BBB NATIONAL CONVENTION 2022
RESEARCH PRESENTATION ABSTRACTS

(alphabetical by last name of primary author)

Acosta, Anna, Bernadette Connors, Emma Sarro. Nu Psi. Dominican College.

BIOMEDICAL SCIENCE ORAL PRESENTATION 11:15-11:30 AM

Behavioral effects of turmeric on short-term memory in an Alzheimer's model of *Caenorhabditis elegans*

Alzheimer's disease is a common neurodegenerative disease that is caused by a misfolding of proteins, such as the tau protein, that disrupts the electrical impulse and cell signaling in neurons. This misfolded tau happens via a mutation that produces a hyperphosphorylated version of the protein. This study utilizes the animal model *Caenorhabditis elegans*, an invertebrate nematode that contains many of the same proteins as humans and has several existing Alzheimer's models. The nematodes are conditioned to learn an association of food to an odor, which is then tested on a chemotaxis assay. This is done to test the short-term memory of the *C. elegans* for the association of the odor to food. Three strains of nematodes are used, two as control and one that produces the hyperphosphorylated tau protein, in addition to three concentrations of turmeric. Turmeric is used as the treatment due to the presence of curcumin, a polyphenol that has been shown to reduce tau levels. The nematodes are grown in their respective turmeric concentrations over multiple generations. Since *C. elegans* provide a model similar to Alzheimer's in humans, it's possible that a short-term memory treatment can translate to a treatment in humans.

Al-Rubayie, Raunak. Upsilon Rho, St. John Fisher College.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #11

Remote Sensing Freshwater Bacteria in Great Lakes.

Remote sensing of bacterial populations using satellite imagery in small and large bodies of water can significantly enhance our ability to understand freshwater ecosystems and monitor water quality. Although the identification of individual species is still unfeasible, the detection of certain bacterial groups and the likelihood of occurrence would be very valuable. Spectral analysis of satellite imagery is currently used to determine water parameters like temperature, turbidity, phytoplankton and dissolved organic matter. In order to establish a correlation between some of these parameters and the presence of microorganisms, we collect water samples from several locations in the Lake Ontario Rochester Embayment and Irondequoit Bay that are imaged by the Landsat 8 OLI and TIRS sensors. Using bacterial 16S rRNA, we map the diversity and distribution of microorganisms isolated from the samples and then link this information to the bio-optical properties of the water. A comprehensive understanding of the factors affecting the conditions favoring the establishment of the microbial flora will require a library of seasonal ground truth sampling to assess potential geographic distributions of the bacterial populations. The ultimate goal of the project is to find correlations between the parameters of the water that can be measured by the satellite and the bacterial species found in the water.

Barry, Ashley. Gamma Delta Alpha, Bryan College of Health Sciences.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #21

Sucralose and the Commensal Species of the Gut Microbiome.

Sucralose is a non-caloric, high-intensity sweetener that is widely used in foods and beverages. The increased use of sucralose is in part due to both its high stability and its behavior in the human body. The vast majority of sucralose passes through the digestive tract unchanged and the minimal amount that is absorbed appears to be excreted via the kidneys. However, while sucralose is not metabolized by the human body, recent studies have begun to examine how sucralose and other non-caloric sweeteners interact with the gut microflora and impact the composition of the gut microbiome. Two bacteria of known importance in the gut microbiome are *Lactobacillus L.rhamnosus GG* and *Bacillus coagulans*. Both bacteria are considered to be commensal bacteria within the human GI tract and have become a focus of study because of their

antimicrobial properties that inhibit pathogenic growth. In this study, the minimum inhibitory concentration (MIC) of sucralose on each bacterial strain was determined. The long-term impact of sucralose on both strains was examined by re-assessing the MIC of each strain after long-term growth in sucralose. Finally, the impact of sucralose on the antimicrobial properties of each strain was determined by comparing the inhibition of both *E.coli* and *S.aureus* in the presence of spent-cell-supernatant (SCS) from cultures grown in the presence and absence of sucralose.

Calbaza, Gia-Maria. Omega Epsilon, Bradley University.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #22

Implementing Transposon Mutagenesis to Investigate Proteins That Alter the Expression of Bacterioferritin Comigratory Protein in *Bacillus subtilis*.

All organisms that rely on oxygen for survival produce reactive oxygen species (ROS). Living organisms must maintain moderate levels of ROS, otherwise they may undergo oxidative stress. Oxidative stress has the ability to damage the structures of proteins, lipids, and deoxyribonucleic acids of cells. It can intervene in a lot of the cellular processes that are important for life and may even cause cell death. Bacteria use peroxide-scavenging enzymes to attack ROS and maintain them at low and tolerable levels. In *Bacillus subtilis*, there are nine different enzymes that have been identified to play a role in removing ROS, including bacterioferritin comigratory protein (Bcp). However, little is known about Bcp, including its regulatory proteins. Regulatory proteins control the replication of genetic material and the synthesis of proteins in cells. The goal of this study is to investigate the regulatory proteins of *bcp*, and how they function in terms of influencing Bcp to defend against ROS. In this project, strains containing a *bcp'-lacZ* fusion have been created to measure expression of the *bcp* gene. These strains have undergone transposon mutagenesis and screening processes to analyze possible mutations that may increase expression of the *bcp* gene.

Chekuri, Isha[1], and DeLisa Fairweather[2]. [1]Sigma Tau, Florida State University and [2]Mayo Clinic.

BIOMEDICAL SCIENCE POSTER PRESENTATION #1

Mitochondrial Dynamics are Disrupted in CVB3 Acute Myocarditis.

Myocarditis is an inflammation of the muscle layer of the heart (myocardium) most often caused by viruses such as Coxsackievirus B3 (CVB3). The inflammatory response to infection can lead to various different structural changes in the heart, with can lead to many consequences involving heart health. Mitochondria are abundant in cardiomyocytes and regulate processes beyond the energetic demands of the cell. Because mitochondria comprise a significant portion of cardiomyocytes and are essential for normal cardiac function, we investigated how mitochondrial dynamics may be altered during CVB3 myocarditis. DRP1 is a master regulator of mitochondrial fission which precedes mitochondrial autophagy (mitophagy) when mitochondria undergo damage or stress. We found that DRP1 is upregulated and activated during acute myocarditis and that initiation of DRP1 mitochondrial localization coincides with CVB3 VP1 mitochondrial localization, suggesting that CVB3 damages mitochondria. Our collaborator observed that CVB3 can escape cardiomyocytes in nanoparticles (NPs) containing virus and mitochondria *in vitro* - therefore we attempted to isolate and characterize vesicles from mice using cardiac dissociation and found that the population of NPs containing mitochondria was relatively pure.

Coffman, Electra. Delta Rho, Austin College.

BIOMEDICAL SCIENCE POSTER PRESENTATION #2

PA28γ Regulation of H4K20me3 Under Genotoxic Stress.

The nuclear 20S proteasome activator, PA28γ, is overexpressed in many cancers and has shown to play a role in mitosis, cell proliferation, chromosomal stability, and apoptosis. When PA28γ is deleted, levels of cellular apoptosis increase, but its role in the apoptotic pathway has yet to be fully elucidated. To better understand this role, PA28γ-deficient cells were treated with variable genotoxic stressors, most resulting in differing apoptotic responses when compared to controls. However, when targeting histone deacetylase function specifically using genotoxic stressor trichostatin A (TSA), there is uniquely no difference in apoptosis observed between PA28γ deficient and PA28γ sufficient cells. Therefore, chromatin compaction could be involved in the mechanism for PA28γ's effects on apoptosis. An important silencing epigenetic modification

for compaction, the trimethylation of histone H4K20 (H4K20me3), is reportedly maintained by PA28γ. This compaction is crucial for genomic stability, and thus an abnormality in this process could lead to one of the host of somatic DNA mutations that contribute to oncogenic transformation if not properly regulated by apoptosis. Indeed, the aberration of H4K20me3 has been identified as a cancer biomarker. Therefore, further investigation is required to understand the role of PA28γ in supporting H4K20 trimethylation and its impact on apoptosis. This study examines whether PA28γ regulates the trimethylation of H4K20 under genotoxic stress from TSA and chemotherapeutic drug cisplatin as well as their apoptotic protein-specific effects in mouse embryonic fibroblast (MEF) cells.

Cossey, Larry and Regina McGrane. Delta Sigma, Southwestern Oklahoma State University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #12

Detecting Variations in Microbial Concentrations in Oklahoma Lakes.

The microbial composition of water can be the difference between life or death for many organisms. Microbes in lakes can reproduce and spread to other parts of the water cycle. Ice nucleating Pseudomonads are microbes that have been shown to be in all parts of the water cycle and damage plants. These Pseudomonads conduct ice nucleation by inducing freezing of supercooled water molecules. Through evaporation and rainfall, Pseudomonads can disperse anywhere. When bacterial ice nucleation occurs around plant tissue, ice crystals form within the tissue and damages the plant. To examine microbial composition, two Oklahoma lakes: the urban lake--Lake Hefner and the rural lake--Crowder Lake, were examined. In each lake, water samples were collected from three specific locations in summer and winter months. Samples were inoculated on 10% tryptic soy agar to determine total bacterial load and King's B agar supplemented with boric acid, cycloheximide, and cephalexin to isolate Pseudomonads. At Lake Hefner, the eastern shore had significantly larger bacterial concentration in both seasons compared to other locations. At Crowder Lake, the center of the lake had significantly lower bacterial concentration in both seasons compared to other locations. Seasonally, there was lower bacterial concentration in the winter at Lake Hefner compared to the summer, while Crowder Lake had similar bacterial concentration year-round. Lake Hefner had higher bacterial concentration compared to Crowder Lake. Pseudomonads isolated from both seasons and lakes were tested for ice nucleation activity by inoculating in super cooled water and detecting ice formation. Twenty-two ice nucleators were detected at Crowder Lake and three ice nucleators were detected at Lake Hefner in the summer, and none were detected in the winter. The seasonal differences in the concentration of ice nucleating bacteria were surprising because other studies have shown that cooler environments select for increased ice nucleating bacteria.

Cox, A., Mumbi, F., Missey, E., Nagpal, R., Parvatiyar, M. Sigma Tau, The Florida State University.

BIOMEDICAL SCIENCE ORAL PRESENTATION 9:00-9:15 AM

Superimposing Celiac Gut Microbiome Metabolites on Healthy Caco-2 Cells to Observe Inflammatory Effects.

