



The University Of

T A M P A

CNIHS UNDERGRADUATE research SYMPOSIUM

April 22, 2016

College of Natural and Health Sciences
4th Annual Undergraduate Research Symposium
April 22, 2016

Schedule:

2:00 – 3:00 PM:

Keynote Presentation

Shannon M. Biros, Ph.D.

“Nuclear Waste Remediation: Engaging Undergraduate Students in Research”

Sykes Room 131

3:00 – 5:00 PM:

Poster Presentations

Fletcher Lounge, Plant Hall

Awards for best poster presentations will be announced immediately following the poster session.

Symposium Organizers: Dr. Eric Freundt, Dr. Eric Werner, and members of the Beta Beta Beta Biology Honor Society.

The CNHS Undergraduate Research Symposium provides an opportunity for students within the College of Natural and Health Sciences to present their current or recently completed research projects in a poster format. The research may have been performed as part of a course, an Honors Research Fellowship, or an independent project conducted with a faculty mentor. Abstracts for all poster presentations are included in this booklet and are listed in alphabetical order based on the presenting author's last name.

The Symposium was initiated in 2013 through a generous grant from the UT Board of Fellows. Further financial support from the Office of the Dean of CNHS, the Department of Biology and Department of Chemistry, Biochemistry and Physics is also acknowledged. Finally, the organizers would like to thank all presenters, faculty mentors, and faculty judges for their participation in this event.

Keynote Presentation
Shannon M. Biros, Ph.D.
Associate Professor of Chemistry
Grand Valley State University

Shannon M. Biros joined the faculty of GVSU as an assistant professor of organic chemistry in the fall of 2008. She was a graduate of GVSU, receiving her bachelor's in chemistry and bachelor's in biomedical sciences in 2001. From there she moved to San Diego to pursue a doctorate in chemistry at The Scripps Research Institute under the direction of Professor Julius Rebek, Jr. Following the completion of her thesis, Biros spent a year at the University of California, Berkeley as a postdoctoral research associate in the laboratory of Professor Kenneth N. Raymond investigating the guest binding properties of a series of supramolecular metal-ligand clusters. She is currently in her eighth year as a tenured faculty member at GVSU, and maintains an active research group of undergraduate students.



Nuclear Waste Remediation: Engaging Undergraduate Students in Research

Nuclear power has significant advantages over coal, oil and natural gas given that it is non-greenhouse gas producing and can be utilized as a highly efficient fuel source (e.g., one kg of natural uranium will yield about 20,000 times as much energy as one kg of coal). Unfortunately, a major disadvantage of nuclear power is the disposal and treatment of nuclear waste, which contains mixtures of heavy metals in water. The efficient remediation of this waste remains an unsolved problem. The development of new methods that can remove one metal over all others present in nuclear waste is critical to increasing the sustainability of nuclear power. This seminar will describe our approach to this problem, as well as the incorporation of undergraduate students in the research process. Strategies employed by the speaker, as well as the department and institution, to ensure successful undergraduate research experiences will also be discussed.

Submit your Research Paper to *Acta Spartae*!

Along with your poster for the CNHS Undergraduate Research Symposium, please consider submitting a 3-5 page research paper to *Acta Spartae*, UT's new journal of science and mathematics. *Acta Spartae* is an annually-published refereed publication of research articles authored by undergraduate students at UT. The Journal will be published in a printed bound volume once a year, as well as in electronic form on the *Acta Spartae* website on a continuous basis as papers are submitted and accepted. There is no charge for publishing, and each student who has a paper appearing in the Journal will receive a free copy of the bound volume.

Papers received and accepted from those students chosen as category winners at the CNHS Undergraduate Research Symposium will be published as *Highlighted Research* in the Journal!

To submit an article, please visit our website: <http://www.ut.edu/actaspartae/>, and visit our author instruction page: <http://www.ut.edu/actaspartae/authors/>.

Submission deadline for the September 2016 issue is June 1, 2016.

ABSTRACTS

* Denotes authors presenting at symposium.

(1) **It's A Fish! It's A Plane! No, It's A Hammerhead!**

Haley Amplo^{*1}, Kyle Mara², Jonathan Ford³, Summer Decker³, and Dr. Daniel Huber¹

¹Department of Biology, The University of Tampa

²University of Southern Indiana

³University of South Florida College of Medicine

The hammerhead sharks are characterized by an extremely unusual head morphology, the cephalofoil (= "head wing"). Studies have demonstrated the cephalofoil's use in maneuverability and enlarging the substrate sampling area for sensory systems, but the fluid dynamics of the diversity of cephalofoil shapes has yet to be explored. In this study, six hammerhead shark species, ranging from the most basal winghead to the most derived bonnethead, were utilized to determine if cephalofoil shape affected fluid drag during locomotion. Using CT scans and reconstruction software, scaled 3D models of the sharks were placed in a water flow flume to determine the drag coefficient on each head. It is hypothesized that cephalofoil size and shape will influence fluid drag, and ultimately swimming performance.

(2) **A Metagenomic Approach to Understanding the Relationship Between Biological Iron Demand and Composition and Function of Symbiotic Gut Bacteria in Antarctic Fishes**

Meghan Angelina^{*1}, Mary Chamberlin², Irina Mueller³, Leonardo Almeida³, Corey Allard³, H. William Detrich, III³, Stuart Gordon⁴, Padmanabhan Mahadevan¹, and Jeffrey Grim¹

¹Department of Biology, The University of Tampa

²Ohio University

³Northeastern University

⁴Presbyterian College

Sixteen Antarctic fishes (icefishes) lack hemoglobin, making iron regulation in these species unclear. Further icefishes consume an iron-rich diet, resulting in a high dietary load, but low biological demand. Symbiotic gut microbes assist in digestion and other nutritional tasks for the host and utilize dietary iron. While we have shown that composition of gut microbial communities varies between icefish and *Notothenia coriiceps* (a red-blooded relative), it is unclear whether these differences alter iron metabolism of the fish host. We hypothesize that the gut microbiomes of icefishes are enriched in iron-loving bacteria that help these fishes regulate high dietary iron. We induced controlled, experimental anemia (25% and 100% knockdown of red blood cells) in *N. coriiceps* to explore how changes in red blood cell content impact the gut microbial communities of notothenioid fishes. Experimental animals were made anemic with injections of phenylhydrazine, and DNA was extracted from intestinal samples of control and experimental animals using the MoBio Powersoil kit. Full metagenomic sequencing of DNA from control and knockdown individuals was conducted. Resulting sequence data will be analyzed using bioinformatics and will help elucidate how the Channichthyid fishes mitigate their abundant dietary iron. Funding by NSF OPP (ANT-1019305) and NIH SC INBRE.

(3) ***Escherichia coli* Susceptibility to Antibiotics, Essential Oils, Garlic, and Honey**

Andrea Arnaiz*, Cyanna Fryar*

Department of Biology, The University of Tampa

Natural antimicrobials have recently become a subject of much interest due to the increase in bacterial resistance to multiple antibiotics. Strains of bacteria that were once easily curable are now much harder to combat. Scientists are interested in determining the mechanism of cell killing for the antibacterial components of certain essential oils such as tea tree oil and foods such as honey. In this study, we

compared the efficacy of several commonly available antimicrobials, such as essential oils, garlic, and honey, to traditional antibiotics using the broth dilution assay. Compared to regular antibiotics, natural remedies were found to be less effective in inhibiting *Escherichia coli* growth.

(4) Tipping the Scales on Trendelenburg

Jenna Beaulieu* and Melissa Bigger*

Department of Nursing, University of Tampa

Evidence based translational nursing research should lead the clinical practice of healthcare providers to ensure the best patient outcomes. Surveys show that the majority of practicing nurses utilize Trendelenburg positioning, but do hypotensive patients in the acute care setting benefit more or less when treated with this position as compared to the use of other physical maneuvers, hemodynamic support, and/or pharmacological interventions? A variety of peer-reviewed empirical and theoretical studies were analyzed during a formal literature review to determine the safety and efficacy of Trendelenburg position. Overall, literature shows that the consequences of Trendelenburg may be quite detrimental and can lead to poor patient outcomes. Alternatives such as the passive leg raise (PLR) in combination with fluid resuscitation should be utilized to protect patient safety. Research regarding the safety and efficacy for PLR should be examined more thoroughly as it is incorporated into standard practice. Overcoming current provider perceptions and traditions, which have been a part of healthcare for centuries, poses a challenge to the implementation of and education about these findings.

(5) Identifying Genotypes of *Acropora cervicornis* that Are Resilient to White Band Disease 8

Alana L. Boyles*¹ and Erinn M. Muller*²

¹Department of Biology, The University of Tampa

²Coral Reef Ecology, Mote Marine Laboratory

White band disease in the Caribbean has become commonplace on coral reefs of the Florida Keys, resulting in significant loss of *Acropora cervicornis* (staghorn coral). To combat this rapid decline, *A. cervicornis* is grown in nurseries in situ and transplanted onto affected reefs. In order for transplanting efforts to be the most successful, corals should be resilient to disease outbreaks. To propagate resilient corals in nurseries, scientists should first determine whether varying genotypes differ in susceptibility. An experimental laboratory manipulation was conducted to test whether nine genotypes from an in situ nursery varied in disease susceptibility. The corals were arranged in three distances from a diseased individual to test for genotypic resilience to white band disease. Though the evidence suggests there is variation among genotypes, the data was not significant. However, the B/O genotype was able to withstand contracting white band disease in all but one individual, suggesting this genotype may be more resilient. There was no difference in susceptibility among distances from the diseased coral, although there was a trend of higher infection rates at close distances. These results suggest there may be differences in susceptibility among genotypes of *A. cervicornis*, although further study with higher replication is needed.

