



70th Annual
**EASTERN COLLEGES SCIENCE
CONFERENCE**

April 2, 2016



WESTERN NEW ENGLAND UNIVERSITY | **WNE**



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SCIENCE
CONFERENCE**
1947-2016



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UNIVERSITY

History of the Eastern Colleges Science Conference

The first Eastern Colleges Science Conference (ECSC) was organized in 1947 by undergraduate Pauline Newman at Vassar College in Poughkeepsie, New York. The aim then, as now, was to stimulate interest in undergraduate research in the sciences and related fields and to provide a lively forum for the presentation of research papers. Pauline Newman received her bachelor's degree in chemistry and went on to receive a Ph.D. in chemistry from Yale. About 22 schools attended the first conference, and the theme was "Science, Philosophy and Society."

The constitution of the ECSC was ratified on April 24, 1948 at Union College in Schenectady NY, making the conference a self-sustaining body.

In 1972 the Pennsylvania State University was named the repository for all official documents of the ECSC. Professor Stanley Shepherd was named the permanent secretary of ECSC. In 1980 Professor Shepherd stepped down and Professor Gerard O'Leary from Providence College was elected to the post. At the 35th annual conference a steering committee was established to assist in directing the activities of the ECSC.

In 1983 the ECSC was incorporated in Rhode Island and now operates with a Board of Directors, elected from faculty of the participating colleges and universities. In 1986 Professor Gerard O'Leary stepped down, and Professor Edward Gabriel of Lycoming College was elected Chair of ECSC. In 1995 Dr. Gabriel was succeeded by Professor Lance Evans of Manhattan College. In 2008, Dr. Michael Kotarski of Niagara University was elected to the Chairmanship, and in 2010 was succeeded by Dr. Donald Stearns of Wagner University.

Over the years interest has increased in the conference and over 50 colleges and universities have attended this annual event. Over time the range of subject matter has also expanded and now covers computer science and behavioral and social sciences, as well as the original areas of biology, chemistry, mathematics, physics and engineering.

Previous Meetings

- 1947: Vassar College, Poughkeepsie, NY
- 1948: Union College, Schenectady, NY
- 1949: Adelphi College, Garden City, NY
- 1950: Bernard College, New York, NY
- 1951: Yale University, New Haven, CT
- 1952: Pennsylvania College for Women, Pittsburgh, PA
- 1953: N.Y. State College for Teachers, Albany, NY
- 1954: Brooklyn College, Brooklyn, NY
- 1955: Seton Hall University, South Orange, NJ
- 1956: Temple University, Philadelphia, PA
- 1957: Georgetown University, Washington, DC
- 1958: Wilkes College, Wilkes-Barre, PA
- 1959: Suffolk University, Boston, MA
- 1960: Hunter College, New York, NY
- 1961: SUNY College of Forestry, Syracuse, NY
- 1962: North Carolina State College, Raleigh, NC
- 1963: Boston College, Chestnut Hill, MA
- 1964: Jersey City State College, Jersey City, NJ
- 1965: Danbury State College, Danbury, CT
- 1966: D.C. Teacher's College, Washington, DC
- 1967: Fordham University, New York, NY
- 1968: Yale University, New Haven, CT
- 1969: Yale University, New Haven, CT
- 1970: Wilkes College, Wilkes-Barre, PA
- 1971: Rosary Hill College, Buffalo, NY
- 1972: U.S. Military Academy, West Point, NY
- 1973: Pennsylvania State University, University Park, PA
- 1974: Worcester Polytechnic Institute, Worcester, MA
- 1975: Widener College, Chester, PA
- 1976: Rhode Island College, Providence, RI
- 1977: Fairleigh Dickenson University, Rutherford, NJ
- 1978: Union College, Schenectady, NY
- 1979: Wilson College, Chambersburg, PA
- 1980: SUNY at Cortland, Cortland, NY
- 1981: Jersey City State College, Jersey City, NJ
- 1982: Lycoming College, Williamsport, PA
- 1983: Wilkes College, Wilkes-Barre, PA
- 1984: Providence College, Providence, RI

1985: SUNY at Fredonia, Fredonia, NY
1986: Duquesne University, Pittsburgh, PA
1987: Lycoming College, Williamsport, PA
1988: Ithaca College, Ithaca, NY
1989: U.S. Military Academy, West Point, NY
1990: Manhattan College, New York, NY
1991: SUNY at Fredonia, Fredonia, NY
1992: United States Naval Academy, Annapolis, MD
1993: Central Connecticut State University, New Britain, CT
1994: Duquesne University, Pittsburgh, PA
1995: Ithaca College, Ithaca, NY
1996: Lycoming College, Williamsport, PA
1997: Central Connecticut State University, New Britain, CT
1998: Niagara University, Lewiston, NY
1999: Sacred Heart University, Fairfield, CT
2000: Wagner College, Staten Island, NY
2001: Wilkes-Barre College, Wilkes-Barre, PA
2002: Niagara University, Lewiston, NY
2003: Ithaca College, Ithaca, NY
2004: Manhattan College, Bronx, NY
2005: Central Connecticut State University, New Britain, NY
2006: St. Joseph's University, Philadelphia, PA
2007: College of Mount St. Vincent, Bronx, NY
2008: Niagara University, Lewiston, NY
2009: Wagner College, Staten Island, NY
2010: Pace University, Pleasantville, NY
2011: Sacred Heart University, Fairfield, CT
2012: William Paterson University, Wayne, NJ
2013: Providence College, Providence, RI
2014: Marist College, Poughkeepsie, NY
2015: Niagara University, Lewiston, NY
2016: Western New England University, Springfield, MA

70th Annual Eastern Colleges Science Conference April 2, 2016

SCHEDULE OF EVENTS

7:30 a.m. – 8:30 a.m. Registration & Breakfast
Rivers Memorial, Western New England University Campus
1215 Wilbraham Road, Springfield, MA, 01119

8:30 a.m. – 8:45 a.m. Greeting: Anthony Caprio, President
Dr. Linda Jones, Provost
Orientation: Dr. Ronny Priefer, Coordinator
Rivers Memorial

8:45 a.m. – 9:45 a.m. Keynote Speaker: Stanley Kowalski
CEO, FloDesign

10:00 a.m. – 12:00 p.m. Platform Session
Center for the Sciences and Pharmacy Rooms 301, 302, 304, 305, 306, 307, 401, 404, 405, 406, 407

12:00 p.m. – 1:45 p.m. LUNCH
D.J. St. Germain Campus Center Cafeteria

12:00 p.m. – 1:45 p.m. LUNCH and BOT meeting
D.J. St. Germain Campus Center Board Room

2:00 p.m. – 3:25 p.m. Poster Session I (1-64)
Center for the Sciences and Pharmacy
Posters 1-22 (2nd floor), Posters 23-43 (3rd floor) Poster 44-64 (4th floor)

3:30 p.m. – 5:00 p.m. Poster Session II (65-128)
Center for the Sciences and Pharmacy
Posters 65-86 (2nd floor), Posters 87-107 (3rd floor) Poster 108-128 (4th floor)

6:00 p.m. – 7:30 p.m. Dinner
Springfield Sheraton 3rd Floor Ball Room
Monarch Pl, Springfield, MA 01144

7:30 p.m. Awards
Springfield Sheraton 3rd Floor Ball Room
Monarch Pl, Springfield, MA 01144



KEYNOTE SPEAKER

Stanley Kowalski '92

How an Undergraduate Project Turned into a \$300M Company

Stanley Kowalski III is 1992 BSME graduate from our school, Western New England University. Stanley possesses an insatiable entrepreneurial drive. He is Chairman of the board at FloDesign and founding CEO of FloDesign Wind Turbine, FloDesign Water Turbine and FloDesign Sonics. These companies have raised over \$300M in capital and employ over 200 people. Many of the employees are graduates from Western

New England University. He led the teams that won (2) prestigious business plan competitions at MIT and Harvard. He has received investments from the some of the world's most prominent investors, such as Goldman Sachs, Vantage Point and KPCB. From KPCB his board members include John Doerr, who is on the board at Google and Bill Joy, Founder and Chief Scientist at Sun Microsystems as well as Al Gore and Colin Powell.

Prior to these entrepreneurial endeavors, Stanley worked as an engineer on the Comanche suppressor system under Dr. Walter Presz which won UTC's MEAD award for the most outstanding engineering achievement at United Technologies. Holder of 11 patents and 4 publications. In 2008, Business West named Stanley the Top 40 under Forty leaders in the region. He is on the boards of Ogin Energy, WestMass Development Corp., The Springfield Public Forum, DaVinci Arms, Elysium (a company developing a molten salt reactor) and is most proud of being the alumnus of the year and a member of the board of trustees here at Western New England University.

MANUSCRIPTS SUBMITTED FOR EVALUATION/CONSIDERATION FOR AN EXCELLENCE AWARD

Title: **Bending Stress Characteristics of Terminal Tree Branches**
First Author: Domenick Avanzi
School: Manhattan College
Category: Botany

Title: **Rates of Bark Formation on Surfaces of Saguaro Cactus Plants**
First Author: Lauren Barton
School: Manhattan College
Category: Botany

Title: **Monitoring the Interaction of Nanomaterials with Catalase Using Optical Spectroscopy**
First Author: Kaitlyn Chhe
School: Pace University
Category: Biochemistry

Title: **Impact of Pharmaceuticals in the Hudson River on the Histopathology and Behavior of the Crayfish *Orconectes immunis***
First Author: Julia Czarnecki
School: Marist College
Category: Environmental Science

Title: **Method Development for Illicit Drugs (Amphetamine and Methamphetamine) Analysis**
First Author: Normisha V. Evans
School: Pace University
Category: Forensic Sciences

Title: **Effect of pH on the Spectroscopic Properties of Several Hydroxycinnamic Acid Derivatives**
First Author: Paris M. Hanson
School: Pace University
Category: Biochemistry

Title: **Characterization of Eccentric Growth in Stems of *Artemisia tridentata* Nutt. ssp. *wyomingensis* Beetle & Young**
First Author: Tiffany A. Kharran
School: Manhattan College
Category: Botany

Title: **Prevalence of Human Intestinal Parasites in Atlantic Oysters (*Crassostrea virginica*)**
First Author: Steven Michael Kowalyk
School: Manhattan College
Category: Environmental Science

Title: **Emerging Anthropogenic Chemicals in the Hudson River: The Potential Histopathological and Chemical Effect on Aquatic Vegetation**
First Author: Alec Lee
School: Marist College
Category: Botany

Title: **Anti-microbial Properties of Different Bee Propolis**
First Author: Santana Martinez
School: Pace University
Category: Microbiology

Title: **Investigation of Hematological Responses to Diacetylmorphine and Methadone Exposure Using Avian Model**
First Author: Beckley Miller
School: Marist College
Category: Physiology

Title: **Lack of Deleterious Side Effects in Naltrexone-Treated Rats**
First Author: Jacob Musiol
School: John Carroll University
Category: Psychology

Title: **Binding Interactions of Nanoceramics (Metal Oxides) and Human Serum Albumin Monitored by Different Techniques of Spectroscopy**
First Author: Tyler Nolan
School: Pace University
Category: Biochemistry

Title: **Ischemia Impairs Mitochondrial Velocity in White Matter of the Brain in an Age-Dependent Manner**
First Author: Stephen Politano
School: John Carroll University
Category: Biochemistry

Title: **Effects of Perched Culverts on Upstream and Downstream Eel Populations in Hudson River Streams**
First Author: Marissa J. Porter
School: Marist College
Category: Ecology

Title: **Microhabitat Use by an Urban Salamander Population**

First Author: Mary Portes

School: Manhattan College

Category: Ecology

Title: **Xylem Characteristics and Xylem Conductivity in Stems of North American Cactus Species**

First Author: Kristen Skonieczny

School: Manhattan College

Category: Botany

Title: **The Role of Drebrin in Heroin Relapse**

First Author: Samantha Stein

School: John Carroll University

Category: Physiology

Title: **Effects of a High Fat Diet on Metabolism and Working Memory in Rats**

First Author: Sarah Sternbach

School: John Carroll University

Category: Health Sciences

Title: **Chromatographic Analysis of Bee Propolis from Different Parts of the World**

First Author: Kevin Symczak

School: Pace University

Category: Biochemistry

Title: **Evidence of *Cryptosporidium* spp. in Three Bivalve Species Collected from Orchard Beach, New York**

First Author: Freda Fafah Ami Tei

School: Manhattan College

Category: Health Sciences/Environmental Science

Schedule of Platform Paper Sessions

70th Annual ECSC

BOTANY: CSP 301

Time

10:00 1-BENDING STRESS CHARACTERISTICS OF TERMINAL TREE BRANCHES
D.G. Avanzi and K.E. Petrizzo, Manhattan College, Department of Biology

10:20 2-ANALYSIS OF TERMINAL BRANCH LEAF ARRANGEMENTS AMONG PLANT SPECIES
D.S. Castillo, Manhattan College, Department of Biology

10:40 3-CHARACTERIZATION OF ECCENTRIC GROWTH IN STEMS OF ARTEMISIA TRIDENTATA NUTT. SSP. WYOMINGENISIS BEETLE & YOUNG
T.A. Kharran, Manhattan College, Department of Biology

11:00 4-RATES OF BARK FORMATION ON SURFACES OF SAGUARO CACTUS PLANTS
L.B. Barton, Manhattan College, Department of Biology

11:20 5-XYLEM CHARACTERISTICS AND XYLEM CONDUCTIVITY IN STEMS OF NORTH AMERICAN CACTUS SPECIES
K.L. Skonieczny, Manhattan College, Department of Biology

ECOLOGY: CSP 302

Time

10:00 6-EFFECTS OF DIFFERENCES IN ANTI-HERBIVORE DEFENSE AMONG TREE MATURITY ZONES ON INSECT GROWTH, SURVIVAL AND DEVELOPMENT
N. Chandler and B. Rehill, United States Naval Academy, Department of Chemistry

10:20 7-EFFECTS OF FOLIAR PHENOLICS ON GYPSY MOTH LARVAL GROWTH AND SURVIVAL
A. Hammer and B. Rehill, United States Naval Academy, Department of Chemistry

10:40 8-VARIATION IN GYPSY MOTH LARVAL GROWTH RATE, SURVIVAL AND DEVELOPMENT AMONG LARVAE FROM DIFFERENT EGG MASSES
V. Molony and B. Rehill, United States Naval Academy, Department of Chemistry

11:00 9-MICROHABITAT USE BY AN URBAN SALAMANDER POPULATION (*PLETHODON CINEREUS*)
M.A. Portes, and G.L.F. Carfagno, Manhattan College, Department of Biology

11:20 10-METABOLISM AS A BIOASSAY OF ENVIRONMENTAL STRESSORS: *HEMIGRAPUSUS SANGUINEUS* AS A MODEL ORGANISM
Z.T. Scheid and M.L. Judge, Manhattan College, Department of Biology

MICROBIOLOGY: CSP 304

Time

10:00 11-BACTERIAL INFECTIONS OF THE ZEBRAFISH (*DANIO RERIO*) SWIM BLADDER
B.M. Hart, Y. Khaled, and C.P. Corbo, Wagner College, Department of Biological Sciences

10:20 12-DETECTING HUMAN VIRUSES IN THE LOCAL ENVIRONMENT
C. Longo and D. Dube, University of Saint Joseph, Department of Biology

10:40 13-EFFECTS OF *BATRACHOCHYTRIUM DENDROBATIDIS* AND URBANIZATION ON
PLETHODON CINEREUS IN LOWER NEW YORK STATE
A.T. Paramo, and G.L.F. Carfagno, Manhattan College, Department of Biology

11:00 14-INVESTIGATING THE INTERACTIONS BETWEEN ANTIMALARIAL AND
ANTIRETROVIRAL DRUGS *IN VITRO* USING SYBR GREEN 1
M. Ramirez and G. Mayer, Manhattan College, Department of Biology

11:20 15-INVESTIGATING THE INTERACTIONS BETWEEN ANTIMALARIAL AND
ANTIRETROVIRAL DRUGS
S. Saeed and G. Mayer, Manhattan College, Department of Biology

MOLECULAR BIOLOGY I: CSP 305

Time

10:00 16-FILAMENTATION PROTECTS *CANDIDA ALBICANS* FROM AMPHOTERICIN B-INDUCED PROGRAMMED CELL DEATH VIA A MECHANISM INVOLVING THE YEAST METACASPASE, *MCA1*.

