



The University Of

T A M P A

CNIHS UNDERGRADUATE
research
SYMPOSIUM

April 26, 2013

**College of Natural and Health Sciences
Undergraduate Research Symposium
April 26, 2013**

Schedule:

2:00 – 3:00 p.m.

Keynote Presentation

Dr. Greg Springsteen

“The Search for Prebiotic Remnants in Modern Biochemistry”

Sykes Room 131

3:00 – 5:00 p.m.

Poster Presentations

Fletcher Lounge, Plant Hall

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

Symposium Organizers: Dr. Eric Freundt and Dr. Eric Werner

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 in alphabetical order with respect to the presenting author's last name.*

The Symposium was made possible by a generous grant from the UT Board of Fellows. Further financial support from 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 inaugural event.

(1)

Selective HDAC6 Inhibition Significantly Reduces Total Tau Levels with Mild Memory Improvements in rTg4510 Mouse Model

Leif Benner¹, Steven B. Housley¹, Barbara Manchec¹, Daniel C Lee^{1,2}, Jay Kalin³, Joel A. Bergman⁴, Alan Kozikowski⁴, Marcia N. Gordon^{1,5}, Maj-Linda B. Selenica^{1,2}, Dave Morgan^{1,5}

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Histone deacetylases (HDACs) are a class of enzymes that regulate the removal of acetyl groups from histone and non-histone proteins. HDAC6 plays a key role in deacetylation of cytoplasmic proteins, including, but not limited to, tubulin and heat shock protein 90. Deacetylation of both may be implicated in de-stabilization of microtubules and inhibiting HSP90 degradation pathway, respectively. The inhibition of HDAC6 has been pursued as a novel treatment for tauopathies, since inhibiting HDAC6 has been shown to have neuroprotective effects and increase mutant protein degradation. Tubastatin A, an HDAC6 inhibitor, or .9% saline was administered through i.p. injection every day over a two month period to nontransgenic and rTg4510 mice. We found that rTg4510 mice, treated with Tubastatin A, showed a trend for improved performance in a spatial memory test compared to rTg4510 Saline treated mice. Immunohistochemical and western analysis, showed a significant reduction of total tau protein (H150) in Tubastatin A treated mice, compared to saline treated mice. Our data so far suggests that HDAC6 inhibition ameliorates memory deficits, as well as reduces tau levels in the rTg4510 mouse model, positioning HDAC6 as a therapeutic target for AD and tauopathies.

(2)

Eutrophication Investigation: the affect fertilizer run-off has on the algal community

Kiyoko Yokota, Aryk Bingham

Nutrient-rich run-offs are known to cause eutrophication in water bodies. In urban and suburban areas, the nutrients often come from non-point sources such as lawns and paved surfaces. We investigated the possible impact of local lawn fertilizer ordinances that ban conventional inorganic nitrogen (N) and phosphorus (P) fertilizers during the rainy season. Our results indicate that conventional fertilizer containing both N and P is indeed most likely to contribute to N & P runoff and decreased phytoplankton diversity. Iron run-off from a P-free conventional fertilizer with added Fe was significantly higher than others, and this, combined with its high N runoff, may potentially promote unwanted algal growth especially when it enters the aquatic environment.

(3)

Horizontal Transfer Of Viral dUTPases

Clara N. Cassell, Padmanabhan Mahadevan

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The dUTPases are enzymes found in eukaryotes, prokaryotes, and viruses. These enzymes control the level of dUTP (deoxyuridine triphosphate) by hydrolyzing it to dUMP (deoxyuridine monophosphate) and pyrophosphate. The horizontal transfer of dUTPases between viruses and eukaryotes and prokaryotes was shown more than a decade ago using phylogenetic analysis of the sequences available in databases at that time. Since then, the growth of sequence databases has been exponential due to advances in sequencing technology. In particular, next generation sequencing has enabled the low cost determination of a myriad of genomes, including virus genomes. Therefore, we searched GenBank for viral dUTPases and performed phylogenetic analysis in order to determine cases of previously undiscovered horizontal transfer of dUTPases. A semi-automated phylogenetic pipeline was used to perform multiple sequence alignment, alignment curation, and phylogenetic tree construction. The results of the phylogenetic analysis showed potentially novel cases of the horizontal transfer of dUTPases between viruses and other organisms.

(4)

Effects Of Disinfectants On *E. Coli* Growth

Tawsha Creason, Hannah Gordon

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The common disinfecting agent, Lysol®, was tested against *Escherichia coli* biofilms and suspended colonies to see at which dilutions, if any, would inhibit growth. The recommended working dilution of 1:256 was first used, and from there increasingly more diluted amounts of Lysol® were added to *E. coli* biofilm and suspension cultures present in a 96-well-plate. The absorbance of growth in the biofilm and suspended culture wells was compared using Crystal Violet dye and a spectrophotometer. Growth was found to be more variable in the biofilm when Lysol® was added, but no specific trend was observed. In contrast, suspended culture in growth increased as the Lysol® became more dilute, leading to the conclusion that Lysol® is more effective against suspended culture than biofilm.

(5)

Bacillus Subtilis And Its Effectiveness of Protection against UV-B Light

Marianna De Mello Souza Roque, Alisha Siddons

The human body is covered in a variety of bacteria. With all this bacteria present on the skin, we questioned what capacity this bacteria has to protect the skin? Are *Bacillus subtilis*' endospores able to protect UV sensitive bacteria, *E. coli*, from UV-B light? A serial dilution was performed with *E. coli* to obtain increasing dilutions ranging from 10^{-3} to 10^{-7} . Each dilution was then pipetted onto 12 different plates. To each of the 60 plates, *B. subtilis* endospores (500 μ l) were pipetted onto the plates. A spread technique was used to spread the bacteria. Once dry, the plates were exposed to UV-B light (302nm) at varying times. The results were observed and the colonies on each plate were manually counted and recorded. *B. subtilis* did not protect *E. coli* from the UV-B light, however more research should be conducted in the future on this topic. Perhaps the bacteria can work in different ways to protect the skin from harmful UV light.