Celiac disease (CD) affects approximately 1/100 US residents. Studies indicate that CD patients have gut dysbiosis, but the link between CD and gut bacteria is under-investigated. To examine this relationship, we collected fecal samples from 5 celiac and 5 healthy subjects and extracted the gut microbiome metabolites into a fecal conditioned media (FCM). The FCM was added to Caco-2 cells. After 24hrs of exposure, we measured inflammatory markers—TNFα, IL-6, 1L-1β, IFNβ, MX1—by qPCR. We hypothesized that CD metabolites would increase inflammation compared to the healthy metabolites. For IL-6, the average fold increase in L32 (control marker) expression was 4.710 in healthy sample exposed cells (HS) and 35.591 in celiac sample exposed cells (CS). The fold increase in expression between L32 and 1L-1β was 0.6102 in HS cells and 3.2043 in CS cells. While there was a trend for all inflammatory markers to increase in CD metabolite exposed cells, it was not statistically significant with the current sample size. We plan to increase the sample size and control for gender.

De Lucia, Ayuni I. Tau Delta Gamma, Ave Maria University.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #23

Leishmaniasis; Combatting Vault Shell Drug Resistance

Leishmaniasis is a flesh-eating parasite that has become an epidemic in many South American countries. It is an incredibly interesting target for research because it has many unique qualities to its genome. For example: it is eukaryotic, but its genome is expressed in operons (characteristic of prokaryotic cells) and its gene structure suggests that its vault particles are made of multiple different proteins, which has never been seen before in vault shells. These characteristics give an opportunity to discern related proteins in uncharacterized pathways. We are investigating the overall stability, structure, and functional activity of the Leishmaniasis vault proteins as a mechanism of drug resistance. The characteristics of this parasite are so unknown that research in this field could open the opportunity for the formation new mechanisms for drug delivery, CO_2 capture, and vaccine stabilization, new drug targets, and improvements in general industrial biochemistry.

Echevarría-Bonilla, Oswaldo L. Zeta Lambda, University of Puerto Rico at Aguadilla.

ECOLOGY & ENVIRONMENT ORAL PRESENTATION 9:00-9:15 AM

Effects of non-natural light on leatherback sea turtle (*Dermochelys coriacea)* hatchling orientation on the northwestern of Puerto Rico.

Artificial lightning on shorelines has been known to disrupt sea turtle hatchling orientation from the nest to the sea. This investigation focuses on evidencing the kind of disruption these light sources cause in hatchling orientation towards the sea by analyzing leatherback sea turtle hatchling crawl marks on the north western of Puerto Rico, where, in some areas, non-natural light sources are misplaced. This data was then compared to those areas in which there is no non-natural light source interference. A drone was used to capture images at a certain altitude for this statistical analysis. The results demonstrate that artificial light sources interfere with leatherback sea turtle hatchling natural orientation responses.

Enos, Madeleine and Jay Brewster[1]. Kappa Delta Alpha, Lipscomb University. [1]Department of Natural Sciences, Pepperdine University.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #24

The Hsp90 Chaperone Regulates p38 Activation During ER Stress.

The Hsp90 chaperone complex sequesters p38 in the cytoplasm and prevents its auto-activation (Ota et al., 2011). In response to studies of PERK-mediated activation of p38 during ER stress, we hypothesized that PERK activation may mediate post-translational modification of the Hsp90 complex, which would release p38, allowing it to activate. In this study, both tunicamycin-induced ER stress and chemical inhibition of HSP90 were used to assess impact upon p38 activation. Cultured hamster BHK21 fibroblast cells were used in these studies. Previous studies have shown that tunicamycin induced ER stress activates a PERK-dependent elevation of activating p38 phosphorylation. The 17-AAG inhibitor of HSP90 was shown to elevate p38 activation, consistent with disruption of HSP90 activity resulting in p38 activation. Dissociation of p38 from HSP90 has previously been shown to contribute to autoactivation of p38. Dissociation of the p38-Hsp90 complex was measured through co-immunoprecipitation analysis and revealed tunicamycin to significantly reduce p38 association with HSP90. Unexpectedly, we found that inhibition of Hsp90 causes it to exhibit increased binding of p38 with a peak average fold increase after 30 minutes. Because p38 plays an important role in the induction of many intracellular signaling pathways, learning ways to regulate its actions within the context of ER stress may be beneficial in mediating symptoms of the disease.

Esenwein, Raegen M[1, 2] and Dembowski, Jill A[1] Xi Psi, Duquesne University. [1]Department of Biological Sciences, Bayer School of Natural and Environmental Sciences, Duquesne University, Pittsburgh, PA, [2]Current member of Duquesne University's Xi Psi Chapter of Tri-Beta Biological Honor Society.

BIOMEDICAL SCIENCE ORAL PRESENTATION 9:15-9:30 AM

The Role of DNA Topoisomerase 1 in Herpes Simplex Virus Type-1 Infections

Herpes simplex virus type 1 (HSV-1) infects almost 70% of the human population. In addition to producing its own viral factors, HSV-1 utilizes many host proteins to facilitate its infection cycle. One host protein of interest, found to interact with the HSV-1 genome throughout replication, is topoisomerase 1 (Top1). In human cells, Top1 is an enzyme required for normal growth and development. Top1 ensures proper transcription and DNA replication by creating transient, single stranded nicks in DNA to relieve topological stress and allow for relaxation of supercoiled DNA. Based on its role in cellular processes, we believe that Top1 aids in the regulation of HSV-1 viral transcription and/or replication. We hypothesize that altering Top1 function or expression in HSV-1 infected cells will decrease viral yield by preventing an efficient infection cycle to occur. To alter Top1 function, the commercial inhibitor, camptothecin (CPT) was used. CPT functions by blocking religation of DNA by Top1, preventing relaxation of supercoiled DNA. Our studies revealed the novel observation that Top1 inhibition via CPT does reduce viral yield. An inducible Top1 shRNA knockdown cell line has been created as another method of alteration. Top1 targeting shRNA cell lines stop translation of Top1 mRNA reducing the amount of Top1 protein present in cells. We are currently characterizing the effects of Top1 knockdown on HSV-1 infection. In the future, we will determine if viral transcription or DNA replication are altered after Top1 inhibition or knockdown. These studies will further pinpoint the role of Top1 in HSV-1 infection.

Estrella, Catrina, Arno Nanyely and Ioanna Visviki. Chi Epsilon, College of Mount Saint Vincent.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #13

Is There a Trade-off Between Reproduction and Longevity?

Our study examined the cost of human reproduction using a novel population, Catholic nuns and their biological sisters that were born from 1880 to 1899. The nuns were members of the non-cloistered, socially active congregation, Sisters of Charity of New York (SCNY). This population offers multiple advantages, because the religious and secular women share the same ethnicity (Irish descent), religion, childhood socioeconomic status and they are biologically related. We constructed Kaplan-Meier survival curves comparing the longevity of the nuns (Control 1), to that of their secular, single, sisters without children (Control 2) and their secular, married, sisters with children (Experimental). For the women with children, we determined the age at first and last reproduction, total number of children born, number of children surviving and duration of inter-birth intervals. We also examined the effect of adult socioeconomic status, using home ownership as a proxy, on the total number of children. Analysis of survival data via Tarone-Ware, Log Rank and Breslow tests indicated that reproduction did not have any statistically significant effects on longevity.

Fajardo, Abigail[1], Laila Barkoudeh[1], Abigail Contreras[1], Francisca Gutierrez[1], Heidi Diaz[1], Kati H. Phan[1], Daniel Lam, Guadalupe J. Rodriguez[1], Rebecca A. Rosero[1], Elizabeth Klettke[1], Jerry L. R. Amomoy[1], Cecilia Nguyen[1], Vanessa Phung[1], Jenny M. Tran[1], Melody Zarghooni[1], Guillermo N. Armaiz-Peña,[2] and Gabriel J. Villares[1]. [1]University of St. Thomas, Houston TX, [2]Ponce Health Sciences University, Ponce PR. Nu Beta, University of St. Thomas.

BIOMEDICAL SCIENCE ORAL PRESENTATION 9:30-9:45 AM

Increased Levels of Stress Induces a More Metastatic Phenotype in Human Melanoma Cells.

Growing evidence suggests that stress plays a vital role in metastasis and tumor development by activating the sympathetic nervous system. The catecholamines released into the tumor microenvironment (TME), specifically norepinephrine (NE), results in a cascade effect leading to a variety of pro-metastatic activities that sustain tumor growth and increase melanoma aggressiveness. Most notable are the secretion of cytokines and the stimulation of tumor-associated macrophages (TAMs). Using a co-culture system of several human melanoma cancer cells and macrophages, we found that sustained exposure of NE in the TME induced the release of tumor-growth and progression-associated cytokines from TAMs. Several of the upregulated

cytokines found, including IL-11, IL-24, GRO-a, MIF, DKK-1, and angiopoietin-2, are known to induce growth, migration, invasion, and tumor development in human melanoma. An ELISA assay of human-MIF was used to validate the cytokine array in which upregulation of MIF was noted in co-culture with NE present. At a molecular level, these findings suggest how physiological stress in cancer patients can further lead to cancer progression. These preliminary findings may lead to supportive therapies that emphasize mental health and the treatment of the psychological state of the patient. Our next steps include continuing the validation of the cytokine arrays using different ELISA assays to quantify protein levels of stress-secreted cytokines in the TME that augment the metastatic phenotype of human melanoma cells.

Farnsley, Payden and Lisa Castle. Delta Sigma, Southwestern Oklahoma State University.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 9:00-9:15 AM

Microbial Analysis of Regolith-grown Species on Mars.