M.S. Brown, D. Laprade, M. McCarthy, and N. Austriaco, Providence College, Department of Biology

10:20 17-GENOMIC ANNOTATION OF *DROSOPHILA ELEGANS* AND *DROSOPHILA BIARMIPES*
D.S. Caugh and E.C. Merkhofer, Mount Saint Mary College, Department of Natural Sciences

10:40 18-DOPAMINE MODULATION OF NEURON EXCITABILITY IN *C. ELEGANS* REQUIRES THE SMALL G PROTEIN RHOA.

L.H. Duncan, A. Benner, A.A. Ahmed, and D. Chase, Central Connecticut State University, Department of Biomolecular Sciences

11:00 19-FINE MAPPING OF THE ROUGH FUR (RUF) MUTATION IN MICE

M.A. Rabah, K. M. Palanza, and T.R. King, Central Connecticut State University, Department of Biomolecular Science

11:20 20-DETERMINING THE FUNCTION OF F10C2.4 IN REPRODUCTION

M.D. Gobin and M. Marcello, Pace University, Department of Biology

MOLECULAR BIOLOGY II: CSP 306

Time

10:00 21-PNEUMOCOCCAL CELL WALL INDUCES THE NEUROPROLIFERATIVE TLR2/6 PATHWAY AND INHIBITS THE INFLAMMATORY TLR2/1 PATHWAY

P.A. Moresco, St. Jude Children's Research Hospital, Department of Infectious Diseases

10:20 22-VINCULIN FOCAL ADHESIONS RETARD CELLULAR MIGRATION WITH INCREASING EXTRACELLULAR MATRIX CONCENTRATIONS

M.A. Rabah, M.P. Sagnelli, and J.P. Mulrooney, Central Connecticut State University, Department of Biomolecular Science

10:40 23-CONVERGENT EXTENSION IN kv2.1 DEFICIENT ZEBRAFISH EMBRYOS

A.R. Walsh, Manhattan College, Department of Biology

11:00 24-PCR IDENTIFICATION OF FOUR SPECIES OF BACTERIA IN COMMERCIALY AVAILABLE HORSE PROBIOTICS

M.F. Zulch and J.B. Williams, Elms College

PHYSIOLOGY/ZOOLOGY: CSP 307

Time

10:00 25-AVIAN MIGRATORY FLIGHT & OXIDATIVE STRESS: THE IMPACT OF EXERCISE ON ERYTHROCYTIC ANTIOXIDANT DEFENSE SYSTEMS IN EUROPEAN STARLINGS, *STURNUS VULGARIS*

K.B. Bohannon, Sacred Heart University, Department of Biology

10:20 26-NEUROGENESIS OBSERVED IN THE ADULT ZEBRAFISH OPTIC TECTUM

J.R. Orvidas and C.P. Corbo, Wagner College

10:40 27-PREVALENCE OF TREMATODE INFECTION OF THE MUD SNAIL, *ILYANASSA OBSOLETA*, WITHIN DIFFERENT ESTUARINE HABITATS OF THE BRONX (NY)

L.K. Pujols and M. Judge, Manhattan College, Department of Biology

11:00 28-CHARACTERIZATION OF THE CELL GROWTH INHIBITORY MECHANISM OF METHYL N- PHTHALIMIDOOXY-2-METHYLACRYLATE

L. Calderon and M.A. Sweezy, University of Saint Joseph, Department of Pharmaceutical Sciences

11:20 29-THE EFFECT OF PSEUDO POLYELECTROLYTE COATINGS ON MAMMALIAN CELL CULTURE

C.R. Harper, R. Priefer, and S.M. Kinney, Department of Pharmaceutical and Administrative Sciences, Western New England University

ANALYTICAL CHEMISTRY: CSP 401

Time

10:00 30-ANALYSIS OF SULFA DRUGS USING RAMAN SPECTROSCOPY AND DENSITY FUNCTIONAL THEORY (DFT) CALCULATIONS

A.R. Javornik and E.-R.E. Mojica, Department of Chemistry and Physical Sciences, Pace University

10:20 31-DISCRIMINATION OF FLUOROQUINOLONE ANTIBIOTICS USING RAMAN SPECTROSCOPY

A.E. Kuptsov and E.-R.E. Mojica, Department of Chemistry and Physical Sciences, Pace University

10:40 32-MEASUREMENT OF ARSENIC AND HEAVY METALS IN GROUNDWATER IN BANGLADESH BY INDUCTIVELY COUPLED PLASMA ATOMIC SPECTROSCOPY

R. Cekovic and M. Alauddin, Wagner College, Department of Chemistry

11:00 33-CHROMATOGRAPHIC ANALYSIS OF BEE PROPOLIS FROM DIFFERENT PARTS OF THE WORLD

K. Symczak and E.-R.E. Mojica, Department of Chemistry and Physical Sciences, Pace University

11:20 34-METHOD DEVELOPMENT FOR ILLICIT DRUGS (AMPHETAMINE AND METHAMPHETAMINE) ANALYSIS IN BIOLOGICAL SAMPLES

N.V. Evans and E.-R.E. Mojica, Department of Chemistry and Physical Sciences, Pace University

BIOCHEMISTRY: CSP 404

Time

10:00 35-THE BIOCHEMICAL ACTIVITIES OF RAD51 PARALOGS RAD55 AND RAD57
O. Germano and M.A. Sweezy, University of Saint Joseph

10:20 36-THE ROLE OF THE RAD52 FAMILY RECOMBINATION MEDIATOR PROTEINS IN
HOMOLOGOUS RECOMBINATION REPAIR IN THE FISSION YEAST
SCHIZOSACCHAROMYCES POMBE
T. Kowalski and M.A. Sweezy, University of Saint Joseph, Department of Pharmaceutical Sciences

10:40 37-HYDROPONICALLY GROWN MORINGA OLEIFERA SHOWS HIGH POTENTIAL AS
A PREVENTATIVE TREATMENT FOR ALZHEIMER'S DISEASE
S.L. Johnson, H. Ma, J. Chace, and S.M. Meschwitz, Salve Regina University, Departments of
Chemistry and Biology and Biomedical Sciences

11:00 38-IDENTIFICATION OF MMP9 INHIBITORS
N.J. Rampino, K. Johnson, and J. Franco, Merrimack College, Department of Chemistry and
Biochemistry

11:20 39-INTEGRATION OF HIGH PERFORMANCE LIQUID CHROMATOGRAPHY
ELECTROSPRAY IONIZATION MASS SPECTROMETRY FOR IDENTIFICATION OF
HYDROLYSABLE TANNINS IN LEAF EXTRACTS
J.C. Francisco and D.K. Dillner, United States Naval Academy, Department of Chemistry

ORGANIC/PHYSICAL CHEMISTRY, COMPUTER STUDIES, ECONOMICS: CSP 405

Time

10:00 40-EXPANDING A NITROGEN BRIDGE ON EPIBATIDINE COMPOUNDS TO AIDE IN SMOKING CESSATION

S.A. Copeland and S.R. Slauson, University of Saint Joseph School of Pharmacy

10:20 41-RATE STUDIES OF N-PROTECTED PYRROLES FOR THE SYNTHESIS OF EPIBATIDINE DERIVATIVES

J.A. Walicki and S.R. Slauson, University of Saint Joseph School of Pharmacy

10:40 42-DETERMINATION OF POLYELECTROLYTE PKA VALUES USING SURFACE-TO-AIR TENSION MEASUREMENTS

B.N. Dickhaus and R. Priefer, Western New England University, College of Pharmacy

11:00 43-USE OF LINUX OPEN-SOURCE SOFTWARE AND MAPLE IN ANALYZING THE NEW GOEKEN-JOHNSON RUNGE-KUTTE TYPE METHODS

A. Ionescu and R.Ulaj, Wagner College, Department of Mathematics and Computer Science

11:20 44-MICROFINANCE ENTERPRISES FOR GSAP MICROFLUSH TOILETS

K.A. Ayala and C.R. Rapp, Providence College, Department of Engineering-Physics-Systems

ENVIRONMENTAL: CSP 406

Time

10:00 45-PHARMACEUTICAL POLLUTION: EXPLORING THE EFFECTS OF ASPIRIN CONTAMINATED WATER ON LEMNA MINOR

S.O. Haughton and K. Martin, University of Saint Joseph, Biology Department

10:20 46-UTILIZATION OF WASTE SEASHELLS AND LOW-COST FEEDSTOCKS FOR BIODIESEL PRODUCTION

T.A. Kelly and Y.H. Balkir, Manhattan College, Departments of Biology and Chemistry

10:40 47-THE EFFECTS OF PERCHED CULVERTS ON EEL POPULATIONS IN THE HUDSON RIVER WATERSHED

M. Porter, R. Brase and Z.E. Gagnon, Marist College, School of Science

11:00 48-EVIDENCE OF *CRYPTOSPORIDIUM SPP* IN THREE BIVALVE SPECIES COLLECTED FROM ORCHARD BEACH, NEW YORK.

F.F.A. Tei and G. Mayer, Manhattan College, Department of Biology

11:20 49-PRESENCE OF HUMAN INTESTINAL PARASITES IN OYSTERS (*CRASSOSTREA VIRGINICA*): TEMPORAL TREND IN PREVALENCE AND GENOTYPE

S.M. Kowalyk and G. Mayer, Manhattan College, Department of Biology

PSYCHOLOGY AND HEALTH SCIENCES: CSP 407

Time

10:00 50-A NOVEL ROLE FOR IL-10 IN MEDIATION OF MAST CELL RESPONSES AND THE DEVELOPMENT OF IgE- DEPENDENT FOOD ALLERGY

J.R. Rovatti, S.H. Polukort, L. Carlson, C. Thompson, J. Ser-Dolansky, S.R.M. Kinney, S.S. Schneider, and C.B. Mathias, Department of Pharmaceutical and Administrative Sciences, Western New England University; Pioneer Valley Life Sciences Institute, Baystate Medical Center

10:20 51-FORMULATION, EVALUATION, AND CHARACTERIZATION OF THE *IN VITRO* RELEASE KINETICS OF COMPOUNDED SLOW-RELEASE CAPSULES OF LIOTHYRONINE SODIUM (T3)

C.M. Cassone and S.N. Sani, Western New England University, College of Pharmacy, Department of Pharmaceutical & Administrative Sciences

10:40 52-CRIMINAL MINDS AND LOONEY TOONS: A CONTENT ANALYSIS OF MENTAL ILLNESS ON TELEVISION

R. Leary and M. Bryant, Ithaca College, Dept. of Psychology

11:00 53-TEACHING THIRD GRADERS ABOUT GENDER STEREOTYPING THROUGH MEDIA LITERACY

A. Gonzalez and S. Olsen, Ithaca College, Dept. of Psychology

11:20 54-YOURS, MINE OR OURS? THE EFFECT OF PSYCHOLOGICAL OWNERSHIP ON CONSUMERS' TERRITORIAL RESPONSES

J. Noyes, C.P. Kirk, and Y. Kalkstein, Mount Saint Mary College

PLATFORM PRESENTATION ABSTRACTS

1-BENDING STRESS CHARACTERISTICS OF TERMINAL TREE BRANCHES

D.G. Avanzi and K.E. Petrizzo

Manhattan College, Department of Biology
Riverdale, NY, 10471

Trees have an almost infinite array of morphologies. Tree branch morphologies are the result of natural bending stresses in response to the physical and mechanical properties of the branch. The mechanical properties of tree branches were analyzed using Finite Element Models (FEM) in which models were created and simulated using Abaqus FEM software. Terminal branches were sampled from 22 species of trees and large shrubs exhibiting various bending stress configurations. Six individual experiments were conducted to study bending stresses. As branch length was increased, the bending stress increased. As branch stem diameter was increased, the bending stress increased. When a branch's natural curvature was reduced or eliminated, overall bending stress decreased. On average, a branch's stress without leaves was 0.094 times smaller than when leaves were present. As side-branch angle was increased, the maximum bending stress increased. Only when the side-branch was orthogonal to the main-branch did the maximum bending stress decrease. As leaf mass was artificially increased, the bending stress proportionally increased with a one to one ratio. When artificial leaves were placed between each pair of actual leaves, the bending stress increased on average by 1.9 times. These results provided understanding into branch stresses with regard to geometry, sizing, natural bending, weight and location of leaves, and overall branch morphology.

2-ANALYSIS OF TERMINAL BRANCH LEAF ARRANGEMENTS AMONG PLANT SPECIES

D.S. Castillo

Manhattan College, Department of Biology
Riverdale, NY, 10471

This study was conducted to determine whether there were similarities in terminal branch growth and arrangement within plant species. 42 plant species were observed in three groups, alternate tree species, opposite tree species, and vine species. Each group's samples compared the growth of the stem and petiole to the second leaf area to determine if the plant species would elongate in accordance to the leaf areas. Both the alternate tree species and vine species showed a weak positive correlation; however, the opposite tree species showed a strong positive correlation which determined that species grew in proportion to the leaf areas present. Samples within individual species were compared to show similar growth patterns when comparing the cumulative leaf area to the cumulative stem and petiole lengths as well as the cumulative stem and petiole volume. Using the same comparisons within the groups, the slopes obtained determined that each species had a unique growth pattern. The slopes from each group were compared in order to determine whether there was a relation between the leaf area growth in proportion to stem and petiole growth. The data indicated that there was a correlation between the average leaf areas in proportion to the stem and petiole length of a species. Based on this study, plant species are able to efficiently grow their branches so that the size of the leaves are supported by the proper length of stems and petioles. This efficient distribution of energy allows for species to obtain energy efficiently for further growth.

3-CHARACTERIZATION OF ECCENTRIC GROWTH IN STEMS OF ARTEMISIA TRIDENTATA NUTT. SSP. WYOMINGENSIS BEETLE & YOUNG

T.A. Kharran

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Artemisia tridentata Nutt. ssp. *wyomingensis* stems have an eccentric growth pattern which causes death in localized areas of the stems. Normal growth occurs in all other locations along the stem since the eccentricity only occurs in specific areas. Three stems of *Artemisia tridentata* Nutt. ssp. *wyomingensis* presented similar characteristics such as diameters, ring numbers, and stem areas which were studied. Samples were taken along each stem over a distance of 550 mm and had a time difference of more than 26 years in age. All three stems exhibited eccentricity. The results imply that individual stems of *Artemisia tridentata* Nutt. ssp. *wyomingensis* will not have exactly the same pattern of eccentric growth although the characteristics of the stems are similar. Data obtained from parameters such as non-sector specificity of eccentric growth and the start of eccentric growth support the randomness of the eccentricity. More than 13% of segments exhibited a decrease of more than 10 xylem rings from segment to segment which is indication of extreme localization of eccentricity along a stem. Bizarre wood shapes are viewed in cross section due to the expansion of xylem cells adjacent to localized areas which experience a lack of xylem cell production. To the author's knowledge, this is the first publication which documents the frequency of eccentricity along *Artemisia* stems and the variation of its results.

