FLORIDA ATLANTIC UNIVERSITY

9th Annual Broward Student Research Symposium

Friday, November, 15 2019
9:00AM – 1:00pm
University/College Library
First Floor
Davie Campus

Agenda	
8:30am-12pm	**On-going Registration**
8:30 – 12:30pm	**On-going Light refreshments**
9:15– 12:45 pm	**Doctoral, Masters, Undergraduate**
	Oral Presentations (LY 146)
9:15– 10:30 am	**Doctoral & Masters Poster Presentation, Undergraduate Visual Arts Presentation**
10:45-12:30pm	**Undergraduate Poster Presentation**
12:45-1:15pm	**Judging wrap-up**
1:15	**Announcement of Winners**

Ninth Annual Broward Student Research Symposium Schedule

D1-D11: DOCTORAL Submissions

M1-M4: MASTER'S Submissions

U1-U40: UNDERGRADUATE Submissions

Doctoral, Masters, and Undergraduate Oral Presentations 9:15AM-12:30PM

Doctoral Posters 9:15AM-10:30AM

Masters Posters 9:15AM-10:30AM

Undergraduate Posters 10:45 AM-12:45 PM

Oral Presentations

Room LY 146

Doctoral, Masters, and Undergraduate

9:15AM-12:15PM

D1: 9:15AM High Discharge Events: Effects on Common Snook, Centropomus undecimalis, in St. Lucie Estuary

Lauren Kircher, lkircher2015@fau.edu, doctoral student, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. John Baldwin

Discharge events in managed waterways may alter the timing of fish spawning movement resulting in a temporal mismatch of food supply, spawning conditions, or typical dispersal patterns. Common snook in south Florida serve as a model of large euryhaline predators that

encounter water discharge events. The majority of discharge events coincide with both the rainy season and snook spawning season. Snook likely use temperature and freshwater flow cues to initiate movement to spawning aggregations in high salinity waters. This research seeks to understand if and how discharges in St. Lucie alter environmental conditions and may cue snook movement and impact reproductive success. A comprehensive understanding of these impacts will improve the management of both estuarine fish and waterways, further protecting mobile species and sustaining the recreations that depend on them.

D2: 9:30AM Wearable Sensors for Estimation of Parkinsonian Tremor Severity during Free Body Movements

Murtadha Hssayeni, mhssayeni2017@fau.edu, doctoral student, Department of Electrical and Computer Engineering and Computer Science, College of Engineering and Computer Science, Mentor: Dr. Behnaz Ghoraani

Tremor is one of the main symptoms of Parkinson's Disease (PD) that reduces the quality of life. However, the assessment is based on onsite physical examinations and does not fully represent the patients' tremor experience in their day-to-day life. Our objective in this work was to develop algorithms that, combined with wearable sensors, can estimate total Parkinsonian tremor as the patients performed a variety of free body movements. We developed two methods: an ensemble model based on gradient tree boosting and a deep learning model based on long short-term memory (LSTM) networks. The developed methods were assessed on gyroscope sensor data from 24 PD subjects. Our analysis demonstrated that the method based on gradient tree boosting provided the highest correlation ($r = 0.93$) between the estimated and clinically assessed tremor subscores in comparison to the LSTM-based method with a moderate correlation ($r = 0.77$).

D3: 9:45AM Flexibility under fire: repeatability of aggression and boldness in Bachman's sparrows

Joseph Niederhauser, jniederhause2015@fau.edu, doctoral student, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. Rindy Anderson

In changing environments, behavioral plasticity should be favored when the cost is low and individuals can match their behavior to environmental conditions. However, some behaviors can become fixed and consistently covary as animal "personalities," but personality traits can be plastic in some cases. Are personality traits plastic in frequently disturbed environments? To explore this question, we studied aggression and boldness in the Bachman's sparrow, a songbird that experiences frequent fire every 1-3 years. We measured aggression over four years and boldness over two years. Aggression and boldness varied across years, had low repeatabilities, and were not related to one another. Aggression was related to density and fire: sparrows were very aggressive in greater densities that may arise after a fire. However, boldness was not related to any environmental factors. Bachman's sparrows are flexible in their aggressiveness and boldness, but what remains to be tested is why boldness changes with time.

D4: 10:00AM Genotypic Sperm Sorting: A less invasive "ART" to prevent Genetic Disorders in Newborns.

Olumide Adenmosun, oadenmos@fau.edu, doctoral student, Dr. Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. James Kumi-Diaka, Dr. Waseem Asghar

Genetic disorders like sickle-cell, cystic-fibrosis and X-linked diseases such as hemophilia are inherited by offspring from parents who are healthy carriers of the autosomal or allosomal recessive gene. About 10-million Americans are carriers of the cystic-fibrosis gene; 1 in 8 African-Americans is a carrier of the sickle-cell gene, and in some parts of Africa, about 1 in 4 individuals have the sickle-cell trait. Therefore there is a high occurrence of genetic-disorders in newborns from such "at-risk" couples who are healthy carriers of clinically significant mutant genes. Our research therefore seeks to propose a less invasive method of orchestrating safe conception by genotypically sorting sperm cells using biological markers on the sperm cell membrane.
By using microfluidics and immunomagnetic separation techniques with specific monoclonal anti-sperm antibodies, we have been able to delineate sperm populations by their genotypic characteristics, thus paving a way to minimize the occurrence of genetic disorders in newborns.

D5:10:15AM A new approach for preparing SC-514 loaded PLGA particles by single emulsion method

Toluleke Famuyiwa, tfamuyiwa2014@fau.edu, doctoral student, Dr. Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. James Kumi-Diaka

Poly (lactic-co-glycolic acid) (PLGA) is a non-toxic and non-injurious subdivision of biodegradable polymer that does not cause immunological rejection. PLGA has been successfully used to encapsulate drugs and to deliver drugs in various applications. PLGA is becoming more popular in new applications because it has been approved by FDA (Food and Drug Administration). SC-514 is a relatively new hydrophobic dug, which has been shown to exhibit anti-cancer effects via inhibition of NF-KB dependent gene expression in cancer cells. In this study, SC-514 was encapsulated in PLGA nanoparticles via single-emulsion method. The SC-514 loaded PLGA nanoparticles (diameter=49.4nm) synthesized have the potential to increase the bioavailability of SC-514 drug in prostate cancer treatment. Hence, increasing the therapeutic effect of SC-514 in prostate cancer treatment.

D6:10:30 Selection of High Quality Sperm with Lower DNA Fragmentation

Afrouz Ataei, aataei2014@fau.edu, doctoral student, Department of Physics, Charles E. Schmidt College of Science, Mentors: Dr. Andy W.C. Lau, Dr. Waseem Asghar

The first step of in-vitro fertilization is to sort the motile sperm from the non-motile. Centrifugation based sperm swim-up and density gradient separation are common methods to sort sperm. However, these methods reduce sperm quality during the repetitive centrifugation

steps and isolate sperm with high DNA fragmentation. In this work, we construct a microfluidic device based on the observation that motile sperm can swim against the flow within a specific range of flow rates. This sperm-sorting device consists of two chambers, top and bottom separated by a filter. The sorted motile sperm is collected from the top retrieval chamber and placed on a glass slide for visual inspection and data collection. We find that 1)the most motile and functional sperm pass selectively through the micropores; 2)the optimum flow rate is the one that gives the lowest DNA fragmentation and higher percentage of morphologically normal sperm. Our device provides an efficient, inexpensive way to sort sperm without the disadvantages of centrifugation.

M1: 10:45AM Thyme Heals: The Impact of Horticultural Therapy on Individuals with Dementia Related Diseases

Doren-Elyse Marquit, dmarquit@fau.edu, graduate student, Department of Counselor Education, College of Education, Mentor: Dr. Ayse Torres.