(6)

In Silico Restriction Enzyme Analysis Of Human Adenoviruses

Shane Dorden¹, Donald Seto², Padmanabhan Mahadevan¹

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Human adenoviruses are divided into seven different species, A through G. Each species is further divided into types which are numbered numerically in order of their discovery. Methods such as serum neutralization assays and hemagglutination inhibition assays have been used to distinguish between human adenovirus species. Restriction enzyme analysis has long been used to distinguish between human adenovirus types. However, with the decreasing cost of genome sequencing, many whole human adenovirus genome sequences are available in sequence databases. Therefore, whole genome bioinformatics methods can be used to distinguish between human adenovirus types instead of wet lab methods. In silico restriction enzyme analysis using several enzymes was performed on human adenovirus genomes and the results were compared to whole genome bioinformatics methods such as phylogenetic analysis. We predict that restriction enzyme analysis is not as accurate as other whole genome methods such as phylogenetic analysis in distinguishing between closely related human adenovirus types.

(7)

Genetic Investigation Of Squamous Cell Carcinoma In Haflinger Horses

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Squamous cell carcinoma (SCC) is the most common cancer of the equine eye and the second most prevalent tumor of the horse overall. Typically SCC originates in the limbus; the part of the eye between the cornea and the sclera. Limbal SCC has the potential to not only damage the limbus itself but invade the cornea and lead to blindness. Haflinger horses represent a high prevalence of SCC with an estimated occurrence being 25% and 69%, and though very little is known about the cause of this disease, it is believed that genetics plays a role. All affected horses can be traced back to a single predominant ancestor, thus supporting the role of genetics. This research is employing both a candidate gene approach and a genome wide association study to probe the horse genome for locations showing association with this disease. By employing these methods we make it possible to pinpoint key areas of interest for further investigation.

(8)

Kirby-Bauer Disk Diffusion Testing In Isolates From Origins of Differing Antibiotic Prominence

Amanda M. Duke, Sara C. Polge

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The practice of modern medicine has never been more afflicted with the problem of antibiotic resistance than it has been in recent times. Individuals in hospitals are 25x more likely to be prescribed antibiotics than individuals who are not hospitalized. With this information the hypothesis was developed that such high rates of antibiotic use would yield a population of bacteria that exhibited substantial antibiotic resistance in comparison to bacteria that was not exposed to such prominent antibiotic use. In testing this hypothesis, determinations about antibiotic resistance were made by using the zones of inhibition (in mm) obtained via the Kirby-Bauer disk diffusion test. The data collected in this experiment suggests that proximity to antibiotics plays less of a role in the development of antibiotic resistance than the ability for bacteria to communicate in both an intra and interspecies fashion.

(9)
Zooplankton Biodiversity of Tampa Bay

Dorothy H. Estrada

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Zooplankton play an important role within marine food webs since they are an essential food source for animals of higher trophic levels. Copepods, in particular, provide a crucial link between primary producers and the rest of the food web, and their biomass accounts for most of the animals in the ocean. The goal of this project was to assess current zooplankton populations in Tampa Bay and to compare the distribution and abundance of these populations to historic data sets repeating their approximate sampling time frame and location. Variations between current and historic zooplankton patterns may provide important information on the relevant health of the Tampa Bay system. Zooplankton were sampled at six different locations in Tampa Bay throughout a 7 month period (September 2012-April 2013) with 65 μm or 150 μm mesh nets. The Hillsborough River station was both influenced by tidal and riverine flow, and was sampled on a weekly basis, while The University of Tampa Marine Lab and a transect in Tampa Bay were sampled on a monthly basis. Twelve different types of plankton were identified, and the most abundant was naupliar copepod stage. In general, samples from the Hillsborough River, a brackish water source, were less dense with zooplankton and lacked the biodiversity of samples taken from Tampa Bay. In conclusion, zooplankton biodiversity could be detected more easily in bay waters, and served as a general indicator of the overall health of the ecosystem.

(10)
Interaction Between RGS7 Binding Protein and Receptor Protein Tyrosine Kinases

Chris Fatora, Dr. D. Scott Witherow

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The function of the dimer between the G protein beta subunit 5 and the regulator of G protein signaling 7 (G β 5-RGS7) in cell signaling is not well understood. However, it is known that the G β 5-RGS7 dimer reversibly binds the regulator of G protein signaling 7 binding protein (R7BP). To determine potential binding partners that might be involved in regulation of G β 5-RGS7 and R7BP activity, we performed a yeast two-hybrid screen with R7BP. Of numerous potential interacting proteins, we have studied the interaction of the kappa isoform of protein receptor tyrosine phosphatase. We attempted to confirm the interaction of R7BP and PTPR-K using immunoprecipitation in CHO-K1 cells. Unfortunately our experiment was inconclusive in determining this interaction

(11)
Childhood Immunization Availability in Hillsborough County

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In 2011, the Hillsborough County Health Department (HCHD) was restructured due to a significant reduction in funding at the state level. As a result, six of the seven HCHD clinics providing childhood immunizations were redistributed to two local federally qualified health centers (FQHC's), and are therefore no longer agencies of the state health department. Anecdotal information indicates that children may have more limited access to timely early childhood vaccines as a result of these changes. The purpose of the study was to quantify/specify any barriers to childhood immunizations or gaps in vaccine coverage that have occurred as a result of the change in local vaccine providers. The researchers made telephonic contact with agency representatives from a sample of pediatric clinics in Hillsborough County to ascertain whether there is any difference in vaccine availability. Data were also requested through the state immunization program office and the county health department to document the volume of immunizations delivered at relevant points in time before and after the restructuring.

(12)
Venus: The Future Earth

Alexis Forteza

Venus has long been referred to as Earth's sister planet. Shrouded in rust colored clouds which conceal many of its surface features, Venus has been tantalizing scientists minds for decades about what possible life forms may exist on this mystery planet. With similar size and shape to that of Earth, Venus may have shared the life history to that of its sister planet. With surface temperatures far exceeding those of Earth, heat-loving organisms, aka thermophiles, are of high interest and possibility on Venus. Studying thermophilic organisms on Venus will not only broaden scientist knowledge of Venus's planetary history, but might also aid in the understanding of what properties Earth like thermophilic organisms might contain in order to endure such harsh conditions. Understanding life on Venus will provide some insight as to what conditions might develop on Earth within the next few million years.

