SCHOOL OF SCIENCE

MONMOUTH UNIVERSITY

WHERE LEADERS LOOK *forward*

THIRD ANNUAL SUMMER RESEARCH PROGRAM SYMPOSIUM

AUGUST 11, 2011

1:00 PM — 3:00 PM

ERLANGER GARDENS

Acknowledgments

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MONMOUTH UNIVERSITY
SCHOOL OF SCIENCE
SECOND ANNUAL SUMMER RESEARCH PROGRAM SYMPOSIUM
Thursday, August 11, 2011
Erlanger Gardens

Presentations by Department

Biology

Adenosine Receptor Expression in the Adolescent Brain Following Chronic Caffeine and Alcohol Consumption
Patrycja Bolewska – Monmouth University
Kelly Jenkins – Hamilton College
Faculty Mentor: Dr. Dennis E. Rhoads

Asiatic Sand Sedge (*Carex kobimugi*) Invasive Control Through Differing Burial Treatments of Sand
Kyle Borodunovich – Monmouth University
Mitchell Mickley – Monmouth University
Bryan Hewins – Monmouth University
Lucas Rhoads – Cornell University
David Patrick James – Monmouth University
Arturo Romua – Monmouth University
Alyson Eng – Marine Academy of Science and Technology
Faculty Mentor: Dr. Pedram Daneshgar

Biodiversity and Ecosystem Health at Weltz Park in Oakhurst, NJ
Bryan Hewins – Monmouth University
Lucas Rhoads – Cornell University
Kyle Borodunovich – Monmouth University
Alyson Eng – Marine Academy of Science and Technology
David Patrick James – Monmouth University
Mitchell Mickley – Monmouth University
Arturo Romua – Monmouth University
Faculty Mentor: Dr. Pedram Daneshgar

Cadherin Regulation in Fibroblast and Fibrosarcoma Cells
Vincent Marchese – Monmouth University
Afroditi Emporelli – Monmouth University
Mena Gaballah – Monmouth University
Vivian Chang – High Technology High School
Faculty Mentor: Dr. Dorothy Lobo

Effects of Lipopolysaccharide-induced Inflammation on Hypoxia-inducible Factor-1 in Rat Testis
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Faculty Mentor: Dr. Michael A. Palladino

Isolation and Identification of Pharmaceutical and Personal Care Degrading Bacteria from Two Polluted Environments
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Tim Troppoli – University of Maryland College Park
Faculty Mentor: Dr. Karen Pesce

Macrozooplankton of Upper Barnegat Bay
Ryan Gergely – Monmouth University
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Faculty Mentor: Assistant Dean John A. Tiedemann

New Jersey Garlic Mustard (*Alliaria petiolata*) Field Survey
David Patrick James – Monmouth University
Arturo Romua – Monmouth University
Lucas Rhoads – Cornell University
Bryan Hewins – Monmouth University
Kyle Borodunovich – Monmouth University
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Mitchell Mickley – Monmouth University
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Northern Diamondback Terrapin Activity in Shark River, New Jersey
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Faculty Mentor: John Wnek, Marine Academy of Technology and Environmental Science

Nuisance Gelatinous Macrozooplankton of Upper Barnegat Bay
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Faculty Mentor: Assistant Dean John A. Tiedemann

Phylogenetic Analysis of the genus Alagoasa Based on Molecular Analyses of 28s D2 rDNA and COI mDNA
Smriti Agrawal – Monmouth University
Faculty Mentor: Associate Dean Catherine N. Duckett

Serotonin manipulation and spontaneous alternation behavior
Madelyn Mauterer – Monmouth University
Krystal Orlando – Monmouth University
Victoria Schroeter – Johns Hopkins University
Faculty Mentor: Dr. Dennis E. Rhoads

Tianeptine as a Therapeutic Agent for Alcohol Withdrawal: Behavioral
Victoria Schroeter – Johns Hopkins University
Krystal Orlando – Monmouth University
Madelyn Mauterer – Monmouth University
Faculty Mentor: Dr. Dennis E. Rhoads

Tianeptine as a Therapeutic Agent for Alcohol Withdrawal: Biochemistry
Bryan Martin – Monmouth University
Carlos Rivera – Missouri University of Science &Technology
Faculty Mentor: Dr. Dennis E. Rhoads

Chemistry, Medical Technology and Physics

Design of a "Greener" Oxidation Process for the Synthesis of Polyol Alkanoic Acids
Lauren Bonfiglio – Monmouth University
Gillian Shaw – Monmouth University
Miriam Basiouny – Monmouth University
Eric Gosselin – Stowe High School
Faculty Mentor: Dr. Carolyn Supplee

Speciation of inorganic chromium under natural water conditions
Lauren Lechner – Monmouth University
Sean Grimes – Monmouth University
Soleil Farrow – Monmouth University
Faculty Mentor: Dr. Tsanagurayi Tongesayi

The Study of Chiral Bidentate Phosphine Ligands
Michael J. Bertocchi – Monmouth University
Susette E. Ingram - Monmouth University
Chrissy Roselli – Monmouth University
Dylan Bradley – Monmouth University
Alyssa Teehan – Monmouth University
Faculty Mentor: Dr. Carolyn Supplee

Computer Science & Software Engineering

Framework for Storing Information about People, Organizations and Their Relationships
Michael Rowland – Academy of Allied Health and Science
Jessica Buck – Brookdale Community College
Annie Wang – Rutgers University

Put-A-Tag
Chidveer Chinthakuntla Reddy – Monmouth University
Charles Reed – Monmouth University
Ryan Cerankowski – Monmouth University