Horticultural Therapy is the intersection of people and plants. The therapist acts as a guide, helping clients achieve specific goals while engaging in garden related activities in a welcoming and peaceful environment. These goals may include rehabilitation, vocational training, and/or wellness- allowing clients to gain independence, self-awareness and social skills. 50 million people worldwide suffer from dementia, many of whom have various physical and emotional issues that accompany the disease. This program will explore the ability of Horticultural Therapy to improve wellbeing and enhance quality of life within those living with Dementia related diseases.

U1: 11:00AM Engineering of Novel Peptide Inhibitors for Matriptase Based on Eglin C Core

Dalia Souied, dsoueid2014@fau.edu, undergraduate student, Department of Chemistry & Biochemistry, Charles E. Schmidt College of Science, Mentor: Dr. Maciej Stawikowski

Matriptase, a type II trans-membrane serine protease, is over-expressed in breast cancer cells and may be involved in breast cancer progression. Matriptase over activity results in cell proliferation, tumor growth, and metastasis through cleavage and activation of HGF. The discovery of matriptase as a breast cancer target has led to an increased need in the development of matriptase inhibitors. Eglin C is a thermally stable, 72-residue, potent inhibitor, isolated from the medical leech Hirudo medicinalis. We have engineered a novel Eglin C-based inhibitory scaffold that reduces the structure to 26 residues with added disulfide bonds for stability. Design of the inhibitory scaffold, with modifications to make it specific to matriptase, was aided by molecular dynamics studies. Chemical synthesis of the inhibitors followed the molecular design. The obtained inhibitors were characterized by circular dichroism spectroscopy, mass spectrometry, and RP-HPLC analysis. Inhibitory activity was tested with human recombinant matriptase in kinetic assays.

U2: 11:15AM Law and Social Change: Eminent Domain in the Era of Neoliberal Capitalism

Laura Marino, lmarino2015@fau.edu, undergraduate student, Department of Sociology, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Farshad Araghi

This paper develops a sociological perspective on the law. Relating the changing interpretation of law and the changing social context we argue that there are strong social forces at work towards a dual tendency, that is the "the privatization of the state" and the "privatization of law." We show this tendency by a close examination of a key case, viz., Kelo vs. the City of New London. Through developing a socio-historical genealogy of this case, we show that the neoliberal period of capitalism, or what we characterize as a period of counter-mobilization of corporate interests against the public gains of the post New Deal and the postwar period, has led to increasing application of Eminent Domain as a form of enclosure in the interest of private corporations.

U3: 11:30AM Elucidation of biomarkers in fossil plants via Raman spectroscopy

Mallory Theurer, mtheurer2016@fau.edu, undergraduate student, Department of Chemistry & Biochemistry, Charles E. Schmidt College of Science

Organic compounds undergo many changes throughout fossilization, leaving biomarkers of what once were polysaccharides, proteins, and nucleic acids. Raman spectroscopy can identify what chemical compounds are present in a sample and has been used with identifying biomarkers in animal fossils; however, plant biomarkers remain uncharacterized. Raman was used to determine the compounds that remain in plants after diagenesis and if said compounds are distinct from those preserved in animals. After analyzing a variety of plant fossils and comparing their spectra to those of animal fossils, it was confirmed that plants have distinct biomarkers. Plants are characterized by aromatic compounds, ethers, esters, and carbonyls while animals were found to have thioesters, thiols, S-heterocycles, and peptide bonds. Through principle component analyses, it was also determined that different plant phyla have distinct spectra. Raman can be utilized to identify unknown specimens, supplement phylogenetic studies, and even contribute to paleoenvironmental reconstructions.

U4: 11:45AM Student GPA vs. Work Balance

Diana Mazo, dmazo2015@fau.edu, Daniela Mazo, Estefania Ospina, Tiffany Sackett, undergraduate students, Department of Marketing, College of Business, Mentor: Dr. Pradeep Korgaonkar

Balancing a full-time job with school is a task that the majority of the people have to deal with in order to obtain a degree; not only they have to maintain a job but also some of them have families and different obligations outside their job. Our study and research go deeper into the problem in order to understand the different aspects in which a GPA can vary from student to student besides having a job and other factors that can contribute to having a lower GPA. By conducting a survey we can identify the different aspects in which a GPA can be affected. And how having a job or not having one can be positive or negative in the GPA.

U5: 12:00PM Design, Synthesis and Characterization of Fluorescent and Lipid-specific Probes for Membrane Imaging

Deborah Thomas, deborahthoma2014@fau.edu, undergraduate student, Department of Chemistry & Biochemistry, Charles E. Schmidt College of Science, Mentor: Dr. Maciej Stawikowski

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 at 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. It was found that the probes exhibit solvatochromic properties. When comparing the emission spectra of probes between the aqueous and micellar solutions, the fluorescence is greatly enhanced in the lipid environment, making the probes suitable for cell membrane imaging in live cells. These unique properties allow for elimination of additional cell washing steps. Furthermore, the probes with the piperazine moiety exhibit enhanced fluorescence in acidic environment due to the photoinduced electron transfer mechanism, making them applicable for acidic pH sensing at the cell membrane.

Visual Arts

Undergraduate

9:15 AM-10:30 PM

U6: Save the World: Sustainable Package Design System

Kelly Hodgman, khodgman2017@fau.edu, undergraduate student, Department of Visual Arts and Art History, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Stephanie Cunningham

The purpose of the project was to redesign an existing packaging system to be sustainable and ecofriendly. Reed diffusers appeal to an audience that prefer natural fragrances over the synthetic quality of traditional air fresheners. Packaging for this product should logically reflect the level of environmental consciousness of its target audience. The solution removes the excessive plastic, instead opting for a two-piece container made of basswood. It also includes a cigar band that wraps around the container and a die cut interior to hold the items inside. Mandatory information and alluring graphics complete this redesigned package system. Reusability is a key element to this package solution. Along with using only recyclable paper material, the two basswood pieces are crafted to function as shelves. Providing a level surface for the product or meeting other needs of the consumer, this adds value to the product.

U7: Save the World: Sustainable Package Design System

Robert Connor Fisher, rfischer2013@fau.edu, undergraduate student, Department of Visual Arts and Art History, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Stephanie Cunningham

The purpose is to design an eco-friendly package solution that eliminates plastic for a product currently produced with an excess of material. Disposable paper filters for reusable K-Cups are an inexpensive product used by coffee consumers with Keurig-type brewing machines. The product appeals to eco-conscious consumers as a compostable alternative to disposable plastic k-cups. The current package uses an excessive amount of plastic relative to the product. The redesigned packaging solution uses an unbleached recycled and recyclable paperboard printed with a soy-based ink that has a lower environmental impact. It is presented as a resealable hexagonal flip-top box with added storage value and visually attractive graphics distinctly different from competitors. Plastic is the go-to materials for many packages for its low cost, versatility, and reliability. However, as exemplified in this re-design, sustainably grown paperboard is a viable alternative that comes at a much lower cost to the planet.

POSTERS

Doctoral

9:15-10:30 AM

D7: The Association Between Functional Assessment of MCI and Dementia and Brain Biomarkers in an Ethnically Diverse Sample

Fernanda Arruba, farruda2016@fau.edu, Maria Barrero, mbarrero2015@fau.edu, Tatiana Pizzo tpizzo2018@fau.edu, doctoral students, Department of Psychology, Charles E. Schmidt College of Science, Mentor: Dr. Monica Rosselli

Although studies have examined the association between biomarkers of dementia and cognitive performance, little is known about the relationship between biomarkers and functional assessment. Objective: To investigate if the Functional Activities Questionnaire (FAQ) predicts biomarkers (betaamyloid load [SUVR], bilateral hippocampal volume [BHV] and bilateral entorhinal volume [BEV]). Method: 181 participants (110 female) completed a neuropsychological battery, the FAQ, an MRI, and a PET scan. Stepwise regression analyses examined the impact of the FAQ in BHV, BEV, and SUVR after controlling for demographics and general cognition (MoCA scores). Results: Those with better FAQ and MoCA scores were likely to have larger hippocampi independently of demographics. General cognition and gender significantly contributed to the model predicting BEV, while general cognition and age were significant predictors of SUVR. Conclusion: Results suggest that FAQ contributes to the prediction of BHV, which may be explained by the high association between memory performance and FAQ scores.

