2016 Brooks and Johnson Winners National Convention
Bethel University, Gamma Omega Chapter
May 30 – June 5, 2016

Brooks Award winners

Session 1: Microbiology

1st Place Tyler S. Laird, Azusa Pacific University, Epsilon Gamma Chapter "Entomopathogenecity of the fungus (*Aspergillus sclerotiorum*) on subterranean termites (*Reticulitermes hesperus*) and the effect of glucono delta lactone in conjunction with fungus on termite survival."

2nd Place Teresa Bukowski, St Vincent University, Upsilon Gamma Chapter, "Regular exposure to Gregorian chant promotes increased anxiety-like behavior and decreased depression-like behavior in male Swiss Webster mice."

3rd Place Sarah Murray, Angelo State University, Epsilon Sigma Chapter, "Sampling the anterior nares of Staphylococcus aureus: one nasal passage or both? Does it matter?"

Session 2: Molecular and Cellular Biology

1st Place Gordon, Molly. Sigma Tau, Florida State University. Peripherally perturbing replication timing.

2nd Place Dietrick, Barbara, Zheng, Yiming & Timothy Megraw. Sigma Tau, Florida State University. Determining the genetic network of primary microcephaly disease.

3rd Place Armaghan T. Raeouf ,Gannon University, Theta Omega Chapter, Effects of Polybrominated Diphenyl Ethers on the Heat Shock Protein Profile of Human Umbilical Vein Endothelial Cells

H.M. Rigg, Stefanie R. & Kennedy, Nathaniel G. Xi Rho, Purdue University North Central. Abstract submission for oral presentation. Methods in extracting DNA: Using phenol-chloroform on formalin-fixed human brain tissue.

Session 3: Ecology

1st Place Lindsay Millward and Darlene Panvini, Belmont University, Mu Theta Chapter, Leaf Decomposition Rate Differs between Invasive Exotic *Lonicera maackii* and Native *Acer saccharum* in Temperate Deciduous Forest.

2nd Place Nicholas Alexander, Florida State University, Sigma Tau Chapter, "Crypsis in the Cricket Frog, *Acris gryllus*."

3rd Place Jared Wilczynski, Brian Fuller, Greg Andraso, and Kelly Grant. Gannon University, Theta Omega Chapter, "Using DNA from the feces of Piscivorous Fish to Track Aquatic Invasive Species."

Session 4: Cell, Organismal and Developmental Biology

1st Place Julianna Sherman, Oral Roberts University, Mu Kappa Chapter, Positive Regulation of Yes Associated Proteins (YAP) Nuclear Activity via Amot Expression.

2nd Place Mary Wright, Xi Gamma Chapter, Mount St Joseph University, "Testing for Depression-like Behaviors in Mice Lacking Phosphodiesterase 1B.

3rd Place Kyle Fish, Epsilon Gamma Chapter, Azusa Pacific University, "Maternal and fetal hyposerotonemia alter biogenic amine function and co-expression of 5-HT/Netrin G1 in the placenta and developing fetal brain.

Johnson Award Winners
Poster Presentations

Session 1: Microbiology

1st Place Alina Pancyshyn, Brian Maharaj, Melody Scrudato. Nu Psi, Dominican College of Blauvelt. "Analysis of the Microbiome and Antibiotic Sensitivities of Fecal Bacteria in the Sparkill Creek."

2nd Place Keishla M Rodriguez-Martir, Mario Vendrell-Martinez, and Yadira Malavez. Zeta Lambda, University of Puerto Rico at Aguadilla. "Assessment of Tamarindus incica antimicrobial activity against Gram-negative bacteria."

3rd Place Yamaris Lopez, Lino Rivera, Alejandro Mitchell, Karelys Herrera and Jose A Carde. Zeta Lambda, University of Puerto Rico at Aguadilla. "Isolation and Characterization of Bacteria Isolated From PEG.

Session 2: Molecular and Cellular Biology

1st Place — Shantae M Thornton and Marcia J Abbott. Epsilon Mu, Chapman University. "Determining the Role of PPARa in the Pathway of IL-15-Induced Mitochondrial Activation."

2nd Place — Elizabeth Hughes and SM Herod. Epsilon Gamma, Azusa Pacific University. "Interaction of SERT Deletion, Early Life Stress and Maternal or Novel Female Presence as Indicators of Individual Differences in the Corticosterone Response to Adulthood Stress Challenge in B6.129(Cg)-Slc6a4tm1KpI/J serotonin Transporter Knockout Mice."

Session 3: Ecology

1st Place — Elizabeth R Wrobell, Wilcoxen, Travis E., Vana, Emily & David Horn. Iota Epsilon, Millikin University. "Seroprevalence and health impacts of Mycoplasma gallisepticum and Avipoxvirus in wild songbirds with access to anthropogenic food sources."

2nd Place — Nathaniel Zbasnik. Sigma Psi, Florida Institute of Technology. "Ontogeny of ecomorphological divergence in sympatric North American fishes."

3rd Place — Kelsey Going and Travis E Wilcoxen. Iota Epsilon, Millikin University. "Innate Immune and Antioxidant Costs of Low Temperatures in Native Green Tree Frogs (Hyla cinerea) and Invasive Tropical Cuban Tree Frogs (Osteopilus septentrionalis)."

