



The University Of

T A M P A

CNIHS UNDERGRADUATE
research
SYMPOSIUM

April 24, 2015

College of Natural and Health Sciences
3rd Annual Undergraduate Research Symposium
April 24, 2015

Schedule:

2:00 - 3:00 PM:

Keynote Presentation

Sara McGrath, Ph.D.

“Chemicals, Contaminants, and Toxins: Analytical Approaches to Solve Seafood Safety Challenges at the FDA.”

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

Sara McGrath, Ph.D.

FDA Center for Food Safety and Applied Nutrition

Dr. Sara McGrath is a chemist at the United States Food and Drug Administration, Center for Food Safety and Applied Nutrition, in College Park, MD. McGrath received her bachelor's degree in chemistry from Illinois Wesleyan University, and her doctorate in analytical chemistry from the University of North Carolina at Chapel Hill. McGrath was a postdoctoral researcher at the Johns Hopkins School of Medicine, Pharmacology Department, in Baltimore, MD. In 2006 she became a staff fellow at the Centers for Disease Control and Prevention in Atlanta, GA, developing mass spectrometry-based assays for protein toxins ricin and anthrax. McGrath joined the FDA in 2010, researching analytical techniques for characterization and quantitation of gluten proteins in food products. Her current research is focused on development of mass spectrometric methods to detect marine toxins, in support of FDA's regulatory efforts.



Chemicals, Contaminants, and Toxins:

Analytical Approaches to Solve Seafood Safety Challenges at the FDA

Seafood is one of the most highly traded commodities in the world. To protect public health, it is vital that domestic and imported seafood is safe, wholesome and properly labeled. The responsibility for safe seafood in the marketplace rests with the Food and Drug Administration (FDA), Center for Food Safety and Applied Nutrition (CFSAN). Through the Food Safety Modernization Act, FDA is working to introduce safety standards and practices to prevent contamination of food before it occurs, with standards grounded in food safety research and science. Research efforts at CFSAN towards safe seafood are broad and varied, and encompass issues ranging from analytical methods for detection of bacterial pathogens and chemical contaminants in seafood products to mislabeling of seafood in markets and restaurants.

Some toxins associated with seafood illnesses occur naturally in certain marine organisms, while other toxins are produced by marine algae that accumulate in organisms that feed on the algae. Often marine toxins are not destroyed by heating or cooking, so contaminated seafood products must be identified and removed before reaching the marketplace. FDA is working to develop robust, reliable and sensitive detection methods for toxins so that regulatory guidance levels can be set for harvested seafood. Liquid chromatography-mass spectrometry (LC-MS) has been a vital tool in research efforts at CFSAN to identify and quantify toxins that may be present in fish and shellfish. LC-MS methods being developed to detect Brevetoxin and Tetrodotoxin in fish and shellfish will be used to ensure species native to the Gulf of Mexico are safe to consume.

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 the inaugural edition of *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!

If you are interested, please consult with your research advisor. Submission deadline for the September 2015 issue is **April 30, 2015**. For more information and submission guidelines, please visit the *Acta Spartae* website at <http://www.ut.edu/actaspartae>.

ABSTRACTS

* Denotes authors presenting at symposium.

(1) Electronic Cigarette Behaviors, Influencers and Effects in College Students

Lauren Ahart*

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

Electronic cigarettes, also called “E-cigarettes,” are battery-operated devices proposed by manufacturers to replace traditional cigarettes. E-cigarettes have flavor appeal and misperceptions of harmlessness, yet contain chemicals as well as the addictive component nicotine. Increased usage has warranted understanding behavior initiation, physiological effects and perceptions. This study consisted of a cross-sectional quantitative and qualitative survey (n=766) conducted amongst students attending a private liberal arts college in the Southeast U.S. Data was collected through email recruitment among both smokers and nonsmokers of E-cigarettes. Data was collected on initiation influencers, behavior, beliefs and reasons students smoke e-cigarettes. Nearly 46% of students had ever tried an E-cigarette with 42% of those being current smokers. Of ever-smokers only 14% currently smoked traditional cigarettes. Overwhelmingly, friends who smoked e-cigarettes and curiosity were the primary influencers. Findings from the survey indicated that the primary negative effects experienced by users consisted of lightheadedness, throat burning sensation and coughing. The majority of respondents did not smoke e-cigarettes to quit smoking. E-cigarettes are becoming increasingly popular among all age groups. College students are at high risk for experimentation of novel smoking behaviors. College campuses can institute social marketing campaigns to educate students and aid them in making informed decisions about the constituents and potential addictive behavior related to nicotine exposure.

(2) Social, Behavioral and Physiological Aspects of E-cigarette Smoking Among Asthmatic College Students

Lauren Ahart*

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

Electronic cigarettes have become a booming industry in the U.S. Usage among all age groups has elevated to concerning levels in this unregulated product. E-cigarettes have been found to emit heavy metals, contain carcinogens and produce negative respiratory side-effects. No research to date has been conducted to assess the usage of E-cigarettes with asthmatics and this research served to educate those individuals who work with individuals with asthma. A cross-sectional online survey was conducted through email recruitment and distributed to students who attend a private liberal arts college in the Southeast U.S. Data was collected from college students with asthma (n=151) and analyzed using SPSS software. Our research question was exploratory and was deemed pertinent to the National Institute of Health. The data revealed that 45% of participants with asthma reported ever smoking E-cigarettes and 46% reported past 30 day smoking (current). Initiation influence was by friends and participants trying dual smoking behaviors. In terms of site influence, 13% of participants reported local store influence, while most participants indicated no site influence. Positive influences were also reported. The majority (70%) of participants consisted of White individuals who perceived their health status to be average to excellent. Curiosity about these novel devices seems to propel college students to try e-cigarettes, even those participants who are cigarette naive. Social marketing campaigns should be implemented to educate at risk populations, such as asthmatics, about the risks of E-cigarettes and report common myths of harmlessness.

(3) Lunar Effects On Terrestrial Life

Diego Alvarez*

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

Our Moon is a vital part to terrestrial biology. Here, we study the astrobiological effects that the Moon has on Earth; we look at how lunar tidal forces influence terrestrial planet formation and their effects on the planet’s biological progression. We investigate how the Moon’s long term stabilizing effect on Earth’s obliquity has promoted an environment stable enough to allow terrestrial life to occur. We also explore how lunar effects have shaped planetary chemical composition, which allow for the creation and propagation of life.

(4) Analysis of Antibiotic Resistance in *Escherichia coli* and *Pseudomonas aeruginosa*

Candace Anderson* and Alexis Robinson*

Department of Biology, The University of Tampa

The resistance of the Gram negative microorganisms, *Escherichia coli* and *Pseudomonas aeruginosa*, against the antimicrobial agents penicillin, erythromycin and triclosan, was tested in this experiment. The experiment was completed using a 96-well assay plate and 1:2 dilutions of each antimicrobial agent. *Escherichia coli* was susceptible to both penicillin (a bacteriostatic, β -lactam antibiotic targeting peptidoglycan in the cell wall) and erythromycin (a bacteriostatic macrolide targeting ribosomes). *Pseudomonas aeruginosa* was completely resistant to both penicillin and erythromycin, but was susceptible to triclosan (an antibacterial agent targeting fatty acids inside the cell membrane). Our results indicate that antibiotics targeting fatty acid synthesis may have clinical applications for treating multi-drug resistant bacteria, such as *Pseudomonas aeruginosa*.

(5) Impacts of Flow on the Feeding Behavior of Ophioridea

Meghan Angelina* and Anna Ferreira*

Department of Biology, The University of Tampa

Flow is an abiotic factor that can have a significant impact on the physiologies and life processes of marine invertebrates. Ophioridea are benthic organisms that react to changes of flow in many situations, including impacts on their feeding behaviors. The effect of flow on brittle star feeding behavior was observed to determine the most ideal flow environment for these organisms. Four brittle stars were placed into one of the three tanks that simulated high flow, low flow, and no flow environments. Each flow environment was tested separately to observe arm waves, movements, and scooping behaviors. Following the addition of brine shrimp, feeding behaviors exhibited were recorded over a period of five minutes. The frequency of feeding behaviors significantly varied between the three flow treatments. The low flow tank exhibited the highest amount of feeding compared to the other two. These findings can be analogous with flow conditions in nature. Extreme flow environments can influence a brittle star's particle retention and nutrient intake, which subsequently can affect the reproduction and growth rates of these ecologically important organisms.

(6) Voltage of Electrogenic Bacteria Generated Inside a Microbial Fuel Cell

Taylor Ascone*

Department of Biology, The University of Tampa

Electrogenic bacteria are bacteria that produce an electromotive force, also known as voltage. These bacteria can be found all around Earth and may be used to produce renewable energy. This experiment seeks to discover if the bacteria found in the soil of The University of Tampa campus can undergo bioelectrogenesis. Using a microbial fuel cell, it was determined that 3.5 mL of soil taken directly from Plank Park had produced a maximum voltage of 0.505 V. After inoculating an agar plate with a sample of mud it was discovered that it contained 28,600,00 CFU of staphylococci and bacilli. Additional studies to identify bioelectrogenic species are warranted.