D8: The effect of mindfulness exposure on executive inhibition and emotion-regulation: an EEG study

Emily Ahne, eahne2014@fau.edu, doctoral student, Department of Psychology, Charles E. Schmidt College of Science, Mentor: Dr. Monica Rosselli

An electroencephalography (EEG) project is underway to analyze the effect of mindfulness exposure on measures of emotional inhibition and emotion-regulation, as compared to a control group. Participants will be recruited from Florida Atlantic University study body. EEG will be recorded throughout the duration of the experiment for measures of oscillatory patterns, asymmetry values, as well as various event-related potentials (ERPs) during two executive function tasks of emotional inhibition (i.e., emotion-salient versions of the Go/NoGo and the Stroop), and one emotional word-rating task. It is expected that the mindfulness exposure group will outperform the control group on measures of emotional inhibition (i.e., decreased Go-N2 amplitudes, shorter Go-N2 latencies, increased amplitudes and shorter latencies for both Go- and NoGo-P3; faster response times on the emotional Stroop task) and on measures of emotion-regulation (i.e., less pronounced P3b amplitude for negative words).

D9: Effects of Musical Training and Bilingualism on Executive Function: An ERP Study

Merike Lang, mlang2015@fau.edu, doctoral student, Department of Psychology, Charles E. Schmidt College of Science, Mentor: Dr. Monica Rosselli

The purpose of this study is to assess amplitude and latency differences in event related potential (ERP) components of the P3a (directing attention towards novel stimuli), the P3b (corresponding to rules held in working memory) and the P300 (stimulus evaluation and response inhibition) recorded with EEG across groups of musicians, bilinguals, bilingual musicians, and monolingual nonmusicians during executive function tasks (WCST and visual oddball). 280 participants will complete cognitive flexibility and attention/updating tasks. It is expected that the P3a will be earlier and smaller for musicians and bilinguals during shift and stay trials, with a greater decrease in amplitude across two shift trials in the P3b for nonmusicians. For the P300, there will be shorter latencies and larger amplitudes in musicians and bilinguals. Results from this study will support the transference of specific types of experience in musical training and bilingualism on cognitive-brain processing related to executive function.

D10: Smarts and symbiosis: Elucidating the relationship between the gut microbiome and cognitive performance in birds

Morgan Slevin, mslevin2018@fau.edu, doctoral student, co-presenters: Wilner Fresin, wfresnin2016@fau.edu, Gillian Cannataro, gcannataro2017@fau.edu, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. Rindy Anderson

Recent years have seen a surge of research on the link between an individual's cognitive ability and its gut microbiome. With recent advances in understanding avian cognition, songbirds are

an ideal system for investigating this relationship. In a captive Zebra Finch (Taeniopygia guttata) population, we quantified individual variation in performance on cognitive tasks that measure learning and memory. We sampled the gut microbiome via cloacal swab immediately prior to testing and await sequencing data from the bacterial taxa present, from which we will calculate diversity and relative abundance metrics in Qiime2. There was high interindividual variation in cognitive performance, and performance on certain tasks were correlated. We will relate each bird's cognitive performance to its microbiome characteristics to test for evidence of a gut-brain axis. Our results from this model species will build a foundation for future research, including understanding the microbiome during critical developmental stages and in wild populations.

D11: Exploring the Therapeutic potential of CRISPR-mediated Genetic Engineering Technology in Chronic Inflammation-driven Tumorigenesis

Saheed Oluwasina Oseni, soseni2013@fau.edu, doctoral student, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. James Kumi-Diaka

Chronic inflammation has been proposed as one of the molecular triggers of tumorigenesis. However, little is known about how certain essential molecules in the inflammatory signaling cascade can promote cancer growth and aggressiveness. Using genomic and bioinformatics analysis techniques, we have identified a novel family of inflammation-associated regulatory genes, known as interleukin-1 receptorassociated kinases (IRAKs) that may exhibit oncogenic activities. The aim of our study is to use both computational data analysis and CRISPR-gene editing techniques to mechanistically elucidate the signaling significance of IRAKs in driving prostate tumorigenesis, and the therapeutic potential of targeting IRAKs in prostate cancer (PCa) patients. Our data show that IRAK1, IRAK2, IRAK3, and IRAK4 are genetically altered and upregulated in over 40% of men with aggressive and recurrent PCa. Furthermore, our mechanistic findings demonstrate that pharmacological inhibition and CRISPR-mediated knockdown of IRAK1/4 negatively affected the proliferation, metastasis, and chemoresistance of PCa cell lines in vitro.

D 12: The contribution of bilingualism to biological markers in MCI and dementia

Valeria Torres, vtorres2015@fau.edu, Merike Lang, mlang2015@fau.edu, Joshua Conniff, jconniff@fau.edu Department of Psychology, Charles E. Schmidt College of Science, Mentor: Dr. Monica Rosselli

Bilingualism acts as a factor delaying dementia onset by allowing bilinguals to withstand greater damage without demonstrating the expected cognitive impairment. Bilinguals exhibit greater gray matter volume (GMV) loss compared to monolinguals in temporal regions, but higher GMV in language and cognitive control regions. This research will examine different aspects of bilingualism and their relationship to brain structural integrity. We included 247 participants from the 1Florida Alzheimer's Disease Research Center who are cognitively normal or diagnosed with Mild Cognitive Impairment or Alzheimer's disease. Neuroimaging and

neuropsychological data were collected, as well as language proficiency and experience. We will consider language balance, use, exposure, as well as an objective index of bilingualism and explore their relationship with GMV in regions associated with cognitive control, language, and in those reflecting atrophy due to dementia. We expect that bilingualism measures reflecting language balance and proficiency will predict the degree of atrophy.

Posters

Masters

9:15-10:30AM

M2: Involvement of Kynurenine Pathway of Tryptophan Metabolites in Phenotypic Changes of Astrocytes in the CNS

William To, wto2014@fau.edu, graduate student, Department of Biomedical Science, Charles E. Schmidt College of Science, Mentor: Dr. Rui Tao

Astrocytes, a type of glial cell, are phenotypically found in either resting or reactive statuses. Maintaining homeostatic conditions in the CNS is mainly ascribed to the role of resting cells, while neuroinflammatory activity is almost exclusively perpetuated by reactive cells. My thesis will investigate whether the kynurenine (KYN) pathway of tryptophan (TRP) metabolites is involved in the phenotypic change of astrocytes between resting and reactive statuses. In this study, I present evidence that TRP is transported into astrocytes and metabolized into KYN, and further demonstrate that the transportation effects are markedly increased in response to inflammatory stimulation. In my future studies, I will test that KYN acts as an activator at cytosol aryl hydrocarbon receptors associated with transcription of glial fibrillary acidic protein. My thesis aims to provide new insights into understanding astrocytic reactivity in drug abuse and neurodegenerative diseases.

M3: Dental Analysis of Prehistoric Populations in Coastal Ecuador

Cassandra Boyer, cboyer2017@fau.edu, graduate student, Department of Anthropology, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Meredith Ellis

This project compares the human dentition of three coastal populations in Salango, Ecuador, dating to Late Guangala (Site 141C: 100 B.C. – A.D. 800), Early Manteño (Site 35: A.D. 645 +/- 45 and A.D. 430), and Late Manteño (Site 140: A.D. 1300 – 1600). Dental pathologies such as caries, abscesses, calculus, hypoplasia, as well as dental wear patterns indicate subsistence, or diet, behavioral and cultural practices, and early developmental physiological stress. Statistical tests were performed and the data suggests that agriculture became more intensive during Site 35's occupation, whereas the other two sites simultaneously used the sea and agriculture for food, and neither practice dominated. Further, early developmental physiological stress became significantly more apparent during Site 140's occupation, suggesting these individuals

were heavily affected by climate, Spanish colonization and subsequent disease, social struggles, and/or dietary deficiency.