Session 4: Cell, Organismal and Developmental Biology

1st Place — Jean-Nicole Place. Rho Chi, Bloomsburg University. "DNA Methylation of Gng7 in Human breast Cancer Tissues."

2nd Place — Andrew Taylor. Upsilon Theta, California University of Pennsylvania. "Effects of Variations in Insulin Levels on Developing Xenopus laevis Embryos."

3rd Place — Sara A Siegfried, Jennifer kR Schroeder, and Paris W Barnes. Iota Epsilon, Millikin University. "An Essential Solution: Toxicity of Five Essential Oils in MCF-7 Cancer Cells Lines."

H. M. — Loyda M Morales-Rodriguez. Zeta Lambda, University of Puerto Rico in Aguadilla. "Effect of Lipoxin A4 and Anti-malarial Drugs on Experimental Cerebral Malaria."

Abstracts for Paper Presentations

1st place Brooks Award -- Microbiology
Name: Tyler S. Laird
School: Azusa Pacific University
Chapter: Epsilon Gamma
Presentation Title: Entomopathogenecity of the fungus (*Aspergillus sclerotiorum*) on subterranean termites (*Reticulitermes hesperus*) and the effect of glucono delta lactone in conjunction with fungus on termite survival.

Termites have an important ecological role in regards to nutrient cycling and soil quality. However, termites, particularly subterranean termites, can also act as pests causing billions of dollars in damage worldwide. Methods of termite control typically involve the use of potentially hazardous chemicals. However, alternative methods do exist, including the use of entomopathogenic fungi. Previous work has shown that a strain of *Aspergillus sclerotiorum* fungal spores elicit dose-dependent mortality on subterranean termites (*Reticulitermes hesperus*). However, this study finds that low doses of the fungal spores do not elicit a statistically significant effect on survival. Nevertheless, the fungus can be transmitted between infected and uninfected termites at higher doses. Additionally, an experiment utilizing glucono delta lactone(GDL), an inhibitor of fungal defense enzyme (β(1,3)-glucanase), and fungal spores, show that GDL alone and fungal spore exposure alone both exhibit main effects on termite survival. However, no interaction is found between GDL and fungal spore exposure for the doses used in this experiment.

2nd Place Brooks Award – Microbiology
Name: Teresa Bukowski.
Chapter: Upsilon Gamma,
School: Saint Vincent College.
Title: Regular exposure to Gregorian chant promotes increased anxiety-like behavior and decreased depressionlike behavior in male Swiss Webster mice.

Anxiety disorders are the most common mental illness in the US, commonly demonstrating co-morbidity with depression. Studies on the effects of music exposure demonstrate improved cognitive performance and positive emotions. These studies tested the hypothesis that mice exposed to Gregorian chant would show reduced anxiety-like and depression-like behavior, while mice exposed to country music experience the opposite compared to control mice. For three weeks mice were exposed to one of three music genres or white noise. During week four, anxiety-like behavior was evaluated using the elevated zero maze and light dark box tests. Forced Swim and Tail Suspension tests were used to evaluate depression-like behavior. Surprisingly, mice exposed to Gregorian chant showed increased levels of anxiety-like behavior but reduced depression-like behavior. The bi-modal effect of Gregorian chant on affective behavior suggests further research is necessary to determine the molecular mechanisms underlying the changes in behavior observed in these studies.

3rd Place Brooks Award – Microbiology
Name: Sarah Murray.
Chapter: Epsilon Sigma,
School: Angelo State University.
Title: Sampling the anterior nares for Staphylococcus aureus: One nasal passage or both? Does it matter?

Nosocomial infections are of high importance in modern medicine, with special attention being paid to the bacterium Staphylococcus aureus which often resides in the nasal passages of humans. This specific bacterium has the genetic ability to evolve into many different strains, some more virulent and pathogenic than others including Methicillin-resistant Staphylococcus aureus (MRSA) and Vancomycin-resistant Staphylococcus aureus (VRSA). Standard sampling protocol in hospitals and research studies vary. Some stipulate that only one nostril be tested, while other protocols specify that both nostrils be tested with the same swab, as if the bacterial carriage in each nostril is homogeneous. The proposed study tested the extent of variation in each nostril, through biotyping, enterotoxin typing, and genetic strain typing.

Honorable Mention Brooks Award – Microbiology
Name: Keith Privé.
Chapter : Mu Iota,
School: Northern Kentucky University.
Title: Bacterial Growth on Contact Lenses: Examining Links between Lens Care and Biofilm Formation.

Reports of complications from bacterial infection of the cornea, including loss of vision, increased exponentially in the 1970's, shortly after soft contact lenses became popular on the market. Bacteria are capable of forming biofilms on the plastic polymers of contact lenses. Biofilms may consist of multiple bacterial types which work together resulting in resistance to antibiotics and disinfectants. The purpose of this research is to better understand the formation of bacterial biofilms on contact lenses by identifying the types of bacteria which grow on contact lenses under normal use and examining links between patterns of bacterial growth and lens care.

1st place Brooks Award – Molecular and Cellular Biology
Name: Gordon, Molly.
Chapter: Sigma Tau,
School: Florida State University.
Title: Peripherally perturbing replication timing.

