

The University Of

T A M P A

CNIHS UNDERGRADUATE
research
SYMPOSIUM

April 25, 2014

**College of Natural and Health Sciences
Undergraduate Research Symposium
April 25, 2014**

Schedule:

2:00 – 3:00 p.m.

Keynote Presentation

Dr. Summer Decker

“From the Outside Looking In: Transitions in Medical Research”

Sykes Room 131

3:00 – 5:00 p.m.

Poster Presentations

Fletcher Lounge, Plant Hall

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

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

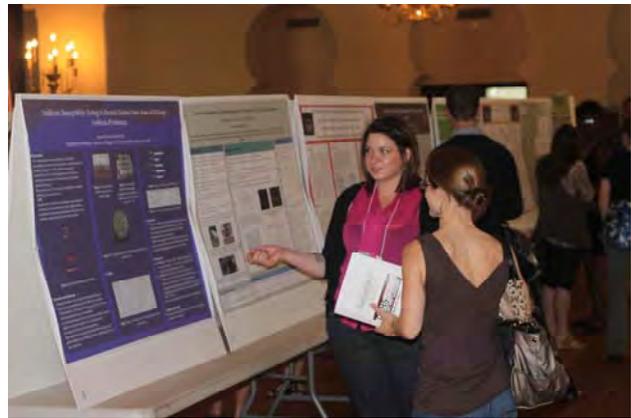
The CNHS Undergraduate Research Symposium provides an opportunity for students within the College of Natural and Health Sciences to present their current or recently completed research projects in a poster format. The research may have been performed as part of a course, an Honors Research Fellowship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

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

2013 Symposium Highlights

Poster Award Winners:

Jonathan Marks
Amanda Duke
Leif Benner
Bethany Loya
Kelsie Lee Kostakos



Keynote Presentation

Dr. Summer Decker

Department of Radiology
USF Health Morsani College of Medicine

“From the Outside Looking In: Transitions in Medical Research”

Computed virtual models and rapid prototypes of anatomical structures are proving to be of increasing value in clinical medicine, education and research. With a variety of fields focused on human and non-human morphology, there is a need for accurate anatomical models. Recent technological advancements in computer and medical imaging technologies have provided the tools necessary to develop three-dimensional (3D) functional models of anatomy for use in medicine (surgical planning and education), biological research and engineering (computer-aided design (CAD) and finite element analysis). However, many experts have been reluctant to transition to 3D volumetric data until it can be validated as anatomically accurate.

The Division of Imaging Research at the University of South Florida’s Department of Radiology has been working to test the technologies at several levels and in turn has developed new methods for accurately analyzing virtual anatomy for an array of disciplines. The results of the studies show a dramatic increase in accuracy using their novel protocols over current methods in the field. With accuracy validated, virtual and/or prototypic models can now be used with confidence to teach anatomy to students in a wide range of fields such as medicine, biological anthropology and the forensic sciences. While many researchers have declared the field of anatomy “dead”, we have just scratched the surface of its potential and applications. Applying this data in fields that are outside the norm of radiology such as forensics and biometrics will be critical as those fields work to establish more quantitative standards and reproducibility.

(1) Analysis of Mating Behavior and Use of Chemical Cues in Gulf Pipefish, *Syngnathus scovelli*

Bayleigh E. Benner,* Elisabeth A. Pendergrass,* Dr. Heather Masonjones

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In organisms in the family Syngnathidae, the role of reproduction is reversed as males fertilize and carry the eggs until birth. Little is known regarding visual behavior in regards to sexual selection in gulf pipefish, *Syngnathus scovelli*. By conducting a laboratory behavioral analysis of female *S. scovelli* behavior when alone, in the presence of multiple females, and in the presence of multiple females and one male, we were able to determine whether females actively display various behavioral cues when attempting to obtain a suitable mate. In addition, using IR spectrometry techniques, we attempted to determine whether chemical cues play a role in sexual selection during mating, where male *S. scovelli* are 'choosy' of which female's eggs he will parentally care for. Here we show that particular behaviors such as active utilization of tank space, white color change in body bands, and dorsal fin flare are all significantly related to female dominance in order for females to gain access to males and pass on their genetic material. Better understanding behavior and chemical cues in sex-role reversed species may allow us to determine why sex-role reversal occurs from an evolutionary standpoint.

(2) Feeding Biomechanics of Deep Sea Squaliform Sharks

Bayleigh E. Benner,* Dr. Daniel Huber

Department of Biology, University of Tampa, Tampa, FL 33606

Previous studies have identified links between the feeding ecology of sharks and the biomechanics of their feeding mechanisms, with jaw muscle force, leverage, and bite force correlated with diet throughout evolutionary history. However, little is known about these relationships in deep sea sharks, which are notoriously difficult to study. The purpose of this study was to investigate the feeding biomechanics of two deep sea squaliform sharks, *Squalus cubensis* and *Centrophorus granulosus*, to identify the relationship between feeding biomechanics, body size, vertical distribution, and diet. In addition, the bite forces of *S. cubensis* and *C. granulosus* were compared to other sharks to evaluate the hypothesis that squaliform sharks have relatively low feeding performance. Results indicate that differences in bite force are due to differences in body size, not the underlying biomechanics of the feeding mechanism, and that greater bite forces in *C. granulosus* are associated with the inclusion of sharks in their diet, which are more difficult to consume than bony fishes. As expected, *S. cubensis*, *C. granulosus*, and other squaliform sharks had relatively low mass-specific bite forces compared to non-squaliform sharks, which is associated with the lack of durable prey in their diets.

(3) Selection of Triclosan Resistant Genes in *Salmonella paratyphi* and its Effect on Antibiotic Resistance

Bayleigh E. Benner,* Jessica M. O'Connor,* Dr. Eric Freundt

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The effect of heightened antimicrobial product use has become an increasingly important topic of study in relation to the growing abundance of antibiotic resistant bacteria. Triclosan, a common antimicrobial compound used to eliminate bacteria in many household products, is thought to be facilitating a shift to increased antibiotic resistant strains in the environment. By conducting 2-fold serial dilutions of 0.5% triclosan, we demonstrate the ability for *Salmonella paratyphi* to rapidly mutate, selecting for triclosan resistance genes. Using the Kirby-Bauer disk diffusion assay to test resistance to antibiotics, we demonstrate that the experimental *S. paratyphi* culture (selected for triclosan resistance genes) is more resistant to antibiotics that target the bacterial ribosome, yet more susceptible to antibiotics that target the cell wall compared to the original *S. paratyphi* culture. In addition, we show that the experimental *S. paratyphi* culture is significantly more resistant to triclosan compared to the original. These data support the hypothesis that overuse of triclosan may lead to antibiotic resistance and indicate that routine use of triclosan should be avoided.

(4) A Mass Spectrometer for Elemental Analysis based on Fieldable Technologies

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Laser ablation (LA) can facilitate direct analysis of solid samples for mass spectrometry (MS), and is often coupled with an inductively coupled plasma torch (ICP). LA-ICP-MS is now widely used for accurate elemental and isotopic analysis; however, the technique is not fieldable, primarily due to the gas and power requirements of the ICP torch. A mass spectrometer system for elemental and isotopic analysis using technology that is amenable to portable instrumentation is being studied. Solid samples are being ablated with an excimer laser and the resulting particle and ion plume will flow through a microwave plasma torch (MPT) and into an ion trap mass spectrometer. Preliminary data confirms that using laser ablation directly coupled with an ion trap mass spectrometer is a viable technique for detecting metals (e.g., lead, cobalt) and refractory compounds (e.g., strontium titanate). Current efforts are focused on enhancing sensitivity by incorporating a custom MPT. While we anticipate that LA-MPT-MS will have somewhat reduced sensitivity relative to LA-ICP-MS, MPTs, laser ablation and ion trap mass spectrometers can all be incorporated into portable instruments. This unique LA-MPT-MS instrumentation is promising for rapid elemental and isotopic analysis in the field.

