

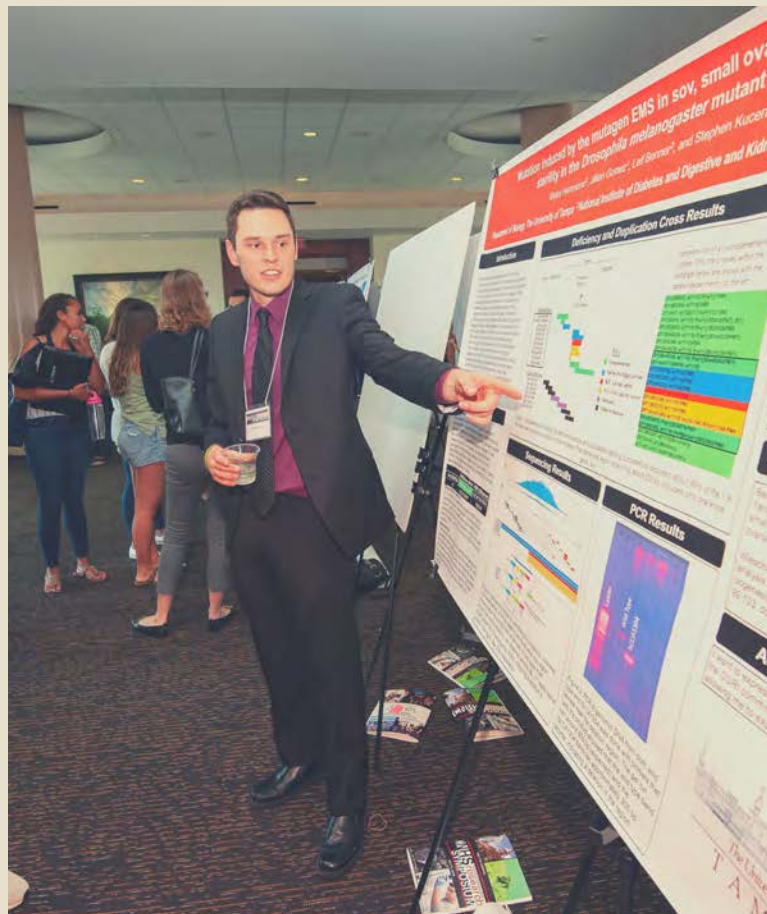
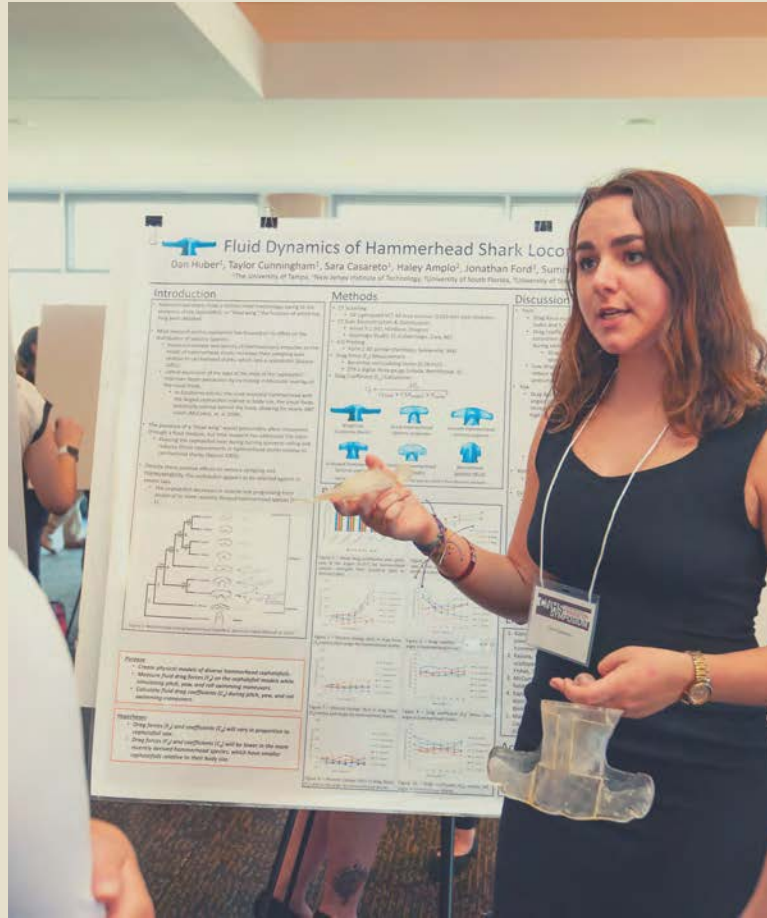
THE UNIVERSITY OF TAMPA UNDERGRADUATE RESEARCH SYMPOSIUM

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**APRIL 21,
3 PM - 5 PM**

An online showcase of
UT student research
accomplishments



**OFFICE OF UNDERGRADUATE
RESEARCH AND INQUIRY**

3 - 4 p.m. Presentations

1) **Stress Management Among Hispanic College Students**

Hailey Daves and Zachery Geist
Mentor: Dr. Alyssia Miller De Rutté

Stress is a known debilitating factor among college students, but the effects of stress among Hispanic college students lacks extensive research. This study aims to identify effective coping mechanisms for stress management among Hispanic college students, as a means to further understand and research an important topic impacting the wellbeing of young individuals. A systematic review investigating effective stress management techniques of and for Hispanic college students is reported. 121 peer-reviewed journal articles from databases JSTOR, PubMed, and CINAHL were found in the original database search. To ensure the gathering of relevant data only published sources from the past ten years were used. After adjustments for duplicates and relevancy, 38 peer-reviewed articles were selected for the study. Common methods of stress level measurement included the perceived stress scale and personal accounts of stress management techniques. Other methods of measurement vary greatly, adding difficulty to drawing steadfast conclusions about the effectiveness of certain coping mechanisms. However, students who were given systematic options of stress management and familial/community support were shown to have lower levels of stress after the introduction of said coping mechanism. Further research is pertinent to identify effective stress management techniques of Hispanic college students.

2) **Busyness & Cognition in Undergraduates: End-of-Semester versus Beginning-of-Semester Cognitive Performance**

Dani Mryczko and Tina M. Brown
Mentor: Dr. Sara Festini

Students often report feeling more stress at the end-of-the-semester versus the beginning-of-the semester (Kofman et al., 2006). However, whether this end-of-semester stress results in worse mental functioning has not been extensively investigated. The current study assessed whether cognitive performance was different under a naturalistic manipulation of stress produced by the time-of-the-semester. Specifically, we measured three types of mental functioning, including long-term memory, working memory (i.e., what is currently held in mind), and executive functioning (i.e., higher-level mental control operations, like strategic planning), at the end of the Fall 2020 and beginning of the Spring 2021 semester. High stress levels have been related to worse cognitive performance (see Lupien et al., 2009). However, moderate stress levels can improve cognition (e.g., Parihar et al., 2011), and high busyness levels have been associated with better cognitive performance in middle-aged and older adults (Festini et al., 2016). We assessed whether cognitive performance was different at the beginning- versus end-of-the-semester, and whether it was related to stress and busyness levels in undergraduates. Contrary to the hypotheses, there were no significant differences in busyness or stress at the

beginning- versus end-of-the-semester. This may explain why cognition was stable. Only word recognition exhibited improvements at the end-of-the-semester.

3) **Synthesis of Alkenes**

Allison Duffy

Mentor: Dr. Richard Squitieri

Dr. Squitieri and I focused our efforts the summer and fall of 2020 and spring of 2021 towards writing a review article that summarizes the most recent synthetic methods from 2014 to 2020 for the synthesis of alkenes. The goal of this new project is to gain proficiency in reading, presenting, and summarizing scientific literature. In collaboration with Dr. Cordova Guerrero, Alexa Tomaiolo, and Alexia Rangel from California Luthern University, as well as Kaitlin Wykoff from The University of Tampa, 40 recent methodology papers in the field were presented in a group setting and summarized in review format. Each week two papers were thoroughly analyzed by each student and presented to the team. Professional figures were designed to summarize the results of each paper using ChemDraw software. We are currently in the final steps of editing our final draft for the Journal of European Organic Chemistry.

4) **Impacts of Language Barriers in Healthcare**

Maddison Olley and Aida McClatchey

Mentor: Dr. Alyssia Miller De Rutté

In this study we investigated the impact of language barriers on quality of care within the healthcare industry. The purpose of this systematic review was to identify if language barriers in Latino patients negatively impacted their healthcare experience. Approximately 1 million immigrants move to the United States every year, with 25% of those immigrants being Latino (Pew Research Center, 2020). This change in population suggests the possibilities of language barriers arising for Latino patients who are Non-English Primary Language (NEPL) speakers. According to our research, a majority of healthcare facilities have not properly adapted to higher influxes of NEPL patients, which has led to conflicts in how patients and physicians communicate. Based on the data we analyzed, there is substantial evidence indicating a clear correlation between poor quality of care and language barriers between Latino patients and healthcare workers. These findings indicate that healthcare facilities must act to minimize the language barriers NEPL Latino patients face through means such as interpreters, bilingual staff, and educational opportunities for patients.

