breakout Sessions 6-9	Zoom
12:00 – 1:15 p.m.	<p><b>Lunch and Virtual Panel Session</b></p> <p><b>Research: What is next?</b></p> <p><b>Panelists include:</b></p> <ul style="list-style-type: none"> <li>● Jennie Soberon, Associate Director and Moderator</li> <li>● Dr. Robert Stackman, Dean, Graduate College</li> <li>● Cristina C. López, Director, Experiential Learning &amp; Internships</li> <li>● Jessica Cornely, Assistant Director of Prestigious Fellowships</li> <li>● Lauren Melanson, Graduate Student and OURI staff</li> <li>● Reinaldo Dos Santos, Alumni and current Ph.D. student</li> <li>● Vanessa Stubbs, current student researcher</li> </ul>	Zoom
April 9 – 11	Poster sessions available all weekend on Canvas	Canvas

# AWARDEES

## Undergraduate Researcher of the Year Presentations

We are proud to highlight the 2021 Undergraduate Researchers of the Year. Each year the Office of Undergraduate Research and Inquiry (OURI) invites nominations for the Annual *Undergraduate Researcher of the Year* awards. One student from every college is selected for this award. Our Scholars receive the "Undergraduate Research Scholar" Stole to wear during their graduation ceremony . These selected students often have presented at multiple conferences and symposia, engaged in additional research activities with their faculty mentors, and some have even published their research as an undergraduate! Be sure to watch their Keynote Address in the discussion board below where they discuss their research experiences.

Congratulations to the 2021 Undergraduate Researchers of the Year!

<b>Undergraduate Researcher of the Year</b>	<b>College</b>	<b>Faculty Mentor</b>
Maria Gabriela Esquivel	Dorothy F. Schmidt College of Arts and Letters	Michael Zager
Daniela Rivera-Cintron	Allen E. Smith Award - College of Business	Monica Escaleras
Julie Deshommes	College of Engineering and Computer Science	Masoud Jahandar Lashaki
Alyssa Payne	Harriet L. Wilkes Honors College	Carmen Cañete-Quesada
Darian Peters	Charles E. Schmidt College of Medicine	Lawrence Toll
Caroline Brodi	Christine E. Lynn College of Nursing	Lisa Wiese
Angel Rodgers	Charles E. Schmidt College of Science	Jeanette Wyneken
Erika Stone	College of Social Work and Criminal Justice	Seth Fallik

# FRONT COVER ART

**Jamie Knaub, Integrative Biology doctoral student**  
**FAU High School Imaging Lab, College of Education**  
**Pseudo-colored micrograph of black racer snake skin**

The cover art image of the black racer snake (*Coluber constrictor*) skin was taken after magnification with a stereo-microscope. The patterns in nature, including on the surface of the snake skin pictured, are often striking in their beauty and symmetry. Photo editing software allows for the pseudo-coloring of images post capture, which can highlight particularly notable features, such as the diamond shape of the snake skin scales.

# LUNCH PANEL

We are pleased to offer a lunch panel entitled “Research: What’s next?”.

Our esteemed panelists include the following:



**Jennie Soberon, Associate Director, OURI as moderator**



**Dr. Robert Stackman, Dean, Graduate College**



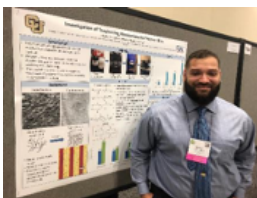
**Jessica Cornely, Assistant Director of Prestigious Fellowships**



**Lauren Melanson, Graduate Student and OURI Program Coordinator**



**Cristina C. López, Director, Experiential Learning & Internships**



**Reinaldo Dos Santos, Alumni and current Ph.D. student**



**Vanessa Stubbs, College of Science student and current student researcher**



# ORAL/PERFORMING ARTS PRESENTATIONS

## **SESSION 1, 9:15 – 10:15 AM**

### Cross Disciplinary Projects:

#### **Il Verde Senso: An Analysis of the Symbolic Meaning of the Garden in Italian and Italian American Culture**

By: Isabella Cipollone Movilla

Faculty Mentor(s): Ilaria Serra

Presenters: **Isabella Cipollone-Movilla**

In Italian American culture, the backyard can be best understood as a form of escapism that allows people to reconnect to the roots of their past. In this small oasis, the presence of fig trees imposes a sense of nostalgia that dates back to the 1800s, when Italian immigrants from the south brought along with them the seeds of these luscious and saccharine Mediterranean trees. This paper analyzes the stories of Italian American families whose tradition is the burial of fig trees, and the importance of such ceremonies in the carrying of culture and familiarity, with connections to the 1995 film Tarantella by Helen De Michiel. This paper also explores the importance of oak trees and the role of the “orto” (vegetable garden) in Italian culture, through the analysis of the famous Italian children’s book series Fairy Oak by Elisabetta Gnone.

#### **American Sentiments on Behavioral & Cognitive Qualifications within Public Officials**

By: Kevin Lopez Pelaez

Faculty Mentor(s): Monica Escaleras and Eric Levy

Presenters: **Kevin Lopez Pelaez**

With the increasing polarization of dialogue in the American political atmosphere, public sentiment has progressively become indispensable to U.S. governmental affairs; bearing heightened importance for continued interdisciplinary study in Psychology & Political Science. With a rise in political engagement, there have been growing concerns about the behavioral and cognitive qualifications of government officials, especially officials who are elected to hold public office. This research examines Americans' attitudes toward the likeliness of public officials' conduct to be a factor in vote choice. Correspondingly, by expanding the umbrella of Political Psychology to explore perceptions of the behavioral sciences - this study also examines Americans' beliefs for the disqualification of public officials due to cognitive decline. My results show a statistically significant difference between responses based on age and party affiliation. With these findings, there are broad future implications as to psychological and conduct testing for public officials.

## **Urban Design Perspective on the Influence of Built Environments on Brain Health: A Scoping Review**

By: Starr Warner

Faculty Mentor(s): Lilah Besser

Presenters: **Starr Warner**

My research focuses on the influence of the built environment on human brain health, from an urban design perspective. The built environment includes physical man-made spaces that interact with humans, including buildings, cities, roads, sidewalks, and greenspaces. Published studies suggest that the built environment impacts cognitive brain health across all ages, but thus far the effects are not widely known and have not been comprehensively summarized. This study involves a scoping literature review of two databases, PubMed and Web of Science, to compile relevant papers that meet predetermined inclusion and exclusion criteria. The resulting research paper will summarize evidence, identify knowledge gaps, guide future research, and influence urban design strategies to best promote human brain health. At the symposium, I will present on the study background, the scoping review methods, the scoping review progress, and the findings from relevant papers found to date.

## **Gender and Violence in Africa**

By: Haliston Lake

Faculty Mentor(s): Kristin Shockley

Presenters: **Haliston Lake**

This project seeks to investigate how colonialism has influenced sexual and gender-based violence (SGBV) in the Democratic Republic of the Congo (DRC). The field of political science alone is unable to offer assistance as there are gross gaps in the literature. The language to analyze sexual violence in times of war in academia is the weapon of war frame, which is riddled with issues of its own. Although many scholars purport the Rwandan Genocide as the catalyst for SGBV in the DRC, this paper argues that the colonization of the DRC is where the country's issue of widespread sexual violence became normalized. By using the weapon of war frame, the international community creates one-size-fits-all solutions to sexual violence for places with vastly different histories. This paper seeks to highlight the importance of a holistic approach to address SGBV, as opposed to solutions based solely in political science.

## **Factors of Political Affiliation: Influences on American Thought**

By: Lorenzo Gari

Faculty Mentor(s): Monica Escaleras and Eric Levy

Presenters: **Lorenzo Gari**

According to a 2014 Pew Research Center survey, Republicans and Democrats are more divided recently than any point within the last twenty years. This study analyzes the degree of differences in a response to questions based on individuals' party affiliation. How likely are Republican or Democrat's values to reflect religious influence? Does party affiliation affect a citizen's view of how foreign nations perceive the U.S., either positively or negatively? My findings show that there is a statistically significant difference between party affiliation and the perception of the United States internationally. In addition, I found that there is a statistically significant difference between party affiliation and whether an individual's religion influences their values. This study may serve as a benchmark for the commonalities that bind us and, in the future, dispel the view that Americans significantly differ.

## **SESSION 2, 9:15 – 10:15 AM**

### **Behavioral, Educational & Social Sciences:**

#### **Different Time Courses of Neural Field Interaction For White and Black Objects**

By: Zeena Shather, Fatima Al Ukidi, Misha Dilmaghani, and Fredericka Hendricksen

Faculty Mentor(s): Howard Hock

Presenters: **Zeena Shather**, Fatima Al Ukidi

It is well-established that neurophysiologically independent receptive fields in the retina and brain exist for the detection of lighter-than-background (white) and darker-than-background (black) objects. The purpose of this experiment was to examine the time course of the interactive neural fields created by independently detected white and black objects. The object and probe were presented as parallel vertical bars on a computer monitor for varying durations. Human participants adjusted the probe's luminance until it was no longer visible. Both white and black objects suppressed the visibility of nearby white probes. However, the black and white objects differed with respect to the emergence of their neural fields. The inhibition effect of the object's neural field emerged quickly when the object was white, but slowly when the object was black. Objects can differ with respect to the time course that their surrounding neural fields affect the perception of nearby objects.

## **A Methodology of Empowerment**

By: Alexia Betances and Marianna Colvin

Faculty Mentor(s): Marianna Colvin

Presenters: **Alexia Betances**

Photovoice methodology is a form of participatory action research. Participants create documentary photography to represent their lived experiences and advocate for social change. Although photovoice is used across disciplines in ways that give voice to the needs of marginalized populations, little is understood about the experience of photovoice participation itself. The purpose of this study is to examine the emotions that were a product of participating in a photovoice project. Eight sessions with mothers who completed a photovoice study were transcribed verbatim (n = 13). Preliminary analysis identified that women described feeling valued and heard during the project despite the stigma they experience in other settings, as well as feelings of hope for the future and gratitude to be part of “something bigger”. Findings support that photovoice methods can serve as a tool for empowerment among participants themselves, in addition to the value to inform research and promote social action.

## **Revenge Porn: A Critical Content Analysis of the Nation’s Laws and Reflection Upon Social Science Research**

By: Erika Stone and Seth W. Fallik

Faculty Mentor(s): Seth Fallik

Presenters: **Erika Stone**

Though revenge porn, also known as nonconsensual pornography, is perceived as a relatively new phenomenon, the first instance can be dated back as early as the 1950s. Unfortunately, very little is known about this phenomenon, and even less is known about how it is criminalized. This study explores the Nation’s revenge porn state statutes (n = 186) in a content analysis. In doing so, we describe the landscape of revenge porn laws and reflect upon the limited available phenomenological social science research. These analyses identified three themes, including laws that 1) defined revenge porn, 2) expressed the evidence and prosecution of revenge porn cases, and 3) discussed victims of revenge porn. These findings suggest that the Nation’s legislative approach to combating revenge porn is a vague patchwork of statutes in need of greater legislative attention. Such laws have the potential to reduce the occurrence and harms of revenge porn.

## **A PhotoVoice Study on the Lived-Experience of Students Attending College While Homeless**

By: Matthew Patterson and Dani Groton

Faculty Mentor(s): Dani Groton

Presenters: **Matthew Patterson**

College is seen as a way out of poverty and homelessness and about 14% of college students are homeless. This project uses Photovoice to explore the experiences of these students and builds on existing research by empowering students who are homeless to use their own 'lens' to describe and share their stories. Students were asked to take photographs representative of their experiences and discuss their meaning and significance in a one-on-one interview. Qualitative research procedures, such as content analysis, were performed to find manifest and latent themes shared across the interviews. Preliminary findings suggest that students experiencing homelessness struggle with a “duality” of identities and a hopeful ambivalence—juggling their strong desire to do well in school with the harsh realities of being homeless. They often feel “alone” and “different.” This research allows existing educational supports insight into this sometimes hidden segment of the student population.

## **The Effects of Luminance Contrast and Size on the Neural Fields of Simple Objects**

By: Howard Hock, Misha Dilmaghani, Fredericka Hendricksen, Fatima Al Ukidi, and Zeena Shather

Faculty Mentor(s): Howard Hock

Presenters: **Misha Dilmaghani** and Fredericka Hendricksen

Neural field theory states that a perceived object creates surrounding excitatory and inhibitory interactions that affect the visibility of nearby objects. The purpose of this study was to examine the effects of the object's size and its background-relative luminance contrast on neural field interactions. The visibility of dim probe stimuli near the object was measured. The object and the probe were presented in the form of parallel vertical bars on a computer monitor. Human observers adjusted the probe's luminance until it was no longer visible. Probe visibility was enhanced when the object was low in contrast, but was suppressed when the object was higher in contrast. Increasing the width of the object increased the likelihood that probe visibility would be suppressed. The results indicate that the neural field surrounding an object varies with respect to the balance of its excitatory versus inhibitory influences on nearby objects.