(13)

The Effect of Nitrogen Levels on Barnacle Feeding

Rebecca Gaesser, Krista Schafer

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This experiment tested the effect nitrogen levels in a tank system on barnacle feeding. Two tanks were kept at salinities between 26 and 30 ppt and equivalent water levels. Tank one was maintained at a safe level of nitrogen between 0 and 1.0 ppm, and tank two had an elevated level between 2.0 and 6.0ppm. During each series of data collection the tanks were returned to initial salinity levels, and administered equivalent amounts of phytoplex for food. The tanks were compared by counting the number of cirri observed before administering food, as well as 5 and 10 minutes after feeding. The statistical results of a t-test showed that nitrogen level does not have a significant effect on the feeding of barnacles.

(14)

The Effect of Salinity and Diet on the Metabolic Rate of the Mangrove Crab, *Aratus pisonii*

Chelsea Gravunder, Danielle Whitaker

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Mangrove crabs, *Aratus pisonii*, are arboreal crabs that live throughout mangrove forests feeding on the living leaves of the mangroves. Although mangrove leaves are the primary food source of *A. pisonii*, these crabs have been known to be opportunistic carnivores. These crabs also experience different salinities living among the mangroves. In order to breathe, *A. pisonii* must leave the refuge of the trees and wet their gills in the estuarine water. For this experiment, the effects of two different salinities (15 ppt and 25 ppt) and two different food sources (mysid shrimp and mangrove leaves) had on the metabolic rate of *A. pisonii* was tested. Thirty three crabs were collected and put into 4 divided tanks with two tanks filled with water of each salinity and for each salinity one of the tanks were fed mysid shrimp and the other fed live mangrove leaves. Each crab lived in these conditions for one week before the metabolic rate was measured by measuring oxygen consumption over 20 minutes. Neither salinity nor food type had a significant effect on the metabolic rate.

(15)

Habitat Preference of *Chilomycterus schoepfi* Based on Prey Absence and Prey Presence

Catharine S. Hargenrader, Shelly K. Terek

University of Tampa

Chilomycterus schoepfi, commonly known as striped burrfish, are a key predator in intertidal communities. This study was performed to determine habitat preference for striped burrfish with and without prey. These fish commonly prey on a variety of shelled organisms including various sea snail, hermit crab, and crab species. We recorded and analyzed the movements of individual striped burrfish when they were placed in a tank with the habitat options of a sand flat, rocky intertidal zone, and seagrass bed. The results of this study concluded that the frequency of *Chilomycterus schoepfi* observed was not equal for each habitat when prey was introduced ($X^2 = 10.247$, $df = 2$, $p < 0.0052$). Without prey, striped burrfish prefer sand flat ecosystems; however, if prey is introduced their selection changes to seagrass beds. These preferences also hold true when factors such as age, size, health, and nutritional status are involved. The results and conclusions of this study emphasize the importance of conserving and protecting intertidal ecosystems because of the large number of marine organisms which they provide habitat for. They are also a major predator to crabs, gastropods, and hermit crabs, which causes them to have a prominent influence on benthic ecology.

(16)

Seasonal and Spatial Trends in an Epiphytic Macroalgal Community N A Mangrove Basin Forest

Catharine S. Hargenrader, Tessa M. Skilton, Madeleine Gagne, Kevin S. Beach, Ph.D.

University of Tampa

Mangrove prop roots and pneumatophores provide hard substrates that host many types of macroalgae. These macroalgal communities contribute significant amounts of fixed carbon to these systems over time. Spatial and temporal trends in primary production, biomass, and stress tolerance have only received limited attention despite the prevalence of this community type on the hard substrate provided by mangrove roots and the long intervals of emersion from seawater for these aquatic organisms. The importance of this substrate to macroalgae is underscored by the relative absence of other hard, attachment substrates (that most macroalgae require) in this largely soft bottom community. This full year study examines the variation in overall ecophysiology and biomass of mangrove pneumatophore epiphytes in a basin forest in Tampa Bay, FL over both seasonal as well as horizontal (cm) and vertical spatial scales (m). A synthesis of samples from four “seasons” is sampling will be presented in order to discern significant trends related to these three scales. These findings will also be discussed in the context of future research on primary production and stress tolerance in this macroalgal community in comparison to other mangrove forest types.

(17)

Disk Diffusion Testing Susceptibility of *Escherichia coli*, *Bacillus subtilis*, and *Serratia marcescens* to Phenol, Eugenol, and Butylated Hydroxytoluene

Charles Harvey

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The antimicrobial effects of three phenolic compounds (phenol, eugenol, and butylated hydroxytoluene (BHT)) in an apolar solvent (DMSO) were tested against *Escherichia coli*, *Bacillus subtilis*, and *Serratia marcescens* at equal concentrations. The disk diffusion assay demonstrated phenol had slightly better antimicrobial effects than eugenol. BHT and a control solution of DMSO indicated little inhibitory effects.

(18)

Effects Of Thapsigargin On The Unfolded Protein Response During The Replication Of A Mammalian Model For Multiple Sclerosis

Ibrahim Hambazaza, Omar A. Heredia Nieto, Eric C. Freundt

Department of Biology, University of Tampa, Tampa, FL

Theiler's Murine Encephalomyelitis Virus causes a chronic demyelinating disorder affecting several strains of mice. TMEV is an accepted mammalian model for multiple sclerosis, where demyelination of the central nervous system, and oligodendroglial apoptosis are shared characteristics. The unfolded protein response is a cellular stress pathway, triggered by several viruses, and reported to be active within oligodendrocytes in patients with MS. This study examined the effects of the UPR on TMEV replication. This experiment was performed by treating BHK and L929 cells with thapsigargin, a known inducer of UPR; or DMSO, a control. These cells were inoculated with TMEV to measure the rate of viral replication at 6, 9 and 12 hours post-infection by performing plaque assays. The results indicated that thapsigargin inhibits the replication of both the chronic strain (DA) and lethal strain (GDVII) of TMEV. It was found that samples treated with DMSO had more plaques formed than samples treated with thapsigargin, with about a 10-fold difference, and was more pronounced in samples infected for longer periods of time. This study shows that TMEV is inhibited by induction of the UPR, and suggests that pharmacological induction of the UPR could be effective in limiting replication of certain sensitive viruses.