5) Investigating AWOL in Theiler's Murine Encephalomyelitis Virus Infection

Daniel Maselli

Mentor: Dr. Eric Freundt

Classically, two exit-strategies are utilized by viruses during infection: non-enveloped viruses leave after lysing the host cell and enveloped viruses exit without causing lysis. These mechanisms are largely conserved throughout the extensive span of viral species. However, a different mechanism has recently been described in the literature in which some non-enveloped viruses exit the cell by manipulating the host autophagic pathway. During infection, some picornaviruses such as poliovirus, coxsackievirus B3, and enterovirus D68 interact with host autophagosomes and block their fusion with lysosomes. These viruses occupy the double membraned vesicles and use them as vehicles to leave the cell. This exit strategy has been called autophagosome-mediated exit without lysis (AWOL). Theiler's Murine Encephalomyelitis Virus (TMEV) is another picornavirus that we believe may utilize AWOL during infection. We hypothesize that TMEV blocks autophagic flux and instead uses the double membraned vesicles for AWOL. To investigate whether TMEV uses AWOL, we have infected cells with TMEV in the presence of both an autophagic inducer and inhibitor and determined intra- and extracellular viral titers by plaque assay.

6) Isolating Previously Uncharacterized Microbes from a Hypoxic Marine Sinkhole in the Gulf of Mexico Using a Winogradsky Column

Devin Lazare

Mentor: Dr. Haydn Rubelman

Jewfish Sink is an offshore marine sinkhole with a 6 m opening that widens as the depth increases. The aquifers surrounding the sink had previously provided oxygenated water to the water column. Although the surrounding aquifers have since ceased flow causing the sink to become stagnant. Without active water flow from the aquifers through the sink a large hypoxic zone (LDO 0.1 mg/L) has formed in the lower portion of the sink. This hypoxic zone is home to a magnitude of microbes who have adapted to live in an environment that lacks oxygen. Without oxygen available to perform aerobic respiration these microbes are able to use terminal electron acceptors other than oxygen. Since sulfur compounds are in abundance in marine water, sulfur is often used as a terminal electron acceptor within the hypoxic portion of the sink. Previous sequencing of eDNA identified uncharacterized bacteria within the hypoxic zone of the sink. A Winogradsky column was used to culture these complex communities of microbes. Water samples were collected at 4 depths within the sink (10 m, 20 m, 30 m, and 40 m) and added to the Winogradsky column. The nature of the Winogradsky column should allow for both aerobic and anaerobic microbes from the sink to grow within the column. A time-lapse was set up to monitor the colonization of these microbes in large enough numbers to be seen by the naked eye. Sulfur test results showed that the column has become increasingly more sulfidic over time. An original Sulfur test from the top portion of the column yielded a sulfur concentration of 10ppm. A sulfur test 27 days later yielded a concentration of 40ppm. Individual species from the column were isolated and cultured. These species grew on Maring agar and Blood heart infusion agar but

not Nutrient agar We are currently sequencing two isolates that were cultured from the column. Other techniques that are planned include anaerobic culturing, creating a custom agar using sterilized water from the column, and microscopy of the biofilm present in the column.

7) Biochemical Analysis of the MAPK Pathway During Fertilization and Blastogenesis Using Sea Urchin *Lytechinus* Species.

Matthew Olszewski and Danielle Vezensky
Mentor: Dr. Michelle Osovitz

Life's first decisions involve biochemical, physiological, and genetic changes occurring when sperm fertilizes an egg. Many questions remain unanswered regarding biochemical events following fertilization and leading to the first embryonic divisions (blastogenesis). It is important to understand how embryonic divisions occur given that mis-regulation can lead to diseases such as cancer. This research uses two species of *Lytechinus* sea urchin to study the role of the MAPK signaling pathway. MAPK signaling is known to control cell division, although less is understood about its role during embryonic divisions. Previous work in the lab has cloned and identified the protein Mos which is part of the MAPK signaling pathway in eggs and oocytes. In order to test the role of Mos and MAPK signaling during fertilization and blastogenesis, urchin biochemical lysates and western blotting were used to measure Mos and MAPK protein. Our data indicate the presence of active MAPK in urchin embryos and continued analysis will determine presence and activity profiles of Mos protein as well as the effect of pharmacological inhibition on MAPK activity and cell cycle progression. In addition, this project involves establishing a specialized urchin aquaculture system to maintain *Lytechinus* from cold water climates as well as local species. This will allow comparison of *Lytechinus* sp. cell signaling and will open up access to multiple genomic and biochemical resources for analysis. Our experimental results contribute to understanding how cell cycle is regulated during embryogenesis that can be applied to a wide range of cell cycle control questions.

8) Carbazole Derivatives as Photocatalysts for the C-H Arylation of n-Butyl Vinyl Ether

Marehd Lopez Ocasio
Mentor: Dr. Ashley Longstreet

Photoredox catalysis uses light to excite photocatalysts to facilitate single-electron transformations. According to previous research, the use of organic molecules as photocatalysts is beneficial because they offer a metal-free alternative to other photocatalysts and exhibit unique redox properties. This opened doors for new strategies that keep contributing to organic methodologies. Herein, an investigation into the use of an electron-rich carbazole as a photocatalyst in the C-H arylation of n-butyl vinyl ether was performed using 2-chlorobenzonitrile as the aryl substrate. When the reaction was performed, a different product than the hypothesized product was observed to form by ¹H NMR spectroscopy. The hypothesized product was proposed to have an alkene functional group, and there is evidence for a product containing an aldehyde functional group. Current work is being performed to isolate and possibly identify the products and by-products of the reaction.

9) Changes in Risky Behaviors and Mental Health of UT Students from the Beginning of the Pandemic as Compared to a Year Later

Benjamin Conness

Mentors: Dr. Mary Martinasek and Dr. Claudia Aguado Loi

Vaping/e-cigarette use is increasingly more common among young adults. Whereas, drinking on university campuses is a common activity done at social events and can lead to negative consequences including academic problems and interpersonal relationships. These behaviors coupled with mental health during a pandemic should be assessed. This research assessed two cross-sectional research studies conducted at the University of Tampa. The initial survey was administered April 2020 (30 days after UT went online) and the second survey was administered in February 2021. The surveys were sent to all undergraduate students at the University of Tampa, with 769 students responding in 2020 and 596 responders in 2021. The data was analyzed using SPSS version 26. Vaping behaviors declined when students went home or off campus in 2020 as compared to 2021 (36% and 65%, respectively). Alcohol use increased from 22% to 31%. Mann Whitney U indicated a statistically significant increase in PHQ-9 depression scores ($p < 0.01$). With the increase in e-cigarette use and overconsumption of alcohol and strains of a pandemic, college administrators need to have a pulse on negative health behaviors during unusual circumstances in order to provide necessary resources.

10) Alternative Medicine Practice of Latinos in USA and Latin America

Evelyn Martinez and Ashley Hammond

Mentor: Dr. Alyssia Miller De Rutté

In an ideal world, various forms of medicine are heavily investigated, standardized, and safely practiced. Unfortunately, with the lack of research, this reality seems out of reach. This prompts the question, what is the prevalence of alternative medicine use in Latin people? Throughout our research this led to follow up questions like why little to no research for this group of people is present, if there is research why it is outdated, and, for their means, are Latin people getting the best healthcare they possibly can. Due to the lack of research, most of the findings in this study were focused on providing cultural context and utilizing the limited quantitative data. The findings in this study concluded that alternative medicine is still widely used in Latin culture today, that more extensive and recent research needs to be conducted and that there needs to be a standardization of alternative medicine practices. The overall takeaway of the study illustrates that Latin Americans and Latino's are not receiving the quality of healthcare that they deserve.

11) The James Webb Space Telescope: Time Machine Technology

Elizabeth Turner

Mentor: Dr. Ethan Deneault

The James Webb Space Telescope (JWST) is the preceding and complimentary mission for the Hubble Space Telescope. The telescope will be the largest in space, designed with three near infrared and one mid-infrared instruments: each having multiple operating modes. The planned orbit for the mission will allow the telescope a long and steady path with uninterrupted observing sequences following a halo-path orbit around Earth-Sun L2 point. The sunshield will provide protection for the onboard equipment keeping it cool throughout the mission and providing a thermally stable environment. The Webb Telescope has heightened sensitivity and a broader range of wavelengths, providing data with a high signal to noise ratio. JWST is likely to be able to even capture information on the earliest formation of stars and galaxies, while also providing insight on the composition of a diverse variety of exoplanet's atmospheres.