M4: Visualizing Sea Level Rise Impacts in Transportation Planning

Amir Koleni, akoleini2017@fau.edu, Serena Ann Hoermann, shoermann@fau.edu, graduate students, School of Urban & Regional Planning, College of Design and Social Inquiry, Mentor: Dr. John Renne

Transportation planners regularly engage communities through public meetings to seek input on planning for the future, including impacts of sea level rise (SLR) on streets and neighborhoods. Planners present ideas verbally and visually with maps and other two-dimensional (2D) media, such as photo renderings. Three-dimensional (3D) virtual and augmented reality visualizations are increasingly affordable and accessible to display on devices. In meetings of neighborhoods facing SLR impacts up to the year 2100, participants learn about SLR using traditional methods, such as verbal presentations and 2D photos, maps, and charts showing SLR impacts on their streets and take a survey on what they saw. Then attendees view SLR impacts using 3D visualization technology and indicate via a survey whether the 3D visualization technologies led to a deeper understanding of the issues.

Posters

Undergraduate

***U8 9:15AM-10:30AM Effects of MDPV on the Activation of Cortical Neurons Associated with Excited Delirium**

Giselle Shim, gshim2017@fau.edu, Rama Abdin, rabdin2017@fau.edu, undergraduate students, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentors: Dr. Rui Tao, Dr. Ibrahim Shokry.

3,4-Methylenedioxypyrovlaerone (MDPV) is a synthetic cathinone that causes signs and symptoms of excited delirium similar to symptoms of schizophrenia. The purpose of this study was to investigate regional difference in activation of glutamatergic and GABAergic neurons associated with the delirium behaviors. Male Sprague-Dawley rats were administered MDPV. Delirium behaviors were assessed by measuring hyperactivity, stereotyped behaviors and five-choice serial reaction time task (5-CSRTT). In separated tests, changes in c-fos expression levels in glutamatergic and GABAergic neurons were estimated in the prefrontal cortex (FCx), nucleus accumbens (NAcc) shell, NAcc core, and dorsal striatum (dST). Our results show that MDPV administration caused delirium behaviors in animals. MDPV also caused an increase in the c-fos mRNA expression in all measured regions. The FCx had more expression than subcortical nuclei with a rank order of FCx>dST>NAcc shell>NAcc core. MDPV administration causes regional specific activation of glutamatergic and GABAergic neurons in the brain.

Undergraduate Poster Sessions

10:45AM-12:45PM

U9: Cognitive Impairment Recognition Using Dual Task Assessment and Machine Learning

Lillian Boettcher, lboettcher2016@fau.edu, undergraduate student, Department of Computer Science, College of Engineering and Computer Science, Mentor: Dr. Behnaz Ghoraani

It is a challenge for many doctors to diagnose Alzheimer's Disease in the cognitively impaired. One promising lead to this problem, however, lies in the technique of dual task assessment, which analyzes movement data from a patient who performs both a physical task, such as walking, and a cognitive task, such as counting, simultaneously. Using Support Vector Machine Learning, the patterns in dual task movement data during a gait task can be processed and used to find the differences in data between patients with Alzheimer's Disease and patients with a mild cognitive disorder. This project is about developing a learning model that can be used on data from motion sensors to determine whether or not a patient has Alzheimer's Disease in order to assist doctors with patient diagnosis.

U10: Students Perception of Hurricanes Based on Media

Cecile Maria Montalvo Cordova, cmontalvo2016@fau.edu, Amelia Pickney, apinckney2017@fau.edu, undergraduate students, Department of Sociology, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Patricia Widener

This research project is an analysis of how South Florida university students perceived Hurricanes Irma and Dorian. We asked how did students experience these hurricanes and how did they perceive the influence of social and news media in terms of their experiences. We conducted two focus groups, four interviews and a photovoice project of five people. We found media was perceived as playing an important and helpful role in decision- making and taking action. The study also showed that media can cause stress and anxiety because it was perceived as exaggerating and portraying approaching storms as destructive and dangerous. People felt frustrated with the media when they over prepared, spent excessive amounts of money on supplies, evacuated, lost time at work, and the hurricanes changed course. They also wanted more regular updates on impacted communities after the hurricane.

U11: Comparing Overwintering Population Dynamics of Snook in St. Lucie and Loxahatchee Rivers

Delaney Frazier, dfrazier2017@fau.edu, undergraduate student, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. John Baldwin

Common snook (Centropomus undecimalis) inhabit South Florida's rivers and estuaries and they are extremely sensitive to cold temperatures. Snook are protandric hermaphrodites, so they are born as males and most transition into females as they grow. It has been hypothesized that St. Lucie serves as an important snook overwintering habitat. This study utilized acoustic telemetry data of 61 snook in the St. Lucie Estuary tagged by FWC between February 2008 and January 2012. Snook were classified as resident, overwintering transient, spawning transient, and traveler. Hierarchical clustering in R was used to group snook into these behavior types. Sex and size of snook were compared between individuals exhibiting different behaviors. This information helps us identify if some overwintering habitats are sheltering a higher proportion of larger, female snook. This will help with the management and conservation of both the species and their habitats.

U12: Exploring the Relationship Between Protandric Sex Change and Increment Growth on C. undecimalis Otoliths

Gregory Fesler, gfesler2015@fau.edu, Brent McKenna, bmckemma2017@fau.edu, undergraduate students, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. John Baldwin

The common snook (Centropomus undecimalis), a tropical, salinity-tolerant sportfish, mature initially as male and the majority later transition to female. Little is known about why this transition occurs, but it is accompanied by a change in metabolic rate which is reflected in their ear stones (otoliths). The otolith's rate of growth increases with the metabolic rate and vice versa. As a result, otoliths grow ring-like increments which can be read like tree rings. Increment analysis was used, measuring a change in the width of increments, to identify the age that an individual snook transitioned from male to female. By analyzing magnified images of snook otoliths we searched for evidence of protandric sex change. If this technique can identify age at sex change, future studies may help unravel the mystery around snook sexual change.

U13: Potentiation of Anticancer Effects of Phytochemical Compounds Using a Common NSAID Sulindac as Adjuvant Therapy in Prostate Cancer Management.

Jonathan Bonachea, jbonachea2017@fau.edu, Shaunakay Wollaston, swolaston2017@fau.edu, Ashley Mcgill, ashleymcgill2018@fau.edu, undergraduate students, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. James Kumi-Diaka

Prostate cancer (PCa) is the fourth most common cancer overall and the second most common cancer in men. The American Cancer Society (ACS) has estimated that prostate cancer will have the highest incidence rate of all non-cutaneous cancers in the United States, with greater than 174,000 men diagnosed with the disease in 2019. Chemotherapy is one of many methods of treatment against PCa, but current treatments for metastatic PCa is still underdeveloped. We hypothesize a combination of NSAID sulindac with known anticancer compounds will enhance efficacy. The aim of this study is to investigate the synergistic effects of combinational chemotherapy treatments using sulindac with a phytochemical, genistein, on AR+ (LNCaP) and AR- (DU-145) prostate cancer cell lines. Our current results have shown combinational efficacy within LNCaP, but not DU-145 PCa cell line. Further studies will seek to explore the therapeutic potential and mechanisms behind our preliminary data.

U14: Media Depictions of Secondary Teachers: Politics and Gender

Justin Hinson, jhinson2017@fau.edu, undergraduate student, Department of Sociology, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Patricia Widener, Dr. Lotus Seeley

The perception of teacher as a female-dominated job, despite secondary teachers representing a 58/42 female-male split, affects the ways in which the public perceives and judges those in the profession. This study attempts to understand how men and women high school teachers are differently portrayed in newspapers. I conducted a media analysis of three national newspapers, The New York Times, The Washington Post, and USA Today, totaling approximately 50 articles during the first ten months of 2019. I selected using the term 'teacher' and I coded by theme and gender. My tentative findings suggest there was a focus on teachers' political commentary on current national politics, including immigration. Gender differences are still being analyzed. For my poster presentation I will include a table highlighting key themes by gender differences.

