



Tenth Annual

**Undergraduate
Research
Symposium**

April 3rd 2020

WELCOME

Welcome to the 10th Annual Undergraduate Research Symposium, which showcases undergraduate students at FAU who are engaged in research, scholarship and creative activities. This year we have gone to a Virtual Symposium, and have established a Canvas site to showcase our undergraduate research scholars. Students present their findings through poster or visual and oral or performing arts presentations, and represent all disciplines, all colleges, and all campuses of FAU.

Few activities are as rewarding intellectually as research and inquiry. In addition to the acquisition of invaluable research skills, students learn how knowledge is created and how that knowledge can be overturned with new evidence or new perspectives. Such scholarly activities engage students in working independently, overcoming obstacles, and learning the importance of ethics and personal conduct in the research process.

The Office of Undergraduate Research and Inquiry (OURI) serves as a centralized support office of both faculty and students who are engaged in undergraduate research and inquiry. We offer and support university wide programs such as undergraduate research grants, annual undergraduate research symposia, and undergraduate research journals, to name a few. We also support all departments and all colleges across all campuses in their undergraduate research and inquiry initiatives.

For more information on how OURI can help you, please visit our website at www.fau.edu/ouri

SPECIAL THANKS

- Council for Scholarship and Inquiry (CSI)
- Division of Research
- Division of Student Affairs
- Faculty Judges
- Faculty Mentors/Advisors
- The Office of Undergraduate Research and Inquiry (OURI)
- Faculty Liaisons & Peer Mentors
- Office of Informational Technology (OIT)
- Undergraduate Studies
- University Communications - Marketing and Creative Services
- University Libraries

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2019 Awardees

Undergraduate Researcher 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 and is recognized at the annual Honors Convocation with an “Undergraduate Research Scholar” Stole to wear during their graduation ceremony. These selected students are in good academic standing, have participated in at least two semesters of documented faculty-mentored undergraduate research and inquiry at FAU, and often have presented at multiple conferences and symposia, engaged in additional research activities, and even published their research as an undergraduate!

2019 Awardees

Undergraduate Researcher of the Year

The 2019 Awardees

Jessica Olivier
Dorothy F. Schmidt College of Arts and Letters
Faculty Mentor: Brian McConnell

Xana “Kira” Nash
College of Business
Faculty Mentor: Monica Escaleras

Laura Eugene
College for Design and Social Inquiry
Faculty Mentor: Lincoln Sloas

Kelly Thomas
College of Education
Faculty Mentor: Lisa Finnegan

Tucker Hindle
College of Engineering
Faculty Mentor: Hongbo Su

Vineet Reddy
Harriet L. Wilkes Honors College
Faculty Mentor: Carmen Cañete-Quesada

Anastasia Tyulmenkova
Charles E. Schmidt College of Medicine
Faculty Mentor: Ceylan Isgor

Katie Abel
Christine E. Lynn College of Nursing
Faculty Mentor: Lisa Wiese

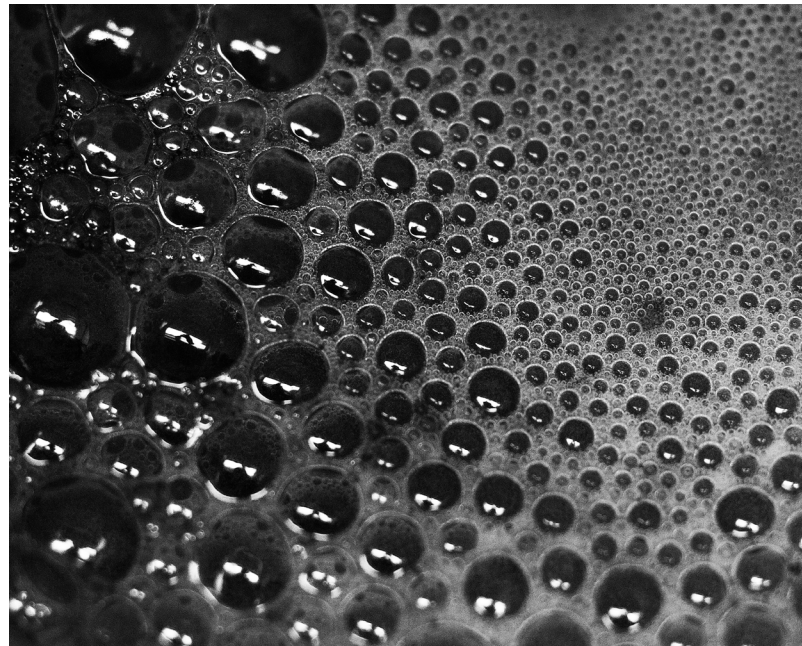
Gary Drotleff
Charles E. Schmidt College of Science
Faculty Mentor: Gregg Fields

COVER ART: ARTIST STATEMENT

“From Beach Sand”

Ellie Vilakazi, Undergraduate Student
Dorothy F. Schmidt College of Arts and Letters

A researcher in the FAU Geoscience Department is working to find out how beach sand affects sea turtles. Sand samples are collected from beaches in Boca Raton all the way up to Jupiter. Samples are then brought back to the Coastal Studies Lab, put through several sieves, and weighed. The image below shows the next step which is to put the sand into a diluted hydrochloric acid solution in order to dissolve the calcium carbonate fraction (e.g., shells), a process that produces the bubbles seen here. The purpose of this step is to determine the relative mineral composition of the beach sand.



ART OF SCIENCE

PHOTO CONTEST 2020

What does your research look like?

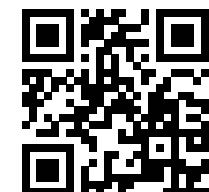
Open to all members of FAU community – students, faculty and staff, to help highlight the cutting-edge research across the colleges, while engaging and educating others in all the unique research taking place at FAU.

DEADLINE: OCT. 23



FLORIDA ATLANTIC UNIVERSITY
DIVISION OF RESEARCH

WIN PRIZES!



ORAL PRESENTATIONS

Potential of a Phytochemical's Anticancer Effects Using a Common NSAID Sulindac in Adjuvant Therapy for Prostate Cancer Management

Author(s): Jonathan Bonachea-Diaz

Faculty Mentor(s): James Kumi-Diaka

Presenter(s): Jonathan Bonachea-Diaz, Brandon Hernandez, Ashley McGill, and Shaunakay Wollaston

The American Cancer Society states prostate cancer (PCa) is the fourth most common cancer overall and the second most common cancer among men. Chemotherapy is one of many treatment methods against PCa, but current metastatic PCa therapies are still underdeveloped. The aim of this study is to investigate the synergistic effects of combinational chemotherapy treatments using a common NSAID, sulindac, with a known anticancer phytochemical, genistein, on AR(+) (LNCaP) and AR(-) (DU-145) prostate cancer cell lines. Our current results have shown combinational efficacy within the LNCaP PCa cell line but not for DU-145. Further studies will seek to explore the therapeutic potential and mechanisms behind our preliminary data.

Therapeutic Potential of the Marine Natural Product, Pseudopterosin H, on PC-3 Prostate Cancer Cells

Author(s): Zoey Bowers, Davian Caraballo, Joubin Jebelli, Austin Bentley, Toluleke Famuyiwa, James Kumi-Diaka, and Lyndon West

Faculty Mentor(s): James Kumi-Diaka and Lyndon West

Presenter(s): Zoey Bowers

Metastatic prostate cancer has remained predominantly incurable despite various advancements in cancer treatments. The lack of effective treatment options has driven the search for alternative therapies, such as the use of marine natural products. A class of marine compounds known as Pseudopterosins, or diterpene glycosides, are of interest in cancer research. Previous studies have concluded cytotoxic, anti-inflammatory and anti-cancer activity in triple negative breast cancer, therefore, we hypothesized that similar activity will be observed in PC-3 prostate cancer cells. Pseudopterosin H was isolated from the octocoral Pseudopterogorgia elisabethae and therapeutic efficacy on PC-3 cells assessed at various treatment concentrations through in-vitro screening using the MTT, NBT, LDH, and AO/EB fluorescence assays. Our preliminary results have shown Pseudopterosin H reduces PC-3 cell viability by inducing apoptosis. The chemosensitivity of PC-3 cells to treatment with Pseudopterosin H suggests a potential prophylactic and therapeutic advantage in the treatment of metastatic prostate cancer.

Inhibitory Potential of Kallosin, its Byproduct and a Kallolide H Analogue Towards MCF-7 Breast Cancer Cells

Author(s): Varad Gharat, Paul Scesa, and Lyndon West

Faculty Mentor(s): Lyndon West

Presenter(s): Varad Gharat

Current treatment options for cancer are limited to costly methods like chemotherapy and surgery rendering them inaccessible to many patients. This has resulted in an increase in research conducted by natural product chemists, who assess the viability of compounds and screen their ability to be used as drugs. Findings show that marine products Caucanolides A and B, inhibit the replication of MCF-7 breast cancer cells, when administered for forty-eight hours. The findings were quantified through the use of IC50 values, which determine the amount of a compound needed to inhibit a biological function by half. We hypothesized that Kallosin and its byproduct would display inhibitory effects, similar to their caucanolide counterparts. A Resazurin Assay was used to verify the termination of replication. The results not only provide credence to the research regarding natural products' therapeutic potential, but also provide preliminary data to construct a pharmaceutical drug.

Synthesis and Characterization of Novel Biopolymer Containing Cysteic Acid Moiety

Author(s): Djimmitry Graham, Deborah Thomas, and Maciej Stawikowski

Faculty Mentor(s): Maciej Stawikowski

Presenter(s): Djimmitry Graham and Deborah Thomas

There is a need for the development of novel polymers especially for drug delivery purposes. We have proposed to develop novel polyproline type II biopolymer containing a novel amino acid – cysteic acid (Cya). A series of peptides containing Pro-Cya pairs was studied using molecular dynamics simulation and solid phase peptide synthesis. Cysteic acid moiety can be obtained by oxidation of cysteine amino acid. Efforts to efficiently oxidize this residue were undertaken and compared. Oxidizing conditions are summarized and applied for the synthesis of one peptide. Oxidation products were analyzed by mass spectrometry and will be further tested for polyproline type II structure by means of circular dichroism spectroscopy. Obtained results are compared with molecular dynamics simulations and are basis for further biopolymer optimization studies.

Development of Membrane-Bound Calcium Probes

Author(s): Catherine Jimenez

Faculty Mentor(s): Maciej Stawikowski

Presenter(s): Catherine Jimenez

The purpose of this research project is to develop fluorescent cellular membrane-bound probes that will identify intracellular calcium ion concentrations. Although there are many calcium probes already available, there is a limited number of them that are membrane-bound. In our studies we apply 1,8-naphthalimide fluorophore scaffold, which is derivatized to induce calcium ion binding. The synthesized probes will be used to determine possible changes in spectral properties upon binding to calcium (or other metals) and the cellular localization of calcium within live cell membranes. The metal binding properties are possible through incorporation of iminodiacetic and iminodipropionic acid connected to naphthalimide scaffold. The overall goal of this project is to develop selective, membrane bound calcium probes capable of monitoring calcium signaling in cells, especially neurons. This project will contribute to the development of novel fluorescent calcium probes for live cell imaging and will add to the repertoire of existing calcium probes.

Conservation Genetics of Cercopithecus dryas in the Central Congo Basin

Author(s): Marianthi Karadakis, Emma Larkin-Gero, and Kate Detwiler

Faculty Mentor(s): Kate Detwiler

Presenter(s): Marianthi Karadakis

The dryas monkey (*Cercopithecus dryas*) is an understudied primate species found in Africa's central Congo Basin. Using the cytb gene on the mitochondrial genome, I examined haplotype diversity within the population using a new fecal sample. An additional objective was to sex the individual using Y-chromosome markers. I used PCR and gel electrophoresis methods to isolate the cytb region. I determined the new sample is from a female individual and observed three confirmed haplotypes within the population. Utilizing maximum likelihood and Bayesian analyses, I verified the phylogenetic relationship between the four existing dryas samples and the new sample. Dryas forms a monophyletic clade with high support that groups closely with *Chlorocebus djamdjamensis*. This confirms the introgression between dryas and members of the *Chlorocebus* genus, a pattern found in a recent full genome study of dryas. To further investigate the genetic diversity of Dryas, I recommend increasing the sample size.

Analyzing the Antibiotic Activities of a Novel Depsipeptide KTG3 and Two Novel Bacterial Strains

Author(s): Amy Donne, Alexis Martin, and Diane Baronas-Lowell
Faculty Mentor(s): Diane Baronas-Lowell
Presenter(s): Elizabeth May

Our environment has become rich in antibiotics due to their overuse and misappropriation. To survive, bacteria mutate and become resistant to antibiotics. Although evolutionary resistance to antibiotics is impossible to combat, students in Tiny Earth research (<https://tinyearth.wisc.edu/>) hunt for novel antibiotics produced by soil bacteria. Here, three soil bacteria (ESM16, ESM8 and KTG3) collected in Palm Beach County were tested against model bacteria. Newly isolated bacteria ESM8 and ESM16 and their organic extracts show varied antibiotic activity. Specifically, ESM8 bacteria kills model bacteria *Bacillus subtilis* and *Erwinia carotovora* and ESM16 bacteria kills *Staphylococcus epidermidis*, *Escherichia coli*, *Bacillus subtilis*, *Erwinia carotovora* and *Pseudomonas putida*. When organic compounds are extracted with ethyl acetate from ESM8 bacteria, they kill all nine bacteria tested. Organic compounds extracted from ESM16 kill *Bacillus subtilis*. Further investigation is warranted to identify the ESM8 compounds displaying a broad range of antibiotic activity.

Stacking Properties of RNA Dimers Using Computational Methods

Author(s): Amirhossein Taghavi, Ivan Riveros, and Ilyas Yildirim
Faculty Mentor(s): Ilyas Yildirim
Presenter(s): Ivan Riveros

RNA is a critical biomolecule with complex and dynamic folding properties that determine its function. Due to experimental limitations, molecular dynamics (MD) simulations are one of the few viable options for studying the atomistic details of RNA. However, the accuracy of MD simulations is dependent on the quality of the force field used. In this study, we tested two RNA force fields by running 3.5 microsecond long MD simulations to predict the stacking properties of single-stranded RNA (ssRNA) dimers. Stacking in nucleic acids results from quantum mechanical phenomena that are not explicitly simulated. So, geometric definitions, which are subjective and may negatively affect results, must be used to describe stacking. We explore the dynamics and complications of using various geometric definitions using the two force fields and their impact on results, as well as propose our own improvements to existing definitions.

Antibacterial Properties of a Henna-Based Hydrogel

Author(s): Satviki Singh and Daniela Scheurle
Faculty Mentor(s): Daniela Scheurle
Presenter(s): Satviki Singh

Nosocomial diseases affect close to 10% of hospital patients in the US. *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Escherichia coli* are common nosocomial disease causing pathogens. This project was designed to assess the antibacterial properties of a henna-based superabsorbent polymer (SAP) hydrogel against these three common infectious bacteria as a possible wound dressing. The SAP was treated under a UVC light, infused with various concentrations of a henna-based mixture, and tested via the Kirby Bauer method. The hydrogel showed no sign of antibacterial activity regardless of concentration. The SAP hydrogel was tested to determine if it was absorbing and releasing the mixtures to test whether it could hold and distribute mixtures that could be used in antibacterial wound care. The polymers showed release of fluid at different rates for different mixtures. The study suggests that, with further testing, the SAP possibly could be used as an antibiotic delivery system.

