

**Monmouth University
School of Science**

**ELEVENTH ANNUAL STUDENT RESEARCH CONFERENCE
WEDNESDAY, APRIL 18, 2012
WILSON HALL**

Presentations by Department

Department of Biology

**A Comparative Northern Diamondback Terrapin (*Malaclemys terrapin terrapin*)
Habitat Analysis in Island Beach State Park and Shark River, New Jersey**

Brian Carlsen

Faculty Mentor: John Tiedemann

**Adolescent Long-Evans Rats are Resistant to the Induction of Repetitive Behavior
by Bupirone**

Krystal Orlando, Madelyn Mauterer

Faculty Mentor: Dr. Dennis Rhoads

Aldehyde Dehydrogenase in Brain and Liver

Vivek Angara

Faculty Mentor: Dr. Dennis Rhoads

**Caffeine Dependence and Expression of Adenosine Receptors in Adolescent
and Adult Brain**

Kristin McKeever

Faculty Mentor: Dr. Dennis Rhoads

**Down-regulation of Adenosine A1 Receptors in Adolescent Brain during Chronic
Alcohol Consumption**

Patrycja Bolewska

Faculty Mentor: Dr. Dennis Rhoads

**(The) Effects of Chronic Ethanol and Tianeptine on AMPA Receptor Density in the
Adolescent Brain**

Bryan Martin, Trevor Wood

Faculty Mentor: Dr. Dennis Rhoads

**Effects of *E. coli* and *P. aeruginosa* Lipopolysaccharide-Induced Inflammation on
Hypoxia-Inducible Factor-1 in the Testis**

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Experimental and Computational Catalase Enzyme Activity in Central Metabolism Under the Morpheein Hypothesis

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Faculty Mentors: Dr. James Mack, Dr. William Schreiber (CE)

Influence of Antioxidants on Cellular Migration and Protection from Oxidative Stress

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Phylogenetic Analysis of the Oedionychines (Coleoptera: Alagoasa) Based on 28S D2 rRNA and COI mRNA Molecular Analyses

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Research Mentors:

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Levels of Arsenic and Selected Restriction of Hazardous Substances (RoHS) Metals and Metalloids in Rice Food Products

Chelsea M. Bray, Christiana J. Brock, Arielle Le Beau

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Microwave –Assisted Synthesis of Aryl Viologens

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Cortney Cavanaugh, Mena Aioub

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Animation for Educational Presentation

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Effectiveness of Blood Pressure Cuffs used on Dogs: Designing a Study

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Prognostic Value of Regional Lymph Node Metastasis with Grade 2 Cutaneous Mast Cell Tumors in Dogs

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**A Comparative Northern Diamondback Terrapin (*Malaclemys terrapin terrapin*)
Habitat Analysis in Island Beach State Park and Shark River, New Jersey**

Brian Carlsen

**Monmouth University
Department of Biology**

Faculty Mentor: John Tiedemann

Northern diamondback terrapins (*Malaclemys terrapin terrapin*) are listed as a species of special concern in the state of New Jersey. These animals are unique to brackish water environments and are the only turtles in North America that are able to live in an estuary. Although favorable ecosystem characteristics for diamondback terrapins have been identified, the importance of each are still unknown. This study is going to explore a successful northern diamondback terrapin habitat in Barnegat Bay and compare it with possible areas of suitable habitat in the Shark River estuary.

Optimum environmental conditions are going to be identified in each region using a suitability index that has been created from the findings of numerous diamondback terrapin studies and field researchers. Using the Terrapin Resource Index (TRI), similarities and differences for each area will be revealed. The main objective of this project is to propose reasons why Island Beach State Park is able to support a thriving diamondback terrapin population and why the Shark River estuary cannot. This ongoing research is expected to be complete by September 2012.