(7) Evaluation of Solar Disinfection Protocol Efficiency

Philip Ash*, Sasha-Lee Pestana*, and Maximillian Ganz*

Department of Biology, The University of Tampa

The Solar Disinfection method, or SODIS, is commonly used as a cost-effective and rapid means to create drinkable water in third world countries. Although this method has been effectively used, through research and experimentation it may be possible to introduce new and inexpensive elements to increase the rate and efficiency of the SODIS protocol. Specifically, we have applied a mirror to one treatment and compared the reduction of bacterial load to non-mirror and no-SODIS conditions. Our results support our hypothesis by depicting an increase in reduction of bacterial load in the mirror condition when compared to the non-mirror and no-SODIS conditions. Additionally, we hypothesized that the SODIS protocol would kill more of the Gram-negative bacteria. Our data support this hypothesis due to the significant reduction in Gram-negative bacteria between Gram-staining samples from both the control and the Dasani mirror condition.

(8) Preventative Capabilities of Mouthwash to Reduce Oral Flora

Sarah Ballentine* and Dana Scherer*

Department of Biology, The University of Tampa

The effectiveness of mouthwash as a tool for reducing oral flora was tested over the course of two weeks. Two test subjects were used to carry out this experiment and as a control, no mouthwash was used for three days consecutively in the morning, and the saliva samples were collected later in the day between 3:30 PM and 4:00 PM. Two control samples were collected per person. Next, person 1 used Listerine mouthwash for three days while person 2 simultaneously used Crest mouthwash. Two saliva samples were collected between 3:30 PM and 4:00 PM on two different days after using the different mouthwashes. Another trial was conducted, but the subjects switched their mouthwashes and the same procedure for the previous samples was repeated. Each collected saliva sample was serially diluted and cultured on nutrient agar plates. Results show that mouthwash does decrease oral flora within the mouth, whether these flora are harmful or beneficial. Comparison between Listerine and Crest proved that over time, oral flora populations decreased and growing populations were restricted due to consistent usage of the mouthwash.

(9) Cerata Autotomization and Regeneration in the Sacoglossan *Cyerce antillensis*

Kourtney Barber*

Department of Biology, The University of Tampa

Cyerce antillensis is a small marine sea slug that feeds on and inhabits siphonous green macroalgae. *C. antillensis* can be found throughout the Caribbean in warm shallow waters. The body of *C. antillensis* is covered in long translucent appendages called cerata. These dorsal appendages can be autotomized, likely as a defensive mechanism, when the slug is threatened. After autotomization the cerata begin contracting, which may distract predators and allow the slug to escape. In this experiment *C. antillensis* were collected from the algae *Penicillus capitatus* in Tarpon Springs, FL, placed into separate containers, and agitated until cerata became autotomized. After autotomization, cerata regeneration rates and contraction times were measured and recorded. Cerata were able to continue contracting for as long as 30 minutes. Complete regeneration of cerata took between 5-15 days. This study demonstrates the potential for how quickly *C. antillensis* is able to recover from sub-lethal predation events.

(10) The Feeding Regimen of *Melongena corona* of Three Separate Species of Bivalves Found in Tampa Bay

Alexandria Barry* and Shannon Amiot*

Department of Biology, The University of Tampa

Fifteen *Melongena corona*, collected from the west end of Gandy Bridge in Tampa, were exposed to three different species of bivalves known to inhabit the bay. These bivalves included two native species, *Crassostrea virginica* and *Geukensia granosissima*, and the invasive species, *Perna viridis*. The experiment performed endeavored to understand the food preference of the common conch predator. Conchs were split into three treatments. Each treatment was then assigned a choice between two, out of the three listed, different food options wherein each individual conch was separated by a divider. After a month of starvation, food items were added to opposite ends of each dividing section, totaling ten food items in each tank. The experiment was run for a week to record which food option was eaten first with the assumption that this option was the preferred food choice. Results concluded that there is a statistically significant food preference, but it is not in favor of the invasive mussels.

(11) Physical and Behavioral Effects Of Organic And Non-Organic Fertilizer On *Lagodon rhomboides* In The Tampa Bay Area

Rose Bastian*, Nicholas Martin*, and Anais Maurel*
Department of Biology, The University of Tampa

Pesticide run-off due to agricultural usage is a relevant source of the pollution in waterways and damage to aquatic organisms. In the Tampa Bay area, 16% of the runoff is composed of fertilizer compounds. *Lagodon rhomboides*, commonly known as the pinfish, belongs to the class Actinopterygii and inhabits subtropical coastal marine waters. This study tested the physical and behavioral effects of 15 pinfish divided into an organically fertilized tank, non-organic fertilized tank and a control tank over one week. Pinfish were weighed and measured every three days, while behavior was observed every other day. It was hypothesized that there would be a significant difference between the *L. rhomboides* treated with fertilizer and those not treated, as well as a significant difference between non-organic and organically treated *L. rhomboides*. Statistical analysis provides evidence of a significant decline in weight (ANOVA: 0.03442, 14=4.5187) and length (ANOVA: 0.03692, 14=4.3968) in organic and non-organic tanks compared to the control tank. These findings leave evidence that non-organic and organic fertilizer both have significant harmful impacts on *L. rhomboides*.

(12) Sustainability of Potential Non-Aqueous Life on Exoplanets

Alexander Benner*
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This research paper serves the purpose of discussing what factors contribute to supporting life on exoplanets. Requirements include elemental composition, as well as environmental conditions that can affect the development and sustainability of life. Researchers have been limited to searching for carbon-based aqueous life like that on Earth but other solvents may be able to support organic material and ultimately life. There are three categories of solvents (1) polar solvents (2) non-polar solvents and (3) cryosolvents. Solvents such as methane, ethane, and carbon dioxide have been studied to try and claim that they can sustain life.

(13) The Effects of Salinity Variations on the Behavior and Size of the Nudibranch *Polycera hummi*

Alana Boyles* and Erin Brosnan*
Department of Biology, The University of Tampa

Due to global warming, Earth is experiencing an increase in severe weather patterns in coastal areas. In order to determine the effects of salinity changes on local organisms, physical and behavioral responses were recorded through careful observation of the nudibranch *Polycera hummi* over a five-hour time span. During that time, behavioral observations were recorded for the first ten minutes of every hour, with a ten-minute observation period in the controlled salinity of 30 ppt before transferring to either 20 or 40 ppt salinities. Body length and width were recorded under a microscope before introduction and after the five-hour test duration. It was found that nudibranchs in the salinity of 20 ppt were generally wider after five hours, and those in the salinity of 40 ppt were observed to decrease in both length and width. Behavioral abnormalities were observed in the nudibranchs in the lowered salinity of 20 ppt, whereas the nudibranchs in the salinity of 40 ppt expressed more natural behavior. Although several factors beyond the scope of this experiment could explain the observed effects, based on these results, it can be concluded that nudibranchs, specifically *P. hummi*, are more tolerant of salinities higher than that of normal ocean salinity.

(14) Run for Cover! The Effects of Predatory Cues on Gulf Pipefish over a Sea Grass Concentration Gradient

Kelly Colbert* and Elizabeth Brown*

Department of Biology, The University of Tampa

For this experiment, we tested how predator cues of *Callinectes sapidus* (blue crab) affected the distribution of *Syngnathus scovelli* (gulf pipefish) through a sea grass concentration gradient. We set up three tanks with different patterns of sea grass ranging from low to medium to high densities. Five pipefish were placed in each tank and given five days to settle out in the sea grass. Each day their position was recorded with the absence of any predator cues. For the next five days, a blue crab was placed in each tank for a total time of one hour. The positions of the pipefish were again recorded for settlement in density. Our null hypothesis stated that the predator cues would have no effect on the pipefish distribution. This hypothesis was rejected after the ten days and the alternative hypothesis, stating that the predatory cues do in fact have an affect on the distribution, was accepted. The pipefish favored the high-density areas both with and without the predatory cues, but during the absence of predator the pipefish were also found in the medium and low-density areas.

(15) Analysis of Power Output During Locomotion in the Cuban Tree Frog, *Osteopilus septentrionalis*

Joanna Burr* and Daniel Huber

Department of Biology, The University of Tampa

Power output during locomotion can affect resource acquisition, thereby affecting organismal fitness. The relationship between power output and jumping velocity was investigated in Cuban tree frogs *Osteopilus septentrionalis* by filming frogs jumping from a force plate. Linear regressions used to identify patterns among biomechanical parameters identified a significant positive relationship between power output and jumping velocity. This relationship suggests that *O. septentrionalis* modifies the factors affecting musculoskeletal power output to generate jumping velocities appropriate for different behaviors.

(16) Disk Diffusion Testing (Kirby-Bauer) of Susceptibility To Natural Alternatives of Antibiotics on *Staphylococcus aureus* and *Escherichia coli*

Isabel Carattini* and Blair Saunders*

Department of Biology, The University of Tampa

As the rate of drug resistant bacteria increases, it is important to begin thinking about other sources of antibiotics other than those we have been using for over the past 60 years. Natural alternatives to medicine such as honey and lime, cayenne pepper and honey, and apple cider vinegar underwent serial dilutions and were plated in a 96 well plate. The Kirby-Bauer disk diffusion assay was used to compare how the inhibitory effects of these three natural household items measured up to penicillin in inhibiting both *E. coli* and *S. aureus*. The inhibitory effects of the honey and lime proved to be the most successful in inhibiting bacterial growth of *S. aureus*. Cayenne pepper and honey proved to be the most successful in inhibiting *E. coli*. However, *E. coli* in general was significantly lower in bacterial inhibition.