A cell must carefully replicate its DNA once and only once during each cell cycle. Disrupting this process leads to genomic instability and eventually diseases such as cancer. One poorly understood aspect of DNA replication control is replication timing (RT), the strict temporal manner in which chromosomal segments replicate. In all

eukaryotic cells observed, certain chromosomal regions replicate early while others replicate late; however, the mechanism controlling RT is unknown. Understanding this mechanism may help to understand the biological significance and role of large-scale chromosome architecture in cellular function and disease. RT is spatio-temporally segregated with early replicating DNA in the center of the nucleus and late replicating DNA associated with the nuclear periphery and proper genome organization within the nucleus is also necessary for normal cellular function, suggesting that location of DNA may play a role in determining RT. Using a tagged chromosomal insertion site system, we relocated early replicating DNA to the repressive nuclear periphery and found this sub-nuclear re-localization was sufficient to delay RT. These results suggest the existence of mechanisms acting at the nuclear periphery that hold the potential to control RT, which can be further teased apart to define necessary *trans*-activators controlling RT.

2nd Place Brooks Award – Molecular and Cellular Biology
Name: Dietrick, Barbara, Zheng, Yiming & Timothy Megraw.
Chapter: Sigma Tau,
School: Florida State University.
Title: Determining the genetic network of primary microcephaly disease.

Autosomal recessive primary microcephaly (MCPH) results in reduced cerebral cortex growth. Mutations in 9 centrosome protein-encoding genes characterize this genetically heterogeneous disease. I used *centrosomin (cnn)* mutant *Drosophila melanogaster* to genetically dissect the disease. Centrosome assembly and microtubule-organizing regulation requires *cnn*, but *cnn* mutant adults survive with undefined neuropathology. An RNA interference screen identified *cnn* mutant modifiers. I discovered that genes controlling autophagy and microtubule regulation strongly enhanced *cnn*. Two components of the augmin complex, a microtubule-regulating complex, were identified in the screens. I investigated one of these augmin subunit mutants, a mutation in *dim gamma tubulin 4* (*dgt4*^{1}), and found neuroblasts with impaired microtubule organization and reduced Cnn and gamma-tubulin centrosomal recruitment. The *dgt4*^{1} mutant has early embryo lethality with severe microtubule-organizational defects, including a lack of microtubules attached to kinetochores. The *dgt4*^{1} mutant also showed increased levels of autophagy in fat body cell. These findings suggest microtubule organization and autophagy play critical roles in MCPH. Because autophagy requires *cnn* and microtubules, and the combination of *dgt4* and *cnn* mutations is lethal, I hypothesize that Dgt4, and the augmin complex, also regulate autophagy. My project tests this novel concept and contributes valuable information about autophagy regulation and MCPH.

3rd Place Brooks Award – Molecular and Cellular Biology
Names: Armaghan T. Raeouf,
School: Gannon University,
Chapter: Theta Omega Chapter,
Title: Effects of Polybrominated Diphenyl Ethers on the Heat Shock Protein Profile of Human Umbilical Vein Endothelial Cells

Heat shock proteins (HSPs) are critical to cellular survival in stressful conditions such as altered pH, temperature, or oxygen levels. Their role is to correct denatured proteins and aid in reformation of their structure. HSPs' maintenance capabilities prevent the formation of cellular protein aggregates that would, if unattended, promote cellular necrosis. Exposure to toxicants has been found to alter the levels of these proteins. Recently, HSPs are found to be involved in a wide range of human cancers and are implicated in tumor cell proliferation and differentiation. Polybrominated diphenyl ethers (PBDEs) are a category of halogenated compounds that serve as flame retardants in consumer goods ranging from electronics to textiles. Recently labeled as 'probable carcinogens' by the Environmental Protection Agency, this study proposes to investigate HSP profile in BDE-209 and BDE-85 exposed human umbilical vein endothelial cells. This presentation reports the standardization protocol and the results of two ELISA assays. Also, a comparative toxicity of these two congeners in terms of HSPs' levels will be presented and discussed in the light of the role of these proteins in the cells. Any alterations in the concentration of HSPs indicates increased cellular stress; therefore, the results are expected to signal a direct relationship between PBDE toxicity and number of HSPs present in the cell and can be used as a diagnostic tool to monitor cellular PBDE levels.

Honorable Mention – Molecular and Cellular Biology
Name: Rigg, Stefanie R. & Kennedy, Nathaniel G.
Chapter: Xi Rho,
School: Purdue University North Central. Abstract submission for oral presentation.
Title: Methods in extracting DNA: Using phenol-chloroform on formalin-fixed human brain tissue.

Genetic markers of diseases can be studied post-mortem with isolation of DNA from tissues. In formalin-fixed soft tissues (FFST), such as brain, cellular degradation resulting from fixation impedes extraction. There are no published methods for extractions from FFST. The development of efficient DNA extraction protocols for FFST will allow post-mortem study of genetic markers. Existing techniques of phenol-chloroform extraction were modified to produce the most efficient method of DNA extraction. Tissue samples were obtained from 3 human cadaver donors preserved in 10% formalin solution. Various methods were used to mitigate the effects of formalin fixation and expose the DNA, including proteinase K digestion and extreme temperature fluctuations. Quantification of DNA was determined via agarose gel electrophoresis and ultraviolet spectrophotometer analysis. The quality of the purified DNA will be assessed by targeted gene amplification using standard polymerase chain reactions. Similar techniques will be utilized for the identification of specific genetic markers in disease, including those known in Alzheimer's. This work will significantly expand the availability of tissues for genetic analysis post-mortem, thus contributing to genetic disease research.