Undergraduate researchers from Southwestern Oklahoma State University participated in the Plant Mars Challenge hosted by the NASA-Artemia funded Institute of Competition Sciences to study how crops grow on non-Earth soils. This team studied how microbial diversity affects overall crop yield. Five different crops—lettuce, carrots, radishes, spinach, and peas—were selected to be grown over a nine-week period and the biomass was measured at the end of this period. Since mycorrhizal associations are known to increase surface area of roots and are hypothesized to favor plant growth by increasing nutrient acquisition and limiting the concentration of pathogenic microbes, we hypothesized that pots inoculated with high microbial diversity would have more biomass compared to pots inoculated with low microbial diversity. To test this hypothesis, sixteen bottom-wicking pots were used to test Mars-regolith soil versus Earth soil, high versus low microbial diversity, and three selected plants versus another three, with two trials of each treatment. Little to no plant growth was detected in Mars-regolith soil. These results will be discussed by another presenter. This presentation will focus on microbial activity and fungal and bacterial concentrations detected at the end of the growth period. Microbial activity was detected by fluorescein diacetate analysis and microbial load was determined by serial dilution plating using Potato Dextrose Agar (PDA), Sabouraud Dextrose Agar (SDA), and Tryptic Soy Agar (TSA). Earth soil was found to have significantly more microbial activity, suggesting that there was a higher rate of microbial metabolism within Earth soil. There was no significant difference between the microbial load in the Mars-regolith pots and the Earth soil pots regardless of the microbial diversity of the inoculum. Due to the Mars-regolith pots becoming progressively denser towards the end of the growth period, future directions may include evaluating the presence or absence of microbes containing water-retaining properties.

Ferlan, Emma*, Priya Gupta*, Grace Callahan*, Benjamin Kurtz, Angela Wharton, Courtney Nave, and Justin W. Merry. Upsilon Beta, Saint Francis University.

BIOMEDICAL SCIENCE POSTER PRESENTATION #3

Dietary Impacts on Development in Fruit Flies *(Drosophila melanogaster).*

Juvenile animals subject to poor nutrition often show reduced development rate and body size. Nevertheless, there is ongoing research into the specific limiting factors within diets that have the largest effects on growth rates. While neurological literature has identified energy (carbohydrates and lipids) as a potentially limiting constraint on nervous system performance, developmental studies have identified other nutrient limitations as important to whole-animal development. Herbivore growth rates, for example, are typically nitrogen- or phosphorus limited. We test two competing hypotheses regarding the development of *Drosophila melanogaster* flies, a frugivore: a) development is limited by carbohydrate availability, or b) development is limited by protein availability. Groups of fruit flies were reared on three artificial diet recipes: normal (control) lab stock diet, low-carbohydrate diet, and low-protein diet. There were five batches of each food type, and at least 20 families (one family vial = offspring of one female) in each batch of food. We then measured total offspring per vial, development time to eclosion from pupa, and body size within each sex (mass and thorax length). Low protein diet yielded longer development times and significantly fewer offspring per family than the other diets. Surprisingly, low-carbohydrate diet yielded more flies than control diet. Mass and thorax length appear similar across diets, which may indicate that flies delay development by about 4 days to compensate for the poor quality of the low-protein diet. Through this delay, they still grow to typical size before moving to the next stage of development. Overall, our data support the hypothesis that

fly development is protein limited, and not energy limited. Future work will investigate whether eye size diverged from body size across diets; eyes consist largely of nervous tissue, which has 10x metabolic rate of other tissues and may be more sensitive to energy limitations.

Floyd, Evan and Natalie Yaeger. Beta Omega, Mercer University.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 11:15-11:30 AM

The Patent Pending HEFY Assay: A Novel Assay for Biofilm Inhibition in Bacillus subtilis and Staphylococcus aureus.

With the rise in the number of antibiotic resistant strains of bacteria, an alternative approach to antimicrobial drugs is needed. Biofilm inhibition is one of the new alternative approaches to combat these antibiotic resistant strains. The HEFY assay is an inexpensive, undergraduate accessible, and expedient way to quantify biofilm production. This assay uses 3D printed modified petri dishes to analyze biofilm production in Congo Red using Image J, a free NIH-developed software. Two of our biofilm inhibitors, Tyrosine-trans-4-hydroxycinnamic acid (Tyr 64) and Glycine-trans-cinnamic acid (Gly-16), show consistent, quantifiable biofilm inhibition in the HEFY assay of 41.5 and 34.4 percent respectively within *Bacillus subtilis*. Preliminary results also show promise for the application of the HEFY assay with *Staphylococcus aureus*, with Tryptophan-4-phenolbuteric acid (Trp-37) and Tryptophan-trans-3,5-dibromo-4-methoxylcinnamic acid (Trp-69) showing 7.98 and 14.46 percent inhibition respectively. The consistency in replica testing within *Bacillus subtilis* surpasses the consistency in standard crystal violet assays. This assay could easily be adopted for quantifying biofilm in other bacterial and fungal pathogens.

Franck, Ezabelle, Alex Cox, Tyla Dolezel, & Debra Ann Fadool. Sigma Tau, The Florida State University.

BIOMEDICAL SCIENCE ORAL PRESENTATION 9:45-10:00 AM

Therapeutic Potential of Chronic Administration of Cannabidiol for Treatment of Anxiety.

While cannabis products grow popular for their advertised therapeutic potential, little is available about their effectiveness after recurrent use. Our objective was to assess behavior changes following administration of cannabidiol (CBD) using a knockout mouse model that exhibits anxiety and attention deficit-like behaviors (Kv1.3-/-). Kv1.3-/- or wildtype (WT) mice were tested for anxiety using 24- and 1-hour memory, object attention, elevated-plus maze, light-dark box, and marble-burying tests. Mice were administered daily doses of CBD for 3 weeks, low or high dose, prior to testing. Chronic drug lessened anxiety in the light-dark box and elevated-plus maze and increased the initial transition time to the dark compartment for WT mice. However, the Kv1.3-/- mice became anxiogenic in the elevated-plus and increased in object recognition. In conclusion, our data suggest that CBD may act as an anxiolytic drug in WT mice, but ineffective regarding anxiety in Kv1.3-/- mice, and therefore also subjects that have trait anxiety. Our next objective is to analyze the effects of sex dependency on the chronic administration of CBD. This work was supported by the Consortium for Medical Marijuana Clinical Outcomes Research (CMMCOR).

Fuller, Gwynna K. and Megan Ealy. Chi Chapter, Drury University.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 9:15-9:30 AM

Nuclear Versus Cytosolic Expression of *Goosecoid* During Neuroblast Delamination in the Chicken Otocyst.

During inner ear development, the movement and fate of progenitor cells must be carefully regulated for the developing organism to hear properly. One critical step of inner ear development, neuroblast delamination, is the migration of neuronal progenitor cells from the developing otic epithelium and towards the hindbrain to create the vestibulocochlear nerve. The purpose of this research project is to investigate the expression and regulatory role of the *Goosecoid* (*GSC*) gene during neuroblast delamination in chicken embryos. *GSC* is an evolutionarily conserved transcription factor that regulates changes in cell movement in an array of contexts. Given the conserved function of this gene, *GSC* may be promoting neuroblast delamination in the chicken otocyst. Using immunofluorescence to track *GSC* expression during neuroblast delamination, the

expression of *GSC* within migrating neuroblasts was analyzed. *GSC* is co-expressed in cells expressing either neuronal or epithelial markers, potentially representing the switch in cell fate that occurs during this process. Interestingly, the location of *GSC* within cells varies. Based on preliminary data, *GSC* is present in the cytosol of non-neuronal cells whereas nuclear localization of *GSC* is specific to the neuron fate. Further testing will be necessary to confirm these results, but this preliminary data potentially suggests that *GSC* undergoes nucleocytoplasmic transport, which has not been previously investigated. Understanding the genetic mechanisms underpinning neuroblast delamination during chicken inner ear development will add to our knowledge of this fascinating developmental process and of the role of the *GSC* gene itself.

Gaona, Isabella P. Kappa Delta Alpha, Lipscomb University.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 9:30-9:45 AM

The Effect of Topoisomerase II on Zebrafish Behavior and Neural Organization.

Topoisomerase-II Beta (TOP2B) is an enzyme that manages supercoils in DNA and is important in DNA transcription and replication. Previous studies showed that TOP2B mutant mice develop axons that fail to innervate the diaphragm resulting in the pups suffocating at birth. To further examine this phenomenon, a loss of function study was conducted utilizing 4µM Hu-331 as an inhibitor for Topoisomerase-II (Top2) in the model organism D*anio rerio.* Previous immunohistochemistry in our lab found that groups treated with 4µM Hu-331 displayed shortened axons with higher disorganization, abnormal Mauthner neurons, and the embryos appeared to swim slower. Mauthner cells – activated by sudden stimuli – initiate escape responses: C-start and S-start. C-start responses use either one or both Mauthner cells and first appear at 4 days post-fertilization. S-start responses require both Mauthner cells and appear earlier in development. In the present research, a touch-evoked response assay was conducted measuring distance traveled and velocity, using video analysis software EthoVision by Noldus. Our data suggests that Top2 plays a role in neural development as a majority of the treatment group exhibited a premature C-start response. Meanwhile, there was no significant difference between control and treatment groups in either distance traveled or velocity at this dosage.

Ghimire, Purnima. Epsilon Rho, St. John Fisher College.

ECOLOGY & ENVIRONMENT POSTER PRESENTATION #31

Exposure of Predator Scent to *Vanessa Claudi* Changes Their Behavior Toward Predator Scent.

Many butterflies primarily use vision to detect food and predators, but some rely on olfaction more than vision. It is known that insects learn new chemosensory cues as embryos like mammals, amphibians, and fishes. Butterflies oviposit on their host plant and eggs laid on the host learns the scent and return to the same host plant to oviposit their eggs. There are two kinds of butterflies, generalist, and specialist. Specialists only feed only very specific plant families whereas generalists have many different host plants. In this study, the generalist butterfly, *Vanessa cardui* (painted lady butterfly) was raised from eggs up to adults. There were four different groups in total and each group was exposed to predator odor at different stages of life. The scent of chicken feces was used as the predator scent. Group 1(control), group 2 (exposed as adults), group 3 (exposed as eggs), and group 4 (exposed as larvae) were tested on their food preference and their attraction toward a scent (control, chicken feces, and thistle). One of the host plants of painted lady butterflies is thistle, they know the scent of it at hatch (innate cues). In the lab butterflies were grown on artificial food (learned cues). Through experimentation, we wanted to see the food preference of larvae. Larvae were experimented on food preferences, the option was artificial food vs thistle. Out of 4 groups, 3 groups significantly chose artificial food over thistle and the 4th group showed no preferences. It could be said that chicken feces scent caused the larvae to not recognize the scent of artificial food from thistle as visuals and the lighting were the same, so was the taste. Experiment 2, adults were experimented on their behavior toward different scent, as they were put in the wind tunnel (7 vertical to 6 horizontal squares, each square measuring 10 by 10 cm). Butterflies were placed at the end/opening to the tunnel and different scents were placed on the first row in the middle. The results of experiment 2 showed that butterflies were not attracted to any particular scent. According to the Rayleigh test, the mean of the direction adults butterflies moved was meaningless and insignificant. The third experiment was done on the distance walked by butterflies when a wind tunnel blew in a different scent. When compared, distance walked was insignificant as it did not vary when a different scent was blown in for all four Groups. Therefore, Painted lady butterflies preferred learned cues against innate cues as they significantly chose artificial food against thistle. However, their movement, be it in

direction they flew and the distance walked is independent of the scent present. The chicken feces scent and thistle both were unable to influence the movement of adult butterflies. They were not able to learn the scent of chicken feces, nor they could recognize thistle.