Adolescent Long-Evans Rats Are Resistant to the Induction of Repetitive Behavior by Buspirone

Krystal Orlando, Madelyn Mauterer

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Dennis Rhoads

Spontaneous alternation behavior (SAB) is the natural tendency of rats to alternate in their choice of arms of a T-maze when both arms are baited equally with an attractant. Disruption of SAB by drugs altering brain serotonin (5-HT) is of interest because the resulting repetitive behaviors serve as models for aspects of human Obsessive-Compulsive Disorder (OCD). Might rat strain differences in responses to disruption of SAB provide insight toward understanding individual differences in people, including differences between adolescents and adults? Repetition in choices of arms of a T-maze was measured along with increased apparent decision time due to induction of vicarious trial and error (VTE) behavior. Responses of male adolescent Long-Evans (LE) rats were compared to those of adolescent Sprague Dawley (SD) and adult LE rats. The 5-HT_{1A} agonist 8-hydroxy-dipropylaminotetraline (8-OH-DPAT; 2-3 mg/kg, i.p.) induced repetitive choices of arms in the maze in all three test groups. Buspirone (1-4 mg/kg, i.p.), a 5-HT_{1A} partial agonist/dopamine D₂ receptor antagonist, had no significant effect on arm choice but induced VTE behavior and increased the apparent decision time in the adolescent SD and adult LE rats, but not the adolescent LE rats. Thus, insensitivity to buspirone is characteristic of the adolescent stage in the LE strain. Western blotting of brain 5-HT_{1A} receptors showed that adolescent LE brain had a similar density of receptors to that seen in adolescent SD and adult LE. A 5-HT_{1A} antagonist WAY 100365 failed to block the effect of buspirone on VTE behavior. We conclude that the adolescent LE brain has normal levels of 5-HT_{1A} receptor and that the effect of buspirone on VTE behavior is not mediated by the 5-HT_{1A} receptor. Dopamine may share roles with serotonin in inducing repetitive behaviors and the LE strain provides a useful model for exploring differential responses of the adolescent brain.

Aldehyde Dehydrogenase in Brain and Liver

Vivek Angara

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Dennis Rhoads

During consumption of alcoholic beverages, alcohol is oxidized to the highly toxic acetaldehyde by alcohol dehydrogenase in the liver and by catalase in the brain. The enzyme aldehyde dehydrogenase (ALDH) is expected to continue alcohol metabolism in both tissues by catalyzing the oxidation of the acetaldehyde to non-toxic acetate. This study focused on the activity of ALDH in the brain and liver, with the goal of determining how alcohol dependency, rat strain and age may affect this enzyme. Of particular interest is the level of ALDH in juvenile rats which consume very high levels of alcohol in a model for studying adolescent alcohol dependency. As acetaldehyde is oxidized, the electron carrier NAD^+ is reduced to NADH. The resulting levels of NADH were measured over time using spectrophotometry to determine ALDH activity. Tissues were homogenized and, following subcellular fractionation, preparations of mitochondria were used as the source of enzyme.

Studies of liver ALDH yielded similar levels of activity for both adult and juvenile Long-Evans rats. The effects of rat strain and chronic alcohol consumption are being tested. Initial studies of ALDH in brain mitochondrial fractions yielded no detectable activity. This was unexpected and, if verified, raises questions about how brain acetaldehyde is being eliminated.

Caffeine Dependence and Expression of Adenosine Receptors in Adolescent and Adult Brain

Kristin McKeever

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Dennis Rhoads

Caffeine consumption among adolescents and children remains a concern, especially in its influence on the still-developing brain. Using Long-Evans rats as a model for studying the juvenile brain, previous work showed that adolescent rats exhibit motor behavioral symptoms of caffeine withdrawal and tolerance after only 2 weeks of chronic caffeine consumption (administered in the drinking water at 1 mg/ml). Using computer-controlled activity chambers to measure motor responses, the present study showed that adult rats exhibited no tolerance or withdrawal symptoms even after 7 weeks of caffeine consumption. Levels of consumption were comparable to those of adolescents. Thus, adolescents appear much more susceptible to caffeine “dependence”. To understand the molecular basis for this finding, Western blotting was used to assess the expression of adenosine A1 and A2a receptors, the primary targets of caffeine in the brain. Both receptors were detected in adult and adolescent brain membranes, but adolescents had up to 20% lower baseline expression of A2a. This is an important finding because A2a is thought to be responsible for residual responses to caffeine in caffeine-tolerant rats and these are decreased in adolescents.