1st place Brooks Award – Ecology
Name: Lindsay Millward, Darlene Panvini,
Chapter: Mu Theta
School: Belmont University, Nashville, TN
Title: Leaf decomposition rate differs between invasive exotic *Lonicera maackii* and native *Acer saccharum* in a temperate deciduous forest

Invasive exotic plant species may have various impacts in terrestrial forest ecosystems depending on their interaction with the native plants. This study compared the decomposition rates of the exotic invasive shrub Lonicera maackii and native Acer saccharum in a terrestrial forest ecosystem at the Belle Forest Cave Property in Nashville, TN. Additionally the influence of dominant canopy cover type, native or exotic, on decomposition was examined. Litter decomposition rates were measured over a five-month period using single-species litterbags of L. maackii and A. saccharum, with replicates placed either directly under exotic or native canopy. Litter from L. maackii decomposed more rapidly than A. saccharum. L. maackii decomposed faster under exotic canopy than native canopy. The evidence of faster decomposition of exotic plants than native plants suggests a need for better understanding of the ecological consequences of exotic species invasion in forest ecosystems.

2nd Place Brooks Award – Ecology
Name: Nicholas C Alexander.
Chapter: Sigma Tau,
School: Florida State University.
Title: Crypsis in the Cricket Frog, Acris gryllus

The Southern Cricket Frog, Acris gryllus, is a polymorphic species that occurs in several color types, such as brown and green, even within the same pond. The dorsal background color may be similar or different from the dorsal stripe (Conant and Collins 1998). In the presence of a predator, cricket frogs have been documented to jump once and then exhibit "freezing" behavior to maintain camouflage on their background substrate (Marchisin and Anderson 1978). Our field observations of cricket frogs have suggested that individuals may associate more often with habitats that match their 2016 Beta Beta Beta National Convention dorsal background color, but this association has not been tested systematically in the literature. We proposed to test two hypotheses for this putative habitat matching: (1) Frogs physically move to patches of habitat that match their current coloration and (2) Frogs change color to match their habitat patch (Gray 1972).

3rd Place Brooks Award – Ecology
Name: Jared Wilczynski, Brian Fuller, Greg Andraso, and Kelly Grant.
Chapter: Theta Omega,
School: Gannon University.
Title: Using DNA from the Feces of Piscivorous Fish to Track Aquatic Invasive Species

Lake Erie's ecology has been disrupted by aquatic invasive species (AIS), such as the round goby (Neogobius melanostomus) and the tubenose goby (Proterorhinus semilunaris). Our current study focuses on discovering which fish prey upon the gobies. We use polymerase chain reaction (PCR) to amplify specific DNA sequences from AIS found in DNA extracted from feces of piscivorous fish from Lake Erie. Identification of DNA from AIS must be specific and sensitive for our assay to be successful. The Qiagen Tissue Kit is the most effective method to extract DNA from feces and for subsequent amplification (or PCR). We optimized primers to amplify segments of cytochrome oxidase I (COI) that are species specific. We demonstrated the specificity of our primers by ensuring that they do not amplify DNA from other fishes commonly found in Lake Erie. In terms of sensitivity, we can detect the target DNA at concentrations below 10ng/mL. This molecular approach offers advantages compared to traditional gut content analyses because collection of feces does not harm the fish and it allows for collection of many more samples, potentially by leveraging community partners such as anglers. This DNA-based approach allows us to map where and when piscivorous fish recently consumed the gobies; thus enabling us to better track these AIS.

1st Place Brooks Award – Cell, Organismal and Developmental Biology
Name: Julianna Sherman.
Chapter: Mu Kappa,
School: Oral Roberts University.
Title: Positive Regulation of Yes-Associated Proteins (Yap) Nuclear Activity via Amot Expression.

Breast Cancer is a commonly diagnosed disease that is not well defined. The ability of the mammary glands to undergo organogenesis requires maintenance of sensitivity to growth signals. This sensitivity is necessary, but it does make this organ susceptible to aberrant growth. Mammary ducts are composed of polar epithelial cells, which lose polarity following growth stimulation. Angiomotin (Amot), an epithelial polarity adaptor regulates the distribution of apical polarity proteins, and in turn regulates growth. Recently, a universal size control mechanism was discovered which results in the polarity protein Yes-Associated Protein (Yap). Translocation of Yap from the tight junction to the nucleus stimulates growth. Amot80 expression is thought to promote growth via increasing nuclear Yap activity. Some of the key techniques performed while

investigating connections between Yap and Amot80 include: bacterial transformation, tissue culture, 3D matrix organogenesis modeling, transient transfection, stable gene expression via lenti virus, RNA extraction, cDNA synthesis, and quantitative polymerase chain reaction. Supported by Florida State University Undergraduate Research Travel Award. Catherina Artikis. Sigma Tau, Florida State University. Genomics in Action: Exploring Mechanisms for SMARCC1 Nucleosome Remodeling The nuclear architecture of a cell requires a precise and deliberate 3-dimensional spatiotemporal distribution of the factors responsible for the maintenance and regulation of the genomic response. These factors are ATP-dependent chromatin remodelers. In proteasomal complexes known as nucleosomes, DNA is wrapped around histones, allowing for exposure to select portions

of DNA and blockage of others. High temporal resolution imaging has indicated that ATP-dependent chromatin remodelers have the ability to transiently reorganize the positions of these nucleosomes in order to allow access to the previously blocked-off areas of DNA (Druliner et. al, 2011); however, the mechanism for these reorganizations is unknown. In this study, we aim to monitor these dynamics using live cell fluorescent microscopy of the BAF155 (smarcc1) remodeler protein. Examining the relationship between the strict regulation of nuclear cartography and genomic activity will contribute valuable findings towards related studies in gene expression regulation, questions of disease accumulation, diagnoses and control, as well as furthering the collective understanding of epigenomic responses.