Givens, Gina. Sigma Tau, The Florida State University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #14

Data Needs for Designing and Implementing Go Slow Zones to Mitigate Impacts on Sea Turtles.

Marine megafauna is persistently being put at risk by anthropogenic factors. Vessel strikes are attributed to an alarming proportion of incidents that endanger marine megafauna, specifically marine turtles. Focus on conservation management skills, strengthening educational awareness within communities, and implementation of enforcement is required to lessen vessel strikes on marine sea turtles. Go-slow zones are one of the strategies that can be implemented to reduce impacts from vessel strikes. Therefore, it is imperative to identify the data needed to implement and ensure compliance of go-slow zones. Distinguishing data needed to support the benefits of go-slow zones will assist in the fitness of sea turtles, such as sea turtle distribution, vessel distribution, public awareness, and adherence to speed limits. Data were reviewed and analyzed with a specific focus on go-slow zones effectiveness and uses. This was constructed via the utilization of the search engine Google Scholar. Key words such as vessel strikes, sea turtles, go-slow zones, were searched. It was determined that there is a strong need to better go-slow zones with supplemental data and overlapping research.

Gonzalez, Mariangelis and Daryl Hurd. Epsilon Rho, St. John Fisher College.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #25

The Role of *klp-13* in Phasmid Neurons in *C.elegans*.

The ability for an organism to sense its environment is critical for life. Cilia are neuronal cellular extensions involved in sensation and signaling. *klp-13* is a kinesin-like protein found in the model nematode *C. elegans* which is thought to have a role in regulating cilia length as loss of function causes longer cilia. The ortholog in humans is KIF19. Deletion of this gene causes renal diseases and other pathologies such as orofacial syndrome and Axenfeld-Rieger syndrome. Similar to *C. elegans*, this motor-like protein regulates the length of motile cilia by mediating depolymerization of microtubules at ciliary tips. *klp-13* is expressed in non-motile sensory neurons in nematodes; however, its exact role is unclear. Lipophilic dyes, such as DiI, backfill certain ciliated sensory neurons in worms and allow for an assessment of cilia structure. 49 N2 wild-type and 47 *klp-13* deletion mutants were stained with DiI and viewed through the fluorescent microscope. The results showed that all 4 phasmid neurons in *klp-13* mutant *C.elegans* filled similar to the N2 wild-type. This indicates that the deletion of *klp-13* gene has no effect on the phasmid neurons in this assay and shows that longer cilia still dye-fill as normal cilia do. Future experiments will assess whether the increase in the length of cilia in *klp-13* mutants may change the functionality of ciliated sensory neurons.

Jaramillo, Angie and Devdutta Deb. Upsilon Zeta, Mercy College.

ECOLOGY & ENVIRONMENT ORAL PRESENTATION 9:30-9:45 AM

Understanding How Oomycete Plant Pathogens Interfere With PAMP-triggered Immunity in Soybean *Williams* and *Solanum lycopersicum* plants.

Plants lack an adaptive immune system and instead rely on an innate immune system that allows them to defend themselves against microbial pathogens. Some of these pathogens include bacteria, viruses, fungi, oomycetes, and nematodes. Pathogens are either host specific or can affect a wide arrange of plants. These pathogens enter their hosts through wounds, natural openings, or mechanical pressures. Once in the host, pathogens then use molecular strategies to begin colonization and cause disease. Our research focus is on oomycetes as a plant pathogen. Oomycetes use sophisticated molecular strategies called effector proteins to sabotage the defenses of their hosts. These proteins, often manipulate signaling pathways in the plant to cause disease. These pathways induce several immune responses, like callose deposition and production of Reactive Oxygen Species or ROS, in the host plant such as those inhibiting pathogen proliferation (PAMP-Triggered Immunity or PTI) and those recognizing the effector right away (Effector-Triggered Immunity or ETI). Each year, agronomically important crops such as soybean, maize, wheat, rice, and potatoes are lost

due to pathogen attack, which not only cost the agricultural industry billions, but plays an effect on world hunger. Throughout this research, we used the Soybean *Williams* and *Solanum lycopersicum* as the model host plants to study plant-microbial interactions. The aim is to understand how to avoid pathogen infection due to the action of effector proteins. *Phytophthora sojae* is an oomycete that causes stem and root rot of soybean. In this research, we aim to show that effector, Avh73, from *P. sojae* act as suppressors of callose deposition and ROS signaling, which are examples of PAMP-triggered immunity, an immediate immune response. Using *in-planta* experiments and ImageJ analysis tool, we have reached a better understanding of how effectors target the innate immunity that plants harbor.

Joshi, Meenal M., Elizabeth A. Klar, Abigail L. Abernathy, Amy L. Sibley, Jeramy M. Belt, and Michael G. Newbrey. Mu Omicron, Columbus State University.

ECOLOGY & ENVIRONMENT ORAL PRESENTATION 9:45-10:00 AM

Background Levels of Intersex in Largemouth Bass (*Micropterus salmoides*) Revealed Through Histological Evaluation of Gonadal Tissue from Three Interconnected Water Bodies.

Intersex, the presence of oocytes in male gonadal tissue, has been studied as an abnormal phenomenon in gonochoristic species. Previously published studies do not explicitly identify the background levels of intersex in male Largemouth Bass (*Micropterus salmoides*), and this lack of knowledge limits our ability to interpret the species-specific severity of intersex. Perturbations to fecundity are considered to be minimal if a population exhibits a hypothetical value of 65% intersex when compared to a natural background level of 60% intersex. In contrast, the effect of intersex on fecundity is interpreted to be much greater if the hypothetical background level was 0% intersex. We hypothesized the occurrence and prevalence of intersex should be the same among the Chattahoochee River and two of its tributaries, Columbus, GA, USA. Largemouth Bass were collected using backpack and boat electrofishing techniques from Lindsey and Heiferhorn creeks, and Lake Oliver of the Chattahoochee River. Gonads from all fish were prepared histologically and stained using hematoxylin and eosin. In Largemouth Bass from Lake Oliver (n=41 males), the occurrence of intersex was 78%. However, in Lindsey and Heiferhorn creeks (n=22 males), the occurrence of intersex is 16.7%. This evaluation demonstrates that low levels of intersex can be expected in Largemouth Bass and also showcases the extremes in intersex among connected waterbodies within the same drainage.

Kaimari, Abdulraheem. Beta Omega, Mercer University.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 9:45-10:00 AM

Novel Lead Compounds Demonstrating Anti-biofilm Properties in *Staphylococcus aureus* May Act as Nor-A Efflux Pump Inhibitors.

Numerous studies have shown that bacteria quantify their density and collectively carry out a certain response with a communication mechanism known as quorum sensing. Biofilms are a type of virulence factor that forms once a bacterial quorum is reached within the host, preventing the host's immune system from detecting and ultimately eradicating these pathogenic bacteria. Efflux pumps may also be involved in biofilm production. These pumps are transport proteins that are responsible for the extrusion of various substances, including toxins, quorum sensing molecules, and biofilm components. The increased activity of efflux pumps has allowed antibiotic-resistant bacteria to increase their survival rates. This study tests certain drugs that were designed to resemble quorum sensing signaling molecules to inhibit biofilm formation. Since these drugs also have structural homology with known Nor-A efflux pump inhibitors (EPI) in *S. aureus,* we tested their activity on this pump. Fourteen of our previously synthesized drugs share this structural homology, with five of them revealing significant biofilm reduction in SA-1199 (wildtype) and SA-1199B (Nor-A overexpressor) but not in SA-K1758 (Nor-A knockout). This indicates that the drugs function in targeting the Nor-A pump rather than as competitive inhibitors at the receptor sites of the *S. aureus.* The conjugated aromatic ring with alternating electron-withdrawing and donating groups on the ortho and para positions appear to affect the inhibitory characteristics of these drugs. Developing a cocktail of drugs that curtail quorum sensing and inhibit efflux pump activity can maximize biofilm inhibition in *S. aureus*.

Lane, Ethan. Upsilon Rho, St. John Fisher College.

BIOMEDICAL SCIENCE POSTER PRESENTATION #4

Quantifying p53 Regulated Genes in a Zebrafish Melanoma Model.

Cancer is a prevalent disease and is one of the leading causes of death worldwide driven by mutations at the genetic level. An ideal model organism used for cancer research, specifically melanoma, is zebrafish as adult zebrafish display disappearance of their horizontal stripes and emergence of black masses. Zebrafish have highly conserved genes, comparable signaling pathways, and similar tumor development. This research project is designed to identify gene expression changes that are critical for the progression of melanoma in this model system. Wild-type and heterozygous p53 deficient (M214K) zebrafish are exposed to ultraviolet (UV) radiation to promote tumorigenesis. The expression of multiple genes in the p53 pathway are monitored via qPCR during progression of the melanoma. Genes that are identified as upregulated or downregulated will be targeted using CRISPR-Cas9 to determine their role in the progression of the disease.

Lenahan, Bridget and Maryann Herman. Upsilon Rho. St. John Fisher.

ECOLOGY & ENVIRONMENT ORAL PRESENTATION 11:15-11:30 AM

Investigation of Harmful Algal Blooms caused by Cyanobacteria in the Lake Ontario Embayment.

Occurrence of harmful blue-green algal blooms, caused by cyanobacteria, has increased in local freshwater lakes and ponds. Microcystins, hepatotoxins produced by cyanobacteria during algal blooms, pose a human health risk. Not much is known about the distribution of or whether cyanotoxins are a major health issue for the Great Lakes region, specifically in swimming areas and drinking water. Water samples were collected from seven locations around Canandaigua Lake and Ontario, NY in October 2021. Microcystin levels were determined using an ELISA-ADDA assay based on EPA method 546. Two of the seven samples had microcystin levels above 4 µg/L, two were between 2-3 µg/L, and four were below 1 µg/L. In accordance with NYS microcystin thresholds, values greater than 0.3 µg/L result in a "do not drink" advisory. Detection of levels above 4 µg/L result in the closure of beach and recreational areas. Previous studies found that Lake Ontario microcystin concentrations start off low in May, increase throughout the summer, hitting a peak in September and then decreasing in October. In October 2021, when samples were collected, temperatures were higher than usual, around 50-60 °F. Warmer temperatures could have caused renewed algal growth which elevated microcystin levels. Sampling over the course of a year and identification of toxin-producing species will provide more information on the patterns of microcystin production in Rochester-area waterways.