## **SESSION 3, 9:15 – 10:15 AM**

### **Engineering:**

#### **Utilizing Virtual Reality to Augment the Efficiency of Analyzing CT Scanned Organisms**

By: Arman Alexis

Faculty Mentor(s): Tricia Meredith

Presenters: **Arman Alexis**

While there are a variety of software available that give people the ability to view anatomy in the form of Computerized Tomography (CT) scans, these methods fail to give viewers a full, immersive viewing experience. This research involves the use of virtual reality technology in order to create a more realistic and immersive experience when viewing CT scans by placing the viewer in a full 3D environment that allows total manipulation of the position, rotation, and scale of the file they imported. To create the software, traditional techniques used in current CT viewing software such as volumetric rendering were borrowed in order to display the CT scan as a 3D object. Using these techniques along with custom SteamVR SDK scripts that allow for user interaction in VR, and custom import scripts that allow users to view Dicom, .raw, and .obj files allowed for a fully functional prototype to be developed.

#### **Reverse Osmosis Manual Emergency Pump (RO MEP)**

By: Alexander Gaudreau and Robert Gaudreau

Faculty Mentor(s): Tsung-Chow Su

Presenters: **Robert Gaudreau** and Alexander Gaudreau

Reverse Osmosis (RO) is a reliable and safe method of providing clean water. RO is an extensively used purification method preferred throughout the globe due to its efficient removal of most bacteria, virus, metal ions, and other dissolved solids such as salt. The RO MEP design features an easy to use hand operated function for the purpose of purifying possibly contaminated tap/well water. After a catastrophic event such as a hurricane, RO MEP may be a cost effective and portable solution. Typically, when power is lost, there is no water pressure to dispense drinkable water. Faucet water could also become contaminated if potable water pipes become damaged. The RO MEP is not designed for heavy use; rather, it is a temporary solution. The prototype cost is less than \$150 which could be reduced significantly in mass production.

## **Attractive Walking Aid/Carry-on Luggage: An Inviting Alternative to Canes/Walkers for the Walking Impaired**

By: Marc Marlin

Faculty Mentor(s): Tsung-Chow Su

Presenters: **Marc Marlin**

The research intends to provide a dynamic solution for an audience that is either unable to walk without a form of assistance or could benefit from an attractive walking aid solution that dismisses the social stigma associated with traditional canes and walkers. Creating a relevant solution to all who rely on some form of walking assistance disguised as a means of practical stowage may allow for more individuals, specifically the elderly, to positively identify with such a solution. Data collected regarding fall-related injuries have shown individuals who are not using their walking aid are at greater risk for severe injuries. Among the individuals who fall, most do not have their walking aid with them. The walking aid's overall design, disguised as luggage, fosters the perception of walking unassisted while discretely providing adequate support.

## **Fluid-particle Dynamics During Particle Settling for Shale Gas Operations**

By: Mazen Hafez, Thi-han Nge, and Roosevelt Delius

Faculty Mentor(s): Myeongsub Kim,

Presenters: **Thi-han Nge** and Roosevelt Delius

Hydraulic fracturing is a leading technology in natural gas extraction from low permeability reservoirs. The sand proppants entrained in fracturing fluid stabilize fractures and help to increase extraction efficiency. One key measure of proppant effectiveness lies in particle settling at fractures. However, particle-particle proximity during settling induces horizontal velocity whose correlation to settling velocity is yet unknown. Therefore, the present study investigates particle-particle settling behavior in a particle slurry. The hydrodynamic interaction of two settling particles was modeled by releasing spherical silica particles at varying initial proximities in a water-filled Hele-Shaw cell. A syringe pump-operated release system was utilized to achieve high precision subsurface particle release. High-speed particle image velocimetry was conducted, allowing for sophisticated particle tracking in space and time. Preliminary results indicate the correlation between initial proximity, horizontal velocity, and settling velocity for two silica particles.

## **SESSION 4, 9:15 – 10:15 AM**

### **Health & Medical Sciences:**

#### **The Melanocytic Effects of hipk2 CRISPR Mutation**

By: Claudia E. Gonzalez

Faculty Mentor(s): Bethany Stanhope and Evelyn Frazier

Presenters: **Claudia Gonzalez**

Changes in coloration are often mediated through alterations in highly conserved pigmentation genes. Pigmentation also plays other critical physiological roles in immune response, hearing, and vision. To investigate changes in pigmentation, we utilize the blind Mexican cavefish, *Astyanax mexicanus*, which have evolved depigmentation in response to the subterranean environment. Further, this species has both a cave- and surface-dwelling forms that enable genetic mapping studies. These studies yielded quantitative trait loci (QTLs) associated with loss of pigmentation. We mapped these QTLs to the *Astyanax* genome and identified the candidate gene Homeodomain-Interacting Protein Kinase 2 (*hipk2*), since it has previously demonstrated a role in melanocyte differentiation in other organisms. To test the function of this gene, we capitalized on the closely-related model fish system *Danio rerio*. Our forthcoming results using CRISPR-mediated mutagenesis to knock-down the expression of *hipk2* will determine if this gene plays a role in pigmentation, and ultimately, cave evolution.

#### **Assessment of Preexisting Immunity to Childhood Immunizations within Peripheral Blood**

By: Imtisal Imran, Czdari Lee, and Mahyar Nouri-Shirazi

Faculty Mentor(s): Mahyar Nouri-Shirazi

Presenters: **Imtisal Imran**

Effective vaccination indirectly prevents the spread of communicable disease to immunocompromised individuals who are not eligible for vaccines. Studies suggest that smokers have less optimal immune responses to natural infections and booster vaccines, which may adversely influence the herd immunity effects of vaccines. We hypothesize that smoking attenuates preexisting memory cells and antibodies specific to childhood immunizations. To test this hypothesis, we evaluated nine culture conditions for the detection of preexisting memory B and T cells specific to childhood vaccine antigens in peripheral blood samples. Condition 2 optimally supported the differentiation of existing memory B cells into plasma cells secreting immunoglobulin IgG. Additionally, Condition 7 most effectively supported the differentiation of memory T cell into IFN-g producing effector cells following measles antigen exposure. Our data introduces culture conditions that will be utilized to compare changes in preexisting immunity to childhood vaccine antigens and booster vaccines between nonsmokers and smokers.



## **The Antioxidant Enzyme System of Methionine Sulfoxide Reductases (MSR) Interacts with the Neurotransmitter Serotonin to Regulate the Larval Motility, Third Instar Development, and Adult Lifespan of *Drosophila Melanogaster***

By: Sanjana Chandran, Alexandra Brown and Gustavo Huaman

Faculty Mentor(s): David Binninger

Presenters: **Sanjana Chandran**, Alexandra Brown, and Gustavo Huaman

The antioxidant enzymes named Methionine Sulfoxide reductases (MSR) play an important role in longevity and age-related diseases because they reverse oxidative damage to proteins by reducing methionine sulfoxide back to methionine. MSR deficient flies exhibit a markedly reduced lifespan as well as reduced larval motility and delayed third instar development. Dietary restriction (DR) is known to increase lifespan in many species, including *Drosophila*. Serotonergic signaling mediates the perception of dietary protein value and reward in *Drosophila*. Previous data from our lab showed that MSR deficient flies exhibit elevated levels of serotonin. Hence, we suppressed serotonergic signaling using serotonin antagonist pCPA to see if it mimics DR and rescues the markedly reduced adult lifespan of the MSR deficient flies. Our data show that pCPA rescues the adult lifespan of MSR deficient *Drosophila* in a dose-dependent manner. pCPA also affects larval motility and third instar development of MSR deficient *Drosophila*.

## **SESSION 5, 9:15 – 10:15 AM**

### **Music, Art, Literature, Theater, History & Philosophy I:**

#### **An Analysis of Harry Crews' Use of Bodies in the Works "Body" and "Scar Lover"**

By: Tristan Stinchcomb

Faculty Mentor(s): Michael Harrawood

Presenters: **Tristan Stinchcomb**

This presentation will consider representations of the human body in two late novels by the great Florida author, Harry Crews. In *Body* and *Scar Lover*, written respectively in 1990 and 1993, Crews delves not only into the experiential qualities of the body – what it feels like to live and die inside a body – but also utilizes his characters' bodies to express broader themes including sacrifice, resilience, mortality, and redemption. I propose that the profane nature of Crews' writing juxtaposes the sacred themes which underlie his works and serves to represent a defining characteristic of the human experience; to this end, I explore the various bodies of Crews' characters in *Body* and *Scar Lover*, and how they are used to develop these themes.

## **Postcolonial Translation Theory and the Ethics of Translation**

By: Sarah Bagnall

Faculty Mentor(s): Timothy Miller

Presenters: **Sarah Bagnall**

Typically, works translated into English from the languages of predominantly nonwhite speakers are accepted by the general public as trustworthy representations of the original texts and the cultures that produced them. This talk advances an opinion to the contrary, inspired by notable thinkers in postcolonial studies such as Edward Said and Tejaswini Niranjana, who have conjectured that translations perpetuate uneven power structures between imperial powers and colonial subjects. Various translated works by authors from regions that have suffered colonial occupation or Orientalist stereotyping will be examined to support my argument that translations are often created without sufficient consideration of the environments the original works were produced in. Furthermore, contemporary lines of thought that advocate for alternate modes of disseminating a text's meaning that devote more attention to translation in postcolonial contexts can challenge the harmful idea that translation into English is the ultimate metric of success for a literary work.

## **The Transformation of Negative into Positive: Black Creativity as a Response to Black Trauma and the Space it Creates**

By: Maegan Barber

Faculty Mentor(s): Regis Fox

Presenters: **Maegan Barber**

Admittedly, there are times when being a Black person feels bleak and suffocating. Existing with the crushing knowledge that, at any moment in time, your life has the ability to drastically change for the worst due to the meaning America has attributed to your skin and thus your very life. Focusing on the gloomy aspects of Blackness can be incredibly depressing and possibly lead to variations of self-hate. In an attempt to avoid that, Black people have chosen to do something greater with these troubling emotions. Overtime, Black people have developed a specific skill in response to traumatizing occurrences within Black history, the skill of transforming their pain and frustration into outpourings of creativity in various art forms. Instead of completely wallowing in sorrow, we take these moments of great distress and pain and use them as creative inspiration, directly and unapologetically turning these negative incomes into positive outcomes.

## **Playing with Old Norse**

By: Maiya Xirinachs

Faculty Mentor(s): Timothy Miller and Carla Thomas

Presenters: **Maiya Xirinachs**

The tremendous resurgence of Norse mythology within popular culture today—inspired by material gleaned largely from Snorri Sturluson's Prose Edda and the collection of poems found in the Poetic Edda—has appeared throughout many entertainment platforms, one of the most notable being the video game industry. While the popularity of Old Norse culture has greatly widened the scope of medievaesque fantasy realms to include historical accuracies of the Middle Ages, thanks to medieval scholars, the issue of racism and subsequent racial tensions cannot be ignored, in reality as well as virtual worlds. This analysis will explore the inspiration major video game titles have taken from Old Norse culture, as well as the regrettable but important connections these imagined realities have to the perversion of Old Norse symbols by white supremacists in the current political climate of the United States (and abroad). Playing with the Middle Ages is not just a game.

# ORAL/PERFORMING ARTS PRESENTATIONS

**SESSION 6, 10:30 - 11:30am**

## Environmental, Ecological & Marine Sciences:

### **Seasonal Abundance of Blacktip Sharks and their Prey in Southeast Florida**

By: Mackenzie Smith and Stephen Kajiura

Faculty Mentor(s): Stephen Kajiura

Presenters: **Mackenzie Smith**

Blacktip sharks (*Carcharhinus limbatus*) migrate to southeast Florida every winter and spend the period from January to March in the nearshore waters. The goal of this project was to correlate the seasonal abundance of blacktip sharks and their prey fish populations in southeast Florida. To accomplish this, block cameras were placed at fixed sampling stations 50, 100, 150, and 200 meters from the shore approximately every 2 weeks for 18 months. The video footage was analyzed to count the number of individuals of each species that swam past each camera and calculate species richness and diversity. Blacktips occurred in greatest abundance in the nearshore environment less than 100 meters from the beach. Prey fish abundance was greatest in January, immediately before the sharks arrived, and was lowest in April after the sharks left. This study demonstrates a significant impact of the sharks on the nearshore fish community.