U15: Differences Across Bilingual and Monolingual Scores for Verbal Fluency and Naming in Elderly Bilinguals

Leticia Prado, lprado2016@fau.edu, Layaly Shihadeh, lshihadeh2017@fau.edu, undergraduate students, Department of Psychology, Charles E. Schmidt College of Science, Mentor: Dr. Monica Rosselli

The present study analyzed the influence of bilingualism on outcomes of verbal fluency and naming tasks in Spanish and English. Participants included 331 elderly English/Spanish bilinguals and monolinguals from the 1Florida Alzheimer's Disease Research Center in Miami. We compared bilingual-monolingual scores (bilinguals' scores when being tested in Spanish and English) with bilingual-bilingual scores (bilinguals' scores when adding words said in English during Spanish tasks and vice versa). Additionally, we compared bilingual-monolingual scores with those of monolinguals. Results revealed significant differences across bilingual-monolingual and bilingual-bilingual scores for all tasks, showing better performance in bilinguals when they were not penalized for producing words in either language. Bilinguals and monolinguals also differed in performance on the MINT and English fluency tasks. The findings highlight the importance and utility of allowing bilinguals to respond in either language during cognitive testing, minimizing linguistic interference.

U16: Dissociable Effects of the Thalamic Nucleus Reuniens and Ventromedial Orbitofrontal Cortex in Executive Functioning in the Rat

Mina Dawod, mdawood2017@fau.edu, undergraduate student, Center for Complex Systems and Brain Sciences, Charles E. Schmidt College of Science, Mentor: Dr. Robert Vertes, Dr. Stephanie Linley

The nucleus reuniens (RE) has emerged as a key node in executive functioning, presumably through interconnections with the ventral medial orbital frontal cortex (vmOFC). In the present study, Long Evans male rats were tested in the attentional set shifting task (AST) that assesses attentional set formation (ASF), attentional set shifting, and reversal learning (RL). The AAV9 hM4Di designer receptor exclusively activated by designer drugs (DREADD) was microinjected into RE or in vmOFC, followed by implantation of a cannula in vmOFC or RE respectively; this allowed for projection specific inhibition of the brain regions. We found chemogenetic inhibition of RE produced significant impairments in RL, while inhibition of the vmOFC impaired RL and ASF. Suppression of RE projections to vmOFC produced significant effects on the task however vmOFC projections to RE did not. These results demonstrate that RE and the vmOFC have dissociable roles in flexible adaptive behavior.

U17: An Inverted Pendulum and an Obstacle-Avoiding Robot as Teaching Tools for Reinforcement Learning

Noa Abiri, nabiri2015@fau.edu, Pedro Almeida, palmeida2016@fau.edu, Keon Walters waltersk2015@fau.edu, Kiran Shirazi, kshirazi@fau.edu, , Department of Ocean and Mechanical Engineering, College of Engineering and Computer Science, Mentor: Dr. Siddhartha Verma

Reinforcement learning is a branch of machine learning which involves optimal interactions between an agent and its environment. By optimizing its parameters, the agent tries to maximize the cumulative reward it receives over the long term. Reinforcement learning can be a vital tool in the development of autonomous machines with broad applications. We will create physical models of an inverted pendulum and an obstacle avoidance robot, two classic reinforcement learning problems, for the purpose of teaching high school students how to apply reinforcement learning. Students will be able to create their own algorithms and train them in a virtual environment initially. The inverted pendulum and obstacle avoidance robot will then provide a concrete model with which students can visualize their work and adapt it to real world machines.

U18: Visualizing Intergenerational Environmental & Climate Justice

Sage Lowe, sagelowe2015@fau.edu, undergraduate student, Department of Sociology, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Patricia Widener

This creative inquiry interprets environmental and climate justice from the generation Z perspective into a three-piece triptych for viewing. Environmental and climate justice is the fair treatment and involvement of people and communities regardless of background in decision-making, policies, laws, practices and enforcement for the health and wellbeing of human and nonhuman communities and ecosystems. For this project I selected three quotes from two sociological readings to explore sociological arguments in a visual means, interpreting themes such as water access, ecological desperation, climate ignorance, and eventual optimism. Thus creating a three-panel 'storyline' of climate and environmental justice for my and future generations. This triptych was created in a visual medium as to bring people together to discus and visualize environmental and climate justice. In doing so, this project demonstrates how sociological arguments contribute to creative displays and discussions in a manner that invites people of differing opinions and across generations.

U19: Exploring relationships between cognitive performance and the gut microbiome of Zebra Finches

Wilner Fresin, wfresin2016@fau.edu, undergraduate student, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. Rindy Anderson

Research with mammals suggests a link between the gut microbiome and cognitive performance, but few studies have addressed other taxa, including birds. In this study, we tested the relationship between variation within the gut microbiome in Zebra Finches (Taeniopygia guttata) and cognition, specifically learning, and memory. Cognitive abilities encompass learning, memory, and decision-making (Shettleworth 2010), which are critical to the bird's survival. We followed an established protocol (Anderson et al. 2017), where birds were presented with three cognitive tasks: (1) novel foraging, (2) color association, and (3) color reversal. Subjects were tested after 4 h of food restriction to ensure that the birds were motivated to work for food reward (millet seed).We predicted that a greater diversity of taxa in the gut microbiome and greater relative abundance of beneficial taxa will be associated with improved cognitive performance on all three learning and memory tasks.

U20: An Econometric Analysis of Renewable Energy Usage Globally

Grace Sauter, gsauter2016@fau.edu, undergraduate students, Department of Economics, College of Business, Mentor: Dr. Rupert Rhodd

This study looks at the percentage of energy usage from renewable sources in roughly 150 countries including the United States and incorporates an econometric model to analyze the impacts of several different variables using data from the World Bank. It investigates how gross domestic product per capita and other factors play a role in the share of renewable energy a nation uses and attempts to provide am explanation for the weak relationship observed between GDP and renewable energy usage. Overall, it is found that GDP per capita has relatively minimal impact on the use of renewables, but other variables such as rural population and demographic features appear to play a larger and more significant role.

U21: Therapeutic Potential of Novel Marine Natural Products on Metastatic Prostate Cancer

Zoey Bowers, zbowers2016@fau.edu, Davian Caraballo, dcaraballo2013@fau.edu, undergraduate students, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. James Kumi-Diaka

Despite various advancements in the treatment of cancer, metastatic prostate cancer remains predominantly incurable. The limited number of successful treatment options for metastatic prostate cancer has prompted the search for alternative cancer treatment options, like the use of marine natural products. Marine natural products are bioactive secondary metabolites produced by marine organisms. A class of marine compounds known as Pseudopterosins, or diterpene glycosides, are of interest in cancer research due to their cytotoxic and anti-

proliferative activity in malignant cells. Pseudopterosin H was isolated from the marine coral Pseudopterogorgia elisabethae. The therapeutic efficacy of Pseudopterosin H on PC-3 prostate cancer cells was assessed through in-vitro screening using the Resazurin, MTT, and NBT assays. Results showed that Pseudopterosin H exhibited anti-cancer activity by reducing PC-3 cell viability. The chemosensitivity of PC-3 cells to Pseudopterosin H suggests potential prophylactic and therapeutic advantage in the treatment of metastatic prostate cancer.

U22: Song Type Sharing in Bachman's Sparrows

Andressa Reis, reisa2012@fau.edu, undergraduate student, Department of Biological Sciences, Charles E. Schmidt College of Science, Mentor: Dr. Rindy Anderson

Bachman's sparrow (Peucea aestivalis) is a songbird with a large song type repertoire (ave. 48 song types per male). Males use their song types during territorial disputes and other agonistic interactions. Larger vocal repertoires promote song type sharing among males, and sharing allows males to perform song type matching when counter-singing. We studied the song type repertoires of 39 male Bachman's sparrows in Jonathan Dickinson State Park with three aims: 1) develop a song type library for the population, 2) determine the frequency of use for each song type, and 3) determine whether song sharing between males declines with geographic distance. Our population has 126 song types and the average level of song sharing between pairs of males is 47.1% within a 3 km radius of our study population.