(6) Detection of Possible Mutagens in Meat Products Found at the University of Tampa Using the Ames Test

Soraya Baz Fahad* and Taylor Bradford

Department of Biology, The University of Tampa

Mutagens and carcinogens are chemical substances that can alter DNA and possibly lead to cancer. Some mutagens have been found in certain beef and poultry products, depending on the way they are cooked. The presence of mutagens can be detected using the Ames test. In this particular study, samples of meat, mainly beef products, from the University of Tampa were tested using this method. Overall, the study

yielded positive results, i.e. colony formation, for all of the samples. However, there was an inconsistency with the negative control. This could have been caused by procedural error or accidental contamination. Although our results indicate that mutagens may be present in meat products, we are unable to conclusively identify mutagens due to experimental error.

(7) Fighting For The Spotlight

Emilia Brzozowski* and Ashley Clemens*
Department of Biology, The University of Tampa

This experiment is testing the chromatic adaptation hypothesis, which states there is a relationship between the types of pigments that an organism possesses and the habitats it can live in. Wavelength of light changes with depth in the ocean resulting in habitat partitioning, with red algae found in the deepest waters and green algae at the surface pushing brown algae below. The different wavelengths of light the algae are exposed to affect its light response. The light response identifies the plant's light limitations, carbon dioxide limitations, light compensation point, and quantum yield by comparing the photosynthetic rate to irradiance. The purpose of this experiment is to measure the light response of green and brown algae to different wavelength of light, and correlate these responses with each alga's pigment composition. Red, blue, and green filters were used to block out all other wavelengths of light and the algae's pigment composition identified by analyzing its absorbance. It was hypothesized that green alga due to its' chlorophyll b will out perform brown alga at red and blue wavelengths, but at green wavelengths the brown alga will out perform the green.

(8) Comparing Metabolic Rate of Benthic (*Hypostomus plecostomus*) Versus nektonic (*Carassius auratus*) Species of Fish

Jenna Burgess*, Courtney Mastrogiovanni, and Graham Bentz
Department of Biology, The University of Tampa

The change in metabolic rate of two species with distinct habitats, benthic and non-benthic (nektonic), and with varying gill surface area were explored. The two species used were algae catfish (*Hypostomus plecostomus*) and goldfish (*Carassius auratus*). The metabolic rate of five of each species were determined using LabQuest 2 data acquisition system and optical dissolved oxygen probe. Sixty samples per minute were taken for a total of 20 minutes for each individual fish. The gill surface area was determined by photographing the gills through a microscope and measured using Image J software. It was hypothesized that a higher metabolic rate and gill surface area would be seen in the nektonic species of fish (goldfish) because their environment and lifestyle requires more activity, therefore more energy, and oxygen to flow over gills.

(9) Comparative Computational Analysis of Phylloplanin Proteins Present in Different Plant Species

Joanna Burr* and Dr. Padmanabhan Mahadevan
Department of Biology, The University of Tampa

This investigation aims to determine the evolutionary lineage and variation present between phylloplanins present in different plant species. Phylloplanins are highly hydrophobic, basic proteins secreted on the leaf surface (phylloplane) to inhibit spore germination and leaf infection via pathogens. Proteins annotated as phylloplanins were used to search the Genbank protein database. Phylogenetic trees were constructed from these BLAST results. Protein domains were identified in these phylloplanins proteins using the Pfam, CDD, and Interpro databases. The Pollen_Ole_e_I family consists of a number of secreted plant pollen proteins, of approximately 145 residues, whose function has not yet been determined. This analysis enabled

us to gain better insight into the evolution of phyloplanins and the similarities of these proteins found in different plant species.

(10) Webster's Technique vs. External Cephalic Version: Preventing Unnecessary Cesarean Deliveries

Samantha Byrne* and Jasmine Cain*

Department of Nursing, The University of Tampa

Evidence based practices should be the mainstay of obstetrical nursing and translated into care modalities at the bedside. Even when women prefer a vaginal delivery, babies presenting with a breech presentation are often times delivered via cesarean section. Cesarean deliveries put the mother at risk for infection and added discomfort related to post operation pain. The cost of a C-section is also largely increased in comparison to a vaginal delivery. The Webster's Technique and External Cephalic Version (ECV) both attempt to turn the fetus in efforts to allow a vaginal delivery to be possible. The Webster's technique is supported by the evidence to be the most effective way to turn a fetus in breech presentation to cephalic presentation; studies show the technique has a 100% success rate if done the same day of delivery and an 82% success rate when done during the last trimester. Pregnant women with a breech presentation should strongly consider having the Webster's technique performed to prevent delivering via a cesarean section.

(11) Charge to Mass ratio of an electron

Kyle Cheever*

Department of Chemistry, Biochemistry, and Physics, The University of Tampa

The charge to mass ration of electron was investigated using an experiment similar to J.J. Thompson's original method. A set of Helmholtz coils produced a magnetic field, deflecting the electrons in a helium filled vacuum tube. The ionization of helium along the path of the electrons allowed for the visual measurement of the deflection. The results of varied deflection, voltage, and current were used to calculate the charge to mass ratio using a V vs (Br)² linear regression. To account for the effect of the Earths magnetic field, the experiment was set up in a north-south configuration and calculated for.

(12) The Effect of Fertilizer and Temperature on Photosynthetic Rate of Green Algae

Cody Cox*, Megan Greener*, and Cara King*

Department of Biology, The University of Tampa

Fertilizer runoff has been linked to degrading water quality and aquatic life in both coastal waters as well as lakes and rivers in the United States. Excess nutrients, such as phosphorus and nitrogen from agricultural and industrial expansion may be the cause of accelerated plant growth, and ultimately eutrophication worldwide. The purpose of this investigation was to examine the relationship of fertilizer and temperature on photosynthetic rate. It was hypothesized that fertilizer and increased temperatures would dramatically increase photosynthetic rate in two different species of green algae. This was done by examining *Caulerpa prolifera* and *Codium fragile*, at ambient and elevated temperatures, and in the presence and absence of fertilizer. Results from this investigation suggested that *Caulerpa prolifera* in the presence of fertilizer had a positive effect on photosynthetic rate. However, when *Codium fragile* was exposed to fertilizer there was a decrease in photosynthetic rate. The effect of temperature on photosynthetic rate was negligible for both species.

(13) Inconsistencies in Female Hair Color Preferences

Daniela Delvescovo*, Jennifer Wortham, and Abraham Miller

Department of Health Sciences and Human Performance, The University of Tampa

Research on hair color preferences of females has not yielded consistent results. Familiarity has been shown to influence what people find attractive. However, previous studies have not tested female preferences in other females and did not consider parental influences on hair color preference. We predicted that females would choose hair colors similar to their own, or their mothers', as most attractive in other females. We also predicted that females would have boyfriends with hair colors similar to their fathers'. Results indicated that females did not choose other females based on their own, nor their mother's hair colors, and they did not select boyfriends with hair colors similar to their father's. However, Female choice varied by geographic region. We determined that female choice matched the distribution of hair color in the sample population. This lead us to infer that female hair color choice may be influenced by availability. Brunette, blonde, and red hair were chosen in the same frequency that they were available in each geographical region surveyed. The frequencies in which hair colors are available in the environment is the only variable that is related to female choice. Females do not fit models predicted in psychology based on familiarity.

(14) E. Coli in your Drinking Water?

Julia Dudkiewicz* and Dr. Kristine N. White*
Department of Biology, The University of Tampa

A study was organized at the University of Tampa to identify potential sources of microorganisms on common areas around the campus. Different types of organisms were observed, including bacteria such as *Escherichia coli*, and various fungus species. Samples were collected from several distinct locations around the Science Wing building and Plant Hall and placed in petri dishes to later determine the organisms present. After the samples were collected, hand sanitizer and hand soap were applied to the petri dishes to study on their effectiveness of removing the microorganisms. The samples were cultured on nutrient based agar, incubated, and studied weekly. Presence of the diverse organisms and effect on growth of hand sanitizer or hand soap was observed. Health risks to the students and faculty were discussed based on the results due to the type of potentially dangerous microorganisms found living in common locations on campus.

Keywords: Bacteria, *Escherichia coli*, fungus, hand sanitizer, hand soap, health risks

(15) Captive Sponge Growth: Determining Optimal Conditions For High Maintenance Invertebrates

Katie Duval*, Matigan Paulsen*, and Dr. Kristine N. White
Department of Biology, The University of Tampa

Sponges are important hosts for a variety of different invertebrates, making them important to ecosystem function and viability. While maintaining sponges in an aquarium setting, we can monitor growth rates to identify optimal environmental conditions. Determining the ideal environment for members of class *Demospongiae* not only presents the opportunity to improve conditions for sponges kept in captivity, but also provides the ability to monitor the impact of host-symbiont interactions. In order to analyze the growth rate of sponges before and after the introduction of symbionts, such as members of order *Amphipoda*, routine measurements of the height, width and length of the sponges were recorded so that overall health and growth rates could be tracked. This information will be used for future studies on the effect of endo-commensal associates on the growth of sponge hosts.

(16) Effect of Atrazine on Native and Invasive Species of Fish

Grayce Dyer* and Victoria Piechnik*
Department of Biology, The University of Tampa

A predictor of an organism's success as an invasive species stems from its ability to achieve metabolic constancy in variable conditions. Green swordtails *Xiphophorus helleri* have been introduced through the pet trade and are now established throughout Florida, where they compete with native mosquitofish *Gambusia affinis*. To measure the ability of the mosquito fish and the green swordtails to maintain stable physiological conditions under changing environments, the metabolic rates of fish exposed to varying concentrations of Atrazine were collected. Atrazine is a pesticide that is a known contaminant in Hillsborough river due to runoff from rural areas. Five fish of each species were placed in tanks containing a range of Atrazine concentrations: 100µg, 50µg, and control. Dissolved oxygen measurements were taken 3 and 10 days after exposure and used to calculate metabolic rate. It was hypothesized that the invasive species (green swordtails) would exhibit less variability in metabolic rate in relation to changing concentration of Atrazine. Ultimately, the effect of pollution on the physiology of fish is demonstrated and may provide insight into how invasive species are outcompeting native species in environments influenced by human activity.