(5) Synergistic Effectiveness of Natural Remedies on Inhibiting Growth of *Staphylococcus aureus*

Alexandra Brown,* Jeyroll G. Despeines,* Iris Reichman,* Dr. Eric Freundt

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Synergistic effects of commercial antimicrobials for inhibiting growth of *Staphylococcus aureus* have not been thoroughly studied. In this paper, we examined the effects that four natural antimicrobials, including honey, tea tree oil, lavender oil, and spearmint oil, had on the growth of *S. aureus*. In addition to observing the individual agents, we also measured the synergistic effects the antimicrobials had on the bacterium. No inhibitory effects were observed for any of the agents in the broth dilution test. However, the Kirby Bauer disk diffusion method confirmed that several combinations of remedies had higher inhibitory factors than the individual remedies. Zones of inhibition ranged from 6.5 mm to 25 mm, with honey having the lowest zone and the combination of honey and spearmint oil having the highest zone. These data suggest that in cases where *S. aureus* is the predominate cause for disease, the combination of honey and spearmint may be helpful in treatment of *S. aureus* infection.

(6) Stomach Content Analysis of Invasive Pike Killifish (*Belonesox belizanus*) in Tampa Bay

Annie Clift,* Katie Robertson, Dr. Mark G. McRae

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A stomach content analysis of invasive Pike Killifish (*Belonesox belizanus*) was performed on the population in Tampa Bay. *B. belizanus* were collected from North and South Archie Creek in Tampa and preserved in 10% formalin. After dissection, the contents and the stomachs were dried to obtain dry weights, which were then used in statistical analyses. An index of relative importance was generated and indicated that *Poecilia latipinna* and *Palaemonetes pugio* were the main prey items of *B. belizanus*. Future work will investigate the degree of dietary overlap between invasive *B. belizanus* and native *Fundulus grandis*, which will provide information on the potential impacts pike killifish are having on the Tampa Bay ecosystem.

(7) Mandated Flu Vaccination for Health Care Workers

Ashton Abbadessa,* Meghan Bartley,* Brianna Davies,* Dr. Suzanne Collins

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Nursing Clinical Problem: It is unknown whether mandated flu vaccination for health care workers provides protection to unvaccinated health care workers and the patients for whom both vaccinated and unvaccinated workers care.

PICO: What are the protective effects of mandated flu vaccination for health care workers related to their populations of exposure?

Methods/Results: Survey of the literature indexed in health care delivery data bases supports that there is a benefit to mandating the flu vaccine for health care workers and high-risk patients.

EBP Recommendations: The flu vaccine should be mandated for all health care workers and for high-risk populations. Additional research should be conducted on exposure and infection of unvaccinated health care workers.

Barriers to Implementation: Few legal mandates for health care worker flu vaccination exist. Vaccination may be contraindicated in those who have egg allergies. Societal fears of vaccine side effects and complications are additional barriers.

Benefits of Implementation: Implementation of health care worker vaccination mandates would reduce the chance of acquiring flu, prevent spread to others, reduce flu associated medical costs, decrease health care acquired infections, and overall decrease incidence through increased herd immunity.

(8) Coexistence of Pediatric and Palliative and Curative Care

Liz Alt,* Brianna De La Cruz,* Alina Laramée,* Dr. Suzanne Collins

Department of Nursing, University of Tampa, Tampa, FL 33606

Nursing Clinical Problem: Palliative care is commonly perceived to be associated with active dying. Parents may avoid discussing palliative options for their ill child because of the societal stigma. Unfortunately those child-patients may experience unnecessary suffering when transitioning to the end of life instead of receiving appropriate pain and symptom management.

PICO: In children diagnosed with cancer, what is the difference in level of comfort for those receiving palliative care concurrently with curative care versus those who only receive palliative care once curative options have failed?

Methods/Results: Survey of the literature indexed in health care delivery data bases, demonstrated that receiving palliative care throughout treatment can greatly improve the quality of life for a terminally ill child.

EBP Recommendations: Palliative treatment education and social resources should be readily available to pediatric cancer patients/families.

Barriers to Implementation: Barriers to implementation are uncertain prognosis, family denial of an incurable condition, language and cultural issues, time constraints, and divergence in treatment goals between health care providers and families.

Benefits of Implementation: Palliative care can effectively co-exist with curative treatments to provide children/families with the most comfort and quality of remaining life.

(9) Effect of temperature on metabolism in *Syngathus scovelli*

Jamie DiEdwards,* Marissa Skinner,* Dr. Heather Masonjones

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Temperature plays an integral role in determining the rate at which animals metabolize food. Here we examined the amount of food *Syngathus scovelli* consumed at varying temperatures. The fish were fed one cube of mysis shrimp (~3g) along with 12mL of brine shrimp mixed with sea water. Weight was measured along with the approximate percentage of food that was consumed. The mass of one specific pipefish in each tank was measured everyday before feeding in order to measure their metabolism. We were able to separate the specimen that was being handled from the others through photographic analysis. In order to mimic temperature conditions in their native habitat, the control stayed at a steady 70 degrees Fahrenheit (21 degrees celsius). The second tank was brought up to 74 degrees Fahrenheit (23 degrees celsius), and the third was held at 78 degrees Fahrenheit (25 degrees celsius). Varying the temperatures by four degrees gave us a measurable difference in metabolism rate. The amount of mysis and brine consumed varied day by day between treatments. The percent of food consumed was greatest in the tank with the highest temperature, therefore indicating that higher temperatures are correlated with faster metabolisms. When temperature increases, metabolism increases.

(10) Annotation of Hypothetical Proteins in Human Adenoviruses

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Hypothetical proteins are proteins where very little, if any, information is known regarding either their structure, function or, in many cases, both. Many human adenovirus genomes contain varying numbers of hypothetical proteins, and determining the structure and/or function of them is essential to further understanding how these particular proteins play a role in the virus itself. Utilizing various protein function and structure based servers, we discovered that some of these servers, relative to the others, provide more pertinent information concerning the structure and/or function of the seventy-three adenovirus hypothetical proteins we compiled for analysis.

(11) The Effects Of Estradiol On *Artemia salina* Cyst Hatching

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This study looked at the effects of estradiol on the hatching of cysts from *Artemia salina*, the brine shrimp, also commonly referred to as the sea monkey. There were fifteen cultures in total. Five had the concentration of estradiol which would be found in human waste if the body excreted two percent of the estradiol (0.044 g/L), five had the same premise with five percent excretion of estradiol (0.109 g/L), and five had no estradiol at all acting as the control. The cysts were given 72 hours to hatch then data was collected. The number of brine shrimp and remaining cysts were counted per 1 mL of each culture three times, totaling 3 mL per culture. The sum for brine shrimp and cysts were taken for each respectively. Then the ratio of shrimp to cysts was calculated for each culture. After an ANOVA test comparing the two different concentration levels to the control, it was found, although there is a slight trend present, the presence of estradiol did not have a statistically significant effect with a p-value of 0.0836. Further research is warranted on effects of estradiol as this study had relatively low replication and brine shrimp are very resilient.

(12) Comparison of Physiological Tolerances to Temperature and Salinity of the Mayan Cichlid and Green Swordtail

Rebecca Gaesser,* Dr. Daniel Huber

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This study examined the metabolic implications of salinity and temperature on two invasive freshwater fish collected from Plant Park Stream, Tampa, FL. The Mayan Cichlid, *Cichlasoma urophthalmus*, and Green Swordtails, *Xiphophorus helleri*, both native to Central America, were selected in order to conclude which parameter has a larger effect on metabolic rate, as well as compare which species has a greater ability to expand its invasive range based on physiological tolerances. Each fish was tested in four conditions: 25°C 0 ppt, 25°C 10 ppt, 15°C 0 ppt, and 15°C 10 ppt, in a 1L flow through respirometer. Metabolic rate was determined using mass corrected oxygen consumption in mgO₂/L/minute. Analysis of the factorial groups attributed significant differences in metabolic rates to temperature, but not salinity in both the Mayan Cichlid and Green Swordtail. The comparison analysis did not find any statistical difference between the two species in their tolerances. The data revealed that both Mayan Cichlids and Green Swordtails are limited by decreased temperatures, and have equal ability to expand their invasive ranges.