U23: Personal Experiences and Media Portrayals of Hurricanes Influence Climate Awareness

Cristina Bermudez, bermudezc2016@fau.edu, Amy Albolino, aalbolino2015@fau.edu, Miranda Khan, mirandaKhan2019@fau.edu, undergraduate students, Department of Sociology, Dorothy F. Schmidt College of Arts and Letters, Mentor: Dr. Patricia Widener

For South Florida residents, hurricanes may serve as an opportunity to understand better climate change and climate impacts. Climate science indicates Florida is experiencing sea level rise, and may experience stronger storms. The sociological literature also suggests that students use the media to become informed about disasters. Therefore, we explored how the experiences of students and media portrayals during Hurricane Irma (2017) and Hurricane Dorian (2019) influence perceptions of hurricanes and climate change. To answer this question, we conducted six interviews, two focus groups, and a photovoice project with five participants. We discovered that students perceived media reports as useful communication tools, but also felt "panic" and "stress" from those reports, specifically before storms made landfall. Moreover, we found that personal experience and the media together led students to be more concerned about stronger storms and sea level rise.

U24: Towards Carbon Based Nanotechnology: Vertical Translocation of Sodium Cations through (5,5)-Armchair Single-Walled Carbon Nanotubes

Carlos Barredo, carlos.barredo001@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Servando Muñoz

In our research, we have used quantum mechanical analysis ay the Hartree-Fock 3-21G level of theory to study the permeability of sodium cations through (5,5)-Armchair single-walled carbon nanotubes. Our results suggest that the delocalized pi-electron mosaic within the cylindrical cavity greatly facilitates the passive diffusion of sodium cations through the carbon nanotube channels by electrostatically shielding the cationic charge. Thus, single-walled carbon nanotubes may have important practical applications in the construction of controlled-pore molecular filtration assemblies in water desalination technology.

U25: Comparison of the Ionospheric Behavior Between Descendant Phase of Solar Cycle 20 and Ascendant Phase of Solar Cycle 21 For Argentina Is. Ionospheric Station, and Initial Report on Comparisons Against IRI

Denisse de Armas, denisse.de001@mymdc.net, Jose Carlos Lopez, jose.lopez112@mymdc.net undergraduate students, Miami Dade College, Mentor: Eduardo Araujo-Pradere

For this project, we have identified, downloaded and analyzed ionospheric data from Argentina Is. station. In order to clarify different dependencies, the daily maximum (max) and minimum (min) values of the peak ionospheric frequency (foF2) were selected for every 6-year period. These ionospheric data were then compared against solar activity proxy data (for this study we used F10.7 solar flux), and against the predictions offered by the International Reference Ionosphere (IRI), which is the International Standard Organization (ISO) model for the ionosphere. These analyses showed striking contrasts, for the descendant phase of SS20, where there is a significant decreasing trend of -58.1% in the solar flux, the trends of the max and min values are relatively close at -36.6% and -39.5%, respectively. For the ascendant phase, the solar trend is +280.5%, and the trends of the max and min values are +110.4% and +114.3%, respectively. The interesting result of this analysis is related with the dispersion of the data around the fits, with a lot more dispersion for the max values, and an interesting phase opposition in the standard deviation between max and min. The comparison against IRI predictions also shows an unexpected picture, IRI succeeded in capturing the min values, but failed in the prediction of the magnitude and behavior of the max daily values.

U26: Comparison of the Ionospheric Behavior Between Descendant Phase of Solar Cycle 20 and Ascendant Phase of Solar Cycle 21 For Moscow Ionospheric Station, and Initial Report on Comparisons Against IRI

Leisy Alvarez-Tuero, leisy.alvarez001@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Eduardo Araujo-Pradere

Throughout this research, we have identified, downloaded and analyzed Ionospheric data from Boulder station. In order to clarify different dependencies, the daily maximum (max) and minimum (min) values of the peak Ionospheric frequency (foF2) were selected for every 6-year period. The periods altogether were from 1970-1981. These Ionospheric data were then compared against solar activity proxy data (for this study we used F10.7 solar flux), and against the predictions offered by the International Reference Ionosphere (IRI), which is the

International Standard Organization (ISO) model for the ionosphere. The analyses showed striking differences, for the descendant phase of SS20, where there is a significant decreasing trend of -58.1% in the solar flux, the trends of the max and min values are relatively close at -41.6% and 42.3%, respectively. For the ascendant phase, the solar trend is +280.5%, and the trends of the max and min values are +104.5% and +136.6%, respectively. The interesting result is related with the dispersion of the data around the fits, with a lot more dispersion for the max values, and an interesting phase opposition in the standard deviation between max and min. The comparison against IRI predictions also shows an unexpected picture, IRI succeeded in capturing the min values, but failed in the prediction of the magnitude and behavior of the max daily values.

U27: Comparison of the Ionospheric Behavior Between Descendant Phase of Solar Cycle 20 and Ascendant Phase of Solar Cycle 21 For Boulder Ionospheric Station, and Initial Report on Comparisons Against IRI

Ernesto Suarez, Ernesto.suarez010@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Eduardo Araujo-Pradere

Throughout this research, we have identified, downloaded and analyzed Ionospheric data from Boulder station. In order to clarify different dependencies, the daily maximum (max) and minimum (min) values of the peak Ionospheric frequency (foF2) were selected for every 6-year period. The periods altogether were from 1970-1981. These Ionospheric data were then compared against solar activity proxy data (for this study we used F10.7 solar flux), and against the predictions offered by the International Reference Ionosphere (IRI), which is the International Standard Organization (ISO) model for the ionosphere. The analyses showed striking differences, for the descendant phase of SS20, where there is a significant decreasing trend of -58.1% in the solar flux, the trends of the max and min values are relatively close at -41.6% and 42.3%, respectively. For the ascendant phase, the solar trend is +280.5%, and the trends of the max and min values are +104.5% and +136.6%, respectively. The interesting result is related with the dispersion of the data around the fits, with a lot more dispersion for the max values, and an interesting phase opposition in the standard deviation between max and min. The comparison against IRI predictions also shows an unexpected picture, IRI succeeded in capturing the min values, but failed in the prediction of the magnitude and behavior of the max daily values.

U28: Impact of Digitizing Acoustic Waves on Scientific Research: a Case Study

Doris Cruz, doris.cruz005@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Francisco Coro

One of the technological advances that has a tremendous impact on many aspects of our everyday life is the digitizing of acoustic waves, as voice recordings. For many decades, starting at the 1920's, the only possibility was to use analog techniques and magnetic recording of these mechanical waves. This implied limitations in the analysis of the information they contained,

particularly with ultrasonic frequencies (above 20 kHz), as those emitted by many moth species. Sanderford and Conner (1990), using analog techniques and magnetic recording, described the acoustic emissions of Syntomeida epilais, commonly known as the polka-dot wasp moth. These authors were the first to demonstrate the need of acoustic communication during courtship behavior in a moth species with two-celled ears. They also suggested certain features of these emissions that show sexual dimorphism, but were unable to demonstrate them due to technical limitations. During my summer research internship I was able to process and analyze the digitized acoustic emissions from this moth species, using the software BatSound. From these digitized recordings, we have been able to describe previously unknown features of their acoustic signals, as sexual dimorphism in the fine temporal pattern of their emissions. We also showed previously unknown auditory discrimination abilities of females: they are able to discriminate between their own emissions and the acoustic signals generated by their males. Our results suggest that this is the "simplest" (or least complex) auditory system in Nature with adaptations for intraspecific acoustic communication.

U29: Small Molecule Chalcones for the Treatment of Glioblastoma

Anastasia Kaplina, anastasi.belyaeva001@mymdc.net, undergraduate student, Miami Dade College, Mentors: Eduardo Veliz, Ph.D., Joseph Gyedu, Winston Walters, MBA, Roger M. Leblanc, Ph.D., Steven Vanni, D.O., and Regina Graham, Ph.D.