2nd Place Brooks Award – Cell, Organismal and Developmental Biology
Name: Mary E. Wright.
Chapter: Xi Gamma,
School: Mount St. Joseph University.
Title: Testing for Depression-like Behaviors in Mice Lacking Phosphodiesterase 1B

Phosphodiesterases (PDEs) break the phosphodiester bond in the second messenger's cAMP and cGMP. There are eleven different families of PDEs that have different affinities for the cyclic nucleotides and are regulated differently. Family 1 PDEs (PDE1A, PDE1B, and PDE1C) are activated by a calcium/calmodulin complex and break down both cAMP and cGMP. PDE1B is expressed in striatum, dentate gyrus, olfactory tract, and cerebellum including regions having high levels of dopaminergic neurons. PDE1B knockout mice have been shown previously to have changes in locomotor activity levels and specific aspects of learning and memory. PDE4 family members which break down
cAMP are also expressed in areas that overlap PDE1B, and inhibitors of these family members have been used to treat depression and depression-like behaviors. The forced swim test is used to determine if rodents have depression-like behaviors. Rodents who are immobile longer and swim less are said to have more depression-like behavior. To determine if PDE1B may be a potential target for antidepressant treatments, we tested PDE1B mutant and normal mice in the forced swim test. We found that PDE1B mutants had less immobility and more active swimming than normal mice

3rdPlace Brooks Award – Cell, Organismal and Developmental Biology
Name: Kyle Fish.
Chapter: Epsilon Gamma,
School: Azusa Pacific University.
Title: Maternal and fetal hyposerotonemia alter biogenic amine function and co-expression of 5-HT/Netrin G1 in the placenta and developing fetal brain.

During pre-natal development, the placenta provides a transient source of serotonin to the fetus. Low levels of circulating serotonin are clinically implicated in stress-related psychopathologies later in life, including depression and anxiety. To investigate the effect of maternal hyposerotonemia on the placental source of fetal serotonin and its impact on

fetal brain development, B6.129(Cg)- Slc6a4tm1Kpl/J serotonin transporter knockout (SERT-KO) mice were utilized as a model of hyposetonemia. Wild type, heterozygous, and knockout females were bred with heterozygous males to generate pregnancies. Fetal brains and placental tissue were collected at two developmental time points (E14.5 and E 18.5). Cresyl violet staining of samples from both time points revealed no gross morphological changes due to genotype. A serotonin and Netrin-G1 co-stain was developed for immunohistochemical analysis of changes in 5-HT expression and axon migration. Fluorescent imaging of co-stained wild type and knockout fetal brains from a heterozygous mother at the E14.5 time point revealed no difference in serotonin expression. However, the KO fetal brain displayed attenuated
and less fasciculated expression of NetG1 than the WT fetal brain. This result suggests that although serotonin may not be affected by fetal genotype at this stage of development, expression of Netrin-G1 may be affected though a different mechanism.

Abstracts for Poster Presentations

1st Place Johnson Award – Microbiology
Name: Alina Panchyshyn, Brian Maharaj, Melody Scrudato.
Chapter: Nu Psi,
School: Dominican College of Blauvelt.
Title: Analysis of the Microbiome and Antibiotic Sensitivities of Fecal Bacteria in the Sparkill Creek.

Microbial contamination of waterways has been the subject of many studies carried out by citizen science groups in the US. In 2010, the NYS-DEC added the Sparkill Creek to its list of impaired waters due to the high concentration of fecal indicator bacteria. The source of contamination has yet to be identified, but years of research has shown that the problem continues to exist and the levels of the indicator organism has diminished. Our research aimed to determine the diversity of bacteria at selected sites along the Sparkill Creek using 16S rDNA pyrosequencing, in addition to an analysis of the antibiotic resistances of the bacterial isolates. By determining the biodiversity, we hypothesize that the origin of contamination could be deduced. Antibiotic resistance poses a serious health hazard. Data show that on average 70.7% of the isolates were resistant to 5 to 9 different antibiotics. Microbiome sequencing from three of the six sites has revealed that 36.7% of all bacteria belong to Proteobacteria, 34.8% to Bacteriodetes, and 25.6% to the Firmicutes. Success of this research is expected to help the community understand the problem before it and allow for the establishment of a healthy environment and community.

2nd Place Johnson Award – Microbiology
Name: Keishla M. Rodríguez-Mártir, Mario Vendrell-Martínez, and Yadira Malavez.
Chatper: Zeta Lambda,
School: University of Puerto Rico at Aguadilla.
Title: Assessment of Tamarindus indica antimicrobial activity against Gram-negative bacteria.