(13) Presence of Transmissible Bacteria on the Surface of One-Dollar Bills of Various Manufacture Dates

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Money, something that we handle every day without hesitation, has been shown to host a significant amount and variety of potentially harmful bacteria. The ease with which these bacteria can be transferred from the surface of a dollar bill to your hands is worthy of concern. In this experiment, daily contact with money among individuals was simulated by pressing one-dollar bills directly against the surface of nutrient and MacConkey agar plates. Results indicated the presence of bacteria from the genera *Staphylococcus* and *Streptobacillus* as well as fecal coliforms. The data collected showed a positive correlation between the amount of time in circulation and the amount of bacteria present. These results suggest a very real threat of bacterial contamination when exchanging money hand to hand.

(14) Effectiveness of Eye Drops Against Bacterial Conjunctivitis

Geidys Gonzalez,* Frank Lozzi,* Dr. Eric Freundt

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This experiment attempted to determine whether Similason eye products, including Allergy Eye Relief and Irritated Eye Relief, have antibacterial properties and may be effective treatments for conjunctivitis. Using the Kirby Bauer disk diffusion test, we evaluated which eye drops had the greater zone of inhibition against a model organism and opportunistic pathogen, *Staphylococcus aureus*. The results showed that there was no zone of inhibition for the eye drops against *Staphylococcus aureus*. Because no discernable zone of inhibition was observed, a follow up experiment was conducted for *Staphylococcus aureus* using a broth-dilution assay to determine if either product contained any antibacterial components. Bacterial growth was observed in all wells that were inoculated with *Staphylococcus aureus*, irrespective of eye drop concentration, and bacterial growth was not observed in wells that contained saline only. The results from this experiment therefore demonstrate that Similason eye products do not have antibacterial components in sufficient concentrations to kill bacteria and would therefore not be effective treatments for conjunctivitis.

(15) Spatial and Seasonal Variation and The Impacts of Emersion Related Stressors on Photosynthetic Performance in the Epiphytic Macroalgal Community on Mangrove Pneumatophores in Basin Forests

Catharine Hargenrader,* Madeleine Gagne,* Alyssa Fessett,* Elaine Kurr,* Dr. Kevin Beach

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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. Trends in primary production, biomass, and stress tolerance have previously received limited attention despite the prevalence of this community type in mangal intertidal zones. This study examines the variation in ecophysiology and biomass of epiphytes in a basin forest in Tampa Bay, Florida over a seasonal scale, as well as horizontal (m) and vertical (cm) spatial scales. With increasing distance into the basin forest, pneumatophore density and height also increased, providing a greater amount of hard substrate for the attachment and growth of epiphytes. Biomass per pneumatophore surface area was lowest in Winter and Fall, increased in Spring, and was highest in Summer. Distribution of the biomass was spatially complex, with variations driven by both vertical and horizontal trends that altered with season. Emersion and subsequent dessication negatively impacted photosynthetic performance solely on a vertical spatial scale. Tolerance to emersion relative stress in this environment may play a significant role in seasonal and spatial variation in biomass and productivity of macroalgae in basin mangrove forests.

(16) The Effects of Temperature and Salinity Variation on the Feeding Efficiency of *Mnemiopsis leidyi*

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Ctenophores are marine planktonic predators distributed throughout the world's oceans. *Mnemiopsis leidyi*, is known to regulate zooplankton communities and influence ecosystem dynamics in estuaries along the Atlantic and Gulf coast of the Americas. The purpose of this study was to investigate effects of salinity and temperature on the feeding efficiency of *Mnemiopsis leidyi* thereby predicting how environmental variability might affect coastal ecosystem trophic interactions. Retention efficiency (RE), the rate at which predators encounter and retain prey, was determined using a factorial design for salinity and temperature. Mean RE at ambient temperature (19.9 °C) and salinity (23.3 ppt) was $71.4 \pm 39.1\%$ while at decreased temperature (17 °C) and salinity (20.3 ppt), RE was only $45.5 \pm 31.8\%$. RE was further reduced at decreased temperature (17 °C) and increased salinity (28.5 ppt) to $18.7 \pm 11.8\%$. Several individuals reverted in their life cycle due to their inability to tolerate environmental stress, which may have confounded the results. RE is currently being investigated at increased temperature coupled with increased or decreased salinity. This study serves as a representation of the enlarged geographic range of *Mnemiopsis leidyi*, demonstrating that they differences in retention efficiency limit their geographic distribution, with respect to abiotic factors. Such changes in predatory efficiency may influence the overall success of pelagic food webs throughout the Gulf Region.

(17) Bivalve predation in Tampa Bay and portions of Florida's Gulf coast

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In this study, bivalve predation was analyzed for associations between valve selection, drilling site and predator. Ten beaches were selected throughout Florida's Gulf coast and Tampa Bay to collect the dead preyed on bivalves during low tides. Chi-square tests were run to determine if variables differed significantly, while a contingency table analysis was used to determine if variables, such as drill site and predator, are associated. Data analysis has supported the alternative hypothesis that the valve, drilling site, and predators of bivalves occur at significantly different frequencies. This study adds in our understanding of the offshore predation processes occurring off of the Gulf coast and in the Tampa Bay area.

(18) Effects of an Endoparasite on Grass Shrimp (*Palaemonetes pugio*) and its Predator-Prey Interactions

Alexandra Hipolito,* Kyle Freudiger,* Dr. Heather Masonjones

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The presence of a parasitic organism can have a dramatic effect on the life of its host and its fitness in regards to predator-prey interactions. This preliminary study examined the survivorship of grass shrimp (*Palaemonetes pugio*) with the presence of the parasitic organisms (*Probopyrus pandicola*) located under its carapace compared to a non-parasitized shrimp (control). Data was collected on kills, and attempts and time of pursuit of pinfish (*Lagodon rhomboides*) on grass shrimp. Results show that there was a statistically significant difference in survivorship of the grass shrimp with and without parasites present (independent t-test: $t=2.1675$, $dF=54.8$, $p=0.0346$). Additional results show that there was no significant difference in size of parasitized and non-parasitized shrimp. This study is important for predator-prey ecology studies because it takes into account how an outside influence, such as a parasite, affects an organism's ability to survive. This study is consistent with other studies that illustrate the negative effects of parasites on organisms in the marine environment.

(19) Difference in Preference Size of *Perna viridis* for Optimal Foraging of the Sea Star *Echinaster spinulosus*

Haleigh Holmes,* Sydney Perkins,* Dr. Heather Masonjones

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Sea stars are keystone species found in marine ecosystems that have influence on the community structure. These predators balance their prey populations on the lower trophic levels, which includes mussels, clams, and bivalves. *Echinaster spinulosus*, brown spiny sea star, were placed in individual containers containing three different size prey species. The prey, *Perna viridis*, Asian green mussel is an invasive species that the brown spiny sea star feast on. What is being determined is if the optimal foraging theory would apply while observing foraging behavior. Optimal foraging suggests that the medium size that is given to each sea star compared to their size ratio is the most optimal with equal amount of energy input and output. After two and half weeks of daily observations, it was determined that *Echinaster spinulosus* did not fall into the category of an optimal forager. Mussel size did not matter either. The results can relate to other research in this area because it's important to understand the feeding habits of specific species for they have an effect on the lower trophic levels.

(20) Kirby-Bauer Disk Diffusion Testing of Susceptibility of *Escherichia coli* and *Staphylococcus aureus* to Antibiotics: Influence of High pH

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Environmental factors such as the pH level in the environment have strong influences on the efficiency of antibiotics against bacteria. By altering extracellular pH, the cell's resistance to antibiotics can be changed. To test this, the Kirby-Bauer disk diffusion assay was used to measure the susceptibility of *Escherichia coli* and *Staphylococcus aureus* to various antibiotics at pH 9 and pH 7. It was found that penicillin, ampicillin, and tetracycline were less effective against *E. coli* and *S. aureus* at pH 9, while erythromycin and cephalothin were more effective. Vancomycin was more effective at pH 9 against *S. aureus*, but less effective at the same pH against *E. coli*. In some cases, the difference in antibiotic efficiency at the two pH levels was highly significant. *S. aureus* was 56.8% more susceptible to tetracycline at pH 7 than pH 9. The pH influences antibiotic attack on cells and bacterial resistance in various ways depending on the mechanisms of antibiotic-cell interactions, which is why the higher pH affected the antibiotics differently. If combined with further research into the effect of pH's below 7 on antibiotic efficiency, this information can help develop better ways to circumvent antibiotic resistance in bacteria.