(17) Perceptions and Attitudes of University of Tampa International Students Towards Hookah Smoking

Youssra El Hanaoui*, Kelsey Moulton*, and Mary Martinasek
Department of Biology, The University of Tampa

Hookah smoking has been a rising phenomenon amongst college students in the United States. Hookah originated from the northwestern provinces of India and is now incorporated into different cultures such as Middle Eastern countries (hookahcompany.com). Multiple studies on hookah smoking have been conducted on a variety of students here at the University of Tampa (UT) but none have targeted international students specifically. In this research a total of 10 UT international students, representing continents such as Asia, Africa and Latin America, were interviewed on their attitude towards hookah. Their answers were recorded and transcribed. The interviewer and an outside party both coded the transcripts and collectively generated several conclusions. Some of the reoccurring themes gathered from the responses include the “pass it around effect”, “Individual but social”, “barriers outweigh the benefits”, “not a family discussion ” and “U.S. availability”. In conclusions these interviews prompted the participants to want to learn more and have more access to information about Hookah.

(18) Belonesox Belizanus: Examination Of A Tampa Bay Invasive Species Through Gut Analysis

Kyle Estephan* and Katie Robinson
Department of Biology, The University of Tampa

Invasive species have the profound ability to reshape the structure of the ecosystems they inhabit. As seen in many areas around the world, invasive species can also replace and take over certain niches of native species. These niches can be taken by the introduced species because of certain physiological and ecological advantages that it may have over the native species. More specifically, the pike killifish (*Balansax balizanus*) is currently invading the Tampa Bay saltmarshes. They may be affecting these ecosystems through taking up resources natives use and need. This study seeks to determine the affects the pike killifish can have on the saltmarsh ecosystems by analyzing the gut contents of multiple samples and evaluating the Index of Relative Importance for various prey items. Understanding the diet of this invasive species will allow insight into the effect they impose of the local food web.

(19) Investigation into the Predator Defenses of the Sacoglossan *Elysia clarki*

Kristen A Ewen* and Michael L Middlebrooks
Department of Biology, The University of Tampa

Elysia clarki is a species of sacoglossan sea slug found in nearshore habitats of the Florida Keys. They are specialist herbivores which feed on and sequester chloroplasts of green macroalgae including *Penicillus* and

Bryopsis. Several sacoglossan species synthesize chemical precursors or incorporate secondary metabolites from their algal diet. Sacoglossan secondary metabolites can be an important predator defense. Penicillus and Bryopsis are green algae that possess chemical compounds with feeding-deterrent properties. These compounds or modified forms can be detected in several slug species with a similar diet to *E. clarki*. The purpose of this experiment is to identify which, if any, anti-predator defenses *E. clarki* may exhibit, with the introduction of a predator. Based on overlap of habitat and opportunistic diet, a potential predator is the blue crab *Callinectes sapidus*. To increase the potential of interactions, *C. sapidus* was starved for four days (up to 2 weeks) between each trial where they were introduced to *E. clarki*. As the duration of starvation increased, interactions with *E. clarki* should increase if there is no defense mechanism. Instead, the initial trials showed a trend of fewer interactions as the crab and *E. clarki* were reintroduced in persisting trials suggesting a chemical deterrent.

(20) Investigation into the Predator Defenses of the Sacoglossan *Elysia clarki*

Kristen A. Ewen* and Michael L Middlebrooks
Department of Biology, The University of Tampa

Elysia clarki is a species of sacoglossan sea slug found in nearshore habitats of the Florida Keys. They are specialist herbivores which feed on and sequester chloroplasts of green macroalgae including *Penicillus* and *Bryopsis*. Several sacoglossan species are able to incorporate secondary metabolites from their algal diet. Secondary metabolites can be an important predator defense that causes the slug to be unpalatable. These compounds or their modified forms can be detected in several slug species with a similar diet to *E. clarki*. The purpose of this experiment is to identify which, if any, anti-predator defenses *E. clarki* may exhibit, when potential predators are introduced. Based on overlap of habitat and opportunistic diet, a potential predator of this species of sea slug is the blue crab *Callinectes sapidus*. To increase the potential of interactions, *C. sapidus* was starved between each trial before being introduced to *E. clarki*. As the duration of starvation increased, interactions with *E. clarki* should increase if there is no deterrent or defense mechanism being employed. Instead, the initial trials showed a trend of fewer interactions as the crab and *E. clarki* were reintroduced in persisting trials. This suggests that there is an anti-predator defense mechanism in play.

(21) Body Morphology and Community Structure of Tampa Bay Fishes

Alexander Famigletti*, Haley Amplo, and Dr. Daniel Huber
Department of Biology, The University of Tampa

Body morphology often reflects the ecological niche inhabited by an organism. The relationship between body morphology and ecological niche was investigated within the Tampa Bay fish community using specimens of approximately 25 species of fish from the ichthyology collection of the Florida Fish and Wildlife Conservation in St Petersburg, Florida. Measurements describing the size and shape of the head, branchial region, fins, and trunk were recorded and analyzed using principal components analysis. It is expected that species of cartilaginous and bony fish will exhibit morphological convergence with respect to habitat type and modes of locomotion and feeding.

(22) Analysis of Atomic Spectra

Eden L. Frazier*
Department of Chemistry, Biochemistry, and Physics, The University of Tampa

When electrons transition between high- and low-energy states, they emit photons. These photons are emitted at specific wavelengths for and produce a signature spectrum for each element. In this experiment,

we analyzed the spectra of helium, hydrogen, and mercury to glean information about our equipment and the elements themselves.

(23) Application of Selective Pressure on *Escherichia coli* as a Means of Obtaining the Most Resistance to Ampicillin

Pedro Garcia* and Raquel Gutierrez*
Department of Biology, The University of Tampa

Various strains of bacteria in the gut microbiota live in a symbiotic relationship with their host, as does *Escherichia coli*. The bacteria benefit from the nutrient-rich environment as human hosts benefit from, for example, the production of key molecules. Consumption of antibiotics has been shown to negatively impact the gut microbiota, and although probiotics are used as a countermeasure, they are also subdued by antibiotics. Therefore, there is a potential benefit of probiotic bacteria that are resistant to common antibiotics, such as ampicillin. We applied selective pressure on *E. coli*, a common mutualistic gut bacterium. Broth dilution tests were conducted with decreasing concentrations of ampicillin. In the initial test, bacteria growing at a higher concentration of ampicillin were selected for the second test. The subsequent test was conducted at a concentration closer to that in which they grew. The highest ampicillin concentration that exhibited growth of *E. coli* in the first test was 0.391ug/mL. In the second test, the highest ampicillin concentration exhibiting growth of *E. coli* was 3.13ug/mL. The second concentration displayed a 700% increase from the first. Due to time constraints, it cannot be confirmed whether this pattern would continue. Regardless, the substantial increase in resistance exhibited the efficacy of *E. coli* in acquiring resistance, as well as demonstrated the viability of selective pressure as a mean to obtain probiotics that are resistant to antibiotics.

(24) Engineering Clonal Human Cell Lines Stably Expressing a Single p73 Isoform

Niat Gebru^{*1}, Ricardo A. Cordova¹, Irena Gushterova¹, Jong Y. Park², and Dr. L. Michael Carastro¹

¹Department of Chemistry, Biochemistry, and Physics, The University of Tampa

²Department of Cancer Epidemiology, Moffitt Cancer Center

The p73 gene is a member of the p53 tumor suppressor family. This gene has two promoters, P1 and P2, which are the transcription initiation sites for the mRNAs encoding TAp73 and ΔNp73 isoforms, respectively. To facilitate molecular studies of specific p73 isoform functions and to create control samples expressing only one detectable p73 isoform for immunoblotting, pCI-neo expression vectors encoding one of the four p73 isoform cDNAs (TAp73α, TAp73β, ΔNp73α, ΔNp73β) were transfected into Caco-2 cells by electroporation. Clonal populations were selected using antibiotic resistance, isolated and expanded. Clonal cell line populations were used to isolate RNA and to synthesize cDNA in order perform TaqMan Real Time-PCR Comparative CT analyses to determine the p73 isoforms mRNA expression levels relative to untransfected Caco-2 cells. TaqMan RT-PCR data indicate a 6-fold expression of TAp73 mRNA in clone TAp73α#12 (RQ = 6.1536), a 25-fold expression of TAp73 mRNA in clone TAp73β#2 (RQ: 24.9555), a 66-fold expression of ΔNp73 mRNA in clone ΔNp73α#9 (RQ: 66.3434) and 1800-fold expression of ΔNp73 mRNA in clone ΔNp73β#2 (RQ: 1850,175) as compared to untransfected Caco-2. We concluded that these four isolated clonal Caco-2 cell populations overexpress the transfected p73 mRNA isoform.

(25) Comparing the Antibacterial Susceptibility of Natural Remedies against Common Antibiotics on *Escherichia coli* and *Pseudomonas aeruginosa*

Celeste Giglio* and Maria Encarnacion*
Department of Biology, The University of Tampa

As antibiotic resistance continues to emerge, it is essential that other antimicrobials be identified. Natural food items may represent one source of inhibitory compound. In this study, we evaluated whether natural food items such as cayenne pepper, fresh garlic, manuka honey, and olive leaf extract are capable of inhibiting bacterial growth. *Pseudomonas aeruginosa* and *Escherichia coli* were used to test the bacterial susceptibility of these food items with a broth-dilution assay and a Kirby-Bauer disk diffusion assay. Analysis of the minimum inhibitory concentration (MIC) and the zones of inhibition for both *Pseudomonas aeruginosa* and *Escherichia coli* suggested that of the four natural remedies tested, fresh garlic and olive leaf extract were the most effective antibacterial agents.