(19)

An Unexpected Product: The Application of Various Mutagens to *Serratia marcescens* Using A Single-Disc Diffusion Test

Audra V. Hewett, Ariel E. Young

Serratia marcescens is a Gram-negative bacteria, opportunistic pathogen, and has the ability to produce enzymes called prodiginines, which are responsible for its red pigmentation. In this experiment, our purpose was to investigate the properties of these enzymes, which demonstrate anti-cancer, anti-fungal, anti-bacterial, antiprotozoal, and anti-malarial activities. By manipulating these enzymes using a probable carcinogen saturated in a single-disc diffusion test, we can further evaluate *Serratia marcescens* ability to interact with carcinogenic substances. We utilized common household products, such as hairspray and Windex, to test their mutagenic properties when introduced to *Serratia marcescens*' prodiginines.

(20)

A Genetic Study of a Family with Three Cases of Down Syndrome

Brooke S Holland, Stephen Kucera, Ph.D., Deborah Cragun, M.S., C.G.C.

A large extended family presented with three first cousins, two females and a male, each of whom had a child with Down syndrome. Down syndrome is one of the most common chromosomal abnormalities in humans and is due to the inheritance of an extra chromosome 21. The purpose of this study was to determine whether all three first cousins were the source of the extra chromosome 21 in their children. Such a finding would suggest a possible genetic basis for an increased probability of nondisjunction in meiotic events given the unusually high incidence of Down syndrome within this family. Polymorphic microsatellites along chromosome 21 were amplified by PCR and the product sequenced for length with the goal of establishing genotypes. Mendelian analysis of this genotypic information permits individual copies of chromosome 21 to be tracked from parent to child in the pedigree. To date, two microsatellites have been amplified and sequenced for 17 family members. The lab technician was blinded to the identity of the samples. Through these methods two of the three Down syndrome children have been determined, and the source of the extra chromosome has been determined for one of these two children. Data is still being collected.

(21)

Abundance and Zonation of the Florida manatee (*Trichechus manatus latirostris*) at TECO Manatee Viewing Center

Tess Hooker, Ellen Matza

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In this experiment, we observed abundance and zonation patterns of the Florida manatee (*Trichechus manatus latirostris*) at the TECO Manatee Viewing Center on Apollo Beach, Florida. The Manatee Viewing Center, located adjacent to the Big Bend Power Station, receives warm water discharge making the water temperature in the canal to about 27°C. We observed the number of manatees occupying the viewing center water basin 10 times from 17 February to 30 March 2013. Air temperature, water temperature, tide height and time of day were recorded during each replicate. Data were then conglomerated and statistically analyzed to determine which of these parameters most closely correlated with manatee abundance and distribution. While abundance appeared to be most affected by air and bay temperature, zonation did not reflect a particular pattern with Zone 4 being consistently the most densely populated zone. Accumulating more knowledge about habitat preference for the Florida manatee may aid in making predictions for their distribution and migration patterns. This experiment illustrates the benefits to safe water discharge and its effects on an endangered species. With this information, actions can be taken to better protect the Florida manatee in order to increase population sizes across their habitats.

(22)

Knowledge And Attitudes of Nurse Practitioners about Recommendation for the Influenza Vaccine for Healthcare Workers

Christina Humphreys, Kim Curry, PhD., ARNP

Background: It has long been known that healthcare workers (HCW) can contract and transmit infectious disease from patients. This is the reason universal precautions have been put in place in modernized nations. Since 1981, the Centers of Disease Control and Prevention have recommended annual influenza vaccines for HCW in order to reduce transmission of this specific virus to coworkers and patients. Contraction of influenza from healthcare workers to patients has been documented in clinical settings such as long-term-care facilities, oncology units, and transplant units. (Sullivan, 2009)

Purpose: The purpose of this study was to measure the knowledge and attitudes of nurse practitioners toward immunization for influenza.

Methodology: The design was a descriptive survey of 200 nurse practitioners practicing in Florida. 174 valid responses were returned for a response rate of 87%. Convenience sampling was used, and all participants who volunteered and consented were allowed to participate.

Results: Results indicate that provider attitudes toward recommended immunizations vary and are not limited to national guidelines for immunizations. Provider attitudes influence patient care decisions and counseling on immunizations. Mandatory, free, and easily accessed workplace immunizations are effective at increasing provider immunization rates.

Conclusions: Provider education on changing guidelines for immunizations should be ongoing. Further research is needed on barriers to receiving recommended immunizations.

(23)

The Dangers of Elevator Buttons

Samantha Isabella, Raniya Jamal Aldeen

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Bacteria are a part of everyday life. They are found everywhere from our own bodies to every object we touch. A college campus probably contains billions of different types of bacteria due to living in close proximity to one another and the spread of diseases year round from sharing many similar resources. We wanted to test one resource that is inevitable to share: the elevators. Instead of testing for a many types of bacteria, we decided to choose to only test for strains of *Staphylococcus* using mannitol salt agar plates. This was performed by swabbing the call buttons in each residence hall. The goal of the experiment was to identify the presence of *Staphylococcus aureus*, which is a pathogen and can be highly drug resistant. The experiment resulted in *Staphylococcus aureus* being present on 11 out of 12 elevator buttons throughout campus.

(24)

Fouling In The Commercially Important Shrimp *Macrobrachium rosenbergii*

Jace Jedlicka¹, Jen Wortham², Lauren Van Maurik³

(1) University of Tampa, Department of Biology, (2) University of Tampa, Department of Health Sciences and Human Performance, (3) University of South Florida, Department of Biology

The Giant Freshwater Prawn, *Macrobrachium rosenbergii*, is a large shrimp that is extensively used in aquaculture. The grooming behaviors and body fouling was examined in this study. *Macrobrachium rosenbergii* exhibits three unique male morphotypes that differ in their behavior, morphology and physiology: small- clawed males (SM), orange-clawed males (OC) and blue-clawed males (BC). The largest and most dominant males, BC males, are predicted to have significantly different grooming behaviors and body fouling compared to the other three morphotypes due to their position in the behavioral hierarchy. These males may be too large and bulky to efficiently groom and may dedicate more time to mating and agonistic interactions than grooming behaviors. Consequently, these males may have more body fouling compared to the other morphotypes. Significant differences in the grooming behavior of all individuals (females and male morphotypes) were found. BC males tended to have the highest time budget but were fouled the most with sedimentation. Meanwhile, SM males had a relatively low grooming time budget but tended to be fouled with more bacteria than sedimentation. There appears to be a dichotomy of the efficiency of grooming among the male morphotypes and the type of fouling that occurs with these male morphotypes.