Annually, infectious with antibiotic resistant bacteria cause 23,000 deaths in US. The overuse and misuse of antibiotics and antibacterial agents has been associated with bacterial resistance. Identification of novel antimicrobial substances is important to protect us against pathogenic bacteria. For many years, Tamarindus indica (tamarind) has been used as a medicinal plant. Tamarind leaves contain flavonoids and other polyphenols that have been recorded as antimicrobial agents. The aim of the study was to identify parts of the tamarind tree with antimicrobial activity effective against Gramnegative bacteria. Fresh and dry extracts were prepared in water or ethanol. The antibacterial properties of the extracts were analyzed using four different bacteria strains. The fresh ethanol seed extracts showed the highest antibacterial activity in all Gram-negative bacteria tested. A dose dependent response was evaluated. Qualitative analysis demonstrated the presence of flavonoids in the fresh ethanol seed extracts supporting the antibacterial analysis data. Furthermore, the fresh ethanol seed extracts have comparable results to the antibacterial activity of commercial antibiotics analyzed. In summary, tamarind seed extracts demonstrated to have robust antibacterial properties against gram-negative pathogenic bacteria. This study supports the use tamarind extracts as alternative antibacterial agents useful in the fight against pathogens.

3rd Place Johnson Award – Microbiology
Name: Yamaris López, Lino Rivera, Alejandro Mitchell, Karelys Herrera and José A. Cardé,
Chapter: Zeta Lambda,
School: University of Puerto Rico at Aguadilla.
Title: Isolation and Characterization of Bacteria Isolated From PEG.

Glycerol is a byproduct that originates from the transesterification of fat and vegetable oils from biodiesel fuel production. Biodiesel production has increased considerably in recent years with a concomitant increase of the amount of glycerol generated. Approximately for every ten pounds of biodiesel produced, a pound of glycerol is created. In 2007, the United States produced around 450 million gallons of biodiesel and in 2010 sixty new plants with a production capacity of 1.2 million gallons were opened. Due to the nature of the glycerol, microorganisms may be able to convert it into metabolites with performance and features similar to those that are obtained using sugars as substrates. The polyethylene glycol (PEG) is commonly used as a coolant and antifreeze in motor vehicles. Its molecular similarity with the glycerol makes it suitable for explore the possibility of finding some bacteria with the capability to metabolize glycerol. Samples of PEG were obtained directly from radiators, followed by isolation and characterization. Two families of bacteria where identified, Streptococcus and Enterobacteriaceae. These results provide the opportunity for future studies of metabolic pathways in the fermentation of PEG and glycerol. With a future vision of reducing the amount of potentially harmful chemicals from the environment and new strategies for bio-remediation.

1st Place Johnson Award – Molecular and Cellular Biology
Name: Shantae M. Thornton and Marcia J. Abbott.
Chapter: Epsilon Mu,
School: Chapman University.

Determining the Role of PPARα in the Pathway of IL-15-Induced Mitochondrial Activation Obesity is a pressing modern epidemic, a condition resulting in storage of excess energy as adipose tissue. Diet and exercise remain the primary treatment regimen, but maintaining long term weight loss has proven difficult for many. Molecular regulators of metabolism are now studied as potential treatment options. Myokines are cytokines secreted from skeletal muscle (SKM) following exercise and increase mitochondrial activity. We aimed to determine the mechanism by which the myokine interleukin-15 (IL-15) increases SKM mitochondrial activity. We hypothesized that IL-15 acts to increase mitochondrial activity through modulation of mitochondrial mediators, such as peroxisome proliferator-activated receptors (PPARs). C2C12 SKM cells were grown in vitro and treated with vehicle control (V), IL-15 (100 ng/ml), the PPARα inhibitor GW6471 (GW), or a combination of IL-15 and the inhibitor (I+G); every other day for six days. Following treatment, RNA was extracted and reverse transcribed to cDNA. RTqPCR was carried out on the cDNA to assess mRNA expression levels of PPARα and mitochondrial activity regulators, UCP2 and PGC1α. Expression of PPARα, UCP2, and PGC1α, when treated with IL-15, were significantly increased when compared to the V cells ($P<0.05$). All gene expression levels, when treated with GW, were not significantly different from the V cells ($P>0.05$). When samples were treated with I+G, expression of UCP2 and PCG1α were significantly higher than V cells ($P<0.05$). This indicates that IL- 15 induces UCP2 and PGC1α mRNA expression independent of PPARα. These results warrant further studies exploring other targets of IL-15 to induce mitochondrial activity and in turn prevent obesity.

2nd Place Johnson Award – Molecular and Cellular Biology
Name: Elizabeth Hughes and SM Herod.
Chapter: Epsilon Gamma,
School: Azusa Pacific University.
Title: Interaction of SERT Deletion, Early Life Stress and Maternal or Novel Female Presence as Indicators of Individual Differences in the Corticosterone Response to Adulthood Stress Challenge in B6.129(Cg)-Slc6a4tm1KpI/J Serotonin Transporter Knockout Mice.