(26) Increasing *Staphylococcus aureus* minimum inhibitory concentration for hydrogen peroxide

Alexus Gilmore* and James Plummer*

Department of Biology, The University of Tampa

Multi-drug resistant bacteria is a growing problem, threatening modern healthcare infrastructure. Many ancestrally used antibiotics are being reconsidered as alternatives to antibiotics. Honey is a transculturally utilized antibacterial a main component of which is hydrogen peroxide. This study attempted to show the ability of *Staphylococcus aureus* to develop a higher resistance to the effects of hydrogen peroxide. Using a serial dilution of concentrations of hydrogen peroxide we tried to determine the minimum inhibitory concentration (MIC) of hydrogen peroxide on *S. aureus*. Using this we attempted to identify a more specific MIC. Overall, we were unable to accurately determine an MIC. There are other honeys from various sources that provide supposedly stronger bactericidal properties that do not contain hydrogen peroxide which may suggest that a number of synergistic factors may contribute to the bactericidal capacity of honey. Further research should be done to understand if we can create a potentially honey-like synthetic that optimizes the factors involved in honey's antibacterial effectiveness.

(27) Polyphenon E Affects p73 mRNA

Irena Gushterova*¹, Ricardo A. Cordova¹, Christopher D. Cole¹, Jong Y. Park², and Dr. L. Michael Carastro¹

¹Department of Chemistry, Biochemistry, and Physics, The University of Tampa

²Department of Cancer Epidemiology, Moffitt Cancer Center

Polyphenon E (PolyE) is a standardized blend of polyphenols found in green tea extract, which have chemoprevention value in prostate cancer (PCa) models. A p73 dinucleotide polymorphism (DNP) is a G4C14-to-A4T14 linked pair of transitions between the P1 and P2 gene promoters, which are transcription initiation sites for mRNAs encoding TAp73 and DNp73 isoforms, respectively. We reported the p73 DNP allele associated with decreased risk [OR = 0.55, 95%CI = 0.31-0.99] for aggressive PCa and increased TAp73/DNp73 protein isoform ratios in human cancer cell lines. Here we assess the effect of PolyE at 100 or 200 mg/L on total p73 mRNA levels and TAp73/DNp73 mRNA isoform ratios using TaqMan qRT-PCR in two PCa cell lines with different p73 DNP genotypes: DU145 (wild-type) and PC-3 (heterozygous). Our data from both DU145 and PC-3 cells show increased p73 mRNA levels (2.05 and 1.60 fold, respectively) and higher TAp73/DNp73 mRNA ratios (1.13 and 1.29 fold, respectively) at the low PolyE level (100 mg/L). At the high PolyE level (200 mg/L), the TAp73/DNp73 mRNA ratios significantly decreased (0.54 and 0.49 respectively) and total p73 mRNA levels were not changed in DU145 (0.91 fold), but increased in PC-3 (1.60 fold).

(28) Genetic Characterization of Populations of the African Jewelfish (*Hemichromis letourneuxi*) Introduced to the Waterways of Florida

Mitchell D. Hartwig*, Youssra El Hanaoui, Lorenzo A. Gayle, Heather A. Muse, Brandon Saiz, Tejay Swanston, Vickeima Sydney, Emily J. Williams, Pamela Schofield, and Dr. Natalia M. Belfiore

The African jewelfish, *Hemichromis letourneuxi*, is an invasive, predatory cichlid that has been introduced at least once in the 1960s to Florida. Its native range is in freshwater bodies in northeastern Africa, and it is likely adapted to a variety of tropical and subtropical habitats. It was first encountered in the Miami area in the 1960s. It has spread west and north rapidly since. It is tolerant of a wide range of aquatic conditions including shallow tidal creeks, culverts, rivers, and marshes. The species is a threat to other aquatic species, including native fishes, shrimp and snails because of its predatory behavior. We compare mitochondrial DNA sequence data from jewelfish sampled in six Florida populations, spread throughout the current range of this introduced species. We will try to hypothesize the historical relationships among jewelfish populations using Bayesian phylogenetic reconstruction methods. In conjunction with geographic information and the timing of arrival of this species in different drainages, we hope to estimate the number of introductions of jewelfish from unique backgrounds, the mode of spread, and where the initial introduction(s) occurred. Principles learned through understanding the history of this species could help to prevent future introductions of invasive species.

(29) Combining Positive Psychology and the Art of Dance to Find Resilience

Cara Hazel*, Susan Taylor Lennon, and Patty O'grady

Department of Health Sciences and Human Performance, The University of Tampa

As part of my independent study in Dance and Healing, I am focusing on the concept of forgiveness, and how one can practice forgiveness for themselves as well as others by exploring body movement. I am focusing on forgiveness because I think the inability to forgive oneself, or another, is one of the biggest factors in limiting one's resilience. I learned at a dance therapy workshop that expanding one's movement possibilities could expand one's possibilities in life. For instance, someone who has struggled with forgiveness in their past may move through life with a "bound" flow. Through exploration of dance concepts such as "free" flow, we would work through those experiences to find a level of openness to the idea of forgiveness. I think that we could use the art of dance combined with concepts of positive psychology to discover resilience. Concepts such as forgiveness, kindness, joy, shame vs. guilt, all can be physically correlated to dance educator Anne Green Gilbert's dance concepts and experienced in the body. As a future dance therapist, I am interested in doing this for patients: finding and focusing on their strengths and virtues while exploring dance concepts to experience greater resilience.

(30) E-cigarette Use and Perceptions Among UT College Students: A Descriptive Data Analysis

Daniel Indorato* and Mary Martinasek

Health Sciences and Human Performance, The University of Tampa

Background: Prevalence in electronic cigarette (e-cigarette) use has increased in recent years. Despite concerns of long-term health impact of this product, there is little known about awareness and use of e-cigarettes among college students.

Methods: An online survey was administered to undergraduate and graduate students at the University of Tampa (n = 827), (33% male and 66% female), (M = 21 yrs, SD ± 4.58). Data from this survey was used to identify use, attitudes and perceptions of e-cigarette use. SPSS was used to analyze the data for descriptive statistics.

Results: Of the sample, 47% had tried e-cigarettes with the majority not being traditional cigarette smokers. Of these, 33.4 % of students smoked primarily due to the influence of their friends. Reasons for use included diet, taste and relieve nicotine cravings. Less than half were not sure about the effects of the vapor on bystanders.

Conclusions: Friends remain a strong influence on social smoking behaviors among college students. Although most students were not traditional smokers, the desire to try this novel product prompted mostly

by friends resulted in usage.

Discussion: Informational messages regarding current research on the negative health effects are warranted to educate nonsmokers on e-cigarettes on UT's campus.

(31) Growth of *Escherichia coli* and *Staphylococcus aureus* is Inhibited by Breast Milk

Siara Isabella* and Andrea Da Silva*

Department of Biology, The University of Tampa

Evidence suggests that breast milk is a superior source of nutrients for newborn babies. In addition to providing nutrients, breast milk may also play a role in protecting the baby as it is exposed to many different microorganisms present in the environment. Bacteria such as *E.coli* and *S.aureus* are common commensal bacteria present in the non-sterile parts of the body but can become pathogenic. Breast milk could potentially protect the baby from these bacteria through its antimicrobial characteristics. In this experiment, we obtained breast milk from several sources and evaluated its antimicrobial properties by the broth dilution test and the Kirby Bauer disk diffusion assay. Results indicate that breast milk inhibits the growth of *E.coli* for broth dilution test and the Kirby Bauer disk diffusion assay.

(32) Protective Qualities of UV-resistant Bacteria: *Micrococcus luteus* and *Micrococcus radiophilus*

Sloan Goldberg* and Brianna Jackson*

Department of Biology, The University of Tampa

Ultraviolet radiation causes detrimental effects on the cell by mutating its DNA. *Micrococcus luteus* and *Micrococcus radiophilus* are two bacterial species known to be able to withstand high levels of UV radiation. However, it is unknown if they have any protective effects on other cells, like *Escherichia coli*. Using UVB (302nm) radiation from a light box, minimum lethal doses (MLD) were determined for *M. luteus*, *M. radiophilus*, and *E.coli*. The MLDs of the *Micrococcus* species (120s and 240s) were substantially higher than the MLD of *E. coli* (40s). Once determined, *E. coli* was mixed with the *Micrococcus* species and exposed to UV radiation to test for protective effects. It was found that *E. coli* was able to grow past its MLD in a few cases with both *M. luteus*, and *M. radiophilus*. However, it was noted that exact timing was difficult to obtain with our methods. It was found that the *E. coli* colonies that did grow in higher UV exposure were usually surrounded by a *Micrococcus* species, potentially showing protection. Exploring microbes for their UV protective qualities may provide an alternative for chemical containing sunscreens, offering a potentially safer product for both people and the environment.

(33) Ecophysiology of Intertidal Pneumatophore Epiphytes

Elaine Kurr*, Jayde Zimmerman*, Kristen Ewen, Dr. Kevin Beach

Department of Biology, The University of Tampa

Mangals provide hard substrates that host many species of macroalgae. This study examines variations in community structure, pigmentation, stress tolerance and recovery of epiphytes in mangrove forests of Tampa Bay, FL over several scales. Multiple species of macroalgae reside on pneumatophores including *Bostrychia tenella*, *Bostrychia calliptera*, and *Caloglossa* sp.. Physiological differentiation among species is being examined in part by quantifying their photosynthetic pigments. Epiphyte biomass was lowest in winter and fall, increased in the spring and was highest in summer. Tolerance and recovery from desiccation was measured by examining changes in photosynthetic yield. Epiphytes growing higher on pneumatophores exhibited the greatest ability to maintain and recover photosynthetic activity. Patterns in biomass distribution are in part explained by these physiological findings. This work highlights the ability

“simple” algae to acclimate to their respective microclimates and recovery from stresses that would be lethal to most “higher” forms of life.

(34) Soil Nematodes: a Potential Long-Term Reservoir Host for Chytrid Fungus

Nichole A. Laggan*, Electra F. Scott, Sarah E. Cuccinello, and Dr. Taegan A. McMahon

Department of Biology, The University of Tampa

Batrachochytrium dendrobatidis (Bd) is a prolific pathogenic fungus that is known to engender a mass decline of amphibian populations. However, Bd does not impact amphibians exclusively, it is known to infect other species, such as crayfish. It is unclear whether or not if Bd can survive long-term with such species as a reservoir host. Soil nematodes (*Caenorhabditis elegans*) have a similar length lifecycle respectively to Bd. Nematodes were cultured with Bd to monitor species interactions. Nematodes and Bd were also cultured separately with *E. coli* as a growth control without a studied species interaction. Four cultures were destructively sampled every four days for a 32 day period, population numbers of zoospores, zoosporangia, and nematodes were quantified. Bd and Nematodes are capable of surviving utilizing each other as a food source for a long duration of time (32 days), over several generations, with no additional forms of sustenance. The respective increase and decrease of the two populations seem correlated to one another. Thus, Nematodes may persist as a reservoir host for Bd.