12) Implementing and Assessing Gamification in Cybersecurity Learning

Carlos Sanchez

Mentor: Dr. Chen Zhong

Hands-on learning is critical within cybersecurity education as it allows students to grasp essential skills for addressing real-world challenges. Gamification has been recognized as a good mechanism that can provide learners with meaningful contexts and user-friendly educational platforms. Gamification has been used in cybersecurity competitions, but it has not been widely used in university classes. It is necessary to assess the impact gamification has on cybersecurity education. My research questions are, (1) what effective gamification elements for cybersecurity learners are, and (2) whether students enjoy the process of learning and can better apply the skills in gamified labs. To address these questions, I have identified key gamification elements to be used in cybersecurity labs, including mission description, leaderboards, and rewards. I have implemented one gamified lab using a gamification platform (Gametize) and designed a survey study. My advisor is inviting cybersecurity undergraduates to play the gamified lab and collect their responses after they complete the lab. The responses will be analyzed to study the impacts of gamification on students' learning. Furthermore, I will further refine the gamification design based on the collected feedback. The design details and the experiment protocol of the gamified lab will be included in my presentation.

13) The Effectiveness of REDD+ in Africa

Allison Bednar

Mentor: Dr. Kevin Fridy

REDD+ serves as a climate mitigation program for tropical forest regions that offers socioeconomic and environmental benefits. The program could alleviate poverty and promote good governance. African communities are heavily dependent on forests as a source of livelihood. Without proper mitigation of climate in Africa, communities will lose their resource for energy. REDD+ in Africa faces financial challenges, there is a lack of investments that are fueled by uncertainty and lack of proper management. Forests sectors in Africa are highly sensitive as socioeconomic benefits outweigh climate mitigation. There is not a credible system to ensure the measurement, reporting, and verification of emissions from forests is accurate, thus REDD+ does not know how to mitigate climate in African countries. The progress of REDD+ in Africa is disappointing and inadequate. Without proper monitoring and incentives, any REDD+ programs will be ineffective in Africa.

14) Chemotactic Behavior of the Solar Powered Sea Slug *Elysia crispata*

Christopher Baker and Elizabeth Sylvia

Mentor: Dr. Michael Middlebrooks

Elysia crispata, commonly known as the lettuce sea slug, is a species of sacoglossan sea slug native to the Caribbean Sea. They feed on several species of algae including *Bryopsis plumosa* by puncturing the algae with their radula. The slugs can then sequester the chloroplasts in a process known as kleptoplasty, which allows them to photosynthesize. The objective of our research project is to gain a better understanding of chemotactic behavior of *E. crispata* when subjected to algal-treated and control seawater over an eight-week starvation period. Chemotaxis is a biological response characterized by an organism's reaction towards chemical stimuli in the environment. With many marine organisms, water-borne cues aid in food source detection. We are testing the slug's affinity towards algal cues originating from our experimental algal species *B. plumosa*. A three-chambered experimental apparatus was constructed with separate chambers for control and algal-treated seawater. A slug was placed in the center of the apparatus and, after an hour, its location was documented. We are looking for, as the starvation period lengthens, a change in the behavior of *E. crispata*. Due to their photosynthetic nature, we expect the slugs to initially choose to remain in the central chamber, since they would have no need to find a food source. As the period of starvation continues, we expect the slugs to stop remaining in the central chamber, in favor of relocating towards the algal-treated chamber. This is based on their diminishing photosynthetic capabilities and yellowing body color, due to their present supply of chloroplasts giving out. This should create a greater desire to sequester fresh algal chloroplasts, and thus produce active movement towards the algal-treated chamber. The experimental data collected does not support this hypothesis. In the last half of the trials, algal choice considerably became more infrequent, with *E. crispata* favoring to remain in the central chamber. The lack of movement as the period of starvation lengthens is interesting, and we currently do not have an explanation for this behavior. We plan to also run future PAM

fluorometry tests to get a better understanding of the slug's photosynthetic output while subjected to the experimental procedure described above.

15) Avian Counts at U of Tampa Before, During and After COVID-19

Rachamim-Yair M. A. Brito

Mentors: Dr. Heather Masonjones, Dr. Lori Benson McRae and Dr. Mark G. McRae

The downtown campus of the University of Tampa is located near the Hillsborough River and has relatively lush vegetation compared to its urban surroundings. This "green island" serves as an oasis-like habitat for numerous native and introduced species. Birds observed at UT include year-round and seasonally resident species, along with spring and fall migrants. Since mortality rates are high during migration periods, UT's campus likely serves as a crucial stopover site for birds moving towards their breeding or wintering grounds. Avian point count surveys were performed on seven dates during the spring of 2020 at 10 locations on UT's campus to record species presence and abundance. Microsoft Excel and the R statistical program were used to evaluate how abundance, species diversity, and residency status (year-round, winter only, breeding season only, and neotropical migrants) changed throughout the semester, specifically when campus closed due to COVID-19. The 2020 results indicated a decrease in abundance and an increase in avian diversity after the campus closed. The same protocol was utilized to reproduce the experiment in the spring of 2021. Analyses will compare the 2020 migration season with the 2021 results to evaluate the effects that human disturbance may have on avian populations and biodiversity.

16) Mangrove Expansion in Cedar Key from 1988-2019

Clell Carnes III and Rebecca Riccardi

Mentor: Dr. Michael Slattery

Mangroves are currently one of the dominant tidal wetland ecosystems in the Cedar Key area. However, when compared with historical data from the 1980's, there is a significant shift in dominance from the intertidal marsh lands to mangrove dominance. This study was conducted to assess the change in mangrove coverage from the 1980's to 2019 by digitizing aerial images from the Cedar Key area in the ESRI ArcGIS (Geographic information system). Traditionally this area has been dominated by intertidal marsh grasses. However, recent trends, in response to changing climate, have indicated a regime shift to mangroves. An increase in sea level as well as warming temperature trends are concluded to be the driving factors in the spread of the North American mangrove species. Sea level has been measured by changes in mean high-water level (MHW) and mean higher high-water level (MHHW) from the Cedar Key area. The data showed that mangrove acreage increased from 8.24 acres to 155.78 acres over the thirty-year period. The trends found in the data was confirmed in-situ. The conversion of wetland to mangrove occurred more in the southern parts of Cedar Key.

17) Comparison of a Simulated Aquaculture Environment vs. Natural Habitat on Health and Reproductive Success of the Local Green Urchin "Lytechinus variegatus"

Christian Gibbs

Mentors: Dr. Michelle Osovitz and Mr. John Ambrosio

Aquaculture can be an environmentally responsible source of commercial products and a means to sustain organisms for scientific research. Urchins are unique because they are economically valued for gonad production worldwide and are extensively used in scientific research. Aquaculture alternatives are being investigated as a method to reduce damage to benthic communities caused by wild urchin collection methods. This study provides a comparison between gonad health and reproductive success in populations of the green urchin, "Lytechinus variegatus", from wild and simulated aquaculture environments. Urchins were harvested monthly from Tampa Bay, Florida between October-January and housed in closed seawater system. This allowed control of a commercially formulated diet, temperature, salinity and seasonal light cycles. Simultaneously, wild populations were collected monthly and both urchin populations were quantitatively assessed for gonadal index and reproductive health of gametes (eggs and sperm). The data presented here indicates that urchins in simulated environments have increased gonadal index compared to wild populations with decreased individual variation and increased reproductive health. These findings are important as they support an aquaculture alternative to replace disruptive harvesting of urchins in coastal environments. In addition, the increased reproductive health of the simulated urchins provides annual vs. seasonal availability of urchins to be used in scientific research. Continued monitoring over a 12-month period will provide additional assessment of seasonal changes in gonadal index that can be directly compared between the populations. We hypothesize that the simulated aquaculture technique will maintain reproductively gravid urchins past the seasonal cycles seen in the wild population.

18) The Impact of Tobacco Use on Rates of Health Insurance Plans Sold on the U.S. Marketplace

Haley Ruggles

Mentor: Dr. Khyam Paneru

This study compares the monthly premiums paid by tobacco users and nonusers for plans sold on the U.S. Health Insurance Market Place in 2019. The data was provided by the Centers for Medicare and Medicaid Services and included data for 776,609 plans sold to individuals in 2019. Of these, the study focuses on the 269,500 plans that had tobacco preference, meaning these plans had different monthly premiums for tobacco users and non-users. We took a 10% random sample from the original data for tobacco preference plans to compare the monthly insurance premium for tobacco and non-tobacco users. We developed a regression model to predict monthly insurance premiums based on age and tobacco use (0 = No, 1 = Yes). To overcome the issue of model assumption for multiple linear regression, we also developed the regression model by taking the log of the insurance premiums. Both regression models and the results will be presented. Statistical analysis shows that there is a significant difference in average monthly insurance premiums for the two groups. Regression analysis shows that the regression models and regression coefficients are statistically significant.