(25)

Solution Thermodynamic and Relaxometric Studies of Schiff Base/Pyridine Lanthanide Complexes

Katherine R. Johnson, Melanie P. Madsen, Eric J. Werner

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Contrast agents utilizing gadolinium(III) are often used to enhance the images produced from an MRI scanner. When injected, such agents are bound by water molecules within human tissue and cause an increase in the relaxation rate of water protons, improving image contrast. The effectiveness of any contrast agent can be related to the number of bound water molecules (q) that coordinate to the metal. Current commercial agents have q values of one water molecule, resulting in low proton relaxation rate enhancements. In this study, a tripodal pyridine/Schiff base ligand for Gd(III) was synthesized to produce a novel MRI contrast agent. The so-called TRIPy ligand effectively binds Gd(III) and Eu(III) and allows for additional coordinated water molecules. The metal complexes were characterized via UV-Vis, IR, and fluorescence spectroscopy. Relaxometric and thermodynamic stability studies were also conducted and will be discussed in light of potential imaging applications.

(26)

Growth Rate of Echinaster spinulosus Based on a Carnivorous or Omnivorous Diet

Nicole M. Judy, Elizabeth Anthony

This experiment measured the growth of the sea star Echinaster spinulosus with different food treatments over a one month period. The food treatments were a carnivorous diet (frozen Artemia), and an omnivorous diet (frozen emerald entrée- krill, plankton, brine shrimp, spinach, romaine lettuce, spirulina algae, and red leaf lettuce). A control group was given both diets. Nine sea stars were tested, three in each diet treatment. Pictures were taken every Tuesday and Friday, and analyzed with Image-J. An average of five measurements (arm to arm) were taken. The results show a high amount of variability in each of the nine sea stars with only one sea star in the control tank gaining arm length. Because of the high amount of variability found in the Echinaster spinulosus, no conclusions can be made about growth in a carnivorous or omnivorous diet.

(27)

Morphology of Grooming Appendages in the Spider Crab *Libinia dubia*

Amanda LaVelle, Jennifer Wortham

University of Tampa

Decorating spider crabs, in the family Majidae, actively use materials from their environment to decorate their carapace and appendages. Decorations likely decrease predation and help the crab camouflage in their environment. Spider crabs use very fine setae and attach these decorations to their exoskeleton. Spider crabs groom regions where these setae are located, likely to decrease the amount of fouling. Grooming behaviors serve to improve respiration, sensory reception, movement, and reproduction. Grooming also keeps the hooked setae in proper shape in order to attach decorations. To fully understand the grooming practices of spider crabs, distinguishing the structure of the grooming appendages is important. The grooming appendages of the spider crab *Libinia dubia* are the mouthparts (maxillipeds), gill cleaning devices (epipods of the maxillipeds), and the first walking legs (chelipeds/pincher). These appendages have been examined using a scanning electron microscope to determine if there are any special setae on the appendages. The objective of project is to describe the setal morphologies of these grooming appendages and determine if the crab has different grooming structures from other decapods. We hypothesize that the spider crab will have elaborate setal morphology for cleaning the inside of the gill chamber as a result of the high likelihood that materials foul the gills. These data are to be collaborated with a larger grooming study to be completed by Dr. Wortham and another undergraduate research student.

(28)

Metamorphosis Duration of Bullfrog Tadpoles (*Rana castsieliana*) with Selective Variation in Three Specific Nourishments

Jose G. Leon Jaramillo, Cody A. Panton, Roger Ruiz

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The effect of growth rate pertaining to tadpoles of a Bullfrog (*Rana castsieliana*), with a differentiation of proposed food types seem to be unknown. Specific diet preference seemed to be a factor in growth and development towards metamorphosis. The information was studied over a three week period and a comparison of three different food types (egg yolk, lettuce, and artificial food) had been recorded. One of the three nourishments showed substantial growth to metamorphosis, in providing that the Bullfrog tadpoles (*Rana castsieliana*) revealed more development in body mass and legs than the opposing treatments visually and through the known data. The tadpoles for the egg yolk were visually more bulky and showed more metamorphosis from beginning to the end of the experiment. The remaining tadpoles in the lettuce, artificial and control groups were small visually by the third week.

(29)

Broth Dilution Tests: Can *E. coli* and *S. aureus* Develop Resistance to Triclosan or Lysol?

Carly T. Levine, Maria Gomez

Triclosan and Lysol are common household commodities that are used for antibacterial purposes. The market for triclosan products is ever increasing with it found in everything from antibacterial hand lotions to soaps. Determining whether some common household bacteria can gain resistance to these products is an important aspect in deciding if they are safe to use. To do this we employed a series of broth dilution tests in order to establish the lethal concentrations of triclosan and Lysol on *E. coli* and *S. aureus*. We then performed a second broth dilution test with the *E. coli* and *S. aureus* colonies that were able to grow in the triclosan and Lysol dilutions to determine if any resistance was acquired. Both *E. coli* and *S. aureus* had the same susceptibility and amount of growth in accordance to the different concentrations of the triclosan solution and Lysol solution. It was determined that triclosan products were much more effective in stopping the growth of both bacteria as compared to that of Lysol. However, it could not be determine if there was a developed resistance to either triclosan or Lysol. We concluded that further experiments should consider conducting a broth dilution test with smaller increments between dilutions.

(30)

The Hunt For Exomoons: Detecting Changes In The Motion Of Kepler 4B

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Exomoons are moons that orbit an extra-solar planet. Exomoons have the potential to be habitable, depending on the location of their host planet in relation to its star. To be habitable, exomoons must also have liquid surface water and a long-lived substantial atmosphere. These moons are usually too small to actually see, so the motion of the host planet is used to determine whether or not an exomoon is present. The research I conducted tested the detectability of exomoons using light curves and periodograms of Kepler 4B. Kepler 4B does not have a detectable exomoon, but by inserting a theoretical exomoon and comparing the light curves we can test if exomoons were detectable in other large extra-solar planets.