Identifiability Analysis of the Human H1N1 Influenza Virus

Author(s): Vivek Sreejithkumar and Necibe Tuncer
Faculty Mentor(s): Necibe Tuncer
Presenter(s): Vivek Sreejithkumar

The objective of this research is to determine the epidemiologically important parameters such as rate of infection and recovery of the H1N1 influenza virus during last year's season according to data from the Center for Disease Control (CDC). Publicly available influenza incidences data from the CDC webpage, excluding personal information, was used to validate our mathematical model. The research is based on a system of an ordinary differential equations, called the Kermack-McKendrick model, to simulate the influenza virus spread in a population. After developing the preliminary model that matches the CDC data, the model was run on the computer software (MATLAB) to compare the predictions of the model to the CDC data to analyze the model's accuracy, manipulating the parameters in the equation as necessary for the model predictions to match the data. Afterwards, the values of the equation's parameters were estimated to most precisely match the CDC data.

Design, Synthesis and Characterization of Fluorescent and Lipid-specific Probes for Membrane Imaging

Author(s): Deborah Thomas and Maciej Stawikowski
Faculty Mentor(s): Maciej Stawikowski
Presenter(s): Deborah Thomas

Seven fluorescent probes based on the well-characterized naphthalimide scaffold, were successfully synthesized and characterized. These probes have varying emission wavelengths due to the different substituents in the C4 position on the scaffold and have a common lipid moiety allowing for anchoring to the lipid membrane. The prepared analogs have been characterized using NMR and fluorescence spectroscopy. We found that the probes exhibited solvatochromic properties. When compared between aqueous and micellar solutions, the fluorescence is greatly enhanced in the lipid environment, making the probes suitable for cell membrane imaging in live cells and eliminating the need for additional washing steps. In addition, the probes with the piperazine moiety show enhanced fluorescence in acidic environments, which make them applicable for pH sensing in the cell membrane.

Investigation of Serotonergic IL-1R1 in Mediating LPS-Induced Neuronal Activation

Author(s): Alaina Tillman, Paula Gajewski-Kurdziel, and Randy Blakely
Faculty Mentor(s): Randy Blakely and Paula Gajewski-Kurdziel
Presenter(s): Alaina Tillman

Serotonin is a neurotransmitter in the brain and plays an important signaling role in the periphery. The connection between serotonin and immune-system dysfunction is emphasized in comorbidity suggested by a relationship between chronic inflammatory conditions and risk for neuropsychiatric disorders. Using novel transgenic mouse models, such as ePet-1:Cre;IL-1R1loxP/loxP (deletion of the inflammatory-receptor IL-1R1 in serotonergic neurons), we investigated the activation of serotonin neurons that express or lack IL-1R1 following peripheral immune stimulation by lipopolysaccharide. Immunofluorescence and DAB staining were conducted to visualize the expression of IL-1R1, serotonin, and cFos, a marker of neuronal activation. Peripheral LPS induces changes in neuronal activity in midbrain serotonin neurons and distinct downstream projection sites associated with depressive-like behaviors between males and females. Understanding the molecular underpinnings that allow for brain-immune system crosstalk may provide physiological evidence for how individuals with immune system dysfunction exhibit an increased risk in developing neuropsychiatric disorders (and vice versa).

Restored! Assessing Support for Florida's Amendment 4

Author(s): Lincoln Sloas and Laura Eugene
Faculty Mentor(s): Lincoln Sloas
Presenter(s): Laura Eugene

On November 6th, 2018, Floridians voted for the passage of the "Voting Rights Restoration of Felons Initiative" (i.e., Florida's Amendment 4). With the passage of this amendment, former felons now have the right to vote, excluding felony murder and sex offense convictions. Although a body of research exists on the implications of felon disenfranchisement, little research has been conducted on what predicts voters' likelihood of voting to restore felons voting rights. Using a sample of students from a southern university, this exploratory study assesses the factors that influenced voters to vote "yes" for Amendment 4. By breaking down each category of felony convictions (e.g., arson, grand theft) we hypothesize that voters who perceive current rehabilitation systems to be ineffective are more likely to vote in favor of ex-felon suffrage. The findings of the study will contribute to the knowledge of the public's support for the voting rights restoration of felons.

Does Negative Political Advertising have Negative Impacts on Youth Voter Turnout?

Author(s): Michael Evrard-Vescio
Faculty Mentor(s): Dukhong Kim
Presenter(s): Michael Evrard-Vescio

Due to increasing political divisiveness and partisanship, fewer Americans are coming to the polls, specifically those who have yet to vote. Some scholars have speculated that the reason young voters have such low turnout could be poor civics education, barriers to voter registration, or a lack of time to vote. Unfortunately, most of these factors are hard to prove or test in the field of research. This research aims to analyze how increased exposure to divisive advertisement, that attack politicians instead of policy, will impact youth voter turnout while also looking at common explanations for why young Americans don't go to the polls. To find this answer secondary data from previous elections will be used to analyze the past results of election financing as well as the impacts of voter registration laws. Additionally, potential youth voters will be a given an experimental survey to see a direct negative advertising impact.

Guns or Roses? How Americans View Guns in this Climate

Author(s): Marvel Joseph and Chase Rydstrand
Faculty Mentor(s): Monica Escaleras and Eric Levy
Presenter(s): Marvel Joseph and Chase Rydstrand

The gun debate has become one of the most divisive topics in the United States of America. Mass shootings, killings of minorities, and inner-city shootings have engulfed the airways for years. In 2019, it was reported that gun control groups spent \$2 million in efforts for citizens to vote for anti-gun legislators. The purpose of our research is to gain a true understanding of how Americans view guns and the Second Amendment. To do so, we conducted a survey of 15 questions and received 298 completed responses. From the data collected we found significant differences between race and how guns make them feel. We also found a significant difference between age groups and the idea of repealing the Second Amendment. We found that despite the calling for changing gun laws, there cannot be a one-size fits all approach to repealing gun laws because of the differing opinions of community needs.

Shifting State Policies Towards Ethnic Diversity

Author(s): Emma Szabo
Faculty Mentor(s): Renat Shaykhutdinov and Rosemary Rahill
Presenter(s): Emma Szabo

Since World War II, there has been a rise in ethnic and civil conflicts around the globe. Consequently, state treatment of ethnic diversity has assumed an ever-increasing importance. Much of prior scholarly work regarding states' relations with ethnic diversity has predominantly (1) applied a uni-dimensional definition of state ethnic policies and (2) treated conflict as a dependent variable. In contrast, I apply a two-dimensional approach derived from (a) the shifts in ethnic identity and (b) power and dominance. Further, I reverse the ethnicity-conflict link and explain different state policies towards ethnicity by treating conflict as an independent variable. I hypothesize that social conflict, exacerbated by rising inequality and tension, results in segregation, an intolerant form of inter-group relations. However, relative absence of conflict leads to amalgamation. I use a qualitative process tracing technique to evaluate my theory. Specifically, I employ the case of Yugoslavia to illustrate the theory.

Evidence-Based Reading Strategies and Culturally Relevant Reading Material Paired to Improve Reading Comprehension Among Minority English Language Learners in Secondary Education Settings

Author(s): Kelly Thomas
Faculty Mentor(s): Lisa Finnegan and Sharon Darling
Presenter(s): Kelly Thomas

Culturally relevant reading materials, while still a young concept, has provided positive results for increasing reading comprehension among minority students within limited studies. In more established work, advanced research has been conducted on reading strategies for English Language Learners (ELLs) bringing forth a number of evidence-based practices (EBP). While these are two separate categories of diverse learners and it can not be assumed that every ELL is of a minority or vice versa, there is a large population of students that do fit into both categories. To best service these students, this review of literature aims to explore the research question: which evidence-based reading strategies pair with culturally relevant reading materials to yield increased reading comprehension, as measured through standardized testing scores, for minority English Language Learners in a secondary education setting?

A Survey of Law Enforcement Officers and their Knowledge of, and Contacts with, Persons with Autism Spectrum Disorder

Author(s): Oriana Williams
Faculty Mentor(s): Jack Scott
Presenter(s): Oriana Williams

There is not a large amount of literature that exists today relating to training on autism for law enforcement officers or the nature of their field interactions with persons with autism. Our study aims to analyze both the amounts of prior training officers have received as well as the nature of their field interactions with individuals with autism. Additionally, we will be exploring preconceptions officers may have about autistic behaviors prior to receiving training. This will help give a gauge about what knowledge of autism the average officer may have never having received any formal training. We are hoping this study will shed light on the need for formal training on autism and how field interactions between officers and individuals with autism are actually happening.

The Effects of Hurricane Michael on the Florida Panhandle

Author(s): Tyler Su
Faculty Mentor(s): Diana Mitsova
Presenter(s): Tyler Su

On October 10th, 2018 Hurricane Michael struck the Florida Panhandle causing widespread damage to coastal communities. To understand the full impact of the storm, a survey was conducted by the Business and Economics Polling Initiative at FAU to gauge the citizen's rate of recovery in the region. By running crosstabs with survey questions, we discovered significant differences in the rate of recovery with people of different incomes and ages. In addition, a considerable amount of people were left without electricity and basic infrastructure services that delayed their ability to resume normal life. The conclusions in our research offer important insights into the resilience of the Panhandle's infrastructure and the success of the region's recovery efforts.

Sprint and T-Mobile Merger

Author(s): Ashley Alvarez and Andrew Irizarry
Faculty Mentor(s): C.M. Sashi
Presenter(s): Ashley Alvarez and Andrew Irizarry

Sprint and T-Mobile merger will bring in a new force in the cellphone industry. This research will indicate how T-Mobile and Sprint merger will affect customer satisfaction. By investigating and understanding the business market, the results will be able to provide knowledge into how the merger will affect pricing. Using the newfound data and research, we will discuss both Sprint and T-Mobile's innovative business model that will renovate and reshape the cell phone industry using combined services to lower prices. Competitive forces, such as substitution and threat of new entries, will improve services that will have a powerful impact in the cell phone industry.

Cryptocurrency: Money Without Borders

Author(s): Devin Aylward and Corey Luckenbill
Faculty Mentor(s): Monica Escaleras and Eric Levy
Presenter(s): Devin Aylward and Corey Luckenbill

Cryptocurrency is a digitized currency that could dismantle the way we exchange money throughout global markets. According to Tradingview.com, cryptocurrency has a total market capitalization of around \$250 Billion USD. The purpose of our research is to examine the public's knowledge and understanding of cryptocurrency. We conducted a single survey with 352 completed responses from an online panel. Our results show there is a statistically significant difference between age groups and owning or knowing someone who owns a form of cryptocurrency. Additionally, we found that there is also a statistically significant difference between age groups and believing cryptocurrency is primarily used for illegal transactions. Our results show a trend of younger generations having a greater understanding of cryptocurrency, and as they become older there will have a better understanding of cryptocurrency which may cause it to be more prevalent in our global markets.

The Impact of Artificial Intelligence and Self Driving Cars on Sustainability

Author(s): Tyler Webb and Lauren Cargill
Faculty Mentor(s): C.M. Sashi
Presenter(s): Lauren Cargill and Tyler Webb

Times are changing, the world is changing, and our resources will not last forever. This abstract will examine the impact of artificial intelligence (AI) and self driving cars on sustainability. One exciting innovation on the horizon is the use of AI to develop self-driving cars, improve efficiency, and reduce harmful emissions. Self-driving cars utilize AI to replace human operation of a vehicle. Some self-driving cars go further in being sustainable because they are powered by batteries instead of gas. These electric cars do not produce emissions and therefore do not contribute to the carbon footprint as the normal gas-powered vehicles do. Artificial Intelligence and self-driving cars/electric cars are positively transforming the modern world in ways of sustainable economic growth as well as global environmental sustainability.

Alienating the Alien

Author(s): Prema Daya and Tanvi Vaidya
Faculty Mentor(s): Monica Escaleras and Eric Levy
Presenter(s): Prema Dayal and Tanvi Vaidya

On average, the United States admitted 1.18 million legal immigrants in 2016. However, this engagement has posed immigration policy conflicts. The purpose of our study is to gauge people's perception on immigration laws. Therefore, we designed a survey that comprised of 12 questions and collected 277 responses. We found that there is a statistically significant difference between gender and whether they think it should be harder or easier for people to legally immigrate to the United States. And specifically our results concluded that males think that it should be easier for legal immigration while females think otherwise. In addition, there is a statistically significant difference between gender and whether they think all illegal immigrants are lawbreakers. Our data depicted that more males think that most illegal immigrants are lawbreakers. In conclusion, we can claim that males advocate for more anti-illegal immigration policies.

Strategies for Hurricanes: How Service Providers Can Prepare for Florida’s Natural Disasters

Author(s): Connor Delaney and Shatara Bryant
Faculty Mentor(s): C.M. Sashi
Presenter(s): Connor Delaney and Shatara Bryant

Our home state of Florida is ripe with beautiful scenery and some of the best weather in the world. However, every year the looming fear of hurricanes hangs above us as we wonder whether or not we will have to prepare ourselves to face the greatest natural disaster known to man. Little research has been conducted to fully understand the effects on consumer behavior to these events. There appears to be a connection between the fear experienced during a natural disaster and how service providers adjust their strategies to compensate for new shopping patterns. The results of this research will help service providers understand spontaneous shopping motives and how to prepare their strategies in dealing with the occurrence of a hurricane.

Consumer Perception On Implementation Of Facial Recognition Software In Retail Stores

Author(s): Amber Kelley, Alex Natoli-Roland, Devin Simmons, and Juan Torres
Faculty Mentor(s): Pradeep Korgaonkar
Presenter(s): Amber Kelley, Alex Natoli-Roland, Juan Torres, and Devin Simmons

We will be presenting on consumers perception of recognition software in retail outlets. We will look at how it could have a negative impact, especially when it comes to shopping at the store. This will be exploratory research and we'll be conducting surveys on the Florida Atlantic University Boca campus. We would identify issues that might occur while using the facial recognition software. Do people feel like it violates the 4th amendment for them? Or perhaps, the software might not be able to detect the difference between skin tones. We will be taking a look at whether the loss of public anonymity is a deterrent or an asset in recruiting customers to shop in physical retail locations like Target and Walmart which famously use this technology. To analyze this information, we will be utilizing SPSS software to help us determine whether or not our hypothesis is rooted in reality.

Varying Incomes, Varying Overpopulation Perceptions

Author(s): Paloma Rossano and Lisa Campion
Faculty Mentor(s): Monica Escaleras and Eric Levy
Presenter(s): Paloma Rossano and Lisa Campion

According to Worldometers, the population of Earth has more than doubled in the past 50 years, growing by about four billion people. The world is now adjusting to acknowledge this exponential growth. We decided to conduct a survey that would analyze perceptions of overpopulation in relation to gender, age, income, and education level. From the data collected, we found a statistical significance between varying income levels and the questions regarding the ethicality behind imposing governmental laws to slow population growth. In addition, we found that there is a statistical difference between income and preferences in terms of possible solutions to slow overpopulation. Out of 5 possible solutions, we decided to focus on “overpopulation education in schools” and “government incentives for small families.” We can conclude that individuals in the lowest income brackets in our survey have opposing views to those of the highest income brackets regarding overpopulation ethics and solutions.