19) The Long Term Physical and Psychological Consequences of Human Trafficking on Women in Florida

Katherine Justus and Corrine Fanta
Mentor: Dr. Elizabeth Sassatelli

It is estimated that there are over 24 million victims of human trafficking worldwide, with a large percentage of these individuals being utilized for commercial sex. Florida ranks as the third highest state in America for sex trafficking. The evidence suggests that over 80% of victims of sex trafficking seek healthcare at some point during their captivity for a variety of health conditions. Prior studies have revealed that approximately 95% of victims of sex trafficking report at least one physical health problem and up to twelve psychological ailments during their captivity. Prior to this study, the long-term implications of these health conditions were not understood. This presentation will discuss the preliminary findings of a mixed methods research study that: 1) explored the long-term physical and psychological health of women who were formerly trafficked for commercial sex; and 2) identified where and for what reasons these individuals sought and received healthcare services. Data were gathered from focus groups and through a 2-part health questionnaire. Preliminary results of this study reveal that many of the physical and psychological conditions present during captivity linger far after an individual is rescued from their enslavement. Clinical implications of this study include a framework for survivor informed healthcare delivery.

20) Mental Effects on Parents of Raising a Special Needs Child

Sierra Clary, Morgan Bierbrunner, Preston Bowers, and William Forrest
Mentor: Dr. Alyssia Miller De Rutté

The purpose of this research was to investigate if having a child with a diagnosed disability negatively affects the mental health of parents. Specifically, we hoped to discover the extent to which depression manifests in these parents of special needs children. Our study was not limited to one type of cognitive disability in children. By systematically reviewing previously published articles, we examined if parents of special needs children are at a significantly heightened risk for stress and depression, in which the symptoms of these diseases can be exacerbated by the financial strain from medical bills. We discovered that most of our reviewed sources had a statistically significant relationship between increased depressive symptoms and having a child with a disability. This study is beneficial in understanding how to comfort and prepare parents that have children with special needs. Given the results of our research, we hope to advocate for more support groups and financial assistance to parents and guardians of special needs children.

21) Asteroid Mining

Omar Sabbagh

Mentor: Dr. Ethan Deneault

Since the Space Race, technology has continued to exponentially evolve over the past several decades. We have successfully landed humans on the Moon and rovers to explore the soil of Mars, and everyday scientists and engineers have been taking things to the next level. Asteroid mining, which is the process of extracting raw materials from asteroids and other planets may be the next big step for humanity. With the ability to use these materials for our benefit, like refueling rockets that are already on their voyage to outer space and harvesting the materials for something that is scarce here on Earth the possibilities for evolution are endless.

22) Anatomy of an Isolated Population of Bahamian Seahorses: How Different are the Sweetings Pond Seahorses? Cranial Morphometrics

Dimitra Theodosiadis and Taylor Tataris

Mentors: Dr. Mason Meers and Dr. Heather Masonjones

A geographically isolated population of Lined seahorses (*Hippocampus erectus*) in Sweetings Pond (Bahamas) presents an opportunity for study of potential evolutionary divergence in morphology. This study uses geometric morphometrics to investigate the hypothesis that the pond-bound seahorses (images from Masonjones et al. 2019) exhibit divergence in cranial morphology from their open ocean conspecifics (museum specimens). We use Euclidean Distance Matrix Analysis (EDMA) to examine the geometric relationships between landmarks from the head and pectoral appendage based on photographic records of pond and open ocean specimens sourced from natural history museums around the United States. Preliminary results indicate that the pond specimens are statistically different from open ocean populations, including being smaller overall, differences in coronet size, pectoral appendages, and spine lengths. Differences observed may be functional, indicative of sexual dimorphism, or the result of differential selection in the pond environment.

23) Theia 456 and its Stellar Components

Trevor Kattenberg

Mentor: Dr. Simon Schuler

The release of Gaia astrometric data has allowed for machine learning to locate hundreds of potentially new Galactic star clusters and moving groups. Our research is focused on one such association of stars, Theia 456. Theia 456 is a stellar filament of an estimated 468 stars identified by Kounkel & Covey (2019) that is within 1 kpc of the Sun, and our group's preliminary analysis suggests stars in Theia 456 share similar compositions. Due to these properties, Theia 456 is considered primordial, resulting from the Galactic stellar formation process rather than the result of dynamical processes such as tidal stripping. Our research is focused on utilizing a python code we have developed to analyze positions, proper motions, and parallaxes of stars in the Gaia DR2 data to confirm or reject the stellar members of Theia 456 as identified by Kounkel & Covey

(2019). We expect to verify the validity of Theia 456 as a primordial stellar filament and possibly identify additional members of the association. This research will contribute to our understanding of the evolution of the Milky Way Galaxy.

24) Observing Exoplanet Atmospheres for Signs of Extraterrestrial Life

Gina Pantano

Mentor: Dr. Ethan Deneault

The discovery and characterization of exoplanet atmospheres has been a growing field over the last decade. With the James Webb Space Telescope (JWST) launching this year, we will expect to see a significant increase in the number of habitable exoplanets discovered. The most promising indications of life beyond Earth will rely on the detection of atmospheric biosignature gases, such as oxygen, produced by the presence of life on the extrasolar world. The basic techniques used to study exoplanet atmospheres, transmission spectroscopy and observed secondary eclipses, will be discussed along with our current limitations and future observing facilities, including the JWST. I will also provide an overview of the diverse properties of exoplanets from previous observational results, including their chemical makeup, planetary systems, and atmospheric conditions. Overall, the study of exoplanet atmospheres is essential in determining if a planet is habitable or likely inhabited with the ultimate goal of answering the most pressing question, “are we alone?”

25) Effects on Vaccination Rates in Communities Around the World

Kaitlin Modica, Kallista Cors and Serafina Cinicola

Mentor: Dr. Alyssia Miller De Rutté

Our research aims to identify how religious and sociocultural aspects affect vaccination rates in different communities. This study consisted of an in-depth systematic review using already published academic journals and data to draw a conclusion. Multiple communities experience low vaccination rates due to religious beliefs that have been implemented into society. Different religions tend to have beliefs that prevent them from receiving aid against disease. They see vaccines as a hindrance rather than a cure. That attitude carries on through different generations, only encouraging the widespread dispersal of many diseases. Rural areas were found to have low vaccination rates due to socioeconomic status and level of education. Those same populations were not well informed on the benefits of vaccinations and healthcare to be able to understand how vaccines work and prevent disease. In poorer communities, lack of education played a key role in low vaccination rates. This included the rural African and Middle Eastern communities. There is also a divide in regards to political views. Overall, a wide variety of factors affect the rate of vaccinations within communities. We found the main obstacles to be religious beliefs and sociocultural aspects which impede vaccinations.

26) Perceptual Salience of Race and Gender

Nia Dyson and Lauren Sass

Mentor: Dr. Benjamin Marsh

Research has shown that females exhibit an own-gender effect, they are better at remembering female faces than male faces. Previous research has also found evidence of the cross-race effect (CRE), that people are better at remembering faces of their own race compared to other races. This study investigated how the CRE is altered by this own-gender effect. More specifically, for female participants, we predict that the cross-race effect will be more prevalent in male faces than female faces. In experiment 1, white female participants studied a diverse array of 32 racially unambiguous faces (Asian, Black, Latino and White). The CRE was seen across all male faces, but only partially seen in female faces. In experiment 2, white female participants studied 64 racially unambiguous and ambiguous faces. The CRE was less prevalent among racially unambiguous female faces than racially unambiguous male faces. Experiment 3 replicated the procedure of experiment 2, but asked participants to identify the racial category of each face studied. In this context the CRE was equally prevalent in female and male faces. This suggests that identifying the racial ethnicity of the faces erases any memory advantages that female faces had over male faces in experiment 1 and 2.

27) Reducing Stress in College Students

Hannah DeCosta, Pamela Font, Alexander Rolle, Brooke Haney, Alexandra Herrman, Kayley Mount, Rachel Packard, Devinn Searfass and Megan Waddell

Mentor: Dr. Erica Yuen

The purpose of our study was to compare a 2-week peer-delivered mindfulness meditation intervention with an adult coloring intervention and a control condition that received general stress reduction tips. Participants were randomly assigned to an experimental group (mindfulness meditation, or adult-coloring) or the control group. Participants' levels of stress, psychological distress, anxiety, and mindfulness were measured via pre- and post-treatment assessments (online self-report surveys). Participants met with the researchers for 1 hour on Zoom to complete pre-treatment measures and complete the intervention. Periodic emails were sent with assigned exercises. Experimental condition participants were instructed to practice daily for at least 5 minutes, while control participants were told it was their choice whether to practice and for how long. After the two-weeks, participants completed post-treatment measures. We conducted mixed ANOVAs to compare changes of pre/post-treatment stress levels. Results showed that all interventions were beneficial in reducing stress and psychological distress among college students but there was no significant difference between interventions. Both control and mindfulness conditions showed significant decreases in anxiety compared to the adult coloring condition. The control condition showed significant increases in mindfulness compared to the adult coloring and mindfulness conditions.