Down-regulation of Adenosine A1 Receptors in Adolescent Brain during Chronic Alcohol Consumption

Patrycja Bolewska

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Faculty Mentor: Dr. Dennis Rhoads

Adolescence is a period when many people have their first experience with alcoholic beverages. Previous studies showed adolescent rats developed a much stronger alcohol withdrawal syndrome, a gauge of alcohol dependency, than adults. The present study was designed to assess potential changes in the adenosine system of the adolescent brain during chronic consumption of an alcohol-containing liquid diet. After 2-3 weeks of alcohol consumption, membrane fractions were isolated from adolescent brain using subcellular fractionation. Western blot analysis was used to probe levels of adenosine A1 and A2a receptor expression. Each receptor was detected at its expected mass. Compared to age-matched controls, adolescents consuming alcohol showed no change in A2a receptors. In contrast, the density of A1 receptors was decreased by up to 50% in alcohol-consuming adolescents. Down-regulation of the inhibitory A1 receptor may contribute significantly to the over-excitation of the brain characteristic of the alcohol withdrawal syndrome. Relevant to the increased availability of highly caffeinated alcoholic beverages, ongoing work is designed to explore co-use of alcohol and caffeine, which share the A1 receptor as a brain target.

The Effects of Chronic Ethanol and Tianeptine on AMPA Receptor Density in the Adolescent Brain

Bryan Martin, Trevor Wood

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Department of Biology**

Faculty Mentor: Dr. Dennis Rhoads

Recent molecular pharmacological studies have demonstrated that ethanol inhibits the transmission of an action potential via Ionotropic Glutamate Receptors (IGR) thus resulting in overexpression of these proteins. Increased IGR density may cause excitotoxicity, seizures and tremors, which may be aggravated during adolescence. Pathological studies have demonstrated seizures and tremors to be a symptom of Ethanol Withdrawal Syndrome (EWS). A novel anti-depressant Tianeptine acid, proposed to regulate the expression of the AMPA form of IGR, has demonstrated effectiveness in attenuating the seizures associated with EWS. The purpose of this study was to assess variations in relative receptor densities of the AMPA IGR from microsomal and synaptosomal fractions of juvenile Long Evans rat brains at 5 day, 11 day, and 18 day intervals during a 3 week time course. The rats were placed on one of three diets: Alcohol, Tianeptine, and control. Following the drug administration period microsomal and synaptosomal brain tissue fractions were obtained. The tissues were subjected to SDS-PAGE and transferred to a PVDF membrane for chemiluminescent immuno-detection. Densitometry was used to assess the relative amount of AMPA IGR. The results indicate that chronic exposure to ethanol increases AMPA receptor densities in both the synaptosomal and microsomal fractions. The overexpression of AMPA IGR due to chronic alcohol consumption may result in excitotoxicity and account for the seizures observed during EWS. Conversely chronic exposure to Tianeptine decreases AMPA receptor densities in the both the microsomal and syaptosomal fractions and thus may prove to be an effective treatment for EWS.