### **Utilization of Waste Concrete and Natural Seawater for CO<sub>2</sub> Capture**

By: Mallory Thomas, Numana Luqman, Alexander Shaw, Abhishek Ratanpara, and Myeongsub (Mike) Kim

Faculty Mentor(s): Myeongsub (Mike) Kim

Presenters: **Mallory Thomas**, Numana Luqman, and Alexander Shaw

CO<sub>2</sub> mineralization, a prominent solution for handling rising CO<sub>2</sub> gas concentrations, involves dissolving CO<sub>2</sub> gas within a solution and reacting it with alkaline metal ions such as magnesium or calcium to precipitate carbonate compounds. Carbonate minerals serve as the building blocks for sea creatures, such as coral reefs and seashells, and mitigate ocean acidification. Typically, CO<sub>2</sub> mineralization requires high pressures, consumes large volumes of freshwater, and uses pure metal ions. In this research, CO<sub>2</sub> is dissolved in seawater through a microfluidic approach at atmospheric pressure, providing faster rates of CO<sub>2</sub> reaction with extreme volume-to-surface ratios. The dissolved CO<sub>2</sub> is exposed to industrial concrete waste, which precipitates carbonate compounds. Seawater-based CO<sub>2</sub> capture lessens the demands on Earth's freshwater supply. Utilizing waste concrete makes mineralization cheaper by removing the need for alkaline metals. Preliminary results show the performance of CO<sub>2</sub> capture in seawater is comparable to freshwater in producing environmentally-benign carbonate minerals.

## **Testing the Hatching Synchrony Hypothesis in Green Turtles, *Chelonia mydas* —Thermal and Mechanical Effects**

By: Angel Rodgers and Jeanette Wyneken

Faculty Mentor(s): Jeanette Wyneken

Presenters: **Angel Rodgers**

Synchronous hatching in sea turtles is common in nature documentaries. Sea turtle clutches are large and developmental rates are related to temperature; some eggs are warmer/faster and others are cooler/slower. But how is hatching coordinated? We tested two hypotheses about how green turtle (*Chelonia mydas*) hatching may be synchronous. Contact is essential: eggs incubated in contact with neighboring eggs vs. isolated eggs. Grouped eggs hatched synchronously but isolated eggs did not, suggesting contact of flexible eggshells may promote synchrony. Mechanical stimulation of eggs coordinates development. Replicates of 16 isolated eggs were tested under three conditions: 31°C (faster development) without stimulation; 29°C (slower development) with stimulation, simulating rapidly developing embryo movements and coordination; and 29°C without stimulation (control). Stimulation of slower developing eggs neither sped development nor synchronized hatching with faster developing eggs. Therefore, hatching synchrony mechanisms remain unresolved and further research on grouped eggs is necessary.

## **Acoustic Survey of the Abacoa Greenway**

By: Selena Harman

Faculty Mentor(s): James Wetterer

Presenters: **Selena Harman**

The Florida bonneted bat, *Eumops floridanus*, Florida's only endemic bat species, has one of the most restricted distributions of the New World bats and is federally recognized as an endangered species. Although there are no published records of this species in Palm Beach County, in 2018 an FAU undergraduate recorded calls of *E. floridanus* at two sites neighboring artificial lakes in the Abacoa Greenway in Jupiter. In 2020-2021, I have continued acoustic surveys and recorded calls of *E. floridanus* as well. With the start of baseball spring training at Roger Dean Stadium, I am now recording foraging calls of bat feeding on insects that swarm around the floodlights that illuminate the stadium and surrounding practice fields during night baseball games. I wish to examine whether *E. floridanus* is among the bat species taking advantage of this food resource.

## **SESSION 7, 10:30 - 11:30am**

### **Basic Sciences:**

#### **Determination of Region-Specific, Sex-Biased Dopamine Neuron Transcripts Utilizing RiboTag Mice**

By: Angelica Bodine, Randy Blakely and Adele Stewart

Faculty Mentor(s): Randy Blakely and Adele Stewart

Presenters: **Angelica Bodine**

Dysfunction in the dopamine (DA) neurotransmitter system has been implicated in multiple neuropsychiatric disorders that possess a demonstrated sex bias. Recent work in The Blakely Lab has identified a region-specific, sex-biased mechanism controlling function of the DA transporter (DAT), a critical mediator of DA clearance from synapses. Specifically, we observed that autoreceptor-dependent DAT trafficking is confined to DA neurons projecting to the dorsal striatum in male mice, being absent in the ventral striatum. In contrast, in female mice, the functional coupling between autoreceptors and DAT is flipped, appearing selectively in the ventral striatum. My goal is to determine molecules that support sex-dependent autoreceptor-DAT coupling in the two brain regions, with the intent of providing insights into how sexually dimorphic DA signaling determines neuropsychiatric disease risk and characteristics. To achieve this, I plan to utilize the novel RiboTag mouse lines, which allow for cell type-specific isolation of actively translated DA RNAs.

#### **Investigating the Effects of a Calcium-Infused Bacteriophage Cocktail Against *Xanthomonas euvesicatoria***

By: Peter Foerster, Gage Collamore, Ian Fernandez, and Diane Baronas-Lowell

Faculty Mentor(s): Diane Baronas-Lowell

Presenters: **Peter Foerster**, Gage Collamore, and Ian Fernandez

Tomato spot is a disease caused by four species of closely related phytopathogenic bacteria belonging to the genus *Xanthomonas*. This disease causes considerable losses, particularly in warm regions like South Florida. To mitigate this problem, agricultural practices have implemented the use of chemical controls like copper-based bactericides and field-grade antibiotics. However, the effectiveness of these methods is in decline as bacteria develop resistance. An alternative to these conventional methods is to employ bacteriophages as a biocontrol. Bacteriophages are viruses that attack bacteria for the purpose of replication, releasing progeny phage by lysing host bacteria. Although bacteria may develop resistance to bacteriophage, phages can resist by mutating. Likewise, phage effectiveness can be enhanced by modification of chemical environment. Our research investigates this phenomenon through a novel calcium-infused bacteriophage to inhibit the growth of *Xanthomonas euvesicatoria* in vitro. We propose calcium cations will increase the effectiveness of pathogen lysis by bacteriophage.

## **Assessing the Therapeutic Efficacy of Novel Marine Compounds and Very-Low Dose Ionizing Radiation in Various Cancers**

By: Joubin Jebelli, Johnathon Simpson, James Kumi-Diaka, James Hartmann, and Lyndon West

Faculty Mentor(s): Lyndon West and James Hartmann

Presenters: **Joubin Jebelli**

Gorgonian octocorals have proven to be particularly fertile producers of structurally diverse diterpenes with notable antineoplastic activity. Similarly, very low-dose ionizing radiation (VLRD) has garnered a tremendous amount of interest in cancer therapeutics due to its anticancer potential. In this study, compounds were isolated from various gorgonian species and/or synthesized utilizing the biomimetic route. The anticancerous properties of these compounds were then investigated on various cancer cell lines. The results from the viability/cytotoxicity/redox assays revealed significant dose-dependent changes in all cell lines when treated with compounds I-X. In subsequent studies, cells were irradiated with VLDR for 1 hour and then subjected to treatment with these marine extracts. The results demonstrated significantly greater decreases in viability when using the combination treatment. This study, therefore, continues to establish marine compounds as effective drug leads and has also provided the groundwork for combinatorial therapeutic studies involving marine compounds and VLDR in cancer treatment.

## **Development and Optimization of Fluorescent Cholesterol Probes**

By: Diana Herrera, Catherine Jimenez, Vicente Rubio and Maciej Stawikowski

Faculty Mentor(s): Maciej Stawikowski

Presenters: **Diana Herrera**

Sterols are essential membrane components of eukaryotic cells. Interacting with sphingolipids, they provide the membrane surrounding required for membrane sorting and trafficking processes. The purpose of this research project was to develop two fluorescent cholesterol probes. While there are many dye-tagged cholesterol analogues available, they have limited photostability and small Stokes shift. In our studies, we applied 1,8-naphthalamide scaffold, and modular linkers and head groups to obtain two novel fluorescent probes. The two analogs are characterized by the difference in linker type (L-serine and L-beta-alanine), connecting naphthalimide moiety and cholesterol group. The synthesized probes will be used to study cholesterol and lipid trafficking upon binding to membrane components. The overall goal of this project is to develop fluorescent cholesterol probes that are both environmentally and pH sensitive. These new tools will help in understanding of cholesterol and its influence on membranes and intracellular trafficking in the context of neurodegenerative diseases.

## **SESSION 8, 10:30 - 11:30am**

### **Business, Marketing, Finance & Public Administration:**

#### **Procrastination Among Different Groups**

By: Abigail George

Faculty Mentor(s): Monica Escaleras and Eric Levy

Presenters: **Abigail George**

At some point in life, everyone has dealt with a major deadline looming over their head but finds themselves unable to get started. Procrastination is a natural coping mechanism that manifests when tasks cause emotional or mental trauma. The causes of procrastination can be different for each person. This study compares the response of people from different backgrounds and on what leads them to procrastinate as well as their views on time management. The data was collected from over 400 adults across the United States who participated in an online survey that was distributed through Amazon Mechanical Turk. The results show that there is a statistically significant difference between individual's demographics and their views of procrastination. People deal with procrastination differently and understanding these aspects of procrastination can educate people and help them feel less alone.

#### **PODS Case Study: Targeting Millennials, Gen Z, and HR Professionals**

By: Analu Gulin, Enrique Barrios, Felipe Rodriguez, Joi Dean, and Sophia Romagosa

Faculty Mentor(s): Eileen Acello

Presenters: **Analu Gulin**, Felipe Rodriguez, Enrique Barrios, Joi Dean, and Sophia Romagosa

PODS delivers storage units which are to be packed and shipped to new locations or stored in warehouses. They are a leading contender in the residential and commercial moving/storage industries. Since their beginning in 1998, PODS has expanded throughout the USA, Canada, Australia, and the UK, with more than 220,000 containers in service. However, with the customer base skewing towards older generations and being underrepresented among younger adults under 35 (13% vs. 30% of U.S. population), PODS company share is decreasing (-23% since 2012). PODS must find a way to gain relevance among the Millennial (anyone born between 1981 and 1996) and Gen Z (anyone born from 1997 onward) population, as well as strengthen relations with HR professionals.



## **Outer Space - The New Discourse**

By: Christiaan Lecky

Faculty Mentor(s): Monica Escaleras and Eric Levy

Presenters: **Christiaan Lecky**

Humankind has always looked to the stars and other planets with awe and adventure. Throughout the 20th century, humanity has continued to make giant technological leaps forward. Many laws, agreements, and treaties were passed, attempting to address the Outer World's balance as the countries expand. This research aims to measure people's attitude towards the Common Heritage of Humanity principle. Data was collected by using an online survey through Amazon Turk. The results show a statistically significant difference between an individual's party affiliation and their views on the Common Heritage of Humanity Principle. In conclusion, it is in our nature to expand, discover and claim the unknown for ourselves. The political affiliation will always play a significant part in the Earth's political theater and soon the Outer Space, thus confirming my hypothesis.

## **The American Food System: Food for Thought?**

By: Daniela Rivera-Cintron

Faculty Mentor(s): Monica Escaleras and Eric Levy

Presenters: **Daniela Rivera-Cintrón**

For decades the American food system has provided a variety of foods at low costs. However, these low costs fail to factor in the externalities associated with this system. With projections of food insecurity rising as a result of the COVID-19 pandemic, alongside climate change, the pressure on the nation's already fragile food systems is increasing. In response to these challenges, sustainable food systems aim to establish food security while balancing environmental soundness, social equity, and economic growth. This project explores Americans' attitudes towards the adoption of sustainable practices in food production and consumption. My results revealed a gap between consumers' intention and action. In addition, there was a statistically significant difference amongst political affiliations and age groups on consumer attitudes towards the adoption of sustainable practices. This information can be used to develop targeted initiatives that will increase consumer awareness regarding the impact of food choices.

## **Is America "One Nation Under God"?**

By: Anna Simonson

Faculty Mentor(s): Monica Escaleras and Eric Levy

Presenters: **Anna Simonson**

The idea of God's sovereignty and authority in the United States has played a huge role in American history. The Declaration of Independence starts by acknowledging this, In God We Trust is on American money, and the phrase America, "One Nation Under God" was even added to the Pledge of Allegiance in 1954. More recently, the United States has become more politically polarized and society has become less accepting of the concept of God. The purpose of my research is to investigate whether there is a relationship between political affiliation and whether someone believes that the US is "One Nation Under God", as well as if this affiliation affects American pride. My results show that political affiliation had a statistically significant effect on both American pride and an individual's belief that the US is "One Nation Under God".

## **SESSION 9, 10:30 - 11:30am**

### **Music, Art, Literature, Theater, History & Philosophy II:**

#### **Costa Rica: The Inspiration for Songs**

By: Maria Gabriela Esquivel

Faculty Mentor(s): Michael Zager

Presenters: **Maria Gabriela Esquivel**

A Costa Rican undergraduate researcher from the FAU Music Department composed songs based on three of her homeland's musical rhythms: the calypso, the cumbia, and the parrambito. She interviewed four Costa Rican composers to learn more about the specific characteristics of each musical genre and style and used them as a reference to produce the three original danceable songs. In her compositions, she featured three of the native instruments: the accordion, the marimba, and the banjo. The live instruments recorded at the studio were the electric and acoustic guitar, the percussion, and the vocals. With the use of music samples, signal processing plugins, and music libraries, the final sonic image of the songs is a hybrid of styles based on authentic rhythms.