Stress vulnerability and disrupted monoamine signaling are the two best supported hypotheses on the underlying mechanisms of the development of various psychopathologies and other stress-related disorders. This ongoing study seeks to examine and analyze the interactive effects between such factors in an animal model for hyposerotonemia, a condition marked by low serotonin (5-HT) availability. The effects of early life stress (ELS) and stressors in adulthood on animals with low circulating levels of 5-HT were studied by measuring blood plasma levels of corticosterone (CORT), a biochemical response to stress. SERT-WT, HET, and KO mice were assigned to one of four experimental conditions for adolescent testing at 3 weeks. ‘ELS+’ animals

experienced restraint stress for 3h/day for 3 consecutive days, while 'ELS-' controls remained undisturbed. 'ELS+Mom' and 'ELS+Fem' animals experienced identical restraint stress with the addition of either their mother or a novel adult female in the test cage. Blood samples of all animals were obtained following Day 3 of stress treatment. All experimental animals underwent a homotypic stress challenge at 10 weeks, once for 3h, and blood samples were obtained following treatment. ELISA assays measured plasma CORT concentration in all isolated samples. Upon analysis, we observed an interaction of genotype by stress condition in both adolescent and adulthood CORT response, but perhaps more importantly vast individual differences within the 12 treatment groups. In adolescence, stress exposure increased CORT response over control groups only in WT animals ($F=11.94$, $p=0.0001$). Interestingly, both maternal and novel female presence further exacerbated this response over ELS+ animals. However, analysis of maternal and novel female plasma showed that mothers experienced doubled CORT levels (insert data?) over novel females, indicating that maternal presence may partially mitigate an animal's CORT response to stress, as compared to stress exposure with a novel female. In adulthood there were genotypic differences, but only in ELS+Mom animals ($F=3.57$, $p=0.05$), and surprisingly WT animals showed the greatest CORT response to stress for ELS+Mom animals. This analysis suggests that low 5-HT availability, early life stress exposure, and maternal presence may not be the most powerful indicators of individual differences in the sensitivity to stress response in adulthood.

1st Place Johnson Award – Ecology
Name: Elizabeth R. Wrobel, Wilcoxen, Travis E., Vana, Emily & David Horn.
Chapter: Iota Epsilon,
School: Millikin University.
Title: Seroprevalence and health impacts of Mycoplasma gallisepticum and Avipoxvirus in wild songbirds with access to anthropogenic food sources.

In the field of disease ecology, there is a well-known link between large population densities and an increase in pathogen prevalence. Birds often gather at bird feeders in large congregations, especially during times of natural food scarcity, which can increase the spread of various diseases around these resources. During a three-year period, nine species of birds were surveyed for the presence of two different pathogens that can have a serious impact on the overall health of the birds: the pathogenic bacteria, Mycoplasma gallisepticum (a causative agent of conjunctivitis) and Avipoxvirus (the causative agent of avian pox). To assess the impact of these pathogens on bird health, we examined immune and physiological profiles of each bird. To determine if a bird was infected with either pathogen, both field identification of pathological symptoms and molecular techniques were used. We found that birds were more likely to have disease at sites with feeders than at sites without feeders. Songbirds showing visual signs of infection showed greater heterophil to lymphocyte ratios, lower total antioxidant capacity, and were in overall worse body condition. ELISA analysis was also utilized to detect antibodies against either pathogen in birds that may have been infected but not showing visual symptoms of disease. Overall, this study reveals important disease dynamics that are associated with the presence of bird feeders in a community of wild songbirds.

2nd Place Johnson Award – Ecology
Name: Nathaniel Zbasnik.
Chatper: Sigma Psi,
School: Florida Institute of Technology.
Title: Ontogeny of ecomorphological divergence in sympatric North American fishes.

The ecomorphological principle is rooted from the premise that morphological adaptations (e.g., feeding apparatus) reflect the ability of an organism to perform fitness-relevant tasks (e.g., feeding). We test the hypothesis that shifts in food habits of two sympatric species are consistent with shifts in the feeding biomechanics of both conspecifics through ontogeny. Two species of North American fishes, Lepomis macrochirus and Lepomis microlophus that coexist in Florida lakes were collected at the same time, and then we compared the trajectory of their food habits and feeding biomechanics through ontogeny. Larvae and early juveniles of both species are planktivorous and suction feeders, but, after metamorphosis, Lepomis macrochirus continues to suction-feed on soft, elusive, and planktonic prey whereas Lepomis microlophus becomes durophagous and eats hard-shelled invertebrates such as snails. Scaling equations indicated a shift in the growth trajectories of feeding-biomechanical traits including Suction Index (SI) and physiological cross-sectional area of feeding muscles that is coincident with the shift in food habits of these sympatric fishes. Results support the hypothesis that shifts in food habits of two sympatric species is consistent with shifts in the feeding biomechanics of both conspecifics through ontogeny.

3rd Place Johnson Award – Ecology
Name: Kelsey Going and Travis E. Wilcoxen.
Chapter: Iota Epsilon,
School: Millikin University.
Title: Innate Immune and Antioxidant Costs of Low Temperatures in Native Green Tree Frogs (Hyla cinerea) and Invasive Tropical Cuban Tree Frogs (Osteopilus septentrionalis).

Temperature fluctuations affect amphibian immune systems and thermal tolerance likely plays a role in the geographic range over which different species can survive. We studied physiological costs associated with low temperatures in Green Tree Frogs (Hyla cinerea), which are native to the United States, and tropical, non-native Cuban Tree Frogs (Osteopilus septentrionalis) that have invaded Florida. Specifically, we examined variation in innate immunity and skin antioxidant capacity. To complete the study, 107 tree frog tadpoles were raised through metamorphosis and, as young frogs, divided into a control group maintained at room temperature of approximately 20 ˚C and an experimental group at approximately 10 ˚C. Individuals in the low temperature group were placed in the refrigerator for six to eight hours per day for 14 days to simulate early fall nocturnal ambient temperatures in northern regions of Gulf States. Cuban Tree Frogs had a significantly greater survival rate than Green Tree Frogs in the control group, but there was no significant difference between experimental groups. We also found that both species were negatively affected by low temperatures, with a decrease in bacterial killing ability and antioxidants on their skin, but the Cuban Tree Frogs were affected to a much

greater extent. Our findings suggest that the spread of Cuban Tree Frogs into areas north of their current invasive range may be slowed by physiological costs of low temperatures, but we do not expect significantly greater mortality rates associated with cold alone than tree frogs already occupying such a range.