28) Colocalization of TMEV Polymerase to Host Processing Bodies

Jonathan Soler and Olivia Lightfuss

Mentor: Dr. Eric Freundt

Host processing bodies are cytoplasmic ribonucleoprotein granules that act to slow down or degrade mRNA within cells. Many viruses such as poliovirus and hantavirus have been found to destroy or use these granules to give themselves an advantage during infection. This study is being conducted on Theiler's Murine Encephalomyelitis virus (TMEV) to determine if TMEV also utilizes them as well. BHK cells were plated and infected with the GDVII strain of TMEV and stained using an indirect antibody method for both cellular processing bodies and the 3D polymerase of TMEV. Confocal microscopy was used to image and scan for colocalization within the samples. Our preliminary findings indicate possible colocalization in earlier hours of infection, but research is still ongoing. Future experiments will utilize fluorescence in-situ hybridization (FISH) to detect viral RNA in order better understand the movement of viral genome within the host cell.

29) Anthropogenic Impacts on Biodiversity in Tampa Bay Seagrass Communities

Alex Butler, Allie Eshman, Andrew Bilodeau, Natalie Jennings, and Sami Milano

Mentor: Dr. Heather Masonjones

Seagrasses are foundation species that create habitats for a wide range of organisms. Due to their coastal distribution, seagrass ecosystems are subject to a variety of anthropogenic impacts including dredging, fishing, and water/waste pollution. In this study, one impacted and one less-impacted seagrass bed were analyzed through quadrat and BRUV testing, with 6 replicates of each per site to measure species richness and diversity. Additionally, water quality parameters were taken at both sites to evaluate differences in water pollution. The first site evaluated was the impacted bed located near a marina with consistent boat disturbance and pollution runoff from a barging company. The second site tested was the less impacted site, relatively protected by a sandbar closer to the mouth of Tampa Bay and used as an area of seagrass bed conservation restoration projects in the region, with lower overall boat traffic. The less impacted seagrass community showed overall higher biodiversity and abundance of higher trophic level fish, lower invertebrate abundance, and more favorable water quality for seagrass health compared to the more impacted site. These findings suggest that human activity has broad impacts on seagrass ecosystems.

4-5 p.m. Presentations

30) **Effects of Anthropogenic Damage on Species Richness in Tampa Bay's Seagrass**

Sarah Sexton, Alexandria C. Danz, Lauren Ridenour, Rabecka Salo, and Maxx Kirk
Mentor: Dr. Heather Masonjones

Seagrass beds are vital ecosystems in Tampa Bay, but are often damaged due to anthropogenic influences like boat strikes. This study investigates the relationship between damaged seagrass beds (*Thalassia testudinum* and *Halodule wrightii*) and the species diversity/richness of fauna in Tampa Bay, Florida. Data collection occurred at two locations in Tampa Bay, with both damaged and undamaged replicates. Push and hand nets were used to collect organisms that were then identified and counted. Additionally, seagrass density was calculated by counting individual blades inside a grid, and water samples were taken to later measure the salinity and turbidity of the Bay. After calculating Shannon's species diversity and species richness via Margalef's Index, statistical analysis was performed to determine the difference between damaged and undamaged seagrass beds. There was no significant difference between damaged and undamaged species richness in either the push or hand net collections. Additionally, while there was no significant difference between damaged and undamaged species diversity in the hand net count, there was a significant difference in the push net collections, indicating that species diversity can vary depending on the level of damage to the seagrass bed, but other factors are likely key in determining species diversity and richness.

31) **Quantification and Characterization of Microbial Communities within Sourdough Starters**

Danielle Bierman
Mentor: Dr. Lauren Logsdon

Sourdough bread has been a staple in many cultures for thousands of years and is known for its distinctive flavor characterized by the diverse microbial communities that live in the sourdough starters. The purpose of this research is to establish protocols for quantifying and characterizing the yeast and bacterial organisms within sourdough starters to lay the groundwork for future research investigating how varying environmental conditions and growth techniques alter the microbial diversity within the sourdough starters. This study involves the establishment of two initial sourdough starters that were maintained in two separate environments. Once established, the microbes in each starter were quantified by plating serial dilutions. The colony morphologies were characterized on the plates, and differential staining was used to characterize the cellular morphology. Further characterization was done using several biochemical assays. These protocols have identified at least 6 unique yeast and bacterial species present in these starter cultures and can now be used to describe how these communities change when the environment and growth conditions are altered.

32) Understanding the Approach of Health Care Professionals to Interpreter-Mediated Care

Brianna Rubenstein, Alexandria Ortiz, Sarah Manno, and Olivia Keller

Mentors: Dr. Alyssia Miller De Rutté and Dr. Robin White

The purpose of this study was to investigate interactions between patients and healthcare professionals (HCPs) through translator or interpreter mediated care. The goal was to gain insight into the perceived quality of care given by professionals who speak a language different from the HCP's primary language. This study assessed HCP's comfortability in giving care to patients who speak a different language, and their confidence in the safety and effectiveness of the quality of care given through translation or interpretation. Semi-structured interviews were utilized with HCPs who have provided care for patients who speak a different native language. HCPs were recruited by email to schedule interviews. Interview questions were transcribed and asked demographics, language training background, translator experience, and perceptions of quality of care. The interviews were analyzed quantitatively to ascertain common words, phrases, and themes. Initial results suggested the following: HCPs were monolingual, but open to learning a new language to provide quality care and trusted the interpreter or translator that mediated the patient-professional interaction if in person. However, there was a lack of confidence in communicating proper treatment and delivering information about care given to patients through interpretation over the phone which affects the quality of care given.

33) Extremophiles: Living Life to the Extreme

Kelsey Buonodono

Mentor: Dr. Ethan Deneault

The saying, "living life to the extreme" can have substantially different meanings depending on who it applies to, and extremophiles take this to a whole new level. From living in the greatest depths of the ocean to the hottest volcanic vents, extremophiles are life's greatest example of perseverance in the struggle of survival. Life on early Earth can be theorized as being a harsh and cruel environment, where only the toughest of lifeforms could have evolved. This raises a question on the adaptability of extremophiles. If they could form in such stringent conditions here on Earth, then it is theoretically viable that they could adapt on other planets. This paper analyzes the adaptations extremophiles have made in the last 40 million years and how this may impact the search for life on other planets.

34) Complementary and Alternative Medicine Use in International Students at the University of Tampa

Sydney Livingston and Lindsay Graham
Mentor: Dr. Alyssia Miller De Rutté

The purpose of this research study was to determine the medicinal choices of students at the University of Tampa (UT) to see if they changed based upon the culture in which they were living. A total of 167 participants fully completed the email survey which discussed whether they used Western medicine or complementary and alternative medicine (CAM) while attending college. The mean years they had been in the United States was 4.06 but ranged from 1 to 25 years. Participants completed the Complementary and Alternative Medicine Beliefs Inventory (CAMBI), which had three subscales. The mean CAMBI was 90.2 out of 119. The mean CAMBI for natural remedies was 15.9 out of 21. The mean CAMBI for participation in CAMBI was 25.8 out of 35. The mean CAMBI for holistic medicine was 48.5 out of 63. In conclusion, international students at UT behave similarly when it comes to CAM, and there were no differences between countries, years in the United States, or religions. However, international students have high scores on CAMBI, which indicated the need for CAM options for international students on campus. Future research will survey domestic students to compare the two groups.

35) Sick Frogs vs. Healthy Frogs: Effect on Jumping Patterns

Elana Barr and Shannon Fernandez Denmark
Mentors: Dr. Jeffrey Grim and Dr. Taegan McMahon

The proposal will expand our ongoing efforts to explore the physiological changes that occur in animals during the time course of infection by the pathogenic fungus *Batrachochytrium dendrobatidis* (Bd). The spread of this fungus has been linked to population declines and even extinctions in hundreds of species worldwide. Consequently, much effort has been dedicated to tracking the emergence and spread of this pathogen across the globe. Data from the current study will build upon a relatively limited literature regarding the biological implications of Bd infection in frogs. The devastating impacts of this infection are clearly reflected in the mass population declines following infection reported in the literature, yet information regarding the physiological mechanism(s) underlying these infections is relatively scarce. The data generated from the activities proposed would add significantly to this dearth of knowledge. For example, our previous work has shown that metabolic rate and the activities of certain enzymes in amphibian hosts are impacted negatively much more quickly than previously known. We have also shown that the impacts vary between tissues within individuals during a Bd infection. The collaborative work in this proposal will allow Ms. Barr and I to further explore how and to what extent host physiology is impacted during both the initial and longer term stages of Bd infection prior to death. The results of this work will be of wide interest to the scientific community, and she will present at both local and national meetings and be a coauthor on resulting manuscripts.