The Great Dollar Divide

Author(s): Daniel Ortiz and Juan Torres
Faculty Mentor(s): Monica Escaleras and Eric Levy
Presenter(s): Juan Torres and Daniel Ortiz

The top 10% of U.S. households make more than \$200,000 annually. On tax data tracked by economist Emmanuel Saez, the top 10% experience the fastest income growth of all households. The purpose of our study is to measure individuals' perceptions of their financial situations and their opinions on income inequality in the United States. Therefore, we designed a 12 question survey and collected 339 responses. Our results show a statistically significant difference between age groups and their perceptions towards the growth of income inequality over the past four years. In addition, we found a statistically significant difference between age groups and how they perceive themselves financially compared to their parents. Our research uncovered the pessimistic perception on the increased income inequality gap and individuals' current financial situations. Our findings can help policy makers implement resolutions for income inequality.

When Disasters Happen: An Analysis of Preparedness in The Occurrence of a Natural Disaster

Author(s): Ghazal Jabbar and Anthony Washko
Faculty Mentor(s): Monica Escaleras and Eric Levy
Presenter(s): Anthony Washko and Ghazal Jabbar

According to Our World In Data in the past 30 years there has been an increase in natural disasters. The purpose of this study is to determine how people feel about their preparedness in these events. To conduct our research ten questions were developed and collected 267 responses from individuals across the nation. Our research found that at 1% there is a significant difference between age and having insurance, and also believing that their insurance company cover damages caused by natural disasters. We believe that people's age directly aligns with the functions of preparation that they have. For example, people between the ages 35 to 64, tend to not only have homeowner's insurance, but also understand their plans, but people 18 to 34 and 65 plus, tend not to have insurance and don't understand their plans. Our findings can assist insurance companies in deciding on what age group to target.

Algae Separation Techniques for Bio-Fuel Purposes

Author(s): Tahir Farrukh, Rohan Sharma, Mohammadhassan Kavosi, and Myeongsub Kim
Faculty Mentor(s): Myeongsub Kim
Presenter(s): Tahir Farrukh and Mohammadhassan Kavosi

Biofuel is one of the renewable energy resource alternatives to fossil fuels. Among various sources for biofuels, microalgae provide at least three-orders-of-magnitude higher production rate of biodiesel at a given land area than conventional crop-based methods. However, microalgal biodiesel still suffers from significantly lower harvesting performance, making such a fuel less competitive. To increase the separation performance of microalgae from cultivation solution, we used a spiral microchannel that enables the isolation of biofuel-algae particles from water and contaminants contained in the culturing solution. Multiple parameters of algae behaviors and separation techniques were studied and were manipulated to achieve better performance. We found that changing these factors altered the separation performance by altering the bio-flocculation of microalgae within the microchannels. The important characteristics of the separator geometry, fluid properties, and environmental conditions on algae separation was found and will be further studied in the forthcoming tests.

Lionfish Solutions

Author(s): Alexis Base, Isaiah Philippe, Miguel Cruz Santos, Tahj Laguerre, and Victor Zauder
Faculty Mentor(s): Elan Barenholtz
Presenter(s): Victor Zauder, Alexis Base, Miguel Cruz Santos, Isaiah Philippe, and Tahj Laguerre

The invasive Lionfish has been exponentially growing in population, destroying the marine ecosystem in the southeastern United States. The problem is that capturing Lionfish using standard fishing methods is difficult and often costly. Lionfish Solutions proposes the development of an underwater vehicle that will have the ability to capture Lionfish, which will aid in controlling their population in Florida. In order to accomplish this goal, we have developed a unique machine learning algorithm that enables the robot to identify Lionfish in real time. This will be coupled with an inexpensive computer module that will be able to carry out the motion control of the vehicle underwater. This system will have the ability to capture the Lionfish for the potential application to sell for consumption. We hope that the further development of this underwater system helps protects our ecosystem's native species and control the explosive growth of the Lionfish population.

An Evaluation of Hatching Success Rates of Gopherus Polyphemus at the FAUP

Author(s): Emma Outkomp, Lilian Foley, and Evelyn Frazier
Faculty Mentor(s): Evelyn Frazier
Presenter(s): Emma Outkomp and Lilian Foley

Gopherus polyphemus are a keystone species that have a conservation status of threatened. The gopher tortoise population at the Florida Atlantic University Preserve (FAUP) has failed to produce viable nests according to surveys conducted in 2013 and 2016. This project aims to determine whether FAUP gopher tortoise population has a year-round reproductive season, and if they are reproducing yearly, as suggested by reproductive behaviors caught on camera. In this study, we probed all burrows within the home range of 5 radio transmitted sexually active female tortoises. Once a nest was found, we placed cameras facing towards the nest to monitor the nest for predators and hatchling emergence. Both nests were found unhatched within the 110-day incubation period during the summer season. We must look at the different causes for why the nests are unviable, which could include genetics, nutrition, and environmental factors.

Predator-Prey Swimming Kinematics of Sphyrna mokarran and Carcharhinus Limbatus

Author(s): Alexander Shaw, Abhishek Ratanpara, and Myeongsub Kim
Faculty Mentor(s): Myeongsub Kim
Presenter(s): Alexander Shaw and Abhishek Ratanpara

Excessive anthropogenic CO2 emissions have caused serious international concerns about climate change. Post-combustion CO2 capture methods like amine scrubbing are currently being utilized to reduce CO2 emissions. Freshwater based monoethanolamine (MEA) solutions are the most prominent absorption solvents used for this process. However, these media produce environmentally harmful toxic wastewater and consume large amounts of freshwater. This research analyzes the effectiveness of ocean water-based solvent containing nickel nanoparticles as a catalyst to eliminate the use of freshwater and minimize use of MEA in the CO2 scrubbing process. Using bubble-based microfluidics, CO2 microbubbles were generated. We observed the time rate of changes in their size to determine absorption performance of test solutions. Ocean water-based solvents performed better than deionized (DI) water-based solutions, with up to 98% CO2 absorption observed. We found that nickel nanoparticles were effective in further improving CO2 absorption while reducing the concentration of MEA by up to 50%.

Investigating the Anticancer Effects of Puromycin and Blasticidine Antibiotics on Prostate Cancer Cells

Author(s): Genesis Acosta Laguer, Faika Ambrin, Javoncia Betty, and Magdalah Philemy
Faculty Mentor(s): James Kumi-Diaka and Saheed Oseni
Presenter(s): Genesis Acosta Laguer, Javoncia Betty, Faika Ambrin, and Magdalah Philemy

Studies have suggested that some antibiotics have anti-cancer and pro-cancer effects. In this study, we investigated the effects of two antibiotics, Puromycin and Blasticidin, isolated from Streptomyces alboniger and Streptomyces griseochromogenes, respectively, on prostate cancer (PCa). We hypothesized that both antibiotics can inhibit PCa cell proliferation, metastasis, and induce cell death. PCa cell lines (PC3, DU145, and LNCaP) with different p53-gene statuses were seeded in 96 well-plates and treated with varying concentrations of antibiotics (100ng/ml–100µg/ml) for 24–48hrs. MTT, resazurin-reduction and scratch-migration assays, and fluorescent microscopy were performed to assess the treatment-induced effects on PCa viability, proliferation, metastatic potential, and cell death, respectively. Our results indicate that both antibiotics exhibit dose- and time-dependent effects on PCa growth and metastasis. However, the PC3-PCa cell line was more susceptible to antibiotics compared to others. In conclusion, we have demonstrated that both Puromycin and Blasticidin have therapeutic potential for the treatment of aggressive PCa.

Effects of MT1-MMP in 3D Cancer Models

Author(s): Gary Drotleff, Anna Knapinska, and Gregg B. Fields
Faculty Mentor(s): Gregg Fields and Anna Knapinska
Presenter(s): Gary Drotleff

The cause of cancer cell growth has yet to be fully understood and quantified. It has been shown that membrane type-1 matrix metalloproteinase (MT1-MMP) plays an important role in proliferation of multiple cancer types. This study aims at elucidating the role of MT1-MMP overexpression on three-dimensional cancer growth. To this end, we used a surrogate cancer cell line model that enabled us to visualize and quantify the effects of MT1-MMP on cell growth by overexpressing MT1-MMP and DsRed fluorescent protein. Three-dimensional spheroids were formed, and a type-1 collagen layover was performed to establish an in vivo type environment. Imaging and growth analysis of the spheroids were performed over 10 days. Over this time course, the surrogate spheroids containing overexpressed MT1-MMP displayed a 2-fold increase in area and size when compared to the control group. This novel study represents the first quantified assessment of the impact of MT1-MMP on three-dimensional cancer growth.

Effects of Methamphetamine on the Pro-inflammatory Response in Different Cortical Regions

Author(s): Giselle Shim
Faculty Mentor(s): Rui Tao
Presenter(s): Giselle Shim

Tryptophan (TRP) is an essential amino acid, only obtainable through our diet, that is important for the activation of the immune response pathway. Extracellular tryptophan is transported into the cell and is immediately metabolized into kynurenine. Kynurenine (KYN) is further degraded into kynurenic acid (KA) and quinolinic acid (QA), eventually triggering pro-inflammatory cytokines. Therefore, we measured the levels of TRP, KYN, KA, and QA in the hippocampus and hypothalamus to gauge the activity of the immune pathway. We propose that methamphetamine triggers the activation of the immune response pathway resulting in a decrease of tryptophan levels and an increase in kynurenine levels and its products (KA and QA). Future studies will focus on the effects of methamphetamine on the AHR receptor, a critical component in the production of an anti-inflammatory response whose underlying mechanism is still unknown.

Conscious Awareness is Possible for Direction Discrimination Within a Cortical Scotoma

Author(s): Kaitlin Waite and Tomislav Lukic
Faculty Mentor(s): Howard Hock
Presenter(s): Kaitlin Waite and Tomislav Lukic

Blindsight, a phenomenon due to brain damage to the primary visual cortex (V1), results in a scotoma, a loss of conscious awareness in part of the visual field. This project differs from previous evidence asserting individuals discern motion direction, in the scotoma, at better than chance levels, however at unremarkable accuracy. This project studies an individual (H.S.H) with cortical brain damage who can consciously discriminate motion direction in his scotoma. Blindsight was evaluated using MatLab-controlled experiments, featuring drifting sinusoidal gratings at four different speeds. Two grating intervals, upward and downward, were the basis for forced-choice responses. In contrast with previous studies, results reveal the subject's ability to consciously detect the presence of stimuli and discriminate motion direction with almost perfect accuracy at the fastest speed, with some decline at slower speeds. Such awareness would not be expected in the absence of processing in the cortical area of V1.

Pacific Island Literature: Understanding and Bridging the Genre

Author(s): Ariana Anderson
Faculty Mentor(s): Taylor Hagood
Presenter(s): Ariana Anderson

Pacific literature is an emerging genre that academics are still in the process of defining. Solidifying these identifications, with cultures and histories deeply embedded into the roots of the genre, is seemingly difficult in spaces where the genre can seem unpopular or inaccessible to the majority. That being said, along with identifying the genre comes the importance of tradition, the preservation of various cultures, and the decolonization of various texts and ideas. Unlike most mainstream genres, Pacific Literature holds the responsibility of being apart of the resistance literature genre as well. Overcoming both covert and quiet-censorship and encompassing the ability to transcend into so many facets of literature, Pacific Literature holds a value of ancestry, history, and legacy necessary to be understood by the world.

Body-Focused Repetitive Behavior (BFRB): Sensory Objects For Understanding, Connection and Healing

Author(s): Izabella Hernandez
Faculty Mentor(s): Julie Ward and Amber Tutwiler
Presenter(s): Izabella Hernandez

This research intends to support, How It Feels, a sculptural installation on body-focused repetitive behaviors (BFRB). BFRBs are compulsive behaviors that unintentionally cause physical damage to the body and appearance through body-to-body contact. It is a comorbid disorder that attempts to maintain physical and emotional balance in the body. Its presence may, for some individuals, be a symptom of something unresolved in the individual's life. Although BFRBs are receiving more acknowledgment from researchers, there is still a significant lack of awareness in the general population. Consequently, individuals suffering from BFRB are often undiagnosed, untreated, and lack the understanding needed to promote healing. The artwork aims to encourage a collective understanding of BFRB by providing sensory objects that reflect aspects of what it feels like to have BFRB. These objects can also potentially serve as therapeutic objects outside of a clinical environment to help individuals who struggle with the disorder.

Analysis of Archaeological Remains at Tre Portelle (Mineo, Sicily)

Author(s): Jessica Olivier and Brian McConnell
Faculty Mentor(s): Brian McConnell
Presenter(s): Jessica Olivier

This project focuses on the study of the excavation results at the archaeological site of Tre Portelle. Tre Portelle was first explored by the Superintendency of Catania in advance of the construction of wind turbines. Tre Portelle was once inhabited by the island's indigenous Sikel peoples. This complex existed from the Early Bronze Age (late 3rd - 2nd millennia B.C.). From the excavation journals and examination of recovered pottery fragments, there is no indication of a clear Classical (5th - 4th centuries B.C.) Greek presence. Nevertheless, Greek culture exerted a strong influence over this society in the Archaic period (7th - 6th centuries B.C.). Tre Portelle may have been raided or abandoned after an uprising of the Sikel league, or simply the Sikels may have continued the production of local pottery after the Archaic period. Rich in fragments, it is important to determine the complete scale of the settlements in this dramatic location.

Personal Identity within Mariano Vinuales's Literature: Family, Politics, and Isolation Amidst the Spanish Civil War (1936-1939)

Author(s): Alyssa Payne
Faculty Mentor(s): Carmen Cañete Quesada,
Presenter(s): Alyssa Payne

Mariano Vinuales is one of many Republican exiles of the Spanish Civil War (1936-1939) whose history was temporarily erased by the 1977 Pact of Forgetting, which is only now being recovered thanks to the 2007 Historical Memory Law. Access to his vast collection of essays, poetry, prose, and personal letters demonstrates an interplay of family, politics, and isolation uniquely characteristic to his experiences. This investigation aims to address the importance of Vinuales' contributions while deciphering the complexities of personal identity through analysis of his short story "El Leon y La Libertad" (1950), taking into account historical context, where symbolism and personal identity are key.

POSTER PRESENTATIONS

Flesh You Can Stretch: Properties of Silky shark (Carcharhinus falciformis) Skin

Author(s): Joseph Alexander, Madeleine Hagood, and Marianne Porter.
Faculty Mentor(s): Marianne Porter and Madeleine Hagood
Presenter(s): Joseph Alexander

Shark skin is a composition of dermal denticles and collagen fibers that functions as an exotendon to facilitate swimming dynamics. Mechanical properties of Silky shark (Carcharhinus falciformis) skin not only vary among body region and orientation (hoop/ longitudinal), but also correlate with dermal denticle density and collagen fiber angles. C. falciformis' skin is unique due to the high tensile strain (ability to stretch) compared to other pelagic species. We hypothesize that as dermal denticle density and collagen fiber angles increase, the tensile strain will increase. We dissected skin from 4 silky sharks, photographed specimens under a Leica microscope, and quantified collagen fiber angles and dermal denticle density using ImageJ. Tensile mechanical data was collected using an Instron E1000 and analyzed. Variation in skin properties may affect swimming performance in C. falciformis' pelagic ecological niche. This investigation of material property variation improves our understanding and aids in creating efficient biomaterials.