Mathematics

Lymph Node Involvement in Dogs with Grade II Mast Cell Tumors
Meghan Freshnock – Monmouth University
Alexandra Ferrara – Monmouth University
Samantha Kovacs – Monmouth University
Melissa Borodunovich – Brookdale Community College
Ashley Capparelli – Monmouth University
Faculty Mentor: Dr. Richard Bastian

Median Survival Time for Dogs with Grade II Mast Cell Tumors
Nicole Altilio – Monmouth University
Nicole Atrashewski – Monmouth University
John Krajunus – Monmouth University
Mark Untisz – Monmouth University
Trevor Wood – Monmouth University
Faculty Mentor: Dr. Richard Bastian

Regenerative Stem Cell Therapy in Dogs
Colleen McKendry – Monmouth University
Maria Ferrara – Monmouth University
Joan Grzankowski – Monmouth University
Faculty Mentor: Dr. Richard Bastian

Basic Water Requirements Supplied By Desalination Techniques
Nicholas J. La Banca – Monmouth University
Faculty Mentor: Dr. Wai Kong (Johnny) Pang

Urban Coast Institute

Water Quality Monitoring of Whale Pond Brook and Lake Takanassee
Christiana Brock – Monmouth University
Katherine Markowitz – Monmouth University
Allison Crawford – Monmouth University
Catherine Leech – Gettysburg College
Elizabeth Kang – Brookdale Community College
Faculty Mentor: Mr. James Nickels

Adenosine receptor expression in the adolescent brain following chronic caffeine and alcohol consumption

Presenters: Patrycja Bolewska – Monmouth University
Kelly Jenkins – Hamilton College

Faculty Mentor: Dr. Dennis E. Rhoads

Department: Biology

Funding Source: PCAsso Diagnostics, Monmouth University School of Science. Patrycja Bolewska supported by a generous gift from Dr. Samir Tari, PCAsso Diagnostics.

ABSTRACT

Consumption of caffeinated alcoholic beverages is a growing and alarming trend, particularly among students. Previous work from this lab has modeled caffeine/alcohol co-consumption in adolescent Long-Evans rats and showed that caffeine dependency made prior to alcohol consumption lessened severity of subsequent alcohol withdrawal symptoms. The present study was designed to probe the underlying changes in the adolescent brain occurring as a response to chronic alcohol, caffeine or the combination of alcohol and caffeine. Preadolescent Long-Evans rats were given regular water or caffeinated water during a 10-day pretreatment period. Following this period, 4 groups were established: 1) rats continuing regular tap water; 2) rats continuing caffeinated water; 3) rats from the water group switched to an alcohol-containing liquid diet; and 4) rats from the caffeine group switched to an alcohol- and caffeine-containing liquid diet. After an additional 20 days, microsomal and synaptosomal fractions were isolated from the brain using subcellular fractionation. Western blot analysis was used to probe two receptors, Adenosine A1 and Adenosine A2a, the primary targets of caffeine in the brain. The A2a receptor was detected in all fractions at the expected mass of 45kDa. We found that there were no statistical differences in A2a receptor density among treatment groups. The A1 receptor was also detected at the expected mass of 39kDa. Work is continuing to test for differences between treatment groups. The findings of our research can contribute to a better understanding of alcohol withdrawal and of the possible implications of combining caffeine and alcohol in beverages.

Asiatic Sand Sedge (*Carex kobimugi*) Invasive Control Through Differing Burial Treatments of Sand

Presenters: Kyle Borodunovich* – Monmouth University
Mitchell Mickley* – Monmouth University
Bryan Hewins – Monmouth University
Lucas Rhoads – Cornell University
David Patrick James – Monmouth University
Arturo Romua – Monmouth University
Alyson Eng – Marine Academy of Science and Technology

*Poster Author

Faculty Mentor: Dr. Pedram Daneshgar

Department: Biology

Funding Source: Monmouth University School of Science

ABSTRACT

Asiatic sand sedge was first introduced on the coast of New Jersey in the 1920's, first invading at Island Beach where our experiment took place. Although the method of introduction is unclear, it is believed that it may have been due the dumping of packing material from foreign merchant ships. Highly adapted to New Jersey's coastal dunes, the sand sedge outcompetes native dune-binding plants such as American beach grass (*Ammophila breviligulata*) inhibiting the formation of future dunes. In interest of sustaining native coastal plants, it is vital to find an effective and feasible way to reduce the spread of Asiatic sand sedge.

One method being proposed by coastal land managers is to control this sedge through burial using sand. Five treatments at differing depths (ranging from 0 to 24 inches) of burial were established at three sites along Island Beach Park. Observations were made concerning how much Asiatic sand sedge was able to grow in comparison to other native species including American beach grass and seaside goldenrod (*Solidago sempervirens*). Physiological function of the sand sedge grown in the treatments was measured using an infrared gas analyzer (Li-Cor 6400 Photosynthesis System) to observe whether or not burial induces stress. Early results suggest that burial may slow the invasion of Asiatic sand sedge, but due to its ability to grow in dunes, this method does not eradicate it.

Biodiversity and Ecosystem Health at Weltz Park in Oakhurst, NJ

Presenters: Bryan Hewins* – Monmouth University
Lucas Rhoads* – Cornell University
Kyle Borodunovich – Monmouth University
Alyson Eng – Marine Academy of Science and Technology
David Patrick James – Monmouth University
Mitchell Mickley – Monmouth University
Arturo Romua – Monmouth University

*Poster Author

Faculty Mentor: Dr. Pedram Daneshgar

Department: Biology

Funding Source: Monmouth University School of Science

ABSTRACT

Weltz Park in Oakhurst, New Jersey is a 165 acre tract of land likely converted from farmland in the early twentieth century. This park is used for recreational activities such as hiking and bike riding. The park, transected by Whalepond Brook, encompasses several distinct habitats, including wetland, periodically mowed old field, and deciduous forest, with some coniferous areas interspersed throughout. A potential concern is that extensive disturbance over the lifetime of the park has potentially harmed native populations of vegetation.