(31)

Structural Mechanics of Ancestral and Derived Shark Jaws

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While the general morphology of sharks has not changed greatly throughout evolutionary history, the morphology of their jaws has. As a result, modern sharks vary considerably in their feeding mechanisms and ecology. The purpose of this study was to quantify changes in jaw geometry and mineralization in sharks with ancestral (bluntnose sixgill shark *Hexanchus griseus*) and derived (longfin mako *Isurus paucus*) jaw morphologies, and to determine how well these jaws withstand structural failure via bending, torsion, and buckling. Jaws were digitally reconstructed from CT scans and the resulting jaw models were virtually sectioned to determine degree of mineralization, second moment of area (resistance to bending), polar moment of area (resistance to torsion), and slenderness ratio (resistance to buckling) down the length of each jaw. Second moment of area and polar moment of area were generally greater in the upper and lower jaws in *I. paucus*, suggesting greater resistance to bending and torsion, despite comparable mineralization to *H. griseus*. These results suggest that shark jaws may have been structurally modified over the course of evolutionary history to better resist the forces associated with feeding.

(32)

Changing Metabolic Rate in Dwarf Seahorses

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As more research is done in the area of climate change, understanding how organisms will be physiologically affected becomes increasingly important. Organisms with a greater ability to adapt to the changing environment can be studied to understand the extent of how abiotic factors affect various ecological species. In our experiment, temperature and pH levels of seawater were manipulated to observe the effects on the metabolic rate of dwarf seahorses, *Hippocampus zosterae*. A two factor statistical design was used to manipulate pH and temperature for four different treatments with the control tank showing the current Tampa Bay conditions. Our results indicated an increase in metabolic rate with abiotic stress; however, further studies need to be conducted to determine the significance of how pH and temperature affect various species and metabolic rate.

(33)

Functionalized Nanogold Assisted Extraction and Detection of Trace Forensic Evidence using DART-Tandem Mass Spectrometry

Jonathan Marks, Margaret Donohoe, Kenyon Evans-Nguyen

Much forensic research focuses on increasing speed and reducing sample preparation. High surface area nanogold was generated electrochemically and functionalized using alkanthiol selfassembled monolayers. The functionalized nano gold was used to extract trace amounts of drugs and explosives in complex matrices such as river water and blood. The extracted compounds were rapidly identified using Direct Analysis in Real Time (DART) tandem mass spectrometry. Preliminary data suggest that nanoporous gold can meet or exceed the detection limits of commercial SPME fibers.

(34)

Preliminary Results on Hybridization of Two Local Species of Urchin, *Arbacia punctulata* and *Lytechinus variegatus*

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Two genera of subtropical sea urchins, *Arbacia punctulata* and *Lytechinus variegatus* are local to the Tampa Bay area. The urchin *A. punctulata* is typically found in deep coastal waters in the Gulf of Mexico, and the urchin *L. variegatus* typically inhabits the inshore sea grass beds of Tampa Bay. *A. punctulata* has recently increased its range to the shallow coastal waters of Tampa Bay and now overlaps that of the urchin *L. variegatus*. The two species spawn during the same season and hybrid embryos, both *L. variegatus* sperm with *A. punctulata* eggs and *A. punctulata* sperm with *L. variegatus* eggs, can be generated and raised in the laboratory up to the pluteus larval stage. In order to determine if the two genera are hybridizing in the field, specimens from Tampa Bay have been collected, acclimated to lab conditions, spawned, and the morphometrics of the larvae from the four crosses have been examined at both the light and electron microscopy level. Research efforts will continue throughout the summer including investigation of the genetic markers of the hybrid and within-species crosses, and successful metamorphosis of embryos. This information will then be used to look for hybrids in the field. Even if hybrids are not found in the field, the morphometrics of the hybrids will be recorded for the first time ever. Preliminary research is currently ongoing; however, the formal experiment will begin May 13th, 2013 and will be ongoing throughout the summer.

(35)

Temperature Effects on the Gestation Period of the Male Gulf Pipefish (*Sygnathus Scoveli*) and the Resilience of Male Or Female Pipefish in an Average Tank Environment

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This experiment was designed to observe the effects temperature has on the male Gulf pipefish (*Sygnathus scoveli*) gestation period. The set-up included six ten-gallon tanks split into five-gallon sections, where twelve newly impregnated males would be placed. In three of the six tanks the temperature was to be slightly elevated and the other three tanks would be left at room temperature as controls to observe the effects of the elevated temperature on the gestation periods of the males. However the males never reached the point of copulation in the designated mating tank, instead the pipefish began to die over a three-week interval. Since these conditions arose, the observations after this point were made on the resilience of males versus females in the salt-water tank environment. The results showed no significant difference in the survival of males or females since they both died, but through observation, there appeared to be a faster rate of death in males than females. Further research of the topic can prove beneficial due to increased global temperatures as well as gender ratios and the effect on the population of the species.

(36)

The Effects Of Preservatives On Natural Microflora

Allena Brani, Cara Mueller

Preservatives are contained in many of the packaged and canned foods we eat on a daily basis to inhibit harmful bacterial growth. While we know that preservatives inhibit growth of harmful bacteria, it is unknown what the effects of these chemicals are on our natural microflora, which are essential to our health. In this study, both preserved and unpreserved samples of pineapple and turkey were tested on two strains of bacteria. One strain of bacteria, *Lactobacillus*, is commonly found in our microflora. The other strain, *Serratia marcescens*, was used as model organism from the family Enterobacteriaceae, which contains many species of bacteria that are part of our normal intestinal flora. The goal was to determine how the preservatives found in both turkey and pineapple would affect the growth of our natural microflora at various dilutions, mimicking the amount of water ingested when eating preserved foods. This study found that the preservatives found in pineapple and turkey did not seem to inhibit the growth of *Lactobacillus* and *Serratia*. Also, the various concentrations of preservatives in a diluted sample did not seem to have an effect on the growth of natural microflora. Based on this study, it does not seem that preservatives are particularly harmful to our natural microflora, and the amount of water ingested when eating these preserved foods will not have a significant impact on the growth of these valuable bacteria.