Effects of *E. coli* and *P. aeruginosa* Lipopolysaccharide-Induced Inflammation on Hypoxia-Inducible Factor-1 in the Testis

Dharm Patel

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Michael A. Palladino

Bacterial infections and resulting inflammation of the male reproductive tract are known to impair fertility through mechanisms that include decreased sperm mobility through the tract, blockage of the tract and reduced androgen output. Hypoxia-Inducible Factor-1 (HIF-1) is a transcription factor that is considered the master regulator of hypoxia. We hypothesize that HIF-1 α in the rat testis is upregulated following lipopolysaccharide (LPS)-induced inflammation. Inflammation was induced via intraperitoneal administration of LPS from *E. coli* and *P. aeruginosa* for 1, 3, 6, and 12 hours (n = 3-5 animals/time point) at a dosage of 5 mg/kg body weight. Measurement of serum testosterone levels indicated the occurrence of inflammation following LPS treatment. Western Blot analysis of testicular cytoplasmic protein extracts demonstrated an increase in HIF-1 α protein. Messenger RNA levels of HIF-1 α were measured in LPS and saline injected rats via qPCR, which demonstrated no change in testicular HIF-1 α mRNA. To examine potential mechanisms involved in the up-regulation of HIF-1 α , DNA binding activity and protein levels of nuclear factor- κ B (NF- κ B) were measured. Electromobility shift assays (EMSA) suggest a decrease in NF- κ B binding activity following LPS treatment while Western Blot analysis shows no change in NF- κ B and I κ B protein levels. We conclude that HIF-1 α is upregulated following LPS-induced inflammation. However, in contrast to other tissue types, in which HIF-1 α is up-regulated through transcriptional activation via NF- κ B, we conclude that HIF-1 α is not upregulated through an increase in HIF-1 α mRNA. These novel results demonstrate that the testis is physiologically distinctive in responding to infection and inflammation. Further experiments will be performed to examine effects of inflammation on downstream targets of HIF-1 α . The overall objective of this work is to elucidate the link between hypoxic and inflammatory responses in the testis at the molecular level following inflammation.

Experimental and Computational Catalase Enzyme Activity in Central Metabolism under the Morpheein Hypothesis

Jared Rosenblum

**Monmouth University
Department of Biology**

Faculty Mentors: Dr. James Mack, Dr. William Schreiber

Catalase is the terminal enzyme in aerobic respiration in eukarya and prokarya, regulating the redox state of the cell and in turn its survival mechanisms under particular stress conditions. The atypical function of this enzyme is implicated in the regulation of pathological states concerning neurodegeneration, immunological responses, and mitochondrial disorders. The differential regulation of catalase in enzyme kinetics, however, has yet to be determined. Observation of the oligomeric structure and experimental kinetics data reveals contradictory results. Catalase does not appear to fit into the prototypic Michaelis-Menten kinetics, demonstrating short-lived regions of linearity. Moreover, adherence to the predicted linearity varies with concentration of the substrate experimentally and with the shape of the monomer computationally. These findings suggest that the action of catalase and its behavior are more appropriately encompassed in the Morpheein hypothesis, which states that substrate-dependent equilibrium exists between monomeric forms. These monomers with a range of affinities for the substrate in turn form oligomers with associated range in activity. Multiple molecular structures exist for catalase: the inactive monomer, the active monomer, the relatively inactive bovine dimer, and the active erythrocyte tetramer. Both computational docking and experimental kinetic results agree with a substrate-dependent equilibrium model for catalase activity.

Influence of Antioxidants on Cellular Migration and Protection from Oxidative Stress

Jazmin Juarez

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Dorothy Lobo

Resveratrol is a strong antioxidant and natural phytoalexin often found in red grapes and wine. It has been seen to have positive effects on metabolism and anti-cancer activity. Currently, our lab has been studying the regulation of cadherins, important proteins for cellular adhesion, in normal fibroblasts and fibrosarcoma cells. It is also being investigated whether antioxidants, such as resveratrol and N-acetylcysteine (NAC), can influence the control of cadherins, proliferation, or migration. Dishes of HT-1080 fibrosarcoma cells were treated with 10, 25, and 50 μM resveratrol, resulting in inhibited cellular proliferation. While H_2O_2 inhibited both proliferation and cell migration, causing cells to senesce, NAC showed not to have such an inhibitory effect. NAC treatment also did not protect the cells against H_2O_2 -inhibition. Currently, we are testing if treatment with resveratrol can provide protection against H_2O_2 -inhibition of proliferation/migration or alter expression of cellular signaling proteins, including cadherins.