In this study, terrestrial plant species diversity was used as a measure of ecosystem health in Weltz Park. Numbers of native and exotic species were quantified through extensive field observation; large numbers of exotic and invasive species suggest poor ecosystem health. Samples of both herbaceous and woody species were collected, identified, and pressed to compose a field guide for the park. Invasive species such as Garlic Mustard (Alliaria petiolata) were found in the park and have been shown to decrease biodiversity and therefore compromise ecosystem functioning. The invasive species found were heavily established in disturbed areas, such as frequently mowed fields and paths. In many of these areas, native plants were nearly extirpated and replaced by invasives. From this evaluation, it was concluded that approximately half of the park was heavily invaded by various exotic plant species, while the other half was largely comprised of native flora. It is highly probable that the invaded region will expand in coming years if management practices are not implemented to remove invasive populations.

Cadherin regulation in fibroblast and fibrosarcoma cells

Presenters: Vincent Marchese – Monmouth University
Afroditi Emporelli – Monmouth University
Mena Gaballah – Monmouth University
Vivian Chang – High Technology High School

Faculty Mentor: Dr. Dorothy Lobo

Department: Biology

Funding Source: National Institutes of Health (NIGMS)

ABSTRACT

Cadherins are integral proteins that play an important role in cellular adhesion. If E-cadherin is cleaved, releasing an 80 kDa fragment, it is no longer active. Interestingly, this 80 kDa product has been found to be increased in several types of cancers. In this work, the presence of an 80 kDa protein reactive with E-cadherin antibody, consistent with the inactive cleavage product of E-cadherin, has been detected in normal fibroblasts (BJ cells) and fibrosarcoma cells (HT-1080), and is expressed at a slightly higher level in subconfluent cells than confluent cells. Similarly, matrix metalloproteinase-9 (MMP-9), which is capable of cleaving cadherins, is also expressed more in subconfluent cells. Therefore, obtaining a confluent state is correlated with decreased MMP-9 expression, and loss of the 80 kDa fragment. Currently, the potential role of the ERK MAP kinase pathway in regulating the expression of cadherins is being investigated. In addition, alterations in cadherin expression may also influence cellular motility.

Effects of Lipopolysaccharide-induced Inflammation on Hypoxia-inducible Factor-1 in Rat Testis

Presenters: Dharm Patel – Monmouth University
Christine Dugan – Monmouth University
Marie Karpodinis – Monmouth University
Genevieve Fasano – Monmouth University

Faculty Mentor: Dr. Michael A. Palladino

Department: Biology

Funding Source: Bristol-Myers Squibb, National Institutes of Health, and Monmouth University School of Science. Dharm Patel supported as a Bristol-Myers Squib Summer Research Fellow by the generous support of BMS Corporate Giving.

ABSTRACT

The relevance of infection and inflammation in male infertility, although widely studied clinically, is still in debate. Identifying molecular changes following inflammation within tissues is a topic of intense research. Hypoxia-Inducible Factor-1 (HIF-1) is a transcription factor that is considered the master regulator of hypoxia. Nuclear factor-kappaB (NF-κB) is a transcription factor that is considered the master regulator of inflammatory processes during infection and inflammation.. We hypothesize that HIF-1, in the rat testis is upregulated following LPS-induced inflammation through an activation pathway involving NF-κB that stimulates HIF-1α transcription. Induction of inflammation in rats was accomplished via intraperitoneal administration of lipopolysaccharide (LPS) from E. coli and P. aeruginosa for 1, 3 and 6 hours (n = 3-5 animals/time point) at a dosage of 5 mg/kg body weight. Testes were harvested and protein extracts isolated. Western Blot analysis of cytoplasmic and nuclear proteins demonstrated an increase in HIF-1α protein levels and no change in NF-κB and IKKα protein levels following LPS-induced inflammation. Electromobility shift assays (EMSA), performed to determine NF-κB binding activity to HIF-1α promoter, suggest that there is a decrease in NF-κB binding activity following LPS treatment. Data taken together suggests a highly regulated and complex molecular mechanism that is responsible for the crosstalk between NF-κB and HIF-1. Further experiments will be performed to determine if the mechanism affecting levels of HIF-1a is via transcriptional regulation. In addition, Western Blot analysis will be performed to examine effects of inflammation on downstream target genes of HIF-1, such as Mcl-1.

Isolation and Identification of Pharmaceutical and Personal Care Degrading Bacteria from Two Polluted Environments

Presenters: David Atherton – Monmouth University
Tim Troppoli – University of Maryland College Park

Faculty Mentor: Dr. Karen Pesce

Department: Biology

Funding Source: Bristol-Myers Squibb. David Atherton and Tim Troppoli supported as Bristol-Myers Squib Summer Research Fellows by the generous support of BMS Corporate Giving.

ABSTRACT

Many pollutants that cannot be readily degraded have a tendency to build up and have detrimental effects on the environment. The pollutants examined in this research project, pharmaceutical and personal care products, are among those pollutants that are linked to health risk in humans and in other species. This research project focused on finding potential bacterial degraders of the pollutants: DEET, ibuprofen, phthalate and naproxen. Sediment samples were collected from the Manasquan River and Deal Lake and enriched on minimal media where the only carbon source present was the pollutant. Enrichment cultures were serially diluted and plated in order to isolate individual bacterial species. Isolates were screened by 16s PCR and sequenced based on restriction digest patterns. Four DEET degraders, one naproxen degrader, six phthalate degraders and two ibuprofen degraders were sequenced. Thirteen isolates were identified; the genera identified were Pseudomonas, Comamonas, Klebsiella, Acinetobacter, Stenotrophomonas. These bacterial species are potential novel PPCP degraders.