Leonhardt, Justin, Tyler Schneider, Jeilymar Jimenez, Thompson Durham, Elyse Donaubauer and Melissa Hayes. Psi Theta, Lander University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #15

Microbial Soil Community Profiling of Grace Street Park Outer Walking Paths in Greenwood, South Carolina through Illumina MiSeq Sequencing.

City parks and urban environments contain unique microbiomes due to human and animal activities unique to these areas. Bioactive microorganisms are mostly found in the top few inches of soil which often contains polluted material, agricultural products, and animal waste products. These materials provide selective pressures on the microorganisms that exist there. Generally, areas with increasing population densities have increased pollution and waste (Ferreira et al. 2018). According to a study by Delgado-Baquerizo et al. (2021), microbes inhabiting city parts and gardens in densely populated cities are exhibiting a higher proportion of key antibiotic resistance genes. After a brief literature review, we found little to no research on the biodiversity and bioactivity of microorganisms in recreational parks. Soil samples were taken in Grace Street Park in Greenwood, South Carolina. DNA was extracted from 2.5g of soil using Quiagen DNeasy PowerSoil Pro Kit following the standard manufacturer's protocol. Concentrations of extracted DNA were assessed using a Nanodrop spectrophotometer to ensure successful DNA extraction and quantification for sequence library preparation. DNA samples were sent to University of Michigan's Microbiome Core (Ann Arbor, MI) for library preparation and next generation sequencing. The V4 region of the 16S rRNA gene was amplified for downstream sequencing with the commonly used primers 16Sf-V4 (515f) and 16Sr-V4 (806r) and a previously developed protocol (Caporaso et al. 2012; Kozich et al. 2013). Sequencing was accomplished via

a MiSeq high-throughput sequencer (Illumina, San Diego, CA). Acquired DNA sequences were filtered for quality and analyzed using MOTHUR v 1.47.0 (Schloss et al. 2009) following the MiSeq SOP (available at https://www.mothur.org/) with modifications. The results of this study are still in progress, but they will provide an initial characterization of microbial communities collected along the outer walking paths of Grace Street Park in Greenwood, South Carolina.

Lynch, Arilyn and Jay Bolin. Tau Eta, Catawba College.

ECOLOGY & ENVIRONMENT ORAL PRESENTATION 10:30-10:45 AM

The Harder They Fall: Measuring the Decline of a Green Ash Swamp Forest Due to Emerald Ash Borer Damage in North Carolina.

The Emerald Ash Borer (EAB) is an invasive species to the central piedmont of North Carolina. Our goal is to measure the decline and patterns of change in a Green Ash, *Fraxinus pennsylvanica*) dominated swamp forest in the Catawba College Fred Stanback Jr. Ecological Preserve (FSJEP). In the fall of 2019 we established six, 200 m^2 plots using a nested plot design to measure changes in the canopy, sapling, and herbaceous vegetation. We resampled the plots in fall 2020 and 2021. Our data indicated low diversity in the tree canopy, tree importance values in descending order, green ash, sweet gum (*Liquidambar styraciflua*), red maple (*Acer rubrum*), black willow (*Salix nigra*), American elm (*Ulmus americana*), and the American Sycamore (*Platanus occidentalis*). In Fall of 2019, 2020, and 2021, green ash trees were visibly showing signs of EAB infection. In Fall 2019 no ash trees were standing dead and 11% and 37% of the original ash trees were dead in fall 2020 and 2021, respectively. The importance value of the green ash canopy declined from 2019 (IV = 1.61) to 2021 (IV = 1.48). Canopy coverage declined strikingly from 73.1% to 18.5% from fall 2020 to fall 2021. Successional trends based on canopy mortality and sapling dynamics will be presented. Finally, we used a fixed-wing drone with a multispectral sensor to collect baseline data to evaluate change in vegetation in the Fall of 2021.

Maietta, Nathan and Skyler Sevacko. Theta Omega, Gannon University.

ECOLOGY & ENVIRONMENT ORAL PRESENTATION 10:45-11:00 AM

Insect Diversity on Two Green Roofs on the Campus of Gannon University, Erie, PA

This research presents the effectiveness of an urban green roofs and the quantity of different species of insects based upon newer and seasoned roofs as well as the possible progression of hierarchy food chain species. We conducted a series of traps using fly ribbon, both aerial as well as ground, to gain a thorough consensus of insect populations. These tests were conducted for a three-day period in the fall, August through October, and in the spring, March through May. From these observations we concluded what mammalian as well as avian species followed the insect population obtained. Through our experiment and results we hope to find that urban green roofs prove that they have a positive effect on a wide variety of species in the animalia kingdom.

Matt, Laura. Sigma Theta, Texas Wesleyan University.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 10:30-10:45 AM

Antibacterial Properties of a Novel 1,2,4 Oxadiazole.

Antibiotics have revolutionized medicine for the last 100 years, but not without consequences. Over the last 100 years, bacteria have become resistant to common antibiotics, like penicillin, methicillin, and vancomycin. Oxadiazoles are a class of organic compounds that are known to possess antibiotic properties. The study of oxadiazoles is new, and not much is known about how they work as antibiotics, specifically against antibiotic resistant bacteria. In the summer of 2021, a 1,2,4-Oxadiazole compound was synthesized at Texas Wesleyan University. This compound has a guanidine functional group on carbon 3 and a 4-methoxybenzene on carbon 5, which contributes to making this compound an eligible antibiotic. Similar studies done at Texas Wesleyan University have shown that oxadiazole compounds have antibacterial properties toward gram-positive and gram-negative bacteria. Assuming this novel oxadiazole has antibacterial properties, this study is focused on quantitative results to determine the minimum inhibitory concentration of the compound. The minimum inhibitory concentration will give information about how little compound is needed to inhibit growth of the bacteria. These results are presented in growth curves. The antibacterial properties of the novel oxadiazole

have been tested on *Enterococcus faecalis*, a gram-positive bacterium, and *Escherichia coli*, a gram-negative bacterium. In an ever-increasing era of antibiotic resistance, it is worth characterizing the antibacterial properties of the oxadiazole against gram-positive and gram-negative bacteria and considering their applications in modern medicine. Negative control assays have been done to observe the growth of each bacterium uninhibited by antibiotics. Positive control assays have been done to observe the growth (and lack thereof) of each bacterium under the influence of ampicillin, a cell wall biosynthesis attacking antibiotic, and chloramphenicol, a translation attacking antibiotic. The antibiotic properties have been characterized, and there is evidence that the novel 1,2,4 Oxadiazole possesses antibacterial properties against both *E. coli* and *E. faecalis*.

May, Camilla, Ashley Loeven, and Debra Fadool. Sigma Tau, The Florida State University.

BIOMEDICAL SCIENCE ORAL PRESENTATION 10:30-10:45 AM

Can CBD protect against olfactory inflammation and neuronal loss?

As the medicalization of marijuana occurs across the U.S., the main non-psychoactive component, cannabidiol (CBD), has gained recognition for its therapeutic potential. The objective for my project was to access the potential of CBD to mitigate neuroinflammation and neuronal loss following diet-induced obesity. Mice of both sexes were weaned to moderately high fat diet and received 20 mg/kg CBD or vehicle by intraperitoneal injection at equivalent volume every weekday for 4 weeks. Mice were fix-perfused, and their brains were cryoprotected. The main olfactory epithelium (MOE) was cryosectioned; the sections were collected on slides and processed for immunocytochemistry. The MOE sections were incubated with several antibodies (Ki67, Iba-1, and Caspase-3) and imaged on a Zeiss Axiovert S 100 Microscope to quantify signaling molecules marking inflammation and neuronal loss. CBD was not able to mitigate diet-induced inflammation but was able to prevent neuronal loss in the MOE. Next, we will induce obesity for 12 weeks and then see if a 4-week treatment with CBD can reverse, rather than prevent, neuronal loss because normally the MOE regenerates. This work was supported by the Consortium for Medical Marijuana Clinical Outcomes Research (CMMCOR) and the Bess Ward Scholarship from Florida State University.

Menlove, Bridger. Phi Omicron, University of Northern Colorado.

BIOMEDICAL SCIENCE ORAL PRESENTATION 10:45-11:00 AM

Therapeutic Effects of Cannabigerol on Immune Cells in Non-Alcoholic Fatty Liver Disease.

Non-Alcoholic Fatty Liver Disease (NAFLD) is a disease diagnosed when a >5% fat accumulation is found within hepatocytes. Though a diagnosis of NAFLD isn't harmful, it can cause other liver diseases such as non-alcoholic steatohepatitis (NASH) and Hepatocellular carcinoma (HCC). People affected by NASH have greater risk of fibrosis and cirrhosis (liver scarring) which can progress to end-stage liver disease (liver failure) or HCC. It is estimated that 25 percent of adults in the U.S. have NAFLD. and 20-30% of those will develop NASH. Since inflammatory responses play a key role in the development of NASH from NAFLD, innate immune cells such as Kupffer cells might respond to CBG, an anti-inflammatory cannabinoid. Kupffer cells can be activated by proinflammatory factors during the pathogenesis of NAFLD mediated by cannabinoid (CB) receptors. There may be physical changes in expression of these receptors during a proinflammatory cell state such as that found in NAFLD as it develops into NASH. Therefore, this study aims to evaluate the effect of CBG in modulating inflammation in resident subpopulations of Kupffer cells in NAFLD mouse model. This study will use immunofluorescence staining to identify changes within Kupffer cells in terms of CB receptor expression. White blood cell marker CD45, and Kupffer cell Marker F4/80 will be used to evaluate the populational change upon the CBG treatment in both male and female mice. Also, double staining of immune cell subpopulation colocalized with CB receptors will be used to evaluation whether CBG effects CB receptors, which modulate the immune cell population. It is expected that CBG will decrease CB receptors expression, thus decreasing immune cell populations within the NAFLD mouse model.