## **The Power of Voice: A Comprehensive Analysis of the Importance of Rhetoric**

By: Isabella Cipollone Movilla

Faculty Mentor(s): Kristin Shockley

Presenters: **Isabella Cipollone-Movilla**

During the COVID-19 health crisis, political rhetoric has swayed public perception and the efficacy of policy. In the political science field, there has been a growing gap in the literature surrounding the importance of rhetorical speech and analysis in the study of political systems. As such, this paper aims to pinpoint the three most reoccurring modes of speech used by politicians during the COVID-19 pandemic: war rhetoric; the motivating language model; rhetoric through the analysis of both war metaphors and the motivating speech model. Rhetorical study and the analysis of persuasion, I argue, highlights the emergence of a deeper understanding of ideological views that impact both domestic as well as international policies. Hence, this paper also analyzes the past works of ancient scholars such as Jean-Jacques Rousseau, Thomas Hobbes, Carl von Clausewitz, and Aristotle, and argues that examining rhetoric through the years can help us better analyze modern political structures.

## **Interactivity and Unsettling Agency in Fallen Hero**

By: Tristan Sheridan

Faculty Mentor(s): Timothy Miller

Presenters: **Tristan Sheridan**

Interactive fiction, by its very definition, grants its readers the ability to interact with and influence the direction of a text, much like the familiar Choose Your Own Adventure children's books. However, the assumption that interactivity allows for increased reader agency has generated debate among followers of the medium, as interactive texts can naturally only provide readers with as much agency as authors are willing to anticipate for and allow. The interactive novel series *Fallen Hero* is of particular relevance to this debate, as its protagonist's struggle to maintain their agency causes the series' thematic content to mirror its form. I argue that *Fallen Hero* does not attempt to assure readers of their agency, but instead purposefully denies it to them through its unique approach to the conventions of interactive fiction—including second person narration and multiple-choice interactivity—therefore increasing reader empathy with the protagonist's own troubled relationship to agency.

## **Influence of Religious Organization on Poverty in the United States**

By: Lorenzo Gari

Faculty Mentor(s): Renat Shaykhutdinov

Presenters: **Lorenzo Gari**

This paper seeks to examine the influence of religious organization and how, in particular, the objectives of the religious rights impacts poverty in the United States through their political organization and policy goals. In addressing the influence of religious organization, this paper will compare secular organizations, in this case unions, whose members are organized on economic issues, as opposed to moral issues, and whose memberships are more heterogeneous. In discussing these two organizing forces, there will also be an assessment of the decline in union membership and the effects of comparable nongovernmental organization to counterbalance morality movements of religious organization with economic concerns of similar working-class bodies.

# POSTER PRESENTATIONS

## Basic Sciences I

### **Assessing the Therapeutic Efficacy of Novel Marine Products and Very-Low Dose Ionizing Radiation in Various Cancers**

By: Davian Caraballo, Jeffrey Noel, Joubin Jebelli, Lyndon West, and James Hartmann

Faculty Mentor(s): James Hartmann and Lyndon West

Presenters: **Davian Caraballo**, Jeffrey Noel, and Joubin Jebelli

Gorgonian octocorals have proven to be particularly fertile producers of structurally diverse diterpenes with notable antineoplastic activity. Similarly, very low-dose ionizing radiation (VLRD) has garnered a tremendous amount of interest in cancer therapeutics due to its anticancer potential. In this study, compounds were isolated from various gorgonian species and/or synthesized utilizing the biomimetic route. The anticancerous properties of these compounds were then investigated on various cancer cell lines. The results from the viability/cytotoxicity/redox assays revealed significant dose-dependent changes in all cell lines when treated with compounds I-X. In subsequent studies, cells were irradiated with VLDR for 1 hour and then subjected to treatment with these marine extracts. The results demonstrated significantly greater decreases in viability when using the combination treatment. This study, therefore, continues to establish marine compounds as effective drug leads and has also provided the groundwork for combinatorial therapeutic studies involving marine compounds and VLDR in cancer treatment.

### **Investigating the Anticancer Effects of the Novel Marine Compound 9,11-secosteroid in Both Breast and Prostate Cancer**

By: Manal Choudhry, Sabreen Hamad, Dillon Cram, Joubin Joubelli, and James Hartmann

Faculty Mentor(s): James Hartmann

Presenters: **Manal Choudhry**, Sabreen Hamad, and Dillon Cram

Despite advancements in the surveillance, treatment, and palliative care for cancer patients, breast and prostate cancer continue to remain two of the most fatal malignancies in Americans. Furthermore, the conventional chemotherapies have exhibited various side effects which have motivated the search for a less invasive and more effective cure. Marine natural products have provided an aspiration for this cure due to the rich pharmaceutical values within the diversity of these biological species. In this study, a novel 9,11-secosteroid was isolated from the gorgonian octocoral, *pseudopterogorgia americana*. The anticancer activity of this compound will be assessed on MCF-7 breast and LNCaP prostate cancer. It is anticipated that this marine extract will be cytotoxic, enhance therapeutic properties and therefore, will be effective in reducing the viability of both cell lines, resulting in significantly greater cell death. This study continues to establish the framework of marine natural products as effective anti-cancer therapeutic agents.

## **Development of a Kinase Translocation Reporter Assay for High-Throughput Screening of Novel PAK1 Inhibitors**

By: David Harbaugh, Scott Troutman, and Joseph Kissil

Faculty Mentor(s): Catherine Trivigno and Joseph Kissil

Presenters: **David Harbaugh**

The p21-activated kinase 1 (PAK1) is a member of the PAK protein kinase family that plays a role in cell proliferation, motility, and survival. Dysregulation of PAK1 stimulates the growth of cancer cells. Identified PAK1 inhibitors present challenges related to efficacy, toxicity, and selectivity of the inhibitors. Thus, we are developing a novel cell-based assay utilizing a kinase translocation reporter (KTR) approach to identify PAK1-specific inhibitors that are potent and exhibit limited toxicity. This assay tracks the nucleocytoplasmic shuttling of a PAK1-substrate-green fluorescent (GFP) fusion protein. The cellular localization of GFP can ascertain the level of PAK1 activity. Currently, we are determining whether PAK1 mediated phosphorylation results in translocation of the reporter from the nucleus and whether additional modifications to the KTR reporter are required. The development of this assay will allow the generation of stable cell lines that express the KTR reporter to identify PAK1 inhibitors via high-throughput screening.

## **Investing the Potential Anticancer Activity of Two Furanocembranoids, Isolated from the Octocoral Pseudopterogorgia Bipinnata, on Various Lymphomas**

By: Joubin Jebelli, Michael Hamper, Gladel Saintilme, Lyndon West, and James Hartmann

Faculty Mentor(s): James Hartmann and Lyndon West

Presenters: **Joubin Jebelli**, Michael Hamper, and Gladel Saintilme

The marine habitat contains a rich diversity of natural products that possess a remarkable multitude of structures and bioactivities, most notably anticancer activity. One such family are the furanocembranoids, which comprise a diverse array of carbon frameworks that features varying degrees of oxygenation. In this study, two furanocembranoids, Bipinnatin C (1) and E (2), were isolated from the gorgonian octocoral pseudopterogorgia bipinnata. The cytotoxicity of these compounds was then analyzed on THP-1 monocytic leukemia and X-63 myeloma. The results obtained from the viability assay showed significant dose-dependent decreases in both cell types when treated with compounds 1-2. Assessment of redox activity revealed elevated levels of intracellular ROS in both lymphomas when they were subjected to treatment with 1-2, suggesting that both compounds decrease cellular viability via the induction of ROS. This study, therefore, continues to highlight the importance of marine compounds as valuable drug leads in cancer treatment.

## **Investigating the Anticancer Potential of the Nitrogenous Pseudopterane Tobagolide on PC-3 Prostate Cancer**

By: Joubin Jebelli, Danielle Van Quelef, Emily Will, Lyndon West, and James Hartmann

Faculty Mentor(s): James Hartmann and Lyndon West

Presenters: **Danielle Van Quelef**, Emily Will, and Joubin Jebelli

Since its conception in 1917, biomimetic chemistry, particularly involving the field of natural product syntheses, has become an integral tool in developing compounds with therapeutic potential. Of note, the diterpenoids of the rare pseudopterane class, have received considerable attention from synthetic and natural product chemists alike, due to their structural complexity and potential anticancer activity. In this study, pseudopterolide, which was previously isolated in our lab, was subjected to a THF solution of anhydrous dimethylamine. The reaction mixture was stirred for approximately 1 hour at 0°C, which resulted in the synthesis of a nitrogenous pseudopterane (compound 2). The cytotoxic activity of 2 was then investigated on PC-3 prostate cancer, which revealed to have an EC<sub>50</sub> < 10 μM. The results of this study, therefore, continues to justify the advantages of pursuing a biomimetic route in the discovery of compounds with potential anticancer activity.

## **Basic Sciences II**

### **The Effects of Exercise on the Neuronal Connections Between the Hippocampus and the Supramammillary Nucleus**

By: Olivia Curtis, Alejandro Pinto, Seungwoo Yoo, and Henriette van Praag

Faculty Mentor(s): Henriette van Praag

Presenters: **Olivia Curtis**

Running induces changes in the hippocampus, an area of the brain responsible for learning and memory. In particular, voluntary wheel running increases neurogenesis, the formation of new neurons, within the dentate gyrus of the hippocampus. In addition, running changes the afferent neural circuitry of new neurons. The supramammillary nucleus (SuM), a thin layer of neurons part of the hypothalamus, projects to the neurogenic dentate gyrus and area CA2 of the hippocampus. Voluntary wheel running increases projections from the SuM to the hippocampus. This study aims to understand the function of the SuM utilizing a chemogenetic approach to inactivate the SuM. Effects of inactivation will be studied based on results from hippocampus-dependent behavior, neuronal activation, and adult hippocampal neurogenesis.

## **Atomic Force Microscopy to Study RNA CUG Repeat Structure**

By: Julianna Lian, Matthew Disney, Vivian Merk, and Ilyas Yildirim

Faculty Mentor(s): Ilyas Yildirim and Vivian Merk

Presenters: **Julianna Lian**

Myotonic dystrophy 1 is a genetic, neuromuscular disease characterized by weakness and deterioration of voluntary muscles. It occurs when transcribed r(CTG)<sub>n</sub> mRNA folds into a hairpin with repeating 1×1 UU internal loops and inactivates splicing protein muscleblind-like 1 (MBNL1). Atomic force microscopy (AFM) produces high-resolution topographical profiles that can quantify binding affinities of small molecules to r(CUG) and describe morphology of the structures. Samples are prepared in buffer solution, force-vs.-distance curves are automatically generated, and images are analyzed with Gwyddion software. We hypothesize that apo form of r(CUG)<sub>24</sub> is flexible but linear and will get rigidified when targeted with small molecules. Morphological changes will be used when studying r(CUG)<sub>24</sub>/MBNL1 and r(CUG)<sub>24</sub>/MBNL1/compound complexes, where we expect the former to look globular while the latter to display both globular and linear structures. AFM imaging will likely provide additional morphological information of r(CUG)<sub>24</sub> and MBNL1 necessary to understand mechanisms of RNA repeat expansions.

## **The Role of Autophagy in Sleeping Behavior of *C. elegans***

By: Amir Mirnateghi, Catherine Shulman, and Pavel Zabela

Faculty Mentor(s): Kailiang Jia

Presenters: **Amir Mirnateghi**, Catherine Shulman, and Pavel Zabela

*Caenorhabditis elegans* (*C. elegans*) exhibits a sleeping behavior, also known as quiescence, that can be characterized as a cessation of food intake and movement. This behavior can be induced by food intake and is believed to be an indicator of satiety. Autophagy, present in all eukaryotic organisms, is a lysosomal degradation pathway that has been evolutionary conserved. Studies have shown that autophagy is nutrient sensitive and can be induced by dietary restrictions. We have preliminary data showing that autophagy is a component of a neuronal food signaling pathway. Thus, we hypothesize that autophagy plays a role in the quiescence behavior that is regulated by food signals. In this study, we examined quiescence behavior of mutants in the insulin-like signaling pathway (*daf-2*), transforming growth factor (TGF- $\beta$ ) signaling pathway (*daf-7*) and autophagy pathway (*atg-18*). Our results suggest that autophagy is associated with quiescence behavior of *C. elegans*.