Zebra Finch Vocal Production: Sex Differences in Superfast Tissue

Author(s): Emily J. Argueta, Angelina Smith, and Rindy Anderson
Faculty Mentor(s): Rindy Anderson
Presenter(s): Emily Argueta

The purpose of this study is to examine the sex differences in syrinx musculature versus other superfast bodily tissue in the zebra finch. This research aims to investigate how structural differences in syringeal tissue can affect song production, and if such differences exist in other superfast tissues. Although both sexes possess a syrinx—the avian vocal organ—and produce a variety of call types, only males produce song. The syrinx, pectoralis and supracoracoideus— primary flight muscles—are superfast muscles due to high contraction frequency. Complete visualization of the pectoralis, supracoracoideus, and syringeal muscles using diffusible iodine-based contrast-enhanced computed tomography (diceCT) imaging will be created. We anticipate differences in tissue composition between males and females in the assessed superfast muscles. This research will contribute to a better understanding of muscle formation and related sexual dimorphism in the zebra finch (Taeniopygia guttata).

Methionine Sulfoxide Reductase (MSR) Deficiency Affects Activity of the Neurotransmitter Serotonin in Drosophila

Author(s): Alexandra Brown, Maria-Fernanda Vinas Chapman, Michael Iacobelli, Ali Hamadeh, Kristina Beluskov, Natasha Harpalani, and David Binninger
Faculty Mentor(s): David Binninger
Presenter(s): Alexandra Brown and Maria-Fernanda Vinas Chapman

Our long-term objective is to understand how oxidative damage to proteins contributes to the aging process and age-related neurodegenerative diseases. Our overarching hypothesis proposes that oxidative damage to methionine residues in critical proteins affects essential processes required for development and contributes to the aging of the organism. Methionine sulfoxide reductase (MSR) is a highly conserved enzyme that repairs oxidized methionine. Our lab has generated the first animal genetic model that is deficient for any MSR activity. These animals exhibit several interesting phenotypes including a shortened lifespan, reduced locomotion in adult flies and a prolonged third instar larval development due to slowed feeding behavior including reduced movement of larval mouth hooks. Interestingly, increased levels of the neurotransmitter serotonin also cause similar phenotypes. We are pursuing the hypothesis that MSR-deficiency leads to increased levels of serotonin, which in turns affects numerous aspects of larval development and the lifespan of the adult fly.

Identification of Novel Drugs Controlling Nematode Parasites

Author(s): Michelle Vela, Linda Do, Vivian Ling, Luis Uribe Campos, and Kailiang Jia
Faculty Mentor(s): Kailiang Jia
Presenter(s): Linda Do and Michelle Vela

Under starvation, C. elegans enter dauer, an arrested developmental stage. When food is available, dauer animals can recover and grow to fertile adults. The infectious larvae of parasitic nematodes invade the host and resume development to adulthood, a process analogous to the recovery of C. elegans dauer larvae. We recently identified a G protein-coupled receptor that functions as a food signal receptor to control the recovery of C. elegans dauer larvae. We performed a blast search and identified orthologs of this GPCR in human hookworm Ancylostoma caninum. We anticipate that chemical inhibitors of this GPCR are candidate drugs to treat parasite diseases caused by Ancylostoma caninum and possibly other human hookworms. We screened a group of chemicals with a similar chemical structure to the ligand of this GPCR and identified a candidate chemical that suppresses the function of this GPCR, which helps develop new therapeutic drugs to control nematode parasites.

Inhibitory Potential of Kallolide H, Kallosin and its Byproduct Towards MCF-7 Breast Cancer Cells

Author(s): Varad Gharat, Paul Scesa, Jay Jebelli, and Lyndon West
Faculty Mentor(s): Lyndon West and Paul Scesa
Presenter(s): Varad Gharat

Current treatment options for cancer are limited to costly methods like chemotherapy and surgery rendering them inaccessible to many patients. The lack of alternatives has led to an increase in research conducted by natural product chemists, who assess the drug viability of compounds that have shown therapeutic potential. Findings show that marine products Caucanolides A and B, inhibit the replication of MCF-7 breast cancer cells, when administered for forty-eight hours. We expanded upon this notion by synthesizing a marine natural product known as Kallosin and its byproduct. We hypothesized that they would display inhibitory effects, similar to their caucanolide counterparts. A Resazurin Assay was used to depict a visible color change once replication had been inhibited. The results depict inhibitory potential for the products and not only provide credence to the research regarding natural products' therapeutic potential, but also provide preliminary data to construct a pharmaceutical drug.

Investigating the Chemosensory Deficits Associated with Alzheimer's Disease in Drosophila melanogaster

Author(s): Samuel McFarlane
Faculty Mentor(s): Alex Keene
Presenter(s): Samuel McFarlane

Alzheimer's Disease (AD) is a neurodegenerative disorder that causes symptoms such as gradual loss of cognitive function, learning and memory deficits, and navigational deficiencies. Among these symptoms, chemosensory deficits are well-documented in medical cases, however not well-studied. This project investigates the chemosensory deficits, particularly taste, associated with Alzheimer's Disease, using Drosophila melanogaster (fruit fly) as a model organism. This experiment seeks to answer if the taste perception of the flies would be altered by the induction of AD conditions, and if that effect is age-related. In this experiment, the flies were tested by applying appetitive tastants at different ages to see the differences in taste perception between the control and experimental (AD-induced) groups. Results from this project will provide insight on the taste deficiencies associated with AD using the fruit fly.

The Role of Autophagy in Controlling Expression and Secretion of Insulin Peptides

Author(s): Charles Shi, Cecilia Nicholas, and Kailiang Jia
Faculty Mentor(s): Kailiang Jia
Presenter(s): Charles Shi

The highly conserved insulin growth factor (IGF) pathway regulates development and aging in eukaryotic multicellular organisms, including the nematode *C. elegans*. Mutants with reduced IGF signaling have increased levels of autophagy, a cellular lysosomal degradation pathway. By using real-time PCR, our lab has established that intestinal autophagy regulates expression levels of six insulin-like peptides (ILPs) in IGF mutants. Of these ILPs is the homologue of human insulin, INS-1. Importantly, restoration of autophagy in the intestine rescues ins-1 expression back to IGF mutant levels. To determine the expression and secretion of INS-1 in IGF mutants with and without intestinal autophagy, we expressed INS-1 tagged with a green fluorescence protein (GFP) in ASI chemosensory neurons and are examining its expression and secretion in IGF and autophagy mutants. The results from this study will help to understand the role of autophagy in neuroendocrine regulation of *C. elegans* lifespan by the IGF signaling pathway.

Identifiability Analysis of the Human H1N1 Influenza Virus

Author(s): Vivek Sreejithkumar and Necibe Tuncer
Faculty Mentor(s): Necibe Tuncer
Presenter(s): Vivek Sreejithkumar

The objective of this research is to determine the epidemiologically important parameters such as rate of infection and recovery of the H1N1 influenza virus during last year's season according to data from the Center for Disease Control (CDC). Publicly available influenza incidences data from the CDC webpage, excluding personal information, was used to validate our mathematical model. The research is based on a system of an ordinary differential equations, called the Kermack-McKendrick model, to simulate the influenza virus spread in a population. After developing the preliminary model that matches the CDC data, the model was run on the computer software (MATLAB) to compare the predictions of the model to the CDC data to analyze the model's accuracy, manipulating the parameters in the equation as necessary for the model predictions to match the data. Afterwards, the values of the equation's parameters were estimated to most precisely match the CDC data.

Symmetry is All Around Us and We Shall Tell You How Viruses Can Be Potentially Fought with Symmetry and Math Group Theory

Author(s): Julia Seay, Emma Thomas, Andrew Tirado, and Pavel Zabela
Faculty Mentor(s): Daniela Nikolova and Julia Seay
Presenter(s): Pavel Zabela, Andrew Tirado, and Emma Thomas

Symmetry is all around us - "of fundamental significance to the way we interpret the world" (Marcus du Sautoy). Group theory is a branch of mathematics that answers the question: "What is symmetry?" We shall give examples of objects and patterns that exhibit symmetry.
We shall analyze them and classify them.
Our explorations lead us to other practical examples of symmetry, including ones as diverse as honeycombs, molecular crystals, tiling, viruses, DNA nanostructures, music, and dancing. We shall tell you about different virus models, quasi-symmetric modeling, virus imaging methods and how applying all that in virology it is possible to fight viruses with symmetry.

Research on Dear Enemy Effect in Northern Cardinals

Author(s): Adriana Gonzales, Maria Zamudio, and Korbin Reynolds
Faculty Mentor(s): Rindy Anderson
Presenter(s): Maria Zamudio, Adriana Gonzales, and Korbin Reynolds

The Dear Enemy Effect refers to reduced aggression between neighboring territorial animals once territorial boundaries have been established. This phenomenon is hypothesized to be an adaptive strategy to save time and to minimize potential danger by reducing aggressive social interactions. We aim to test for the Dear Enemy Effect in a local population of the Northern cardinal by testing the prediction that territorial males will show a stronger response when confronted by a territorial intrusion by an unknown male compared to an intrusion by an adjacent neighbor. Our study consists of three aims: we will map the territories of all males in Tree Tops Park, record the songs of each male and complete a song playback experiment to 15 territorial males to test for the Dear Enemy Effect in this species. The results of our study will establish information about this local population of the Northern cardinal about social behavior.

Social Media’s Impact on Social Connectedness Among Veterans

Author(s): Cheryl Krause-Parello and Katalin Bieniek
Faculty Mentor(s): Cheryl Krause-Parello
Presenter(s): Katalin Bieniek

The purpose of this project is to assess how different Facebook postings from Canines Providing Assistance for Wounded Warriors (C-P.A.W.W.) relate to social connectedness (SC) for the veteran community over a 13-week period. The incidence of post-traumatic stress disorder (PTSD) within veterans is higher than the general population. Heightened SC increases help-seeking behaviors for PTSD symptoms. SC was measured through counting total reactions to C-P.A.W.W. posts, which were posted consistently from June 1st-August 31st, 2019. Posts were divided into two categories and analyzed using a one sample t-test. Results revealed there was a greater amount of interactions for veteran-related posts than general posts with total community member count of n=920. The project suggests the veteran community is more likely to react to items they share something in common with. This can help C-P.A.W.W., and other non-profits, create posts that better target their audience, potentially improve mental health, and enhance SC.

Gender Differences in Feelings Associated with Wartime Violence

Author(s): Victoria Falcone and Patricia Liehr
Faculty Mentor(s): Patricia Liehr
Presenter(s): Victoria Falcone

Exposure to violence in media has had a significant effect on the mental health of adolescents. However, there is limited data exploring how each gender reacts towards violence. The purpose of this study was to investigate how adolescent boys and girls differ in their description of feelings associated with out-loud read about wartime violence and bombing. Fiftynine high school students participated in readings of With Their Voices Raised and wrote reflections describing their feelings towards the readings. The results, analyzed in a deductive fashion, conveyed that boys’ expressed gratitude towards being able to read the survivors first-person accounts, while girls’ conveyed appreciation towards the learning opportunity that the play presented to them regarding how the survivors dealt with the destruction that was generated from the bombings.

Social Media: What Does the Future Hold and How are we Using it?

Author(s): Kira Xana-Kai Nash
Faculty Mentor(s): Monica Escaleras and Eric Levy
Presenter(s): Kira Nash

Social Media is not only influencing how businesses conduct their marketing strategies but is also changing consumer behavior. The purpose of this research is to investigate how people are using social media in their daily lives and where that attention will be in the future. Insights such as which social media platform do people most use; and additionally, examining if people spend more time on Instagram, Facebook, and Snapchat comparing from a year ago. Therefore, I designed a 12 question survey and collected 267 responses across the United States. My results find that there is a statistically significant difference between gender and their most used social media platform. In addition, there is a statistically significant difference between the social media platform they use the most compared to a year ago and if males and females think social media will be an integral part of their lives ten years from now.

Who Did It? Emotional Valence, Learning, and Memory

Author(s): Andrew Ly, Alyssa Payne, Omar Avila, Jason Baluja, Paula Baniotaite, Ewa Barnas-Lionarons, Abigail Chavez, Alexia Cree-Newman, Jack Elm, Hannah Miller, Melanie Sanders, Kalani Stanton, Camden Weist, Claudia Villasimil, Laurie Yurchuck, and Julie Earles
Faculty Mentor(s): Julie Earles
Presenter(s): Alyssa Payne and Andrew Ly

Research in learning and memory seeks to provide insight into how to better remember events in our lives and to assess how accurate these memories are. Typically, information with emotion attached to it, from pleasant or attractive (positive valence) to unpleasant or adverse (negative valence), is remembered better than information without emotional valence. One factor that has not been explored in-depth is how music affects learning. We hypothesized that people, while still following the trend of higher accuracy with negative valence memories, might be impacted by the presence of arousing or calming music. Participants listened to various types of music before being asked to remember 60 clips of different actions. Their memory of the actions and corresponding actors was tested one week later. This study contributes to the literature on the relationship between memory binding and emotional valence and provides further insight into the effects of music on memory.

Investigation of Valuables Left in Vehicles on FAU’s Boca Raton Campus

Author(s): Eva Reyblat, Gaby Childers, Kaitlyn Lui, and Aman Shaan
Faculty Mentor(s): Amy Tift
Presenter(s): Eva Reyblat, Gabriella Childers, Kaitlyn Lui, and Aman Shaan

Automobile burglaries are increasingly common on college campuses, including the FAU Boca campus (FAU PD, 2019). Researchers predicted students would leave more valuables in their vehicles than faculty members, and that the types of valuables would vary depending on lot and vehicle owner. Two hundred and six faculty vehicles and 488 student vehicles were observed, and the valuables inside the visible in the vehicle were recorded. Results indicated that 46% of student-owned vehicles had visible valuables (52% of faculty vehicles). Lot 2, a faculty lot, had the highest ratio of valuables (62%), whereas Lot 35, a student resident lot, had the lowest ratio (28.9%). The faculty parking lots had a higher percentage of valuables, most commonly bags and sunglasses. Observations were limited because we could not see obstructed valuables. Awareness of campus safety relating to valuables in vehicles could help the FAU campus become a safer place for everyone.

The Effects of Implementing Visual Supports when Teaching Functional Sight Words to Students with Intellectual Disabilities

Author(s): Tamaria Smith
Faculty Mentor(s): Lisa Finnegan
Presenter(s): Tamaria Smith

The use of visuals aids while teaching sight-words to students who are already able to decode has proved beneficial in previous studies. Unfortunately, this area has not been explored as much regarding students with intellectual disabilities who are unable to decode. This study looks to examine the effectiveness of utilizing visual aids while teaching functional sight words to students who have not yet mastered decoding. For this study, effectiveness is measured by comparing the amount of functional sight words learned in a learning sequence with visual supports to one without visual supports. A group of six high school students identified with intellectual disabilities, ranging in age from 14- 16, completed two learning sequences using five functional, community based, words in each sequence. The preliminary findings show a strong directly proportional relationship between increasing the number of visuals used during instruction of the learning to the number of words learned by sight.

Gamification in the Classroom: A Help or Hindrance to Student Reading Comprehension?