Milligan, Johnathan, Caio Franca, Shawna York, and Lisa Crow. Omicron Phi. Southern Nazarene University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #32

Sophisticated Beanwater.

Due to the wide consumer use, there is an enormous amount of information and misinformation surrounding the phenomena of coffee consumption. There is an oversaturation of the 'best', 'most flavorful', and 'superior' methods to source, brew, and drink coffee, which generates a perceived elitism within the community. In an attempt to limit the subjectivity of taste, aroma, and preference regarding the quality of coffee, we use analytical techniques to observe the compounds that make coffee taste like coffee. By comparing the choice of coffee and brewing method to the statistical data, I measure the "flavor profile" of a drink by its components. Primary comparison is Folgers vs. Starbucks vs. Craft brands. Special attention is given to the kinds of roasts within the same sample of beans, as it pertains to quantifiable chemical changes. We use TLC and ESI-MS to separate and characterize the chemical components of the brewed coffee.

Mota, Rosabely, Besani Espinal, and Renee Haskew Layton (mentor). Upsilon Zeta, Mercy College.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #26

Lack of LPS-induced LRRC8A Transcription Despite Presence of NF-kB Binding Site.

In the central nervous system, astrocytes facilitate neuronal viability. Astrocytes ubiquitously express volume-regulated anion channels (VRACs), which are activated in response to cell swelling and are permeable to chloride, the antioxidant glutathione, and several organic osmolytes. VRACs are comprised of several leucine-rich repeat-containing protein 8 (LRRC8) subunits, with the LRRC8A subunit being essential for VRAC function. A bioinformatic analysis performed by our group suggested a potential nuclear factor kappa B (NF-kB) binding site in the promoter region of *Gallus gallus* LRRC8A. The NF-KB transcription factor is involved in both neuronal pro-death and pro-survival activity, including activating apoptotic pathways and promoting the transcription of antioxidant enzymes. Based on our bioinformatic results, we hypothesized that treating primary astrocyte cultures from *Gallus gallus* with lipopolysaccharide (LPS), an inducer of NF-KB, would lead to increased LRRC8A mRNA expression. Astrocyte cultures were treated with 0.1 μg/mL to 2.0 μg/mL of LPS for 2 hours or 25 hours to identify if LPS stimulated LRRC8A transcription. We measured LRRC8A mRNA levels using real-time polymerase chain reaction (RT-PCR). Despite our bioinformatic results suggesting that there is an NF-KB binding site in the LRRC8A promoter, LPS treatment at the concentrations and time points tested did not induce LRRC8A transcription.

Newman, Tabitha. Kappa Delta Alpha, Lipscomb University.

BIOMEDICAL SCIENCE POSTER PRESENTATION #5

The Effects of Topoisomerase II Inhibition with Hu-331 or Cannabidiol on Embryonic Cell Death

Topoisomerase IIß (TOPIIβ) is a DNA repair enzyme that manages supercoiling of double- stranded DNA. Mice without functional TOPIIβ survive until birth but soon die because they experience neural defects that prevent innervation of the diaphragm. Their data suggests that TOPII has a more direct role in neural development than previously understood. Using Zebrafish as a model, we can study the neuronal defects caused by inhibition of TOPII using Hu-331, a natural oxidation of Cannabidiol (CBD). A study of marijuana use in pregnant women showed an increase in many neurologic conditions in the children leading to inquiries about if CBD treatment has similar results to treatment with Hu-331. There are three theories about the cause of the neuronal defects seen in TOPIIβ mutant mice including defects in axon guidance, lack of differentiation, or increased cell death. The cell death theory states that the inhibition of *topII* induces either neuronal cell death or generalized cell death leading to the observed neuronal deformities. Preliminary results reveal no significant decrease in primary motor neuron cell bodies with treatment of Hu-331or significant increase in the number of apoptotic cells induced by treatment of Hu-331 or CBD. Together this preliminary data suggest that cell death is not an accurate explanation of the neuronal defects seen in TOPIIβ mutant mice.

Norton, Jenevieve. Sigma Tau, The Florida State University.

ECOLOGY & ENVIRONMENT ORAL PRESENTATION 11:00-11:15 AM

Causes and Consequences of Nest-site Fidelity in a Tropical Bird.

Nest-site selection is crucial to the survival of both care-giving parents and their offspring. We examined nest-site fidelity in *Chiroxiphia lanceolata*, or the lance-tailed manakin (LTM), a small tropical songbird. Our population in Isla Boca Brava, Panama has been banded and monitored since 1999. To determine what drives LTM nest-site fidelity, we tested the non-exclusive hypotheses that nest fidelity (1) is a response to prior success at a site, and (2) relates to subsequent female and offspring survival. We assessed the timing of 1003 georeferenced nests attended by LTM females over 19 years to identify choices of nest-sites. While most females switched sites between nests, they were more likely to switch after offspring failed to fledge. Nesting success was unrelated to whether the female had switched sites relative to a prior effort. Females that switched were no more likely to survive than females who remained site faithful. Though females respond to past experience, these responses do not always result in improved outcomes. Females who showed nest-site fidelity nested almost 2 weeks earlier the following year, allowing for more opportunities to fledge young.

Plymale, Aubree, Hope McNair, Dara Moore. Mu Kappa Delta, Thomas University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #16

The Evaluation of Prescribed Fire Frequency and Burn Severity on the Ecological, Chemical, and Microbiological Soil Parameters in Post-agriculture Plots.

Fire is a powerful, naturally occurring disturbance that influences a network of biological communities and ecological processes. Fire affects nutrient cycling, chemical, and biological properties of soils. The severity of the fire has a variety of impacts on the soils in fire-prone ecosystems. The evaluation of soil parameters is important for macroflora, microflora, and fauna. In this study, post-agricultural plots were evaluated based on burn frequency. Soil plugs were evaluated from a zero, one, two, three-year burn frequency interval plot for chemical and microbiological parameters. Reflectance values of health, moisture and overall vegetation are related to fire severity. Moisture and overall vegetation are highest in one year pre-burn and vegetation health was lowest in three-year post burn. Microbial analysis revealed prescribed burn soil samples had significant microbial diversity and increased carbon source utilization compared to the zero-year sample. The H, Mg, Cl, Ca, S, and P concentrations increased while Al and Fe remained unchanged after burning. This analysis provides insight into the relationship between the fire dynamics, chemical parameters, and the presence of microorganisms.

Quintanilla, Cristofher, Amelia Zych, and Chun Zhou. Upsilon Zeta, Mercy College.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #17

PLTL Sessions in an Introductory Biology Class and Their Effects.

As students transition from high school to higher education, they often struggle to adapt to learning and study capacity changes. Aiding first- and second-year college students can help their academic growth and development. Peer-Led Team Learning (PLTL) is a teaching model used in undergraduate STEM courses to help students improve class performance. In the present study, students were placed into small groups for more opportunities to interact and better engage in study activities. According to the zone of proximal development (ZPD) theory, learners require assistance and motivation to learn a new skill or knowledge. Students who have taken the course can help as peer leaders and aid new students in becoming successful in the class. This form of teaching has been applied to a General Biology I Lecture (BIOL160) course to help students understand biological concepts and mechanisms, promoting critical thinking and in-depth understanding via diagrams and a scaffolding approach. The student's knowledge gain was assessed by giving students quizzes at the start and end of the study of a chapter of the lecture class.

Quiñones Barreto, Miliarys J., Acevedo Soto, Edwin L., Albarrán Acosta, Gretchen M., Rivera Díaz, Jeevan, and Juliana Pérez Laspiur. Zeta Lambda, University of Puerto Rico at Aguadilla.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 10:45-11:00 AM

Optimization of RNA Extraction Yields from White Blood Cells of Bovines With Mastitis.

Mastitis is a chronic inflammatory disease of the mammary glands in both bovines and humans that generally develops during the first twelve weeks postpartum. Long-term effects of mastitis include loss of milk production and cessation of lactation. The main objective of our research is to study differential expression of target genes related to the anti-inflammatory properties of the CB_2 receptor. This project aims to optimize the extraction of RNA from white blood cells (WBCs) of dairy cows with mastitis and healthy cows for qRT-PCR analysis. Concentrated and pure mRNA is recommended for further processing and analysis by qRT-PCR. Blood samples were collected from dairy cows and WBCs were isolated. RNA extraction was performed by testing different RNA extraction buffers, start-up sample size, RNA dilution volume, and temperature on extracted RNA concentration and purity, as determined by nano-drop spectrophotometer. Differences between means were investigated with student's t-test and ANOVA. Significant differences were considered at $P<0.05$. Higher RNA concentration yields were obtained by doubling the start-up number of blood samples ($P<0.01$) and diluting the RNA in less than 50 μL of nuclease-free water ($P<0.001$). Future research should aim to further increase RNA yields from bovine WBCs.

Ray, Sam, Alisha Howard, and George Wang. Psi Delta, East Central University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #18

Molecular identification of arthropods colonizing decomposing meso-mammalian carcasses.

Decomposing mammalian carcasses attract opportunistic insect detritovores and other colonizers. Identifying carrion insects on decaying mammalian carcasses and their patterns of succession can be used in forensics to ascertain the rate of carcass decomposition. We conducted an experiment to compare arthropod colonization of medium-sized mammalian carcasses between spring and summer seasons at the Outdoor Learning Environment (OLE) of East Central University in Ada, Oklahoma. The mammalian specimens used were collected from highways and included individuals of *Didelphis virginiana, Procyon lotor, Castor canadensis,* and *Dasypus novemcinctus.* We conducted two sessions of arthropod sampling, once in late April 2021, and then in early August 2021. During each session, four mammalian carcasses were enclosed individually in metal-wire cages and placed in the wooded area of OLE. We conducted regular sampling of arthropods on the carcasses until the carcasses fully decomposed. At least two specimens of each arthropod morphospecies were collected for identification using DNA barcoding, totaling 59 arthropod specimens for the two sessions. We used a standard DNA extraction protocol (GuHCl with proteinase K) followed by amplification of barcoding loci with PCR. Our results will allow more accurate identification of arthropod species colonizing mammalian carcasses and for seasonal comparison of the colonization process.

Croes, A.[1], Clymer, J.[1], Loveless, J.[1], Flores, R.[1], Nguyen, C.[1], Patel, N.[1], **Romo, C.[1],** Tawfiq, H.[1], Olaleye, O.[2], Rosell, R. C.[1]. **Nu Beta, University of St. Thomas. [1] Biology Department, University of St. Thomas, Houston, TX.,** [2] Department of Pharmaceutical Sciences, Texas Southern University, Houston, TX.