## **Establishing a New Assay to Measure Oxygen Consumption in Drosophila Wildtype and Mutants**

By: Satviki Singh and Dr. Tanja Godenschwege

Faculty Mentor(s): Tanja Godenschwege

Presenters: **Satviki Singh**

There is a strong correlation between metabolic changes and neurodegeneration, while mitochondrial dysfunction and oxidative stress are a common cellular pathologies. The mammalian genes of Drosophila transmembrane protein, Distracted (Dsd) and E3-ligase dMgRn1, have been linked to obesity, diabetes and neurodegeneration. To further characterize the phenotypes of the Drosophila null mutants, this project aims to establish the Loligo® Systems microplate, which has been predominantly used for aquatic species, to measure baseline oxygen consumption real-time in drosophila. Oxygen consumption can be used as a measure of metabolic rate since oxygen is required for ATP synthesis in mitochondria. Here, we provide preliminary data of oxygen consumption rate in wild type and mutants using the Loligo® microplate system.

## **A Machine Learning Characterization of Social and Fear Behaviors in a Mouse Model of Autism Spectrum Disorders**

By: Vivek Sreejithkumar, Joe Schumacher, Michael Smirnov, and McLean Bolton

Faculty Mentor(s): Michael Smirnov and Joe Schumacher

Presenters: **Vivek Sreejithkumar**

Complex behavioral disorders, such as autism spectrum disorder, are thought to arise through a combination of social/environmental factors and an individual's genetic makeup. By quantifying the behavior of genetically defined mouse models of neuropsychiatric disorders, it may be possible to attribute a genetic origin to neurological and behavioral phenomena. Machine learning technology, such as DeepLabCut, can be used to quantify the body position of behaving animals, and define coordinate points that specify movement patterns. Using DeepLabCut, we compared patterns of fear behavior in wildtype (WT) and mutant mice with an autism-associated mutation of the neuroligin-3 (NLGN3) protein. We tested the performance of DeepLabCut using multiple network training strategies. We then identified behaviors of interest and analyzed their movement signatures to better quantify potential differences between experimental groups. Ultimately, it may be possible to link the associated behaviors to a neural circuit basis for autism spectrum disorder.

## **Symmetric Structures of Viruses**

By: Karina Barskova, Jacob Boyer, Ja'Cara Gillis, Misha Klopukh, Bianca Philippe, Emma Thomas, and Niara Williams

Faculty Mentor(s): Daniela Nikolova and Julia Seay

Presenters: **Niara Williams**, Jacob Boyer, Karina Barskova, and Bianca Philippe

Classification of viral symmetry is used to characterize the capsid of a virus. The general form include icosahedral formation. Further classification is dependent on individual capsomere arrangement that forms the virus capsid. Both triangulation number and unit cell theory are being used to create an algorithm which identifies the shape of viruses. Biochemical properties are also being examined, which are involved in capsid formation. These include peptide degradation via proteolytic enzymes, genetic material such as RNA, and mutations that occur within the genetic material. RNA length and capsid dimensions are also under investigation regarding their effect. Protease activity ensures viral particles mature, along with mutations, enable infection in host cells. Thus, RNA viruses have enhanced virulence compared to other classes of viruses. Gaining a better understanding of these three biochemical processes, along with utilizing the developed algorithm, will aid greatly in the development of pharmaceutical agents and other preventive techniques.

## **Behavioral, Educational & Social Sciences I**

### **Male C57BL/6J Mice Exposed to Females in Estrus Demonstrate Increased Fear Memory**

By: Camila Barvo, Claire Rice Kuchera, Brandon Hindman, and Robert W. Stackman, Jr.

Faculty Mentor(s): Robert Stackman and Claire Rice-Kuchera

Presenters: **Camila Barvo**

There are limited studies involving behavior and the effects of female pheromones on male mice. Our study focuses on assessing whether the female estrus cycle phase generates a particular response in male rodents when presented with aversive stimuli. We consider the various cycles in female rodents for comparison, ultimately emphasizing the female estrus cycle phase. This study will further expand the limited knowledge we have on female rodent pheromones' effects on male mice while helping researchers determine if current protocols involving male mice are being unknowingly influenced by proximity to female cohorts in distinct phases of their cycle. As a result, we give insight into the effects on learning and memory.

## **The Coordination of Casual Agency**

By: Dasha Jonassaint, Snezana Dimova, Aliza Sloan, and Nancy Jones

Faculty Mentor(s): Nancy Jones and Aliza Sloan

Presenters: **Dasha Jonassaint** and Snezana Dimova

Casual agency is the ability to identify oneself as an active manipulator of the environment. This experiment examined how recognition of casual agency in infants affects coordination between infant's feet and arms. During the experiment, one of each infant's feet is connected to a string. When the string is moved an overhead mobile rotates. Videos of the infants will be taken throughout the experiment and examined to identify the relationship between the arm and feet movements, but also the mood of the infant- specifically crying and fussing. The differences in infant movement throughout the experiment will allow us to get a better understanding of key factors in the formation of the agency. Expected results are a positive correlation between kicks and arm movement, and a happier temperament while kicking. Through gaining a better understanding of agency, we can create better-suited environments for infants to learn through their actions.

## **The Relationship between Trait Mindfulness, Affective Perception, and Cognitive Flexibility**

By: Jude Larsen and Robert Medeiros

Faculty Mentor(s): Monica Rosselli

Presenters: **Jude Larsen** and Robert Medeiros

The objective of this online project is to examine the influence of mindfulness disposition (a person's inclination towards a receptive, non-judgmental form of awareness) on affective-word ratings and cognitive flexibility. Behavioral outcomes (reaction time and accuracy) will be assessed using a word-rating task (WRT) and Wisconsin Card Sorting Task (WCST). Mindfulness disposition will be assessed using a sample median split of the Five Facet Mindfulness Questionnaire. It is expected that higher levels of mindfulness disposition will not only diminish negative affective-word ratings on the WRT but will also improve performance on the WCST (i.e., shorter reaction times and increased accuracy). In future developments, this project will examine how mindfulness disposition influences the neural correlates of affective word perception (LPP for negative words) and cognitive flexibility (PFC activation). This project will provide evidence for the positive impact of mindfulness disposition on affective-word perception and cognitive flexibility.

## **Developing an App to Understand Pedestrian Travel Patterns**

By: Mohamed Picault, Benjamin Thaw, Shelly Davidashvilly, Ania Schulz, Summer Poissonnier, Louis Merlin, Marlon Orellana, and Rose Pierrette

Faculty Mentor(s): Louis Merlin

Presenters: **Mohamed Picault** and Benjamin Thaw

Since June of 2020, a team of undergraduate computer science students has been developing the GoStroll app to support travel behavior research. GoStroll is an opt-in app by which regular citizens can share information about their walk trips with their town to improve the pedestrian environment. The GoStroll app benefits citizens by allowing them to track their own walk trips and report pedestrian hazards; it benefits cities by helping them understand the needs of their pedestrian population; and it benefits the FAU research community by providing a new source of detailed data on where people want to walk and why. We have spent the past year developing a beta version of the GoStroll app. We want to present our experiences with developing the app and coordinating our efforts with the Institutional Review Board and the City of West Palm Beach.

## **The Effect of Temperament on Infant Jealousy Response**

By: Victoria Karaluz, Mariam Rizvi, and Leah Dublino

Faculty Mentor(s): Nancy Jones

Presenters: **Mariam Rizvi**, Leah Dublino, and Victoria Karaluz,

Infant jealousy is a collection of behavioral responses to a social rival usurping maternal attention from the individual, yet little is known about the dispositional factors influencing jealousy response. A more holistic understanding of individual developmental processes is required to understand emotional development. This project's purpose was to identify the relationship between emotionality, a sub-score of temperament, and the behavioral and physiological development of infant jealousy response. This was investigated by analyzing infant behavioral responses to the jealousy provoking paradigm, cortisol reactivity taken from saliva samples, and temperament scores determined using the CTI scoring. We hypothesized that increased CTIS emotionality scores will be correlated with increased negative affect, higher arousal, and higher reactive cortisol levels. Establishing a relationship between individual temperament, infant jealousy, and increases in cortisol levels demonstrates the integrative aspects of infant jealousy across development. Further research is required to understand the relationship between temperament and jealousy response.

## Behavioral, Educational & Social Sciences II

### **Role of Life Satisfaction in Managing Symptoms in Older Adults With Osteoarthritis**

By: Brianna Beaver and Juyoung Park

Faculty Mentor(s): Juyoung Park

Presenters: **Brianna Beaver**

The purpose of this study was to determine whether life satisfaction plays a role in managing osteoarthritis (OA) symptoms. We hypothesized that older adults with higher levels of life satisfaction would be more likely to report greater pain reduction or improved physical function after an 8-week group intervention (chair yoga or health education program) than those with lower levels of life satisfaction. A total of 112 older adults completed either intervention. Independent-samples t tests identified the association between level of satisfaction and OA symptoms (pain interference, physical function). The association between level of life satisfaction and physical function was significant,  $t(102) = -2.013$ ,  $p = .047$ . However, no significant association was found between level of satisfaction and pain interference. Older adults with higher levels of life satisfaction showed higher levels of physical function after the intervention. It was concluded that high levels of life satisfaction could improve physical function.

### **Does Foster Parent Well-Being Moderate the Relationship Between Youth-Caregiver Relationship and Youth Internalizing and Externalizing Behavior?**

By: Shadiya Black, Robin Bean, and Morgan Cooley

Faculty Mentor(s): Morgan Cooley

Presenters: **Shadiya Black**, Robin Bean

Prior research has shown an association between the mental well-being of youth in foster care and having a good relationship with their foster parent. However, more research is needed to examine how foster parents' mental well-being may influence youth, particularly youth who have been separated from their biological parents and need support navigating transitions into adulthood. This research will include a secondary data analysis with a sample of adolescents (age 11-17) in foster care using the National Survey of Child and Adolescent Well-being II. This poster will first examine whether associations exist between the foster youth-parent relationship, youth internalizing and externalizing behavior, and foster parent mental health. Second, this poster will examine whether foster parent well-being moderates the relationship between youth-caregiver relationship and youth internalizing and externalizing behavior.

## **Predicting the Response to Workplace Bullying in Nurses**

By: Brianna Chardon and Joy Longo

Faculty Mentor(s): Joy Longo

Presenters: **Brianna Chardon**

Workplace bullying in nursing is an issue that can impact psychological well-being of nurses and decrease quality and safety of patient care. The purpose of this study was to examine the relationship between years of employment as a nurse and negative affect in response to workplace bullying. Twenty-four registered nurses were asked to read 11 vignettes simulating bullying experiences and then complete the Negative Affect Scale (NAS) after each one. The difference between the first and last NAS score determined the change in negative affect after exposure to bullying. Results revealed a low negative correlation between participants' years of nursing employment and negative affect ( $r = -.36$ ,  $p = .09$ ). The study suggests that nurses with fewer years of experience have a greater increase in negative affect in response to workplace bullying. Therefore, nurse leaders need to support new nurses and provide education on coping with negative emotions.

## **Infant Comprehension and Production of Index-Pointing Gestures**

By: Chloe Joseph, Teresa Wilcox, and Jacqueline Stotler

Faculty Mentor(s): Teresa Wilcox

Presenters: **Chloe Joseph**

Previous research indicates that after a year of life, infants understand index-pointing gestures as communicative (Behne et al., 2012). In this partial-replication study, we investigated infants' ability to comprehend social intention from index-pointing and their ability to produce such gestures. Following Esteve-Gibert et al. (2017), we predicted that 12-month-old infants can not only understand the intention behind pointing, but also produce index-pointing gestures. Data were collected from twelve caregiver-infant dyads who engaged in a laboratory-based experiment, where dyads engaged in a freeplay session before caregivers shared interest in a stimulus with their infant. Results indicated that caregivers tended to use index-pointing gestures more when tasked with sharing interest, and infants responded to those index-pointing gestures most frequently with gaze. These findings indicate infants do understand index-pointing gestures as a method of communication, specifically for expressing interest, and suggest index-pointing gestures are the beginnings of complex communication in infants.

## **Infant Physiological and Behavioral Responses to Jealousy Provoking Conditions**

By: Mylinh Nguyen, Angela Bernardo, and Nancy Aaron Jones

Faculty Mentor(s): Nancy Jones and Tricia Meredith

Presenters: **Mylinh Nguyen**

This project aims to study infants' emotional responses to the withdrawal of their mother's exclusive attention by examining physiological (with an electroencephalogram, EEG) and behavioral patterns. In this study, evaluations of behaviors, reactivity, and affect of infants are examined along with EEGs across development. This study examines EEG asymmetry evaluating the connections between emotional reactions and brain activity patterns. This study places infants in a social-rival paradigm, which specifically provokes jealousy by replacing their mother's attention with either a book/doll. Behaviors were observed and coded as composites of either withdrawal/approach behavior. Results showed that more approach style responses are displayed during the social rival; and greater reactivity and negative affect in response to maternal attention focused on the social rival (i.e., doll). The jealousy-induced conditions showed more left-frontal EEG asymmetry. These findings are useful to understanding when jealousy occurs and how it's represented in an infant's brain.