Bristol-Myers Squibb

Macrozooplankton of Upper Barnegat Bay

Presenters: Ryan Gergely – Monmouth University
Keith Leonard – Monmouth University
Shelby Whitebread – Monmouth University
Nicole Wisniewski – Monmouth University
Emily Schaffer – Marist College

Faculty Mentor: Assistant Dean John A. Tiedemann

Department: Biology

Funding Source: Monmouth University School of Science. Ryan Gergely and Keith Leonard were supported by the Urban Coast Institute's Heide Sculthorpe Scholarship.

ABSTRACT

Macrozooplankton are important components of marine ecosystems because they are intermediates in estuarine food webs, forming links between smaller zooplankton and higher trophic levels. However, despite their importance in filling this niche, little is known about the distribution, abundance, and ecology of macrozooplankton in many coastal regions including Barnegat Bay.

The goal of this study is to gather information on the status of macrozooplankton populations in upper Barnegat Bay. The results of this project include production of an inventory of macrozooplankton found in the upper bay, information on their distribution and abundance, and information on the seasonal occurrence and peak abundance periods for nuisance zooplankton species in the bay, including ctenophores and sea nettles.

Six sampling stations were sampled weekly from May through August in upper Barnegat Bay from Bay Head to Seaside Park. Water quality parameters were measured using a calibrated water quality probe; water depth was determined using a depth finder; water transparency was measured using a Secchi disc. Zooplankton were collected using 500µm plankton nets towed off the stern of the boat for 3 minutes into the prevailing current. Duplicate samples were collected at each station. A flow meter mounted in the nets enabled calculation of the volume of water filtered through the net.

In the lab samples were sorted and enumerated. Individual macrozooplankton were identified to the lowest taxonomic level practicable and the total number of individuals of each taxa was recorded in order to calculate their relative abundance. These data will help us understand the distribution and abundance of macrozooplankton in Upper Barnegat Bay, as well as any spatial or temporal patterns of distribution and abundance.

New Jersey Garlic Mustard (*Alliaria petiolata*) Field Survey

Presenters: David Patrick James* – Monmouth University
Arturo Romua* – Monmouth University
Lucas Rhoads – Cornell University
Bryan Hewins – Monmouth University
Kyle Borodunovich – Monmouth University
Alyson Eng – Marine Academy of Science and Technology
Mitchell Mickley – Monmouth University

*Poster Author

Faculty Mentor: Dr. Pedram Danesghar

Department: Biology

Funding Source: Monmouth University School of Science

ABSTRACT

Garlic Mustard (Alliaria petiolata), an invasive species, threatens ecological biodiversity due to its highly successful reproductive rate and supposed allelopathic properties. The Global Invasion Network, the leading organization investigating garlic mustard, aims to examine the anatomical and physiological differences of the species in Northern America relative to its native European range through the Global Garlic Mustard Field Survey. As participants, our team carried out sampling procedures, during the flowering period of the species, across the state of New Jersey, in accordance with the field survey.

To locate potential survey sites, county park officials were contacted and GIS map information was obtained for several target parks. Nine sites were surveyed altogether—seven in Monmouth County and two in Morris County. A transect survey method was utilized for the project. At each site, a transect line was placed through the median of the population and all individuals were counted within a .5m2 plot. The transect line extended to a maximum length of 10 meters, although some sites either had a smaller or larger distribution. The first-year rosettes widths and the second-year (fruit-bearing) individual heights were measured along the transect line. Furthermore, the quantity of seed pods and leaves as well as signs of herbivory and/or fungal infections was recorded. The various ecosystem types including forest understory, forest edge, and roadside were also noted.

The contribution of our collected data will serve to further understand the impacts of garlic mustard worldwide. Ultimately, this understanding will lead to improved management strategies of garlic mustard.

Northern Diamondback Terrapin Activity in Shark River, New Jersey

Presenters: Lauren Fitton- Monmouth University
Scott Mayes – Monmouth University
Brett Gilmartin – Monmouth University
Tessa Connolly- Monmouth University
Josette Hutcheson – Monmouth University
Brian Carlsen – Monmouth University

Faculty Mentor: John Wnek, Marine Academy of Technology and Environmental Science

Department: Biology

Funding Source: Monmouth University School of Science.

ABSTRACT

The northern diamondback terrapin (*Malaclemys terrapin terrapin*) is a turtle that is endemic to estuaries across the Eastern and Gulf Coastline of the United States. Little is known about the population of terrapins along the New Jersey shore. As a result of declines in natural habitat, terrapins are now listed as a species of special concern in New Jersey. This is the first project to provide information on terrapin activity in Shark River. The Shark River is considered an estuarine system with acceptable terrapin marsh habitats that is within the animal's range. The purpose of this project was to determine if there was any terrapin activity within the Shark River system, and to create a comparison between this area and that of Island Beach State Park which supports a stable terrapin population. An ideal habitat for the terrapin requires a delicate balance of salinity within an estuary, suitable nesting areas, and a series high and low marshes. We trapped in several locations throughout the Shark River estuarine system using baited hoop traps ranging from 76 cm to 90 cm in diameter by 1.5 meters long. These are accepted methods used in various locations such as Island Beach State Park where there has been extensive research conducted on the northern diamondback terrapin since 2005. As a result of this project, we captured no terrapins in Shark River, which shows that the density of terrapins, if present, is obviously lower than that of Island Beach State Park.