**Phylogenetic Analysis of the Oedionychines (Coleoptera: Alagoasa)
Based on 28S D2 rRNA and COI mRNA Molecular Analyses**

Smriti Agrawal, Peter Gonzalez

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Catherine N. Duckett

Oedionychina is a diverse group of flea beetles that are economically important insects. This group contains species that are used for biological control of weeds as well as important pest species. Previously, morphological-based phylogenies of the group have been constructed, but no molecular phylogenetic consensus exists. As predation pressure has led to convergent evolution of these arthropods, resolving the relationships among Alagoasa species has been a challenge in the past. In this study, a comparative analysis of 28S rRNA (expansion segment D2) and Cytochrome-C Oxidase I (COI) mRNA sequences from a variety of Oedionychina taxa was performed by constructing annotated alignments. A combination of both ribosomal and mitochondrial RNA sequence alignment was used to test the monophyly of the flea beetle taxa in order to resolve the relationships among closely related genera. A total of 94 taxa were included: 86 species representing Alagoasa and closely related genera: Asphaera, Aspicela, Capraita, Omophoita, Paranaita, etc., and 10 selected outgroup taxa. Based on the homology assessment and the patterns of change among the characters, not only synapomorphies, but interestingly, apomorphies have also been evident in the annotated pairwise alignment sets. Although regions of high sequence conservation were present among various taxa, interestingly, secondary loss of sequence was evident in *Walterienella*, and presence of small conserved regions was apparent exclusively among *Hemiphysis* and *Hyphasis*. In the future, parsimony and Bayesian analyses will be performed based on the current structural alignments to reconstruct a consensus phylogenetic tree utilizing combined analyses of rRNA and mRNA molecular data.

Response of the Invasive Asiatic Sand Sedge to Beach Nourishment

David Patrick James

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Pedram Daneshgar

In New Jersey, one problematic plant species is Asiatic sand sedge (*Carex kobomugi*), which is invading native dunes along the shore. This sedge was first introduced accidentally and then was used extensively for dune stabilization. Recent work has revealed that the sedge reduces native diversity and fails at accruing sand, which is problematic for dune formation. A proposed treatment method of the species is beach nourishment (burial). We hypothesize that beach nourishment would actually promote growth of the invader rather than be a useful control method. Thus, the objective of the study was to evaluate the impacts of various burial depths on the invader. Five burial depth treatments were replicated at three study sites at Island Beach State Park, NJ in May 2011. Growth and physiological responses of the sedge and native species (American beach grass and seaside goldenrod) were monitored biweekly. After one growing season, only the sedge emerged at each burial depth. Early physiological responses indicate that nourishment promotes the growth of the sedge while impeding the productivity of the native species. The results indicate that nourishment is not a viable control method.

Stormwater Monitoring of Beachwood Beach and Avon Road West Beach: An Anthropogenic and Bacteriological Analysis of Stormwater

Kevin Dillon

**Monmouth University
Department of Biology**

Mentors: Danielle Donkersloot (NJDEP), Cara Muscio (Rutgers University Cooperative Extension of Ocean County), and Dr. John Wnek '87, '94M (OCVTS MATES)

During the summer, a myriad of people flock to bathing beaches. People assume that the water that they are swimming in is perfectly safe. On many bathing beaches, there are storm drain outfall pipes. These outfall pipes reroute water to a water body via a storm drain system to prevent flooding. Water coming from the outfall pipes can contain bacteria and pollutants as a result of rainfall events. As rainwater collects in a storm drain pipe, the materials inside of it flow towards the outfall pipe. Bacteria could include dog excrement, waterfowl waste, and even human sources. It is possible for a septic system to leak or be illegally connected to storm drain systems. Fecal coliforms are used as indicator bacteria for pathogenic bacteria; because the fecal coliforms are introduced to the beach system, beach bathers can possibly contract diseases and other illnesses from exposure to the water. By monitoring bacteria levels, beach access can be closed to the public if the bacteria levels are high. The beaches that are frequently closed are put on the NRDC's Beach Bum list. Beachwood Beach in Beachwood, NJ has been on the list often in the past and Avon Rd. West Beach in Pine Beach, NJ was recently added. To monitor the effects of the stormwater, *E. coli*, *Enterococcus* sp., optical brighteners, and various abiotic factors were monitored during storms and dry weather. All data collection techniques are verified by a New Jersey Department of Environmental Protection Quality Assurance Plan that corresponds with Tier B in their Volunteer Water Quality Monitoring Program. The results indicate that there are pollutants in the pipes, thus causing elevated levels of bacteria at these bathing beaches