## **Cross Disciplinary Projects**

### **Development of a Universal Testing Fixture to Integrate Microfluidic and Electrical Components**

By: Ladd Brown, Darryl Dieujuste, Nan An, and Sarah E. Du

Faculty Mentor(s): Sarah E. Du

Presenters: **Ladd Brown**

Microfabricated thin-film electrodes have been widely used in microfluidic devices for electric cell-substrate impedance sensing, allowing label-free, quantitative measurements in real time. However, soldering wires to gold or indium tin oxide (ITO) electrode pads patterned on glass slides can be difficult. To overcome this issue, a universal testing fixture that integrates microfluidic and electrical components was developed. Three-dimensional models of the fixture parts and assembly were developed in SolidWorks, then a CNC mill was used to manufacture the parts from Delrin. Spring piston connectors with pre-soldered wires are placed into the top part while the microfluidic chip is set into the bottom part. Final assembly is achieved by screwing the two fixture parts together, so that the piston connectors make firm contact to the electrode pads. The testing fixture advanced the development of a portable, smartphone-operated microvascular occlusion device for monitoring painful occlusion risks in patients with sickle cell disease.

## **Characterization of MIH-Affected Teeth via Atomic Force Microscopy and Raman Spectroscopy**

By: Daniel Gil Valenzuela and Marc-Kendy Michel

Faculty Mentor(s): Vivian Merk

Presenters: **Daniel Gil Valenzuela** and Marc-Kendy Michel

Molar-incisor hypomineralization (MIH), a condition that affects 1 in 6 children worldwide, is a disease marked by discolored lesions and sharp differentiation from normal enamel on molars and incisors. Teeth affected by MIH are prone to rapid erosion and are therefore a global health concern. Selected areas of lesions and normal dentin of MIH-affected teeth will be analyzed with Raman spectroscopy and atomic force microscopy (AFM) to map the chemical composition of teeth samples and to obtain structural information of said regions. We expect a correlation to exist between biomineral distribution and the nanomechanical properties of MIH-affected teeth. These results may assist in the development of devices and methods for the early detection and diagnosis of dental diseases and improve resins utilized in clinical dental restoration applications.

## **Systematic Study of Robustness of Deep Learning Models for Skin Lesion Classification and Melanoma Detection**

By: Kate Maier and Oge Marques

Faculty Mentor(s): Oge Marques

Presenters: **Kate Maier**

Early detection of melanoma can significantly increase survival rates. Many reasons – from pandemics to inadequate transportation – deter patients from office visits. Tele-dermatology is an alternative where patients can take and submit their own oftentimes lesser quality images. Deep learning AI techniques can assist a dermatologist's diagnosis by predicting whether a lesion is benign or malignant. However, many models are built using high-quality image data from the relatively few publicly available datasets. This research explores the robustness of deep learning models in the presence of diminished image quality, bias in training data, and other extraneous factors, like artifacts, imperfections, and other confounding factors. Experimental results demonstrate that AI-powered skin lesion classification shows diminished accuracy when test images are substantially different than the ones used in model training. Problems can be mitigated by adding a more diverse mix of images to the training and using robust contemporary deep neural networks.



## **Sensory**

By: Henry Plante

Faculty Mentor(s): Annina Ruest

Presenters: **Henry Plante**

Sensory is a game about sensory issues. Its goal overall is to communicate the stress of such issues without using a word. While it was rather difficult to test because of my own issues, the overall experience should even be jarring to those without sensory issues. Through testing with people who lack the sensory issues that I have, the gameplay mechanics, graphical effects, and sound effects have been fine-tuned to communicate the feelings of distress and futility that one may feel with sensory issues. It aims to be a distressing and uncomfortable experience, to give just a glimpse into the problems with trying to be part of a world that can feel unaware of, or even at times hostile towards one's senses.

## **Sanitizing Pods [Spods]**

By: Paris Prince and Tricia Meredith

Faculty Mentor(s): Tricia Meredith

Presenters: **Paris Prince**

Over 3,000,000,000 [billion] people including those in healthcare-settings and informal settlements lack the accessibility to water and soap for handwashing. As a temporary solution, emergency response teams procure handwashing stations and alcohol-based sanitizers, but they pose numerous challenges including inaccessibility and feasibility. Spods, a novel hybrid pod innovation, will allow handwashing to occur in a cheaper and more distributable approach. Its effectiveness was tested through numerous trials (n=27) by contaminating model hands with dirt, grease, and bacteria and assessing its cleansing ability. We expect to find that, when compared with traditional hygienic products on the market, Spods will provide an alternative way to cleanse hands that is equally effective to the traditional hand washing practices. Its distribution worldwide will support the United Nations' goal for universal hand hygiene by 2030.

## **Fluid Spread Based on Vibrational Frequency**

By: Michael Romega, Henrique Almeida, and Sebastian Buenaventura

Faculty Mentor(s): Tsung-Chow Su

Presenters: **Michael Romega**, Henrique Almeida, and Sebastian Buenaventura

This paper discusses the observations of the different properties of fluid's viscosities through vibrations. Through the use of an extremely high-tech frequency generator we will be studying viscosity, and how it influences the spread of different fluids. We will additionally be observing how the differences between Newtonian and non-Newtonian liquids affect the spray on the surfaces of the containers. With the addition of different frequencies, the liquids will develop different spray patterns and heights depending on their viscosities, Newtonian properties, and densities. To conduct this experiment, the liquids used will be an array of common household products such as milk, water, and honey on a high-tech frequency device to test the splatter and spray patterns.

## **Behavioral Interactions Amongst Gopher Tortoises, Green Iguanas, and Burrowing Owls**

By: Shanay Thompson and Lauren Melanson

Faculty Mentor(s): Evelyn Frazier and Monica Maldonado

Presenters: **Shanay Thompson**

The conservation area on the FAU Boca Campus is home to gopher tortoises (*Gopherus polyphemus*) and burrowing owls (*Athene cunicularia*), both native species and listed as threatened in Florida. Both species dig burrows that are sporadically occupied by the green iguana (*Iguana iguana*), which is an invasive species. It has been shown that burrowing owls eat young green iguanas (McKie et al., 2005) but the overall impact of the green iguana on populations of gopher tortoise and burrowing owls is not well known. This project will analyze the interactions between these species. Two cameras were placed in front of gopher tortoises' burrows and two cameras in front of burrowing owls' burrows that are adjacent to iguana burrows. Three of the cameras captured still images and one collected video for every motion detected.

## **Engineering**

### **Neural Networks for Automatic Cavefish Behavior Classification**

By: Aden Eagle and Shoshanah Marcus

Faculty Mentor(s): Erik Duboue

Presenters: **Aden Eagle**

The blind Mexican cavefish *Astyanax mexicanus* is a small tetra found as two distinct morphological types: eyeless and eyed. Additionally, myriad behaviors such as stress, sleep, and aggression differ between these evolutionarily divergent morphs. Such intraspecies distinctions make *A. mexicanus* a model organism for evaluating the evolutionary bases of differing responses to stressful stimuli; however, the laborious nature of collecting and classifying behavioral stress response data in forms of *A. mexicanus* is a major limitation of current research. Machine learning algorithms such as neural networks serve as exciting tools for dynamic automation of complex tasks. In this project, neural networks were developed to classify between eight common *A. mexicanus* behaviors using positional and movement data of the body parts of the fish. Here we find that an optimized neural network can achieve accuracies of more than 80% on most test datasets across Tinaja, Pachon, Molino, and surface-dwelling conspecifics.

## **SIDs Prevention Baby Monitor**

By: Osee Fraiss, Eric Jobson, Michael Troubeev, Jordan Culp, Jordon Matthew, and Guillermo Gayoso

Faculty Mentor(s): Amir Abtahi

Presenters: **Osee Fraiss**, Michael Troubeev, Eric Jobson, Guillermo Gayoso, Jordan Matthew, and Jordan Culp

It is undeniable that Sudden Infant Death Syndrome (SIDs) is a tragic and unpreventable event that claims the lives of more than 2000 infants in the United States alone. While the actual causes of this phenomenon are unknown, medical doctors believe that SIDs likely occur when a baby has low oxygen blood levels, an elevated heart rate, or a poor sleeping position. From this dilemma, the SIDs Prevention project was birth with the desire to provide guardians of newborns peace of mind by creating a device that has the ability to monitor the positioning and vitals of their child. This system would include a heart rate as well as a blood oxygen level sensor for the child in the form of a wireless bracelet. The baby's sleeping position will also be monitored with the use of a pixy 2 camera which is capable of image recognition.

## **Project Wheely**

By: Keri Grimes, Timothy Guzik, Bandon Kendrick, and Aaron Koontz

Faculty Mentor(s): Homayoon Abtahi

Presenters: **Timothy Guzik**, Aaron Koontz, Brandon Kendrick, and Keri Grimes

Mobility, being able to get from point A to point B. Most people on a daily basis do not think of this as a task. But mobility can be quite the challenge for paraplegics or even people with a sprained ankle, the inability to walk makes mobility difficult. And due to economic limitations or lack of health insurance coverage, traditional motorized wheelchairs are expensive. A patient may find their mobility drastically reduced because of not being able to afford a high-end electric wheelchair. Project Wheely gives the user the ability to convert any standard wheelchair into a low-cost motorized wheelchair, thus reducing the physical demand of a standard wheelchair while simultaneously increasing the mobility of the user.

## **Undulating Fin Unmanned Underwater Vehicle**

By: Daniel Resio, Roman Sperkacz, Miranda Davila, Lyubov Denissova, Mario Aparicio, Chad Kaplowitz, and Trey Brauch

Faculty Mentor(s): Oscar Curet

Presenters: **Daniel Resio**, Lyubov Denissova, Mario Aparicio, Roman Sperkacz, Miranda Davila, Chad Kaplowitz, and Trey Brauch

The main purpose of the current project is to design, fabricate and test a dynamically stable Unmanned Underwater Vehicle (UUV). This concept utilizes bio-inspired undulating fin propulsion and controls its orientation with at least 3 degrees of freedom. This bio-inspired project has potential to be significant to the scientific community and has minimal impact on marine environmental disturbance. The designed system will be able to precisely control surge and pitch while operating for continuous 2 hours. The propulsion system will propel the vehicle at approximately 1 ft/second in the surge direction with dual symmetrical horizontal undulating fins. The UUV utilizes front and rear piston buoyancy controllers as well as a shifting weight inside the main pressure vessel that is capable of controlling pitch by 90° with minimum surge or sway motion. The system will also be equipped with a ducting shroud that will protect and increase thrust for undulating fins.

## **Understanding Proppant Distribution at Fractures during Hydraulic Fracturing for Shale Gas**

By: Michael Romero and Jared Mcfadden

Faculty Mentor(s): Myeongsub "Mike" Kim

Presenters: **Michael Romero** and Jared Mcfadden

This research investigates particle distribution in hydraulic fracturing. This process involves initiating cracks in oil and natural gas reservoirs, the cracks are filled with a 'slurry' that contains small particles known as proppants which prevent premature closure of cracks due to natural reservoir pressure. A challenge in fracking is the uneven distribution of proppants throughout the fractures, this can greatly impact the permeability of the reservoir. We investigated geometrical parameters that may affect the distribution of proppants in fractures. Our observations help in predicting the ideal fracture shape and size for particle distribution. We found that fractures with greater width and angle relative to the flow result in even flow characteristics. We faced the challenge of introducing micro-sized particles into the system. However, we concluded important flow parameters affecting the distribution of particles that can be further investigated with the injection of particles as part of future work.

## **Developing Amine-Modified Silica Materials for Concurrent Removal of Carbon Dioxide and Water Vapor from Landfill Gas**

By: Ryan Thomas, Mitch Guirard, and Diego Jara Li

Faculty Mentor(s): Masoud Lashaki

Presenters: **Ryan Thomas**, Mitch Guirard, and Diego Jara Li

The United States relies on finite fossil fuel resources for roughly 80% of its total energy generation which results in the release of billions of metric tons of greenhouse gases every year. Landfill gas, the by-product of anaerobic digestion occurring in municipal solid waste landfills, is comprised of primarily methane, CO<sub>2</sub> and water vapor. Landfill gas accounted for 15% of total methane emissions in 2018 making it the third largest anthropogenic source of methane emissions. However, this gas can be purified and up-cycled into grid-quality biomethane, also known as renewable natural gas which can then be used as an energy source, mitigating the greenhouse gas effect of the landfill emissions. This research has developed an amine-modified silica compound, capable of adsorbing all the impurities from landfill gas in a single step filtration process in order to streamline landfill methane purification and increase the viability of biomethane as an energy source.