36) Analysis of Intrinsically Disordered Proteins Found in Copy Number Variant Gains Exclusive to Homo Sapiens

Johannes Ali and Daniel Maselli
Mentor: Dr. Kimberly Dobrinski

Copy Number Variation is a type of structural variation that is characterized by gains or deletions of DNA in a chromosome, which in the case of gain regions (CNVGs) may allow for multiple copies of a protein. One group of proteins that may be affected by these structural variants includes intrinsically disordered proteins (IDPs); proteins that lack a fixed 3-D structure and assume alternative binding partners and conformations based on microenvironment. The scope of this study was to locate IDPs found on CNVGs in Homo Sapiens and analyze the proteins for possible disease-progression and evolutionary-specific associations. The amino acids associated with genes found in CNVG regions were tested for disorder percentage using the web-based tool PONDR (www.pondr.com) and were classified as IDPs or non-IDPs. The IDPs found were analyzed for function using gene-ontology (GO) and were cross checked with disport for verification. In terms of disease progression, the IDPs found are associated with disease such as Huntington's disease, melanoma, hepatocellular cancer, and immunodeficiency. For evolution, the IDPs found suggest adaptations in skin, mucus, catalytic processes, and binding. These results can be the basis for future research into copy number variation in humans and possible clinical adaptations of disease progression.

37) Detection of Staphylococcus aureus in Tampa Bay recreational areas using eDNA and molecular validation by PCR

Ashley Thomas, Stella Nau, and Kathleen Sherman
Mentors: Dr. Michelle Osovitz and Dr. Bridgette Froeschke

Staphylococcus aureus and Methicillin-Resistant Staphylococcus aureus (MRSA) are gram positive, contagious bacterium that can cause infections in healthy individuals with no common risk factors. In the study presented here water samples were collected and evaluated using microbial and molecular techniques to evaluate if Tampa Bay is at high risk of infection by these microbes due to increased recreational usage. Spatial-temporal distribution of samples was designed and conducted to collect monthly from seven sites throughout Tampa Bay. Water samples were first subjected to standard microbial selection for Staphylococcus aureus and MRSA positive isolates. After microbial selection testing, eDNA was extracted in preparation for molecular verification by polymerase chain reaction (PCR). The sample genes nuc and mecA were amplified via PCR and results were compared to a known Staphylococcus aureus and MRSA positive clinical sample via gel electrophoresis. Results indicate the successful detection of Staphylococcus aureus within recreational used water bodies across Tampa Bay and these results could be an indicator of human pollution. This data presented will include analysis of microbial data against molecular verification over a 9-month period in 2020. This data will be used to rigorously evaluate the presence of Staphylococcus aureus and MRSA in the Tampa Bay with the goal to provide means to predict and inform the communities of Tampa Bay of human pollution and risk of exposure.

38) **Disabilities, Mental Health, and the Effects of Culture**

Catherine Boino, Michaela Avallon, Cristina Ciampone, and Kelly Nowak

Mentor: Dr. Alyssia Miller De Rutté

Several studies have examined the relationships between disabilities, mental health, and culture. Various cultures handle disabilities in different ways, which may or may not impact the mental health of those involved. Disabilities have also shown to bring about some mental health issues due to the stigmas surrounding the topic. The purpose of this study was to compile previous research on these topics to highlight a connection between the stigmas surrounding mental health and healthcare associated with different cultures. Studies from a systematic review were selected and analyzed by location, sample data, data collection, and ethnicity. Twenty-five articles described the relationships between disabilities, mental health, and culture. Overall, the studies showed that there is a correlation between culture and mental health for those with disabilities. The various countries and ethnicities examined treat those with disabilities differently, which is often damaging to the mental health of these individuals. Each location also has distinct factors unique to that location that impact the care of those with disabilities as well.

39) **Copy Number Variation and Obesity in *Danio rerio***

Shivani Desai

Mentor: Dr. Kimberly Dobrinski

Obesity is a worldwide epidemic resulting in increased morbidity and mortality. It is proposed here that overfeeding *Danio rerio*, (zebrafish), will provide an effective model for studying human obesity. This hypothesis is based on the knowledge of the genetic and structural commonalities between zebrafish and humans that have allowed zebrafish to be used for other types of human research. Fish were fed normal and high-fat diets over 8 weeks and Body Mass Indexes were analyzed using ANOVA (p -value $1.04e-11$) and a Post-hoc Tukey Test. Results indicated the BMIs from fish-fed high-fat diets were statistically significant from each other. Furthermore, histological procedures such as the oil red stain indicated that *Danio rerio* fed on the high-fat diet contain a greater number and larger-sized adipocytes which are a marker of increased adipose tissue because of the diet. It is also proposed that an increase in Body Mass Index (BMI) will lead to changes in the genome of the fish, Copy Number Variance (CNV's), measured by DNA and RNA sequencing analysis. CNV's are associated with obesity-related diseases such as Hepatic Steatosis and Type 2 Diabetes.

40) Protein Domain Parsing and Visualization Software Tool

Nathan Eolin

Mentor: Dr. Padmanabhan Mahadevan

Some of the most important methods of data analysis across the science disciplines are dependent on the use of computer technology, especially software developed for the biological sciences. Right now, there is a lack of ways to visualize protein domains that are contained within a sample, and even fewer programs that are able to be used as a pipeline in conjunction with the other bioinformatics tools. In this research project, the goal was to produce a tool to help other scientists with the visualization of their data through the creation of a python-based bioinformatics pipeline. Throughout this project, methods have included the learning and utilization of the Python coding language and learning the capabilities and limitations of Operating Systems like Mac OS X and Linux were to help with the project but also to help the student with his future career in bioinformatics. The results of this research concluded on two parts of code, a graph visualizing the output of the program Interproscan, and the other to interpret the output of Interproscan into a readable format by the graph. These two sets of code will be used to create a program that can be published in a bioinformatics journal.

41) Enhanced Lanthanide Extraction with Tripodal CMPO Ligands

Wyatt Larrinaga

Mentor: Dr. Eric Werner

The progression toward the development of new technologies and advanced materials that utilize the rare earth elements (REEs) has led to a focus on improving ways of acquiring these valuable metals. Mining REE ores provides a major source stream, but these processes are often cumbersome and produce large amounts of hazardous waste. This has resulted in increased attention on improving the separations processes that occur during mining to make them more efficient and environmentally conscious. Further research in this area also has the potential to increase the viability of additional REE source streams such as from nuclear and electronic waste (i.e., “e-waste” recycling). Previous work conducted by our group has suggested fluctuation in metal extraction efficiency based on variation in the liquid-liquid extraction protocol (e.g., stir time and metal chelating agent size). This project will focus on the effect variation in stir time has on extraction efficiency of Gd(III) from aqueous solution utilizing an extraction agent previously prepared which incorporates three carbamoylmethylphosphine oxide (CMPO) metal binding units connected through a tris(2-aminoethyl)amine capping structure (TREN-CMPO-Ph). Additionally, the synthesis of a novel extractant employing three CMPO binding groups connected by a 1,1,1-tris(aminomethyl)ethane capping structure will be reported (TAME-CMPO-Ph).

42) Xenarthrans and the Evolution of the Mammalian Brachial Plexus

Daniella DeFelice

Mentor: Dr. Mason Meers

The brachial plexus is formed by interconnected spinal nerves that give rise to branches which innervate the muscles associated with the pectoral limb. Historically, the utility of this anatomical structure has largely been associated with practical medical and veterinary interests, although recently the utility of the plexus in understanding mammalian evolution has been explored. In this study, we examine published dissections of the brachial plexus of two Xenarthrans, including *Myrmecophaga* and *Bradypus*, and add them to a growing database of mammal brachial plexus morphology. Viewed in a phylogenetic context, this meta-analysis uses character optimization, also known as trait mapping to better understand the evolution of the mammalian brachial plexus. The results allowed us to recognize several traits that characterize placental mammals that were previously not known as shared-derived characters for the clade, while also identifying traits within Mammalia that are evolutionarily informative. Unique traits are common throughout the plexus, which is also known to exhibit substantial polymorphism. The traits that characterize large clades may be indicative of developmental constraints on brachial plexus morphology.

43) A Systematic Review to Determine Barriers Latinos Face in the ED

Genesis Hernandez Garcia, Emma Sheehan, Kyle Cleaver, Paige Hunt, and Riley Pay

Mentor: Dr. Alyssia Miller De Rutté

Barriers in the Emergency Department (ED) have been studied among different populations, but not much is known about the obstacles that Latino populations face as compared to those of other cultures. The purpose of this systematic review is to determine barriers that Latino populations face in the United States while receiving care at Emergency Departments, focusing specifically on ones that compare to other ethnic groups in the United States. Using multiple databases, applicable studies were selected for analysis based on spoken language, personal identification as Latino, length of time in the U.S., maternal citizenship, etc. Fifteen eligible articles showed various barriers Latinos face when accessing treatment in the ED in comparison to different ethnic groups. Overall, the studies that were reviewed provided results that were inconclusive due to the variety of certain topics that were discussed, which results in a need for further investigation. Based on the data collected, it was determined that Latinos face specific obstacles that affect their access to health care, or the specific care received.