(35) Comparing Jaw Morphology of the Blue Parrotfish, *Scarus coelureus*, and Bicolor Parrotfish, *Cetoscarus bicolor*, in Correlation to Hard Prey Consumption

Lauren LaMonica*, Dr. Daniel Huber, Jonathan Ford, Summer Decker

Department of Biology, The University of Tampa

Parrotfish are known for their ecological roles of preying upon hard corals and algal turfs on reefs. This ability to consume hard prey items is based on the presence of several morphological characteristics such as powerful musculature, supportive jaw configuration such as joints and other strong structures to endure forces exerted while feeding. XYZ. In this study, the structural mechanics of the jaws of two common reef inhabiting parrotfish, blue parrotfish, *Scarus coelureus*, and bicolor parrotfish, *Cetoscarus bicolor*, were examined. Stress and strain patterns were analyzed via Finite Element Analysis to test the hypothesis that the structural properties of the jaws would reflect the quantity of hard prey found in their diets. It is anticipated that the jaws of *C. bicolor* will exhibit greater mechanical efficiency in association with its diet of more hard prey.

(36) Treating *Pseudomonas Aeruginosa* with Bacteriophage Therapy

Nicole LeCours* and Paige Mazzocchi*

Department of Biology, The University of Tampa

Since evolving bacteria are becoming more resistant to antibiotics, it is crucial we begin to find new ways to treat these problematic bacteria. In this study, we evaluated the susceptibility of *Pseudomonas aeruginosa* to a variety of antibiotics and compared them with the ability of a bacteriophage to inhibit growth. These assays were performed by a kirby bauer disk diffusion assay and a broth dilution assay. We found that *Pseudomonas aeruginosa* displayed resistance to the antibiotics tested but was susceptible to lysis bacteriophages specific for *Pseudomonas aeruginosa*. Our results suggest that bacteriophage therapy may be more efficient than antibiotics in treating *Pseudomonas aeruginosa*.

(37) A Pilot Study Exploring Modifying Factors Related to Pregnant Women’s Behaviors and Perception of Electronic Smoking Products

Mary Martinasek, PhD, Irene Lopez LLOrente*, and Megan Scipione
Department of Biology, The University of Tampa

Methods:

IRB approved paper surveys in English and Spanish were administered by three public health students at a public health department during pregnancy check-up visits (n=60). Informed consents were obtained and the study was explained either in Spanish or in English. Survey participation was voluntary and a gift card of \$5 to Walmart was provided for participation.

Results

Forty-three percent of all participants were Spanish speaking and over half were pregnant with their second or third child. Of the sixty participants, twenty had tried an electronic product and 75% had used the product within the prior three weeks. These participants were evenly distributed in White, Black and Hispanic ethnicity. Friends were the primary influencers to vape. Primary reasons for usage was for where cigarettes were banned, an effective quit aid and considered a healthier option. Five of the twenty women were traditional cigarette smokers. Seventeen percent of the total sample size perceived vaping products as less harmful than cigarettes, while 40% were unsure. Over 50% of the women were unsure if the secondhand vapor was harmful. Coughing, stomach aches and throat burning were experienced by some of the users. Thirty-five percent of the twenty users, vape primarily in their cars.

(38) Measuring the Metabolic Rates of Intertidal Species

Kimberly A. Kennell*, Ariana R. Manikas*, and Tavonte J. Russell*
Department of Biology, The University of Tampa

Life in an intertidal zone can be challenging due to the constant changing of the environment including but not limited to the changing of the tides, seasonal availability, and exposure to dry land. Metabolic rates of three intertidal species (common limpet *Patella vulgata*, Atlantic purple sea urchin *Arbacia punctulata*, and a hermit crab *Paguroidea* spp.) were measured with oxygen sensors in air and water to determine the effects of this habitat change on their metabolic physiology. It was expected that each species would perform at a higher metabolic rate in one environment over the other due to the manner in which their lifestyles have evolved. It was hypothesized that the common limpet would have the lowest specific metabolic rate in both environments due to relatively sessile lifestyle, and that the hermit crab would have the highest specific metabolic rate in both environments, due to its high activity level. The three species were chosen from three different phylums in effort to observe if a specific phylum has evolved to live more efficiently in the intertidal environment.

(39) Physiological Effects of Atrazine on Terrestrial and Aquatic Organisms

Nicholas Martin*, Rachel Zaragoza*, Shanika Miles*
Department of Biology, The University of Tampa

There are many types of herbicides that people use to kill weeds and other unwanted plants, and keep a nice and clear yard. One such herbicide is atrazine, which is used to prevent pre- and post-emergence of broadleaf weeds in crops such as maize and sugarcane as well as on turf, such as golf courses and residential lawns. Since atrazine is so widely used, many wild animals, such as lizards and fish, can come into contact with it. This could cause many problems for the physiology of these animals, such as changing their metabolic rate which could affect their ability to gather resources. The purpose of this experiment is to examine the effect of atrazine exposure on terrestrial lizards and aquatic fish. This was done by setting up a control tank and two atrazine tanks (50 ug/g, 100 ug/g), and collecting data on a weekly basis using optical DO probes and LabQuest software, for both lizards and fish. It is expected that atrazine exposure will increase the metabolic rate of fish and lizards due to increased stress levels, and that fish will be more effected do to atrazine diffusing across their skin.

(40) Building Resistance to Cinnamaldehyde by Oral Bacteria Through the Process of Chewing Gum

Christina Matthews* and Christian Bell*

Department of Biology, The University of Tampa

Big Red has become one of the nation's most well known brands of chewing gum. Scientifically speaking, this gum has been shown to be more than just a breath refresher, but a powerful antibacterial substance as well. Due to the presence of cinnamaldehyde, a powerful essential oil derived from cinnamon, the gum contains the ability to both target and destroy oral bacteria. This experiment was designed to further test the powers of the cinnamaldehyde in terms of bacterial resistance. It was predicted that constant exposure to cinnamaldehyde over time would create oral flora demonstrating resistance to cinnamaldehyde. To test this, two volunteers chewed Big Red gum over a period of three days. Oral flora were sampled before and once per day during gum use. Isolated Gram-negative bacteria were evaluated for susceptibility to cinnamaldehyde by the Kirby-Bauer disk diffusion assay. No significant differences were observed in bacterial resistance to cinnamaldehyde.

(41) Biodiesel Production via Genetically Altered Lipase from *Proteus mirabilis* Transesterification in Methyl Acetate

Alaina McDonnell*, Jake Altier, Demetrius Carey, and Dr. Scott Witherow

Department of Chemistry, Biochemistry, and Physics, The University of Tampa

Lipase catalyzed biodiesel production presents a potential methodology that exceeds the traditionally utilized acid/base protocols. Advantages include economic favorability and convenience due to more efficient catalysis, which leads to less time, starting material, and energy required for production. A lipase has been previously genetically engineered for methanol tolerance and was shown to be an effective catalysis for transesterification reactions utilizing methanol to produce fatty acid methyl esters, or biodiesel, and glycerol. An alternate acyl acceptor to methanol, methyl acetate, produces a fuel stabilizer, triacetin, as opposed to glycerol when used in the transesterification. This methodology has not been previously utilized with the characterization of these genetically engineered lipases, which are also described as dieselzymes. Dieselzyme mutations have been expressed in *E. coli* using a pET28 bacterial expression vector and purified utilizing immobilized metal ion affinity chromatography. Kinetic optimization was performed for three mutants using p-nitrophenyl palmitate as substrate at varying pHs and in methyl acetate versus methanol reactions. Further investigation of the dieselzymes includes use of synthetic triglycerides as substrate to continue kinetic optimization.

(42) Horizontal Gene Transfer of Ampicillin Resistance Between *Escherichia Coli* and *Salmonella Paratyphi*

Michael T. W. McKibben* and Lauren Droske*

Department of Microbiology, University of Tampa

Antibiotic resistance is an ever increasing topic of worry and debate world wide. The rate at which this resistance can be transferred across bacterial species varies widely and depends on numerous variables. We attempted to determine the rate at which this occurs between two common species, *Escherichia coli* and *Salmonella paratyphi*. *E. coli* that contained a plasmid conferring resistance to beta-lactam antibiotics were cocultured with *S. paratyphi* that was susceptible to antibiotics. Bacteria were plated onto Hektoen Enteric agar that contained antibiotics to identify *S. paratyphi* that has acquired resistance. Due to issues with the Hektoen Enteric Agar not reacting strongly to the colonies, and a large level of die off at day 2, this rate was not determined. Further testing was attempted for those colonies that did grow on the plates, however they were still not determined to be or not be either species.

(43) Sacoglossan Sea Slugs *Elysia clarki* and *Elysia chlorotica* Exhibit Photopositive Behavior

Rachel E. Moline* and Dr. Michael L. Middlebrooks
Department of Biology, The University of Tampa

A number of sacoglossan sea slugs, including *Elysia clarki* and *Elysia chlorotica*, demonstrate the ability to sequester chloroplasts from an algal food source in a process known as kleptoplasty. These sequestered chloroplasts will continue to photosynthesize for prolonged periods of time within the slugs, providing them with the nutrients necessary to survive. Given the presence of chloroplasts within their bodies, the slugs exhibit a need to receive light in order to photosynthesize, but may also benefit from shading their chloroplasts in order to prevent photodegradation. *E. clarki* and *E. chlorotica* were both tested in order to determine their phototactic responses to light. Both sacoglossan species demonstrated positive phototaxis, spending most of their time in the light. This suggests that the slugs may potentially utilize a biochemical method in maintaining their chloroplasts, rather than a behavioral method.