(17) College Classrooms and the Spread of Germs

Carlie Austin* and Alexandra Ferrer*

Department of Biology, The University of Tampa

The purpose of this study was to determine whether Expo markers in classrooms serve as fomites for spread of bacterial pathogens and to determine if bacterial concentration increases over time. Markers were swabbed over a period of one week and the bacterial load quantified. From marker to marker, there was substantial variability in bacterial levels over time. However, our data showed that there were potential pathogens present amongst the colonies. One isolated organism was determined to be *Staphylococcus aureus*, which displayed resistance to oxacillin. These results indicated that Expo markers function as fomites for spread of bacteria and emphasize the need for proper sanitation prior to using objects left in populated rooms.

(18) The Next Space Race: Mission to Mars

Kyle Cheever*

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

On March 27, 2015, astronaut Scott Kelly began what will be the longest continuous mission in space. Staying aboard the International Space Station for 342 days, scientists will be able to apply this data to future missions to Mars. Current estimations suggest manned missions to Mars will take anywhere between 7 months to two years. Some of the potential challenges that must be overcome are: cost, health threats, psychological factors, equipment and technology, and possible microbial contamination. Currently there are several different organizations working on plans for getting the first human to Mars. NASA, currently working with SpaceX and Boeing, plans to have humans on asteroids by 2025 and Mars by the 2030's. Russia is currently designing a nuclear engine with plans to have manned missions to Mars by 2021. Also in the mix is the Dutch non-profit Mars One program. Set to begin in 2024 using currently available technology they will launch groups of people on a one way mission to Mars every two years. Whether for scientific, political, or commercial purposes, landing the first human on Mars will be a landmark event in human history.

(19) The Success of the Removal of *Escherichia coli* From Baby Spinach By High and Low Pressures of Standard Commercial Sinks

Caroline Clark* and Youssef Saad*

Department of Biology, The University of Tampa

Escherichia coli food contamination occurs frequently during production, harvest, processing, or even in the setting of our own domestic kitchen. Ingestion of the pathogenic strain of *E. coli* causes severe gastroenteritis that can be life-threatening. There have been numerous studies that have shown a variety of techniques for removal of bacterial pathogens from food to prevent potentially serious contamination and outbreaks. We hypothesized that the high pressure water flow of a standard commercial sink would be sufficient to reduce the amount of *E. coli* on spinach after contamination through food handling. However, the results obtained did not support the current hypothesis. After a 24 hour incubation period all experimental groups displayed signs of obvious bacterial growth. There was not a marginal difference of growth between the control, high pressure washed spinach and low pressure washed spinach. Thus, additional practices should be applied to reduce food contamination.

(20) The Effects of Different Antiseptic Mouthwashes on the Elimination of Microorganisms in the Oral Cavity

Gina Clarke* and Jessica Wagner*

Department of Biology, The University of Tampa

The goal of this study was to determine out of six mouthwashes the most efficient at eliminating oral bacteria. The experiment was conducted by using isolated colonies of mouth bacteria grown in nutrient broth to dilute and add to a cell well culture plate with different dilutions of the mouthwashes. After a day in the incubator at 37°C, the culture plates were removed and then analyzed according to whether or not the well was cloudy, which indicated bacterial growth. The wells were then documented as either containing growth or no growth with the most successful mouthwash being Crest Clinical, which contained the compound cetylpyridinium chloride. This compound was also present in the second most effective mouthwash, Colgate Total.

(21) Stability of p73 mRNA Isoforms

Zachary M. Connelly* and L. Michael Carastro

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

The p73 gene is a member of the p53 tumor suppressor family. The p73 dinucleotide polymorphism (DNP) is a G4C14-to-A4T14 linked pair of transitions located in exon 2 between the P1 and P2 promoters, from which TAp73 and deltaNp73 mRNA isoforms are transcribed, respectively. Etoposide is a topoisomerase inhibitor, which causes dsDNA breaks and induces p73 gene expression. We previously reported cell lines with a p73 DNP allele contained a higher TAp73/deltaNp73 protein isoform ratio. Another group reported that treatment of T47D breast cancer cell with an inhibitor of DNA methylation, 5-aza-2'-deoxycytidine, caused a decrease in deltaNp73 and increase in TAp73 mRNA expression. We hypothesized the p73 DNP allele causes altered p73 promoter usage, resulting in the higher TAp73/deltaNp73 ratios. Five cancer cell lines with varied p73 DNP genotypes were treated with etoposide and/or 5-aza-2'-deoxycytidine. RNA was isolated and used for cDNA synthesis followed by TaqMan RT-PCR assays to detect total p73 and the two specific p73 isoforms. Our RT-PCR data for chemically treated cell lines wild-type or heterozygous for p73 DNP were consistent within genotype groups. However, our data for T47D cells was not consistent with published results.

(22) Stability of p53 mRNA Isoforms in MCF7 Cells

Zachary Connelly* and L. Michael Carastro

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

Two p53 mRNA isoforms differ in 5'-leader sequence lengths. Longer isoforms (p53 mRNA-L) contain a putative upstream open reading frame (uORF) not present in shorter 5' leaders (p53 mRNA-S). We hypothesize p53 mRNA-L is subject to nonsense-mediated mRNA decay (NMD). Cell treatment with cycloheximide or PI-3 kinase-like kinases inhibitors (caffeine and wortmannin) block NMD. Our objective was to chemically block NMD in MCF7 cells treated with actinomycin D (ActD). Cellular proteins were analyzed by immunoblotting for p53 and beta-actin (ActB). RNA samples were converted to cDNA and subjected to RT-PCR analyses of p53 mRNA-L & -S isoforms. Our p53 mRNA-L/p53 mRNA-S ratios (L/S) were calculated for two independent data sets. ActD treatment resulted in a L/S = 1.135 (dev = 0.1105). ActD with cycloheximide, caffeine or wortmannin resulted in L/S means of 1.260 (dev = 0.1801), 1.241 (dev = 0.1099) and 1.310 (dev = 0.2117), respectively. Immunoblotting data were consistent with decreased p53 protein in cycloheximide treatment, where ActB was unchanged. Samples from caffeine or wortmannin treatments were consistent with hypo-phosphorylated p53. We conclude chemical treatments effectively inhibited translation and kinase activity, and p53 mRNA-L is partially rescued by treatment with chemical inhibitors of NMD.

(23) p73 Dinucleotide Polymorphism Genotyping of Human Cancer Cell Lines

Ricardo A. Cordova*¹, L. Michael Carastro, Jr.¹, Kaia K. Hampton¹ and Hyun Y. Park²

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

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The p73 gene is a member of the p53 tumor suppressor family. The p73 dinucleotide polymorphism (DNP) (rs1801173) is a G4C14-to-A4T14 linked pair of transitions located in exon 2 between the P1 and P2 promoters, from which TAp73 and deltaNp73 mRNA isoforms are transcribed, respectively. Recently, the p73 DNP allele was associated with decreased risk [OR = 0.55, 95%CI = 0.31-0.99] for aggressive prostate cancer (PCa) and increased TAp73/deltaNp73 protein isoform ratios. We hypothesize the p73 DNP allele causes altered p73 promoter usage, resulting in increased TAp73/deltaNp73 ratios, explaining the observed decreased risk. Our goal here is to determine the p73 DNP genotype in fourteen human cancer cell lines not yet characterized for p73 DNP status. We used three human cancer cell lines with known p73 DNP status as genotyping controls: Caco-2 (homozygous polymorphic), NCI-H1299 (homozygous wild type), and HepG2 (heterozygous). Cell line genomic DNA samples were isolated and used in TaqMan RT-PCR allelic discrimination assays to determine the p73 DNP genotypes. Our data conclusively determined that DU 145, JEG-3, K-562, LNCaP, MDA-MB-468, MRC-5, SW48, T47D, U-2OS, VCaP and WPMY-1 were p73 DNP homozygous wild type, while 22Rv1, PC-3 and MDA-MB-231 were p73 DNP heterozygous.

(24) Hypothetical Life On Triton

Robert Davidson*

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

Neptune's moon Triton could potentially harbor life, albeit with biochemistry very different from our own, due to the satellite's hostile environment. The surface of Triton is extremely cold, with vanishingly little sunlight and none of the warming that Titan experiences due to its sister-moons. Additionally, Neptune's magnetic field causes a constant bombardment of ionizing radiation, which would pose a challenge developing organisms. On the other hand, Triton has many exciting features that might enable the development of life, such as prolific cryovolcanic activity that could periodically bring liquids to the surface. The moon also has a hypothesized subsurface ocean consisting of a water and ammonia mixture; this mixture might serve as a biological solvent at extremely low temperatures.

(25) Influence of Cinnamon Gum and Spearmint Gum on Levels of Oral Bacteria

Shannon Desjardins* and Laura Maldonado*

Department of Biology, The University of Tampa

Cinnamon oil is a natural substance that defends against bacteria in the mouth, which may cause bad breath, tooth decay and cavities. An experiment using Wrigley's Big Red Cinnamon Chewing Gum as well as Wrigley's Spearmint Chewing Gum was performed to see if they had an effect on the amount of bacteria in the oral cavity. It was hypothesized that the Wrigley's Big Red Cinnamon chewing gum, which contains a natural cinnamon oil substance in it, would decrease the amount of bacteria in the mouth whereas the spearmint gum would have less of an effect. The mouths of 6 volunteers were rinsed with sterile bottled water for 15 seconds and then collected into a tube. The gum (spearmint or cinnamon) was chewed by the volunteers and then thrown away after 20 minutes. Sterile water was used again to rinse the mouth for 15 seconds and again collected. The number of colonies that grew from each water sample were counted and compared before and after the two different chewing gums. A greater percent decrease was observed for cinnamon gum compared to spearmint gum. These results could inform oral hygiene practices.