(37)

Investigation of Feeding Dynamis in *Callinectes sapidus*

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Juvenile *Callinectes sapidus*, commonly known as blue crabs, were taken from the Florida gulf waters to explore some factors involved in feeding time. Six blue crabs were measured and individually given 0.05 g pieces cut out of a silverside fish and were timed from when they inserted the food into their mouth to when the food disappeared from their mouth. They were timed approximately every 12 hours, resulting in a feeding in the morning and at night. Statistical tests were used to compare both periods of the day, and it was found that the time of day does not affect the feeding frequency. Blue crabs are active feeders in both morning and night and do not distinguish time of day from an opportune meal. While growth rate of the crab was not significantly associated with feeding time, there was a relationship between carapace area and feeding time. This suggests that the dynamics of a blue crab population will not be affected by a food source's change in time of activity, but could be altered by intraspecific competition due to body size.

(38)

The effects of seagrass habitats on predator - prey relationships in Pinfish and Ghost Shrimp

Anisha Russell, Julianne Dirks, Tobias Nielsen

Seagrass ecosystems are complex, and are a habitat for many different species. As seagrass habitats are on the decline, there is an urgent need to understand the ecological implications of decreasing seagrass habitat on predator - prey relationships. Pinfish (*Lagodon Rhomboides*), a common fish in sea grasses along the eastern coast of the United States, patrols the sea grass in search of food. The study conducted investigated the relationship between different sea grass species by collecting counts of number of prey (*Palaemonetes kadakensis*) killed. The efficiency of predation was studies based on the efficiency of the pinfish locating and killing the shrimp. *Thalassia* and *Syringodium* replicates were used instead of the protected sea grass, and a bare sediment tank was used as a control. The results were analyzed by conducting linear regressions and a two factor statistical test. The results indicate that there were some significant differences between each habitat in the efficiency of predation by pinfish on shrimp; however, not enough data was collected to provide statistically good data. More research on predator - prey relationships is needed to understand the effects of habitat destruction on ecological interactions of organisms that live in seagrass habitats.

(39)

Testing the Antibiotic Properties of Gram-positive Bacillus Bacteria Collected from a Campus Bench

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Certain bacteria have proven to secrete antibiotic substances that inhibit the growth of some other types of bacteria. Utilizing the Kirby-Bauer disk diffusion method, eight different environmental isolates were subjected to the antibiotics; Oxacillin, Tetracycline, Penicillin, Cephalothin, Erythromycin, Ampicillin, and Vancomycin. This was done to see which bacteria were resistant to each antibiotic. Once the results were gathered, each environmental isolate was tested for susceptibility to a separate bacteria harvested from an outdoor bench that showed to contain antibiotic properties. Through the aseptic inoculation of seven Nutrient Agar plates, each containing a bacterial lawn of a separate environmental isolate, three samples of a bacteria that exhibited antibiotic properties were placed on each of the seven plates. After incubation, it was observed that only one of the seven environmental isolates had a zone of inhibition of approximately 7mm surrounding the bench bacteria. This result was not ideal, in that it did not conclude that the bacteria harvested from the bench significantly inhibited the growth of various types of environmental bacteria and the antibiotics used in the Kirby-Bauer disk diffusion proved to be much more effective in killing bacteria.

(40)

The Role of Autophagy For Replication In Theiler Murine Encephalomyelitis Virus

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Theiler's Murine Encephalomyelitis Virus (TMEV) is a pathogenic single stranded RNA virus in the Picornaviridae family. It is known that several RNA viruses such as poliovirus, which is also a member of Picornaviridae, have the ability to modulate the autophagic cellular pathway in order to replicate. When a normal autophagic cascade has been induced, the cell will form double membrane vesicles (DMV) in an attempt to enclose undesired elements inside the cell. The DMV will then fuse with a lysosome and the contents inside will be broken down by various lysosomal enzymes. Blocking the lysosome allows the virus to use the DMV as a scaffolding structure to replicate. If the autophagic pathway is blocked by chemical inhibitors during infection by poliovirus, viral titers drop drastically. In an attempt to see if TMEV also induces autophagy for replication, infected BHK cells were treated with wortmannin and DMSO. Wortmannin is a known inhibitor of autophagy. Replication of TMEV was quantified using plaque assays to determine viral replication kinetics. The results show that there is no statistical difference in viral titer between our control (DMSO) and experimental (wortmannin) groups. Thus, TMEV does not rely on the formation of DMV in order to replicate.

(41)

Comparative Analysis of Marine and Freshwater Bacteria

Jasmyn K. Sewell, Quinn Pippin

The goal of this study is to compare and contrast the differences in bacterial growth of marine and freshwater fish. Data from the tail and stomach of one marine catfish and one freshwater Bluegill fish were used to conduct this experiment. The microbes taken from each fish will be isolated on nutrient agar plates and then gram stained to deduce their morphologies and variance. Bacterial composition/morphology and number will be the two most effective measurements in comparing the microbes from these two separate environments. We conclude that the amount of bacteria on the freshwater fish will be much more extensive and will show a wider variety of bacteria than on the marine catfish.

(42)

Bone Remodeling and Stem Cell Regeneration

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Mechanical load caused by everyday function of an organism causes bone to experience stress and strain. The stress on bone can lead to microdamage in the form of microcracks. Bone responds with the activation-resorption formation cycle which repairs and prevents any further damage from occurring. This cycle is a back and forth resorption and formation process carried out by osteoclasts and osteoblasts. Sometimes, the bone remodeling process fails and does not repair bone properly. Improper completion of bone remodeling can lead to bone diseases, such as Osteoporosis and Osteopetrosis. Fragile bone can be detrimental to an organism's life and it is beneficial to find the most efficient way to fix this problem.

Within recent years, research in the medical field has shifted from focus on repair to one on regeneration. Stem cell regeneration has shown promising results for both the medical and veterinary fields since they have a direct correlation to each other. There have been several successful studies in the veterinary field that have shown stem cells as a promising solution to bone remodeling failure in the future. Regeneration research is becoming more advanced and in time it can be a very useful tool for both humans and animals who suffer from weak, fragile bones.