4-RATES OF BARK FORMATION ON SURFACES OF SAGUARO CACTUS PLANTS

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Extensive bark formation, or epidermal browning, has been found on twenty-one species of tall, long-lived columnar cactus species in the Americas. It has been noted that for each species bark formation begins on equatorial-facing surfaces. Additionally, controlled experiments using UV-B irradiation show the initial stages of bark formation as well. Both of these facts suggest that UV-B irradiation is primarily the cause of this sunlight-induced bark formation. Sunlight-induced bark is detrimental to cacti and leads to premature morbidity and mortality. This study focused on bark formation rates on twelve cactus stem surfaces. Bark formation rates were compared using logistic curves. Typically, logistic curves are best fit to the data using least squares analysis. Least squares analysis allows for the least amount of error in the graph. For this study, south-facing crest surfaces of saguaro cacti in Arizona show bark before other surfaces, so bark formation rates on the south crests were compared to the bark formation rates on eleven other surfaces. Results indicate that east crests are the first surfaces to show bark formation about three years after bark formation on south-facing crests. West crests are next to follow delayed by about 8 years with the north crests following with a delay of 15 years. Crests bark first, followed by the troughs. The delay of the bark formation on the south, east, west, and north troughs from their respective crests were about 4, 5, 10, and 15 years, respectively.

5-XYLEM CHARACTERISTICS AND XYLEM CONDUCTIVITY IN STEMS OF NORTH AMERICAN CACTUS SPECIES

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Cactus plants are found in deserts and arid environments. With limited water availability, efficient water use may be a factor in plant growth. This research focused on comprehending vessel (conduit), vascular bundle, and xylem conductivity features in stem terminals among several morphologies of cactus species from Arizona, U.S.A. These morphologies were columnar, prostrate, terminal branch, and globose. Average conduit diameters in the most basal stem sections were 38.8, 33.4, 18.7 and 17.9 μm for columnar, prostrate, terminal branch and globose species, respectively. Average quantities of conduits in the most basal stem sections for the species tested were 9080, 3420, 2410 and 984 for columnar, prostrate, globose and terminal branch cacti, respectively. Vascular bundle ring diameters were roughly 23% of stem sample diameters. The numbers of bundles were well associated with stem sample diameters. Average xylem conductivities of the most basal sections were 0.56, 0.70, 13.5, and 80.0 $\text{g cm MPa}^{-1} \text{s}^{-1}$ for terminal branches, globose, prostrate, and columnar species, respectively. Xylem conductivity values ranged from 0.04 $\text{g cm MPa}^{-1} \text{s}^{-1}$ for the terminal branches of *Cylindropuntia arbuscula*, to 344 $\text{g cm MPa}^{-1} \text{s}^{-1}$ for the columnar stem of *Carnegia gigantea*. The cumulative stem surface areas of the species previously mentioned spanned from 1.18 to 202 mm^2 , respectively. Even with the diversity indicated above, collectively, xylem conductivities were well correlated with both cumulative stem volumes and cumulative stem surface areas. These data propose that water conducting features of cactus species are well proportioned to the dimensions of stems.

6-EFFECTS OF DIFFERENCES IN ANTI-HERBIVORE DEFENSE AMONG TREE MATURITY ZONES ON INSECT GROWTH, SURVIVAL AND DEVELOPMENT

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Trees face numerous threats from natural enemies such as diseases and herbivores that threaten their individual survival as well as the function of the ecosystems that they inhabit. Leaves from different maturity zones of trees can differ widely in their levels of defense against natural enemies and this difference is believed to be related in part to the tree's constitutive chemical defenses. This project quantified the effects of differences in constitutive defense among maturity zones on insect growth and survival rates. The growth, survivorship and developmental status of gypsy moth (*Lymantria dispar*) larvae were used as a bioassay of the differences in defense of the foliage of different maturity zones. Leaves from local sweetgum (*Liquidambar styraciflua*) were freeze dried, ground and mixed with an artificial gypsy moth diet. Larvae were fed diet amended with leaves from three maturity zones (mature, juvenile, and sapling) for 15 days. Larvae consuming diet amended with sapling leaves had the greatest mean mass of 58.1 mg as well as the highest survival rate of 56%. The caterpillars fed diet amended with juvenile or mature leaves had lesser average masses (both ca. 49 mg) and slightly lower survival rates (48 and 46%, respectively). Thus the foliage of sweetgum saplings appears to be less defended against gypsy moth larvae, and presumably other insect herbivores, than the foliage of juvenile and mature zones of canopy sized trees.

7-EFFECTS OF FOLIAR PHENOLICS ON GYPSY MOTH LARVAL GROWTH AND SURVIVAL

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Population outbreaks of gypsy moth (*Lymantria dispar*) larvae have resulted in major defoliation of North American forests since the late 19th century. These outbreaks are controlled by a nuclear polyhedrosis virus that kills the larvae, phenolic compounds in the foliage consumed by them, and predators. These compounds may damage the larval gut, allowing the virus to infect its host. In an effort to identify and understand the effects of these phenolic compounds that would be found in foliage typical to the gypsy moth caterpillars' natural diet, freeze-dried red oak (*Quercus rubra*) foliage was extracted using 70% acetone and this extract was chromatographed, eluting with water, 30% methanol, 50% methanol, and 10%, 30%, 50%, 70%, and 100% acetone versus a solid phase of Sephadex LH-20. After removing residual organic solvent and freeze-drying the aqueous solution, the solid products were separately dissolved in water at 5 mg/mL and infused into 1 cm plugs of gypsy moth artificial diet. Ten first-instar gypsy moth larvae were placed in 20 mL vials and fed the fraction infused diet for two weeks, with six replicate vials per fraction, after which the larvae were frozen and weighed. Larvae that consumed the control (non-infused) diet had the greatest masses (mean = 65.5 mg), whereas larval mass decreased as the polarity of the infused solids decreased (e.g. mean = 52.4 mg for larvae that consumed the 50% acetone fraction).

8-VARIATION IN GYPSY MOTH LARVAL GROWTH RATE, SURVIVAL AND DEVELOPMENT AMONG LARVAE FROM DIFFERENT EGG MASSES

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Population outbreaks of gypsy moth (*Lymantria dispar*) larvae have resulted in major defoliation of North American forests since the late 19th century. Laboratory studies in this system often produce useful outcomes, but require baseline data on rates of growth, survivorship and development to allow unambiguous interpretation of results. Using egg masses from USDA-APHIS, the source used by most laboratories in the United States, the growth, survivorship and development of gypsy moth larvae from three separate egg masses were compared to discern if these measures of performance vary significantly among larvae hatched from different egg masses. Ten first instar larvae were placed in a 20 mL vial with a 1 cm plug of artificial gypsy moth diet, with ten replicate vials per egg mass, and allowed to feed for two weeks. Mean mass did not differ among larvae from the three egg masses (53.9 mg), but survivorship was lower for larvae from egg mass A (85.9%) versus the other two egg masses (both: 94.8%). Also, developmental rates differed from larvae hatched from different egg masses, in that 39.6% of larvae from egg mass C had reached the third instar by the end of the experiment, vs. 5.5% and 12% for the larvae from egg masses A and B, respectively. Clearly larvae from different egg masses vary in survivorship and developmental rate, and this variation must be accounted for when designing experiments.

9-MICROHABITAT USE BY AN URBAN SALAMANDER POPULATION (*PLETHODON CINEREUS*)

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Amphibians play important roles in many ecosystems, serving as vital links in community food webs. Knowing more about their behavior and ecology, and understanding how they are affected by a changing environment can shed light on what we can do to better protect threatened species and their ecosystems. This study focused on quantifying microhabitat variables of salamanders (primarily the red-backed salamander, *Plethodon cinereus*) found in Van Cortlandt City Park in the Bronx, NY. We used this data to compare those same habitat variables with surrounding available habitats to determine if salamanders were preferentially selecting distinct micro-environments within an urban landscape. We also measured physiological traits to test if there was any easy way to evaluate the condition of individual salamanders in this urban location. We compared these data with information about microhabitat selection and condition for salamanders found in less disturbed environments. In this way we hoped to quantify the unique circumstances these urban populations might face. Our results show that salamanders may be preferentially selecting sites based on certain microhabitat variables. However, many of the variables we measured were found to not be unique to locations of urban salamanders. These results indicate that populations of this species may be able to persist locally, even given a highly modified and disturbed landscape if the appropriate microhabitat conditions are retained.

10-METABOLISM AS A BIOASSAY OF ENVIRONMENTAL STRESSORS: *HEMIGRAPUS SANGUINEUS* AS A MODEL ORGANISM

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Metal toxicity is an important abiotic factor in our understanding of the limitations of invasive species. Since its first observation in Townsend Inlet, New Jersey in 1988, the nascent establishment of the Asian shore crab, *Hemigrapsus sanguineus*, has overwhelmed intertidal regions along the East coast of North America from Maine to South Carolina. Nickel, a heavy metal abundant in many urban ecosystems, may serve as an indicator of stress in invasive species. Oxygen consumption as a function of time and weight is a useful measurement for metabolism, and also an indication of stress. Metabolic enzyme kinetics of the Krebs cycle enzyme, isocitrate dehydrogenase, and the post-glycolytic enzyme, lactate dehydrogenase, are also useful in revealing a stress response through an analysis of the individual's metabolism. This project looks to determine the metabolic activity at three levels of study when exposed to nickel (II) chloride hexahydrate as a metabolic stressor. Oxygen consumption indicates a significant decrease in rate at moderate concentration (10 mg/L) of nickel but not at high concentration (100 mg/L). Isocitrate dehydrogenase activity followed a similar trend to oxygen consumption but without significance after performing an analysis of variance. Lactate dehydrogenase increased significantly at high concentration (100 mg/L) of nickel indicating a stress response at the enzymatic level.

11-BACTERIAL INFECTIONS OF THE ZEBRAFISH (*DANIO RERIO*) SWIM BLADDER

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Swim bladders are gas filled sacs found in the abdominal cavity of fish. The main function of this organ is to provide fish with neutral buoyancy. Swim bladders serve an important role in its ability to help fish hear by amplifying sounds and vibrations. Swim bladder disease is a common ailment found in zebrafish (*Danio rerio*). Infection of this organ causes inflammation and prevents the inhalation and exhalation of gas, which hinders swimming, causing fish to float upside down or at the surface of the water. We set out to determine the bacteria that might be causing these infections in captive zebrafish. Zebrafish exhibiting sickness were anesthetized and had their swim bladder removed. There were a total of five trials conducted, with five fish in each trial. Fish were anesthetized by using Tricane and euthanized by severing of the spinal cord. Swim bladders were extracted and put into brain-heart infusion broth and incubated for 48 hours at 37 C. Samples were subsequently inoculated onto Phenylethyl Alcohol agar and Thiosulfate citrate bile salts sucrose agar and incubated for another 24 hours. Agar plates exhibiting growth were gram stained and revealed gram positive rods. Further biochemical analysis revealed that zebrafish swim bladders were infected with *Bacillus subtilis*, and *Bacillus coagulans*. This research will help us to identify fish pathogens and allow us to test which antibiotic treatment could be most effective.

12-DETECTING HUMAN VIRUSES IN THE LOCAL ENVIRONMENT

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Environmental waters that are used for recreational purposes and drinking water may be contaminated with unknown viruses. Some viruses that can cause human disease, such as poliovirus or hepatitis virus, are known to be spread through contaminated water (Cashdollar & Wymer, 2013). Currently, most water testing does not examine the viral populations, but focuses more on bacterial and parasitic organisms due to their size and ease of detection. The purpose of this study is to examine the local rivers and reservoirs of Connecticut, to detect any viruses present that could infect human cells. Specifically, we hypothesize viruses that can infect human cells will be present in Connecticut's Scantic River. To test this, we utilize a combination of methods and cell culture cells (293T and HeLa) that have the potential to allow are both more sensitive and more comprehensive analyses than previous methodologies. These include a recently developed detection method using FTIR spectroscopy, and also classical techniques such as viral plaque assays to support and extend the FTIR analysis. Proof of concept experiments were conducted last year and the preliminary data suggested the continuation of the study and optimization of the protocols. While still being analyzed, FTIR spectra of uninfected controls and water samples have shown noticeable differences suggesting the presence of infectious viruses in these waters. Future studies will look to determine the identity of any viruses present.

13-EFFECTS OF *BATRACHOCHYTRIUM DENDROBATIDIS* AND URBANIZATION ON *PLETHODON CINEREUS* IN LOWER NEW YORK STATE

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The chytrid fungus (*Batrachochytrium dendrobatidis*; *Bd*) is detrimentally impacting amphibian populations globally, however few studies document its presence within New York State (NYS). Some studies suggest that amphibian populations may differ in their ability to resist this emerging disease, with urban populations potentially being more resilient to the pathogen. This study aimed to investigate the prevalence of *B. dendrobatidis* in lower NYS, and to compare symbiotic microfloral resistance to *Bd* between urban and rural amphibian populations. Between the months of June and November of 2015, 21 amphibians (primarily *Plethodon cinereus*) were collected and swabbed for *Bd* in Van Cortlandt City Park and Harriman State Park. DNA was extracted from these swabs, subjected to Polymerase Chain Reaction (PCR), and compared to a positive sample. All samples have tested negative for *B. dendrobatidis* thus far, and microfloral challenges await the successful establishment and proliferation of *Bd* stock cultures. This ongoing study seeks to establish a consistent system to detect the presence of the chytrid fungus, and to work with *Bd* to better understand its relationship to amphibian symbiotic microflora.

14-INVESTIGATING THE INTERACTIONS BETWEEN ANTIMALARIAL AND ANTIRETROVIRAL DRUGS *IN VITRO* USING SYBR GREEN 1

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Malaria is one of the most common infectious disease in the world, causing 90% of deaths in sub-Saharan Africa. Likewise, AIDS accounts for 70% of deaths in that part of the world. As a result of this geographical overlap, co-infection with the HIV virus, the causative agent of AIDS, and *Plasmodium*, the causative agent of malaria is common. Previous research in our laboratory has shown that patients co-infected with *Plasmodium* and HIV in Benin City, Nigeria taking antimalarial and antiretroviral drugs, still had *Plasmodium* parasites present in their blood. We have shown that *P. falciparum* was the only species present in these patients at a 28.7% prevalence. We also have demonstrated that parasitemia was not a function of CD4⁺ T-cell count. Our working hypothesis is that the antimalarial drugs are inhibited by the antiretroviral drugs. This was tested by an *in vitro* parasite viability assay using the antimalarial drugs lumefantrine, sulfadoxine, and artemisinin, individually and in combination, in the presence or absence of the antiretroviral drugs lamivudine, zidovudine, stavudine, and nevirapine. Parasite viability was determined using SYBR Green I, a fluorescent marker which measures the amount of double-stranded DNA. Our preliminary data indicates that at low concentrations, sulfadoxine was a more effective antimalarial drug than artemisinin. Furthermore, we observe that all the antimalarial drugs were inhibited by the antiretroviral drugs, suggesting that the antiretroviral drugs are antagonizing the antimalarial drugs.

15-INVESTIGATING THE INTERACTIONS BETWEEN ANTIMALARIAL AND ANTIRETROVIRAL DRUGS

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Geographic overlap of the two infectious diseases, malaria and AIDS, is common in sub-Saharan Africa. The causative agent of malaria is the protozoan parasite *Plasmodium*, which is transmitted by the *Anopheles* mosquito. AIDS is caused by the Human Immunodeficiency Virus (HIV), a retrovirus that destroys CD4⁺ T- cells. It is propagated by contact with infected bodily fluids. Previous research in our laboratory has revealed low-levels of parasitemia in patients from Benin City, Nigeria co-infected with *Plasmodium* and HIV, taking both antiretroviral and antimalarial drugs. A lack of correlation between the levels of CD4⁺ T-cells and *Plasmodium* in these patients suggests no interaction between the HIV virus and *Plasmodium* parasite. Therefore, we hypothesized that antiretroviral drugs are inhibiting the antimalarial drugs. Our preliminary research, using a ³H- hypoxanthine incorporation assay, indicates that the antimalarials, sulfadoxine and lumefantrine are inhibited by all the antiretroviral drugs tested. We are in the process of confirming the antagonistic effect of the antiretrovirals by using an ELISA-based assay using the *Plasmodium* specific protein, the histidine-rich protein 2.

16-FILAMENTATION PROTECTS *CANDIDA ALBICANS* FROM AMPHOTERICIN B- INDUCED PROGRAMMED CELL DEATH VIA A MECHANISM INVOLVING THE YEAST METACASPASE, *MCA1*.