(26) Gene Order And Core Gene Analysis Of Giant Virus Genomes

Shane Dorden* and Padmanabhan Mahadevan

Department of Biology, The University of Tampa

In recent years, the genomes of several giant viruses have been determined. These genomes provide a rich source of data to delve deeper into the comparative genomics of these viruses. The genomes of Mimivirus, Megavirus, Moumouvirus, and Pandoravirus were analyzed using the bioinformatics software tools GeneOrder4.0, which determines gene order, and CoreGenes3.5, which determines the core and dispensable genes of these viruses. GeneOrder4.0 analysis showed differences in gene order between some of these viruses. In addition, CoreGenes3.5 analysis showed numerous shared genes between these viruses, as well as many unique genes not found in the core genome. Interestingly, many of these shared and unique genes are unknown or hypothetical proteins. We demonstrate the utility of GeneOrder4.0 and CoreGenes3.5 in annotating these hypothetical proteins to gain greater insight into their function.

(27) Impact of Freshwater Flow Restoration in the Lower Hillsborough River on the Fish Community in One of its Tributaries, Plant Park Stream

Sarah Escamilla* and Mark G. McRae
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The fishes of Plant Park Stream (PPS) experienced physicochemical changes in their habitat after freshwater flow was restored to the Lower Hillsborough River (LHR). Current spatial patterns in fish species distributions were compared to patterns observed prior to the 2008 restoration in an attempt to document changes that have occurred in the fish community. Principle Components Analysis (PCA) was used to characterize patterns of spatial distribution along physicochemical patterns. Since restoration, regions of the stream that were under the greatest tidal influence of the river experienced marked decreases in salinity. The composition and spatial distributions of the fishes in PPS have also changed since flow was restored to the LHR. Nonnative Mayan Cichlids (*Cichlasoma urophthalmus*) colonized PPS after freshwater flow restoration. The native estuarine species Sheepshead Minnow (*Cyprinodon variegatus*), Marsh Killifish (*Fundulus confluentus*), Rainwater Killifish (*Lucania parva*), and Eastern Mosquitofish (*Gambusia holbrooki*) were captured less frequently than before 2008. Sailfin Mollies (*Poecilia latipinna*) shifted their spatial distributions. Both Green Swordtails (*Xiphophorus hellerii*) and Sheepshead Minnows expanded their distributions in PPS after 2008. These results are consistent with other experiments that have documented profound impacts of ecosystem restoration on biological communities.

(28) Evaluating the Selectivity of a Luminescent Lanthanide Complex for Biological Anion Sensing

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In clinical applications, such as medical imaging and biosensor development, lanthanides have proven to be extremely useful due to several properties they exhibit. The luminescent and magnetic properties of lanthanides, such as europium(III), are highly useful in biomedical applications; emission peaks are usually large, narrow, and characteristic which facilitates easy identification. When the lanthanide binds with an organic ligand, absorbed energy from the ligand is transferred to the metal which enhances emission (the “antenna effect”). This luminescence can be quenched by interaction of the complex with water molecules; introducing the complex into an aqueous solution of anions probes the binding efficiency of the anion by way of an increase in luminescence due to displacement of quenching water molecules. In this experiment, these properties were observed using europium(III) bound to a tripodal pyridine/Schiff base ligand. Fluorescence spectroscopy was used to evaluate the binding efficiency of biological anions to the Eu(III) complex. The complex displayed a significant increase in luminescence only when exposed to oxalate, showing extreme specificity that could be used in medicinal applications. A subtle increase in luminescence was also seen for certain concentrations of phosphate, resulting in further evaluation of the binding affinity of phosphate to the metal.

(29) Microhabitat Use By An Invasive Cichlid In Tampa Bay

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The structure of ecosystems is changing do to the introduction of invasive species. In South Florida the sub-tropical climate is the northern border for the range of many fishes in the family Cichlidae such as: Blue Tilapia (*Oreochromis aureus*), Mayan Cichlids (*Cichlasoma urophthalmus*), and the African Jewelfish (*Hemichromis letourneuxi*). *H. letourneuxi* is a recently discovered invasive species in Tampa Bay. Little is known about the spatial ecology of these fish. This study explores an ecosystem ranging from fresh to brackish water. The availability of the various fish species along with biogeochemical data were collected and examined using multivariate analysis. *H. letourneuxi* showed strong correlations with freshwater and relatively dense vegetation. This information will help us to understand which native species they compete with at a microhabitat level and what steps, if any, to take in conservation efforts.

(30) When The Twin Suns Set: Finding Tatoonie

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Binary stars and their planets have long been the subject of science fiction. The farther we look into the heavens, the more science fiction dissolves into scientific reality. This is a study of binary star systems, their planets, and the physics that keeps such systems in balance. As a conclusion, we will discuss the potential habitability of these star systems and the possibilities for life around binary stars.

(31) Phospholipid Formations in Various Organic Solvents

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The presence of membranes is suspected to be a major component of what allowed early life to keep useful materials from diffusing out of the cell, as well as to hold biochemical reactions in a confined space. Cell membranes are formed from phospholipids in a bi-layer, due to the hydrophilic head and the hydrophobic tail, forming a membrane in water. In this experiment, the possibility of phospholipid membranes forming in various organic solvents was explored, especially using hydrocarbons. The Saturnian moon, Titan, is suspected to be rich with liquid hydrocarbons such as methane and ethane. To test this, phosphatidylcholine, a common phospholipid, was added to various organic solvents. Phospholipid formations were visibly counted and recorded, then compared to the formations in water, which acted as a control group.

(32) The Impacts of Desiccation and Rehydration on Photosynthetic Performance in an Epiphytic Macroalgal Community on Mangrove Pneumatophores in Basin Forests

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Mangal communities provide hard substrates that host various species of macroalgae. These macroalgal communities contribute significant amounts of fixed carbon to these systems. Prior to the work presented here, we have documented significant impacts of seasonal, vertical, and horizontal clines on macroalgal epiphyte biomass and pigmentation in basin forests. The current research compares variation in stress-tolerance and recovery of epiphytes by measuring quantum yield of photosynthesis (Y). Measurements are obtained from along the length of pneumatophores from different regions of basin forests, as well as from different seasons. As an additional basis of comparison, similar measures were made on a green macroalga, *Ulva*, which occurs in this same habitat but lower in the intertidal zone. Quantum Yield decreased with increased desiccation in the mangrove-root epiphyte community. The severity of depression of Y was greater in Spring compared with Fall samples. No other differences were detected neither vertically over the length of the pneumatophore nor horizontally into the basin forest. Upon rehydration, the epiphyte community recovered photosynthetic capacity rapidly in contrast to *Ulva*, which had a quantum yield of 0 even after 6 hours of rehydration. The physiological significance of the ability of these epiphytes to tolerate and recover from desiccation stress will be discussed.

(33) Decorating Behavior of *Libinia dubia* When Exposed to Different Benthic Habitats

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Equal amounts of *Libinia dubia* (decorator crab) were collected from Tampa Bay, Florida and placed in either a sandy bottom substrate or rocky bottom substrate tank. The overall intent of this study was to determine if there would be greater decoration performance by *L. dubia* within a sandy or rocky bottom habitat. It was expected that crabs in a sandy bottom habitat would decorate more than those in a rocky bottom habitat due to the increased exposure and decreased hiding availability. The habitats varied only by bottom substrate with all other parameters held constant, including the mass of red algae provided for decoration. Data was collected biweekly for 27 days by weighing the decorating material of each crab. Sandy bottom *L. dubia* were first observed decorating the most, while those exposed to a rocky bottom substrate decorated the least. Overall, *L. dubia* from each environment on average decorated at almost the same rate. Although the results were insignificant, this data could be used to better understand the purpose and requirements for decoration by *L. dubia*, especially if performed in situ where predator cues will be present.

(34) Correlation of Tooth Chemistry and Feeding Biomechanics with Diet in Fish

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Fish diet can be affected by the biomechanics of the feeding mechanism and the composition of the teeth. To investigate these relationships, jaw muscle force, jaw leverage, and bite force were correlated with tooth elemental composition and diet of fish that consume a variety of soft and hard prey. Jaw muscle force, jaw leverage, and bite force were positively correlated with percentage of mollusk in the diet and quantity of sodium and sulfur in the teeth. Jaw leverage was negatively correlated with percentage of echinoderm, arthropod, and teleost in the diet, as well as quantity of magnesium and molybdenum in the teeth. Finally, the overall quantity of hard prey in the diet was positively correlated with the quantity of calcium, zirconium, and molybdenum in the teeth, all of which were negatively correlated with percentage of soft prey and detritus in the diet and quantity silicon and oxygen in the teeth. These results indicate that fish consuming harder prey items have higher levels of biomechanical performance of the feeding mechanism and suggest the roles of certain elements such as calcium and sulfur in reinforcing the teeth for the consumption of hard prey.