Author(s): Jacqueline Stark and Kelly Thomas
Faculty Mentor(s): Lisa Finnegan
Presenter(s): Jacqueline Stark and Kelly Thomas

The 21st century has teachers battling more outside influences than ever before to earn and keep students' attention. Unfortunately, attention alone is not enough to increase the average student's reading comprehension. Engagement and buy-in to the lesson are critical components. Programs such as Kahoot!, Quizzex, Quizlet, and Gimkit offer students an opportunity to compete and work together on any given topic. These platforms are customizable by the teacher and can be interactive both in a live activity or a challenge for the students to work on at a later time. While classrooms buzz and whirl with cheers and excitement when these programs appear on the whiteboard, there is still a question as to how much gamification in the classroom really improves students' skills. In this study, we attempt to reveal the positive benefits and improved engagement in regards to reading comprehension in high school students.

Evidence-Based Reading Strategies and Culturally Relevant Reading Material Paired to Improve Reading Comprehension Among Minority English Language Learners in Secondary Education Settings

Author(s): Kelly Thomas
Faculty Mentor(s): Lisa Finnegan and Sharon Darling
Presenter(s): Kelly Thomas

Culturally relevant reading materials, while still a young concept, has provided positive results for increasing reading comprehension among minority students within limited studies. In more established work, advanced research has been conducted on reading strategies for English Language Learners (ELLs) bringing forth a number of evidence-based practices (EBP). While these are two separate categories of diverse learners and it can not be assumed that every ELL is of a minority or vice versa, there is a large population of students that do fit into both categories. To best service these students, this review of literature aims to explore the research question: which evidence-based reading strategies pair with culturally relevant reading materials to yield increased reading comprehension, as measured through standardized testing scores, for minority English Language Learners in a secondary education setting?

What Determines Support for Israel Among Generations in America?

Author(s): Luke Turner
Faculty Mentor(s): Jeffrey Morton
Presenter(s): Luke Turner

Previous scholarship argues various factors such as political predispositions, religion, foreign aid, and education as contributors to categorical attitudes of American's toward Israel. In this research, I test prior claims analyzing if age groups are the significant variable determining support for Israel. This is not intended to discredit past studies but instead, argues age is the primary factor. In this project, I identify and compare age groups, education, foreign aid, political ideology, and religion using Ordinary Least Squares (OLS) regression as a primary statistical tool of analysis. For this purpose, I assemble a dataset acquired from assorted studies to find what determines support for Israel. Upon analyzing demographics in general population surveys that focus on what individuals in America of feelings are towards Israel, I find that of all the factors, age groups are the most significant variable in explaining the determinant on support for Israel.

A New Study of the Ceramics from the Belle Glade Site

Author(s): Macarena Vargas
Faculty Mentor(s): Clifford Brown
Presenter(s): Macarena Vargas

The Belle Glade site (8PB41) lies in what was the Everglades, southeast of Lake Okeechobee. It consists of a habitation mound and a burial mound, as well as related deposits nearby. The habitation mound was excavated in 1933-1936 by M. W. Stirling. The excavations produced more than 1,350 sherds of ceramics. Willey created a classification for the pottery, defining and describing several new taxa, as well as identifying several previously defined types. The purpose of this study is to create a better, more detailed, and more precise description of the ceramic typology for the Belle Glade archaeological culture by analyzing a previously unstudied collection from the type-site for the culture, the Belle Glade site in Palm Beach County. The results from the study will provide an updated description of the typology Willey first defined and, in addition, will yield at least one new radiocarbon date for the Belle Glades culture.

Predicting Driver Expertise from Eye Fixations

Author(s): Deborah Beuttenmuller
Faculty Mentor(s): Elan Barenholtz and Amy Tift
Presenter(s): Deborah Beuttenmuller

This study aims to develop algorithms that can automatically determine people's level of driving expertise from their eye movement patterns as they engage in real-world driving. This study will further enhance our knowledge of the relationship between neural networks and intricate time series data while contributing significantly to our understanding of the complex behavior involved in driving. We will collect eye-movement data from both novice and experienced drivers as they navigate an on-campus course while wearing a head-mounted eye-tracking device (designed as a pair of lightweight glasses). We will then use these data to train a machine-learning algorithm to determine the level of expertise based on eye movements alone.

Aggression is Induced by Limited Food Availability in the Monarch Caterpillar

Author(s): Joseph Collie, Odelvys Granela, Elizabeth Brown, and Alex Keene
Faculty Mentor(s): Alex Keene
Presenter(s): Joseph Collie

Food represents a limiting resource for the growth and developmental progression of many animal species. As a consequence, competition over food can trigger territoriality and aggressive behavior. Throughout their early development, insect larvae eat voraciously, and limited food availability can potentially impact their viability through metamorphosis. In the Monarch butterfly, *Danaus plexippus*, caterpillars feed predominantly on milkweed, suggesting that access milkweed is critical for growth and survival. We characterize the role of food availability on aggression. We find that monarch caterpillars display stereotyped aggressive lunges that increase during development peaking during the 4th and 5th instar stages, immediately prior to pupariation. To determine the relationship between food availability and the initiation of aggressive behavior, we provided groups of caterpillars differing amounts of food availability and measured aggressive behavior. The number of lunges toward conspecific larvae was significantly increased under conditions of low food availability, suggestion resource defense may trigger aggression.

The Influence of Musical Experience through Visual Stimulus Evaluation using an EEG Visual Oddball Paradigm

Author(s): Michely de Oliveira, Ronit Golan, Merike Lang, Emily Ahne, and Monica Rosselli
Faculty Mentor(s): Monica Rosselli
Presenter(s): Michely de Oliveira and Ronit Golan

Musicians and non-musicians will be examined to evaluate differences in amplitudes and latencies of the P300 event-related potential (ERP) component using a visual oddball task. Factors of commitment to music and reactive musical behavior, as measured by the Brief Music Experience Questionnaire (BMEQ) will be correlated to ERP measures. Sixty participants will be tested: 30 musicians and 30 non-musicians. The visual oddball task and the Brief MEQ will be administered. It is predicted that musicians will have shorter reaction times compared to non-musicians during the visual oddball task, and musicians will have shorter latencies and larger amplitudes of the P300 ERP component in response to deviant stimuli, with shorter reaction times and P300 latencies associated with subcomponents of commitment to music and reactive musical behavior. Findings of this study will identify possible enhancements in cognitive function through stimulus devaluation and identification due to musical training.

Infant’s Processing of Positive and Negative Emotions

Author(s): Daniella Hernandez, Jacqueline Stotler, and Teresa Wilcox
Faculty Mentor(s): Teresa Wilcox
Presenter(s): Daniella Hernandez

Infant's ability to interpret social-communication cues is critical to early behavioral development. Research suggests there may be age-related changes in infant's attention to positive (e.g., happy, neutral) as opposed to negative (e.g., angry, fearful, sad) facial expressions, with younger infants exhibiting a negativity-bias and older infants exhibiting a positivity-bias. The present study examined whether infants shift from holding a negativity-bias to positivity-bias when processing emotional facial expressions as they age. Infants aged 5-to-9- and 11-to-14- months were shown static images of upright and inverted faces displaying one of the following emotions: neutral, happy, angry, fearful, or sad. A trending interaction between valence (positive/negative) and age group ($p=0.082$) indicated older babies look longer to negative faces compared to positive faces on average (Positive $M=0.652$, Negative $M= 0.722$), while younger babies look about equally between both (Positive $M=0.682$, Negative $M=0.690$).

The Racial Bias that the Media Portrays in Professional Sports

Author(s): Kirsten Hobson
Faculty Mentor(s): Gina Carreno-Lukasik and Lara Preacco
Presenter(s): Kirsten Hobson

Society has embraced the ideology of ethnocentrism which states that people tend to assume that their own culture and way of life is better than others. They believe that their culture is the norm and displays xenophobia towards other cultures. Xenophobia expresses someone's prejudice towards people from other cultures/countries. Every day, the media displays these traits when reporting on professional sports. Practices such as cultural relativism, the ideology of looking at another's behavior through the eyes of their culture, and cultural similarity, the common practices and beliefs that all cultures/societies have created, exposes the media's racial bias towards certain groups of people

The Effect of Distractor Strength of Bilinguals and Monolinguals on Attentional Processing

Author(s): Manal Imran, Dayna Roth, Joshua Conniff, and Summer Sheremata
Faculty Mentor(s): Summer Sheremata
Presenter(s): Manal Imran and Dayna Roth

Bilinguals demonstrate increased cognitive control due to the need to switch between languages. However, enhanced inhibition can negatively impact performance in the attentional blink paradigm. In this task, two numerical targets (i.e. 2,9) are presented in a stream of letters. When the two targets are presented close in time, detection of the first target reduces the possibility of the second target being detected. Previous studies have demonstrated that the presence of an irrelevant stimulus increases the probability of correctly reporting the second target. However, it is unknown whether distraction reduces the attentional blink similarly in bilingual and monolingual participants. We will investigate this by asking participants to perform an attentional blink task surrounded by an irrelevant motion stimulus with different levels of direction. The results of this study will be important for understanding how bilingual individuals ignore distractions.

The Effects of Maternal Depression and the Implications on Attachment Styles of Mother-Infant Dyads

Author(s): Nancy Jones and Angela Bernardo
Faculty Mentor(s): Nancy Jones
Presenter(s): Alexandra Lyster

This project is based on a longitudinal study which investigates the physiological, emotional, and behavioral patterns of infants' as they experience the loss of maternal attention. Mother-infant dyads were examined at 6-9 months and again at 12 months of age. The focus is to examine the relationship between maternal depression and attachment styles after observing, coding, and analyzing the infants' behavior. The infants' behavior was observed through conducting social and non-social rival attention conditions, the Strange Situation Paradigm, and a maternal separation and reunion task. Future analysis will be conducted to determine if maternal depression is associated with a secure or insecure attachment style among the mother-infant dyads. The results are predicted to show a relationship between an insecure attachment style and maternal depression. In addition, I expect that infants will display more jealousy-related emotions in the social condition compared to the non-social rival condition.

Neurohormonal Influence on the Mother- Infant Relationship: A Study of Oxytocin, Cortisol, Maternal Attachment, Postpartum Depression, and Breastfeeding Efficacy

Author(s): Jessica Martin and Nancy Jones
Faculty Mentor(s): Nancy Jones
Presenter(s): Jessica Martin

The current study examined the effects of neurohormones (oxytocin and cortisol) on the mother-infant relationship, specifically in terms of attachment. Additionally, the role of oxytocin in both postpartum depression symptoms and breastfeeding efficacy were analyzed. Thirty-two mother infant dyads participated in the current study. Questionnaires to assess maternal perceptions of pre/post attachment and urinary oxytocin (mother and infant)/ salivary cortisol (infant) samples were collected during and after three visits: prenatal, newborn, and 3-month over the course of a four to five-month period. Results indicated that there were significant correlations between oxytocin levels in mothers and infants and showed that while oxytocin is not associated with maternal attachment, cortisol is. Paradoxically, the results revealed that oxytocin levels in mothers are positively related to postpartum depression symptoms, but not to breastfeeding efficacy. Further research is needed to confirm the interaction of these neurohormones, and how genetic variation/ environmental factors come into play.

Capture Affects Territorial Behavior in a Songbird

Author(s): Laura Roldan, Christian Hunt, Nicole Nalty, Joe Niederhauser, and Rindy Anderson
Faculty Mentor(s): Rindy Anderson
Presenter(s): Laura Roldan, Christian Hunt, and Nicole Nalty

Many studies of bird behavior involve capturing and banding birds for identification. A variety of studies suggest that capture procedures cause stress. We asked whether capture affected subsequent territorial behavior in male Bachman sparrows. For each male in the study, a simulated intrusion by a rival male (an "STI") was conducted. Afterwards, the subjects were divided into two groups: half the males were captured and banded, and the other half received a "mock capture" where capture procedures were performed, but the bird was not captured. Additional STI trials were performed 7 days (STI2) and 21 days (STI3) after the capture or mock capture was performed. While all birds were less aggressive during STI2, captured birds remained less aggressive than mock-captured birds in STI3. Our data suggest that capturing and handling small songbirds can have lasting impacts on behavior, such as aggressiveness and territorial defense.

Dark Triad influences on Goal Pursuit in Relationships

Author(s): Vanessa Szabolcsi
Faculty Mentor(s): Michael Maniaci
Presenter(s): Vanessa Szabolcsi

The Dark Triad involves a collection of subclinical socially aversive traits: machiavellianism, psychopathy, and narcissism. We can differentiate these subclinical traits from their clinical counterparts by the former merely involving the presence of particular socially aversive personality attributes that fall within the normal range. These traits play a role in how individuals perceive the world and behave interpersonally. Transactive Goal Dynamics Theory defines goal setting, goal pursuit, and goal success as involving active human interaction embedded in relationships. The current research examines the influence of Dark Triad personality traits on interpersonal relationships and goal pursuit within those relationships. For instance, participants higher in narcissism perceived more conflict between their goals and a close relationship partner's goals. Viewed through the lens of Transactive Goal Dynamics Theory, our results indicate that Dark Triad personality traits may influence how people pursue and evaluate their goals in the context of close relationships.

Vertical Take-Off and Landing Drone with Rotary and Fixed Wing Flight Capabilities

Author(s): John Praleston and Reinaldo Dos Santos
Faculty Mentor(s): Oren Masory
Presenter(s): Reinaldo Dos Santos and John Praleston

Electric Vertical Take-Off and Landing (eVTOL) drones promise the possibility of becoming the industry standard when they are shown to be a reliable option for fast, and safe payload delivery. Currently, the limitations hindering the progression of developing a cohort of drones for autonomous package delivery are the flight time, flight range, and flight speed of each individual drone. The current drones initially proposed to carry out such tasks are - rotary drones, similar to a small helicopter, and fixed wing aircraft such as what the military uses for reconnaissance. Both designs have inherent limitations that are not amenable to the desired application. We have developed a hybrid design with vertical take-off and fixed wing flight capabilities. Our design has been developed around the possibility of autonomous flight and image recognition. Drones of this type hold implications for search and rescue, and delivery applications.

Magnetic Field Effects on the Propulsion Force of Compact Remotely Operated Vehicles

Author(s): Laura Eugene, Sorahya Eugene, and Anisa Sookhoo
Faculty Mentor(s): Allan Phipps
Presenter(s): Laura Eugene, Sorahya Eugene, and Anisa Sookhoo

Remotely operated underwater vehicles are increasingly being integrated into search and rescue attempts, these vehicles can be used in place of or in conjunction with divers. In some cases, these vehicles can complete operations faster than divers. The purpose study is to apply the force of the non-power induced permanent magnet to improve propeller efficiency. Although research has been conducted to identify the functions of permanent magnets in relation to underwater vehicles, little research has been done on the direct influence permanent magnets have upon the actual propulsion force in smaller underwater crafts. Using static and dynamic testing we aim to determine the effect permanent magnets have on propeller forces. This study will determine which magnetic field intensity in high torque permanent magnets most facilitate the agility of remotely operated underwater vehicles. The findings of this study contribute to the knowledge of making small remotely operated underwater vehicles more efficient.

Self-Anchoring Autonomous Surface Vessel

Author(s): Robert James, Marco Leo, Martine Montgomery, Yun Ni, Eli Shoshan, and Joshua Tashbar
Faculty Mentor(s): Pierre-Philippe Beaujean
Presenter(s): Martine Montgomery and Yun Ni

Autonomous Surface Vessels (ASVs) often perform operations away from any dock where it's necessary to maintain position for a certain amount of time. This project assesses the feasibility of a Self-Anchoring ASV that would provide a low energy alternative to current station keeping strategies. Six senior Ocean Engineering students have designed, fabricated, and tested an ASV capable of traveling to pre-assigned GPS coordinates, deploying an anchor, monitoring its position for a fixed amount of time, and retrieving the anchor. Potential applications of this technology involve scientific missions, such as a long term autonomous environmental monitoring drone, and defense industry operations.