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The budding yeast *Candida albicans* is one of the most significant fungal pathogens worldwide. It proliferates in two distinct cell types: blastospores and filaments. Only cells that are able to transform from one cell type into the other are virulent in mouse disease models. Apoptosis, or programmed cell death, is a controlled form of cell suicide that occurs when *C. albicans* cells are exposed to fungicidal drugs like amphotericin B and caspofungin, and to other stressful conditions. We now provide evidence that suggests that programmed cell death is cell-type specific in yeast: Filamentous *C. albicans* cells are more resistant to apoptosis induced by either amphotericin B or caspofungin than their blastospore counterparts. Finally, our data suggests that this phenomenon is mediated by a mechanism involving the yeast metacaspase, *MCA1*. [In addition to funding from the RI-INBRE Program, our laboratory is supported by grant NIGMS R15 GM110578, awarded to N. Austriaco.]

17-GENOMIC ANNOTATION OF *DROSOPHILA ELEGANS* AND *DROSOPHILA BIARMIPES*

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Annotation and comparison of genomic sequences of multiple species, also referred to as comparative genomics, is very important for understanding organismal evolution, adaptation and gene conservation. Comparative genomics advances the understanding of gene function and homology between species. Furthermore, comparative genomics aids in the advancement of medical diagnoses and treatment. Here I present data from the Genomics Education Partnership (GEP). In this study, large genomic sequences (approximately 50-60 kilobases) of Chromosome 3L in the fly species *Drosophila elegans* were annotated, identifying putative coding regions and splice sites. This annotation was completed using the UCSC Genome Browser, Gene Record Finder, FlyBase, the Basic Local Alignment Search Tool (BLAST) and gene prediction software, such as GENSCAN. Multiple genes were annotated from these genomic regions, including P5CDh1, DNAPol-eta, and CS-2. While variation between isoforms was observed for most genes, a high level of conservation was found between the species *Drosophila melanogaster* and *Drosophila elegans*. This gene conservation was observed through the use of protein analyses, as well as through the use of Dot Plots comparing the two species. Furthermore, we have validated these *in silico* findings with dideoxy sequencing of the annotated regions of these two species. We have also set out to analyze the transcriptional start sites for genomic regions of *Drosophila biarmipes*, resulting in the putative identifications for multiple genes. The mapping of potential transcriptional start sites has the ability to build on the understanding of gene regulation, transcription and protein translation of specific genes of interest.

18-DOPAMINE MODULATION OF NEURON EXCITABILITY IN *C. ELEGANS* REQUIRES THE SMALL G PROTEIN RHOA

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Dopamine modulates neuron excitability by acting through G-protein coupled receptors. These receptors couple to protein kinase signaling pathways inside the cell including PKA and PKC which then modulate neural activity by phosphorylating neurotransmitter receptors, ion channels, and other signaling molecules. We have begun to investigate the mechanisms of dopamine signaling at the level of a single neuron in *C. elegans*, the ASH chemosensory neuron. ASH senses noxious cues in the worm's environment and activates a reversal behavior that allows the animal to move away from potentially harmful environments. Using a combination of behavioral and genetic analysis we found that the excitability of ASH is modulated by dopamine acting through both the conserved PKC pathway and through a novel signaling mechanism that includes the small G protein RhoA.

19-FINE MAPPING OF THE ROUGH FUR (RUF) MUTATION IN MICE

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The autosomal recessive mutation called rough fur (abbreviated *ruf*) first appeared in an animal stock colony comprised of C3H/HeJ mice. Homozygous *ruf* mice are characterized by a greasy 'wet' appearance, mild hyperkeratosis, and progressive hair loss. The *ruf* mutation was previously mapped to Chromosome 9, but no gene candidates were identified. Our mapping refines the *ruf* locus to a region of Chromosome 9 where four potential gene candidates were identified. Only one, myelin protein zero-like 3 (*Mpzl3*), when knocked out in mice displays the same phenotypic abnormalities as rough fur. Studies involving a similar mutant mouse rough coat (*rc*) has already been linked to a mutation in *Mpzl3* (*Mpzl3^{rc}*). We set out to determine if *ruf* is a mutation in the *Mpzl3* gene.

20-DETERMINING THE FUNCTION OF F10C2.4 IN REPRODUCTION

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F1 OC2.4 is gene that is hypothesized to be required for the timing of cell divisions and chromosome segregation in embryos. Using the model organism *Caenorhabditis elegans*, I have been performing a series of experiments to determine the role of F1 OC2.4 in embryo development using RNA interference to disrupt gene function. *C. elegans* is a good model system because of its fast reproduction rate, ability to self-fertilize, and similarity with human cell biology. I have found that if animals are missing functional F1OC2.4 there is a dramatic decrease of progeny. By using fluorescence microscopy, I plan to define the molecular reason for the decrease in progeny. This will allow us to define what F1 OC2.4 does in reproduction and what similar genes do in human cells.

21-PNEUMOCOCCAL CELL WALL INDUCES THE NEUROPROLIFERATIVE TLR2/6 PATHWAY AND INHIBITS THE INFLAMMATORY TLR2/1 PATHWAY

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Pneumococcus is the cause of up to 50% of cases of bacterial meningitis in the US each year. Current medical treatments are readily available to treat infected patients, however pneumococcal meningitis is still lethal in 30% of cases. This abnormally high degree of lethality is partially attributed to the cell wall (CW) of pneumococcus, which has proven to be highly irritant in the brain and cause the apoptosis of adult neurons through the TLR2/1 heterodimer pathway. However, while the neurons of the adult brain are stimulated to undergo apoptosis, the neurons of the fetal brain undergo a vastly different response when presented with pneumococcal CW. The fetal brain responds to CW by undergoing neuroproliferation, which is believed to be mediated by the TLR2/6 heterodimer pathway. In this study, we show that the TLR2/6 pathway appears to be the active player in the fetal system, while the TLR2/1 pathway is actively repressed. Additionally, we show that the TLR2/6 pathway is not active in adult neurons, but that the TLR2/1 pathway appears to be at work.

22-VINCULIN FOCAL ADHESIONS RETARD CELLULAR MIGRATION WITH INCREASING EXTRACELLULAR MATRIX CONCENTRATIONS

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Cellular migration is very important process in biology, with major implications in cancer and embryonic development. The characteristics of cellular migration, such as direction and rate, are dictated by a multitude of factors, including chemoattractants and the chemical composition of the environment surrounding the cell, known as the extracellular matrix (ECM). Our current research has shown that adding functional blocking antibodies to an important cellular adhesion protein, E-cadherin, significantly increases cellular migration. However, a siRNA knockdown of E-cadherin showed virtually no change in cellular migration when compared to the control. To explain this conflicting data we hypothesize that another adhesion protein, vinculin, is responsible for the cellular adhesions made in the absence of E-cadherin. To prove this we have turned our focus to the extracellular matrix (ECM). The ECM is an array of various proteins and other macromolecules which the cell interacts with, and is also the primary focus of our research. Up to date, we have empirically shown that a higher overall concentration of macromolecules in the ECM impedes the rate of cellular migration. The next objective of our research is to show that this impediment of migration is mediated by a cellular adhesion protein known as vinculin.

23-CONVERGENT EXTENSION IN kv2.1 DEFICIENT ZEBRAFISH EMBRYOS

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We investigated cellular and molecular processes in zebrafish embryos during the development of the notochord, approximately eight hours after the eggs are laid. During convergent extension (CE) cells on the periphery of the embryo are migrating to the midline and elongating the axis. By using confocal microscopy, we are able to view individual cells developing and migrating through CE. The mutant zebrafish embryos are generated throughout kv2.1 morpholino injections during the 1-cell stage. Morpholino knockdown of this voltage gated potassium channel alters the embryos at the cellular level. In the kv2.1 morphant embryos we find that as early as 90% epiboly CE is disrupted and results in an abnormal notochord when compared to the control-injected embryos. When the kv2.1 morphant notochord is viewed as a whole, we observe that the notochord is not only wider but also undulated. Taken together our data leads us to believe CE is disrupted and we hypothesize that the morphology and velocity at the cellular level has been functionally altered. By comparing changes in the morphology of the individual cells as well as the directional velocity of cellular migration we hope to elucidate the mechanism underlying defective CE in kv2.1 morphant embryos. We have found a novel development role for a well characterized protein and hope to use kv2.1 to further our understanding of CE in vertebrate embryos.

24-PCR IDENTIFICATION OF FOUR SPECIES OF BACTERIA IN COMMERCIALY AVAILABLE HORSE PROBIOTICS

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Supplements and probiotics have recently been scrutinized for false advertising. It has been found that many commercial supplements fail to contain the constituents indicated by the labeling. In this experiment two commercially available horse probiotics were assayed by PCR to specifically identify four bacterial species (*Lactobacillus casei*, *Lactobacillus acidophilus*, *Lactobacillus plantarum*, and *Enterococcus faecium*) listed. Results show that one product contained all four species of bacteria while the other contained only *L. plantarum* and *E. faecium*.

25-AVIAN MIGRATORY FLIGHT & OXIDATIVE STRESS: THE IMPACT OF EXERCISE ON ERYTHROCYTIC ANTIOXIDANT DEFENSE SYSTEMS IN EUROPEAN STARLINGS, *STURNUS VULGARIS*

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Migratory birds engage in strenuous exercise and continuous fat oxidation, both of which are known to increase oxidative stress. It is theorized that migratory birds have numerous antioxidant defense systems in order to cope with their increased level of oxidative stress. Avian erythrocytes are equipped with a number of enzymatic antioxidants to limit damage, including superoxide dismutase, catalase and glutathione peroxidase. The level and nature of fat content in their diet is also thought to play a role in coping with oxidative stress. In this study *Sturnus vulgaris* were fed diets varying in polyunsaturated fatty acid content (32% vs. 13%), and antioxidant levels (high vs. low) to illustrate the combined effects of diet and exercise on superoxide dismutase (SOD), glutathione peroxidase (GPx), and catalase (CAT). Each of the four diet groups contained 15 individuals who underwent flight training in a wind tunnel (trained) and 10 who did not (control). Erythrocyte samples were collected from each subject at the onset of the experiment (background) and following the experimental bird's most demanding flight (exercised). Samples were processed using standard protocols of Caymen SOD, GPx and CAT Activity Assay Kits. We predicted that trained birds would have higher SOD concentrations than controls within their own diet group. We also expected SOD, GPx, and CAT to be higher in birds fed the 32% diet vs. the 13% diet. Preliminary results show some support for our predictions. Our results are timely due to increased public interest in dietary antioxidants and how they promote human health.

26-NEUROGENESIS OBSERVED IN THE ADULT ZEBRAFISH OPTIC TECTUM

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Previous studies using light, transmission and scanning electron microscopy, has shown that the brain of the zebrafish (*Danio rerio*) has the ability to survive in organotypic culture for up to 14 days. Various studies have also shown that the optic tectum continued neurogenesis. In an attempt to gain a better understanding of the cellular events taking place in the surviving culture explants, our work utilized BrdU labeling to detect proliferating cells seen in the zebrafish optic tectum maintained in organotypic culture. The goal of this experiment was to further characterize the cellular composition and organization of the normal adult zebrafish optic tectum, as well as the embryoid bodies seen in the surviving brain explants of the organotypic. Six specific time points of cultivation were extensively analyzed; 12, 48, 96 hours, 7 days, 9 days, and 12 days. Optic tectum neurogenesis has not been extensively recorded in organotypic cultures of zebrafish brain, which in this experiment are used as a major traumatic event to the tectal tissue. The time points leading up to 7 days will then be used in comparison with other studies to determine homology and the data collected beyond the time point of 7 days will be recorded as new examinations.

27-PREVALENCE OF TREMATODE INFECTION OF THE MUD SNAIL, *ILYANASSA OBSOLETA*, WITHIN DIFFERENT ESTUARINE HABITATS OF THE BRONX (NY)

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The gastropod mollusk, *Ilyanassa obsoleta*, has been known to be an intermediate host of nine different types of parasitic trematodes, which not only influences the host's growth and behavior, but it also influences the diversity of the benthic community. Although *I. obsoleta* is the intermediate host to many species of trematodes, the prevalence of infection in most gastropod species may vary from one estuarine habitat to another. The objective of this experiment was to compare the presence of trematode infection in the mud snail, *Ilyanassa obsoleta*, from different estuarine habitats in Bronx (NY). Snails were collected from one low density (55 m⁻²) site in Clason Point Park and two high density (4500 m⁻²) subpopulations in Pelham Park. The snails' gonads (n=98) were removed and assessed for infection under a compound microscope. The percentage of parasitized snails from Clason Point was 20.0%, whereas the percentage of parasitized snails from the two subpopulations of Pelham Park was somewhat lower (6.06% and 6.67%). Comparing all three source populations, the prevalence of infection did not differ significantly ($\chi^2 = 3.74$, df = 2, P = 0.05). Even though the high density sites tended to have lower infection rates, additional samples would be needed to confirm this tendency.

28-CHARACTERIZATION OF THE CELL GROWTH INHIBITORY MECHANISM OF METHYL N-PHTHALIMIDOOXY-2-METHYLACRYLATE

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Due to recent advances in our understanding of the molecular biology of cancer, a substantial number of novel anticancer drug targets have been identified. The identification of these targets has led to the development of new pharmacophores that affect these targets. One novel class of potential anticancer agents are the imidooxy compounds represented by E49 and related compounds. The imidooxy compound E49 has been shown to inhibit growth in select cell lines within the National Cancer Institute's panel of sixty cancer cell lines. However, nothing is known about the mechanism of this cancer cell killing activity. Our early efforts to identify the mechanism of action of E49 have been focused on its actions in the fission yeast, *Schizosaccharomyces pombe*. In this model system, we demonstrate that E49 induces a dose dependent inhibition of growth. We further show that this inhibitory effect is cytostatic as opposed to cytotoxic and that E49 treated cells are smaller and less elongated than untreated cells. This small cell phenotype is similar to that of the *wee1* mutant. Based on these preliminary results we hypothesized that E49 acts through the inhibition of the *wee1* kinase. We tested this hypothesis through two experimental lines. First, we screened for the effects of E49 on the growth of various mutant strains including the *wee1* mutant and those that are synthetically lethal with the *wee1* mutation. Second, we tested to the ability of E49 to induce radiation dependent cell death in wild type and various *S. pombe* mutant strains.

29-THE EFFECT OF PSEUDO POLYELECTROLYTE COATINGS ON MAMMALIAN CELL CULTURE

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Multilayering of polyelectrolytes is a technique allowing for surface modification by alternately introducing two oppositely charged polymer solutions. These polyelectrolytes are divided into polyanions and polycations, with sub-divisions of strong, weak, and pseudo. We examined the ability of several of these compounds to affect the growth of normal kidney (HEK-293) and ovarian cancer (HeLa) cells. We utilized the pseudo polyelectrolyte, poly(4-vinylphenol) (PVPh) and the weak polyelectrolyte, polyacrylic acid (PAA); multilayered with polycations: poly(allylamine hydrochloride) (PAH) and poly(diallyldimethylammonium chloride) (PDADMAC). We coated cell culture plates with the polyelectrolytes in various settings, including single or alternating double, triple, or quadruple layers (e.g. polycation followed by PVPh), and at several pHs. We quantified the live/attached cells after 24 hours using a colorimetric tetrazolium compound based assay and observed a decrease in live cells, especially with PAH-PVPh and PDADMAC-PVPh coatings, a third or fourth layer diminishes the observed effect, and the cells are mostly affected at pH 11.5 or higher. We used calcein imaging to quantify the attached cells and their morphology at 1, 2, and 4 hours after seeding. Interestingly, it appears that PAH delays the ability of attached cells to fully adhere, while PDADMAC decreases total number of cells adhering to the plate. Cells that cannot attach will undergo a type of apoptosis termed anoikis. To measure apoptosis and cell cycle alterations we used flow cytometry at 24 hours. As expected, there was an increase in the percent of apoptotic cells, especially with PDADMAC, but no clear effect on cell cycle.