Nuisance Gelatinous Macrozooplankton of Upper Barnegat Bay

Presenters: Ryan Gergely – Monmouth University
Keith Leonard – Monmouth University
Shelby Whitebread – Monmouth University
Nicole Wisniewski – Monmouth University
Emily Schaffer – Marist College

Faculty Mentor: Assistant Dean John A. Tiedemann

Department: Biology

Funding Source: Monmouth University School of Science. Ryan Gergely and Keith Leonard were supported by the Urban Coast Institute's Heide Sculthorpe Scholarship.

ABSTRACT

Typically, in Mid-Atlantic estuaries, short but intense blooms of ctenophores, primarily Mnemiopsis leidyi, occur in late summer and early fall; however, several recent studies have documented an expansion in ctenophore abundance and seasonal distribution to include spring and early summer blooms. This shift appears to be related to increasing average water temperatures. If such a shift in the seasonal pattern and abundance of ctenophores is occurring in Barnegat Bay, it could have an impact on the abundance of other planktonic assemblages, as ctenophores are voracious predators on a variety of zooplankton, including bivalve veligers, copepods, and naplii.

Sea nettles (*Chrysaora quinquecirrha*) are becoming more abundant in Mid-Atlantic estuaries including Barnegat Bay, reaching peak numbers in mid to late summer, especially north of the Toms River. This phenomenon has apparently resulted from warmer summer water temperatures and increased eutrophication. Due to their severe sting, sea nettles are a nuisance and pose a hazard to recreational users of the bay.

The results of this study have yielded updated information on the seasonal occurrence and peak abundance periods for ctenophores and sea nettles in upper Barnegat Bay. Documentation of the seasonal patterns of ctenophore and sea nettle distribution and abundance could serve as an indicator of the health of the bay. In addition, updated information on ctenophore and sea nettle distribution and abundance may assist scientists attempting to understand fishery declines in the Bay since sea nettles and ctenophores such as Mnemiopsis leidyi are known to prey on fish eggs and larval fishes.

Phylogenetic Analysis of the genus Alagoasa Based on Molecular Analyses of 28s D2 rDNA and COI mDNA

Presenters: Smriti Agrawal – Monmouth University

Faculty Mentor: Associate Dean Catherine N. Duckett

Department: Biology

Funding Source: Monmouth University School of Science

ABSTRACT

Oedionychina is a diverse group of flea beetles (Galerucinae: Alticini) that is distributed both in the New and Old Worlds. One of the features that distinguish this group is that many participate in mimicry complexes, which makes it challenging to accurately reconstruct the phylogeny by making a homology assessment using external morphology. Studies based on rDNA in the past have yielded results discordant with hypotheses based on morphology. Therefore, the purpose of this study is to conduct phylogenetic analyses of the genus Alagoasa Bechyné, which contains over 200 species and has a wide geographic range (from Argentina to Mexico) in comparison to other flea beetle genera. In the past primarily, morphological characteristics of various flea beetles were examined. In order to provide an improved rDNA hypothesis for phylogenetic reconstruction, a comparative study of the partial rDNA (28s; D2: 455 nts) from a broad range of Oedionychina genera, as well as select out-group taxa will be performed. Additionally, mitochondrial COI marker fragments will be assessed; both structural alignments of the D2 and COI segments will be used to perform Parsimony and Bayesian analyses. Factors such as the mimicry complexes of these flea beetles, potential homoplasy, and conclusions drawn from morphological analysis susceptible to homoplasy have resulted in classifying Alagoasa as a monophyletic group in previous research. However, it is important to test this presumed monophyly, which this research aims to study in order to establish a refined conclusion about Alagoasa heterogeneity.

Serotonin manipulation and spontaneous alternation behavior

Presenters: Madelyn Mauterer – Monmouth University
Krystal Orlando – Monmouth University
Victoria Schroeter – Johns Hopkins University

Faculty Mentor: Dr. Dennis E. Rhoads

Department: Biology

Funding Source: Monmouth University School of Science. Madelyn Mauterer supported by a generous gift from Mr. John Chunko (‘67)

ABSTRACT

Two drugs acting at the serotonin receptor subtype 1A (5-HT1A) of the brain were tested for their ability to disrupt the spontaneous alternation behavior (SAB) of adolescent Long-Evans (LE) and Sprague- Dawley (SD)rats. Disruption of SAB has been proposed as a model of human Obsessive-Compulsive Disorder (OCD). The drugs, Buspirone and DPAT, were injected (3-4 mg/kg,ip) and the effects were observed by the rats’ reaction in a T-maze. The rats were fasted overnight and, upon injection the next morning, were allowed to choose between two arms of the maze that were equally baited with peanut butter. Rats were given an SAB score calculated by the number of choices of arms before alternation. The SAB scores were higher (i.e., the rats were repeating their choices rather than alternating) when injected with either DPAT or Buspirone. The highest scores occurred in the DPAT-injected rats and there was no significant difference between the two rat strains. Both drugs also produced vicarious trial and error (VTE) behavior, another repetitive behavior resulting from apparent difficulty completing a choice and thus prolonging the decision time. VTE behavior was most prominent in rats injected with Buspirone and, in this case, LE rats were less sensitive to the induction of VTE behavior than were the SD rats. The results suggest that serotonin receptors play a vital role in initiating repetitive behavioral patterns in adolescents and that strain differences may help identify the key genetic factors mediating the VTE response.