Glioblastoma (GBM) is a lethal primary brain tumor with a dismal prognosis. A major obstacle to effective therapy is the presence of treatment resistant GBM stem cells (GSCs). Successful elimination of GSCs is a high-priority as these cells are responsible for tumor regrowth following therapy and ultimately patient relapse. Chalcones are a group of plant-derived polyphenolic compounds demonstrating a broad range of biological effects. Due to their versatile organic structures and simple synthesis, these small molecules represent promising lead compounds in the field of anti-cancer drug discovery. Here we synthesized and tested the efficacy of novel 4'-amino chalcones against GSC and GBM cell lines and determined chalcone efficacy using tumor-targeted carbon-dot nanoparticle drug delivery system. Chalcones were synthesized using the Claisen- Schmidt condensation reaction between 4-amino acetophenone and appropriate aryl aldehyde. Viability of GBM cell lines and GSC lines was assessed using MTS assay. Targeted Carbon-dot drug delivery system was synthesized by classical EDC/EDH coupling reaction using transferrin as the targeting ligand. Of the 14 4'-amino chalcones synthesized, 6 demonstrated IC50's in the low micromolar range, inducing significant cell death across all cell lines at 10µM. In contrast no cell death was observed in noncancerous cells. Furthermore, the C-dot drug delivery system significantly increased the effectiveness by approximately 100-fold, resulting in substantial cell death at concentrations as low as 100nM. Given the robust effects on GBM and GSC viability, small molecular weights and ease of chalcone and chalcone-nanoparticle synthesis, these chalcones are promising lead compounds for the development effective anti-GBM therapies.

U30: Phytochemical Screening and Total Content of Flavonoid of Different Parts of Bursera Simaruba

Anastasiya Dyagileva, anastas.dyagileva001@mymdc.net, undergraduate student, Miami Dade College, Mentor: Yaelis Rivas, M.S.

The present study analyses qualitative and quantitative phytochemical and evaluate the antioxidant properties of the methanolic extract of the leaves, bark, roots and stem of Bursera Simaruba. The preliminary phytochemical screening revealed strong presence of alkaloids and flavonoids in the bark and the leaves of the plant. The extracts also showed a moderate presence of tannins, phenols, terpenoids, and saponins. The stem did not show strong presence of the tested metabolites. Moderate amounts of terpenoids and alkaloids are observed, as well as weak presence of amino acids, anthraquinones and saponins. Roots show high amounts of cardiac glycosides, as well as moderate amounts of amino acids and terpenoids. Alkaloids are weakly present in roots.This study also showed the total content of flavonoids present in each part of the plant using a colorimetric method. The leaves have the highest total content of flavonoids (23.97±0.41 µg/100g of dried extract) compared to the rest of the plant. The flavonoids concentrations of the roots, stem and bark were 0.21±0.01, 4.90±0.21 and 1.07±0.05 µg/100g of dried extract, respectively. The amount of flavonoids in the leaves is six times higher than the stem.Future studies will isolate, purify and characterize the bioactive compounds responsible for the antioxidant activity in Bursera Simaruba.

U31: Effects of Salinity on Seed Germination

Onesi Calzado, onesi.calzado001@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Steven Ritter

Salt water intrusion is an increasing global problem affecting many plant species worldwide. The decrease in average yields of many crops is an expectation with the salinization of the soil in low lying areas. The research conducted an impact on eight different (tap water, distilled water, 0.25% NaCl, 0.5% NaCl, 0.75% NaCl, 1.0% NaCl, 1.5% NaCl, and 3.5% NaCl mimicking salt content in seawater), salt concentration on a variation of seeds. The seeds placed in agar prepared with the concentrations of salt to better identify the concentration in a grow chamber. The Waltham Broccoli, Purple Top Rutabaga and Italian Leaf Basil showed the most growth with the highest salinity levels (0.75%) with 86%, 71.4% and 57.1% respectively.

U32: Effect of Salinity on Seed Germination

Kathiavenia Dupiche, kathiaven.dupiche002@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Steven Ritter

Salt water is increasing on a global scale, decreasing average yields for most major crop plants. Investigations into salt resistance have, unfortunately, mainly been focused on conventional

crops, with few studies screening the potential of available halophytes as new crops. We evaluated the effects of seawater and different salts on seed germination. Seeds were germinated on eight different (tap water, distilled water, 0.25 % NaCl, 0.5 % NaCl, 0.75% NaCl, 1.0 % NaCl, 1.5 % NaCl, and 3.5 % NaCl mimicking salt content in seawater), salt concentration on a variation of seeds. Most precisely, we used those seeds, which are lettuce, Long Island Improve, Snowball Cauliflower, Swat Onion, Waltham Broccoli, Rutabaga, Heirloom, Sweet Bell Pepper, Beans, Green Okra, Tom Thumb, Walla Walla Union, Emerald Green Okra, and Italian Leaf Basil in those different types of salt concentration. The seeds paced in agar solution prepared with the concentrations of salt and food coloring to better identify the concentration in a grow chamber. The seeds observed depend of the expected germination period, that took exactly three weeks, on the seed. Our results demonstrated that all salts, at lower concentrations, increased the germination rate but not the germination percentages, compared with control (pure water). Conversely, seedlings were differently affected by treatments in respect to salt type and concentration. Both Broccoli and Heirloom had the most growth in the highest salinity with 70% and 71% percent germination in 0.75% salinity. Growth parameters affected were root and shoot length. We extend the period in which the seeds were observed in the 3.5% NaCl concentration. The impact of salinity on seed germination is a necessary study for agriculturist located near areas of ocean across. Moreover, osmotic and ionic stress factors had different degrees of influence on germination and development.

U33: Finding Cognitive Differences between English-Spanish Bilinguals and English-only Monolinguals

Darek Barquero, darek.barquero001@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Trinidad Argüelles

The Genus Homo, Latin for human being, has evolved from simple bipeds learning how to use stone tools to a species that has reached the stars. The biggest factor in this evolution is our brain volume and our capacity for cognition. Cognitive control or executive functioning is what allows us to plan, organize and complete tasks. This function of our brains has allowed us to learn and create different tools we use in our everyday lives, such as language. In this study, we wanted to see if bilinguals score differently compared to monolinguals on a battery of neuropsychological tests which assess executive functioning. The tests include the Shipley Abstraction Test which measures fluid and crystallized intelligence and the N-Back which measures working memory and capacity. The testing was administered to 13 monolingual and 22 bilingual college students, whose ages range from 18-35. This study hypothesized that bilinguals would outperform monolinguals in executive functioning tests, but preliminary results show the opposite, possible due to insufficient data. The lacking number of monolinguals has been a point of concern. Due to the demographics of the area, monolinguals are hard to find and test. We will increase our recruitment strategies in the Fall semester and concentrated on data coding for the non-verbally confounded data (N-Back) for the present study.

U34: A Comparison of Cognitive Differences between English-Spanish Bilinguals and English-only Monolinguals.

Gabriela Diaz, gabriela.diaz022@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Trinidad Argüelles

Throughout time scientists have investigated the effects of bilingualism in the human brain (Kramer, Borges 2015). Psychologists have focused on the performance of people whose brain is able to function in two different languages. We recruited Miami Dade College students for this research and focused on Spanish and English speakers for bilinguals and English speakers for monolinguals. This study is aimed to test the hypothesis that bilinguals will outdo monolinguals in executive functioning. Thus far 35 participants have been recruited (13 monolinguals and 22 bilinguals). One of our goals was to increase the number of monolinguals since more data is needed for further analysis. Due to the demography of Miami Dade County it was very difficult to identify true monolinguals in the college population that expressed interest in the study. The other goal of the study was to code and analyze data from the N-back tests where working memory and memory capacity of our participants were measured without linguistic confounds. Coding of this data (N-Back tests: auditory and visual) has taken more time than anticipated but will contribute to further research in this area.