(35) Temporal and Spacial Variability in the Crocker Reef Nutrient Regime

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The United States Geological Survey (USGS) Coral Reef Ecosystem Studies' (CREST) goal is to elucidate the processes controlling the heterogeneity, health, and resiliency of reefs in the Florida Keys. There are three main interrelated components that affect reef conditions and control carbonate precipitation and dissolution: geochemistry, geology, and metabolic processes. Nutrients are an important biogeochemical component of reef systems and can influence coral resilience. Seawater samples were collected on Crocker Reef (24.90906 N, 80.52641 W) and analyzed for inorganic macronutrients (nitrate, nitrite, phosphate, ammonia, and ortho-silicic acid) to evaluate spacial and temporal variability and their relationships to substrate type, which included seagrass, sand, coral, and rubble. A significant increase in nitrate was found to be correlated with decreased salinity and dissolved oxygen. No concurrent increase in phosphate was found, which may indicate preferential phosphate uptake.

(36) Titanium-Promoted Reduction of Alkynes in the Presence of Triethylsilane

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It was serendipitously observed that the triple bond of diphenylacetylene was reduced in the presence of titanium(IV) isopropoxide. Given the relatively mild conditions and that this transformation is important in organic synthesis, the reaction was investigated to determine its scope and mechanism. Control experiments provided some insight to these aspects of the reaction. Per GC/MS, neither cis- nor trans-stilbene were reduced under the reaction conditions. After the reaction mixtures were exposed to an aqueous workup, intermediates of hydrosilylation were not observed.

(37) The Effect Light has on *Artemia salina* in Activity Levels

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We investigated the effect of different light levels on how active *Artemia salina* (commonly known as brine shrimp) are from the amount of light they receive before and after they are hatched. We determined brine shrimp activity by observing shrimp from each tank in a separate triangular shaped tank and determining their velocity. A waterproof grid was placed inside the tank with 1 cm squares marked off, therefore we were able to determine the distance a particular shrimp traveled in 60 seconds. In the end, we found that there was a significant difference between brine shrimp activity due to the amount of light they receive each day, therefore we rejected our null hypothesis. Very little research has been conducted on *Artemia salina*, due to their main use as food for aquarium fishes. Our results were similar to the few studies we found.

(38) Insight Into The Origins Of Metazoan Multicellularity By Studying Adhesion Proteins

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For many years, scientists have been trying to better understand the origins of multicellularity. Recently, the genomes of organisms such as the unicellular choanoflagellate *Monosiga brevicollis* and the basal metazoan *Trichoplax adhaerens* have been sequenced. Our research focuses on studying adhesion proteins involved in cell-cell binding or cell-substrate binding, such as lectins, cadherins, immunoglobulins, etc. and comparing them across various multicellular and unicellular taxa. Adhesion proteins were extracted from the genomes of numerous metazoans, as well as their unicellular relatives. A presence-absence matrix was constructed that showed differences in the number of adhesion proteins between not only the unicellular relatives of metazoans and multicellular metazoans, but also differences in number between the multicellular metazoans themselves. The results provide greater insight into the origin of metazoan multicellularity.

(39) Novel Use of Limonene as the Active Ingredient in Toothpaste

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One of the most common reoccurring infectious diseases arising in children ages 12-19 is dental carries. Dental carries were found in almost 59% of all children between the ages of 12-19. *Streptococcus mutans* and *Streptococcus sobrinus* are the two most common bacteria associated with dental carries. Toothpastes contain two common antibacterial chemicals, triclosan and stannous fluoride. Unfortunately both have been shown to cause detrimental health effects, especially triclosan, which is also the more common of the two chemicals. The purpose of this experiment is to study the antimicrobial properties of limonene, which is found in the rinds of citrus fruit like oranges and lemons. Inhibitory properties of limonene were compared those of triclosan, which is an active ingredient in toothpaste. The greatest amount of bacterial inhibition was observed for 5% limonene. Addition of limonene to triclosan resulted in a decrease in inhibition. Thus, it was found that limonene does act as an effective antimicrobial and could be incorporated in toothpaste to decrease the incidence of dental carries.

(40) A Crustacean Enigma: Spider Crab *Libinia dubia* Grooming Behavior

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In crustaceans, grooming is typically focused around respiratory structures and vital sensory structures and has been categorized as a secondary action that only occurs when primary actions (i.e. feeding, mating, defense) are not present. The behaviors associated with grooming were examined in the crustacean spider crab, *Libinia dubia*. Over the course of the study, a total of 210 crabs were collected and initial information including missing appendages was documented. Three observational experiments were performed: in isolation (behavioral; N=142), together in a tank separated by a screen (social; N=30), in physical contact with another crab (agonistic; N=45). Grooming behaviors documented were 1) the appendages used to groom, 2) groomed body areas, and 3) time spent grooming. Grooming was observed to be predominantly from third maxilliped (outer mouthpart) and chelipeds (front claws), and occurred in regions involved in sensory/respiration and not in regions where decorations occur. Individuals in the behavioral experiment had a higher grooming time budget (5.6%) while the presence of another individual overall decreased grooming (< 0.7%) because of the occurrence of other primary actions (e.g. fighting, displaying). Primary actions take priority over grooming which appears to be a secondary action that mostly occurs when primary actions are absent.

(41) Soil Nematodes: a Possible Host for *Batrachochytrium dendrobatidis*

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Batrachochytrium dendrobatidis (*Bd*) is a pathogenic fungus believed to have caused the decline, extirpation and extinction of over 200 species of amphibians since 1980. *Bd* has a global distribution and is still spreading with known and unknown hosts. Non-amphibian reservoir hosts for *Bd*, e.g. crayfish, can increase pathogen persistence, virulence and facilitate disease spread between ecosystems. In this study, we explored the possibility of a non-parasitic soil nematode (*Caenorhabditis elegans*), which co-occurs with *Bd*, as an alternative *Bd* host. We cultured *C. elegans* and *Bd* together and tracked abundance of both species over a period of 29 days (subsampling every few days) and found evidence that suggest the two organisms facilitate each other's growth. These results, combined with previous preliminary experiments, indicate that *Bd* may be able to survive and persist on soil nematodes. Soil nematodes are widely distributed and so findings could dramatically impact management plans for this disease.

(42) Predator Influence on Interspecific Competition for Habitat Selection Between the Florida Blenny (*Chasmodes sabburæ*) and the Code Goby (*Gobiosoma robustum*)

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Preferred habitat structure plays an important role in the survival of small benthic fish by facilitating avoidance from predators. More specifically, the Florida blenny (*Chasmodes sabburæ*) and the code goby (*Gobiosoma robustum*) are both benthic fish abundant in the Gulf of Mexico and thrive in similar seagrass-dominated areas. This study examines whether interspecific competition between the Florida blenny and code goby occurs between non-structured (bare sand) and structured (artificial seagrass with shell) habitats in the absence and presence of a predator (*Callinectes sapidus*). In a laboratory setting, interspecific competition between each species was tested with structured versus non-structured habitats as well as the frequency of choosing either habitat in both predator absence and presence. A significant association was observed in that gobies initially were seen more frequently than blennies within the structured habitat in the absence of a predator. However, the introduction of a predator showed blennies more frequently dominate the preferred habitat over gobies. It is likely that overall body size and gender of blennies contribute more significantly to these interspecific competitive differences within the same microhabitat. Selections for structural complexity, predator presence, and competition can overall help determine notable patterns of benthic fish in their natural environments.

(43) Comparative Analysis of Acquired Triclosan Resistance in *E. coli*, *S. aureus*, and *S. cerevisiae*

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The introduction of antibiotics into everyday life has led to untreatable infections because these bacteria are resistant to nearly all forms of antibiotics. One antimicrobial, triclosan, has been used for over 30 years in an attempt to control microbe growth on commercial products. In this study, *E. coli*, *S. aureus*, and *S. cerevisiae* are model organisms to evaluate the effect of triclosan on gram-negative, gram-positive, and eukaryotic organisms. The organisms were grown in a 96 well plate and a concentration dilution method was used. This was an attempt to propagate triclosan resistance over several generations which could provide insight into which group of organisms are more susceptible or resistant to triclosan. The results of this study show *E. coli* is sensitive to triclosan, whereas *S. aureus* and *S. cerevisiae* are resistant.

(44) DNA Subcloning of the Cnidarian G α Subunit into pET41a

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Recent innovations in DNA sequencing have shown an unexpected complexity in evolutionarily older species, such as coral. Corals contain a large quantity of G protein-coupled receptors that have no clear homology to vertebrate G protein-coupled receptors. Recently, a novel G α subunit expressed in Elkhorn coral (*Acropora palmata*) was discovered. When the amino acid sequence of the G α subunit was analyzed, it was found that it did not belong to the normal G α subunit families. The novel subunit was termed G α c, the “c” meaning “cnidarian.” To further analyze the G α subunit and its role in G protein signaling, the cDNA sequence for the G α subunit was ligated into the pet41a vector. The pet41a vector was double digested with two restriction enzymes and a ligation was performed using the vector, the cDNA sequence, and T4 DNA ligase. The ligation reaction was then transformed into New England BioLabs (NEB) 5 α competent bacterial cells. The transformed bacteria did not grow in the LB/Kanamycin agar plates. Repeated ligation and transformation of the cDNA sequence into NEB5 α and protein expression and purification of the transformed bacterial cells is ongoing.