Tianeptine as a Therapeutic Agent for Alcohol Withdrawal: Behavioral

Presenters: Victoria Schroeter – Johns Hopkins University
Krystal Orlando – Monmouth University
Madelyn Mauterer – Monmouth University

Faculty Mentor: Dr. Dennis E. Rhoads

Department: Biology

Funding Source: Monmouth University School of Science. Madelyn Mauterer supported by a generous gift from Mr. John Chunko (‘67)

ABSTRACT

The purpose of this research project was to investigate the effectiveness of the antidepressant drug tianeptine as a therapeutic agent for alcohol withdrawal in adolescent and adult rats. This research project has potentially great value long-term in furthering our knowledge and treatment of human alcohol withdrawal. Data was collected for this project using computer-controlled activity chambers with half of the box kept in light and half in dark. Rats were administered alcohol as part of a liquid diet and tested once a week following withdrawal from alcohol. Tests included total activity (distance traveled) and time spent in the dark versus the light area of the activity chamber over a 10 minute trial period. Compared to age-matched controls, alcohol withdrawing rats in both age groups typically displayed hypoactivity (significantly less activity) in the activity chambers. Rats given continuous supply of tianeptine in addition to alcohol displayed significantly less hypoactivity during withdrawal than rats that received alcohol alone. Tianeptine had no affect on the rats’ alcohol consumption. Tianeptine can potentially serve as a therapeutic agent for alcohol withdrawal by lessening the occurrence or severity of alcohol withdrawal behavioral symptoms,. Because the appearance of withdrawal symptoms tends to promote continued alcohol consumption, tianeptine may also be effective in preventing relapse drinking. This project was supported by the Biology Department and School of Science at Monmouth University, as well as by a donation from Mr. John Chunko.

Tianeptine as a Therapeutic Agent for Alcohol Withdrawal: Biochemistry

Presenters: Bryan Martin – Monmouth University
Carlos Rivera – Missouri University of Science &Technology

Faculty Mentor: Dr. Dennis E. Rhoads

Department: Biology

Funding Source: Elusys Therapeutics and Monmouth University School of Science. Bryan Martin supported by a generous gift from Dr. Elizabeth Posillico and Elusys Therapeutics.

ABSTRACT

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 and AMPA SER845 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 fractions of juvenile Long Evans rat brains. The rats were placed on one of three diets: Alcohol, Tianeptine, and control. Following the drug administration period microsomal 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 both AMPA P-SER845 and AMPA receptor densities in the 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 both P-SER845 AMPA & AMPA receptor densities in the microsomal fractions and thus may prove to be an effective treatment for EWS.

Elusys
THERAPEUTICS, INC.

Design of a "Greener" Oxidation Process for the Synthesis of Polyol Alkanoic Acids

Presenters: Lauren Bonfiglio – Monmouth University
Gillian Shaw – Monmouth University
Miriam Basiouny – Monmouth University
Eric Gosselin – Stowe High School

Faculty Mentor: Dr. Carolyn Supplee

Department: Chemistry

Funding Source: Monmouth University School of Science. Gillian Shaw is supported by a generous gift from Dr. Denis E. Hruza (’68, ’71) and Mrs. Anne Hruza (’81).

ABSTRACT

Selective oxidation of carbonyl groups to their corresponding acids in compounds containing both alcohol and aldehyde groups is of growing interest in the specialty chemicals and pharmaceutical industry. Compounds containing alcohol and carboxylic acid functional groups are used in waterborne and powder coating systems as well as in the formation of dendrimers. These types of compounds impart water solubility of the
coating system into the polymer and therefore allow for the formulation of lower VOC or more environmentally friendly coatings.

An example of a compound that is of interest to both the coatings and pharmaceutical industries is dimethylolpropionic acid (DMPA). Currently,
DMPA is produced by the stoichiometric peroxide oxidation of dimethylolpropanal (DMPAL). The current reported synthesis and production of DMPA is carbon inefficient, requires a lot of energy and is not catalytic. A more economical and efficient synthetic route to DMPA and these types of compounds, in general, using air or an oxygen atomsphere in the presence of a transition metal catalyst is under investigation. Initial results to date indicate successful selective oxidation of the aldehyde group under mild conditions using transition metals. Nickel (II), copper (II), iron (II), iron (III), and manganese (III) salts and
complexes have been investigated to determine the optimal catalyst and reaction conditions for the development of a mild air oxidation process
for DMPA and other desirable polyol alkanoic acids.

Speciation of inorganic chromium under natural water conditions

Presenters: Lauren Lechner – Monmouth University
Sean Grimes – Monmouth University
Soleil Farrow – Monmouth University

Faculty Mentor: Dr. Tsanangurayi Tongesayi

Department: Chemistry, Medical Technology and Physics

Funding Source: Monmouth University School of Science, Bristol-Meyers Squibb. Soleil Farrow and Lauren Lechner supported by a generous gift from Dr. Denis E. Hruza (’68, ’71) and Mrs. Anne Hruza (’81). Sean Grimes supported as a Bristol-Myers Squib Summer Research Fellow by the generous support of BMS Corporate Giving.

ABSTRACT

Trivalent chromium, Cr(III), and hexavalent chromium, Cr(VI), represent the two most common inorganic forms of chromium. Both forms have high chronic toxicity to aquatic life. Cr(III) occurs naturally and is an essential trace nutrient to humans and animals whereas Cr(VI), a known carcinogen, enters the environment, mostly, as a result of anthropogenic activities. One of the major sources of exposure of Cr(VI) to humans is drinking water. We are studying the effect of fulvic acid (FA), humic acid (HA), iron (Fe), pH and light on the speciation of inorganic chromium in the environment. Preliminary results indicate the stabilization of Cr(VI) by both FA and HA at pH 8 and 9 under both light and dark conditions. Addition of Fe enhanced the complex-formation, likely through intermetallic bridging. At pH 4 and 5, under similar conditions, complex formation occurred but only to a limited extent compared to that at pH 8 and 9. The presence of Fe at pH 4 and 5 resulted in the reduction of Cr(VI) to Cr(III), forming chromite, $FeCr_2O_4$, a brown precipitate. The reduction of Cr(VI) to chromite may provide a cheaper but effective method of removing the carcinogenic hexavalent chromium from drinking water. There was also an indication of the oxidation of Cr(III) to Cr(VI) by both FA and HA in the presence of Fe at pH 8. More work is being done to investigate the effect of other pH conditions and other water quality parameters on the speciation of chromium.