Testing the Suitability of Gastric Lavage Techniques for Sampling Bonefish Diets

Shelby Whitebread, Nicole Wisniewski

**Monmouth University
Department of Biology**

Faculty Mentor: John Tiedemann

Bonefish (*Albula vulpes*) inhabit shallow tropical and subtropical flats environments throughout The Bahamas and are prized as a sport fish. It was recently estimated that flats fishing contributes \$141 million annually to the Bahamian economy. Ecologically, as adult bonefish move between various flats habitats and forage in the benthos, they play a role in shaping the physical structure of the flats substrate and may serve as conduits for nutrient cycling.

Understanding bonefish diet and feeding ecology is critical to assessing the implications of development related habitat destruction on the population ecology of bonefish. However, data on food habits of bonefish in the Bahamas are limited. Typically, studies of fish diets have been accomplished by collecting and sacrificing fish to excise their stomach or digestive tract and inspect gut contents. However, the use of gastric lavage has recently proven to be effective as a nonlethal technique for performing diet analysis on a number of species of fishes. This technique uses pulses of water to flush the stomach contents from the fish.

Our preliminary evaluation in 2011 was a proof of concept project to see if gastric lavage would be an effective method for collecting stomach contents of bonefish. In 2012, an experiment designed to evaluate post-lavage mortality was conducted to determine if stress-induced mortality would result from using this technique. The outcomes of both of these efforts are being used to develop a more detailed study of feeding ecology of bonefish on the flats of The Bahamas using this technique.

Utilizing Hydroponics to Test For Allelopathy in Asiatic Sand Sedge

Peter Coviello, Anthony Romandetto

**Monmouth University
Department of Biology**

Faculty Mentor: Dr. Pedram Daneshgar

Hydroponics, a hydrocultural method, entail growing plants without soil in mineral nutrient solutions. Hydroponic experiments can be useful for assessing the direct impacts of one plant species on another below ground because the root exudates of one species may directly interact with the roots of another. Plant species that produce root chemicals harmful to other plant species are referred to as allelopathic. Asiatic sand sedge (*Carex kobomugi*), an invasive species, which threatens several native dune species including seaside goldenrod (*Salidago sempervirans*) and American beach grass (*Ammophila breviliguta*) has been proposed to use allelopathic means to gain dominance.

We utilized hydroponic methods to determine whether or not Asiatic sand sedge utilizes allelopathy to dominate dunes along the Jersey shore. We hypothesize that allelopathy by sedge will lead to a reduction in growth of native species. We established a randomized block design with four repetitions of six treatments. Each treatment consisted of a hydroponic container with two plant individuals. The species combinations were as follows: sedge with sedge, sedge with American beach grass, sedge with goldenrod, American beach grass with American beach grass, American Beach grass with goldenrod, and goldenrod with goldenrod. Each individual plant was weighed, the number of leaves quantified and measured at the start of the experiment and biweekly measurements of plant growth were taken.