44) The Road to a Successful Human Mission to Mars

Kayla Diaz

Mentor: Dr. Ethan Deneault

Exploring space was once a tale reserved for science fiction and dreams. Years of scientific ingenuity and passion have led us to the dream itself. NASA, along with its partners, are now in the stages of preparation to develop the technology needed for humans to live on Mars and research the Red Planet firsthand. NASA's Artemis Lunar Exploration Program will focus on exploring the Moon further to enable the progression of operation Gateway. The Gateway will be an operational test allowing astronauts to experience Mars simulations on the moon, called Analogs, which gather information needed for the types of technologies Mars will require as well as investigating explorations risks to human health. This research will investigate the way Artemis will help prepare the agency for the next step in space exploration, delving into the new technologies being created and the human research that will be performed, both mental and physical.

45) Possible RNA-precursors and reforming the RNA World Hypothesis

Nick Argentieri

Mentor: Dr. Ethan Deneault

The RNA World Hypothesis theorizes that self-replicating RNA precursed and eventually evolved into DNA, which replaced RNA as the genetic information system for life. The mid-1980s discovery of ribozymes shows that RNA molecules can serve as catalysts for replicating, making proteins unnecessary in the RNA world model. Although ribozymes bolster the RNA World Hypothesis, the model is still conflicted. Studies have shown that for RNA to have self-replicating capabilities, it needs to be 40 to 100 nucleotides long and assembled from random polymerization. A study by Tomonori Totani of the University of Tokyo shows that self-replicating RNA is not expected to form in the observable universe more than once. However, the abiogenesis occurrence of Earth being relatively early into its life suggest that this might not be the case. A possible precursor to both RNA and DNA might resolve this discrepancy and raise the likelihood of abiogenesis where the necessary materials are present.

46) Kepler-22b: The first of many

Asim Arain

Mentor: Dr. Ethan Deneault

The term "habitable zone" is defined as a distance range that a planet can be away from its star where conditions are optimal for liquid water to exist on the surface. In 2011 scientists discovered Kepler-22b, the first planet to be found within the habitable zone of its star. Scientists since have found many more planets within the habitable zone, with optimistic views of discovering more that we would hope to discover. This paper will explain what we know about Kepler-22b and how it can lead us to further discoveries of other planets within their habitable zone.

47) Behind the Rover Scenes

Allison Jones

Mentor: Dr. Ethan Deneault

Throughout the world, people eagerly wait for the departure and landing of the newest rover with hopes of discovering more of what lies out in the vast universe. Behind this excitement, lies the scientists and engineers who pour all their time and effort into the creation of these rovers for years before they depart and leave the rest of the world in awe. These scientists and engineers are the ones who make the possibility of discovery possible and so often their work gets lost in the excitement of the rover's journey. However, the most important part of these rovers is the technology and innovation that they require. As each new rover is built, the development of technology allows for new possibilities for exploration. Throughout this presentation, the technology behind the rovers will be discussed in detail with highlights on the most famous rovers.

48) Life on Titan

Sean Knapp

Mentor: Dr. Ethan Deneault

Humans continue to look for life in the cold, dark vacuum of space. It has been established that there is no life on any other planets in the solar system, with the exception of microscopic life, such as extremophiles. However, this does not necessarily rule out the possibility for life on some of the moons in the solar system. Titan, Saturn's largest moon, has an atmosphere containing numerous organic compounds, such as nitrogen and methane. Some of these compounds are similar to that of on Earth. These organic compounds form when sunlight destroys and breaks down methane. The question remains, how is methane penetrating the atmosphere if sunlight is always destroying methane? Besides Earth, Titan is the only body in the solar system to contain liquid water. Henceforth, where there is water, there is life. Water is what kick-started life on Earth when the earliest cells started forming in the depths of oceans. Even though Titan is much colder than Earth, there is still a strong chance that life can exist on this moon because of the atmosphere and the presence of water. Is Titan's atmosphere and possession of liquid water enough to foster life?

49) Impact of National Diet with Respect to Diabetes and Obesity

Karoline Gajewski, Jaxon Cooper, Emily Nicolich, and Kristin Dunn

Mentor: Dr. Alyssia Miller De Rutté

Diabetes and obesity have become a worldwide health crisis in developed countries such as The United States, Spain, and Costa Rica. This systematic review has displayed correlations between dietary intake and the prevalence of these diseases in each country. Using a literature review while assessing the diets research supported that Spain's Mediterranean diet was proven to be healthier, thus leading to lower levels of diabetes and obesity. The intake of processed foods was found to be higher in the United States and Costa Rica. The United States has a reputation of high levels of obesity from the large amount of easily accessible processed foods. It was concluded that Costa Rica has just recently seen an increase in obesity rates with the shift in diet from a decrease in beans, vegetable, and dietary fibers to an increase of total added sugars. The rise of obesity was positively correlated to the increase in diabetes. Restorative measures in the medical field such as the artificial pancreas have been developed to help individuals control diabetes. Studies have shown that implementing learning seminars to help identify which foods have health benefits and which ones to avoid can help lower rates of diabetes and obesity.

50) Developmental Investigation into Emotional Validation

Alyssa Wence

Mentor: Dr. Meredith Elzy

Chronic emotional invalidation at a young age can negatively influence many components of children's emotional development (Linehan, 1993). We sought to investigate children's understanding of Emotional Invalidation and Emotional Validation and the impact these behaviors have on someone's feelings. We hypothesized that participants of all ages would recognize that emotional validation encourages emotional well-being. Based on developmental socialization processes, we predicted that younger children would have a harder time identifying and understanding emotional invalidation and its effect. We recruited a sample of 19 school age children (13 female, 6 male), age 11-17, from a local preparatory school. Participants watched a short video clip from the movie *Inside Out* which depicts an emotionally validating and invalidating response. After the video clip was finished, participants were asked about a series of questions to evaluate their depth of understanding. We used grounded theory (Saldaña, 2016) for the overall systematic approach to analyze our qualitative data. Analysis of participants' level of emotional understanding revealed that all participants were able to accurately identify and explain other's emotional experiences. Similar themes emerged across all ages, but older participants provided more elaborative answers. More details regarding specific codes and themes will be presented.

51) Emotion Regulation

Ashley Barall, Surumya Bhargava, and Madelyn Sandone

Mentor: Dr. Sarah Urban

Emotion regulation is the ability to modify an emotional response to be consistent with goal-directed behavior (Schmeichel & Tang, 2014). Research suggests that emotion regulation is dependent on executive functions (McRae et al., 2012; Stawski et al., 2010). Three executive functions implicated in emotion regulation are working memory, behavioral inhibition, and task switching. The purpose of this study is to examine the extent to which executive functions predict emotion regulation skills among a sample of college students. Forty-one undergraduate students participated in the current study. Emotion regulation was measured using the Difficulties in Emotion Regulation Scale (Victor & Klonsky, 2016). Performance-based indices of working memory, inhibitory control, and task switching were measured using computerized tasks. Results revealed that worse task switching ($r = .379$, $p = .023$) was significantly correlated with difficulties in emotion regulation. Task switching requires flexible thinking as the mind switches from one thought pattern to another. Better emotion regulation may involve flexible thinking to modulate appropriate emotional responses to be consistent with one's goals. Neither working memory ($r = -.026$, $p = .878$) nor behavioral inhibition ($r = -.130$, $p = .334$) were significantly associated with emotion regulation. However, a multiple regression model using working memory, task switching, and behavioral inhibition as predictors of difficulties with emotion regulation was not significant ($F(3,31)=1.87$, $p=.155$, $r^2=.153$). This may indicate that emotion regulation relies on a component of executive function that is common among the three main executive functions, but not specific to task switching.

52) Vaping Influences and Perceptions Among College Students with Asthma

Briana Lipski, Rheese McNab, and Isabella Carabio

Mentor: Dr. Mary Martinasek

The long-term health risks associated with the use of electronic nicotine delivery systems (ENDS) is still a topic of concern in public health. The use of these devices has been linked to the inhalation of many harmful chemicals, carcinogens, heavy metals, nicotine, and irritants that can trigger the inflammation of an asthmatic user's airways. Our study sought to assess influencers of use with asthmatic students. An online survey was administered in 2019 via Qualtrics to undergraduates attending the University of Tampa. The data was analyzed using SPSS version 25.0 to evaluate UT's asthmatic students' behaviors, demographics, and attitudes pertaining to vaping/JUULing. Our sample size consisted of 315 participants who self-reported having asthma ($N=315$). Most student participants were White/Caucasian females of ages 18 and 19. Of these, 33.3% said that their friend influenced them to vape ($n=105$). Students responded that their preferred ENDS is the JUUL and that they had primarily vaped nicotine and THC. There was an association between how many times a student vapes in a day and positive perceptions of the device (p value= 0.028, 0.013). Based on the results, students who vape more frequently during the day are less likely to believe that vaping is harmful, and students who vape less frequently tend to believe that vaping is harmful. Therefore, programs that focus on educating young adults

around the health risks associated with vaping and how ENDS may aggravate their asthma symptoms should be implemented.