(44) Effectiveness of ampicillin and 4-phenylbutanoic acid in the breakdown of biofilms produced by *Pseudomonas aeruginosa*

Andrew Mulville* and Amana Pacheco*
Department of Biology, The University of Tampa

Since their discovery by Alexander Flemming, healthcare professionals have been prescribing antibiotics to treat a wide variety of infections and diseases. Recently, however, new strains of pathogenic microbes have evolved resistance to antibiotics. One such microbe, *Pseudomonas aeruginosa*, is well-known for its antibiotic resistance, in part due to its formation of biofilms. It is crucial to research and develop new ways to the increasing population of antibiotic resistant pathogens. 4-phenylbutanoic acid was tested for its effectiveness in breaking down *P. aeruginosa*-produced biofilms and compared to the effectiveness of ampicillin in the breaking down of these same biofilms. Both 4-phenylbutanoic acid and ampicillin had an effect on the biofilms when compared to the control groups. On average, 4-phenylbutanoic acid produced a smaller amount of colony forming units per milliliter (CFU/ml) than ampicillin. Although more research must be done to test the sensitivity of *P. aeruginosa* to 4-phenylbutanoic acid, we conclude that 4-phenylbutanoic acid has a slight advantage over ampicillin in breaking down biofilms.

(45) Estimating the Amount of Thymine Dimers Required to Kill *Escherichia coli*

Dominique Notare* and Rodrina Henriquez*
Department of Biology, The University of Tampa

Ultraviolet light induces adjacent thymine dimers on strands of DNA to covalently bond to each other by forming a cyclobutyl ring. These so called thymine dimers can be repaired. However, when the number of dimers overwhelms the DNA repair mechanisms, the cell will die. The purpose of this experiment is to estimate the number of thymine dimers that lead to cell death. *Escherichia coli* that contained the pGLO plasmid was exposed to varying amounts of UV at 302 nm. The plasmid DNA was extracted and *MseI* was used to digest the plasmid DNA at non-mutated sequences TTAA. An electrophoresis gel was run to analyze the DNA fragments. Although fragments of digested plasmid DNA were observed, we were unable to detect the expected decrease in the number of restriction fragments. Reasons for these unexpected results are discussed.

(46) An Exploration of the Inhibitory Effects of *Pseudomonas fluorescens* on *Fusarium oxysporum*

Madeline Feeney* and Kathryn Panichella*
Department of Biology, University of Tampa

The ability to control plant pathogens with bacteria would drastically alter the field of agricultural science. This experiment was done to investigate the inhibitory effects of the bacterial species *Pseudomonas fluorescens* on the fungus *Fusarium oxysporum*. *F. oxysporum* has the ability to cause wilt in several plant species. The two organisms were grown in potato dextrose broth and plated on potato dextrose agar and Hektoen enteric agar via a serial dilution. The results showed the decrease in *F. oxysporum* growth over several time intervals. The experiment displayed the ability of *P. fluorescens* to decrease the ability of *F. oxysporum* to grow.

(47) Tripodal CMPO Ligands as Potential Lanthanide Extractants: A Systematic Study of Ligand Structure and Selectivity in Acidic Aqueous Media

Michael G. Patterson*, David A. Hardy, Shannon M. Biros, Dr. Eric J. Werner
Department of Chemistry, Biochemistry and Physics, The University of Tampa

Nuclear power is an effective alternative energy source, but hazardous byproducts of primarily lanthanide (Ln) and actinide (An) metal cations dissolved in acidic solutions require further processing. Presently, carbamoylmethylphosphine oxide (CMPO) ligands are used to extract An's via the TRUEX process. Inspired by reports of novel, multipodal CMPO ligands, our work has focused on the preparation of tripodal derivatives designed to selectively target Ln cations. In particular, a tripodal TREN-capped CMPO ligand developed previously by our group, TREN-CMPO-OEt, displayed a high affinity for terbium(III) relative to other Lns. To probe this unprecedented result further, our group investigated ligand structure systematically. A novel ligand, TRPN-CMPO-OEt, analogous to the TREN-capped structure but with an additional methylene group in each arm of the capping scaffold, was synthesized to investigate Ln extraction selectivity dependence on the central ligand cap. TREN-CMPO-Ph, which replaced the CMPO ethoxy substituents with phenyl groups, was also tested as a Ln extractant. Extractions were conducted on acidic solutions of individual Lns and Ln mixtures. Finally, the photophysical properties of Eu(III) and Tb(III) complexes were utilized to determine the number of metal-bound solvents within each complex in the solution state.

(48) Comparing the Microbial Growth Found in Soda Fountain Water and Public Water Fountains at the University of Tampa

Leann Petschonek* and Charlotte Navarro*
Department of Biology, The University of Tampa

Public water sources may be site of microbial transmission. For example, spread of Epstein Barr virus has been documented through public water fountains. This experiment was performed to compare microbial growth found in soda fountains and public water fountains at the University of Tampa. We tested duplicate water samples from Plant Hall (water fountain and bottle filling station), Brevard Residence Hall (water fountain), Stadium (water fountain), Stadium (soda fountain), and Spartan Club (two different soda fountains). We used the Membrane Filter Technique (MFT) to filter the 14 duplicate water samples and plated the membrane filters for bacterial growth. Petri plates that displayed the most bacterial growth were samples from water fountains in Plant Hall and soda fountains in Stadium. Plates with the lowest quantity of bacterial colonies were water samples from the soda fountain at Spartan Club and the soda fountain and water fountain at Stadium. Colony morphology and cellular morphology of the bacterial isolates was also assessed and a greater diversity of bacteria on water fountain plates. While most of the samples were identified as Gram-positive, four of the samples tested were determined to be Gram-negative. Therefore, we conclude that water fountains are more bacterially contaminated than soda fountains and may represent sources of bacterial transmission.

(49) The Efficacy of Natural Antimicrobials and Antibiotics on *Staphylococcus aureus* and an Environmental Isolate

Keith Gandy*, Danielle Oddo* and Danielle Pett*
Department of Biology, The University of Tampa

The problem of antibiotic resistance is growing increasingly prominent as more microbes are evolving to evade traditional antibiotics. New antibiotics and treatment against virulent bacteria is becoming a necessity in the medical community. In this experiment, antimicrobial properties of homeopathic compounds were tested. Tea tree oil and apple cider vinegar were compared with three common antibiotics: vancomycin, erythromycin and cephalothin. These compounds were tested against the possibly virulent bacteria *Staphylococcus aureus* as well as an environmentally isolated strain that was identified to be a gram positive streptobacillus. The results of this experiment suggested that the homeopathic compounds created zones of inhibition. The zone diameter directly correlated with the susceptibility or resistance of that particular colony to the antibiotic. The zones from the homeopathic medicines and the antibiotic disks of vancomycin, cephalothin, and erythromycin were compared. The largest zones of inhibition with *Staphylococcus aureus* and the environmental isolate were generated by cephalothin.

(50) Effects of Microorganisms and Glucose on the Decomposition Rates of Canine Feces

Nina Razavi* and Madison Whitney*
Department of Biology, The University of Tampa

Microorganisms are utilized in waste treatment facilities to digest fecal material before wastewater is discharged into the environment. Microorganisms may also expedite the decomposition rate of canine feces in the environment. In this experiment, the effects of *Saccharomyces cerevisiae*, *Bacillus thuringiensis*, and glucose, on the decomposition of a canine fecal sample were examined. Each microorganism and sugar was tested separately with a constant fecal sample. Three trials were performed for each microorganism, each sugar, and the control that contained feces and sterile water. Levels of carbon dioxide and oxygen were measured over 24-hour and 96-hour intervals to measure bacterial respiration rates. The higher carbon dioxide values along with depleted oxygen values indicated an increased decomposition rate. The control and the three experimental groups each containing either *Saccharomyces cerevisiae*, *Bacillus thuringiensis*, or glucose were compared to determine if one of the microorganisms or sugar caused an increase in the rate of decomposition of the fecal sample.

(51) Microbiology Bar Growth from Ten Hookah Bar Pipes in the Community

Zachery Rivera*, Alexandra Ferrer, Mary Martinasek, Dr. Eric C. Freundt
Department of Biology, The University of Tampa

Hookah smoking involves a type of water-pipe used to smoke shisha, a form of tobacco, by one or more people at a time. Hookahs vary in size, yet are similar in structure and contain surfaces that harbor bacteria. The communal nature of hookah usage may represent an important mechanism for disease transmission. In this study, microbial communities present on various areas of hookah pipes from community hookah bars were evaluated. Ten hookah devices from ten hookah bars (n=10) were swabbed in three different areas for a total of thirty cultures. The bacteria were grown and isolated on nutrient agar. The isolates were characterized to determine gram morphology, growth on selective/differential media, and catalase/coagulase activity. Antibiotic susceptibility for isolates was also evaluated. Genomic DNA was isolated and subjected to PCR amplification of the 16S ribosomal RNA gene. PCR products were bi-directionally sequenced to identify the isolates. Our results suggest that hookahs provide an environment that can support various species of bacteria. This ability to support bacterial life combined with group

sharing of hookahs can potentially contribute to the spread of disease. The spread of pathogens can be minimized by installing regulations regarding the sanitation of hookah pipes, which are currently lacking.

(52) Comparison of Antibiotic Susceptibility of Bacterial Communities on Cell Phones Belonging to Health Care Workers and Non-Health Care Workers

Matt Guillemette* and Zachery Rivera*

Department of Biology, The University of Tampa

The frequent use of cell phones inside of health care facilities produces a risk of contamination of the phones with potentially pathogenic bacteria. The elevated use of antibiotics within these health care facilities may also contribute to heightened levels of antibiotic resistant strains on these devices. To assess this, bacterial samples were collected from health care workers and non-health care workers cell phones. The bacterial isolates were assessed for antibiotic resistance via the Kirby-Bauer disk diffusion assay. Eleven out of nineteen (58%) of the bacterial isolates from the health care workers cell phones displayed resistance to at least one antibiotic. The lower amount of resistance of the isolated of the health care worker samples compared to the non-health care workers sample leads us to conclude that there is not a higher prevalence of antibiotic resistant bacteria on health care workers phones.