30-ANALYSIS OF SULFA DRUGS USING RAMAN SPECTROSCOPY AND DENSITY FUNCTIONAL THEORY (DFT) CALCULATIONS

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Sulfa drugs are commonly used in aquaculture, as agricultural herbicides and in the treatment of respiratory and urinary tract infections in humans. The aim of the work is to use Raman spectroscopy as well as density functional (DFT) calculations to characterize ten sulfa drugs namely sulfisoxazole, sulfamethizole, sulfamethoxazole, sulfathiazole, sulfachloropyridazine, sulfadimethoxine, sulfamerzine, sulfameter, sulamethazine and sulfadiazine. The first four mentioned sulfa drugs all have a five-membered ring attached to sulfonamide in comparison to the last six which have six-membered ring attached to sulfonamide. This difference and the functional group each of the sulfa drug possesses was analyzed in terms of vibrational bands that are both unique and common to the sulfa drugs. Results showed some unique peaks that are common to some sulfa such as the peak at around 1600 which can be found in all sulfa drugs except sulfisoxazole. Sulfathiazole on the other hand showed unique peaks at 1443 and 1502 cm^{-1} not found in other sulfa drugs. The data obtained was used to develop a method to identify sulfa drugs within a mixture.

31-DISCRIMINATION OF FLUOROQUINOLONE ANTIBIOTICS USING RAMAN SPECTROSCOPY

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Fluoroquinolones are antibacterial drugs used to treat UTI and respiratory infections. In this research, we will focus on four different types of fluoroquinolones, ciprofloxacin, enrofloxacin, norfloxacin, and sarafloxacin. The goal of this project is to analyze the chemical bonds and functional groups found in each sample using Raman spectroscopy and to differentiate the samples from each other based on the obtained Raman spectra. Theoretical calculations were also performed to aid in the assignment of the peaks. Results showed unique peaks that can only be found in a specific sample. Among these unique peaks are those found at 1359 and 1587 cm^{-1} for ciprofloxacin; 1432 and 1736 cm^{-1} for enrofloxacin; 1327, 1544, 1589, 1611 and 1719 cm^{-1} for norfloxacin; and 1271, 1402, 1446, 1489, 1597 and 1709 cm^{-1} for sarafloxacin. These peaks identify and distinguish the four fluoroquinolones.

32-MEASUREMENT OF ARSENIC AND HEAVY METALS IN GROUNDWATER IN BANGLADESH BY INDUCTIVELY COUPLED PLASMA ATOMIC SPECTROSCOPY

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About 97% of 160 million people in Bangladesh depend on groundwater as a principle source of drinking water. However, the groundwater in Bangladesh is found to be contaminated with arsenic (As) from geogenic origin. While the World Health Organization (WHO) permissible level for As is 10 $\mu\text{g/L}$, the As level in Bangladesh groundwater ranges from 100 to several thousand micrograms per liter in seriously affected areas. While most of the mitigation efforts are directed to removal of As from groundwater through various filtration systems, multielemental analysis of the water from an arsenic affected area reveals that the groundwater is contaminated with several other heavy metals. Using the analytical technique of inductively coupled plasma atomic spectroscopy (ICP-AES), we have analyzed water samples from 100 tube wells in four villages in a seriously affected area. In addition to As, heavy metals such as Fe, Mn, Pb, Sr, Ba, U and several other trace elements have been detected. For safe drinking water supplies for vast population, an effective filtration system needs to be developed. Interelement correlation in our collected data will be presented.

33-CHROMATOGRAPHIC ANALYSIS OF BEE PROPOLIS FROM DIFFERENT PARTS OF THE WORLD

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Propolis, a natural resinous substance collected by honeybees from buds and exudates of plants, is believed to be used in the beehive as a protective barrier against enemies. Also known to be a natural medicine, propolis contains beneficial characteristics such as antibacterial, antioxidative, antiviral, and antimicrobial properties. Depending on the season, bee species, vegetation, and the area of collection, the chemical composition of propolis are qualitatively and quantitatively variable. In this study, several propolis samples obtained from various parts of the world (Europe, Australia, United States and the Philippines) were analyzed using a chromatographic technique (gas chromatography-mass spectrometry GC-MS). Based on the results, most samples have different composition specific to the location of the beehive. Among the unique chemicals found are p- and m-coumaric acid from Australian propolis, chrysin from Pennsylvania propolis, flavones from California propolis, and 9, 19-cyclolanost-24-en-3-ol from the Philippine propolis samples.

34-METHOD DEVELOPMENT FOR ILLICIT DRUGS (AMPHETAMINE AND METHAMPHETAMINE) ANALYSIS IN BIOLOGICAL SAMPLES

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Analysis of illicit drugs such as amphetamines and its derivatives found in biological samples such as urine is usually done by chromatographic methods like gas chromatography (GC) and liquid chromatography (LC). The complex nature of biological samples results to the needs of using sample pretreatment methods such as solid phase extraction (SPE). There were SPE materials that were developed to improve sample pretreatment method and one of these are molecularly imprinted polymers (MIPs), a class of polymer-based recognition elements tailored to target a specific chemical or class of structurally related compounds. In this study, analysis using sample pretreatment method (SPE) with MIP was compared with analysis without treatment. In addition, the performance of two commercially available MIPs to extract amphetamine from water and synthetic urine was compared. Results showed a higher recovery of amphetamine in complex samples with the use of the sample pretreatment method (sorbents) as opposed to analysis without pretreatment. Similar results were obtained for both sorbents in terms of percent recovery of the amphetamine in both water and synthetic urine samples. An HPLC method utilizing these materials was also developed.

35-THE BIOCHEMICAL ACTIVITIES OF RAD51 PARALOGS RAD55 AND RAD57

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Homologous recombination is a repair mechanism that pairs and exchanges sequence information between two similar or identical molecules of DNA. It is most widely used by cells to accurately repair harmful double-strand breaks in DNA. Rad51 catalyzed homologous recombination repair is essential for genome stability; when homologous recombination is misregulated it leads to oncogenesis and the subsequent proliferation of cancer cells. Both Rad55 and Rad57 are paralogs of the Rad51 recombinase that serve to mediate Rad51 catalyzed homologous recombination repair. The Rad55 and Rad57 proteins are thought to function as a heterodimer and play multiple complex roles in the regulation of homologous recombination repair of DNA damage. The RAD51 paralogs have been shown to act in the displacement of RPA, the eukaryotic single-strand DNA binding protein, facilitating the loading of Rad51 onto the single-strand DNA; the stabilization of the RAD51/ single-strand DNA filament; the remodeling of this filament and the suppression of the activity of antirecombination helicases. We hypothesize that the RAD55 and RAD57 proteins of *Schizosaccharomyces pombe* act to stabilize the RAD51 presynaptic filament and stimulate the homologous pairing and DNA strand transfer reactions catalyzed by Rad51. This study characterizes the biochemical activities of RAD55 and RAD57. We assay the DNA binding, ATP hydrolytic and RAD51 stimulatory activities of these Rad51 paralogs.

36-THE ROLE OF THE RAD52 FAMILY RECOMBINATION MEDIATOR PROTEINS IN HOMOLOGOUS RECOMBINATION REPAIR IN THE FISSION YEAST

SCHIZOSACCHAROMYCES POMBE

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Misregulation of DNA repair plays a large role in the development and proliferation of cancer cells. A better understanding the processes that control DNA repair will aid in the development of new drugs that inhibit the cancer cell growth and tumorigenesis. The RAD52 protein of *Saccharomyces cerevisiae* is a key regulator of DNA recombination that is conserved throughout eukaryotes. However, the functions of this family of proteins in the control of recombination vary between organisms. The fission yeast, *Schizosaccharomyces pombe* has two RAD52 homologs, RAD22 and RTI1. We hypothesize that these two RAD52 homologs of *S. pombe* mediate homologous recombination via differing mechanisms. We tested this hypothesis via two objectives. Our first objective was the characterization of the DNA binding properties of these RAD52 homologs, employing etheno-DNA binding, gel mobility shift, and affinity chromatography assays to identify differences in their DNA binding activities. We then evaluated the effect of these proteins on the catalytic activities of the RAD51 recombinase. Specifically, we assayed for effects of these mediator proteins on the RAD51 DNA binding, ATP hydrolysis and DNA strand exchange activities.

37-HYDROPONICALLY GROWN MORINGA OLEIFERA SHOWS HIGH POTENTIAL AS A PREVENTATIVE TREATMENT FOR ALZHEIMER'S DISEASE

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Alzheimer's disease is ranked as the 6th leading cause of death in the United States, with over 5 million diagnosed cases. Natural products high in phenolic content have recorded high antioxidant potential, and high inhibition rates in the formation of advanced glycation end-products (AGEs). The bioaccumulation of AGEs has been linked to several chronic human diseases such as diabetes, inflammation, and neurodegenerative diseases. *Moringa oleifera* was grown in a hydroponics system to determine if the leaves and flowers would yield high concentrations of phenols, possess high antioxidant and anti-AGE inhibition. Leaves and flowers were extracted to yield four fractions: Crude, Ethyl Acetate, H₂O and Butanol. These fractions were subjected to HPLC, Total Phenolic Content, DPPH (antioxidant), and Anti-AGE assays. HPLC yielded the presence and relative concentrations of known phenols. Total phenolic content assay showed higher concentrations than previously reported for all fractions. The ethyl acetate fractions contained the greatest amount of polyphenols, 19,600 (leaves) and 12,367 mg/100g of GAE (flowers). The ethyl acetate fractions also showed highest antioxidant potential, yielding IC₅₀ values of 1.83µg/ mL (leaves) and 71.14µg/ mL (flowers). These results provide evidence that the ethyl acetate fractions of the leaves and flowers will inhibit the formation of AGEs in the fluorescent assay.

38-IDENTIFICATION OF MMP9 INHIBITORS

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Increasing the wound healing rate through inhibition of enzymatic activity is a pursuit that could have many benefits for a wide array of studies. Reductions in healing rates are typically caused because of the activity of a particular class of enzymes, one of which is Matrix Metalloproteinase-9 (MMP-9). MMP-9 helps break down collagen type IV, an integral component of wound healing. Inhibition of MMP-9 could potentially lead to increased healing rates through faster accumulation of collagen within the extracellular matrix (ECM). To identify inhibitors for further research, a virtual screen was performed on a database of FDA approved compounds using AutoDock Vina on MMP8 and MMP9. We identified the top 25 inhibitors based on binding affinity, relative safety and availability. We then researched the specific cleavage sites of MMP9 in order to make a proper fluorescent assay. We have been working to develop a feasible assay to quantify the activity of our identified inhibitors.

39-INTEGRATION OF HIGH PERFORMANCE LIQUID CHROMATOGRAPHY ELECTROSPRAY IONIZATION MASS SPECTROMETRY FOR IDENTIFICATION OF HYDROLYSABLE TANNINS IN LEAF EXTRACTS

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In this project, new techniques for the separation and identification of hydrolysable tannins in leaf extracts using High Performance Liquid Chromatography/Electrospray Ionization Mass Spectrometry (HPLC/ESIMS) integration were developed. Tannic extracts from Red Oak and Sweetgum leaves dissolved in 70% acetone were analyzed using these techniques, and known hydrolysable tannins were identified in each. A mass spectrometry-only technique was developed which proved effective for identifying major substituents in either of the extracts. This technique employed either direct injection of the extract into the mass spectrometers solvent loop or use of an auto-sampler bypassing the chromatography column. Additionally, an integrated High Performance Liquid Chromatography/Electrospray Ionization Mass Spectrometry technique was developed which was shown to achieve chromatographic separation of smaller components in the tannic extracts such that their mass peaks were better resolved and these compounds could also be identified. These techniques will be useful for fraction analysis in future work concerning macroscale separation of hydrolysable tannins using chromatography.

40-EXPANDING A NITROGEN BRIDGE ON EPIBATIDINE COMPOUNDS TO AIDE IN SMOKING CESSATION

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Nicotine is a very powerful and addictive compound that has many serious negative effects. Nicotine produces an effect by binding to different nicotinic receptors in the brain. The receptor releases dopamine which in return creates a positive consequence and can be the start of abuse of these and other drugs. Epibatidine is a potent nicotinic acetylcholine receptor agonist that was isolated from a poison dart frog in Equador. If epibatidine is used in minimal amounts, it is said to have many powerful, positive uses, such as pain relief. Analogs of epibatidine can be created to bind with different nicotinic receptors in the brain. Analogs, similar to epibatidine, built to modulate properties could act as an antagonist or partial agonist to the nicotinic receptors and not allow the positive reinforcement that can lead to abuse. In creating the expanded bridge on our analogs, we hope to be able to add different functional groups in order to change the selectivity of the compound. The focus in this research is creating a di-hydropyridine from a pyridine, which can then be added to a Diels-Alder reaction that will create our analogs, as it may be used to block nicotinic receptors. In this research, we hope to create a partial agonist that could aide patients in smoking cessation.

41-RATE STUDIES OF N-PROTECTED PYRROLES FOR THE SYNTHESIS OF EPIBATIDINE DERIVATIVES

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Nicotine addiction is a condition that has a negative impact on one's health and affects humans worldwide. Nicotine is the addictive ingredient found in tobacco. About 45 million people smoke tobacco every day. Nicotine addiction happens when a nicotine molecule binds to the $\alpha 4\beta 2$ receptor in the brain. The binding of the molecule stimulates dopamine to be released. Dopamine is a neurotransmitter that has a pleasurable effect causing addiction. Varenicline or Chantix, is a partial agonist at the $\alpha 4\beta 2$ receptor and is currently being used to aide smoking cessation. Another agonist being researched is Epibatidine. Epibatidine is a much more potent agonist at the $\alpha 4\beta 2$ receptor. It is a natural poison found in the skin of dart frogs. Epibatidine has a much higher binding affinity at the receptor than Varenicline. Epibatidine is not selective to just the $\alpha 4\beta 2$ receptor, it also binds to other nicotinic receptors which causes toxicity. This research focuses on synthesizing Epibatidine analogs through a Dies-Alder reaction to alter the selectivity by adding different functional groups. The different reaction rates of the Dies-Alder reaction when adding different dienophiles will be studied. This will allow Epibatidine to become more selective. The reaction is also focused on taking different N-protected pyrroles and reacting them with dienophiles while comparing the rate of these reactions. The overall goal is to find a more effective compound for treating nicotine addiction.

42-DETERMINATION OF POLYELECTROLYTE pKa VALUES USING SURFACE-TO-AIR TENSION MEASUREMENTS

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The determination of pKa values of acids can be done in a multitude of manners, ranging from the classic potentiometric titration to computationally. We envisioned that it would be possible to determine the pKa values of polyelectrolytes using surface tension measurements at the surface-to-air interface. When measuring surface tension at the surface-to-air interface of polyelectrolytes at differing solution pH values a classic sigmoidal curve was obtained with the inflection point being the pKa value of the polymer. The pKa value of PAA, PAH, PEI, PSS, and PMA were all obtained with this novel technique. We were also able to illustrate how both the polymer and salt concentration effects the surface tension at the surface-to-air interface and thus the pKa values. This is the first reported study of using surface tension at the surface-to-air interface to determine pKa values of acids.

43-USE OF LINUX OPEN-SOURCE SOFTWARE AND MAPLE IN ANALYZING THE NEW GOEKEN-JOHNSON RUNGE-KUTTE TYPE METHODS

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Autonomous ordinary differential equations for intermediate value problems are traditionally solved numerically by using Runge-Kutta methods. Some new Runge-Kutta methods have been developed, in which the user can evaluate functions. The novel feature of this approach is the replacement of evaluations of the function, by approximations of the function. We have implemented Goeken-Johnson algorithms by using C programming. In this presentation, the classical Runge-Kutta methods of orders 3, 4 and 5 are compared to the corresponding Goeken-Johnson methods using approximations of functions by using open-source software (Linux) and Maple. These results indicate that the new methods are at least comparable, if not better than the classical methods. We have also implemented a new Goeken-Johnson-type interpolation method and have a complete analysis comparing the advantages of each method using Linux and Maple.