(21) Grooming Behavior In Spider Crab, *Libinia dubia*

Jace J. Jedlicka,* Dr. Jen L. Wortham

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Grooming behaviors reduce the amount of fouling material, such as bacteria, epibionts, algae, or sediment. In crustaceans like decapods, grooming is typically focused around respiratory structures and vital sensory structures. The behavior and quality of fouling was examined for the spider crab, *Libinia dubia*. Four observational studies were performed to determine how the frequency and duration of grooming behaviors may vary in the absence and presence of another conspecific individual. They included: isolation (behavioral; N=142), together in a tank separated by a screen (social; N=30), in physical contact with another crab (agonistic; N=45) with each of the three experiments lasting for a 30 min. time period, and 24 hour experiment (N=20). Grooming behaviors documented were the appendages used to groom, groomed body areas, type of grooming behavior and a time budget for grooming. Grooming was observed to be predominantly from third maxilliped and left and right claws. Individuals in the behavioral experiment were observed to have a higher grooming time budget while the presence of another individual overall decreased grooming because of the occurrence of other primary actions (e.g. fighting, displaying). These primary actions take priority over grooming actions which makes grooming appear to be a secondary action.

(22) Tripodal Pyridine-Based Ligands for Gadolinium (III) Complexation: Implications for the Design of High-Relaxivity MRI Contrast Agents

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Lanthanide metal complexes based on gadolinium(III) are often used as contrast agents to enhance the images produced from an MRI scanner. When injected, such agents are bound by water molecules within physiological tissues and cause an increase in the relaxation rate of water protons, improving image contrast. The effectiveness of any contrast agent is related to the number of bound water molecules (q) that coordinate the gadolinium(III) ion. Standard MRI contrast agents have q values of one water molecule, resulting in low proton relaxation rate enhancements. In this study, pyridine/Schiff base ligands were synthesized and the potential of one particular Gd(III) complex as an MRI contrast agent was explored. This complex was made from the so-called TRIPy ligand which binds in a hexadentate manner to Gd(III), allowing space for additional bound water molecules within the metal inner coordination sphere. Luminescence decay lifetimes of the Eu(III) analog and relaxometric characterization performed for the Gd(III) derivative were used to determine the number of bound waters. Solution thermodynamic studies suggest complex instability at high pH. These findings have led to the synthesis of more stable derivatives employing amide linkages as alternatives to imine which will be discussed.

(23) Safety of Levels in the Waters of Tourist Locations

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As populations increase around prime beaches, run off from land finds its way into waters that are frequented by tourists and locals daily. There have been records of beaches being closed to the public for various reasons. This project looks at the level of bacteria and fecal coliforms in the water column at popular locations along the Gulf of Mexico in the central region of the Florida coast. Sample collections begin in the Clearwater area and are taken through various beaches around Sarasota County. Water samples are collected from these locations and plated on nutrient agar plates, which look for bacterial growth and m-Coli Blue plates, which look for fecal coliforms. After the appropriate time, colonies are counted and evaluated to determine the safety of the waters. When levels become too high the safety of the population becomes a factor and authorities will have to close a beach until the levels return to a safe count. By checking these locations regularly authorities can determine the normal level and any fluctuations can be examined for hazardous growth.

(24) Bedside Nursing Shift Change Report and Patient Satisfaction

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Nursing Clinical Problem: Shift change in hospitals represents a time of limited attention to patient requests, contributing to patient dissatisfaction. It is unknown which method of shift change report best minimizes patient dissatisfaction.

PICO: Does the use of bedside report increase measures of patient satisfaction for hospitalized adults, as compared to other forms of nursing shift change report?

Methods/Results: Survey of literature indexed in health care delivery data bases identified major types of shift change report: recorded, nurse to nurse at the nurse's station, written, and bedside nurse to nurse. The use of bedside report increased patient satisfaction.

EBP Recommendation: Bedside report should be implemented but the patient's preferences in relation to confidentiality must be honored; delivery of the report should be consistent among nurses; patient education should occur regarding the process; sensitive information should be conveyed outside of the room.

Barriers to Implementation: Barriers are potential breaches of confidentiality, inconsistency in delivery, communication issues including language differences, and use of medical jargon by nurses.

Benefits of Implementation: Patients reported being better informed about their conditions, their plans of care, and their nurses' identities. Patients reported increased levels of trust between patients and nurses.

(25) The Role Of L-Arginine Decarboxylase In Polyamine Synthesis And Tau Pathology

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Conversion of L-arginine to agmatine by L-Arginine decarboxylase (ADC) has been previously studied in connection with neurodegenerative disorders such as Alzheimer's and Parkinson's disease. It is thought to play an essential role in neuronal function as in vivo, agmatine acts as a ligand for imidazoline receptors, the binding of which acts as a control for the release of secondary neurotransmitters. Overall, we aim to identify the role of ADC in models of tau pathology. In order to achieve this we started by cloning ADC from mRNA extracted from mouse brain tissue. The mRNA was reverse transcribed to generate cDNA for PCR. Primers for ADC were designed for the 5' ATG to the 3' termination signal. A hemagglutinin (HA) tag sequence was added to the 3' primer in frame with the ADC sequence for detection of the ADC protein. The cDNA was cloned into a recombinant adeno-associated viral expression vector. ADC sequence was confirmed by DNA sequencing analysis. Protein expression was confirmed by transfection into HEK293 cells followed by western analysis using an anti-HA tag antibody. We are currently examining the effects of over expression of ADC with future experiments examining the effects of ADC in vivo using viral gene delivery.

(26) Health Scan Assessments on Hookah Bar Patrons

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Introduction: Waterpipe (also known as "hookah") smoking started as a tradition in India and has since become prevalent in the U.S. Hookah smoking has become a popular practice among college students due to the social nature of the activity. Users are exposed to several toxicants, including carbon monoxide (CO), heavy metals and other chemicals known to cause cancer.

Methods: Assessments of exhaled CO, pulse CO-oximetry readings, heart rate, oxygen saturation (SpO₂), and perfusion index (P.I.) were conducted among two hundred patrons (n=200) before and after attending hookah bars in Tampa FL.

Results: A non-parametric test was conducted to assess changes in the measured variables. Significant increases were observed in exhaled CO, pulse CO-oximetry readings, and heart rate measured in beats per minute (BPM), while SpO₂ and P.I. significantly decreased. Mean increases of 60.8 ppm, 5.9% COHb, 3.8 BPM, -0.5%, and -0.4% were recorded for exhaled CO, pulse CO-oximetry, heart rate, SpO₂, and P.I. (all p-values < .05).

Conclusion: Hookah bar patrons are exposed to considerable amounts of CO, had a measureable increased heart rate, decreased SpO₂ and decreased P.I. Smokers are at risk of chronic heart and lung diseases. Environmental and policy control efforts are needed to curb this high-risk behavior in the U.S.

(27) Antibiotic Susceptibility of Mouth Microflora from Canines and Felines in Local Animal Shelters

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Mouth microflora from animals can cause human infection through animal bites. When domestic animals such as felines and canines bite a human subject, their sharp canine teeth easily puncture the skin, allowing pathogenic microorganisms to pass through. As most infections caused by mammalian bites are polymicrobial, it is important to identify microbes on the canines of animals and their susceptibility to commonly used antibiotics. The objective of this research is to determine antibiotic susceptibility patterns of microbes isolated from the canines of animals in local shelters. Forty subjects (dogs and kittens) were tested from two Humane Societies surrounding Tampa Bay. The subjects' canine teeth were swabbed with sterile cotton swabs and inoculated on MacConkey's Agar and Mannitol Salt Agar. Selected isolates were gram stained and preliminary identified with biochemical tests. Once identified, the isolates were tested as to their antibiotic susceptibility patterns using the Kirby Bauer method testing eleven antibiotics. Results from Mannitol Salt agar indicated mostly gram positive bacilli with ~one third gram positive cocci. Five isolates from the MacConkey's agar plate were preliminary identified as *Citrobacter freundii*, *Klebsiella pneumoniae*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Pantoea*. This research could aid in managing treatment of patients with an animal bite.