## **Telematics Sensors for Older Drivers' Behaviors**

By: Jinwoo Jang, Cleverson Viana, and Tai Nguyen

Faculty Mentor(s): Jinwoo Jang

Presenters: **Cleverson Viana** and Tai Nguyen

According to the Veterans Administration Workgroup on Driving Safety for Veterans with Dementia, elders with moderate to severe dementia should limit driving due to safety concerns. Driving is a complex activity and can indicate age and disease-related cognitive declines. Therefore, deficits in driving performance compared with those without mild cognitive impairment can reflect cognitive functioning changes. Age and cognitive-related fitness determination to drive remains unspecified and controversial since driving licensure varies by state. Current driver evaluation programs cannot evaluate every elder. Importantly, no concrete scientific approaches have been investigated to directly understand the current or former status of cognitively impaired older drivers in daily life. In this research project, current in-vehicle technologies may help detect any anomalous driving behavior attributed to cognitive and neurobehavioral impairment associated with driving. Our goal is to design a low-cost in-vehicle sensing device with high-precision positioning to identify important indicators for abnormal vehicle trajectories.

## Environmental, Ecological & Marine Sciences I

### **Harmful Algal Bloom Educational Intervention**

By: Nicole Anderson and Shirley Gordon

Faculty Mentor(s): Shirley Gordon

Presenters: **Nicole Anderson**

Harmful Algal Blooms (HABs) produce toxins which may be present in the environment. Risk of HAB exposure on human health is unclear. However, current epidemiological research shows a strong correlation between HABs and increased emergency room visits for respiratory, gastrointestinal, and integumentary distress. An educational intervention may increase knowledge, reduce exposure and mitigate potential effects. This study explored the impact of an education intervention on HAB knowledge. This study included a pretest/posttest knowledge survey and a narrated PowerPoint (PPT) presentation embedded in an online undergraduate nursing course. Eight adult nursing students volunteered to participate. A paired t-test was used to analyze the data. There was a significant improvement in HAB knowledge ( $p=0.000002$ ). In conclusion, an educational intervention (narrated PPT presentation) was effective in increasing participant knowledge. Limitations included a small sample size and researcher constructed tools/intervention. Additional research is needed to determine if public education will mitigate potential health risks.

### **Field Testing of Facial Recognition Application for Cercopithecus Monkeys**

By: Connor Cane and Kate Detwiler

Faculty Mentor(s): Kate Detwiler

Presenters: **Connor Cane**

Recognition of individual animals in the field is critical to long-term studies of animal behavior and ecology. This project used facial recognition software to identify individual Cercopithecus monkeys in Gombe National Park in Tanzania, an important long-term primate study site of hybrid monkeys. The first phase of this project was building an identification system—accomplished by utilizing a combination of machine learning, object detection, and image classification. Using 16,226 images of 62 individuals resulted in a machine learning model that is 99.44% accurate at detecting and identifying individuals. The current phase of the project is to use this system in the field. This was accomplished by hosting the trained models and face-detection algorithms in a web-based environment accessible by the field researchers through the internet. A cross-platform, browser-based custom Python application was created whereby the researchers could use the identification system to test accuracy in the field.

## **Apis mellifera Floral Resource Prioritization: Preferences for Native Versus Non-Native Species with Self-Medicating Secondary Metabolites in a South Florida Scrub Habitat**

By: Kylie Long and Aidan Donev

Faculty Mentor(s): Evelyn Frazier

Presenters: **Aidan Donev** and Kylie Long

*Apis mellifera*, known as the Western Honeybee, is a species of eusocial insects that play a major role in agricultural pollination. Worker bees are responsible for collecting pollen and nectar to be used for colony nutrition. This study aims to observe the foraging preferences of worker bees for native versus non-native flora on the FAU Preserve containing self and social-medicating compounds. An understanding of which medicinal compounds are favored by bees, and their preferences for native or non-native plants, may allow for improved bee conservation efforts. We hypothesize that honeybees will favor the use of plants with more chemical compounds used for self-medication independent of whether the plant is native or not. The collection of pollen samples on the preserve will allow for the creation of a catalog of pollen on the preserve. Pollen loads from captured bees will then be analyzed and compared to the pollen catalog.

## **Home Range Analysis of Cercopithecus Monkeys in Gombe National Park Using Hotspot Analysis**

By: Casey Hudspeth, Diana Mitsova, and Kate Detwiler

Faculty Mentor(s): Kate Detwiler and Diana Mitsova

Presenters: **Casey Hudspeth**

Documenting the home range of a group of hybrid *Cercopithecus* monkeys in Gombe National Park, Tanzania, aids in understanding the behavioral ecology of hybrid primates. I mapped the total home range of a single group using Global Positioning System (GPS) data in ArcGIS to create a minimum convex polygon (MCP) from the start of the 2015 dry season (June) to the end of the 2018 dry season (September). I used the Hot Spot Analysis tool to analyze the range for different patterns of movement within and between seasons over a 12-month period (2016). The aggregate total home range was 61.83 ha. The group utilized the southeast part of their range more in the wet season and the northwest section more in the dry season. The seasonal variation in movement is likely related to the distribution and availability of food items throughout the range and between seasons.

## **Comparative Analysis of Gopherus Polyphemus Activity in Relation to Human Activity as a Result of COVID-19 Pandemic**

By: Kylie Long, Lauren Melanson, and Evelyn Frazier

Faculty Mentor(s): Evelyn Frazier

Presenters: **Kylie Long**

The pandemic has brought about the opportunity to analyze animal behavior in urban areas under reduced human activity. The Florida Atlantic University (FAU) Boca campus, home to approximately 100 gopher tortoises, was closed from March through August of 2020 due to the lockdown. Decreases in human activity may have caused tortoises to change their behaviors. This natural experiment allows us to understand the impact humans may have on threatened or endangered species, such as the gopher tortoise. We hypothesize that the decrease in human activity in gopher tortoise habitat caused an increase in tortoise activity. We will compare tortoise activity via photographs taken of tortoise burrows, located throughout FAU's Scrub, by Moultrie A-25i game cameras from 2016, 2020, and 2021. These cameras track tortoise movements in, out, and around burrows. Images from burrows in similar locations will be compared from 2016 and 2020 (pre-Covid), and of 2020 and 2021 (post-Covid).

## **Environmental, Ecological & Marine Sciences II**

### **Sex Differences in Shark Skin Structure and Mechanical Properties**

By: Joseph Alexander, Madeleine Hagood, and Marianne Porter

Faculty Mentor(s): Marianne Porter

Presenters: **Joseph Alexander**

Shark skin is a network of dermal denticles and connective fibers. Collagen fibers impact skin thickness and mechanical behavior. Sharks are sexually dimorphic in skin structure and thickness, with females having thicker skin. We evaluated differences between male (N=4) and female (N=2) silky shark (*Carcharhinus falciformis*) skin structure and mechanical properties. We predicted stronger skin from females than males, and that orientation (longitudinal or hoop) effects would be larger in females. The skin was cut into a grid of 5x5 cm squares, with each square yielding four pieces for testing (2 per orientation). Skin structures (dermal denticle density and collagen fiber angles) were analyzed using stereoscopic microscopy. The skin was tested in tension with an Instron E1000 to collect mechanical data at a 2 mm/s-1 strain rate. We found that female skin trends towards increased strength and greater mechanical anisotropy. Skin structures reflect sex differences and affect mechanical properties.



## **Tracking SARS-CoV-2 RNA in the Wastewater Collection System as a Realtime Viral Hotspot Indicator**

By: Valerie Dalencourt, Sara Hollenbeck, and Daniel Meeroff

Faculty Mentor(s): Daniel Meeroff

Presenters: **Valerie Dalencourt** and Sara Hollenbeck

Tracking the progression of a communicable disease like Covid-19 by positive tests, hospitalizations, or deaths are all lagging indicators by as much as 2 weeks or more from the onset of symptoms (Peccia et al. 2020). Researchers at Yale University (Peccia et al. 2020), Arizona State University (Hart and Halden 2020), and Rice University (Amirian 2020) have demonstrated that SARS-CoV-2 RNA fragments, which is the cause of Covid-19, can be readily detected in wastewater collection systems and treatment plants. In those cases, the wastewater sampling was conducted in gravity sewers or at the treatment plant. In South Florida, lift stations concentrate raw wastewater and isolate a small segment of the community. Our team successfully demonstrated this technique, as a leading indicator of disease, using Real-Time Quantitative Polymerase Chain Reaction on the FAU Boca Raton campus, focusing on dormitories and athletic facilities.

## **Testing for Effects of Anthropogenic Noise on Cognition and Growth in a Songbird**

By: Leena Al-Hraki, Carson Ennis, and Elisset Poveda

Faculty Mentor(s): Rindy Anderson

Presenters: **Carson Ennis**, Elisset Poveda, and Leena Al-Hraki

As the human population grows, habitat loss and landscape development increases. Urban environments present novel challenges that affect the survival and reproductive success of wild animals. For example, anthropogenic noise in urban environments can profoundly impact the behavior of animals. Our project will investigate how urban noise affects behaviors related to cognition, such as learning, memory, and problem solving. Understanding how urban noise might affect cognition is critical for the conservation of species impacted by urbanization. Using an experimental approach, we will test the hypothesis that chronic exposure to urban noise during development negatively affects cognitive performance and growth. We predict that birds exposed to urban noise will perform significantly worse on cognitive assays (learn more slowly) and will experience negative effects on growth compared to birds exposed to normal aviary noise. Presently, the team has bred a total of forty-one zebra finches and has started the cognition trials.

## **Volitional Swimming Kinematics of Wild Leopard Sharks (*Triakis semifasciata*)**

By: Charles Romero, Lenia Jordan, Braden Ruddy, Andrew Nosal, and Marianne Porter

Faculty Mentor(s): Marianne Porter

Presenters: **Charles Romero** and Lenia Jordan

Recently, a growing body of research has looked at shark swimming from the standpoint of a double oscillating system, or an offset mode of wave propagation between the anterior and posterior body. We hypothesize that individual leopard sharks (*Triakis semifasciata*) within an aggregation will utilize a double oscillating system of wave propagation similar to what has been seen in other free-swimming sharks. We obtained aerial drone video taken from the nearshore environments from La Jolla, CA, an area known to have a high abundance of leopard sharks. We used Logger Pro 3.16 software to motion track individuals frame by frame using 5 anatomical landmarks. We quantified tail beat amplitude (bl), tailbeat frequency (Hz), head yaw frequency (Hz), head yaw amplitude(bl) and velocity (bl/s). This work hopes to expand on the growing body of literature about wild volitionally swimming sharks moving in nearshore environments.

## **Testing Behavioral Responses to Common and Rare Vocal Units in a Songbird**

By: Emily Whu and Rindy Anderson

Faculty Mentor(s): Rindy Anderson

Presenters: **Emily Whu**

Male Bachman's sparrows (*Peucea aestivalis*) sing a unique repertoire of approximately 48 distinct song types. Analyzing song types reveals that some types are very common throughout the population while others are very rare. We asked if male sparrows discriminate common from rare song types and whether this discrimination is meaningful in relation to territorial defense. We predicted that individual males would respond more aggressively to playbacks of common types compared to rare types because a rival male singing common (typical) song for the population is perceived as a stronger threat than a rival singing rare (atypical) songs. Instead, we found no differences in any of the behaviors we measured when comparing response to common songs versus rare songs. These results suggest that either male Bachman sparrows do not perceive differences between common and rare song types, or those differences are not important in the context of territory defense.

## Health & Medical Sciences I

### **Parental Head Lice Notification Letters in the U.S.: A Content Analysis**

By: Kiara Bradley and Shirley Gordon

Faculty Mentor(s): Shirley Gordon

Presenters: **Kiara Bradley**

Head lice infestations commonly occur around the world and affect children and adults across various socioeconomic backgrounds. Parental education is often addressed through public health nursing interventions such as head lice notification letters to promote the prevention, diagnosis, and treatment of head lice and reduce transmission in schools. Despite their broad use in schools, there are currently no published studies examining information provided in head lice notification letters. The purpose of this study is to describe content included in head lice parental notification letters. The study design is a descriptive, quantitative content analysis. The purposive sample includes publicly available parental notification letters that were posted on the internet within the past 5 years. In order to get geographic representation, parental notification letters representing one state from each of the nine United States Census Bureau divisions (n=9) were selected. Descriptive data analysis is in progress with results pending.

### **Developing a Story-Sharing Intervention to Increase Dementia Literacy in a Rural, Ethnically Diverse Population**

By: Caroline Brodi, Lisa Wiese, and James Galvin

Faculty Mentor(s): Lisa Wiese

Presenters: **Caroline Brodi**

Rural older adults are an unspoken population facing increased risk for Alzheimer's disease and related dementias (ADRD), due to barriers such as limited educational opportunities designed for lower health literacy groups. The purpose of this study was to develop and pilot-test a culturally relevant story-sharing intervention to increase dementia literacy among ethnically diverse faith-based older adults residing in Belle Glade, FL. Ten stakeholder narratives of experiences with ADRD were gathered and combined into two stories with stakeholder and dementia expert input. In addition to stages and symptoms, the stories highlighted the importance of dementia prevention and treatment. The stories were then administered to 12 rural residents, who also completed a novel dementia literacy assessment (DELA). Paired samples t-tests revealed that there was an increase in DELA pre-posttest scores ( $M = 7.5$ ,  $SD = 1.1$ );  $t(11) = 72.9$ ,  $p = .01$ . This shows great promise for dementia awareness among this population.