44-MICROFINANCE ENTERPRISES FOR GSAP MICROFLUSH TOILETS

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Some 2.5 billion people in the world lack access to a proper toilet and the Global Sustainable Aid Project (GSAP) Microflush household toilet, has proven to be a viable solution. However, households in the lowest quintiles of the household income spectrum cannot afford the GSAP Microflush household toilet without a microloan. Many rural communities do not have microlenders and those that do have credit available often will not lend to the rural poor or will charge excessive interest rates. Consequently, our project utilizes the basics of the business process to empower a community woman, having a high school education and a few classes in business and IT, to create a sanitation credit business that makes microloans to needy households for the purchase of a GSAP Microflush household toilet. The project considers everything from the facilitated provider grant and donor goals to the basic elements of the business. A complete training manual has been created to be used in conjunction with a class- or on-line teaching-learning program aimed at developing appropriate preparation for a new LENDERS, again emphasizing women in that role. Finally, forms, such as loan forms, payment schedules, and tracking worksheets and action lists and work flow scenarios are assembled and packaged in a tablet-based system and used as part of the training program.

45-PHARMACEUTICAL POLLUTION: EXPLORING THE EFFECTS OF ASPIRIN CONTAMINATED WATER ON LEMNA MINOR

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Pharmaceutical products (i.e. anti-inflammatories, antibiotics, antidepressants, oral contraceptives, etc.) have been detected in sewage, surface water, ground water, and drinking water. When prescribed pharmaceuticals are ingested, only a portion of the active ingredient of the drug is metabolized; a portion of the consumed pharmaceutical are excreted through urine as metabolites and as an unused product in solid waste. Very few treatment solutions for pharmaceutical pollution are under investigation. Also, the long term effects of pharmaceutical pollution on human health, aquatic life and even our food supply still have not been determined. This is a multi-phase study investigating the effects of pharmaceutical pollution using a simple aquatic plant, *Lemna minor* (duckweed), as a model organism. The LD50 of duckweed in aspirin contaminated water and effects of aspirin on water pH have been determined. Effects of aspirin on duckweed in buffered aspirin solution were also determined. Current research involves introducing the bacterium *Acinetobacter calcoaceticus* P23, a plant growth promoting bacterium (PGPB), to duckweed to observe its effects on duckweed health in aspirin contaminated water. Those results will be compared to duckweed without PGPB in aspirin contaminated water. It is hypothesized that PGPB will increase duckweed health and possibly increase bioremediation success. Future directions of this study include investigating bioremediation success of duckweed in aspirin contaminated water and the effects of other types of pharmaceuticals on duckweed.

46-UTILIZATION OF WASTE SEASHELLS AND LOW-COST FEEDSTOCKS FOR BIODIESEL PRODUCTION

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The seafood industry annually produces a large amount of shell waste that requires expensive removal efforts, making more sustainable routes of disposal increasingly important. Waste shells can be repurposed as heterogeneous catalysts in the transesterification of various feedstocks into biodiesel. Biodiesel is a sustainable alternative to nonrenewable energy resources, though its cost and typical utilization of edible feedstocks can make production difficult. This project describes the use of waste shells in the synthesis of biodiesel from *Camelina sativa* oil and waste vegetable oil. The *Camelina sativa* plant grows favorably under a range of growing conditions and it is a low maintenance and cost effective source of oil. The utilization of waste vegetable oil as a feedstock offers a suitable means of reusing an additional source of food waste. The use of these renewable feedstocks and catalysts demonstrates the potential of low cost and waste materials in future biodiesel production. X-ray Powder Diffraction and Fourier Transform Infrared Spectroscopy were used to characterize the catalysts sourced from waste shells. ¹H NMR and FT-IR spectroscopy were used to analyze the biodiesel products.

47-THE EFFECTS OF PERCHED CULVERTS ON EEL POPULATIONS IN THE HUDSON RIVER WATERSHED

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A decline in the American eel (*Anguilla rostrata*) population has recently been noticed along the eastern coast of North America. The purpose of this study was to gather data about eel populations in the Hudson River Watershed and to see whether or not they are being affected by the presence of perched culverts. A total of 12 culverts sites were sampled. At each site, the altitude, distance from river, number of barriers between the culvert and the river, and other site characteristics such as water quality were recorded. Eel populations were enumerated by performing a two-pass sequential removal backpack electroshocking in 3 locations relative the culvert: downstream, upstream, and before the next barrier. The density of eels at each location was calculated using the estimated area measured. The true population size of eels at each location was estimated using a series of two-pass depletion equations. The relative health of eels was determined by comparing length and weight values of sedated eels. Total eel population numbers at each of the 12 sites were compared to different site characteristics in order to investigate eel presence. Results suggest that perched culverts act like dams in that they inhibit the upstream migration of eels in smaller tributaries. Site characteristic comparisons suggest that too few eels are reaching distant culverts to determine whether or not the culvert's presence is affecting those eels. These results may be used in future management decisions regarding the prioritization of new and existing culvert mitigation projects in the Hudson Valley.

48-EVIDENCE OF *CRYPTOSPORIDIUM SPP* IN THREE BIVALVE SPECIES COLLECTED FROM ORCHARD BEACH, NEW YORK.

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Bivalve mollusks obtain nutrients by filtering the aquatic environment. Bivalves are typically bottom-dwellers or spend their lives attached to substrates. Mussels and oysters are a common part of our diet. Recently, bivalves have been shown to be infected with the human intestinal parasite of the genus *Cryptosporidium*, which causes cryptosporidiosis in humans and other vertebrates. Therefore, bivalves could be useful as bio-indicators for detecting *Cryptosporidium* in aquatic environments. The goal of this study is to determine the prevalence of *Cryptosporidium* from mollusks of New York City using a polymerase chain reaction (PCR)-based assay. Four bivalve species, namely *Mytilus edulis*, *Mya arenaria*, *Geukensia demissa* and *Crassostrea virginica* were collected at low tide from Orchard beach New York in September 2014. For this study, we have focused on *Mytilus edulis*, *Mya arenaria*, and *Geukensia demissa*. We found that the prevalence of *Cryptosporidium* in *Mytilus edulis* was 1% (1/97), and 16% (7/44) in *Geukensia demissa*. Surprisingly, 50% (4/8) of the collected specimens of *Mya arenaria* tested positive for *Cryptosporidium* DNA. Our data indicates that *Mya arenaria* would be the best bio-indicator for *Cryptosporidium*.

49-PRESENCE OF HUMAN INTESTINAL PARASITES IN OYSTERS (*CRASSOSTREA VIRGINICA*): TEMPORAL TREND IN PREVALENCE AND GENOTYPE

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Bivalves, such as the Atlantic oyster, are excellent bio-indicators of marine environments. By filter feeding, these organisms often ingest various pollutants and parasites, providing an overall picture of the health of a marine habitat. *Toxoplasma gondii*, *Cryptosporidium parvum*, and *Giardia lamblia* are intestinal protozoan parasites that can lead to serious complications in immunocompromised individuals. Surprisingly, *T. gondii*, *C. parvum*, and *G. lamblia* have been found recently in many marine organisms. The goal of this study is to determine the prevalence of *T. gondii*, *C. parvum*, and *G. lamblia* in oysters. Oyster samples were collected from Orchard Beach in New York in the fall of 2014 and 2015 during low tide. Tissues were harvested from the oysters prior to DNA isolation. To determine whether the collected samples were infected with *T. gondii*, *C. parvum*, and *G. lamblia*, a polymerase chain reaction (PCR) was performed using primers specific to those parasites. We found that none of the tested samples from 2014, 0/10, were positive for *T. gondii* or *C. parvum*. However, a 60% prevalence of *G. lamblia* was found in the samples. It was determined that the *G. lamblia*-positive samples were of the assemblage A genotype. In contrast, a 33% prevalence of *G. lamblia* DNA was found in the samples collected in 2015, indicating approximately a two-fold decrease from 2014. We will be screening for *C. parvum* and *T. gondii* in the samples collected in 2015. The results indicate that Atlantic oysters are excellent bio-indicators of human intestinal parasites.

50- A NOVEL ROLE FOR IL-10 IN MEDIATION OF MAST CELL RESPONSES AND THE DEVELOPMENT OF IgE- DEPENDENT FOOD ALLERGY

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IL-10 is a pleiotropic cytokine that has manifold effects on immune cells and can regulate the outcome of immune responses. Herein we demonstrate a novel role for IL-10 in the activation of mast cells and the development of food allergy. Co-culture of mast cells with recombinant IL-10 (rIL-10) induced a significant increase in their expansion and resulted in enhanced production of mast cell-derived cytokines after activation with IgE and antigen. Furthermore, while IL-10-deficient mast cells exhibited attenuated responses upon IgE activation compared to wild-type controls, co-culture with rIL-10 significantly increased their expansion and activation as well. This effect of IL-10 on mast cells was further confirmed in a mouse model of food allergy. Oral ovalbumin challenge in sensitized BALB/c mice resulted in a robust intestinal mast cell response accompanied by allergic diarrhea, mast cell activation and increased Th2 cytokine production. In contrast, the development of food allergy including the above symptoms was significantly attenuated in IL-10-deficient mice. These data therefore suggest a critical role for IL-10 in driving mast cell activation and regulating the development of allergic diseases.

51-FORMULATION, EVALUATION, AND CHARACTERIZATION OF THE *IN VITRO* RELEASE KINETICS OF COMPOUNDED SLOW-RELEASE CAPSULES OF LIOTHYRONINE SODIUM (T3)

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Establishing the release kinetics of sustained release formulations is highly desired for rational drug development, effective utilization, and dosing regimens of any medication. The primary aim of this investigation is to formulate and evaluate the *in vitro* performance of extemporaneously compounded Liothyronine Sodium (T3) slow-release capsules, which currently are being compounded by pharmacists for thyroid dysfunctionalities specifically hypothyroidism. In this study, the dissolution release profiles of various composition of Methocel[®], Simple Cap[®], Lactose, and T3 were characterized and the cumulative percentage of drug release for each formulation over 24 hrs. was fitted to eleven release kinetic equations to determine the best model of drug release as well as the mechanism of the drug release. An enzyme-linked immunosorbent assay (ELISA) method was developed and validated to quantify T3 concentrations. Assay sensitivity was found to be in the ng/mL range and the optimal calibration range was found to be between 0-7.5 ng/ml, which corresponded well with the actual physiological concentrations of T3. The results indicated that Methocel[®] and Simple Cap[®] are both effective for slow-release of T3 and a various compositions of excipients in selected formulations were identified to exhibit a desirable slow-release pattern.

52-CRIMINAL MINDS AND LOONEY TOONS: A CONTENT ANALYSIS OF MENTAL ILLNESS ON TELEVISION

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The purpose of this study was to evaluate how the media portrays mental illness and compare it to the real world. There was been little research done on the topic and Stout and Villegas(2004) call for more inspection. We used content analysis methodology to identify and categorize incidence of mental illness portrayal in the media. All demographic information was recorded to see what groups were portrayed with mental illness. We also coded incidents of therapists and their demographic information. Contextual information of mental illness portrayal and the character reactions was included. All content was pulled from 320 random shows ranging from fiction (soap operas, dramas, crime/action, sitcoms, children, and teen shows) and nonfiction (news, talk shows, and magazine shows) videotaped from the 2012-2014 sample from the Center for Research on the Effects on Children (CRETV) archive. 10% of each genre of show was coded, with a minimum of 2 shows, of all eligible shows archived from 2012-2014. We found that media portrays of people affected by mental illness are rare but when they are shown they are predominately derogatory and negative. The most frequent portrayals of mental illness were off hand euphemisms meant to insult or mock. The media is a main propagator of the misconceptions about mental illness that stigmatize those affected. These sensationalized portrayals of mental illness often convey the idea that mental illness is exotic and dangerous.

53-TEACHING THIRD GRADERS ABOUT GENDER STEREOTYPING THROUGH MEDIA LITERACY

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Media literacy involves teaching children to critically analyze and evaluate media content and can be a very effective tool to use when teaching children about gender stereotypes portrayed in the media. This study looks at the effectiveness of teaching children about gender messages and gender stereotyping using constructivist media decoding of children's toys commercials, focusing primarily on the level of the children's engagement and participation during the lesson and sophistication of their responses. Using lessons created by Project Look Sharp, students from the Center for Research on the Effects of Television conducted participant observation studies of 3rd grade classes from elementary schools in Ithaca and Trumansburg, NY. The lessons focused on toy commercials that used gender techniques (actors, lighting, voiceovers, music, special effects, etc.) to convey the message that the toy was made just for girls or just for boys. The researchers coded the children's participation, reactions, comments, and overall level of engagement in the lessons, in addition to their ability to successfully identify gender techniques and gender stereotypes in the commercials. The observational data showed high levels of engagement and understanding by both boys and girls, including an understanding of the advertiser's purpose and the role of the actors playing the parts of children in the ads. At a later time, students will complete a short follow-up questionnaire to assess their understanding of the lessons, and teachers will be completing an online survey about the effectiveness of the lessons.

54-YOURS, MINE OR OURS? THE EFFECT OF PSYCHOLOGICAL OWNERSHIP ON CONSUMERS' TERRITORIAL RESPONSES

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Psychological ownership, or a sense that “It’s mine!” (Pierce, Kostova, & Dirks, 2003) refers to feelings of ownership of a target independent of legal ownership. Psychological ownership of a target can emerge from feelings of control of, a sense of intimate knowledge of, or an investment of self in the target. Psychological ownership has garnered interest among psychology, management and marketing researchers (Kirk, Swain, & Gaskin, 2015) partly due to its positive outcomes, such as organizational citizenship (van Dyne & Pierce, 2004) and willingness to pay for products (Peck & Shu, 2009). Nonetheless, territoriality, defined as the behavioral expression of psychological ownership in a social context (Brown, Lawrence, & Robinson, 2005), is a more nuanced outcome that is less understood. We predict that consumers who feel they psychologically own a target will perceive an infringement and respond territorially to another individual’s signal of psychological ownership of the same target.

In Spring 2016, a laboratory study is being conducted to test our hypotheses. Specifically, the study is a 2 (consumer psychological ownership: low vs. high) x 2 (other’s psychological ownership signal: no vs. yes) factor between-subjects design. Data collection is currently under way and results will be presented at the conference.

POSTER PRESENTATION ABSTRACTS

1- EMERGING ANTHROPOGENIC CHEMICALS IN THE HUDSON RIVER: THE POTENTIAL HISTOPATHOLOGICAL AND CHEMICAL EFFECT ON AQUATIC VEGETATION

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Rapid increase of anthropogenic pollutants such as commonly used prescription drugs and pharmaceutical personal care products (PPCPs). Lack of available methods to remove these compounds from the wastewater raises concern among the scientific community on the impact on human and environmental health. In this study, the effect of Fluoxetine, Amphetamine and Triclosan was investigated using the aquatic plant, arrow arum (*Peltandra virginica*) as a model. Experimental treatments were conducted in tanks filled with raw Hudson River water. There were a total of sixteen tanks and each treatment was replicated twice with three plants in each tank. The following experimental treatments were established: 0.05 and 5.00 mg/L (Fluoxetine), 2.00 and 200.0 µg/L (Amphetamine), and 0.0023 and 0.23 mg/L (Triclosan). In addition, the following controls were established: a flow through that contained a continuous run of raw Hudson River water and a filtered standstill of Hudson River water. After 18 days of exposure, most plants visibly had a decrease in chlorophyll content and growth. Reduced plant growth raises concern for the potential bioaccumulation and possible the biomagnification effects.