(28) Setal Morphology on the Grooming Appendages of the Spider Crab *Libinia dubia*

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In crustaceans, grooming behaviors decrease fouling by removing debris from the exoskeleton and internal structures. These grooming behaviors improve respiration, sensory reception, movement, and reproduction. Spider crabs decorate themselves with materials from their environment by attaching these materials to decorating setae. Grooming may, therefore, be of extra importance to these spider crabs because these decorating setae may need to be maintained and kept free of fouling through grooming behaviors. The objective of this study was to describe the setal morphologies of spider crab grooming appendages and determine if the spider crabs have different setal morphologies compared to other decapods. The grooming appendages examined were the first pereopod, the first, second, and third maxillipeds, and the first, second, and third epipods. Spider crabs were predicted to have elaborate setal morphology for cleaning externally as well as internally within the gill chamber. After 1.5 years of collecting data using SEM techniques, nine types of setae were found on the grooming structures and included varieties of serrate, pappose, simple, and cuspidate setae. The epipods in the gill chamber were free of fouling; suggesting the protopod of the 3M has a functional morphology which removes debris before incoming water enters the gill chamber.

(29) An Analysis of the Potency of Fitness Center Disinfectant on Microbial Growth

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The purpose of this experiment was to test for the growth of microorganisms on workout equipment and to test the provided sanitizer's strength as a disinfectant. The mats, cardio equipment and weight bench at a gym were swabbed for microbial growth. The cleaner was applied to one of two sets of Mannitol Salt Agar and Nutrient Agar plates to compare growth of the collected samples. Results indicated that growth was successfully inhibited by the disinfectant through evidence of zones of inhibition. In further experimentation, evidence of pathogenic gram positive bacterium was detected on the mats. This bacterium was then grown in the presence of Oxiccillin through the Kirby-Bauer method. The gram positive bacteria containing the pathogenic strain was found to have small zones of inhibition, further alluding to potential resistance.

(30) Breast Milk Feeding and IgA level in Pre-Term Babies

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Nursing Clinical Problem: Immune systems of pre-term babies are underdeveloped, thus increasing their risk for infections. Breast feeding may facilitate development of the immune system by providing passive protection from mother to baby in the form of IgA. Immunoglobulins protect against respiratory infections, diabetes, diarrhea, SIDS, and allergies.

PICO: Does exclusive breast milk feeding for the initial 6 months of life affect immune strength (IgA) in pre-term babies who are able to feed, as compared to formula feeding?

Methods/Results: Survey of the literature indexed in health care delivery data bases produced 30 articles of which 4 summary articles were chosen. Breast feeding increases the transference of IgA, however, little quantitative evidence exists as to its role in immunity. What is known is that breast milk feeding of premature infants is superior to formula feeding.

EBP Recommendation: Exclusive breast feeding for the first 6 months of life is recommended. Education of both mothers and health care providers will promote this practice.

Barriers to Implementation: No recent quantitative studies exist measuring serum IgA levels of breast-fed and formula fed pre-mature infants; new studies are recommended.

Benefits of Implementation: Stronger immune systems will prevent infection, thus, reducing the probability for re-hospitalization.

(31) Testing Infection Control in a Veterinary Surgical Setting

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The protocols for disinfecting surgical instruments used in veterinary medicine vary greatly depending on the establishment. Due to concerns of increasing amounts of resistant bacteria, it is extremely important to minimize infections due to cross contamination. At the Humane Society of Tampa Bay 4% chlorhexadine gluconate, Benz-all©, and trifectant are used for disinfecting surgical equipment and tools. The effectiveness of these disinfectants was tested by the sterile swab method before and after the equipment was disinfected. We found, with few inconsistencies, that the amount of bacteria was significantly decreased after disinfecting. Therefore, the Humane Society of Tampa Bay is taking the necessary precautions to ensure that infection caused by contamination of surgical instruments stays contained and at a minimum.

(32) Food Preference and Feeding Behaviors of *Lagaodon Rhomboides*

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In our experiment we measured the food preference of *Lagaodon rhomboides* when offered their usual laboratory diet of live brine shrimp and a secondary food source of pet store fish food. We also measured the resulting behaviors when fed different foods. Sixteen organisms were collected and separated randomly into three tanks. The control group received live brine shrimp, while the experimental tanks were fed either only pet fish food or both fish food and brine. The experiments ran four days at a time with three different trials for a total experimental period of twelve days. Each tank was observed individually for a time period of ten minutes, during which time we watched for behaviors such as chasing; nipping; and stealing food. After statistical analysis, the results revealed that there is a significant correlation between food type and aggression. *Lagaodon rhomboides* showed a preference for the pet fish food; however, offering the fish food also corresponds with an increase in aggressive behaviors. This experiment demonstrates how human interference with an animal's environment can change the normal behaviors of the organism and therefore alter their normal interactions in their environment.

(33) The Diversity of Microorganisms Throughout The University of Tampa Campus

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Due to a greater understanding of the ubiquity of microorganisms in today's world, specifically the knowledge that some of the microorganisms found around us could be pathogenic, numerous preventative methods are now being used to combat pathogenic microorganisms in the environment. Use of ultra violet lights to destroy dangerous microorganisms found in air-conditioner units is becoming more common. However, on a campus in the midst of a city, yet surrounded by water and trees, with buildings built between the span of 1891 (Henry B. Plant Museum) till present day (West Kennedy Hall), UT is an exceptional breeding ground for an extremely diverse population of microorganisms. In an effort to evaluate the numerous microorganisms throughout the university we left nutrient agar plates out around campus to collect and incubate some of the campuses diverse microorganisms. With this information we were able to observe specific characteristics and morphologies, as well as cell counts, to help determine the possibilities for what the microorganisms that may inhabit this campus are. If they are in fact the pathogenic microorganisms many are trying to avoid we also looked at possible alternatives to fight these pathogens.

(34) Kirby-Bauer Disk Difusion Testing Susceptibility of over the Counter Acne Medications against *Staphylococcus aureus* and *Escherichia coli*

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Acne vulgaris is a common skin disease that dermatologists have been struggling to cure for decades. Due to an excess of sebum, produced by the sebaceous gland, or keratinocytes clogging the pores, the pilosebaceous units become a more ideal environment for bacteria to inhabit. This study uses six types of acne medications; some dermatologist recommended, some over the counter, and some organic in order to identify their effectiveness in stopping the proliferation of both *Staphylococcus aureus* and *Escherichia coli*. Using the Kirby-Bauer disk diffusion method all six of the acne medication trials were replicated three times for each strain of bacteria. For every trial, the zone of inhibitions were measured and then averaged to determine the susceptibility to the acne medication. Overall, the active ingredients Salicylic acid (1%) and organic Tea Tree oil were the most effective in eliminating the growth of *Escherichia coli* and *Staphylococcus aureus*.

(35) Bacterial Count on Numeric Keypad Locks Shows Correlation With Passcodes

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Anytime someone punches in a passcode, bacteria are transmitted from their fingers to the keypad. After swabbing numeric keypad locks and counting the colony forming units (CFUs) that grew on agar plates from samples of each number key, it was found that there is a correlation between bacterial growth on certain number keys and the passcode for that keypad. Only minor correlation was found between amount of bacterial growth from a number key and its place in the order of the passcode. This has significant implications for security, as learning the number keys on which bacteria grow can greatly increase chances of guessing the code.