(45) Risky Drinking and Eating Behaviors Among College Students

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The college years, ages 18 to 24, are times of excessive alcohol consumption. During these years it is also common for college students to engage in restricting calories before drinking. Restricting calories before drinking is of great concern because not eating prior to alcohol consumption increases the alcohol's toxicity and the subsequent health consequences such as brain and organ damage. The combination of self-starvation and alcohol abuse can lead to physical and psychological consequences. A cross sectional study consisting of a paper survey (n=80) was conducted at the University of Tampa. The questions were designed to investigate the students drinking behavior. Findings indicated that there was an association between gender and the perceived consequences of drinking on an empty stomach. Assessment of the associations between gender and the amount of food they eat before drinking and the amount of alcohol they drink were also conducted. Analyses revealed that women were more likely to restrict their calories before drinking. Survey data indicated that 45 out of 80 students reported that they were concerned about calories from drinking. Students need to be made aware that these types of drinking behaviors inhibit the storage and formation of new memories and reduce cognitive function.

(46) Laboratory Screening Procedure Frequency and its Effect on Tampa Bay Sea Urchin Larvae Survival

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Two species of sea urchins share residency within Tampa Bay, *Lytechinus variegates* and *Arbacia punctulata*. Being able to rear these sea urchins in the laboratory opens up many research opportunities in both invertebrate and developmental biology (Hinegardner, 1969). Collection and spawning of urchins is relatively simple though maintaining the delicate larval state till metamorphosis can be difficult due to many factors. In this study the effect of water changing procedure, specifically larvae screening frequency, were tested for both Tampa Bay species and its effect of survivorship. Larvae were cultured in 300 mL of 36ppt seawater agitated by a rotating plate, fed a diet of Isochrysis, Dunaliella, and Tetraselmis in accordance with Hinegardner's outline for urchin culturing and were then divided to be screened every 3 or 6 days for water changes (1969). Raw data of larval density in replicated aliquots was processed using linear regression to transform records into slope, degrees of freedom, and sum of squares for each of 4 treatments (Lytechinus and Arbacia both with 3 days and 6 days). Initial analysis of this data set slopes, it appears that the Lytechinus culture being screened every 3 day had the slowest die off rates.

(47) TNA as a Possible Precursor to RNA

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Threose Nucleic Acid (TNA) is a synthetic molecule that was first synthesized in 2001. This molecule has become the subject of multiple studies to determine the plausibility of its presence on primordial Earth before the advent of RNA. While it is synthetically made, no one knows what the conditions on early Earth really were, so it could have been formed naturally and lead to the synthesis of RNA. In this paper we examine different facets of TNA research and theories of RNA-DNA evolution to determine if this theory is plausible. There is no concrete evidence that TNA could have existed several billion years ago. The circumstantial evidence holds plausibility for the theory that TNA, or another molecule like it, could have existed before RNA.

(48) The Importance of Hand Washing

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Hand washing is one of the best ways to remove germs, prevent sickness, and diminish the spread of diseases to others, however, this simple act is not always done properly. The Center of Disease Control (CDC) recommends the duration for hand washing be twenty seconds, along with the proper steps and techniques, to properly wash your hands. The topic of hand washing is our basis for this research project. Surveying and observing the University of Tampa students, will be our two methods of investigating our research topics. Our data will possibly give some insight as to whether or not University of Tampa students wash their hands for the recommended length of time and will differentiate between males and females. The survey questions will show if University of Tampa students, males and females, are knowledgeable about the recommended time for hand washing. The perceived behavior of the participants indicates health awareness for standard hand washing techniques to reinforce health safety of all individuals on campus. Health interventions for proper hand washing can be an illustrated design placed in all bathrooms. Improving the health of students at the University of Tampa is our number one priority.

(49) The Phototaxic Behaviors of the Sacoglossan Sea Slug (*Elysia clarki*)

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Elysia clarki is a Sacoglossan sea slug, which sequesters chloroplasts from their algal food source to perform photosynthesis. It can maintain photosynthetic activity for up to several months feeding on 12 different siphonaceous algal species. Phototaxy describes an organism's response to light and a mobile photosynthetic slug offers a new perspective. Phototaxy was measured by placing three to four slugs in a half shaded/half lit aquarium in an otherwise dark chamber. Timelapse photographs were taken every minute for 205 minutes to record slug position with respect to light/shade within the aquarium. These trials revealed that recently fed *E. clarki* spent ~80% of the time on the lit side of the aquarium. This response could be because the slugs have fully functional chloroplasts and are thus able to gain nutritional value via photosynthesis. However, starved *E. clarki* may spend more time on the shaded side of the aquarium in order to preserve their chloroplasts since they lack a protective shading mechanisms found in other sacoglossan species. Further experiments are underway looking into how starvation impacts *E. clarki*'s responses to light. This research offers insight into the chloroplast stability in *E. clarki* and its phototaxic responses as a photosynthetic animal.

(50) Feeding Behavior Observed in *Asterias rubens*

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The purpose of this experiment focused on the correlation between *Asterias rubens* size and prey size selection. *A. rubens* are echinoderms and classified as Asterozoa. Natural sea star populations graze on barnacles, snails and bivalves. It is hypothesized, when given a range of prey size, the predator will choose the most energy efficient option. In this experiment, twelve sea stars were separated into three categories relative to size. Each treatment received mussels ranging from 2mm up to 6mm. By housing each sea star with its prey items in a separate cubical, it allowed direct monitoring of prey consumed by each individual sea star. After running the experiment over a course of 5 weeks, no correlation between *A. rubens* size and prey size section was found. Studying prey and predator relations allows for better understanding of predator feeding habits.

(51) Luminescence and Extraction Properties of Multipodal CMPO Ligands

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Nuclear power is a common energy source, but improvements must be made to ensure greater efficiency and that its production is environmentally responsible. Toxic waste streams containing lanthanide (Ln) and actinide (An) metals are byproducts of nuclear power processing. While these metals are considered waste by nuclear energy manufacturers, they may serve many purposes if successfully separated and extracted. A liquid-liquid separation can be readily achieved using carbamoylmethylphosphine oxide (CMPO) ligand derivatives dissolved in organic solvents and mixed with aqueous waste streams. Selective separation of the valuable Ln ions, however, presents a challenge. Therefore, new ligands are being investigated in attempts to successfully target Ln extraction. Extraction studies have been performed by our group in the past; one in particular showed selectivity towards Tb(III) recovery and further work is underway to probe the rationale of this selectivity. Studies of the luminescence characteristics of select metal complexes are also being done in an effort to optimize the commercial use of Ln complexes and gain more insight into solution coordination chemistry. A study conducted to probe the effect of solvent on luminescence showed a strong correlation between acetonitrile and increased emission of one CMPO ligand when complexed with Tb(III) or Eu(III) ions.

(52) Susceptibility of *Escherichia coli* and *Staphylococcus aureus* to Apple Cider Vinegar and Tea Tree Oil and Bacitracin

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The purpose of this study was to evaluate the susceptibility of *Escherichia coli* and *Staphylococcus aureus* to apple cider vinegar (ACV), tea tree oil (TTO), and bacitracin (BAC). We hypothesized that the conventional antibiotic BAC would be more effective at killing bacteria than TTO or ACV. ACV and TTO were tested alone first, and then they were tested together to determine if there was any synergistic efficacy. Minimal inhibition concentration (MIC) for *S. aureus* and *E. coli* of ACV, TTO, TTO + ACV, and BAC were determined by serial dilutions performed in 96-welled plates. ACV and TTO + ACV were more effective at a lower concentration than BAC and TTO against *S. aureus*. The average MIC of TTO and ACV for *E. coli* was significantly higher than the MIC of BAC. Scaled against TTO and ACV, BAC was the more effective antimicrobial agent for *E. coli*. The MIC of each of the disinfectants was subjected to a disk diffusion assay via the Kirby-Bauer disk diffusion method. TTO + ACV had the largest zone of inhibition among the antimicrobials tested against both bacteria. The data proves the synergistic efficacy of the two natural antimicrobial agents, and suggests that these agents can be more effective treatments than the conventional antibiotic bacitracin.

(53) Physiological and Anatomical Changes in Cuban Treefrogs During the Time Course of *Batrachochytrium dendrobatidis* Infection

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Efforts continue to quantify the spread and impact of the fungus *Batrachochytrium dendrobatidis* (*Bd*) on amphibian populations worldwide, but the ultimate survival and recovery of amphibians will depend on understanding how *Bd* affects organismal homeostasis. We tested the effects of *Bd* infection on whole animal metabolism and epidermal damage in Cuban treefrogs (*Osteopilus septentrionalis*). Aerobic metabolism, as indicated by the rate of oxygen consumption, was quantified prior to infection and again at days 4, 8, 12, 14, 28, and 42 post-infection (dpf). Additionally, individuals were sampled at all time points and prepared for scanning electron microscopy (SEM) in order to describe and quantify both the nature of the fungal growth and host epidermal damage. We observed an overall decrease in oxygen consumption during the time course of infection that indicates significant metabolic impacts in infected individuals. We also report previously undescribed patterns of *Bd* growth and unexpectedly deep epidermal penetration over infection time. This work provides insights into the physiological and anatomical implications of *Bd* infections in amphibian hosts and possible long-term consequences for amphibian populations.