U35: The Effect of Metabolism, Growth Rate and Cell Density on the Efficacy of the Antibiotic Kanamycin

Gabriela Perez Robles, gabri.perezrobles001@fau.edu, undergraduate student, Miami Dade College, Mentor: Dr. Robert P. Smith

For decades the use of antibiotics has served to combat infections which could otherwise prove to be fatal. However, with continued overuse of antibiotics, and a lack of development of new antibiotics, bacterial infections have once again become a challenge to treat due to antibiotic resistance. Accordingly, there is a drive to develop global principles of antibiotic resistance to extend the 'life span' of current antibiotics, and to spur investment in the discovery of new ones. Recently, two global principles of antibiotic resistance have been discovered: the inoculum effect, which describes a positive correlation between cell density and antibiotic efficacy, and the effect of cellular metabolism, where increasing metabolism increases antibiotic effectiveness. However, these two global principles have yet to be merged. To address this gap in knowledge, we grew Escherichia coli strain BW25113 in conditions that decoupled growth rate and metabolism. Under these conditions, we then challenged bacteria by increasing initial density with the antibiotic kanamycin. We observed that metabolism and growth rate are decoupled, the concentration of kanamycin required to inhibit bacterial growth increased with an initial density of bacteria. However, when growth rate and metabolism are coupled, this relationship is reduced, or in some cases, eliminated. Our results serve to establish an initial understanding of the interrelatedness between growth rate, metabolism, cell density,

and antibiotic efficacy and may lead to new paradigms that extend the clinic shelf life of existing antibiotics.

U36: Differential Epigenetic Expression in Professional Fighters

Maria Ariza, maria.ariza002@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Jaime L. Tartar

Unlike DNA sequence mutations, which cause molecular alterations to the genetic makeup, epigenetic modifications are involved in the regulation of gene expression without altering the organism's genotype. It has been found that this type of phenotypic modification may be affected by psychological and physical stress leading to abnormal gene expression that can be examined through the analysis of DNA methylation and microRNA expression. It is suspected that as a result of repetitive head trauma associated with MMA (mixed martial arts) training, professional fighters may experience epigenetic dysregulation contributing to chronic inflammatory disease. The present study will investigate differences in miRNA expression associated with inflammation in 20 professional fighters compared to 20 active controls. Samples of blood and saliva and different types of PCR arrays will be utilized to observe the differential expression present in several miRNAs of each individual to be tested. Differences in miRNA expression and methylation will be evaluated through and independent samples t-test.

U37: Measuring the Effect of Growth Rate and Cell Density on Antibiotic Efficacy

Beatriz Espinoza, beatriz.espinoza002@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Robert P. Smith

Antibiotics were once an efficient way to treat bacterial infections. However, due to their subsequence overuse, many bacteria now resist one, if not more, antibiotics. This has led to increased bacterial infections, and in some cases, increased mortality rates. As such, understanding the general principles that govern antibiotic resistance is an essential aspect of bacterial physiology. Two general principles that govern antibiotic resistance have been discovered. First, as the initial density of bacteria increases, the amount of antibiotic that the population can resist increases. This is called the inoculum effect. Second, as bacterial metabolism increases, the efficacy of many antibiotics increases. That is, bacteria with faster metabolisms are more susceptible to antibiotics. While these two broad principles of bacterial physiology are important in understanding antibiotic resistance, their interrelatedness has yet to be investigated. To understand the relationship between the inoculum effect, bacterial metabolism and antibiotic resistance, we used the antibiotic kanamycin, a bactericidal that works by interfering ribosome function and performed a series of minimum inhibitory concentration (MIC) assays. We independently manipulated the growth rate and metabolism using different concentrations of glucose and casamino acids. We observed that as growth rate increased, the total MIC increased for both bacteria at high and low initial density. This relationship could be perturbed by manipulating metabolism independently of growth rate. Understanding and predicting how bacterial and metabolism and bacterial density are

intertwined will be critical in developing suitable protocols to address the problem of antibiotics resistance.

U38: Ectosymbiotic Microbiomes of Parasitic Nematodes (Ozolaimus megatyphon) and Their Iguana Hosts

Jacqueline Santis, Jacqueline.santis001@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Christopher Blanar

Florida iguanas (Iguana iguana, Ctenosaura similis) are heavily infected with Ozolaimus megatyphon, a parasitic nematode worm. Prior work in our lab noted an apparent microbial community associated with the worm cuticle. Observations of parasite microbiomes are scarce: ours was the first description of a putative cuticular microbiome associated with this species, and to our knowledge the first non-anecdotal observation of ectosymbionts on a parasitic nematode. The objective of this project was to characterize the cuticular microbiome of O. megatyphon and compare it with the gut microbiome of its host, using a combination of morphological observations and molecular analysis. Morphological examination via light microscopy of worm cuticle stained with gram, Periodic Acid Schiff, lactophenol and methylene blue stains indicated that the community was exclusively bacterial. Further observations using Scanning Electron Microscopy (SEM) revealed the presence of a diverse community of coccoid and coliform bacteria associated with dense mats of possible segmented filamentous bacteria embedded in the worm cuticle. In comparison, SEM of host intestinal lining and fecal material did not detect filamentous bacteria. We then conducted molecular analyses on this microbiome, amplifying and sequencing the variable regions of 16S rRNA using PCR (primer 319F/806R) and Illumina cBot to generate clusters for sequencing on MiSeq. This approach allowed for metabarcoding and molecular level characterization of both parasite and host bacterial communities. The implications of these results for parasite biology and host-parasite interactions are discussed.

U39: Schinus terebinthifolius Extracts Exhibit Anticancer Activity In Vitro

Valeria Nazaire, valeria.nazaire001@mymdc.net, undergraduate student, Miami Dade College, Mentor: Dr. Alexis Tapanes-Castill

Cancer is a deadly disease caused by the malfunction of mitosis. Cells divide continuously and abnormally, killing neighboring healthy cells. Metastasis is the spreading of cancer cells throughout the body, and it occurs through multiple invasion-associated steps. Schinus trees are used as medicinal plants by several cultures and have been reported to exhibit anti-cancer properties. The goal of this project was to evaluate the effect of Schinus terebinthifolius bark extracts on breast cancer cell growth and migration. Data revealed that bark extracts significantly decreased the migration velocity of invasive BT549 breast cancer cells. Preliminary results from cytotoxicity assays indicated that bark extracts could reduce migration at concentrations that do not significantly affect cell viability. Moreover, actin labeling suggested bark extracts reduced migration by rearranging the cellular cytoskeleton. Future directions aim

to identify the bioactive molecules present in the bark extracts that reduce cancer cell migration and to better characterize their mechanisms of action.

U40: The Kinematics and Dynamics of a Planar Manipulator of 2 Degrees of Freedom (DOF)

Axianax Merone, axianax.merone001@mymdc.net, Valeria Nazaire, valeria.nazaire001@mymdc.edu, Benz Pierre, benz.pierre001@mymdc.net, Yoel Reyes, yoel.reyes001@mymdc.net, Sebastian Alarcon, Sebastian.alarcon002@mymdc.net, undergraduate students, Miami Dade College, Mentors: Dr. Manuel Carames, Dr. Claudia Bonilla

Matrices in the field of mathematics, sciences, and physics is a very important concept. For example, the matrices product is not commutative ($a \times b \neq b \times$) and the end effector becomes unexpected if the position of the matrices are changed. The purpose of this research project was to clarify and understand one of the applications of matrices (Linear Algebra Course) and to study in a model, the kinematics and dynamics of a Planar Manipulator of 2 DoF. In order to prove the importance of matrices in real life projects, the researchers described the end effector using direct and inverse kinematics. The results obtained were validated by the equation of inverse kinematics. The researchers selected four (4) triangles in the four (4) quadrants and realized that the end effector is in the right position using the joint coordinates. The researcher also found out during the simulation that the calculated joint positions give them the right end effector.

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