BIOMEDICAL SCIENCE POSTER PRESENTATION #6

Micromolar Concentrations of Methionine Aminopeptidase Inhibitor Has Little Cytotoxic Effect on Cancerous and Non-cancerous Mammalian Cells.

Tuberculosis (TB) is a disease of the lung caused by the bacterium, *Mycobacterium tuberculosis (Mtb),* and is the second leading cause of mortality from an infectious agent after SARS-CoV-2. *Mtb* is an opportunistic pathogen that benefits from a compromised immune system and is particularly deadly in HIV patients. Novel therapies targeting TB are necessary due to an increase in multi-drug resistant strains. Our collaborators at Texas Southern University identified novel bacterial methionine aminopeptidase (*Mt*MetAP1) inhibitors. Genetic knockout studies support the lethality of the deletion of *Mt*MetAP1 in *Mtb*. Further studies support the existence of an ortholog in *Homo sapiens* (*Hs*MetAP1) that performs similar essential functions. Although

these novel inhibitors are known to be effective against *Mtb*, their cytotoxicity in mammalian cells has yet to be established. We hypothesize that there will be low levels of cytotoxicity in cancerous and primary lung cell lines at varying concentrations of the MetAP novel inhibitor, UST-001. Using flow cytometry via a MUSE Cell Count and Viability Kit, the cytotoxicity of UST-001 was assayed in H1299 cancer cells. The H1299 cells were exposed to concentrations of UST-001 ranging from 0.1μM to 750μM for 48 hours at 37℃and 5% CO_2. Three negative controls were included in each replicate: DMSO (carrier), pure media, and Isoniazid (INH). INH is a common clinically effective TB treatment. The viability of H1299 cells was still over 60% at the highest inhibitor concentration tested. Trypan Blue Assays were performed on the same H1299 cells at each concentration and the controls, which corroborated flow cytometry results. In establishment of a dose-response curve, our data showed that at UST-001 concentrations below 100 μM, induced little to no cell death and cell viability of 90% or higher. Current flow cytometry testing on Mlg-2908 fibroblast cells, using the same protocol as the H1299 cells, shows cell viability of 89% or higher in 0.1 μM to 10 μM UST-001 concentrations. Since cancerous cells have higher mitotic rates and more repair pathways, we hypothesize that we will be able to establish an IC_{50} curve in Mlg-2908 cells at higher concentrations. Further studies using a Muse Annexin V apoptosis assay will focus on the UST-001 mechanism of cell death. Our ultimate goal is to characterize the toxicity of this drug in mammalian systems, with hopes of potentially identifying a new class of antibiotics and drug targets.

Rushanika, Shukuru, James Haughian, and Janae Mudge. Phi Omicron, University of Northern Colorado.

MOLECULAR AND MICROBIOLOGY ORAL PRESENTATION 11:00-11:15 AM

Utilizing Nur77 as a Surrogate Biomarker for CD8+ T cell Activation to Assess the Immunological Effects of Berberine and Exercise.

Patients diagnosed with autoimmune disorders are seeking complementary and alternative medicine (CAM) in the hopes of symptom relief (Winter & Korzenik,2017). For decades, Berberine has been a popular CAM of choice due to its immune and metabolic benefits, which are attributed to its ability in affecting biochemical pathways (Och & Nowak,2020). Exercise is also employed for autoimmune symptom relief. However, the action of berberine (Brb) in combination with exercise has not been elucidated. Therefore, our research question is as follows; does berberine in combination with physical activity have a compound pro-immune effect. Our study is examining the effects of berberine supplementation, as well as a prescribed exercise regimen on T cell activation in response to a stimulatory antigen. We monitored the effects of the aforementioned interventions in two model systems: in vitro using human JURKAT cells, and in vivo using mice-fed Brb with access to exercise wheels. To monitor T-cell activity we are utilizing Nur77 as a surrogate biomarker. The quantity of Nur77 expressed as a result of T-cell activation will be an indicator of T-cell responsiveness to stimuli. Our proposed hypothesis is as follows, Berberine with a combination of exercise will provide evidence of immune inhibition specifically in the context of T-lymphocyte cells, and Nurr77 will be a reliable biomarker for activation of T-lymphocyte activation. Knowing the impact of exercise in a combination with berberine can introduce a novel therapeutic for autoimmune disorders, as well as detection of T-cell activation.

Severude, Christine E., Adriana Soriano, Heather E. Wheeler, *Jennifer J. Mierisch. Lambda Omega, Loyola University Chicago, Chicago, IL, 60660.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #27

Characterization of the Role of Notch in Drosophila Testes.

The process of gonad development and gametogenesis is crucial for the propagation of our species and the conservation of biodiversity. The gene *Notch* plays an important role in these processes and is widely conserved across animal phylogeny. In humans and mice, lack of *Notch* has been associated with spermatogenesis arrest, suggesting that the differentiation and survival of male germ cells is dependent on the *Notch* signaling pathway. However, how Notch functions in this process is not well understood. Previous studies in *Drosophila* have shown that a loss of Notch signaling in the embryo results in defects in hub establishment, indicating that Notch functions in gonad development. Recent work in our lab demonstrates that increased Notch signaling in somatic cells of the testes also negatively impacts spermatogenesis, resulting in spermatogenesis arrest and infertility. Despite these important roles, no transcriptional targets of *Notch*

have been identified in the testes. The goal of this experiment is to determine the transcriptional targets of Notch in the testes through RNA-sequence analysis, bioinformatics, immunohistochemistry, and *in situ* hybridization. These target genes will help us understand the process and regulation of spermatogenesis in *Drosophila* and across animal phyla. It will also pave the way for future research endeavors exploring the function of identified target genes. These genes could represent therapeutic targets for individuals dealing with infertility. The gene *Notch* plays an important role in the process of gonad development and gametogenesis, which is crucial for the propagation of our species and the conservation of biodiversity. The goal of this experiment is to determine the transcriptional targets of *Notch* in the testes through RNA-sequence analysis, bioinformatics, immunohistochemistry, and in situ hybridization. These target genes will help us understand the regulation of spermatogenesis in *Drosophila* and across animal phyla. These genes could represent therapeutic targets for individuals dealing with infertility.

Sheridan, Bianca, Beechy, KM, Yoel, F, Doster, Jonathan, and Hank W. Bass. Sigma Tau, Florida State University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #19

The *Maize-10-Maze* Project, an Educational Public Chromosome Map Garden Featuring the Mutants of Maize.

Scheduled for Summer 2023 in Tallahassee, Florida (NSF IOS #2025811), the goal is to reproduce our fun and educational self-guided public tour of the maize genome. Each of the 10 rows features mutant families, arranged in "chromological order", matching the linkage map. This chromosome map garden features mutants that exhibit visually striking phenotypes (*Knotted1*, l*azy plant1*), are agriculturally important (*brittle endosperm1*, a sweet corn), or science history (*teosinte branched1*, a domestication gene). Weatherproof field placards describe each mutant, providing a museum-like experience for visitors with specific genetic information. They and associated images also provide a lasting online resource for science communication. The event is co-sponsored with the Florida A&M University's Forestry and Conservation Education (FACE) Summer Program, which celebrates its 25th anniversary in 2023. Photography and web-based resources from the *Maize-10-Maze* project are developed for use in classroom settings ranging from middle schools to universities and beyond.

Singh, Piarry, and Patricio E. Mujica. Upsilon Zeta, Mercy College.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #28

Involvement of the Endosomal Recycling System in the Control of Endothelial Barrier Function.

The inflammatory response is characterized by a transient loss of function of the vascular barrier, manifested in a rapid increase in endothelial permeability (hyperpermeability) to macromolecules, which leads to tissue swelling. Pro-inflammatory molecules released by injured tissues or cells activate vascular endothelial cells (EC), which in turn respond by rearranging intercellular junctions, thus increasing paracellular transport of fluids and solutes across the vascular wall. EC activation leads to mobilization of the endothelial nitric oxide synthase (eNOS) from the cell membrane, and nitric oxide (NO) production and delivery to subcellular targets. We have observed that cAMP signaling via Exchange protein activated by cAMP-1 (Epac1) triggers the mobilization of eNOS back to the membrane, concomitant with the termination of hyperpermeability. However, the mechanisms that enable the return of eNOS to the EC membrane are not known. We hypothesize that eNOS may interact with the recycling endosomal system in EC. To accomplish this, we established a culture protocol for immortalized (EAhy926) and primary human umbilical vein EC (HUVEC). We stimulated EAhy926 cells with platelet-activating factor (PAF) to simulate inflammation, and with 8cPT-cAMP, an Epac1-selective cAMP analog, to model the cAMP-mediated termination of hyperpermeability. We used immunocytochemistry to determine the localization of eNOS, actin, vascular endothelial (VE)-cadherin, and the recycling endosomal marker Rab11a. Our results suggest that the termination of inflammatory endothelial hyperpermeability may involve the endothelial endosomal recycling system.

Slotnick, Nathan. Rho Chi, Bloomsburg University.

BIOMEDICAL SCIENCE POSTER PRESENTATION #7

Inducible BORIS Expression in HCT116 Cells.

Recent studies suggest CTCF plays an important role in regulating eukaryotic telomeres, genomic structures at the ends of chromosomes that serve a protective role for the genetic material. CTCF is a chromatin and transcriptional regulator found in all human cells. Its only paralog, BORIS, is naturally expressed in spermatocytes but has been shown to be turned on in many cancer cell models. Unlike CTCF, the role of BORIS in telomere biology is yet to be understood. The goal of this project is to create a cell model which can be utilized to study BORIS function in telomere biology. One BORIS plasmid was created using a ligation and lipofectamine transfection to be expressed in HCT116 cells. Another BORIS plasmid with tetracycline inducible expression was infected into HCT116 cells via a retroviral package. BORIS expression in both cell lines has been measured at the mRNA and protein level, by RT-PCR and western blots respectively.

Snide, Austin and Carmony Hartwig. Tau Eta, Catawba College.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #29

Eggshell Organizing Factor 1 Protein in *Psorophora ferox* Mosquitoes.