(54) The Effect of Blue Crab (*Callinectes sapidus*) Predator Cue on the Avoidance Behavior of Dwarf Seahorses (*Hippocampus zosterae*) in Relation to Density and Distance

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Dwarf Seahorses (*Hippocampus zosterae*) and their natural predators, Blue Crabs (*Callinectes sapidus*) are found in the seagrass communities of the Tampa Bay estuarine system. Using the predator cue of *C. sapidus* in a controlled environment, it is possible to elicit a behavioral response from *H. zosterae*. In order to determine whether avoidance behavior in *H. zosterae* was influenced by the density of seagrass, three test tanks were created with a constant supplemental seagrass gradient, a low to high gradient, and a high to low gradient. Across ten trials, the avoidance behavior of *H. zosterae* was influenced by distance from *C. sapidus* rather than by the level of density. Though a comparison of before and after positions do support that, initially, *H. zosterae* do favor greater density prior to the introduction of *C. sapidus*. These findings contribute to the understanding of avoidance behaviors exhibited by *H. zosterae* as well as to organismal interactions within estuarine systems.

(55) Variations in the Spatial Distribution of Pinfish, *Lagodon rhomboides*, Across Different Habitat Types

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The purpose of this experiment was to determine whether or not habitat type affects the spatial distribution of pinfish, *Lagodon rhomboides*. Our hypothesis was that habitat type will be associated with where the organisms spatially congregate. Thirty pinfish were split up evenly into three tanks: one with assorted fake plants (green habitat), one with large oysters and rocks covering the bottom (rocky habitat), and a tank with nothing but sand (control). The tanks were taped off into 3 sections, and observations were taken periodically throughout the span of four days to record which area most of the pinfish were congregating. In order to analyze the data, a chi-squared goodness of fit test was performed, and a one way analysis was implemented as a visual representation of our results. The statistical analysis of the data obtained from this experiment showed an association between habitat type and spatial distribution. In the green habitat and the rocky habitat, the middle of the tank was favored. In the control tank, the top was favored. This experiment gives a better understanding of *L. rhomboides*' use of habitat and the results can be applied towards environmental policy and habitat conservation.

(56) Effects of Superoxide Dismutase Inhibition on Antimicrobial Activities of Hydrogen Peroxide in *Escherichia coli*

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Antibiotic resistance is increasing and presents numerous challenges to treatment of infectious disease. Therefore, it is critical to discover new drugs that selectively inhibit key enzymes in pathogens without inhibiting homologous enzymatic function in the host. Enzymes that exhibit substantial structural differences from those of the host are appropriate targets for inhibition. In this study, we attempted to inhibit superoxide dismutase (SOD) in order to potentiate the effects of hydrogen peroxide on growth of *E. coli*. Serial dilutions of hydrogen peroxide were performed to determine the minimum inhibitory concentration (MIC) of hydrogen peroxide. Serial dilutions were then replicated with *E. coli* treated with diethyldithiocarbamate (DDC), a known superoxide dismutase inhibitor. Results were compared to untreated *E. coli*. No decrease in the MIC of hydrogen peroxide was observed in the presence of DDC. However, structural differences between SOD from *E. coli* and a homologue known to be inhibited by DDC may explain the lack of potentiation. Further research may be conducted using other methods to inhibit SOD activity in *E. coli* before conclusions about the possible therapeutic properties of such treatments can be drawn.

(57) Bacterial Resistance to Antibiotics in Organic and Conventional Meat

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Antibiotics are routinely fed to livestock to increase their overall body weight up to 15%. The same antibiotics given to livestock are commonly administered to humans. This causes a problem though; the bacteria in the animal will develop resistance to the antibiotics and when consumed, the bacteria in the animal can be passed to the consumer. In this experiment, the quantity and types of bacteria present on organic and conventionally preserved meat were analyzed. Furthermore, we assessed the difference of microbiological growth when both the organic meat and conventionally preserved meat was incubated at three different temperatures (37°C, 25°C, and 4°C). Finally, bacteria from the meats were isolated and tested for resistance to erythromycin and penicillin. The results of this experiment revealed that organic meat contains more microbial life. However, bacteria from both organic and conventional meat showed resistance to penicillin.

(58) The Effects of Variable Water Depths on the Growth and Rate of Metamorphosis in Cane Toad Tadpoles (*Bufo marinus*)

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The effects of changing and variable water depth were examined in this experiment using simulated pond water depletion, high and low tank depths. Change in size was recorded between three different simulated habitats. Cane Toad (*B. marinus*) tadpoles were initially collected from Plant Park fountain and then placed in three separate tanks of varying water depth: high (12 cm), low (6 cm), and delta (beginning at 14 cm and removing 1 cm daily down to 4 cm). The tail, head, and total body length of every tadpole was recorded every other day. The tail length was used as a proxy for metamorphosis rate because once the tail begins to shrink, the length can be correlated to the rate of metamorphosis. The results suggested that there was no significant difference in the growth rate across the tank types. As of day 17, one tadpole has completed metamorphosis in the high tank, and two tadpoles have fully grown legs in the low tank. If variations in metamorphic rate are observed across the tanks, this could suggest that developing tadpoles are affected by differing water depths. Therefore, developmental trade offs may arise in varying habitats, corresponding to previous studies regarding tadpole metamorphosis.

(59) Quantification of Physiological and Behavioral Stress in Fishes Following Repeated Exposure to Anthropogenic Noise

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Compared to the effects of anthropogenic noise on terrestrial animals, relatively little is known about how these sources of noise pollution impact the physiology and behavior of fishes. The effects depend on the source of anthropogenic sound and can induce a range of responses, including loss of hearing, tissue injury, and even death. We exposed two fishes to two different ‘sources’ of anthropogenic noise and measured physiological and behavioral stress responses. Oxygen consumption rates in gulf killifish (*Fundulus grandis*) indicated that fish might acclimatize to repetitive anthropogenic sound exposure resulting in lower stress responses over time. In contrast, the Sciaenid family contains both hearing specialists and generalists making plausible that red drum (*Scianops ocellatus*) will have a higher sensitivity and therefore higher stress responses to anthropogenic sound and a lack of acclimatization. We are testing this hypothesis by exposing hatchery-raised red drum to repeated exposure of recorded pile driving noise and quantifying changes in blood cortisol levels using ELISA assays and behavioral responses from video recordings. These data will provide valuable information regarding the effects of anthropogenic noise on fishes and may be informative for future management and permitting decisions.

(60) College Students Unhealthy Eating Habits and Alcohol Consumption
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Eating disorders are a main issue among college students, especially women. Drinking on an empty stomach allows alcohol to stream into the body faster, which increases the blood alcohol levels and leads to increased risk of blackouts and other negative health effects. Individuals who participate in unhealthy eating disorders show a higher tendency to engage in uncontrolled behaviors. A qualitative survey (n=40) was conducted in the Fall 2014 semester. Participants were recruited from a private university. Participants were informed about the study and asked to complete a consent form and a seventeen-item survey. Findings indicated that there is an association between alcohol consumption and gender. Analyses found that college women are more likely to restrict food intake before drinking more often than their male counterparts. Also, women are significantly more likely than men to report eating low-fat foods or eating less than usual during at least one meal prior to alcohol consumption, particularly to compensate for calories consumed through alcohol. College students engage in a variety of unhealthy eating and drinking behaviours. This is a public health concern because it happens across college campuses nationwide and can lead to serious consequences such as alcohol poisoning, sexual assault, rape, and death.

(61) Isolation of Bacteria that are Antibiotic Producers from Different Soil Environments

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Many bacteria in the soil have been found to naturally produce antibiotics as a defense mechanism against other bacteria. Novel antibiotics are useful in medicine due to rapidly growing bacterial resistance against antibiotics. Bacteria that produce antibiotics can also be resistant to various antibiotics. Yale University's Small World Initiative program has reached out to several colleges to crowd source for antibiotic discovery in the soil. At the University of Tampa, these soil samples were collected from various environments such as college campuses, public parks, hospitals and gas stations, where bacteria might be likely to produce antibiotics to survive. Bacteria were isolated (referred to as isolates) on Brain Heart Infusion agar and antibiotic production of the isolated bacteria was tested against *Escherichia coli*, *Pseudomonas putida*, *Staphylococcus aureus*, *Staphylococcus epidermis*, *Enterobacter aerogenes* and *Acinetobacter baylyi* ESKAPE strains to see if there was any inhibition of growth of the strains. Colonies were gram stained to obtain a preliminary identification of the bacteria. The antibiotic producing isolates were tested with the Kirby Bauer antibiotic susceptibility method to examine the susceptibility patterns of the isolates against the antibiotics Ampicillin and Oxacillin.

(62) Analysis of *Staphylococcus aureus* and *Escherichia coli* Inhibition from Varying Concentrations of Vitamin C

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The effects of ascorbic acid (vitamin C) on the gram positive bacteria *Staphylococcus aureus* and the gram negative bacteria *Escherichia coli* were studied using a serial dilution of concentrated vitamin C applied in a Kirby-Bauer disk diffusion assay. It was observed that higher concentrations of ascorbic acid are more effective in killing bacteria. It was also observed that the gram positive bacteria, *S. aureus*, is more susceptible than the gram negative bacteria, *E. coli*. Lastly, it was shown that a saturation of vitamin C at high concentrations was not achieved within the experimental parameters, as no plateau effect was observed. The possibility of ascorbic acid as an antimicrobial agent is worthy of future research due to its safety, versatility, and availability.