## **The Experience of Cultural-Based Care in Minority Populations Living with Diabetes**

By: Alexandra Charles

Faculty Mentor(s): Debra Hain and Rhonda Goodman

Presenters: **Alexandra Charles**

Diabetes remains a major cause of death, as well as related complications and kidney dis-ease, especially in minorities. Indigenous Guatemalan Maya have little to no access to culturally appropriate care for diabetes or guidance for self-management. Guided by transcultural theory, this study explored barriers and strengths in diabetes self-management. Themes were identified through ethnographic content analysis to discover the experience of older Guatemalan adults with diabetes and/ or at risk for kidney disease. Twenty older Guatemalan adults, 17 females and 3 males, with diabetes were interviewed. Common themes were strengths and difficulties in managing diabetes. This study shows that economic, social and religious factors can bring strength and better effectiveness towards self-management of diabetes or make it more difficult by being a barrier.

## **The Mutual Patterning of Power and Resilience in Nursing Students Experiencing Nurse Coaching and HeartMath During a Pandemic**

By: Nancey France, Mary Doan, Marlaine Smith, and David Newman

Faculty Mentor(s): Nancey France

Presenters: **Mary Doan**

Transitioning to college life can be stressful, especially during a pandemic. The purpose of this study was to explore the patterning profile of power and resilience in first-time-in-college nursing students experiencing Nurse Coaching and HeartMath during a pandemic. This descriptive exploratory study used a mixed-methods design with pretest-posttest quasi-experimental and Husserlian phenomenological approaches grounded in caring science. The Integrative Health and Wellness Assessment, the Power as Knowing Participation in Change Tool Version II, the 10-item Connor-Davidson Resilience Scale, a series of guided reflective questions for journaling, and guided nurse coaching questions were used. Qualitative data analysis is in progress. Preliminary quantitative results indicate that, with nurse coaching and HeartMath, students assessed their health and wellness, identified challenges, and set and met their goals for caring-for-self, resulting in increased levels of power and resilience. Therefore, nurse coaching and HeartMath do change the mutual patterning of power and resilience in these students.

## **Experiences that Impact the Mental Health of Students Attending College Who Have Lived in a State of Homelessness**

By: Michelle Ess

Faculty Mentor(s): Andra Opalinski

Presenters: **Michelle Ess**

Students who attend a college that have lived in a state of homelessness encounter unique experiences aside from normal college experiences. The purpose of this study was to use photovoice, a visual anthropology approach, to identify experiences that impact the mental health of students attending college who have experienced homelessness. A qualitative descriptive design, including the photovoice method, was used for this study. The participants were asked to identify five photos from their phone, tablet, or computer that positively or negatively affected their mental health. These photos were used as the springboard for the qualitative semi-structured interview. The analysis is still in progress currently, yet four themes are emerging. The included 1) escape 2) support systems 3) obstacles 4) resilience. The results from this study can inform policy within universities and gain support for these students by sharing knowledge of the unique experiences of students that experience homelessness.

## **Death of an Infant: Listening to the Silent Calls for Understanding of What Matters Most to Mothers Following Infant's Death**

By: Shannon M. Gamble, Dawn M. Hawthorne, Patricia Liehr, Rachael Joyner and Elena Guacher

Faculty Mentor(s): Dawn Hawthorne

Presenters: **Shannon Gamble**

Mothers often struggle to manage their life because of physical, emotional, and social changes when experiencing infant death. The purpose of this qualitative study was to describe what matters most to mothers, and what actions of healthcare professionals helped and did not help following the death of their infant. In-depth, semi-structured interviews were conducted with six mothers 13 - 36 months after the death of their infant. Story Theory was used to guide the questions about their past and present feelings of life without their infant. Three themes emerged, "Hurtful and Helpful words/actions of Healthcare Providers", "The Burden of Being Misunderstood," and "Being with and Being Heard." Keeping the memories of the infant alive was stated as what mattered most. The stories told by participants, provided insight for the training of healthcare professionals and what support was helpful for the mothers.

## **Death of an Infant: Mothers' Management of Health Difficulties and Strategies Used to Resolve the Loss Institution**

By: Julia Pelletier

Faculty Mentor(s): Dawn Hawthorne

Presenters: **Julia Pelletier**

Infant death is an unbearable life experience for mothers. While some mothers learn to cope with their loss, others are consumed with grief, and physical and emotional symptoms. The purpose of this qualitative study was to describe the health difficulties for mothers whose infants have died and to explore methods they used to manage the loss. Semi-structured interviews were conducted with six mothers 13 to 36 months after the death of their infant. Story Theory Smith & Liehr (2018) was used to guide the questions about their past and present feelings of life without their infant. Three themes emerged; "Blemished Identity", "Being Present and Building a Future", and "Finding meaning in the Tragedy." Mothers identified the health difficulties they experienced after the death of their infant and what helped them cope. These mothers shared their insights on ways they built a future by acting on their circumstances to find meaning.

## **School Nurses' Identification and Interventions for Students with Anxiety**

By: Aliyah Walters and Beth King

Faculty Mentor(s): Beth King

Presenters: **Aliyah Walters**

Anxiety is one of the most common psychiatric conditions affecting the child/adolescent population. The purpose of this study was to determine how school nurses identify symptoms of anxiety and intervention utilized with lower, middle, and high school students. This descriptive study using a correlational design examined the relationship between the school nurse's ability to identify and manage student's symptoms of anxiety and the school nurses' experience in school health, mental health, anxiety reduction training, and national certification in school nursing. The CALM-A revised tool, developed by Muggeo and Ginsburg (2019), consisted of 6 demographic questions, and 11 questions related to anxiety and interventions. Data analysis is in process. The results from this study will provide new insight into common mental health issues, current practice for screening anxiety, identification of symptoms of anxiety, and protocols used to reduce anxiety symptoms in school health.

## Health & Medical Sciences II

### **Potential Therapeutic Treatment for Stroke using GCSF Gene Therapy**

By: Parsa Sartipi, Michael Amin, Subash Bhandari, and Jang-Yen Wu

Faculty Mentor(s): Jang-Yen Wu

Presenters: **Michael Amin** and Parsa Sartipi

Stroke is a leading cause of death in the USA. Current treatments for stroke include tPA, hemicraniectomy, and blood thinners. However, these are not effective in all patients and could lead to brain hemorrhage, lasting disability, or death. This project aims to study the effects of granulocyte colony stimulating factor (G-CSF) as a potential therapeutic treatment for stroke. G-CSF is a glycoprotein that has exhibited neuroprotective functions. These neuroprotective functions include autophagy (cellular recycling through the lysosomes), neurogenesis, the formation of new blood cells, decreased apoptotic (cell death) activity, and decreased mitochondrial and endoplasmic reticulum stress. G-CSF has prevented neuronal induced toxicity in diseases with similar cellular stresses as stroke such as Parkinson's, Alzheimers, and Amyotrophic Lateral Sclerosis (ALS). However, it has not been studied in stroke. Our project aims to examine the effects of G-CSF in stroke-like conditions in order to see if it is effective therapeutic.

### **Anti-Malarial Drug Screening Against the PfGARP Antigen Using Anti-Adhesion Approach**

By: Matthew Araujo and Andrew Oleinikov

Faculty Mentor(s): Andrew Oleinikov

Presenters: **Matthew Araujo**

Malaria is a leading cause of morbidity and mortality in developing countries, infecting hundreds of millions of individuals and killing hundreds of thousands of children each year. Parasites resistant to the artemisinin family of compounds threatens recent progress achieved by antimalarial campaigns and underscores the urgent need to identify new antimalarial drugs. Recent studies in antimalarial drug research have recently discovered PfGARP, a previously unrecognized vaccine candidate found only in *P. falciparum*. Antibodies to the highly invariant carboxyl terminal of PfGARP inhibit parasite growth in vitro by 99% compared to controls by killing trophozoite stage parasites. The scientific premise of this study is that PfGARP is a high value druggable target based on: 1) its surface expression on infected RBCs, 2) the absence of any significant amino acid homology with human host proteins, and 3) the ability of antibody binding to PfGARP to kill essentially all parasites within 12-24 hours.

## **Investigation of Galectin-3 Inhibition as an Emerging Biotarget in Myocardial Fibrosis**

By: Ivet Boneva, Mare Cudic, and Ramya Ayyalasomayajula

Faculty Mentor(s): Mare Cudic

Presenters: **Ivet Boneva**

Galectins are a family of glycan-binding proteins involved in various physiological processes. Some of them including Galectin-3 (Gal-3) are known to be pathogenic. Studies have shown that increased Gal-3 concentrations are found in the bloodstream of patients with myocardial fibrosis and heart failure. Our objective was to design potent and specific glycopeptide inhibitors of Gal-3. The procedure included the use of D-galactal, and its per-acetylated analog, as a starting material in the preparation of 3'-O-derivatized Thomsen-Friedenreich (TF) antigen (galactose- $\beta$ -1,3-N-acetylgalactosamine). This building block will be used in the synthesis of glycopeptide inhibitors of Gal-3. Our preliminary data indicate that the peptide scaffold presenting the carbohydrate ligand is relevant for Gal-3 binding and thus provides a rational route for design of more potent, and more selective Gal-3 inhibitors that can improve the diagnostic and treatment methods of myocardial fibrosis and heart failure.

## **Sigma Receptor Antagonists for Chronic Pain**

By: Casey Leary

Faculty Mentor(s): Lawrence Toll

Presenters: **Casey Leary**

The purpose of this study is to perform in vitro experiments on sigma receptors obtained from rat liver and to identify antagonistic compounds by performing radioligand binding assays. Sigma 1 and sigma 2 receptors show that they may have a role in modulating nociception without the same liabilities as opioids for treatment in those who suffer with chronic pain. In the past sigma receptors were confused with opioid receptors because of cross-reactivity of certain ligands. Currently, sigma 1 receptors are a part of a unique category and labeled as a ligand-regulated molecular chaperone. The idea is to identify compounds that are best suited for managing chronic pain and provide comparable relief to opioid based compounds. The results of this study will aid in identifying compounds that have high or low affinity for binding onto sigma receptors. These compounds can then be used further in testing their analgesic effects.



## **Cloning and Testing of a Reporter Minigene to Study the Regulation of Expression of the Transduction Adaptor MYD88**

By: Elijah Ortiz, Sean Paz, and Massimo Caputi

Faculty Mentor(s): Massimo Caputi

Presenters: **Elijah Ortiz**

MYD88 is a transduction adaptor protein that links toll-like receptors (TLRs) and interleukin-1 receptors (IL-1Rs) to the transcription factors NF $\kappa$ B and AP-1, which control genes regulating immune response, cell proliferation, and apoptosis. MYD88 is alternatively spliced into MYD88L and MYD88s. The short MYD88s isoform fails to transduce the signal from the TLRs/IL-1R to NF $\kappa$ B/AP-1. Our preliminary data show that SRSF-1, a factor that regulates the alternative splicing of several genes, promotes transcription of MYD88 but not its splicing. To study the mechanisms controlling MYD88 expression and splicing, we created a minigene containing the MYD88 promoter, its coding exons, and intervening introns cloned upstream a luciferase reporter gene. We are testing this minigene for its ability to mimic the expression and splicing of the endogenous MYD88. Next, we will mutagenize the MYD88 construct to determine the sequences required for the regulation of its expression and alternative splicing.

## **The Interaction of DSD with E3-ligase Mahogunin Ring Finger 1 (Mgrn1) in the Nervous System and in Insulin Producing Cells**

By: Wayne Robinson, Sirisha Kudumala, Vindhya Nawaratne, and Tanja A. Godenschwege

Faculty Mentor(s): Tanja Godenschwege

Presenters: **Wayne Robinson**

The loss of function vertebrate homologs of the *Drosophila* transmembrane protein Distracted (Dsd) and E3-ligase Mahogunin Ring Finger 1 (Mgrn1) have been associated with neurodegeneration and metabolic disorders such as diabetes and obesity. We found that Mgrn1 binds to the highly conserved intracellular MASR-motif of Dsd, and that transgenic co-expression of Dsd in neurons leads to increased levels of Mgrn1 isoforms with a higher molecular weight. Recently, it was shown that proteasome stress causes monoubiquitination of Mgrn1, which induces Mgrn1's translocation from the cytosol to the nucleus to regulate Activating Transcription Factor 3 (ATF3), which has established roles in homeostatic metabolic regulation and cellular stress responses. Our hypothesis is that the presence of Dsd promotes Mgrn1's monoubiquitination to enable cells to adapt to extrinsic (e.g. glucose levels) and intrinsic (e.g. proteasome stress signal) signals by modulating metabolism and cellular stress signaling pathways.