Bristol-Myers Squibb

The Study of Chiral Bidentate Phosphine Ligands

Presenters: Michael J. Bertocchi – Monmouth University
Susette E. Ingram - Monmouth University
Chrissy Roselli – Monmouth University
Dylan Bradley – Monmouth University
Alyssa Teehan – Monmouth University

Faculty Mentor: Dr. Carolyn Supplee

Department: Chemistry

Funding Source: Monmouth University School of Science. Michael Bertocchi and Suzette Ingram supported by a generous gift from Dr. Denis E. Hruza (’68, ’71) and Mrs. Anne Hruza (’81). Chrissy Roselli supported as a Bristol-Myers Squib Summer Research Fellow by the generous support of BMS Corporate Giving.

ABSTRACT

The development of catalysts for asymmetric synthesis with n-alkanes as starting material is of great importance and has significant applications in the petroleum and pharmaceutical industries, including the use of alternative feed stocks to produce new and existing products, the development of new materials, and the synthesis of pharmaceuticals and other bioactive compounds. Recently, Goldman, Brookhardt and others have demonstrated that “pincer-type” ligand metal complexes are useful catalysts in the formation of aromatic hydrocarbons. It has been suggested that the reactivity of these catalysts was due to the sterics of the phosphorus atom, while others contended that the metal-phosphorus plane was the key factor on how substrates coordinate to the metal center. The manner in which the substrate binds to the metal determines the stereochemistry of the product; therefore, varying the substituent on the phosphorus atom and/or the phosphine ligand backbone to widen the substrate metal coordinate site should have a dramatic affect on the stereochemistry.

Research efforts to date, have focused on varying the nature of the phosphine ligand backbone in order to constrict or widen the coordinate site for the substrate to bind to the metal in an attempt to affect the stereochemistry of the resulting chemical transformation. Effort has been made to synthesize chiral, non-racemic chelating phosphine ligands or “pincer-type” phosphine ligands that could form metal facial-isomers, which should have a large impact on the way the substrate approaches and binds to a metal center. The design and synthetic route to the target molecules will be presented herein.

Bristol-Myers Squibb

Framework for Storing Information about People, Organizations and Their Relationships

Presenters: Michael Rowland – Academy of Allied Health and Science
Jessica Buck – Brookdale Community College
Annie Wang – Rutgers University

Faculty Mentor: Dr. William Tepfenhart

Department: Computer Science & Software Engineering

Funding Source: Monmouth University School of Science

ABSTRACT

With the proliferation of social networking, one can easily find information about individuals online. However, the information is often scattered around different websites, in different formats. We look to correct this problem in the form of a personal agent that can store contacts and their information in a very orderly manner. This allows for social networking not only between individuals, but also between individuals and organizations.

We have designed a model in Microsoft Access with specifications for storing data about people, organizations, addresses, and their relationships to one another. Using a global perspective, the model is able to store structured names and addresses that provide a rich level of semantics capable of reflecting different format standards around the world. The model is capable of storing detailed information about people, including physical description, hobbies, and languages, in a way that enables the simple creation of groups based on commonalities between individuals. The concept of groups extends to organizations and addresses, for which one can easily create a group of colleagues or a group of all the people who lived at a certain address in a certain year. A relationship between a person and an organization can occur as an employee/employer relationship, but customer relationships can also be captured. Organization-organization relationships are capable of reflecting takeovers, mergers, and subsidiary branches of umbrella organizations.

Upon implementation, this model will improve interactions between individuals and organizations and provide a more seamless data transfer process.

Put-A-Tag

Presenters: Chidveer Chinthakuntla Reddy – Monmouth University
Charles Reed – Monmouth University
Ryan Cerankowski – Monmouth University

Faculty Mentor: Dr. Cui Yu

Department: Computer Science & Software Engineering

Funding Source: Monmouth University School of Science

ABSTRACT

The Put-A-Tag software will allow you to tag any file, piece of text or web-pages. Every tag will be associated with a set of keywords which will allow the user to search through the tagged content. This is the most flexible way to store and find your interests. This software maintains a long list of directories, files for pictures, short-notes, web-pages and hyperlinks without user involvement. Adding a tag is just as simple as right clicking and selecting “Put-A-Tag” from the context menu. It has capability to listen to the clipboard, in cases where there is no option for the “Put-A-Tag” in the context menu. It also facilitates the user in generating the automatic key words for the context he is tagging in. In cases where web-pages require logins, the software takes a snapshot of the screen and trims it to the browser dimensions so that it retains the content and its formatting. This software has the ability to categorize the tags based on the context. Also, it will have the option to share tags with other users.

The “Tag-Manager” provides a simple interface to access tagged content quickly. It retrieves all necessary data without requiring the user to know where it is or how it stores the data. It uses an inverted index for storing and searching through the keywords. It also supports regular expressions, fuzzy keywords, Boolean expressions and context of the tag.

The Put-A-Tag system is an ideal application in areas such as research, education, and office use.