(63) Career Preferences in Sport Management

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We are looking into what segments of the sports industry UT sport management students desire to work in upon graduation. We believe that the results can be grouped by gender and we want to confirm this with data collected at UT. We think that women gravitate towards public relations and community relations segments over events or facilities. We also want to compare if preferences change when students are beginning the sport management program compared to those finishing the program.

(64) Phylogenetic Analysis Of An Unknown Chlorovirus

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Chloroviruses are large icosahedral viruses that contain about 50 structural proteins, and typically infect certain green eukaryotic algae. Recently, chlorovirus sequences were isolated from throat swabs of healthy adults and were associated with cognitive impairment. Here, we analyzed a pond water sample from New York for the presence of chlorovirus. Cytopathic effects were observed in *Chlorella heliozoae*, strain SAG 3.83. A portion of the chlorovirus polymerase gene was amplified by the polymerase chain reaction using degenerate primers. The PCR product was bidirectionally sequenced. The sequence of the polymerase gene was compared to known chloroviruses and shown to be 98% identical to ATCV-1. The sequence of the environmental isolate was phylogenetically compared to related chloroviruses and results its genetic relatedness to known viruses is presented.

(65) How the Bacterial Communities of Hillsborough County, Florida Compare in Downtown Hillsborough River to Hillsborough State Park

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This experiment was performed to assess the prevalence of antibiotic resistant bacteria in Hillsborough county waterways. Water samples were taken from Hillsborough State Park and the section of Downtown Hillsborough in front of The University of Tampa campus. We hypothesized that the urban site would contain more antibiotic resistant bacteria due to increased contamination from agricultural runoff. Bacteria were cultured on nutrient agar and isolated colonies were assessed for cellular and colony morphology. Isolates were assessed for susceptibility to two antibiotics, neomycin and penicillin. The samples from the downtown section showed an average zone of inhibition of 16.25mm for neomycin and 7.5mm for penicillin. The samples from Hillsborough State Park showed an average of 15.83mm for neomycin and 6.5mm for penicillin. Resistance to penicillin was common to both sites. Based on this limited study, no differences in prevalence of antibiotic resistance was detected. However, further research on non-potable water and the microorganisms in Hillsborough County, Florida is needed in order to draw larger samples and antibiotic susceptibility.

(66) Novel Method of Stereochemical Management of Morita-Baylis-Hillman Chemistry

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The Morita-Baylis-Hillman (MBH) reaction is a tertiary amine catalyzed coupling of a conjugated, electron poor alkene (e.g. methyl acrylate or acrylonitrile) and an aldehyde giving allylic alcohol products. This reaction has enjoyed a great deal of attention in that it is capable of converting relatively simple compounds into those which contain multiple functional groups and new chirality centers. Manipulating the stereochemical outcome of this reaction typically employs asymmetric tertiary amine catalysis or substrate/chiral auxiliary control. We propose a new strategy that combines both asymmetric catalysis and auxiliary control. This strategy involves the formation of acrylate ester that features a chiral auxiliary that contains a tertiary amine that has been shown to be an effective catalyst for the MBH reaction. This method provides new options for greener methods of this highly atom economical reaction. This single-vessel technique allows use of the catalyst as a chiral auxiliary as well as its removal in a closing step, permitting reuse and reduction of waste products.

(67) High-Speed Video Analysis of the Escape Behavior in the Crayfish *Procambarus alleni*

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The neural pathways that control the escape behavior of crayfish have been well-studied via direct measurement of neural and muscular response. However, little data is available regarding the kinetics of live crayfish escape. *Procambarus alleni* is a crayfish species native to the Florida Everglades and popular in the aquarium trade. This species has not been well-studied due to the specificity of their niche and limitations of population distribution, especially when compared to the species *Procambarus clarkii*, an introduced species found in many niches throughout the U.S. The escape behavior of adult and juvenile *P. alleni* will be recorded using high-speed videography, and motion analysis software will be used to quantify the kinetics of individual escape responses. Kinetic parameters include velocity, acceleration, net to gross displacement ratios (NGDR), response latency, number of thrusts per response and total distance jumped. Preliminary experiments have been conducted and indicate that the average velocity of adult crayfish is 40.75 cm/s while maximum velocity reaches 110.49 cm/s. Initial calculations of the average acceleration are 2954.33 cm/s² and maximum acceleration reached 11531.51 cm/s². A better understanding of the crayfish escape parameters can lead to a better understanding of the crayfish predator-prey interactions as well as how human-altered environments have affected their success rates.

(68) High-Resolution Abundance Analysis of Stars with Small Planets Discovered by Kepler

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Using high-resolution, high signal-to-noise ratio Keck/HIRES spectra, we have derived the parameters and abundances of 17 elements of four planetary host stars discovered by Kepler: Kepler-97, Kepler-128, Kepler-131, and Kepler-411. All four stars have small planets (from 0.8 to 1.8 Earth radii) and densities have been determined for planets in two of the systems (Marcy et al. 2014). Previous studies (Ghezzi et al. 2010) have indicated that large planets tend to form around host stars with high metallicity, whereas other work (Buchhave et al. 2012) has suggested that smaller, potentially terrestrial, planets are capable of forming around stars with a wide a range of metallicities. Here we present the results of our analysis of four stars and discuss their abundances in the context of a larger Galactic stellar population.

(69) Risky Sexual Behaviors Amongst Undergraduate Students

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Despite public health efforts to increase knowledge on safer sex practices and decrease STI/HIV rates amongst adolescents, youth between the ages of 15 to 24 account for nearly half of all STIs reported in the United States. Given the long-term implications of STIs and unintended pregnancies for physical health and psychological wellbeing, it is crucial to understand how risky sexual behaviors develop across emerging adulthood and how these behaviors are linked to other personal and contextual factors. This data set contains information collected from 77 randomly sampled undergraduate college students at The University of Tampa. Participants were asked to take a 30-question survey in regards to risky sexual behavior. Data was analyzed using SPSS model 22.0. The data collected was not statistically significant; therefore, we failed to reject the null hypothesis. There is no relationship between grade level and frequency in risky sexual behavior. Although our study shows that there is no relationship between grade level and risky sexual behavior, research has suggested that young adults between the ages of 15 and 24 are the most at risk for sexually transmitted diseases and unintended pregnancy. It is a need of public health to get to know about the risky sexual behavior of young people in order to start adequate prevention campaigns. Young people are considered a segment that is susceptible of being involved in risky sexual practices.

(70) Synergistic Effects of Natural Antimicrobial Compounds on *Staphylococcus aureus* and *Escherichia coli*

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For centuries, mankind has used naturally occurring substances to treat a variety of human ailments. Since many substances have already been tested and determined to have antimicrobial properties, we sought to discover synergistic effects between two different antimicrobial substances. We used the Kirby-Bauer disk diffusion method to test for the combined effects of two naturally occurring substances with known antimicrobial activities. Compounds were tested against both *Staphylococcus aureus* and *Escherichia coli*, as both of these are known pathogens that are becoming increasingly resistant to traditional antibiotics. Three combinations were evaluated: green tea and cinnamon, garlic and lemon juice, and cranberry juice and lime juice. To ensure that synergistic action was occurring, we tested each substance on their own as controls. We found a synergistic effect with garlic + lemon against *E. coli*, but not *S. aureus*. Green tea on its own had the greatest inhibition against *S. aureus*, and adding cinnamon reduced its effectiveness. The combination of cranberry and lime juice did not produce any synergistic effects. Thus, our study suggests that while combining antimicrobials can be beneficial, in some cases, other combinations may limit the effectiveness of these natural compounds.

(71) A Current Problem for Dwarf Seahorses: The Affects of Flow Rates on *Hippocampus zosterae*

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In the ocean, currents are constantly changing and as a result affect organisms and their behavior. In this experiment dwarf seahorses, *Hippocampus zosterae*, were exposed to three different flow intensities. In order to conduct the experiment three ten gallon tanks were set up: one as the control with just the filter, one with two bubblers and a filter representing medium flow, and the last containing three bubblers and one filter, representing high flow. The effect of flow on distribution, anchoring and swimming was tested. There was no significant difference in the total frequency of anchoring and swimming as a result of flow. There was, however, a significant difference in the dispersal of seahorses in top, middle and bottom consequently of high, medium and normal flows. Seahorses in the high flow tanks tended to orient more towards the bottom, attaching to the bottom of sea grasses, shells and other substrate. Medium flow caused dispersed distribution throughout the tank and in the normal tank seahorses oriented more at the top. Finding these results could help to understand where *H. zosterae* is found in areas of high, medium and normal flows and their effect on behavior.

(72) Effect of Food Preservatives on Microbial Growth

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Food preservatives are commonly known to inhibit microbial growth and improve product stability. However, a diet containing high levels of preservatives could negatively impact growth of beneficial gut bacteria. This project sought to determine the effects of various food preservatives on growth of *Escherichia coli*. To assess the inhibitory properties of different concentrations of food preservatives on microbial growth, a 96 well plate was used to perform serial dilutions and inoculated with liquid cultures of *E. coli*. After incubation in preservatives, MacConkey agar plates were used to determine the amount of growth. It was determined that the preservatives in processed food do inhibit growth of *E. coli*. These results indicate that growth of certain strains of beneficial bacteria could be limited by consumption of processed foods.