Here Comes the Sun: Aerodynamic Optimization of a Solar Cruiser Race Car

Author(s): Thi-han Nge
Faculty Mentor(s): Allan Phipps
Presenter(s): Thi-han Nge, Crystal Lopes, and Rosario Firmino Palazzolo

This project is a practical evaluation of and data-driven reduction in the coefficient of drag (Cd) of a four-seater solar-powered vehicle. This reduction in Cd enables solar cars to traverse a greater distance given the same amount of power compared to aerodynamically unoptimized cars. Specifically, the project investigates the supposed benefits of including a central tunnel and/or placing the windshield immediately at the front of the vehicle. Solar car competition regulations were considered as a rule-compliant solar car model was engineered using CAD (Computer-Aided Design) software. After creating the necessary variations, the designs were analyzed using Computational Fluid Dynamics (CFD) simulation to test in a relevant Reynolds number (Re) domain. Practical aerodynamic wind tunnel tests were then conducted on 3D printed scale-models of the designs to validate the CFD findings.

Microfluidic Determination of Fe in Marine Systems by Ferrozine Method

Author(s): Lisa Nguyen, Jordon Beckler, and Sarah Du
Faculty Mentor(s): Jordon Beckler and Sarah Du
Presenter(s): Lisa Nguyen

The bio-limiting micronutrient iron is a water-soluble trace metal that plays a role in biogeochemical processes in marine systems such as primary production and harmful algal growth. Fe is present in active sites of photochemical molecules in phytoplankton and may also promote the sequestering of the greenhouse gas carbon dioxide. Excessive concentrations of Fe in water may promote the growth of harmful algae, compromising ecological and human health. Widespread monitoring of Fe concentrations in oceanic and estuarine settings is necessary for understanding the effects of climate change and anthropogenic influences on marine systems. This study proposes to develop a small cost-efficient microfluidic device to measure Fe by deriving a ferrozine colored complex that can be measured spectrophotometrically. This device will have advantages over existing techniques; primarily, the minimalization of costs and effort for construction, transport, and installation on oceanographic platforms.

Microfluidics Approach for Microalgae Growth Optimization

Author(s): Mirabel Pham, Carlos Garriga-Dominguez, Mohammadhassan Kavosi, and Myeongsub Kim
Faculty Mentor(s): Myeongsub Kim
Presenter(s): Mirabel Pham and Carlos Garriga-Dominguez

Microalgae-based biofuel is an excellent renewable energy resource alternative to fossil fuels. To cultivate microalgae, conventional photobioreactors use bulk CO2 plumes as food for algae that have a low surface-to-volume ratio limiting the growth rate. The goal of this research is to test the effectiveness of CO2 microbubbles for the enhanced growth rate of algae contributing to the increased production rate of biofuel. The cultivation process of microalgae surrounded by carbon dioxide microbubbles will be implemented in a controlled environment and visualized by bubble-based microfluidics combined with high-speed imaging. This research is divided into two phases: phase one will be generating bubbles in a reservoir to obtain a desirable setting to grow microalgae, and the second phase will be involved with testing the growth rate in the controlled environment. Increasing the cultivation rate of microalgae will bring a significant increase in the large-scale production of biodiesel.

Huff-and-Puff on a Chip: Enhanced CO2 Dissolution in Heavy Oil

Author(s): David Navarrete, Michael Romero, Mazen Hafez, and Myeongsub Kim
Faculty Mentor(s): Myeongsub Kim
Presenter(s): Michael Romero and David Navarrete

The high consumption of fossil fuel resources has been escalated over the last century. Among fossil fuels, unconventional heavy oil reserves are 70% of total oil deposits. One of the biggest challenges of heavy oil recovery is the low extraction efficiency of 20~40% due to its ultra-viscous nature. A technique called huff-and-puff has excellent potential to help improve the production of oil while reducing oil's viscosity by gas injection. This research aims to test this innovative huff-and-puff technique in the laboratory and find the optimal conditions that reduce oil viscosity most. Using bubble-based microfluidics, the viscosity reduction of heavy oils will be tested through high-speed visualization of size changes of CO2 microbubbles in oil flow. An accelerated viscosity reduction by the huff-and-puff technique may open the door for the oil and gas industry to better implement this methodology for enhanced oil recovery.

Solar Owls: An Analytical Breakdown of Solar Car Suspension Systems

Author(s): Luke Schuknecht, Maria Castro-Videla, and Matthew Alberto
Faculty Mentor(s): Allan Phipps
Presenter(s): Luke Schuknecht, Maria Castro-Videla, and Matthew Alberto

In this experiment we will test, design and research different types of suspension. We will research what type of suspension is the most optimal for a four seater solar car with an estimate weight of 1400 to 1500 pounds. Once this is done, we will develop our own suspension system on Fusion 360, a CAD software. Fusion 360 has innate stress testing that will allow us to test the functionality of our custom created suspension system. The test results will provide us with necessary information to improve our design. Fusion 360 also has a shape optimization feature that shows a user the excess material of a part. Utilizing both these features, we will test and improve the design of our suspension system.

Visualization of Particle Settling During Shale Gas Operations

Author(s): Chas Taylor, Jared Mcfadden, Mazen Hafez, and Myeongsub Kim
Faculty Mentor(s): Myeongsub Kim
Presenter(s): Chas Taylor and Jared Mcfadden

Hydraulic fracturing is one of the most widely used shale gas extraction processes throughout the world. In the United States, hydraulic fracturing produces approximately 67% of the natural gas. The process involves initiating cracks and subsequently transporting particles into the cracks in geological formations to prevent them from closing. Gravitational settling of particles is a topic of interest due to its effects on the formation's permeability and, therefore, gas recovery efficiency. Our research aims to investigate the impact of fluid rheology, wall surface, particle size, particle density, and particle-particle interaction on particle settling. To successfully model the particle settling process, we will create a setup called a Hele-Shaw cell in the laboratory and test with high-speed imaging. By understanding the fundamental mechanisms responsible for particle settling, new operation strategies can be implemented to achieve enhanced fracture permeability and higher extraction efficiency.

Humannequin: Medical Training Mannequin

Author(s): George Alvarenga, Johan Arrieta, Jacob Kupiec, and Berman Thomas
Faculty Mentor(s): Amir Abtahi
Presenter(s): Berman Thomas, George Alvarenga, Johan Arrieta, and Jacob Kupiec

Humannequin is a medical training mannequin prototype that will allow students of the Charles E. Schmidt College of Medicine to hone their skills at Florida Atlantic University's Clinical Skills Simulation Center. The final design is composed of four subsystems working in unison to offer comprehensive medical simulations with emphasis on trainee immersion and patient realism. Trainees are able to hear cardiac and pulmonary bioacoustic sounds through use of a Bluetooth headset and temporary modifications to their personal stethoscopes. Further auscultation can be performed through the patients back as a lift assist system composed of linear actuators allowing transition from a supine to sitting position. Depending on the severity of the patient's condition, tactile palpation can be performed at the wrist and neck as well as guided administration of cardiopulmonary resuscitation to save the patient's life. Humannequin's goal is to provide an ubiquitous solution to medical simulation through its competitive cost.

Citrus Greening Disease Detection in South Florida via a Novel Combination of Detection Methods

Author(s): Mohamed Abutineh, Nicholas Pizzo, Nicholas Nifakos, and Xing-Hai Zhang
Faculty Mentor(s): Xing-Hai Zhang and Tricia Meredith
Presenter(s): Mohamed Abutineh and Nicholas Pizzo

Citrus greening disease or Huanglongbing (HLB) is a bacterial infection spread by the Asian Citrus Psyllid, characterized by the bacterium *Candidatus Liberibacter asiaticus* (CLas); research on this disease has broad applications in Florida. The goal of this research was to examine the presence of CLas within the phloem of citrus infected with HLB. Sweet orange and Persian lime were the focus species of this research. Real-time qPCR was employed to quantify the relative abundance of CLas DNA in the leaf tissue, suggesting presence of the infection. Then, scanning electron microscopy (SEM) was used to qualitatively describe results indicated by qPCR using images. SEM allowed for direct visualization of bacteria in phloem tissue. Following qPCR, we found low relative gene expression for CLas gene markers, but images from SEM suggested evident bacteria in phloem tissue. This data will be used to develop a cost-effective, phloem-specific therapeutic agent to treat HLB.

Facial Recognition Using Machine Learning on Images of Cercopithecus Monkeys

Author(s): Connor Cane
Faculty Mentor(s): Kate Detwiler
Presenter(s): Connor Cane

This project was designed to develop facial recognition software that could be used to identify individual *Cercopithecus* monkeys in Gombe National Park in Tanzania, East Africa. The purpose was to ensure that data and samples of current and future research projects are attributed to the correct individuals. This was accomplished by utilizing a combination of machine learning, object detection, and image classification. Using 16,226 images of 62 different identified individuals, a YOLO v3 object detection system to detect the face of a monkey was combined with a custom trained fast.ai resnet 50 learning model. The sequence of these two algorithms resulted in a machine learning model that is 99.44 percent accurate at detecting and identifying individual monkeys from this population.

Incubation Conditions Related to Normal, Kyphotic and Lordotic Carapace Form in Green Turtles

Author(s): Lindsey Garcia and Jeanette Wyneken
Faculty Mentor(s): Jeanette Wyneken
Presenter(s): Lindsey Garcia

It is well-established that incubation temperatures play critical roles in sea turtle development, which ranges from defining incubation duration to sex determination. Extreme temperatures have negative impacts on development when they exceed thermal thresholds. In neonate green turtles (*Chelonia mydas*), spinal deformities may occur; lordosis (swayback) and kyphosis (hunchback) alter the carapace. Causes of these deformities are unknown, and hypotheses about the source range from nutritional, parental, or developmental causes. To seek correlates, we examined standardized photos of green turtles hatched on Boca Raton, Florida beaches between 2009-2019. All photos were of turtles with known nest incubation temperatures. Data from the National Weather Service was used to classify years as normal or hotter than normal for correlations. Measurements were taken of the straight carapace length and curved carapace length, and the measurements of normal, lordotic, and kyphotic turtles were compared. Spinal abnormalities formed more often in turtles from warmer nests.

Interspecific and Regional Variation in Shark Vertebral Mineral Structure and Content

Author(s): Ivana Heerdegen, Loredana Pagans, Braden Ruddy, Danielle Ingle, and Marianne Porter
Faculty Mentor(s): Marianne Porter and Braden Ruddy
Presenter(s): Ivana Heerdegen and Loredana Pagans

The mechanical behavior of mineralized cartilaginous shark vertebrae varies across body region and species and may be influenced by mineral architecture. We quantify mineral arrangements (number and angles of radiating lamellae, and number of nodes) and calculate bone mineral densities (BMD) from two orders of sharks (carcharhiniiformes and lamniformes). Previous work demonstrates that shark vertebrae from the posterior column are toughest and stiffest; therefore, we hypothesized that lamniformes will have more radiating lamellae, smaller angles, and more nodes in the posterior region. We expected carcharhiniiform vertebrae to have larger BMD values due to block-like calcification. Vertebrae were dissected from anterior, mid, and posterior regions of 5 species. We then μ CT scanned each vertebra and obtained BMD values with Bruker software, and measured morphological variables using ImageJ. Increased BMD and morphological architecture may aid in thrust and energy storage, as lateral body displacement is concentrated in the posterior region during swimming.

Home Range Analysis of Cercopithecus Ascanius, Cercopithecus Mitis and Their Hybrids in Gombe National Park, Tanzania

Author(s): Casey Hudspeth, Diana Mitsova, and Kate Detwiler
Faculty Mentor(s): Kate Detwiler
Presenter(s): Casey Hudspeth

Guenon species *Cercopithecus mitis* and *Cercopithecus ascanius* live in hybridized mixed species groups at Gombe National Park, Tanzania. To date, there has been no study detailing the home range patterns of these hybrid groups. Using spatial coordinate data (GPS), I created minimum convex polygons (MCP) and kernel density maps in the ArcGIS program (Arcmap 10.7.1) to map and analyze the home range of a single group over 26 months (November 2015 to December 2017). I assessed home range variation between years (2016, 2017) and seasons (dry, wet). The group was found to alter ranging patterns according to the season. The results of my study indicate a similar range size to *C. ascanius* but a smaller range size than *C. mitis* when compared to other studies of the parent species. Further analysis using subsequent years of GPS data will help strengthen our understanding of home range occupancy in this hybrid population.

Thalassia Testudinum Recolonization After Die-off Events in the Florida Bay

Author(s): Kasey MacLeod
Faculty Mentor(s): Marguerite Koch-Rose
Presenter(s): Kasey MacLeod

Major seagrass die-off events (>50 km²) are occurring in coastal estuaries and lagoons world-wide. Florida Bay, at the terminus of the Florida Peninsula with the largest contiguous seagrass meadow globally, has experienced two of these die-off events since 1989. Hydrogen sulfide toxicity has been hypothesized to cause large-scale seagrass die-off events, but how do seagrasses recover? To investigate how seagrasses (i.e., *Thalassia testudinum*) recover from die-off events, we analyzed the density of shoots, their partitioning of biomass, stable sulfur isotopes and internal O₂/H₂S dynamics in intact and newly colonizing beds in Florida Bay. Results indicate that roots, the conduit for H₂S intrusion, are lower in colonizing shoots assisting in survival in highly sulfidic sediments. We anticipate recolonizing shoots in bare patches will have an enriched stable sulfur isotopic signature in their leaf tissue, as they have less roots exposed to sulfide rich sediment, and also supported by internal gas dynamics.

Elasmobranch Olfactory Morphology: Comparison Between Preferred Ecological Niches

Author(s): Charles Romero, Aubrey Clark, and Marianne Porter
Faculty Mentor(s): Marianne Porter and Aubrey Clarke
Presenter(s): Charles Romero

Olfactory sensitivity is similar among elasmobranchs (sharks, rays, and skates) species, but the size and shape of the olfactory rosettes, the organ used to detect odorants, varies. We examined the rosette morphology of sharks (4 species; N=23 individuals) and rays(3 species; N=11 individuals) among habitat types (benthic, benthopelagic, and pelagic). We hypothesized that rosette morphology would vary in species occupying different ecological niches to optimize odorant detection. Olfactory rosettes were photographed and morphology was measured using NIH ImageJ software. We measured interlamellar distance, raphe width, and fineness ratio, a two-dimensional approximation of shape. We found significant differences in fineness ratio, interlamellar distance, and raphe width among habitats. Our data suggests that ecological niche accounts for some of the morphological differences which may mediate flow through the organ.