Lymph Node Involvement in Dogs with Grade II Mast Cell Tumors

Presenters: Meghan Freshnock – Monmouth University
Alexandra Ferrara – Monmouth University
Samantha Kovacs – Monmouth University
Melissa Borodunovich – Brookdale Community College
Ashley Capparelli – Monmouth University

Faculty Mentor: Dr. Richard Bastian

Department: Mathematics

Funding Source: Monmouth University School of Science

ABSTRACT

This study is a preliminary data analysis of dogs with grade II mast cell tumors and whether there is any incidence of lymph node involvement. Subcategories of age, weight, and whether or not the dog had a second surgery were analyzed using T-tests and ANOVA. For the overall sample of 90 dogs, the incidence of lymph node involvement in dogs with a grade II mast cell tumor is 61.1%. Of the 90 dogs, the mean age with positive lymph node involvement was 7.5 years old, the mean weight with positive lymph node involvement was 60.2 pounds, and 42.2% had a second surgery. Initial results indicate no significance in the age or weight of a dog with the incidence of lymph node involvement. However, the incidence of lymph node involvement in dogs that underwent a second surgery is significantly higher than dogs that did not undergo a second surgery. Also, when controlling for sex, the odds of lymph node being positive given a second surgery are 2.998 times higher than the odds of positive lymph nodes given no second surgery. These data may be able to help recommend treatment options that are most beneficial to a dog diagnosed with grade II mast cell tumors.

Median Survival Time for Dogs with Grade II Mast Cell Tumors

Presenters: Nicole Altilio – Monmouth University
Nicole Atrashewski – Monmouth University
John Krajunus – Monmouth University
Mark Untisz – Monmouth University
Trevor Wood – Monmouth University

Faculty Mentor: Dr. Richard Bastian

Department: Mathematics

Funding Source: Monmouth University School of Science

ABSTRACT

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/mean survival time of dogs with these grade II mast cell tumors and also to discern what factors influence the median/mean 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), age at diagnosis, tumor location, treatment, and survival time of 90 dogs. Using Life Tables, Kaplan-Meier, and Cox Regression, we were able to analyze the time-to-event data. A median survival time of 3.4409 years was determined using Life tables and 3.587 years using Kaplan-Meier. A significant difference in the survival curve between the two lymph node statuses (positive, negative) was found when controlling for tumor location when using Kaplan-Meier Survival Analysis. Results from a Kaplan Meier survival analysis show that a dog with a negative node in a distal location has a higher median survival time than a dog with a positive node.

Regenerative Stem Cell Therapy in Dogs

Presenters: Colleen McKendry – Monmouth University
Maria Ferrara – Monmouth University
Joan Grzankowski – Monmouth University

Faculty Mentor: Dr. Richard Bastian

Department: Mathematics

Funding Source: Bristol-Myers Squibb and Monmouth University School of Science. Maria Ferrera and Colleen McKendry supported as a Bristol-Myers Squib Summer Research Fellow by the generous support of BMS Corporate Giving.

ABSTRACT
In conjunction with a veterinarian, we analyzed the method of regenerative stem cell therapy in dogs. Stem cell therapy is the process of removing stem cells from a fatty tissue sample taken from a dog and injecting the stem cells in an arthritic joint. Our purpose was to determine which variables are important in extracting the highest yield per gram of stem cells. Variables that were included in our study were gender, neutered status, age, breed size, and location of the removed tissue. The sample size of our main dataset was 1265. The statistical analyses involved nonparametric testing. Non -parametric tests compare the median viable cells per gram across various independent variables. Throughout performing the tests, we found a statistically significant difference within the location category. There was also a difference within the neutered status of dogs. Further development into the data resulted in significant results in the interactions of gender by location and location by gender.

Basic Water Requirements Supplied By Desalination Techniques

Presenters: Nicholas J. La Banca – Monmouth University

Faculty Mentor: Dr. Johnny Pang

Department: Mathematics

Funding Source: Monmouth University School of Science

ABSTRACT

Potable water is viewed as a limited resource, but there is an ample resource for saline water. Desalination quite possibly could be instrumental in meeting our future population's water needs. The main drawback to desalination, especially true with the distillation processes, it has the connotation of being energy inefficient. With the abundance of saline water, desalination will be necessary for survival as well as stability in a "worst case" scenario given the assumption that there is no natural fresh (potable) water resource readily available. The total energy needed and total monetary cost of water desalinated to meet the World's demand will be highlighted.

Water Quality Monitoring of Whale Pond Brook and Lake Takanassee

Presenters: Christiana Brock – Monmouth University
Katherine Markowitz – Monmouth University
Allison Crawford – Monmouth University
Catherine Leech – Gettysburg College
Elizabeth Kang – Brookdale Community College

Faculty Mentor: James Nickels

Department: Urban Coast Institute

Funding Source: Monmouth University School of Science & Urban Coast Institute

ABSTRACT

The Urban Coast Institute at Monmouth University has provided continued support on various ongoing projects along the coast of New Jersey. During the summer of 2011, progress was made on pre-existing projects, such as water quality monitoring of New Jersey estuaries, multi-beam and side scan benthic habitat mapping, and assistance was provided for NJDEP and NOAA sample collection. Our main project was water quality monitoring of Whale Pond Brook and Lake Takanassee. Six stations along the lake chain were surveyed and observed on a weekly basis between May 24th and August 3rd. Data were collected using calibrated YSI meters that measured specific water quality parameters. These parameters included temperature, conductivity, salinity, dissolved oxygen, pH, turbidity, chlorophyll and water level. A continuously reading water level gauge was installed to track level changes over seasons and the effect of rainfall. On Monmouth University's campus, the depth of sediment and organic build-up in Whale Pond Brook was measured in feet using metal rods that were pushed down to the hard lake bottom. From the data we collected as well as our observations over the past few months, we hope to show that the lake chain would benefit from restoration. This restoration project could include dredging, removal of invasive species and overgrowth, installing fish ladders, as well as the creation of trails and gardens for recreation.