Levels of Arsenic and Selected Restriction of Hazardous Substances (RoHS) Metals and Metalloids in Rice Food Products

Chelsea M. Bray, Christiana J. Brock, Arielle Le Beau

**Monmouth University
Department of Chemistry, Medical Technology, and Physics**

Faculty Mentor: Dr. Tsanangurayi Tongesayi

Until recently, drinking water has been considered the major route of exposure of arsenic (As) to humans, with the health threats posed by the metalloid largely limited to contaminated regions. Recent scientific reports of As in foods and beverages have significantly changed the dynamics of As exposure to humans in a way that has ignited and invigorated public debate on the metalloid. Unlike contaminated water sources, food and beverages are not localized, thanks to the globalized food market. The entire global population is under threat from food-borne chemicals and sufficient regulations need to be put in place. The source of As and other toxic metals and metalloids in food include contaminated soils, contaminated water and agricultural chemicals. Regions that are contaminated with these chemicals could be acting as conduits for global human exposure. The goal of this study was, therefore, to determine the levels of As and RoHS metals (Pb, Cd, and Cr) in rice products by country of origin. Rice constitutes a major staple food for a large proportion of the world population and is processed into various food products for both kids and adults. Samples of rice products from the US, South America, Asia, and Europe were purchased from local supermarkets and analyzed using XRF and GFAAS. Lead was present in all the foods samples analyzed and its concentration ranged from 4.30 to 17.9 $\mu\text{g/g}$. Some baby rice food had levels of Pb as high as $12.5 \pm 0.2 \mu\text{g/g}$. The region that had the highest levels of Pb had the highest levels of Cr ($21.0 \pm 0.1 \mu\text{g/g}$) and As ($0.0075 \pm 0.0007 \mu\text{g/g}$) as well. Cadmium levels ranged from low ppb levels to $8.10 \pm 0.2 \mu\text{g/g}$ across regions. The data was validated using NIST 1568a, NIST 2781 and NIST2702 reference samples. More work is being done to evaluate the effect of processing the rice on the levels of the selected metals and metalloids. Speciation will also be performed.

Microwave-Assisted Synthesis of Aryl Viologens

**Mark Stranieri, Samantha Damiano, Anthony Cauley, Scott Suter,
Cortney Cavanaugh, Mena Aioub**

**Monmouth University
Department of Chemistry, Medical Technology, and Physics**

Faculty Mentor: Dr. Massimiliano Lamberto

The objective of this work was to investigate the effects of microwave irradiation on the synthesis of symmetric and asymmetric aryl viologens. Alkyl viologens have shown extensive use in a wide variety of applications, most notably in electrochromic displays and electronic inks, due to their unique redox chemistry. Aryl viologens, however, have been investigated to a lesser degree due to a number of factors that include poor yields and long reaction times. In this work, microwave irradiation was used to efficiently access both symmetric and asymmetric aryl viologens by reacting an activated 4,4'-bipyridyne with substituted anilines by the Zincke reaction. The improved synthesis, solvent, temperature and reaction conditions will be presented.

Animation for Educational Presentation

Ernest J. Kirstein

**Monmouth University
Department of Computer Science and Software Engineering**

Faculty Mentor: Dr. Cui Yu

Visual aids can add impact and interest to a classroom presentation. Animations are useful aids in all levels of education especially for this visual-media driven generation. Creating an animation typically involves a long intensive process made by an expert user. Much effort has gone into making animations more aesthetically pleasing but little has been done to enable the average person to create them. This project is to develop an easy-to-use animation tool that allows a novice user to produce a custom animation quickly and with little effort. This will give teachers, from K-12 to higher education, access to custom animations tailored to their student's needs. A working demo will be presented for the audience which uses advanced image selection, and deformation techniques to make digital "Puppets". These "Puppets" can be created dynamically from any image and provide a much more life-like interaction than other animation methods available to novice users today.

New York Medical College Database

Michelle Van Lenten

**Monmouth University
Department of Computer Science and Software Engineering**

Faculty Mentor: Jamie Kretsch

For this project I have been asked to create a database. The client, New York Medical College, has requested that I create an Access database for their Speech Pathology program. The database is a record of the field work that New York Medical students have completed in their academic program. The first steps of creating the database in Microsoft Access have been completed to meet the requests of the client.