Beyond the Shell: Using Diffusible Iodine Contrast-Enhanced Micro-Computed Tomography (DICE µCT) to Visualize Internal Structures of Sea Turtles

Author(s): Taylor Samson and Jeanette Wyneken
Faculty Mentor(s): Jeanette Wyneken
Presenter(s): Taylor Samson

Visualizing the morphology of an animal provides important insights into its evolutionary history, structure, ecology, and health status. A new imaging methodology, diffusible iodine contrast-enhanced micro-computed tomography (DICEµCT), uses soft-tissue staining with Iodine solution (I2KI) to visualize muscle, viscera, and nerves in situ, using a micro-CT scanner. The goal of this study was to test the practicality of DICEµCT and develop an optimal method for nondestructive visualization of sea turtle anatomy. Dead loggerhead (Caretta Caretta) and leatherback (Dermochelys coriacea) post hatchlings were used to test for optimal I2KI staining concentration and duration. Then dissections were preformed to compare with CT scans to assess the utility of this new visualization method. Our results show that this is a valuable approach to study normal sea turtle anatomy. Moreover, this study established an optimal DICEµCT staining and scanning protocol for sea turtles, and data files will be an important contribution to worldwide databases.

Salinity Impacts on Thalassia Testudinum Leaf Oxygen Flux

Author(s): Levi Travis, Marguerite Koch, and Chris Johnson
Faculty Mentor(s): Marguerite Koch-Rose
Presenter(s): Levi Travis

Thalassia testudinum, a dominant subtropical seagrass species in Florida Bay, an ecologically and economically important estuary, has exhibited two major die-off events (>80 km2) since 1989. Die-off events globally are linked to high temperature, low water column O2, hyper salinity and high sediment sulfide (H2S). Hypersalinity has been shown to reduce leaf efficiency in oxidizing internal tissue (aerenchyma) critical to prevent H2S intrusion. To evaluate how salinity influences leaf oxygen pressurization, we conducted experiments ranging from ambient to hypersalinity (35, 45, 55, 65). An O2 microsensor was used to measure the O2 change in the leaf aerenchyma under irradiance to examine the leaf's ability to pressurize. The "leakage" of O2 across the surface was measured simultaneously with a second O2 microsensor on the leaf surface. We expect increasing salinity to lower leaf pressurization due to "leakage"; alternatively, the leaf O2 internal rate of increase is lower at high salinity.

CRISPR/Cas9-Mediated GUS Gene Removal (Knock-Out) in Tobacco Plants

Author(s): Rose Weinstein, Annalise Wellman, and Xing-Hai Zhang
Faculty Mentor(s): Xing-Hai Zhang
Presenter(s): Annalise Wellman and Rose Weinstein

CRISPR/Cas9 technology facilitates genetic engineering by removing or adding specific DNA sequences which can manipulate gene expression by causing a cell to undergo DNA repair, thus resulting in a gene knock-out or insertion. Using this RNA/protein complex will help the science community gain knowledge on the effects of CRISPR in respect to successful progenies of a modified plant. CRISPR/Cas9 was utilized to genetically modify a tobacco plant that expresses a reporter gene called X-Glucuronidase (GUS). This gene was removed from this plant's genome and regenerated into new plantlets. Analysis of the removed gene was applied by performing GUS stain assays on the descendants of this plant. The GUS negative plantlets were selected and grown; the DNA then extracted, sequenced and compared to unedited genome. Understanding CRISPR technology could be implemented in future agricultural research, such as creating crops that are resistant to disease and environmental stress that affect the species.

Examining the Impact of Human Beach Use on Galápagos Sea Lion Behavior

Author(s): Yu Brandon, Hernandez Daniella, Hudspeth Casey, John Zachariah, Levine Della, Tallapaneni Manasa, Higgs Ariel, Frost Eva, Molly Adam, and Tricia Meredith
Faculty Mentor(s): Tricia Meredith and Molly Adam
Presenter(s): Brandon Yu and Della Levine

The endangered Galápagos sea lion, Zalophus wollebaeki, is an endemic pinniped species in the Galápagos Islands, prevalent on the beaches of the study site, San Cristóbal Island. The beaches are frequented by locals and tourists, and widely used by the boating industry. In the present study, we observed the behavior of sea lions from 15 June to 20 June 2019 on five San Cristóbal beaches varying in their level of human impact. Beaches were categorized primarily by the amount of terrain development, such as fencing. We scan sampled 15 general behaviors and focal sampled four maternal behaviors. Our research supports the hypothesis that geographical/topographical disturbances on the beaches may cause more aggression, while direct human presence does not significantly produce such behaviors. It is vital to create a conservation plan to protect the Galápagos sea lion populations who play a key role in maintaining the ecosystems of the islands.

Time Course of Ube3a Gene Silencing in Neurons Developing in the Angelman Syndrome Mouse Brain

Author(s): Mariam Aamir
Faculty Mentor(s): Kathleen Guthrie
Presenter(s): Mariam Aamir

The goal of this project is to analyze the time course of paternal Ube3a allele silencing in developing brain neurons in a mouse model of neurological disorder Angelman Syndrome (AS), a genetic disorder on the autism spectrum. I will identify the stage at which expression of the Ube3a ubiquitin ligase is lost from newborn neurons to better understand how the Ube3a gene mutation disrupts normal neuronal maturation. Bromodeoxyuridine (BrdU) will be used to label dividing stem cells in the adult brain subventricular zone (SVZ) that generate new olfactory bulb interneurons. Brain sections will be examined 24 hrs, 5 days, 9 days and 2 weeks after BrdU to track changes in Ube3a expression and intracellular distribution as the new neurons mature. The long-term goal of this study is to identify when developmental defects emerge in mutant neurons, and if these can then lead to impaired cell survival or connectivity.

Effects of Methamphetamine on the Pro-Inflammatory Response in the Blood Serum

Author(s): Rama Abdin
Faculty Mentor(s): Rui Tao
Presenter(s): Rama Abdin

Tryptophan (TRP) is one of twenty essential amino acids in our bodies. Tryptophan plays a major role in the activation of the immune response pathway. The tryptophan pathway begins when it is transported into the cell and degraded into kynurenine. Kynurenine (KYN) is then metabolized into kynurenic acid (KA) and quinolinic acid (QA) which ultimately activate pro-inflammatory cytokines. In this experiment, the levels of TRP, KYN, KA, and QA in blood serum were measured as a representation of the activity of the immune response pathway. We propose that the immune response pathway is activated by methamphetamine, which results in a decrease in tryptophan levels and an increase in the levels of kynurenine and its products (KA and QA). The results of this experiment reveal the effects of methamphetamine on blood and therefore can provide the foundation for future research on drug addiction treatment.

Malarial Proteins Interaction With Cell Surface Receptor Siglec-9

Author(s): Sawdah Ali, Jordan Merritt, and Andrew Oleinikov
Faculty Mentor(s): Andrew Oleinikov
Presenter(s): Sawdah Ali

Malaria is a global health problem that accounted for ~435,000 deaths in 2017. Plasmodium falciparum, the deadliest species of malaria, displays P.falciparum erythrocyte membrane protein 1 (PfEMP1) proteins on the surface of infected erythrocytes to sequester to host cell receptors, avoiding immune clearance. There are known receptor-PfEMP1 interactions; however, many are not known. This study examines whether there is a receptor-PfEMP1 interaction with Siglec-9, a host cell receptor that performs self-recognition of healthy cells. We tested 11 PfEMP1 domains, representing various functional group combinations, to Siglec-9. By utilizing the Bio-Rad Bio-Plex 200 Suspension Array System, PfEMP1-domain coated beads were incubated with recombinant Siglec-9-Fc to determine binding. In this study, 5 out of the 11 sample PfEMP1 domains showed binding above that of the control. Given the importance of Siglec-9 receptor in host immune response, this interaction strongly justifies further investigation.

Expression of Hypoxia-Inducible Factor 1α in Syncytiotrophoblasts of P. falciparum Placental Malaria Samples

Author(s): Amanda Balash, Olga Chesnokova, Stephen Rogerson, and Andrew Oleinikov
Faculty Mentor(s): Andrew Oleinikov
Presenter(s): Amanda Balash

A hallmark trait of Plasmodium falciparum malaria is sequestration of parasite-infected erythrocytes (IEs) in the organ's microvasculature. Sequestration in the placenta of pregnant women called placental malaria (PM) contributes to 200,000 newborn deaths annually. We hypothesized that PM may induce a hypoxic state in placental syncytiotrophoblast. Hypoxia-Inducible Factor 1α (HIF1α) is characteristic of acute hypoxia and serves as the master transcriptional regulator for the adaptive response. In hypoxia, HIF1α levels increase exponentially. We measured HIF1α levels in the syncytiotrophoblasts of placental samples with ongoing (PM+) plus past infection (n=7) and samples without infection (n=3). In addition, results were stratified by birth-weight (low=<2.5 kg vs. normal) delivery status. HIF1α levels were substantially lower for placenta samples with no infection, though without statistical significance due to small sample size. Stratification by birth weight status revealed no difference. Further studies with larger sample size are required to see if the observed differences stay.

A reporter minigene to study the expression regulation of the immune transduction adaptor MYD88

Author(s): Chelsea Brown, Sean Paz, and Anastasia Ritchie
Faculty Mentor(s): Massimo Caputi
Presenter(s): Chelsea Brown

MYD88 is a transduction adaptor protein, which links toll-like (TLR) and interleukin 1 (IL-1R) receptors to the transcription factors NFκB and AP-1, which control genes regulating cell proliferation, immune response and apoptosis. MYD88 is alternatively spliced in two isoforms (MYD88L and MYD88s) with the short MYD88s form failing to activate NFκB and AP-1. Our preliminary data show that SRSF1, a protein known to regulate the splicing of several genes, promotes the transcription of MYD88 by a less understood mechanism. We created a reporter minigene containing the MYD88 promoter, all its coding exon and the intervening introns cloned upstream a luciferase reporter. We will study the role of SRSF1 on MYD88 transcription and splicing by expressing the MYD88 minigene and overexpressing or downregulating SRSF1 in cell cultures. We will also mutagenize putative SRSF1 binding sites within the reporter construct to determine what sequences are required for MYD88 regulation by SRSF1.

Epileptogenic Changes in Immature Granule Neurons in a Vertebrate Model of Adult-Onset Spontaneous Epilepsy

Author(s): Daniel Keith and Matthew Ward-Moses
Faculty Mentor(s): Ceylan Isgor
Presenter(s): Daniel Keith and Matthew Ward-Moses

Studies of patients with temporal lobe epilepsy have found an over expression of hippocampal brain derived neurotropic factor (BDNF) and increased signaling with its receptor, TrkB, which has been shown to be associated with epileptogenesis following an initial seizure episode. These findings suggest that seizures may dysregulate the function of BDNF, causing a restructuring in brain circuitry. To assess if abnormal increases in BDNF solely lead to pro-epileptic circuit dysfunction, we use a transgenic mouse model of spontaneous adult-onset epilepsy that over expresses BDNF (TgBDNF) in order to analyze changes in the integration of dendrites in the dentate granule cell layer of the hippocampus, which has been proposed to gate excessive cortical input, via confocal microscopy with z-stack imaging. Preliminary results show an increase in dendritic maturation and complexity, including an increased number of spines in a blade-dependent manner, in the TgBDNF mice as compared to wild type mice.

Effects of IFN-gamma on Microglia

Author(s): Mark Lewis
Faculty Mentor(s): Rui Tao
Presenter(s): Mark Lewis

Microglia are macrophage-type support cells that are located throughout the central nervous system with the purpose of removing various debris and dead neurons via phagocytosis. This research project attempts to analyze the activity of microglia, in-vitro, in relation to other metabolites upon introduction of 1-10ng/mL IFN-gamma into the cell over a 5-day period. The various metabolites of interest are tryptophan, kynurenine, kynurenic acid, and quinolinic acid. These metabolites are involved in a neuro-inflammatory pathway where tryptophan enters a microglial cell and is metabolized to kynurenine. From kynurenine, it can become either kynurenic acid or quinolinic acid. The latter is more abundant in microglia, thus, is the primary focus. A control was utilized as a reference to make possible distinctions between cells affected and unaffected by IFN-gamma. Overall, this research will provide insight into how IFN-gamma affects microglia which may lead to possible immunotherapies being discovered.

Characterization of the Novel Role of Autophagy Regulating C. elegans Feeding Behavior

Author(s): Isak Nilsson
Faculty Mentor(s): Kailiang Jia
Presenter(s): Isak Nilsson

Quiescent behavior correlates across phylogeny especially in mammals. Many mammals are quiescent during seasonal hibernation or daily torpor and all mammals have been shown to sleep. Autophagy is a wide-ranging cellular process responsible for the bulk degradation of cytoplasmic components through an autophagosomal-lysosomal pathway. We characterized the role of autophagy in regulating C. elegans food-induced quiescence. We found inhibition of autophagy gene atg-18 suppresses food-induced quiescence of mutants with reduced insulin-like signaling, suggesting a novel role of autophagy in regulating C. elegans feeding behavior. It is anticipated that the better understanding of the role of autophagy in C. elegans feeding behavior may reveal new therapeutic targets for food-related disorders in humans.

IFN- Gamma Activation of the Kynurenine Pathway in Astrocytes Increases Inflammatory Activity in the Brain

Author(s): Kimberly Ramgoolam, Guilherme Da Silva, William To, Giselle Shim, Rama Abdin, Mark Lewis, Ibrahim Shokry, John Callanan, and Rui Tao
Faculty Mentor(s): Rui Tao
Presenter(s): Kimberly Ramgoolam

Astrocytes are glial cells that have an active role in the neuroinflammatory response in the brain. The neuroinflammatory response is directly mediated through activation of the kynurenine (KYN) pathway. Upon activation of the KYN pathway, tryptophan (TRP) is transported into the cell and immediately metabolized into KYN. KYN is then metabolized to produce kynurenic acid (KA) and quinolinic acid (QA). In this study, we tested the effect of varying dosages of interferon gamma (IFN- gamma) on astrocytes over a four day period. The effects of IFN- gamma were measured through changes in TRP, KYN, and KA levels respectively. We propose that IFN- gamma stimulates activation of the kynurenine pathway in astrocytes, which would subsequently lead to an increase in inflammatory activity in the brain.

The Acute and Chronic Effects of Vaping on Neuronal Function and Addictive Behaviors in Lumbricus Variegatus

Author(s): Ondre Reid
Faculty Mentor(s): Jennifer Krill
Presenter(s): Ondre Reid

Considering pre-teens and teenagers are cognizant that nicotine, known to be an addictive element, is the principle agent in every vape pen or cigarette, their usage has been increasing. Nicotine creates an enhanced adverse effect to the pre-teens' brain development due to the absorption rate and the plasticity changes in the corticolimbic circuits. Nicotinic acetylcholine receptors have a tremendous impact on neurons and this impact creates a reinforcement and reward circuit within their brain. In my experiment, I will use aerosol to mimic the adoptions within the Lumbriculus variegatus ("Lv") experiment to determine whether the earthworms would develop addictiveness qualities, using varying dosages of nicotine of 5, 10, and 15 mg. This will determine the current flow in the presynaptic input on the dendrite axon by viewing the synoptically gated currents. Lv will be used as a model to deduce how nicotine induces long changes within iron gated channels.