(36) The Effect of Water Temperature on Food Consumption Rates of Brown Spiny Sea Stars, *Echinaster spinulosus*

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Brown Spiny sea stars, (*Echinaster spinulosus*), are found in the shallow waters of the Atlantic Ocean, Caribbean Ocean, and Gulf of Mexico. Temperature is changing on a global scale and thus impacting the physiological interactions amongst marine species. Studies were conducted to assess the correlation between water temperature and food consumption in sea stars. The feeding rates of the sea stars were observed at varying temperatures: low (22 °C), control (24 °C), and high (26°C). Salinity and pH levels were held constant across the tanks. Four sea stars were placed in each of the three tanks and fed squid on a daily basis. To measure food consumption, the weight of the squid was recorded both before and after. It was hypothesized that an increase in water temperature would result in higher rates of food consumption by sea stars. The data showed no significant results indicating that water temperature does not affect the feeding rate. Although the research did not show any significant differences, increases in food consumption were observed. Since *Echinaster spinulosus* is a predominant species with a wide distribution, and climate change is becoming a global issue, further studies to understand how these aspects are associated are key.

(37) Effect of Cinnamaldehyde on Oral Bacterial Growth

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Cinnamaldehyde is a known antimicrobial compound isolated from the oil of the *Cinnamomum zeylanicum* tree. The effect cinnamaldehyde has on oral bacteria that cause halitosis has been studied through the use of Big Red chewing gum. The amount of cinnamaldehyde in Big Red is less than .5%, but it inhibits anaerobic bacterial growth by 50%. This study used serial broth dilution testing to find the minimum inhibitory concentration (MIC) of cinnamaldehyde of three aerobic oral bacteria. The bacteria were isolated from participants, grown on agar plates, and diluted in agar broth. The cellular morphology was determined by Gram staining. All three aerobic isolates had MICs of .0025% despite their different cellular morphologies. The MIC was lower than what is found in Big Red gum, and therefore gives evidence to support the claim that Big Red inhibits bacterial growth.

(38) Microbial Adaptation for Bioremediation

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Storm water runoff contains many different types of contamination including heavy metals, phosphorus-based fertilizers, and hydrocarbons. Bioremediation is an emerging technology to deal with the growing need for waste management solutions. A storm water runoff filtration pond, herein referred to as TRP (Tampa Runoff Pond), collects and treats the runoff from Channel side Drive and surrounding parking garages. The system has been shown to reduce heavy metal pollutants greatly but did not substantially remediate ammonia, phosphorus, or dissolved nutrients including PAH's (polycyclic aromatic hydrocarbons). The microbial life in the TRP has routinely been exposed to hydrocarbons, and therefore might be better able to remediate PAH's compared to microbes found elsewhere. In this experiment, we examined the ability of microbiota from TRP and IWS (isolated water source), which had been exposed to fertilizers from runoff, to utilize waste oil as a nutrient source over a period of 72 hours. Data from viable cell counts, spectrophotometric measurements of optical density, and gas chromatography all indicate that TRP microbiota were significantly better at utilizing and breaking down waste oil compared to the IWS sample. The data collected suggests that when selectively pressured, microbiota can naturally be adapted to perform bioremediation of hydrocarbons.

(39) Complementary/Alternative Therapies and Chronic Back Pain

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Nursing Clinical Problem: Overuse of pharmacologic agents to treat back pain is a significant problem because risks of addiction, overdose, dependence, disabilities, and the possibility of death are associated with their use. The effectiveness of complementary/alternative measures that patients can use in order to eliminate or control their back pain needs to be explored.

PICO: Does complementary/alternative therapy effectively relieve chronic back pain with fewer side effects than medication alone?

Methods/Results: Survey of the literature indexed in health care delivery data bases described 3 complementary/alternative therapies: chiropractic, yoga, and massage, as effective in the treatment of chronic back pain.

EBP Recommendations: Education of back pain patients and their providers about the available complementary/alternative therapies that are effective in reduction of medication requirements will promote utilization.

Barriers to Implementation: Alternative therapies may not be covered by insurance, therefore out of pocket cost may be a barrier. In addition, alternative therapies require time and commitment, as well as transportation to and from therapies. Limited research funding is a barrier to building a strong evidence base that quantifies benefits.

Benefits of Implementation: The ultimate value of implementation of complementary/alternative therapies is enhanced pain control and resultant reduction of the risks.

(40) The Effects of Oregano Extract on Microbial Growth

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Oregano oil is derived from the Mediterranean plant species known as *Oregano vulgares*. The medicinal properties of the oil were first reported in the 6th century BC when Greek physicians advised its use for the treatment of snakebites, hemlock poisoning and headache prevention. Since that time, oregano oil has become a commercially available product, sold for use against respiratory tract infections, gastrointestinal infections, ease of menstrual cramps and headaches, as well as a food additive for both flavor and preservation. In this experiment, we investigated the antimicrobial properties of oregano oil by testing the oil against several bacterial cultures as well as a culture inoculated with a T4 bacteriophage. Furthermore we investigated the effect oil of oregano had on growth rates using spectrophotometry.

(41) Genetic Investigation of Limbal Squamous Cell Carcinoma in Haflinger Horses

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Limbal squamous cell carcinoma (LSCC) is the most prevalent type of equine cancer. The Haflinger breed is disproportionately affected by this cancer, accounting for 69 % of the cases. Although the cause is unknown, this strongly suggests a genetic predisposition for LSCC. A retrospective study tracing all affected horses back to a single common sire supports this hypothesis. The current study identified additional cases and controls that were also descendants from the same sire line. A genome wide association study (GWAS) involving 13 cases and 11 controls was utilized to identify candidate loci. Two SNPs located on ECA4 near a tumor suppressor gene were found to be significantly associated ($p = 5.79 \times 10^{-5}$) and in perfect linkage disequilibrium. These data also suggest that affected horses homozygous for the associated allele developed cancer at a younger age ($p = 0.067$). A second locus of significance was identified on ECA 12 ($p = 5.80 \times 10^{-4}$). Both of these loci will be further investigated by PCR-RFLP analysis in additional samples. Our goal is to identify a genetic variant that can be used for early detection and thus better prognosis.

(42) Ambient Ionization Mass Spectrometry for Simultaneous Detection of Organic and Inorganic Components of Gunshot Residue (GSR) and Explosives

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An analytical method capable of detecting both inorganic and organic components simultaneously, with little sample preparation, is being studied using Desorption Electrospray Ionization (DESI) and Direct Analysis in Real Time (DART) coupled with Laser Ionization-Mass Spectrometry (LIMS). In preliminary experiments, black powder, a common explosive used in IED construction, and 50 ng of CsCl, an analog of a likely radionuclide for an RDD, were added to a polypropylene mesh swab and analyzed using DESI coupled to an ion trap mass spectrometer. The black powder fuel (ascorbic acid) and oxidizer (nitrate and perchlorate) as well as the cesium were detected simultaneously. In more recent experiments, LIMS has been incorporated into the ionization source and used for analysis of refractory materials. Current research is focused on development of a multi-mode LIMS and DART source for simultaneous detection of organic gunshot residues (e.g., diphenylamine) and inorganic lead, barium, and antimony oxides.

(43) Observation of Microbial Life in Different Brands of Bottled Water

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Though all water has the same chemical make-up, it is obvious to consumers that all brands of water have their own distinct taste. Along with differences of source, many bottled water brands also have their own distinct microbial content that may also affect their taste. Several brands of bottled water were evaluated for microbial content: Dasani, Aquafina, Nice!, Zephyrhills, Iceland Pure, and Evian. A fixed volume of water was filtered and the microbes were cultured in nutrient agar and evaluated. Each brand carried its own distinct microbes, however similar bacteria were found in water from similar sources. Spring water types were found to have the greatest abundance of bacteria, which may possibly cause the color and taste differences found between these waters and other purified types. Further identification of the specific bacteria could aid in prevention of the spread of bacterial diseases and could give insight regarding the effects certain bacteria have on flavor.