(53) The Effect of Thyroxine on the Growth and Metamorphosis of *Rana catesbeiana*

K. L. Robinson*, K. Duval*, J. Guin*, D. Kreush*

Department of Biology, The University of Tampa

The process of metamorphosis is regulated by hormones in amphibians; it is induced and promoted by thyroid hormones. Early acquisition of thyroid hormones increases the metabolic rate in tadpole tissues, promoting the developmental process of metamorphosis. Major characteristics in metamorphic development of tadpoles include tail and gill regression, limb buds, and morphological reorganization of vital organs. American Bullfrog tadpoles, *Rana catesbeiana*, were divided into three groups based on thyroxine concentration treatments of 0, 0.01 µg/mL, and 0.02 µg/mL. Tail and trunk length were measured twice a week using Image J to examine development under these conditions. Metabolic rates for each tadpole were also calculated three times a week. It is expected that tadpoles in 0.02µg/mL thyroxine concentration treatment will display higher tail regression rates as well as higher growth rates in hind limb and foreleg development.

(54) Spatial Analysis of Copepod and Crab Zoea Distribution in Tampa Bay, Tampa, Florida

K. L. Robinson*, and R.J. Waggett

Department of Biology, The University of Tampa

Zooplankton play essential roles in the biological cycling of carbon in marine environments and food webs, serving as the primary link between phytoplankton and higher trophic levels. Water quality and ecosystem health can be assessed by the composition and distribution of zooplankton. In order to study the distribution and diversity of the dominant zooplankton taxa, sampling was conducted using 65 µm or 150 µm mesh nets during spring 2015 at five different sites in Tampa Bay. Crustacean zooplankton representatives, copepods and crab zoea, were selected for analysis based on differences in life history. As holoplankton, copepods spend their entire life as plankton, while crab zoea are meroplankton, larval stages of larger benthic adult life forms. Geographic Information Systems (GIS) was used to perform a kriging test to determine and estimate the distribution of copepods and crab zoea across the bay using the data collected from selected sampling sites. Copepods were found to be more abundant throughout Tampa Bay compared to crab zoea.

(55) Effect Of Diet On Growth in Podocnemis unifilis: Assessing Optimal Diets For Turtles in Conservation Oriented Head Start Programs

K. L. Robinson*, and Dr. M.B. Meers
Department of Biology, The University of Tampa

Chelonian species have come under increasing pressures as a result of habitat loss, and over exploitation as a food source and traditional medicine, prompting an immediate need for conservation programs, such as head starting. The success of head start programs depends on establishing economical means of rearing hatchlings to sizes that are more resistant to predation over relatively short time frames. This study examines the effects of three different diets on the growth of the Yellow-spotted Amazon river turtle, *Podocnemis unifilis* over a two-year period. Rates of growth differed among all three treatment groups, though the relationships between morphological variables were not affected by diet. Results indicate that turtles fed on a commercial gel diet may exceed the growth rates of animals fed on a more natural, vegetarian diet by more than 15% as measured by straight carapace length, or by more than 50% in body mass. The use of a vegetarian diet, however, reduces costs to less than 10% the cost of a commercial gel diet. The choice of diets for chelonians in head start programs is consequently a variable that must be weighed against other conservation objectives.

(56) Determination of Wave Speed and Mass Density of Vibrating Strings

Omar Rodriguez*
Department of Chemistry, Biochemistry, and Physics, The University of Tampa

Vibrating strings have different number of nodes depending on the frequency. Using this information, we calculated the speed at which a wave travels in different types of string. We also calculated the mass density of the strings by recording the frequency required for it to stay in the same mode while pulling it at different tensions. We found that wave speed is constant for each of the strings, and that mass density can be easily calculated as long as the string does not significantly stretch.

(57) Velocity Of Xenopus At Various Temperatures

Natasha Roth*, Delaney Russell*, Tyler Nesbitt*
Department of Biology, The University of Tampa

This experiment examined how temperature relates to muscle physiology. This species was a marine organism and therefore the environmental temperature doesn't vary as much as a terrestrial environment. Muscle physiology was represented by velocity considering that temperature provides kinetic energy which increases ATP. ATP synthesis plays a role in the movement of actin and myosin in the muscle fibers responsible for the contraction of the muscle in various activities such as swimming. In order to test the effects of temperature on clawed frogs (*Xenopus*), the frogs were exposed to an ambient temperature, intermediate temperature, and elevated temperature. Their velocity was measured by calculating the time it took for them to swim a certain distance at each temperature. It is expected that the *Xenopus* will have an increased velocity at the intermediate temperature but then a decline at the elevated temperature as they are not adept to such extreme changes in the environment.

(58) Ontogenetic Patterns Displayed in the Dental Morphology in *Belonesox belizanus*

Hannah Saucier*
Department of Biology, The University of Tampa

Pike Killifish, *Belonesox belizanus*, are native to South America and Mexico, but are an invasive species introduced to Florida in 1957. Pike Killifish were collected in Tampa, Florida and were prepared for

measurements and energy dispersive spectroscopy (EDS) analysis on an electron microscope. Measurements made through the electron microscope focus on the ontogenetic shifts in tooth morphology. EDS was applied to analyze iron levels and other heavy metals, which are usually indicative of a hard prey diet. Specimens were grouped by both life stages (neonate, juvenile, and adult) and gender. Jaws were removed and photographed on an electron microscope and measurements include tooth length, tooth width and jaw length. Individual teeth will be measured using electron microscopy to determine whether or not Pike Killifish exhibit allometric tooth growth. Linear regression analyses will be utilized to determine the growth pattern exhibited. Tooth morphology could be applied to understand shifts in diet through the different life stages.

(59) Can Cuban Tree Frogs Avoid Deadly Chytrid Fungus

Electra Scott* and Dr. Taegan McMahon

Department of Chemistry, Biochemistry, and Physics, The University of Tampa

Amphibians are at risk due to their sensitivity to environmental change. They have been decimated by the deadly fungus *Batrachochytrium dendrobatidis* (Bd). This fungus is causing dramatic declines in populations and leading to species extinctions. We examined whether Cuban tree frogs *Osteopilus septentrionalis* were able to detect Bd and its metabolites. We exposed frogs to four different treatments, (live Bd, filtered Bd metabolites, dead Bd zoospores without metabolites, and control exposed to Bd during second observation). Frogs were exposed to treatments before (naïve to Bd) and after infections (Bd experienced) to see if infection experience increased avoidance behaviors. After each exposure, behavior was monitored to see if Cuban tree frogs avoided the exposure treatments. Determining if different species of amphibians have behavioral may lead to more informed conservation efforts.

(60) A Deadly Shift: Is Nursing Overtime Contributing to a Compromise in Patient Safety?

Cintia Moya*, Lyssa Seiden*, Kelly Wietholter*

Department of Nursing, The University of Tampa

Medication errors are one of the most preventable reasons for patient deaths in hospitals. In recent years, nursing overtime has increased, leading to an increase in medication errors. The purpose of this Evidence Based Practice analysis was to identify whether a relationship exists between nursing overtime (greater than 12 hour shifts/day, or greater than 40 hour work weeks) and patient safety as defined by medication errors. After reviewing multiple studies that examined this relationship, there was a clear direct positive correlation between nursing shifts greater than 12 hours or work weeks exceeding 40 hours and an increase in the rate of medication errors. Implications for safer practice include eliminating mandatory RN overtime and limiting voluntary RN overtime. Research recommendations include conducting a comparison analysis between hospitals who currently implement restriction in overtime hours worked versus those who do not, including hospitals that suffer from chronic understaffing. Benefits to eliminating mandatory overtime and limiting voluntary overtime include safer medication administration practices proposed to contribute patient safety.

(61) The Effects of Increased Temperature on Invasive *Xiphophorus hellerii* and Florida-native *Gambusia affinis*

Samantha Shore*, Melissa Duffy* and Carley Reis*

Department of Biology, The University of Tampa

Invasive species generally tolerate a wider range of abiotic stresses, such as temperature, compared to native species. Across a 10-degree increase in temperature, the specific metabolic rates of the invasive Green Swordtail *Xiphophorus hellerii* and the Florida-native Mosquitofish *Gambusia affinis* were

determined. This data was obtained using dissolved oxygen probes and LabQuest data acquisition 2. The slope of dissolved oxygen in relation to time was used to calculate the basal metabolic rate. Each fish's basal metabolic rate was divided by their mass to calculate the specific metabolic rate. It's hypothesized that temperature will have less of an effect on the specific metabolic rate of the Green Swordtail than that of the Mosquitofish. Using these results, the estimated metabolic stress that these species may undergo in future climate change can be used to determine the potential biogeographic shift of these organisms.

(62) The Long-term Influence of the Sonic Toothbrush on Laboratory Grown Streptococcus Salivarius Biofilms

Valentina Moreno* and Madison Shramek*
Department of Biology, The University of Tampa

Sonicare toothbrushes have often been proven to rid teeth of biofilms better than ordinary toothbrushes, but the long term effects of oral sonication are still unknown. This experiment sought to determine whether or not long term exposure to sonic propulsions causes biofilms to adhere better to the surface of the teeth. This was studied by using Streptococcus salivarius growing within Brain Heart Infusion broth within a six-well plate. The procedure consisted of brushing the three of the six wells with a Philips Sonicare Essence HX5611 toothbrush, removing the media from all wells, and adding back fresh media. The experiment continued for the duration of a week, and the bacteria were brushed five times throughout the week. Bacteria were then subjected to a biofilm assay. We observed significantly more bacteria present in the wells that were brushed compared to the wells that were not. Our results suggest that sonication provides selective pressure to create bacteria that are more adherent or better able to form biofilms.