Data Mining 16S rRNA Gene Sequences from Antibiotic-Producing Bacteria

Author(s): Renata Rigueira, James Clark, Rachel St. Clair, Timothy Stinson, Elan Barenholtz, and Diane Baronas-Lowell
Faculty Mentor(s): Diane Baronas-Lowell and Elan Barenholtz
Presenter(s): Renata Rigueira

Soil bacteria are isolated and tested for killing of nine safe relatives to ESKAPE pathogens, as well as, resisting five common antibiotics. A neural network is being used to discover novel patterns in the 16S rRNA DNA sequence that may be responsible for antibiotic synthesis or resistance. The 16S rRNA gene sequences from bacterial isolates that kill Pseudomonas putida are used to train the network to find patterns that may be responsible for antibiotic synthesis. The 16S rRNA DNA sequences of bacterial isolates are also analyzed for penicillin resistance to look for a correlation between the two. Preliminary testing conducted with 100 bacterial isolates showed the neural network was able to predict, with a 30% accuracy rate, which bacteria would kill Pseudomonas putida based on their 16S rRNA DNA sequence. Although, not significant, it is hoped that more training will improve the accuracy rate of the network.

Investigating Gender, Ethnicity, Age, and Health Literacy as Risk Factors for Depression or Discrimination in Rural Older Floridians

Author(s): Katie Abel and Lisa Wiese
Faculty Mentor(s): Lisa Wiese
Presenter(s): Katie Abel

This descriptive study's purpose was to examine if gender, age, ethnicity, or health literacy contributed to depression risk or perceived discrimination among underrepresented older adults living in rural Florida. Sociodemographic, depression, and health literacy surveys (N = 164) were examined using Pearson correlations and one-way analysis of variance. In vivo qualitative coding was used to explore perceived discrimination in a subsample (n = 25). Findings in this non-White (95%) sample of rural adults living alone (82%) included negative correlations between older age and literacy discrimination (r = -0.46, p = .05). Gender F(1,24) = 6.44, p = .018) and ethnic F(1,24) = 4.6, p = .043) discrimination impacted depression risk. In vivo themes included "many folks like [similar to] me" and "peaceful here." The oldest-old rural residents reported less depression and discrimination. Studies are needed regarding the potential impact of discrimination on younger-old health outcomes in rural settings.

The Doctor Is In: How Pediatric Direct Primary Care Reduces Emergency Room Utilization

Author(s): Chad Rudnick, Paul Gilbert, Jennyferd Barco, and Ashley Amaya
Faculty Mentor(s): Chad Rudnick and Jennyferd Barco
Presenter(s): Ashley Amaya

The influx of ambulatory care sensitive conditions (ACSC) to the emergency department (ED) in pediatrics may be avoidable if direct primary care access is available 24 hours per day. The goal of this retrospective study is to review the number of pediatric ED visits in the United States compared to the number of visits from pediatric patients having access to direct primary care. According to the Overview of Pediatric Emergency Department Visits (McDermott, Stocks, & Freeman, 2018) greater than 1 in 3 children (ages 0-18y) visited the pediatric ED for care. Within our retrospective review spanning 1 year, we found that 1 in 9 children had visited the ED in the year. This strong correlation shows that direct primary care access may decrease the likelihood of ACSC reaching the ED. Patients with this 24/7 access are able to receive preventative care and have treatment plans prior to reaching an ED.

A Scoping Review of Infant to Mother Skin-to-Skin Contact Duration of Breast-Feeding

Author(s): Samira Adili and Marissa Delveaux
Faculty Mentor(s): Teresa Sakraida
Presenter(s): Marissa Delveaux and Samira Adili

Applying Melnyk's evidence-based practice steps, a scoping review was conducted to answer the following PICOT question: Among full-term infants, does early skin-to-skin contact between mother and baby in the first hour of life compared to standard nursing care have an impact on the duration of breastfeeding? Breastfeeding duration has been shown to improve the psychological and physical health of mother and baby. Search of PubMed, ERIC and Cochrane Reviews databases from the last five years, resulted in the review of randomized controlled trials, systematic reviews with meta-analyses, literature reviews, and guidelines/standards. While our conclusion supports skin-to-skin contact between infant and caregiver during the first hour of life, evidence in support of longer duration of breast-feeding was limited. Strengthening current standards of care to specify educating mothers on skin-to-skin contact along with breastfeeding practices is indicated for healthier mother-baby couplets. Recommendations for future study entail examining the impact of these practices.

Foot Care in the Homeless Population

Author(s): Darian Docimo and Andra Opalinski
Faculty Mentor(s): Andra Opalinski
Presenter(s): Darian Docimo

The purpose of this study was to examine the incidence of diabetes and PVD in people experiencing homeless who attend a healthcare and foot clinic and to identify challenges the homeless population experiences in caring for their feet. This study will allow the understanding of feelings and behaviors related to foot care of people experiencing homelessness, creating a foundation for acknowledging and improving health in this population. Exploratory descriptive design including descriptive statistics and a qualitative descriptive analysis was used to examine secondary data provided by interviews that were conducted from 179 participants. The results demonstrated that self-report of diabetes and PVD are 15.1% and 16.8% respectively in this sample of persons experiencing homelessness. The themes that emerged that illuminated challenges in caring for their feet were Challenges Resulting from Health Conditions and Challenges of Obtaining Basic Resources. Foot-care is a major health concern for people experiencing homelessness.

Fast Food Consumption and Body Weight and Fat Gains in First-Semester Students

Author(s): Sareen Gropper and Vanessa Hoyek
Faculty Mentor(s): Sareen Gropper
Presenter(s): Vanessa Hoyek

Weight gain among college freshmen is a common occurrence as is frequent consumption of fast foods. Weight and fat gains and poor diet can contribute to future health problems. This study examined first-semester weight and fat changes among college students who ate fast food > 3 times/week (more frequent) versus < 3 times/week (less frequent). Anthropometric measures and frequency of fast food consumption data were used for secondary analysis. Weight and fat gains did not significantly differ between students consuming fast foods more frequently (n=300) versus less frequently (n=151). However, when analyzed by sex, the weight findings among males (but not females) approached statistical significance (p=0.0597). Males (n=59) with more frequent fast food consumption gained between 3.8- 4.9 lbs versus between 2.3 - 4.6 lbs among males (n=97) with less frequent consumption. No significant differences in body fat gains were observed. Freshmen males may benefit from education on healthy food choices.

Deciding When to Stop Driving: Reports of Persons with Dementia and their Families

Author(s): Ashley Johansen and Ruth Tappen
Faculty Mentor(s): Ruth Tappen
Presenter(s): Ashley Johansen

The purpose of this research study is to discover the challenges shared by persons with dementia who are making the lifestyle transition of driving cessation. The study identifies significance of the signs and steps made to promote driving cessation in this population. The design that will be utilized in this study will be a fully integrated mixed methods model design. The study is ongoing and conclusive results have not yet been identified. Once the study has concluded, a deeper understanding of themes and setbacks that study participants have encountered during driving cessation will be identified. Furthermore, this study will identify strategies to ease the need for driving cessation by examining personal records of people affected by their need for cessation.

Stress and Quality of Life in Caregivers

Author(s): Deborah D'Avolio and Sheldon Lictaoa
Faculty Mentor(s): Deborah D'Avolio
Presenter(s): Sheldon Lictaoa

With the older adult population growing exponentially, caregivers assist older adults with activities of daily living, especially older adults who have Alzheimer's Disease and other related dementias. Caregivers experience challenges caring for these older adults and causes immense stress and mental fatigue. The purpose of this study is to investigate the relationship between stress and quality of life among caregivers. In this quantitative secondary data analysis, 20 participants completed reliable and valid tools which measure caregiver stress and quality of life. Pearson correlations were calculated between MCSI and SF-36, and scores were taken pre-intervention. There was a statistically significant relationship between MCSI and SF-36 in the subscales of SF Limit E, Energy, Social Function, and General Health. The finding from this study suggests that caregivers experience stress and decreased quality of life. Healthcare providers should assess family caregivers for stress and advocate for respite to help alleviate caregiver stress.

The Effects of Nursing Oral Hygiene on Guatemalan Maya Children in First Through Sixth Grade

Author(s): Camila Pereira, Rhonda Goodman, and Suzanne Piños
Faculty Mentor(s): Rhonda Goodman and Suzanne Pinos
Presenter(s): Camila Pereira

Dental caries are widely prevalent amongst the indigenous children around the world due to their low socioeconomical resources. The lack of resources prevents many children from seeking professional help for the detrimental effects of untreated dental caries. The purpose of this study is to identify the trend in dental referrals after the implementation of nursing oral care intervention throughout a two-year period 2017 (baseline year), 2018 (year 1) and 2019 (year 2). This quantitative, descriptive exploratory (comparison) measure will be used to examine the correlation between nursing oral care intervention and the decrease in dental referrals. A repeated measures ANOVA was used to analyze the frequency of dental referrals. There was a numerical decrease in referral rates from the baseline year (2017) to year one (2018), and a slight numerical increase in year two (2019). A rationale for primary oral care prevention in rural Guatemalan schools is anticipated.

Exploring the Influence of HeartMath® on Resilience in Persons with Alzheimer’s Disease and Related Dementias and their Partners

Author(s): Christina Phillips, Nancey France, and Maria Ordonez
Faculty Mentor(s): Nancey France and Maria Ordonez
Presenter(s): Christina Phillips

The purpose of this pilot study is to examine the influence of HeartMath® on persons with Alzheimer's disease and related dementias (ADRD) and their partners and their ability to cope with the stress and burden of the adverse effects associated with the disease. There are three research questions: what is the pre-post difference in coherence for persons with ADRD and their partners from baseline to one month after practicing HeartMath®; what is the relationship between the frequency of HeartMath® practice over one month and coherence; what was it like for the persons with ADRD and their partners while learning/using HeartMath®? There will be four sessions where the HeartMath® intervention is taught and reinforced. Participants will complete a pre and post intervention resilience scale survey and a recorded coherence score measuring heartrate variability will be measured. Preliminary results for this study are pending as recruitment process is currently taking place.

Antipsychotic Drug Use in Community-Dwelling Older Adults With or at Risk for Dementia

Author(s): Debra Hain and Vishana Ramnath
Faculty Mentor(s): Debra Hain
Presenter(s): Vishana Ramnath

Antipsychotics are frequently prescribed in older adults with dementia; however, these medications can cause several adverse effects that greatly impact the lives of this population. Prescribing demographics, such as race, and ethnicity are unknown. Knowing this information supports future interventions aimed at reducing the inappropriate use of these medications. The purpose of this study was to explore racial, ethnic differences in antipsychotic medication use in community-dwelling older adults with or/at risk of dementia. A retrospective chart review (n =20) was conducted at the Memory and Wellness Center in Boca Raton. Data was analyzed with SPSSv.24 and researchers found that Non-Hispanic Whites were prescribed antipsychotics more compared to other racial and ethnic groups. The findings of this study are not generalizable but provide much needed evidence regarding prescribing in different racial and ethnic groups. Replication of this study with a larger sample size of a more racially and ethnically diverse population is needed.

The Fixation of Inkblots

Author(s): Deborah D'Avolio and Sheldon Lictaoa
Author(s): Leslie Anglo, Thomas Brady, Ashley Gaze, and Rachel Ramsowr
Faculty Mentor(s): Tammy Knipp
Presenter(s): Thomas Brady, Leslie Angulo, Ashley Gaze, and Rachel Ramsowr

The Rorschach inkblot psychological test was created in 1921 by Swiss psychologist, Hermann Rorschach. In the test, subjects are asked to view inkblots printed on cards and explain what they see as a way of unearthing an individual's unconscious desires, fears, thoughts, and analyzing their emotional functioning. Our experiment will use an eye tracking system to capture the journey of eye movements for each subject as they scan selected inkblots. The data will note commonalities of gaze patterns to forms and contours of each inkblot. Following each image, the subject will be asked what the images resembled. We hypnotize that similar responses to the question will correspond to common fixations that denote characteristics of the described images. The data should also support the hypothesis that an object does not necessarily need to be fully visualized to determine its common identity

Palpation of Undisclosed Objects

Author(s): Adison Gonzalez and Isabel O'Carroll
Faculty Mentor(s): Thomas Stollar
Presenter(s): Adison Gonzalez and Isabel O'Carroll

The rehabilitation of the 'soda kiln' located at the T10 facilities allowed for the utilization of knowledge gained from the ceramic department at FAU and scholarly research. This kiln is unique amongst those used in FAU's Ceramic area which are utilized for the vitrification of ceramic objects. Kilns of this sort are known as 'soda' kilns because soda ash is introduced into the kiln during the firing process, where it volatilizes to create unique glaze effects. Problematically, the soda ash slowly deteriorates the kiln bricks that comprise the kiln itself, slowly ruining it. The fact that the soda causes the kiln to slowly decay necessitates that 'soda firing' is designated to the 'soda' kiln. In essence, the soda kiln provides a process that is unique, and cannot be achieved in standard electric or reduction kilns, but has also taken its toll on our current soda kiln.

Kiln Building: Soda Ash

Author(s): Christina Phillips, Nancey France, and Maria Ordonez
Faculty Mentor(s): Nancey France and Maria Ordonez
Presenter(s): Christina Phillips

The purpose of this pilot study is to examine the influence of HeartMath® on persons with Alzheimer's disease and related dementias (ADRD) and their partners and their ability to cope with the stress and burden of the adverse effects associated with the disease. There are three research questions: what is the pre-post difference in coherence for persons with ADRD and their partners from baseline to one month after practicing HeartMath®; what is the relationship between the frequency of HeartMath® practice over one month and coherence; what was it like for the persons with ADRD and their partners while learning/using HeartMath®? There will be four sessions where the HeartMath® intervention is taught and reinforced. Participants will complete a pre and post intervention resilience scale survey and a recorded coherence score measuring heartrate variability will be measured. Preliminary results for this study are pending as recruitment process is currently taking place.

Mariano Vinuales's Selected Works: Recovering the Historical Memory of Republican Exiles in Spain

Author(s): Alyssa Payne and Carmen Cañete Quesada
Faculty Mentor(s): Carmen Cañete Quesada
Presenter(s): Alyssa Payne

Over sixty years after his death, Mariano Vinuales's works remain underrepresented in the field of literature by Republican exiles of the Spanish Civil War (1936-1939). Due to his anti-Franco publications, Vinuales was exiled and forced to move first to the Dominican Republic (1939-1942) and later to Mexico (1942-1955). Never able to return to his wife and children in Spain, he left behind a vast collection of personal letters, short stories, essays, books, poetry, and prose. This collection is only now being recovered thanks to progress made by the Association of the Recovery of Historical Memory (2000) and the Historical Memory Law (2007), which overrides the Pact of Forgetting (1977) that originally wiped away the memory of individuals like Viñuales. This investigation reconstructs Viñuales's personal and political history while examining how these factors influenced his impactful writings "Siembra" (1940), "El Leon y La Libertad" (1950), and "Mi tía Dominga" (1952).

Gender Gap and Violence in the Muslim World

Author(s): Samira Zahangir
Faculty Mentor(s): Renat Shaykhutdinov
Presenter(s): Samira Zahangir

The question of gender gap in Muslim-majority states has received a lot scholarly interest. With a reference to various aspects, much of the literature shows that Western democracies are superior in gender equality over Muslim countries. More recent research, however, suggests that Islam is not the (only) factor to blame for various gender gaps in the Muslim world. Building on this emergent scholarship, my research argues that gender gap leads to violence in the Muslim-majority states. This hypothesis is tested using statistical data on the instances of violence in the Muslim-majority countries (the Uppsala conflict dataset), which are regressed on gender gap and other relevant independent variables. The purpose of this study is to contribute to the body of research concerning the effects of women's rights, specifically those in Muslim states, on violence. This research has implications on many socioeconomic indicators, such as inequality, the quality of democracy and governance.



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