53) An Exploration of Risky College Students' Behaviors in the Midst of the COVID-19 Pandemic

Rheese McNab

Mentor: Dr. Mary Martinasek

Risky behaviors among college students remains a great public health concern. The health risks associated with the chemicals and toxic substances inhaled through vaping and the overconsumption of alcohol are prime areas of concern. Vaping has been linked to mental health issues like stress, depression, anxiety, and the increased risk of substance use. This research explored risky behaviors of college students during the pandemic. We hypothesized that product use would increase when students were forced to go online from a fully face-to-face teaching platform. An online survey through Qualtrics was sent to all undergraduate students at a private institution in Florida in April. The survey was approved by the university's institutional review board. Data was uploaded into SPSS version 26 for analysis. The sample consisted of 759 students. The data consisted of an even percentage of grade levels at the university, however, 78% of the respondents were female. Over half of the students returned to their parents' home. Of those who vaped, 1/3 quit vaping and only 1% started vaping during the transition. Most students had no reason for vaping, while 15% vaped to reduce stress and 10% replied with boredom. Positive experiences associated with vaping consisted of head rush and nicotine high, while negative experiences consisted of coughing, shortness of breath and dizziness. When asked about other products used, marijuana ranked highest. Regarding alcohol consumption, 30% reported no change, while equal numbers reported increases and decreases. Although the pandemic created stress and unplanned transition to remote teaching and learning, vaping behaviors decreased among this sample of college students, suggesting that possible barriers existed at home and that the behavior may have more social implications. Alcohol consumption varied across the sample suggesting different living and social conditions may factor into predicting drinking behaviors.

54) Short-term Event Influence on Mangrove Prevalence

Rebecca Riccardi and Clell Carnes

Mentor: Dr. Michael Slattery

Florida wetlands feature salt-tolerant vegetation such as mangroves and saltmarsh grasses. Wetlands are important as barriers to storm damage, in sequestration of carbon, and as nurseries for juvenile species. Despite serving similar functions, the two wetland types are distinct. In Cedar Key, FL, a transition from saltmarsh to mangrove appears underway. Mangrove dominance seems to be an occurrence driven by tropical systems (may promote growth) and frost the events (inhibit growth). Over the study interval, 2016-2019, no frost events were evident, but seven tropical systems with documented surge impacted Cedar Key. ArcGIS was used to complete heads-up digitization on aerial imagery in order to quantify mangrove extent. Ground truthing was conducted to verify the digitization. The results indicated 135.3 mangrove acres in 2016

expanding to 145.7 acres in 2019. Some instances of dead mangroves were also recorded over the interval (0.1534 acres). However, dead mangroves appeared to be recovered by the Fall 2020 ground-truthing. High-energy storms are concluded to cause immediate damage to mangroves, but overall lead to an expansion over short timescales. They also may play a role in long-term conversion of saltmarsh to mangrove, while a lack of frost events is no longer inhibiting expansion.

55) Laws and Policies Surrounding Revenge Porn

Jacqueline Zogby

Mentor: Dr. Kathryn Branch

Revenge porn, more recently termed image-based sexual violence, is the non-consensual sharing of images or videos with others; typically, this is carried out by former intimate partners. Currently, 46 states have revenge porn laws in place; however, no federal legislation has been passed. This is detrimental to victims of revenge porn since each state law has varying consequences, and there is no consensus between states. This independent study seeks to explore the disparity among state laws concerning charges and penalties along with certain factors, such as whether the state restricts protection based on age or intent to cause distress. Moreover, this study examines how copyright law and one's First Amendment protections impact revenge porn cases.

56) Carbazole Derivatives as Photocatalysts for the C-H Arylation of Furan

Kevin Ribeiro

Mentor: Dr. Ashley Longstreet

Photoredox catalysis has gained considerable attention in recent years due to the ability to induce single electron transfers under mild conditions. The field of photochemistry has been dominated by metal photocatalysts. However, organic photocatalysts have gained popularity because of their unique reactivities and lower toxicities. Herein, an investigation into the potential of an electron-rich carbazole to act as a photocatalyst in the C-H arylation of furan was performed. Carbazoles, nitrogen-containing heteroarenes, are organic molecules of interest because they exhibit unique redox properties that have the potential to reduce aryl radicals for the arylation from alkyl halides. Carbazoles may also be beneficial because they would not require a sacrificial electron donor like other photocatalysts. In this investigation, 2-chlorobenzonitrile was used as the arylation substrate. A compound resembling the desired product was seen by ¹H NMR spectroscopy, and could have formed in 69% yield. To confirm the identity of the product, an attempt to isolate the product from the mixture and synthesize the compound using other methods was performed. Currently, the isolation and synthesis have been unsuccessful. Therefore, an additional investigation into the arylation of a different substrate, N-phenylpyrrole, has begun. The product of the N-phenylpyrrole reaction mixture is currently being purified and characterized.

57) **There's Something in the Water!**

Magen Hoch, Olivia Guinther, Julia DeMatteo, Ngoc Le, Michelle Sydoruk, Richard Clark and Frederic Montz

Mentors: Dr. Kimberly Dobrinski and Dr. Michelle Crosby

Total Trihalomethanes (TTHM's) are carcinogenic by-products that are formed due to the chlorination of drinking water. A headspace GC-MS method has been optimized for sensing the TTHM concentrations within Hillsborough county. Parameters were set in place to better detect the individual THMs: chloroform, bromoform, bromodichloromethane, dibromochloromethane concentrations, and to determine the free chlorine and bromine levels (determined by chlorometer and bromometer) in the drinking water around the Tampa Bay area. For optimization of sensitivity, the following parameters were changed: run time from 8.00 min to 15.33 min, flow rate from 1.0 mL/min to 0.8 mL/min, GC oven temperature from 80°C to 40°C, vial incubation time from 3m:ss to 5m:ss, front inlet temperature from 175°C to 200°C, speed of injection from 250µL/s to 500µL/s, split ratio to 20:1, GC cool down time to 7.00 min, desorption time from 30 s to 300 s, and fill speed from 100µL/s to 200µL/s. These parameters allow measurements of TTHM to ppb. The TTHM concentrations found in the drinking water were compared to the TTHM standards (EPA: 80 ppb, WHO:10 ppb, EWG: 0.15 ppb). Correlations between TTHM's found in drinking water and head-and-neck cancer rates by zip code in the Tampa Bay area will be evaluated.

58) **Machine Learning in Medical Research: Classifying the Human Adenovirus**

Breanna Arbanas

Mentor: Dr. Padmanabhan Mahadevan

Machine learning is a novel world to all, even the ones who practice it daily. This idea of teaching computers to think critically like a human being, is an idea some people feel is unnatural but others can see the potential it holds. In this research, machine learning techniques were utilized in order to test the accuracy of the computer to classify strains of the Human Adenovirus. Six different strains (A, B, C, D, E, F) of the human adenovirus were collected from Gen-bank totaling 654 complete genomes. Training and test sets were then created for the collection and genomes and a 10-fold cross validation process was used to allow for a test of accuracy of the model. The collection of genomes was split 80/20 into training to testing ratio and stripped of all identifying symbols and numbers. The following 7 different classifiers were used SVM, RTF, ADA, J48, IBK, BAG, NBA from the online bioinformatics server called CASTOR, and varied the metric, classifier, and feature of each serve to find the best possible combination. After the training period, it was concluded that no metric, feature, nor classifier outperformed the other, which led to the testing period to consists of each classifier, and all combination of parameters. The number of missed instances corresponding to the number sequences in the whole groups produces a high accuracy and precision percentage. This would allow the for the conclusion that these artificial intelligence tactics can be used to classify the different strains of the human adenovirus and therefore can be utilized and researched further to access information about other viruses.

59) Anatomy of an Isolated Population of Bahamian Seahorses: How Different are the Sweetings Pond Seahorses?

Taylor Tataris and Dimitra Theodosiadis

Mentors: Dr. Mason Meers and Dr. Heather Masonjones

An isolated population of the Lined Seahorse, *Hippocampus erectus*, living in a marine pond isolated from the open ocean presents an unusual opportunity for the study of evolutionary phenomena. The population, largely isolated from predators, has been shown to occur at significantly higher density than any other seahorse species, potentially changing the selective pressures acting on them. We compare the head morphology between the isolated seahorse population (images from Masonjones et al. 2019) and their open ocean conspecifics (museum specimens). Ocean populations of *H. erectus* are known to exhibit sexual dimorphism in the body, with females exhibiting larger bodies and males having longer tails. We tested the hypothesis that cranial anatomy was also sexually dimorphic, and that the isolated population would differ from the ocean population. Using the geometric morphometric technique, Euclidean Distance Matrix Analysis, we found that sexual dimorphism is also present in *H. erectus* cranial anatomy among open ocean populations, and that the pond population is slightly less sexually dimorphic. This research is the first to document sexual dimorphism in cranial anatomy of *H. erectus* and suggests that the isolated pond population has diverged from the primitive condition found in the parent population.