(63) Mechanical Analysis of a Non-Ideal System

William Smith*
Department of Chemistry, Biochemistry, and Physics, The University of Tampa

The conservation of energy in an ideal system is rather elementary and useless to real world applications therefore an approach to understanding an non-ideal system consisting of a PASCAR connected to a mass hanging over the edge of a SMART pulley is analyzed. The PASCAR was exposed to a number of non-conservative forces: air resistance, rotating friction, and ball bearings, with the results providing evidence that some of the forces are not velocity independent. Air resistance and ball bearings have a significant effect on the total energy of the system decreasing at exponential rates thus presenting their importance in modern day vehicles.

(64) The Jaw Biomechanics of Cookiecutter Sharks' (Isistius spp.) Specialized Feeding Ecology

Kevin Travis*¹, Mark Grace², Jonathan Ford³, Summer Decker³, Dr. Dan Huber

¹The University of Tampa

²National Oceanic and Atmospheric Administration

³University of South Florida College of Medicine
Department of Biology, The University of Tampa

Chondrichthyans display a range of prey capture mechanisms and feeding behaviors associated with their ecological niches. This variety is related to their diverse tooth morphology, which allows jaw muscle forces to be focused onto prey in specific ways (e.g. seizing/grasping, tearing, cutting, crushing, grinding). The cookiecutter sharks (Isistius spp.) exemplify this through their unique feeding morphology and behavior; a row of teeth fused into a continuous blade and longitudinal body rotation removes plugs of flesh from large fishes or cetaceans. In this study, we examined a) the effects of this fused tooth morphology on lower jaw mechanics, and b) jaw mechanics during the application of bite force and subsequent longitudinal twisting

of the body in *Isistius brasiliensis* and *Isistius plutodus*. Jaw models were created through CT reconstruction and Finite Element Analysis was used to observe the stress and strain patterns. We predict a) that the fused tooth pattern will stabilize the jaws, therefore reducing strain and creating a more effective bite, and b) that the jaw morphology is uniquely suited for longitudinal twisting. This tooth-based reinforcement and unique jaw morphology allow these sharks to efficiently gouge flesh from large prey species giving them a unique ecological niche within pelagic environments.

(65) Influential Factors in Type 2 Diabetes Glycemic Control: International Perspectives

Lauren Valdes*, Colleen Godshall*, Ryan Clabaugh*
Department of Nursing, The University of Tampa

Although much research has been done on the factors influencing glycemic control, it is still not well understood why there is such a high rate of non-adherence to treatment regimens among type 2 diabetic patients. This evidence based translational nursing research delves into these factors and, using research articles from around the world, pinpoints those factors that have the most significant effect on glycemic control. It is found that medication adherence, health knowledge, physical activity, and nutrition are the keys to maintaining glycemic control, as measured by HbA1C. Although rates of adherence may be associated with age, race, and socioeconomic status, no one association is absolute. New creative interventions are needed to help patients avoid the complications of diabetes. These include delayed healing of wounds, neuropathy, kidney disease, and vision problems, among others. Several interventions are promising despite the need for more research. Follow-up phone calls and therapeutic patient education are methods that hospitals and health care teams can implement to reduce the occurrence of diabetic end organ diseases as well as lower the costs to the institution, thus preserving valuable health care resources.

(66) The Effects of Temperature and Salinity Change on Native vs. Invasive Fish Species

Dr. Daniel Huber, Estefania Vargas*, Ashely Duenez*, Christopher Molitor*, and Ryan Brushwood*
Department of Biology, The University of Tampa

Fundamentally, the success of aquatic ectotherms is dictated by their ability to maintain their internal physiology under variable external conditions. The effects of elevated temperature and elevated salinity on native and invasive species of fish were assessed by employing a two-by-two factorial design. From our own Plant Park Creek, equal sample sizes of the mosquito fish (*Gambusia affinis*) and green swordtails, (*Xiphophorus hellerii*), were collected and weighed individually. Measurements of dissolved oxygen levels were obtained to calculate specific metabolic rate for each bony fish at low and high saline conditions (0 ppt and 10 ppt) and low and high thermal environments (18°C and 28°C). The prime assumption holds that the less tolerant species will experience higher energy consumption associated with increased metabolic rate. Therefore, it is to be expected that *X.hellerii* will exhibit greater acclimatization success relative to *G. affinis* when exposed to changing temperatures and salinities. This investigation will address the role of abiotic factors by virtue of short term osmotic and thermal stress on the physiology and ecological distribution of invasive populations and broaden our understanding of their threat to local biodiversity.

(67) Morphological Descriptions of the Lips of Canine Ascarids (Nematoda: Ascarididae) Using Scanning Electron Microscopy

Alexis Vedder*, Department of Biology, The University of Tampa

Scanning electron microscopy was used to describe the anterior lips and posterior end morphology of canine ascarids collected from Tampa and Gainesville, Florida. All specimens contained one dorsal(DL) and two ventrolateral lips(VLL) of roughly equal size. Two distinct ascarids have been noted differing in

number of denticles, lip shape, and papillae number on the VLL and DL, and shape of the post-cloacal area. The presence of two doublet papillae on the DL and one on each of the VLL may indicate that one ascarid species falls into the genus *Toxascaris*. The ascarid most similar to *Toxascaris* has pointed triangular lips with two pores at the anterior end of the lip somewhat lateral from the midline. The presence of roughly eighty denticles on one lip is congruent with previous studies that have characterized *Toxascaris*. The post-cloacal area of *Toxascaris* comes to a blunt point and the para-cloacal papillae has a doublet structure. The second ascarid, which is most similar to previously described *Toxocara canis*, has a rounded lip shape with two medial pores. This ascarid can have 126-140 denticles on a single lip. The DL has two single papillae and the VLL each have a single papilla. The results suggest that the presence of a single papilla, rather than a double papillae, on each of the VLL combined with its lip shape and denticle number distinguishes it from *Toxascaris*. The post-cloacal area of *T. canis* comes to a more acute point and the para-cloacal papillae have a doublet structure with two pointed structures directly anteriorly and posteriorly of the doublet.

(68) Salmonella Content And Total Bacterial Load In Organic Versus Conventionally Raised Chicken

Ryan Tartaglia* and Tyler Whitehouse*

Department of Biology, The University of Tampa

Salmonella contamination of food sources is a dangerous and a continuous threat to the world's food supply. Although *Salmonella* can contaminate many different substances, a consistent prevalence exists in poultry products. Due to the danger of *Salmonella* infection, especially to the very young and very old, it is in the best interest of the population to reduce exposure to contamination whenever possible. One new potential concern is the increased prevalence of organic foods. These products are marketed as being natural and healthy, but may contain additional pathogens due to processing methods. This study compared the total bacterial load and *Salmonella* presence of organic and conventionally raised and processed chicken. Ten chicken breasts from a conventional source and ten from an organic source were swabbed and then streaked onto Hektoen Enteric agar. The samples were left to incubate at 37°C for twenty-four hours. The results revealed an absence of *Salmonella* in conventional chicken, while every sample of organic chicken was contaminated with *Salmonella*. The total bacterial load was also found to be significantly higher in the organic chicken samples when compared to their conventional alternative. Therefore, special care must be taken when handling and cooking organic chicken to prevent illness.

(69) Optimization of a Microwave Plasma for Forensic Mass Spectrometry

Ashley Windom*, Michelle Miranda, and Kenyon Evans-Nguyen

The Department of Chemistry, Biochemistry, and Physics, The University of Tampa

Ambient ionization sources developed for mass spectrometry have dramatically simplified molecular analysis. However, elemental analysis with mass spectrometry still primarily relies on complex ionization methods such as ICP. Microwave Plasma Torch (MPT) ionization has the potential to combine both molecular and elemental ionization. The current studies build on previous research using the MPT for molecular ionization, focusing on using it for elemental analysis. Elemental analysis using the MPT coupled to an ion trap mass spectrometer was characterized by building a controlled aerosol generating system. Aerosols of dissolved metals were introduced into the MPT. The influence of different parameters, such as gas flow rates, gas composition, and solution flow rates, on MPT ionization were tested using this system. These parameters changed what elements were seen and their relative intensities. The goal of these characterization studies is to move towards a fieldable MPT mass spectrometer for combined atomic and molecular analysis on-site.

(70) Examination of Virulence Based on the Morphology of the California and Panama Strains of *Batrachochytrium dendrobatidis*

Shelby Wood*

Department of Biology, The University of Tampa

Chytridiomycosis, a disease caused by the pathogenic fungus *Batrachochytrium dendrobatidis* (Bd), has caused hundreds of extinctions and extirpations of amphibians all over the world. We do not fully understand how the fungus grows and develops, which is an essential key in understanding how it impacts amphibians and other organisms that it can infect. Here, we examined the morphology of two virulent strains of Bd, a strain from California and a strain from Panama, with an electron microscope. We compared the morphology of the two strains to further our understanding of how the fungus grows, and to compare the similarities and differences between two strains, which are from very different parts of the world. Overall the strains were fairly similar, however, there was a significant difference in zoosporangia size. Zoosporangia produce the infective stage of Bd, and so this difference in size may affect Bd population growth and virulence. Differences in strain morphology may help us understand the difference in virulence, which are currently still unexplained.

(71) Acellular Pertussis Vaccination Efficacy

Brittany Ziarko*, Kaitlyn Wilson*, Trista Brown

Department of Nursing, The University of Tampa

The past two decades have shown a resurgence of the *Bordetella pertussis* (*B. pertussis*) infection in Europe and the USA. Multiple studies suggest that the increase in *B. pertussis* is not due to a single causative factor, but several factors associated with older children and adults. This evidence based practice translational research summarizes the most influential factors associated with *B. pertussis* infection in older children and adults focusing primarily on the acellular pertussis (aP) vaccine: possible low vaccine coverage and/or insufficient administration of booster doses, reduced longevity of the vaccine, evolution of the *B. pertussis* organism, herd immunity, improved reporting and awareness, and asymptomatic transmission by those vaccinated with the aP vaccine. It is beneficial that individuals be properly vaccinated, accurately diagnosed with improved reporting, obtain increased awareness, and be educated regarding the modes of transmission for *B. pertussis*. Barriers to implementation include asymptomatic transmission, refusal of vaccination or booster shots, and deficient knowledge regarding the infectious organism.