(44) Bacterial Investigation of Coastal Waters

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Bacteria are everywhere, and are indeed necessary for life on Earth to exist as it does. In excess or deficiency, however, certain types of bacteria can cause problems, even in an environment as vast as the marine one. For this study, 50 mL water samples were taken at high and low tides at three different beach locations in the Tampa Bay area. These samples were then transferred to Minimal Media and Eosin Methylene Blue agarose plates and cultured to determine the amount and type of bacterial growth present in these beach locations. Very little growth was observed, and the growth appeared to be fungal rather than bacterial. The possible lack of bacterial growth indicates that certain types of bacteria could be lacking from these environments. This lack of bacterial growth in the marine environment could lead to sickness and death for many different species, as bacteria such as *E. coli* are commensal organisms needed for proper function in animal body systems.

(45) Species Diversity in Floating Wrack Mats in Tampa Bay

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Macro-organism diversity in floating wrack mats was collected from two locations in Tampa Bay. Ben T. Davis Beach is on the North side of Old Tampa Bay, while Picnic Island is in the central region. Of these two locations, Ben T. Davis Beach appeared to have more wave action while the location site at Picnic Island was almost stagnant. Species diversity, determined using Shannon's Diversity index, was compared to the volume and complexity of the wrack mats to see if a correlation was found. Complexity was defined by the number of algal/seagrass species found in the mat. Overall, there did not appear to be any significant connection between volume and macro-organism diversity. This is likely due to some other factor such as: proximity to seagrass or other permanent plant cover, total duration in water column, wave action, or many other environmental conditions.

(46) Metallicity Analysis of Planetary Hosts Kepler-11, Kepler-37, & Kepler-68

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This study aims to examine stellar metallicity and its effect on planet formation in multi-exoplanet systems discovered by NASA's Kepler spacecraft. We have analyzed Keck/HIRES spectra of the planetary hosts Kepler-11, 37, and 68 and derived the abundances of 17 elements for these stars. (Ramirez et al. 2011, Schuler et al. 2011). Of particular interest are stars which could potentially host terrestrial planets. Results from previous studies have suggested that stellar abundance patterns or "signatures" may indicate the presence of planets, and thus such elemental abundance trends may be used as a method to identify stars with planets, including potentially Earth-sized terrestrial planets. In attempt to begin generating data in pursuit of this prospect we present the abundances of three stars which host multiple planets including Earth-sized, and thus possibly terrestrial, planets.

(47) Animal Assisted Therapy in the Critical Care Unit

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Nursing Clinical Problem: Multiple factors contribute to patient anxiety in the critical care unit (CCU), including health instability and a stimulating, unfamiliar environment. It is proposed that incorporating animal-assisted therapy (AAT) into the CCU care experience will improve patient outcomes.

PICO: Does the use of AAT improve vital signs and lab values among patients in the CCU in comparison to those patients who do not receive AAT?

Methods/Results: Survey of literature indexed in health care delivery data bases produced 23 articles, 10 published within the last 5 years were selected. The use of AAT in the CCU promotes physiologic stability as evidenced by improvements in patients' lab values (epinephrine, cortisol, and norepinephrine) and vital signs (blood pressure, respiratory rate, heart rate, and pain).

EBP Recommendations: Support exists that AAT for stable patients should be implemented into CCU based clinical practice guidelines.

Barriers to Implementation: Barriers to inclusion of AAT into patient's plan of care: costs, health care provider resistance to integration of complementary/alternative therapies into the medical complexity of the critical care setting, and patient specific barriers (allergies, preferences, fears, and cultural biases).

Benefits of Implementation: Benefits of AAT enhancement of positive patient care responses/healing in the CCU.

(48) Effect of an Antagonist on the Decorating Behavior and Metabolism of *Libinia dubia*

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Longnose spider crabs, *Libinia dubia*, belong to a unique family of brachyurans attributed to their decorating behavior. Decoration in crabs is used as a camouflage mechanism as well as to attract a mate by attaching elements from the environment to setae on their carapace. These organisms also exhibit aggressive competitive behavior towards each other. Two experiments were conducted in this study to examine decorating behavior and metabolic rate in both an individual and antagonistic environment. Crabs were observed in isolation with natural and artificial decorating materials and the mass was recorded before and after treatment. Specific metabolic rate was determined for each individual in a metabolic chamber. An antagonist will then be introduced and decoration in the presence of competition will be observed. It is hypothesized that decorating behavior will be reduced because defensive behavior will take priority over acquiring decorating materials. An antagonist was added to the metabolic chamber to determine how activity varies with the presence of another. It is hypothesized that oxygen consumption will increase because metabolic demand to interact with another individual is greater than in isolation. This research has importance in understanding the underlying mechanisms and competition of *Libinia dubia*.

(49) The Effect of Predatory Fish on Axolotl Behavior

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Axolotls, *Ambystoma mexicanum*, are well known as aquatic pets and are common research subjects on account of their unique morphology, as they are a neotenic species of salamander that lives its entire life in an aquatic larval form. Though captive bred populations are abundant, axolotls are currently classified as critically endangered as their native habitat has been drained, polluted, and ravaged by non-native fish. Our experiment tested the axolotl's behavior, specifically moving to sheltered areas, as a result of predatory cues from cichlids. We observed the behavior of 30 individuals separated into 6 animals in 5 replicate tanks over the course of two weeks, one week being a control followed by a week of testing the effect of adding cichlid chemical cues to the tanks. The animals reacted by shifting towards the side of the tank with dense coverage as a defensive behavior. As refuges are being created for axolotls in their natural habitat, behavioral research can aid in building more efficient sites for the animals to take shelter in and ultimately aid in the survival and reproduction of dwindling individuals in their natural habitat.

(50) Structural Mechanics of Ancestral and Derived Shark Jaws

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While the general morphology of sharks has not changed greatly throughout evolutionary history, the morphology and composition of their jaws has. As a result, modern sharks vary considerably in their feeding mechanisms and ecology. The purpose of this study was to compare the structural mechanics of jaws from sharks with ancestral (bluntnose sixgill shark *Hexanchus griseus*) and derived (longfin mako *Isurus paucus*) jaw morphologies. Jaws were modeled out of different materials (unmineralized cartilage, mineralized/unmineralized cartilage, bone) to examine the effects of sharks having abandoned bone in favor of cartilaginous jaws as well. Stress, strain, and strain energy density were determined using finite element analysis. *I. paucus* exhibited comparable stress, but less strain and strain energy density than *H. griseus*, indicating that the material and morphology of jaws have become more efficient at handling stress and strain. The heterogeneous model (mineralized, unmineralized cartilage) resulted in low stress, intermediate strain, and intermediate strain energy density for all jaws. These results suggest that shark jaws may have been structurally modified over time to better resist stress and strain, allowing for emergent properties to evolve from the combination of mineralized and unmineralized cartilage as well as a more efficient distribution of cartilage.

(51) The Effects of Very High Fat, Very Low Carbohydrate Diets on Safety, Blood Lipid Profile, and Anabolic Hormone Status

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Very low carbohydrate (<5 %), high fat (>70 %) (VLCKD) diets have caused alarm due to high cholesterol intake and researchers question its safety. However, because lipids provide the raw substrate necessary for the biosynthesis of anabolic hormones such as testosterone the diet may have implications for athletes. **PURPOSE:** Therefore the purpose of this study was to investigate the effects of 11 weeks of VLCKD dieting on safety, blood lipid profile, and anabolic hormone status. **METHODS:** Twenty-six college aged resistance trained men were divided into VLCKD (5 % CHO, 75 % Fat, 20 % Pro) or a traditional western diet (55 % CHO, 25 % fat, 20 % pro). All subjects participated in a periodized resistance-training program. Blood samples were taken at week 0 and 11 and analyzed for safety, blood lipid profile, and insulin and testosterone. **Results:** There were no differences in any of the safety parameters measured (CBC / CMP) in either the VLCKD or traditional group. Total cholesterol increased slightly in the VLCKD group while it decreased in the traditional western group. This rise was driven by an increase in HDL in the VLCKD group (6.69 mg/dl) compared to the western (-1.6 mg/dl) with no changes in LDL. Triglycerides were significantly higher in the VLCKD group (29.3 mg/dl) than the western (-8.4 mg/dl). Total testosterone increased significantly in the VLCKD diet (118 ng/dl) as compared to the western (-36 ng/dl) while insulin increased significantly in the western group (3.7 uIu/ml) compared to the VLCKD (.1 uIu/ml). **CONCLUSION:** This study data suggests that a VLCKD is safe and improves testosterone values while simultaneously increasing insulin sensitivity. Lastly, HDL rose in VLCKD group. **PRACTICAL APPLICATIONS:** Athletes looking to optimize their hormone levels while employing a safe dieting strategy can use a VLCKD.