New York Medical College has also requested that the database be accessible on a variety of platforms rather than just computers with Microsoft Access. Professor Kretsch and I have teamed up to find the best program, or combination of programs, to use to satisfy the requests of the client. We are currently working with importing my Access database to MySQL to then create a web interface through PHP. This would make it possible for the medical students to access and input their hours from any device with internet access.

This particular project is very beneficial as it is teaching me how to use and manipulate different computer programs that are used in the work place. When this project is completed, New York Medical College Speech Pathology will have an easier way to keep track of their medical program. It is great how Monmouth University and New York Medical can team up in this effort to make better use of information technology programs.

Effectiveness of Blood Pressure Cuffs used on Dogs: Designing a Study

Maria Ferrara, Kaitlyn Kramer, Colleen McKendry, Kaitlin Shields

**Monmouth University
Department of Mathematics**

Faculty Mentor: Dr. Richard Bastian

This study involves an experiment with a veterinarian from Garden State Veterinarian Specialists in Tinton Falls to determine the effectiveness of blood pressure cuffs used on animals. The veterinarian wants to know specifically if different sizes of tape to hold a used cuff together will give accurate readings of the animals' blood pressure. We have currently designed a protocol for data collection. Our protocol calls for using only anesthetized dogs and gives specific instructions to eliminate sources of variation affecting the blood pressure readings and to randomize how the data will be collected. The veterinarian wants to test a new cuff versus a used cuff taped 25% or a used cuff taped 100% of the circumference of the dogs' leg. Currently, the data is being collected by the veterinarian following our protocol. We are planning to analyze the data as we receive it as a pilot to determine an appropriate final sample size for the study.

Mandibulectomy and Maxillectomy for the Treatment of Oral Tumors in Dogs

Nicole Altilio, Monica Kuegler, Nicole Noel, Danielle Trancucci

**Monmouth University
Department of Mathematics**

Faculty Mentor: Dr. Richard Bastian

In coordination with a veterinary surgeon, we analyzed 108 dogs with oral tumors. The purpose of this research was to determine the median survival time and median disease free interval (period between surgery and recurrence) of dogs with these oral tumors. The different factors that we focused on were type of surgery (mandibulectomy and maxillectomy), tumor type (melanoma, fibrosarcoma, squamous cell carcinoma, and osteosarcoma), complete excision (whether there were clean margins), age at surgery, and gender. In order to analyze the time-to-event, data we used Kaplan-Meier survival analysis. When analyzing mandibulectomy versus maxillectomy, we found that there was no significant difference between the median disease free interval curves and no significant difference between the survival curves. Overall, a median disease free interval of 1582 days and a median survival time of 2032 days were found also using Kaplan-Meier survival analysis. When analyzing tumor type, there is a significant difference between the median survival curves for squamous cell carcinoma versus melanoma, fibrosarcoma, and osteosarcoma.

Prognostic Value of Regional Lymph Node Metastasis with Grade 2 Cutaneous Mast Cell Tumors in Dogs

Ashley Capparelli, Nicole Cultrera, John Krajunus

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Department of Mathematics**

Faculty Mentor: Dr. Richard Bastian

In coordination with a veterinary surgeon, we analyzed dogs with Grade II Mast Cell Tumors. The purpose of this research was to determine the median survival time of dogs with these Grade II Mast Cell Tumors and also to discern what factors influence the median survival time of these dogs as well. The factors that we focused on included lymph node status (whether or not the grade II mast cell tumor metastasized to the lymph nodes), if there was an incomplete excision, tumor location, if there was ever a local recurrence, if there was an enlarged node, sex, method of diagnosis, and survival time of 90 dogs. Using Kaplan-Meier Survival Analysis and Cox Regression, we were able to analyze the time-to-event data. We found that there were significant differences in the survival times of dogs with a local recurrence, if the tumor was located on an extremity, if there was an enlarged node, and the method of diagnosis.