2-THE USE OF VOLATILE ORGANIC COMPOUNDS AS A GREENER ALTERNATIVE TO CONTROLLING PLANT-PARASITIC NEMATODES

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Green alternatives to pest control are crucial, to sustain the rapid growth of the crop industry and reduce harmful use of pesticides. Nematodes are microscopic round worms that live primarily in soil habitats. There are over 2,000 different species of plant-parasitic nematodes that have been identified to attack the roots and underground parts of host plants. Due to their microscopic size and underground habitat, plant-parasitic nematodes are becoming one of the most difficult pest problems to control and are resulting in large losses of world crop production. Although chemical fumigation has proven to be an effective method for eliminating nematode pests, it negatively impacts the environment. It has been found that infested plants release a variety of volatile organic compounds (VOCs) to protect themselves from natural enemies. The purpose of this study was to test the chemo-attractive behavior of *C. elegans* exposed to different VOCs at varying concentrations. Chemotaxis assays were prepared by dividing Petri dishes into four quadrants; two opposite quadrants contained the test VOC while the other two contained a control. Levisamole, an anesthetic was placed at all four sites. The worms were placed in the center of the plate equidistant from each of the four samples. The assay was left for one hour and choice was determined by the number of worms at each quadrant. Chemotaxis indices were performed and recorded. The results of this study support the need to investigate safer and greener alternatives for nematode pest control.

3-DOES HERBIVORE DAMAGE SIGNAL DAMAGED GOODS TO PARASITIC PLANTS?

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Plants protect themselves from herbivore damage by inducing defensive compounds. These defenses result in a cascade of changes in the plant that can reduce preference and performance of subsequent antagonists such as herbivores and pathogens. Less well understood is how herbivore-mediated changes to plant hosts will affect parasitic plants. Cranberry (*Vaccinium macrocarpum*) plants were grown in the greenhouse and subjected to herbivore damage by gypsy moths (*Lymantria dispar*) for two days. Using dynamic headspace sampling, volatile emissions from damaged and undamaged plants were collected to determine whether the parasitic pest dodder (*Cuscuta* spp.) could discriminate against herbivore damaged cranberry plants based on plant signals. Collected scent was then eluted with hexane, concentrated and injected onto a Gas Chromatograph-Mass Spectrometer (GC-MS). Compounds were qualitatively analyzed by matching retention times to the NIST Spectral Library and previously run standards. Results showed that dodder do discriminate against plants that have been damaged by herbivores, preferring plants that were not attacked. Parasitic plants can profoundly impact host growth and reproduction. Understanding what drives host choice by parasitic plants will help us gain a clearer understanding of the underlying mechanisms that shape communities.

4-THE EFFECTS OF MYCORRHIZAE ON EARLY AND LATE SEASON DAMAGE OF PHASELOUS VULGARIS

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Innovations in agriculture are of vital importance as our world population surpasses seven billion people and continues to grow. Adding to the problem, climate change is threatening to reduce arable land. Arbuscular mycorrhizae fungi (AMF) are mutualists of plants that increase nutrient and water access and have the potential to reduce the detrimental effects of antagonists such as herbivores and pathogens. Crop losses due to herbivory are likely to increase with climate change. Moreover, there may be changes to the ontogenetic development of crops and their herbivores changing the timing of herbivore damage relative to plant development. To test the effects of mycorrhizae on plant resistance to herbivore damage, fifty *Phaseolus vulgaris* were grown from seed under grow lights in the lab. Half of the seeds were treated with commercially available AMF. Leaves were damaged at the early flower bud stage for half of the plants and at the late flower bud stage for the other half. We tested whether plants can compensate for early and late damage by measuring subsequent growth and reproduction. Understanding a plant's response to the environment such as global warming-induced changes in herbivore behavior can inform farmers' decisions about pesticide and mycorrhizae use.

5-ASSESSMENT OF FRESHWATER ECOSYSTEMS NEAR WNEU

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The health of four freshwater aquatic ecosystems that have been exposed to varying levels of anthropomorphic activity was assessed. Both Breckwood and Venture Ponds are found at the base of hills and receive runoff from heavily traveled roads. Mill Pond is a relatively pristine pond surrounded by a protected forest, and Workshop Pond is located near an industrial area. Chemical variations between the 4 ponds were apparent. Nitrate and dissolved oxygen concentrations were greatest in water collected from Workshop Pond, and dissolved CO₂ and calcium levels were highest in Mill Pond water. Phosphate and silica were not detected in any of the water samples, while phosphorous was detected in all four sediment samples (10 mg/L). Potassium concentrations were greatest in sediments collected from Venture Pond (60 mg/L), and the pH of all four sediment and water samples was acidic (≤ 6.5). Microbial community analysis was also conducted on sediments collected from the four ponds. DNA was extracted, and bacterial 16S rRNA gene sequences were amplified by PCR and sequenced on a 454 platform. This analysis showed that different bacterial communities were present in the various ecosystems. These chemical and microbial community analyses should provide us with a detailed assessment of freshwater ecosystems in the vicinity of WNEU that may be used for future conservation efforts in the area.

6-AN ANALYSIS OF VOCAL INTERRUPTIONS DURING LAR GIBBON DUETS

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Vocal duet behavior occurs when two individuals produce repeated, stereotyped vocalizations predictably in time, with alternating contributions from each. Duetting has evolved independently in many taxa, with duets often produced by mated pairs in monogamous species. Duetting occurs in most gibbon species, the only apes known to engage in this behavior, but little is known about how these duets are coordinated by mated pairs. The white-handed or lar gibbon (*Hylobates lar*) is a socially monogamous duetting ape. We hypothesized that the lar female great call inhibits male calls during duets and that male calls likewise inhibit great calls. We therefore predicted that great calls which are interrupted by males will be abnormal, lacking the features typically needed to suppress male calling, and will also typically be abandoned after male interruption. To test these hypotheses, we compared 1) interrupted great calls that were aborted by the female 2) interrupted great calls that were completed, and 3) uninterrupted, completed great calls, from 10 pairs of wild lar gibbons recorded at Khao Yai National Park, Thailand. Our findings show that when female great calls fail to rise in pitch, an indication of an impending call climax, they are typically interrupted and aborted, although females sometimes complete normal calls even when interrupted. As great calls are associated with territorial defense and their climaxes correlate with the female's physical condition, our findings suggest that successful production of a female call climax is not only in the interest of the female, but also her mate.

7-BRINGING SEXY BLADDERWRACK: TEMPORAL CHANGE IN MACROALGAL DIVERSITY AND PERCENT COVER IN DINGLE, IRELAND

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Biological communities living along coastal zones are particularly exposed to anthropogenic pressures because human density and activities are concentrated along coasts. Understanding how biological communities respond to anthropogenic pressures is crucial to preserve biodiversity. We investigated temporal variation in macroalgal diversity and percent coverage at the mouth of the Mill River in Dingle, Ireland, a small town that experiences a 10-fold increase in population density across summer months due to tourism. We assessed macroalgal diversity and % cover across different tidal heights. A total of six different taxa were observed at Mill River. Species diversity was higher in the upper intertidal sites across all sampling periods. *Enteromorpha* spp was the most common species present across all sites. In general, seaweed diversity and abundance decreased from May to July as nutrient concentrations increased and temperature decreased.

8-INFLUENCE OF HABITAT ON ABUNDANCE AND DISTRIBUTION: DO JUVENILE HORSESHOE CRABS GIVE A CRAB?

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The Atlantic horseshoe crab (*Limulus polyphemus*) is one of four extant species within the horseshoe crab family. It is the only species that is found on the North American continent and is historically found along the eastern seaboard of the United States. They are an important resource for the biomedical industry as well as whelk and eel fisheries, which have negatively impacted their population density over the last few decades. Survival of juvenile horseshoe crabs is important for success of Long Island Sound's current population and for the future of these industries, yet little is known about the required habitat for this age class within the population. We investigated several beaches to determine if there are common environmental factors that correlate with juvenile horseshoe crab density including: meiofauna diversity and density, sediment grain size, and total organic carbon. We sampled several beaches by randomly sampling 10 quadrats along three fixed transects at each beach at low tide. Sediment samples were collected randomly within each transect to determine grain size and total organic content. Core samples were analyzed for meiofaunal diversity and abundance. Preliminary analyses indicate that juvenile horseshoe crab density is positively correlated with meiofaunal density/diversity and total organic content but negatively correlated with sediment grain size. We discuss the results in relation to potential juvenile horseshoe crab management strategies.

9-HOW SQUIRRELS TRY TO EVADE RECOGNIZED THIEVES

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We studied Eastern Gray Squirrels' (*Sciurus carolinensis*) behavioral responses to a human observer who tried to unearth the squirrel's cached acorns (thief), compared to one who solely followed them around as they buried acorns (non-thief). The squirrels for this study were followed as they buried pin oak acorns that had naturally fallen from trees on the Central Connecticut State University campus. The closest person following the squirrel alternated between a thief and a non-thief. We found that when a squirrel was followed by a person from whom it had experienced a theft attempt, it increased its evasive behavior. It took longer to bury subsequent acorns, more frequently moved out of sight of the observer while carrying an acorn, and dug more unused holes before actually burying the acorn, compared to when it was followed by a non-thief. These results indicate that squirrels can categorize individuals of another species as thieves or non-thieves, which may be relevant to natural conditions in which some individuals of other species may specialize on pilfering their caches, while other individuals in the same species pose no threat.

10-A COMPARISON OF AQUATIC COMMUNITY COMPOSITION WITHIN PLOTS OF INVASIVE *MYRIOPHYLLUM SPICATUM* AND NATIVE *ELODEA CANADENSIS*

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Submerged invasive plants often cause detrimental effects in the environments they invade. However, it is also true that some invasive species increase biodiversity and lead to positive effects on an environment. This study sought to determine whether consumer community composition differed in patches of non-native *Myriophyllum spicatum* in comparison to native *Elodea canadensis*. We used throw traps to sample the consumer community within patches of *M. spicatum* and/or *E. canadensis* at two sites: Osbourndale Pond in Derby, CT (*M. spicatum* and *E. canadensis*) and Colony Pond in Ansonia, CT (reference pond, *E. canadensis* only). We found that within Osbourndale Pond *Myriophyllum spicatum* and the native *Elodea canadensis* showed no difference in community composition, suggesting that the invasive plant supports a similar community as native plants. However, there was a significant difference in the community composition between the pond with *M. spicatum* and the pond without the invasive plant. The difference in community composition between sites was driven primarily by higher oligochaete and isopod abundances in the pond with milfoil and higher chironomid, amphipod, and nematode abundances in the reference pond. Our results suggest that invasive *M. spicatum* has had little, if any, effect on local community composition. However, future studies examining community composition at multiple ponds with and without milfoil are needed to clarify the effects of the invasive plant on invaded communities.

11-IDENTIFICATION OF HEAVY METAL DETOXIFICATION PROTEINS IN GEOBACTER SULFURREDUCTENS

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Many different species from the genus *Geobacter* are resistant to a wide range of heavy metals and metalloids. The model *Geobacter* species, *Geobacter sulfurreducens*, has genes coding for an arsenic efflux protein (*acr3*), five RND transporter proteins (*czcA1*, *czcA2*, *czcA3*, *czcA4*, and *czcA5*), two P-type ATPases (*cadA* and *copA*), and three CDF proteins (*cdf1*, *cdf2*, and *cdf3*). Genetic strains lacking all of these transporter genes were constructed and their phenotypes were analyzed. Mutant strains with nonfunctional Acr3 proteins were unable to grow in the presence of arsenic. Deletion of the *czcA5* gene did not have an apparent phenotype, however, growth was impaired in *czcA1* and *czcA2* deletion strains in the presence of Cu^{2+} and Ag^{2+} , respectively. Deletion of the gene coding for CzcA3 eliminated the ability for *G. sulfurreducens* to grow in the presence of four metals; Cu^{2+} , Ni^{2+} , Zn^{2+} , and Co^{2+} . Phenotypes were also observed for *cdf1* and *copZ* mutant strains; neither could grow in the presence of Ag^{2+} and *cdf1* and *copZ* mutant strains were also impaired by Co^{2+} and Cu^{2+} , respectively. These studies clearly show that proteins encoded by genes from all four groups of metal transporter families are involved in heavy metal detoxification by *Geobacter* and allow this organism to tolerate extremely high concentrations of heavy metals and metalloids.

12-ANTIMICROBIAL PROPERTIES OF CLOVE OIL AND TURMERIC AGAINST STAPHYLOCOCCUS AUREUS AND ESCHERICHIA COLI

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Worldwide the food industry is combating the repercussions of food spoilage due to the growth and contamination of many foods by food borne pathogens. Combating these pathogens has never reached its full potential, with all the preservative methods that human beings have come up with; there is never a 100 percent success rate. Turning to chemically synthesized substances such as antibiotics can potentially lead to dangerous side effects, even though these chemicals are able to act as a germicide. In this study the use of naturally derived plant extracts such as clove oil and turmeric were tested on *Staphylococcus aureus* and *Escherichia coli* to determine the effectiveness of these agents as antimicrobial agents. These two microorganisms are readily found in and on the human body, which is why it would be of interest to be able to combat these bacteria and their potential pathogenicity to humans. In this study the plant extracts were diluted 1:10, 1:100, 1:1,000, 1:10,000, and 1:100,000, was to determine whether the extract performs as a bactericidal agent or as a bacteriostatic agent.

13-ANTIMICROBIAL PROPERTIES OF PLANT EXTRACTS AGAINST GRAM-NEGATIVE BACTERIA

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In the field of medicine, chemical antibiotics are very widely used. However, these medications can sometimes have harmful side effects on humans as well as create bacteria that ultimately become resistant. Finding an alternative way of creating antimicrobials through testing plant extracts could cut down on the harm caused by the chemical antibiotics. In this research, the researcher used three extracts, ginkgo biloba, turmeric and clove oil and tested them against the bacteria *Klebsiella*, *Pseudomonas fluorescens*, *Morganella* and *Acinetobacter*. In order to complete the research, three ten-fold dilutions of the plant extracts were created and inoculated with the bacteria. The bacteria and extract mixture was swabbed on a nutrient agar plate and incubated at room temperature for a week. When observed after the week, the clove oil was found to have the best result as it had inhibited all four bacteria at all three concentrations. Further research should be done to examine the lowest effective concentration of clove oil that will have the same results.

14-HISTOLOGICAL OBSERVATIONS OF MICROBIOTA-DEPLETED PLANARIA

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The diverse and complex microbial population of the human gastrointestinal tract continuously changes as it adapts to changes in the host. A disruption in endogenous gut microbiota for a prolonged period of time is said to lead to an imbalanced homeostasis. Physiological and behavioral abnormalities such as obesity, diabetes, irritable bowel syndrome, cardiovascular disease, and neuronal disorders are associated with such imbalance. To study the gut microbiota – specifically the relationship between the organism as a whole and its microbial population – our lab has chosen a simple animal model organism, the planarian *Dugesia tigrina*. Previous work has produced bacteria-depleted organisms using high-dose antibiotic treatment as the method of depleting bacterial populations, then studying the microbial recolonization following termination of treatment. Histological sections of the planarian gastric region are an attractive and direct method for tracing changes in the gastric cavity and lining morphology as a result in alterations of microbiota diversity and population. Here we are studying the animals' most prominent anatomical structures, and phenotypically distinguish between normal planaria, those which are microbiota-depleted, and those recolonized after cessation of drug treatment.

15-IDENTIFICATION OF SINGLE NUCLEOTIDE POLYMORPHISMS FOR DISCRIMINATION BETWEEN FOUR COMMON BREWERY STRAINS OF YEAST

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The strain of yeast selected for primary fermentation in the beer brewing process can have major effects on the beer flavor; accordingly, inoculating (pitching) the correct pure strain to the prepared wort, depending on the desired flavor characteristics of the beer, is an essential part of the brewing process. In the craft brewing industry it is common for breweries to use multiple yeast strains, making assurance of strain purity and contamination detection essential to product consistency. We have analyzed the DNA sequence of six genes in four common brewery strains of yeast used in the production of specific beer styles of beer—American IPA, Lager, Hefeweizen, and Saison--in order to identify strain specific patterns of Single Nucleotide Polymorphisms (SNP). Current results indicate sufficient SNP variation between strains to allow development of either high-resolution-melt-curve analysis or probe-based PCR assays for analysis of strain purity and contamination detection.