(52) The Effects of Ketogenic Dieting on Skeletal Muscle and Fat Mass

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Very low carbohydrate (<5 %), high fat (>70 %) ketogenic diets (VLCKD) diets have previously been shown to have favorable changes in body composition (increased lean mass and decreased fat mass) in obese or overweight individuals. However, the impact of this form of dieting relative to a traditional high carbohydrate diet has not yet been investigated in resistance trained athletes. **PURPOSE:** Therefore the purpose of this study was to investigate the impact of VLCKD verses a traditional western diet on changes in muscle and fat mass. **METHODS:** Twenty-six college aged resistance trained men were divided into VLCKD (5 % CHO, 75 % Fat, 20 % Pro) or a traditional western diet (55 % CHO, 25 % fat, 20 % pro). All subjects participated in a periodized resistance-training program three times per week. All measures were taken at week 0 and 11. **RESULTS:** Lean body mass increased to a greater extent in the VLCKD (4.3 ± 1.7 kgs) as compared to the traditional group ($2.2 \text{ kg} \pm 1.7$). Muscle mass increased to a greater extent in the VLCKD group (0.4 ± 0.25 cm) as compared to the traditional western group (0.19 ± 0.26 cm). Finally fat mass decreased to a greater extent in the VLCKD group ($-2.2 \text{ kg} \pm 1.2 \text{ kg}$) as compared to the ($- 1.5 \pm 1.6 \text{ kg}$). **CONCLUSIONS:** These results indicate that VLCKD may have more favorable changes in LBM, muscle mass, and body fatness as compared to a traditional western diet in resistance trained males.

(53) Oral Adenosine Triphosphate (ATP) Increases Blood Flow Following Exercise in Animals and Humans

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Extracellular adenosine triphosphate (ATP) stimulates vasodilation by binding to endothelial ATP-selective P2Y2 receptors; a phenomenon, which is posited to be accelerated during exercise. Herein, we used a rat model to examine how different dosages of acute oral ATP administration affected the femoral blood flow response prior to, during, and after an exercise bout. In addition, we performed a single dose chronic administration pilot study in resistance trained athletes. Methods: Animal study: Male Wistar rats were gavaged the body surface area, species adjusted human equivalent dose (HED) of either 100 mg (n=4), 400 mg (n=4), 1,000 mg (n=5) or 1,600 mg (n=5) of oral ATP as a disodium salt (Peak ATP®, TSI, Missoula, MT). Rats that were not gavaged were used as controls (CTL, n=5). Blood flow was monitored continuously: a) 60 min prior to an electrically-evoked leg-kicking exercise (180 contractions), b) during and c) 90 min following the leg-kicking exercise. Human Study: In a pilot study, 12 college-aged resistance-trained subjects were given 400 mg of ATP as a disodium salt (Peak ATP®, TSI, Missoula, MT) daily for 12 weeks, and prior to an acute arm exercise bout at weeks 1, 4, 8, and 12. Ultrasonography determined volumetric blood flow and vessel dilation in the brachial artery was measured at rest before taking the supplement and 30 minutes after at rest and then at 0, 3, and 6 minutes after the exercise. Results: Animal Study: Rats fed 1,000 mg HED demonstrated significantly greater recovery blood flow ($p < 0.01$) and total blood flow AUC values ($p < 0.05$) compared to CTL rats. Specifically, blood flow was elevated in rats fed 1,000 mg HED versus CTL rats at 20 to 90 min post exercise when examining 10-min blood flow intervals ($p < 0.05$). When examining within-group differences relative to baseline values, rats fed the 1,000 mg and 1,600 mg HED exhibited the most robust increases in blood flow during exercise and into the recovery period. Human study: At weeks 1, 8, and 12, ATP supplementation significantly increased blood flow, along with significant elevations in brachial dilation. Conclusions: Oral ATP administration can increase blood flow, and may be particularly effective during exercise recovery.

(54) Effects of 0µg, 10µg, and 20µg doses of Estradiol on *Xiphophorus helleri*

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Estradiol is a common ingredient found in many oral contraceptives used today. The lowest dose of estradiol that can be found on the market is 10µg but most types of birth control contain approximately 20µg. Remnants of birth control have been found in many different habitats across the U.S. The presence of estradiol may have adverse effects on the organisms living in these habitats (Herman et al., 2003). The purpose of this experiment was to look at how different amounts of estradiol will affect sword tail fish (*Xiphophorus helleri*) found in Plant Park. Twelve sword tail fish were collected and put into three separate tanks, a control tank, low dose tank (0.5µg/L), and high dose tank (1.0µg/L). It was hypothesized that higher doses of estradiol will have an effect on fish body mass, behavior, metabolic rate, and coloration. This experiment was conducted over a fifteen day period in which the data collected supported our hypothesis.

(55) Phenylalanine Hydroxylase Single Point Insertion

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Phenylalanine hydroxylase is an enzyme used to break down phenylalanine into tyrosine. With the inability to do so the, phenylketonuria can occur which can lead to brain damage and death. The phenylalanine hydroxylase (PAH) gene which offers coding for the PAH enzyme, was subcloned into a pET41 expression vector with a single point insertion at the 408 position. The insertion was the addition of an arginine at the 408 position, thus, then moving the tryptophan residue to the 409 position. The protein was expressed, isolated, and purified in order to determine if it was functionally activated in producing the PAH enzyme in order to convert phenylalanine into tyrosine. If this mutation was seen to be successful it could lead to possibilities of ways to prevent the phenylketonuria condition.

(56) AMELX: Amelogenin Coding and Related Health Conditions

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Amelogenin is the main protein product of the AMELX gene found on the X chromosome. Amelogenin is a type of structural, extracellular matrix proteins, mainly responsible for development of tooth enamel. In individuals with Amelogenesis Imperfecta, a genetic disorder, the protein is not properly expressed, causing dental deformities. In this experiment, the mouse isoform of AMELX will be subcloned into the E. coli genome. The proteome will be analyzed with SDS-PAGE and Western Blot to detect presence of amelogenin.

(57) Effects of Temperature on the Growth of Juvenile Dwarf Sea Horses (*Hippocampus zosterae*)

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Due to constant changes in the environment, especially climate change, many oceanic species are forced to adapt to rising water temperatures in order to survive. This study aimed to investigate the effects of changing temperature on the growth of juvenile Dwarf seahorses (*Hippocampus zosterae*), over five weeks. Dwarf seahorses are a member of the syngnathid family of pouch brooders where the males are responsible for carrying and birthing the juveniles. Pregnant males were collected from sea grass beds and the juveniles were acclimated into tanks of varying temperatures after birth. Two tanks were maintained at 20°C, two tanks were warmed to 24°C, and two tanks were heated to 28°C. After five weeks, the average growth of the individuals in 20°C was 1.54mm in height and 0.29mm wide. The individuals in 24°C averaged 4.36mm growth in height, and 1.06mm in width. Finally, the individuals in 28°C had an average growth in height of 9.31mm and an average growth in width of 2.11mm. The individuals in 28°C grew taller and wider than the individuals in 20°C and 24°C, and statistical analyses concluded that data was significant, and hence, the alternative hypothesis that temperature affects the growth of juvenile Dwarf seahorses was accepted.

(58) Luciferase: A Shining Light in Recombinant Technology

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Cloning strategy, molecular characterization, and functional assay for Firefly (*Photinus pyralis*) luciferase are demonstrated. The gene of interest is force cloned into Luciferase Reporter Vector (pTL-Luc). Bacteria are transformed with the recombinant plasmid and lysed. Successful production of Luciferase is characterized by performing the assay with D-Luciferin, ATP, and O₂.

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