1st Place Johnson Award – Cell, Organismal, Developmental Biology
Name: Jean-Nicole Place.
Chapter: Rho Chi,
School: Bloomsburg University.
Title: DNA Methylaiton of Gng7 in Human Breast Cancer Tissues.

Epigenetic regulation of heterotrimeric G-proteins has been associated with human tumorigenicity. Researchers found that the promoter on GNG7, a gene that encodes the γ-subunit, was highly methylated in head and neck cancers. Quantifying methylation levels near the promoter region of GNG7 in human breast cancer and adjacent normal DNA may provide insight on gene regulation in breast cancer development. Methylation was quantified using a bisulfite conversion treatment followed by Sanger sequencing. HeLa cell DNA was used to optimize this procedure. Nine patients' breast tumor DNA and eight of the adjacent normal DNA have been analyzed. The results indicate that there is significantly more methylation in the breast cancer DNA compared to the adjacent normal DNA at two out of the four CpG dinucleotide sites that were analyzed. According to the results thus far, methylation of the GNG7 promoter region may play an important role in how the gene is expressed in human breast cancer.

2nd Place Johnson Award – Cell, Organismal, Developmental Biology
Name: Andrew Taylor.
Chatper: Upsilon Theta,
School: California University of Pennsylvania
Title: Effects of Variations in Insulin Levels on Developing Xenopus laevis Embryos.

The purpose of this study was to analyze the effects of either increasing or decreasing insulin on developing Xenopus embryos. The effect of insulin on development is unfortunately highly visible in the case of diabetic fetal macrosomia, which is an excessive growth of a fetus in response to insulin exposure, leading to several complications. Diabetes itself is an example of the effects a lack of insulin can have on growth, development, and survival. Xenopus embryos are excellent model organisms for this study because many genes and signaling pathways are conserved between humans and Xenopus, including insulin. Embryos were either exposed to increases in levels of insulin by addition of 10, 100, 1000 ug/ml insulin, or reduced amounts using anti-insulin antibody doses of 100, 1,000, and 10,000 ug/ml. The efficacy of the antibodies in removing insulin from the embryos was evaluated using Western Blot analysis. The embryos' subsequent development was quantified by measuring weight and size of tadpoles, and development of neural crest cell derivatives. Preliminary conclusions indicate that while a large excess of insulin (1000ug/ml) is lethal, embryos exposed to

smaller increases develop more quickly than controls, according to both weight and pigment cell branching data. The number of pigment cells with primary branches was significantly higher than controls for 10 ug/ml and 100 ug/ml dosages. This increase in growth when in contact with insulin matches human studies with diabetic pregnancies, where fetuses that produced an excess of insulin in response to a hyperglycemic environment became larger.

3rd Place Johnson Award – Cell, Organismal, Developmental Biology
Name: Sara A. Siegfried, Jennifer R. Schroeder, and Paris W. Barnes. Iota Chapter: Epsilon,
School: Millikin University.
Title: An Essential Solution: Toxicity of Five Essential Oils in MCF-7 Cancer Cell Lines.

Cancer treatment is often costly and harmful to the individual undergoing treatment. Complementary and Alternative Medicine has recently seen an increase in popularity, especially in herbal treatments (Koppikar et al. 2010). Rosemary, eucalyptus, lemon, clove, and cinnamon leaf extracts comprise Thieves, known to support the body's defenses. To test any anti-cancer properties of these components, we utilized MCF-7 breast cancer cells as a model system. Individual oils were diluted using dimethyl sulfoxide (DMSO), and cells were treated with these essential oil dilutions in triplicate. Following a 48 hour treatment, we performed Resazurin and MTT cell viability assays. Cell death was observed with all oils, with more death in the dilutions with the highest concentrations of the essential oils.

Honorable Mention Johnson Award – Cell, Organismal, Developmental Biology
Name: Loyda M Morales-Rodríguez.
Chapter: Zeta Lambda,
School: University of Puerto Rico in Aguadilla.
Title: Effect of Lipoxin A4 and Anti-malarial Drugs on Experimental Cerebral Malaria.

Cerebral Malaria (CM) remains a great challenge for the development of effective therapeutics. Previous data suggest that stable lipoxin (LX) analogs prolong survival in mouse models of CM. Thus, we postulated here that concomitant treatment with lipoxinA4 (LXA4) and anti-malarial drugs could provide 100% survival rates and prevent cerebral malaria from Plasmodium berghei ANKA (PbA) infection. In this study, we infected wild type (WT) C57BL/6 mice with P. berghei ANKA strain, which induces a mouse model of cerebral malaria (ECM). Our results show that exogenous LXs had a minor effect on neurological damage and survival rate of wild type C57Bl/6J mice after PbA infection. These observations establish that anti-malarials worked too well to see any additional protective effect of lipoxins. For future experiments, the dose of the drugs should be optimized to study any other adjunctive therapy.