Mosquitoes may serve as vectors for infective agents that cause human pathologies such as West Nile, Zika, and Malaria; and therefore, controlling mosquito vector populations is an important step towards protecting human health. In a recent study by Isoe et al. (2019), researchers found that mutation of the Eggshell Organizing Factor 1 (EOF1) protein in Aedes, Culex and Anopheles mosquito genera resulted in 'defective' eggs that were discolored and failed to reach maturity to larvae. One genera that has not been evaluated for the EOF1 protein is *Psorophora*. The purpose of this study is to determine if the EOF1 protein is present in the species *Psorophora ferox*. This is an ideal species to study because they can be potential vectors for a variety of pathogens, they belong to the Aedini taxonomic group shared with the Aedes genera which possesses EOF1, and they are highly abundant in the late summer in our ecological preserve. Using published primer sequences, we tested primer combinations known to amplify EOF1 from Anopheles, Aedes and Culex genera on *Psorophora* extracts. A putative EOF1 gene was shown to be amplified using primer sequence EOF1-36304, and after further sequencing analysis the amplified gene was shown to be identical across each *Ps. ferox* (99.9 %) sampled thus far. Here we discuss our continued research into the putative Ps. ferox EOF1 gene by further sampling of local *Psorophora* species, identification of homologous genes in the published nucleotide database, and determination of open reading frames (ORF) of this putative gene as a way to connect this novel *Ps. ferox* gene to the published EOF1 gene.

Stone,[1,2] Nicole, Xiaozhuo Chen[2], Yuxi Zhou [2], Shiyong Wu[2] and Yunsheng Li [2] Xi Chapter, Ohio University. [1]Ohio University Biological Sciences Department; [2]Ohio University Edison Biotechnology Institute.

BIOMEDICAL SCIENCE POSTER PRESENTATION #8

Role of *STC1* Gene in Proliferation and Invasion of Lung Cancer Stem Cells.

Globally, metastasis, the spread of cancer cells from the primary tumor to distant organs, causes approximately 90% of cancer-related mortality, making it a leading cause of death among diseases. Both cancer stem cells (CSC) and macropinocytosis have been shown to play promoting roles in cell proliferation, invasion, and metastasis. In Dr. Xiaozhuo Chen's lab at Ohio University, RNA sequencing was performed on A549, human non-small cell human lung cancer cells, which showed a consistent and significant upregulation of the *STC1 (Stanniocalcin 1)* gene when treated with eATP and TGF-β. The discovery prompted the preliminary knock-down (KD) studies on the A549 cells, which showed that the KD of the *STC1* gene led to reduced proliferation and invasion compared to the untreated cells. Additionally, studies are underway to investigate the role of macropinocytosis on the internalization of extracellular ATP (eATP). ATP is the energy source for use and storage at the cellular level and increased intracellular ATP (iATP) levels in cancer cells play an essential role in cancer cell metabolism, proliferation, drug resistance, and metastasis. This project will involve studying A549 cells with the knocked-out (KO) gene *STC1*, which will be able to confirm the results from the KD experiment and show the function of *STC1* in cancer stem cell

(CSC) formation. Another goal of this study will be to investigate whether the KO *STC1* gene has any effect on the prevalence of macropinocytosis in A549 cells and study the effects that lower levels of macropinocytosis, if relevant, have on the cell proliferation. Investigating the *STC1*'s roles in cell migration, invasion, and CSC formation will help develop future therapies and improve the survival rates of many different cancers. Identifying and understanding pathways and genes involved in cancer proliferation, metastasis, and survival help target new therapies that can more specifically inhibit cancer cells.

Strotman, Megan and Regina McGrane. Delta Sigma, Southwestern Oklahoma State University.

MOLECULAR AND MICROBIOLOGY POSTER PRESENTATION #30

Investigating Potential Circadian Oscillations in *Pseudomonas syringae*.

Pseudomonas syringae is a gram-negative plant pathogen that encodes a *kaiC* ortholog. KaiC has been proven to regulate circadian oscillations in cyanobacteria, which control transcriptional oscillations, cell division, and photosynthesis. We hypothesize that *P. syringae* is capable of circadian oscillation and that *kaiC* contributes to regulation of stress response, biofilm development, motility, and plant colonization. To determine if *P. syringae* has circadian oscillations, the wild type strain or mutants lacking *kaiC* were spotted onto King's B agar media supplemented with coomassie blue, which binds proteins, or congo red, which binds exopolysaccharides. The plates were then exposed to day-night cycles (12 hours light, 12 hours dark) or dark conditions for seven days. Oscillations in protein and exopolysaccharide production were then observed due to varying intensity of either blue or red rings in the colonies. While oscillations were detected, analysis of the plates indicated no significant differences in the number or pattern of the rings when comparing the mutants to the wild type or the plates exposed to day- night cycles to dark conditions. To determine if *kaiC* regulated *P. syringae* stress response, wild type or mutants lacking *kaiC* were exposed to day-night cycles or dark conditions as described above and inoculated in MinA media supplemented with glucose and varying concentrations of salt. Growth was then recorded by detecting absorbance every 30 minutes over a 48-hour period. Analysis revealed significant differences in the growth of the wild type exposed to day-night cycles compared to samples kept in the dark; however, these differences were not observed in mutant strains. This suggests that *kaiC* may modulate the ability of *P. syringae* to combat stressful environments. Determining the function of *kaiC* in *P. syringae* may allow for development of techniques that target this ortholog and prevent *P. syringae* growth on crops.

Swartzentruber, Zachrey L., Elisabeth H. Howansky, R. Chandler Russian, Elizabeth A. McDonald, and Emily K. Prince. Psi Theta, Lander University.

ECOLOGY AND ENVIRONMENT POSTER PRESENTATION #20

Heads up: The Effects of Age, Sex, and Group Size on Vigilance in White-tailed Deer.

In response to the threat of predators, white-tailed deer (*Odocoileus virginianus*) alter their behavior to increase survival. One such behavior, vigilance, is costly but can increase fitness and help avoid predation. Our past research found that solo deer are more vigilant in open habitats and in areas with temporary human disturbance (THD). In this study, we tested whether group size, age, or sex affected vigilance. We also investigated whether group vigilance varied with habitat type or THD. We collected data from images captured by camera traps in Upstate South Carolina. Each observed deer was labeled vigilant if their head was higher than their back and not vigilant if their head was lower than their back. We hypothesized that adult deer would be more vigilant than juvenile deer and that females would be more vigilant than males. We also hypothesized that groups would be more vigilant than solo deer. Finally, we hypothesized that in groups, vigilance would be higher in more open habitats and in habitats with higher THD. In contrast to our hypotheses, we found that juvenile deer were significantly more vigilant than adult deer, and that males were significantly more vigilant than females. As predicted, we found that groups of deer were significantly more vigilant than solo deer. Habitat type had no significant effect on the vigilance of groups; however, groups were significantly more vigilant in areas with high THD than in areas with low THD. Our results suggest that deer in groups may be less vulnerable to predation because they are more vigilant than. Furthermore, the benefits of vigilance may outweigh the costs for juveniles, as well as for males. Overall, vigilance in white-tailed deer is complex and influenced by many different environmental and demographic factors.

Tackett, Hanna. Xi Upsilon, Shawnee State University.

BIOMEDICAL SCIENCE ORAL PRESENTATION 11:00-11:15 AM

The Warburg Effect in Acute Myeloid Leukemia.

Acute Myeloid Leukemia (AML) is one of many cancer types that exhibit the Warburg Effect. This effect is characterized by cells utilizing glycolysis for ATP production even when oxygen is present. Dichloroacetate (DCA) inhibits aerobic glycolysis by activating pyruvate dehydrogenase. This forces the cells to undergo oxidative phosphorylation to generate ATP. HL-60 cells, an AML cell line, was used as a model system in this study. A dosage dependent decrease in cell viability was seen in these cells after 48 hours of DCA treatment. To investigate the mechanism of this effect, the expression of proteins involved with cell cycle regulation and metabolism will be examined. Cdk2 is a protein involved in cell cycle progression and mTOR regulates cell metabolism. The results of these studies could provide insight into DCA toxicity in AML which could result in a novel treatment for this deadly disease.

Teodoro, Lara Isis. Tau Delta Gamma, Ave Maria University.

BIOMEDICAL SCIENCE POSTER PRESENTATION #9

Matryoshka Virus; Investigating Protein Function

We are investigating the recently discovered Matryoshka Virus, which infects a *Plasmodium parasite*, a very close relative of the mosquito-borne parasite that causes Malaria which leads to hundreds of thousands of deaths worldwide (627,000 deaths in 2020). The genome of this virus only codes for 6 proteins, including two polymerases and four proteins with no known homologue and no predicted function or structure. In this poster, we show our investigation development in the attempt of replicating such proteins into E. coli's genome by transformation. Subsequent purification and analysis of these proteins may allow us to learn more about the virus and potentially use this virus for the treatment or prevention of malaria.

Webster, Emilie L., and Nicole L. Podnecky. Omicron Omicron, Saint Michael's College.

BIOMEDICAL SCIENCE POSTER PRESENTATION #10

The Effect of HAE-RND Efflux Pump Expression on Aminoglycoside Sensitivity in *Escherichia coli.*

The increased prevalence of antimicrobial resistance among Gram-negative bacteria, including *Escherichia coli*, is a major public health crisis, only exacerbated by continued use of antimicrobials to treat bacterial infections. Many bacteria possess efflux pumps located in the cell membrane that extrude foreign materials including antimicrobials from the cell. In the process, efflux pumps contribute to the development of multidrug resistance, however increased sensitivities to alternate antimicrobials (collateral sensitivity) can result from changes in the expression of efflux pumps. We determined changes in aminoglycoside, fluoroquinolone, and other antibiotic sensitivities in *E. coli* with and without native expression of hydrophobic and amphiphilic - resistance nodulation and cellular-division (HAE-RND) efflux pumps. The antibiotic concentration that inhibited 90% of bacterial growth, assessed by optical density, of *E. coli* MG1655 with and without genetic knockouts of structural efflux pump genes were compared. Deletion of the inner membrane protein genes *acrB* and *acrD* of the AcrAB-TolC and AcrAD-TolC efflux pumps, respectively, led to decreased susceptibly to aminoglycosides, while all efflux deletion strains except Δ*acrB* and Δ*tolC* (outer membrane transporter) resulted in decreased susceptibility to the fluoroquinolone, ciprofloxacin. Conserved antimicrobial susceptibilities have important implications for the design of future treatment strategies for efflux-mediated antimicrobial resistant infections.