(43)

The Homosexual Fish: Does it Exist? A Look at Homosexual Tendencies in the Gulf Pipefish, *Syngnathus scovelli*

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The gulf pipefish, *Syngnathus scovelli*, is a sex role-reversed fish species. This pilot experiment ran two trials looking at interactions of pipefish in the presence of either a) high abundance of females, or b) high abundance of males and was compared to a control tank with an equal ratio of sexes. The experiment included two trials, the second being inconclusive due to mortalities among male fish. Thus, only one usable trial of data was produced. Two contingency table analyses were conducted. One analyzed behaviors of each pipefish, categorized as normal (opposite sex interaction and/or pregnancy) and not normal (same-sex interactions, solo courtship behavior, and/or lethargy) and the other compared gender and size class. High female ratios induced immediate pregnancy in the male and high hormonal levels among the remaining females. Male abundance induced lethargy in both males and the female with little to no interaction observed among fish. Although further experimentation is needed, sex ratio is a major factor in populations of wild pipefish species. A higher female ratio still produces offspring, but a higher male population seemingly halts reproductive output. Noting effects of sex ratio on this species will further help the understanding of how this population can thrive.

(44)

Presence of Environmental Bacteriophages Found in Local Water Bodies

Jorie Skutas, Tara Temark

As part of an independent study project for Microbiology class we sought to determine if there are naturally occurring environmental viruses such as Bacteriophages in the waters of the Tampa Bay area. After selecting and testing 4 local sites for the presence of these viruses we quantified the plaque by forming units for each sample. Though faced with lab difficulties we were able to find that each sample had a high number of these bacteriophages for two different kinds of bacteria.

(45)

The Search for a Model Organism for Panspermia: Examining the Effects of Vacuum and Ultraviolet Radiation Exposure on Differently Encysted Artemia Embryos

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In this experiment the hatch rates of differently encysted *Artemia franciscana* (brine shrimp a.k.a. Sea Monkeys) exposed to extreme vacuum and ultraviolet radiation conditions similar to those found in space were examined. The viability of not just dehydrated, but also hydrated-capsulated and hydrated-decapsulated cysts were analyzed after exposure to these extreme conditions to see if encysted *Artemia* could be considered a model organism supporting the astrobiological theory of panspermia. Although hatch rates varied, exposure to these extreme space-like conditions did not completely deter the viability of the encysted *Artemia* studied. This, along with previous studies on cosmic ray irradiation and absolute zero temperature exposure, suggests that encysted *Artemia franciscana* may be a model organism supporting the theory of panspermia, although the effects of encystment state (dehydrated, hydrated-capsulated, or hydrated-decapsulated) during exposure to other space-like conditions besides extreme vacuum and UV radiation warrants further investigation.

(46)

The Environmental Effect On The Sporulation Stage of Bacillus

Omran Rashidi, Tinisha Turnbull

Bacillus is a Gram-positive bacteria that when introduced to unfavorable environments has the ability to perform sporulation and create an endospore. In this project four different broths, nutrient broth, 10% diluted nutrient broth, bud light beer broth, and dogfish head broth, were inoculated with an overnight culture of *Bacillus* and left to incubate for 24 hours. The broths were heated to kill off any presence of vegetative cells, so an endospore count could be performed. A ten-fold dilution and plating on nutrient agar was performed to analyze and collect data for the broths before and after heating. The results showed no growth in the beer broths, and also an increase in colony forming units after heating for the nutrient and 10% diluted nutrient broths. It was concluded that the ingredients found in beer, especially hops, inhibited the growth of the bacteria.

(47)

The Growth Rates and Death Instances of Red Mangrove *Rhizophora mangle* in Varying Tank Water Salinities

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This experiment was performed with the aim to investigate the effects of varying salinity on growth and survivorship rates of juvenile red mangroves, *Rhizophora mangle*. . This plant is regularly found along Florida's coasts; these propagules were collected from Picnic Island State Park. This was performed in four 20-gallon aquarium tanks with 5 ppm, 25 ppm, 55 ppm, and 85 ppm salt over a month-long period. Twelve mangrove propagules in each tank were regularly monitored for growth and survivorship. Although results were not significant, data trends suggest that mangrove survivorship was higher in lower salinity; however this finding must be confirmed with a larger sample size. This can be useful in conservation efforts for transplanting mangroves and/or understanding effects of changing salinity on mangrove ecosystems in future research.

(48)

The Effect of the Environment on the Microbial Contamination of Toothbrushes

Chelsea M. VanKleeck, Katie Reisman, Nicole Breslin

The oral cavity of humans contains hundreds of different kinds of bacteria that have been identified. Although many are considered to be normal flora, others are known to be the cause of diseases in the mouth. In order to maintain dental hygiene, toothbrushes are employed to brush away any unwelcome bacteria in the mouth. This routine sets up the possibility of bacteria from the mouth growing on the toothbrush. Bacteria from the environment the toothbrush is kept in can also inhabit it. These harmful bacteria from the mouth could be deposited back into the oral cavity and potentially cause diseases, or other infections could occur from the bacteria from the environment. In some instances, plastic cases that are meant to keep the toothbrushes clean provide a suitable, moist environment for the bacteria to flourish even more than if it were kept in the open. This experiment was designed to test this hypothesis, and potentially show that plastic cases house more bacteria than a toothbrush left in the open would.

(49)

Formation and Potential Habitability of Extrasolar Planets

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This poster examines the formation and evolutionary processes of Earth-like extrasolar planets as well as their potential ability to harbor and sustain life.

(50)

Bacteriophage, Surfactant, and Biofilm

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In a time of increasing prevalence of antibiotic resistant bacteria, new possibilities for treatment are constantly being pursued. Bacteriophage and surfactants may be available for use as a form of treatment. Both bacteriophage and surfactants are known to damage and destroy bacteria. With this in mind our study explored the possibility of the use of bacteriophage and surfactant to treat and reduce biofilm, and the likelihood that it would be more effective if used together than each by itself. To explore this avenue of approach an *Escherichia coli* B biofilm was grown for 48 hours on a 96 well plate. After this it was then treated with Triton 100-X and T4 bacteriophage, both by themselves and together in six differing dilutions. After 24 hours of treatment the plate was then dyed and quantitative data was obtained via a 96-well plate spectrophotometer. The data collected showed that the usage of Triton 100-X (surfactant) and T4 Bacteriophage both separately and together did not have a statistically significant effect in reducing the biofilm.