16-EFFECTS OF PLANT EXTRACTS ON GRAM NEGATIVE BACTERIA

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Pseudomonas aeruginosa is a gram negative, rod shaped bacterium that is commonly found growing in the environment. This bacterium does not have complex nutritional requirements allowing it to grow abundantly in a laboratory setting as well as in nature. This abundance is a problem as the bacteria can cause severe, and possibly fatal illness in humans and animals. It is also beginning to become resistant to antibiotics. Because of this, new methods are being researched to prevent the spread of this bacterium. Certain plant extracts, in this research specifically, chamomile, nutmeg, basil, and clove, have antimicrobial properties that could be effective agents against bacteria such as *P. aeruginosa*. These properties were tested through two different methods; inoculation and swabbing on a selective agar as well as producing mix plates. Out of the plant extracts that were tested chamomile appeared to have the most effective antimicrobial properties. On the plates that were observed, those swabbed with the highest concentration of chamomile, had the fewest colonies of *P. aeruginosa* grown. This observed antimicrobial action may be due to the active metabolites in the chamomile plant, such as α -bisabolol, that are not in the other extracts used.

17-ISOLATION OF *STAPHYLOCOCCUS* BACTERIOPHAGE

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Staphylococcus spp. are a normal inhabitant of the human skin microbiota. However, certain strains of *Staph* exhibit pathogenic characteristics, with methicillin-resistant *Staphylococcus aureus* (MRSA) being the most prominent. Traditional therapeutics such as antibiotics are declining in efficacy due to an increase in the antibiotic resistant profiles of many *Staph* strains. Several novel methods are being developed in order to combat this ever-growing problem, including the use of lytic bacteriophage to specifically target MRSA cells. Bacteriophage were isolated from *Staphylococcus* spp. cultured from local white-tailed deer and spotted on *Staph* type strains to determine host range specificity. It is envisioned that such viruses will be of value as they have not been in contact with clinical species of *Staph* and hence none of the bacteria should have any built-in immunity to them.

18-IDENTIFICATION OF ENTEROBACTERIACEAE IN HORSE STOOL USING ENTEROPLURI TUBE TEST

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Probiotic supplements are a large and growing industry in the United States for livestock supplementation. Equine probiotic supplements claim to boost the presence of mutualistic bacteria within the equine gut. Enterobacterial markers are needed to test these claims by comparing bacterial health pre and post probiotic treatment. Fecal samples from a healthy male horse were collected and used to identify 3 species of Enterobacteriaceae (*Serratia liquefaciens*, *Pantoea agglomerans*, *Citrobacter amalonaticus*) using gram stain, oxidase stain, and Enteropluri test.

19-ANALYSIS OF HFQ AND RPOS FUNCTIONS IN STATIONARY PHASE SURVIVAL IN THE METAL-REDUCING BACTERIUM *SHEWANELLA ONEIDENSIS*

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The bacterial RNA chaperone protein Hfq has been broadly implicated in the function of small, regulatory noncoding RNAs that contribute to adaptive gene expression. In previous work we have found that loss of Hfq in the dissimilatory metal reducing bacterium *Shewanella oneidensis* results in slow exponential phase growth, reduced terminal cell density in stationary phase, a high level of sensitivity to oxidative stress, and, in striking contrast with the wild type strain, a complete loss of colony forming units in post death phase cultures. We are investigating the molecular basis for the stationary phase survival defect of the *hfq* mutant. Because the stationary phase sigma factor RpoS promotes cell survival in other bacteria, our working hypothesis is that deficient RpoS function underlies the stationary phase survival defect of the *hfq* mutant. Consistent with this hypothesis, we have found that the *hfq* mutant expresses *rpoS* at significantly lower levels than the wild type strain during exponential phase, the transition into stationary phase, and stationary phase. We have also shown that increasing *rpoS* expression using an inducible expression plasmid rescues the stationary phase survival defect of the *hfq* mutant. Intriguingly, our preliminary data suggests that exponential phase expression of *rpoS* is responsible for promoting stationary phase survival of *S. oneidensis*.

20-THE DIPEPTIDE, CYSTEINE-GLYCINE, IS THE ACTIVE COMPONENT OF GLUTATHIONE THAT IS RESPONSIBLE FOR THE REDUCTIVE STRESS RELATED KILLING OF MYCOBACTERIUM BOVIS-BCG

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The World Health Organization recently reported that approximately half of the world's population with Mycobacterium tuberculosis is infected with drug/multi-drug resistant strains. Understanding how mycobacteria respond to different host environments could provide novel information for how the bacteria achieve resistance. *M. bovis*-BCG, a safe organism used for the study of tuberculosis, models the organism's metabolic pathways. Glutathione (GSH), a molecule produced by the human immune response when infected by *M. tuberculosis*, is known to kill actively growing *M. bovis*-BCG by inducing a toxically reduced environment within the organism's cytoplasm. GSH is cleaved outside of BCG by an enzyme, gamma-glutamyl transferase (*ggtA*), into two molecules: gamma-glutamate and cysteine-glycine (Cys-Gly). The Cys-Gly can then enter into the bacterial cell by a dipeptide permease (DPP) transporter. This study is to test whether Cys-Gly is the active component of GSH that is responsible for the reductive stress-related killing of mid-log BCG upon exposure to GSH. When both BCG and a strain of BCG with a copy of the dipeptide permease gene interrupted by a selective marker are exposed to Cys-Gly, then survival rates determine whether the dipeptide is entering the cell. If Cys-Gly is responsible for reductive-stress mediated killing, the peptide will not kill the mutant BCG because it will be unable to transport into the cell. Preliminary data suggests that with the Cys-Gly permease blocked, cells are viable after 4 days of 8mM Cys-Gly addition; however, preliminary trials with BCG and cDPP do not show significant cell death.

21-ISOLATION OF PVC/ISN GENE HOMOLOGS FROM UNCHARACTERIZED PSEUDOMONAS SPECIES

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The isocyano/isonitrile group is an unusual functionality present in a diverse class of secondary metabolites. This moiety is synthesized through a series of steps found in enzymes that can produce an unusual carbon nitrogen triple bond. One such enzyme, IsnA, has been shown to be responsible for this reaction, and the gene sequence has been determined. Other related proteins, most notably for our study PvcA, have been found. The crystal structure of some of the proteins is known. However, it must be recognized that there are large numbers of compounds containing this isonitrile group and hence different chemistries are involved in their synthesis as well as alternative proteins responsible for the corresponding reactions. The interaction of IsnA and IsnB and its homologs in other organisms with diverse proteins in their corresponding biosynthetic pathways is poorly understood at the present time. Experiments related to this project include isolation of genes for production of isonitrile-containing compounds from *Pseudomonas* and related microorganisms in order to find previously unrecognized members. The gene will be amplified via PCR and the resulting gene will be cloned into an expression vector for subsequent protein production and purification.

22-BACTERIOPHAGE THERAPY FOR THE SKIN DISEASE ACNE AND PHAGE-RESISTANT ISOLATES OF PROPIONIBACTERIUM ACNES

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The skin disease acne imposes a significant personal burden on those afflicted. One of the main contributors to acne lesions is the overgrowth of one bacterial species commonly found on skin, *Propionibacterium acnes*. We have been developing a bacteriophage-based therapy for acne, one that uses *P acnes* specific phage to target this bacterial species on skin. To this end, we have amassed a large collection of *P acnes* bacterial isolates and *P acnes* specific phage. In screening these collections in pairwise tests, we have identified (from a test subset of about 50 bacterial isolates) a small number (two) of bacteria that are unaffected by any of the phage we have. Since these bacteria would resist therapies using our phage even in complex mixtures, we have focused recent efforts on two fronts: (1) screening more sources for phage with the host range needed to target the recalcitrant bacterial isolates, and (2) developing mutants of phage in our collection to expand or redirect their host range. There have been no promising results from the first approach. Work on the phage mutants has progressed, and will be discussed. Additional screening of our full bacterial collection, to locate additional phage-resistant isolates, will be done as well.

23-ANALYSIS OF HFQ AND CATALASE FUNCTIONS IN OXIDATIVE STRESS ADAPTATION IN THE METAL-REDUCING BACTERIUM *SHEWANELLA ONEIDENSIS*

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Hfq is a bacterial RNA chaperone protein that has been widely implicated in the function of small, regulatory noncoding RNA molecules that contribute to adaptive gene expression. We have previously found that loss of the RNA chaperone Hfq in the dissimilatory metal reducing bacterium *Shewanella oneidensis* results in slow exponential phase growth as a result of reduced heme production, a reduced terminal cell density in stationary phase, a striking loss of colony forming units in extended stationary phase, and an exquisite sensitivity to both hydrogen peroxide and superoxide stress. We are investigating the molecular basis for the oxidative stress hypersensitivity of the *hfq* mutant. Increasing available heme, which is the catalytic portion of the hydrogen peroxide-degrading enzyme catalase (KatB), does not rescue oxidative stress survival in the *hfq* mutant. However, pretreatment with sub-lethal doses of hydrogen peroxide protects the *hfq* mutant from lethal doses of hydrogen peroxide, suggesting that the *hfq* mutant adapts slowly to oxidative stress. Consistent with this hypothesis, increasing KatB levels by expression from an inducible plasmid fully protects the *hfq* mutant against lethal dose challenge with hydrogen peroxide. To elucidate the nature of the *hfq* mutant's oxidative stress adaptation defect, we are utilizing a *katB-lacZ* reporter fusion to characterize differences in *katB* expression kinetics and magnitude between the *hfq* mutant and the wild type *S. oneidensis* strain.

24-THE FATE OF PLASTICS IN WASTEWATER

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Plastic pollution of water ways has become a major topic in recent years. Rising levels of plastic pollution have made this nearly un-degradable polymer a part of the environment. This trend is something on the rise with global demand exceeding 245 million tons of plastic per year. Among those, micro plastics are of particular concern because of their small size and apparent ability to pass through wastewater treatment. During that process, a microbial community begins to develop on the surface, changing over time. This study examines that community and the potential physical changes of the plastic they inhabit.

25-THE EFFECTS OF COMMERCIAL VERSUS “ALL NATURAL” TOOTHPASTE ON THE GROWTH OF *STREPTOCOCCUS MUTANS*

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Oral hygiene has greatly improved over the years with the use of toothpaste and mouthwash. Along with this improvement, advances in various types of toothpastes and so-called natural ingredient use have also become very popular. However, little is known if natural toothpastes are as effective as commercial toothpastes in preventing dental caries, which could potentially lead to periodontitis. The objective of this experiment was to test the growth of *Streptococcus mutans* challenged with two brands of toothpaste: Colgate Total-Clean Mint (commercial brand) and Toms of Maine Simply White (natural toothpaste). *Streptococcus mutans* was isolated using mitis salivarius agar and confirmed as a pure culture with biochemical tests and gram staining methods. The experiment was meant to mimic the act of tooth brushing thus, the effect of the toothpastes were measured using serial dilution methods along with spread plates and optical density measurements.

26-PLASMID CHARACTERIZATION IN *STAPHYLOCOCCI* ISOLATED FROM WHITE TAIL DEER

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Staphylococcus, a well-characterized gram-positive bacteria, can be found in a multitude of environments including our skin, hair, respiratory and gastrointestinal tracts. These bacteria are found on many warm-blooded animals, including white tail deer, *Odocoileus virginianus*. *Staphylococcus* has a diverse genetic composition, and many species, sub-species and strains have been identified. The differences in the phenotype of the bacteria can be attributed to genome composition. Knowing that this bacteria can act as an infectious agent causing a wide-number of diseases and illnesses such as MRSA, it is intriguing to ask questions regarding the location of the genes responsible for its pathogenicity and virulence. By collecting samples from local deer, unique strains of *Staphylococcus* were obtained and used for comparison of antibiotic resistance mechanisms typically found to be located extra-chromosomally on plasmids. To address this idea, plasmid isolation and characterization, as well as PCR and transformation via electroporation will be performed as steps in the characterization of the genes present within the isolated plasmids.

27-ISOLATION AND CHARACTERIZATION OF A YEAST ISOLATED FROM SPONTANEOUS SECONDARY FERMENTATION OF A BARREL-AGED BEER

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Secondary fermentation is often used in the production of beer and wine industries to add additional flavor complexity and/or pleasing sensory characteristics. Recently a local commercial brewery observed a spontaneous “wild” secondary fermentation during barrel aging of “saison” style beer where the resulting beverage exhibited significant desirable taste and sensory characteristics. We were able to recover the dominant organism from this secondary fermentation in pure culture and identify it as a member genus *Dekkara* (*Brettanomyces*). Subsequent metabolic and genetic characterization of the isolated strain has revealed that it is distinct from several commercially available *Brettanomyces* strains and may be of future use in the craft-beer industry.

28-BIOREMEDIATION OF GASOLINE CONTAMINATED SOIL USING GASOLINE CATABOLIZING BACTERIA

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This lab is using gasoline catabolizing bacteria to bioremediate soil that is contaminated with gasoline. The strains of bacteria were isolated from soil obtained at local gas stations and were selected for their ability to grow in the presence of gasoline. In the past, we developed an assay using plants to test soil bioremediation by our bacterial isolates. Samples of soil in the lab were contaminated with gasoline at levels that would inhibit plant growth. Inoculation of contaminated soil with bacteria yielded soils capable of supporting plant growth. We are developing a new bioassay for bacteria-mediated gasoline decontamination using an animal model, since some compounds in gasoline target tissues and systems in animals that are absent in plants. Planaria (*Dugesia tigrina*) are freshwater flatworms that grow well in the lab, and we have confirmed that they are sensitive to small amounts of gasoline in their water. The complete assay begins with gasoline contaminated soil treated with decontaminating bacteria, followed by aqueous extraction of the soil and introduction of that water to the planaria. Our goal is to continue development of decontamination protocols that can render gasoline contaminated soils safe for either plant or animal use.

29-DIFFERENTIATION OF SCC_{mec} TYPES IN *STAPHYLOCOCCUS SPP.* IN NON-CLINICAL ISOLATES

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Acquisition of the mobile genetic element SCC_{mec} confers methicillin resistance to strains of *Staphylococcus*. There are eleven types of SCC_{mec}, each containing a homolog of the recombinase gene, either *ccrA/B* or *ccrC* and a homolog of the penicillin binding protein 2a (PBP2a), *mecA*, *mecB*, *mecC* or *mecD*. The prevalence of SCC_{mec} types differ among clinical isolates, some being associated with the initial observation of methicillin resistance, others with community acquired MRSA, etc. SCC_{mec} is inserted in the genome immediately after *orfX*. Within the region between *orfX* and the recombinase, there are genes that are typically associated with other bacterial antibiotic resistance mechanisms, other transposons and genes for which the function is unknown. These regions vary among clinical isolates and also contribute to classifications of SCC_{mec}. In this study, Staphylococcal isolates were obtained from the nasal passages of white tail deer, *Odocoileus virginianus*. Metabolic and antibiotic resistance profiles were determined for the strains. Degenerate primers for *ccrA/B*, *ccrC*, *mecA* and *orfX* were created based on information from previously characterized strains of *Staphylococcus spp.* and were subsequently used to amplify regions of the genome from these newly-isolated strains. Regions between *orfX* and the recombinase genes were sequenced to elucidate the variation among the studied strains and clinical isolates as well as the evolutionary past of SCC_{mec} found in non-clinical isolates.

30-SURVEY OF MOLDS IN DIFFERENT SEASONAL CLIMATES AND ENVIRONMENTS

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Fungi are among the most important microorganisms and can be fatally dangerous to human health. Fungi have been extensively studied in indoor environments with relation to their pathogenicity. To date, the importance of studying outdoor fungal communities has not been sufficiently noted. Creating the connections between outdoor fungi and their preferred seasonal climates and environments is important for the development of further information about the way in which fungi effects on human health. This research aims to identify and enumerate the various locations, temperatures and environments of fungi that are found in outdoor settings. Using Sabouraud Dextrose Agar, samples were collected via settling and swabbing methods to isolate fungi in both rural and urban environments. Fungal cultures were given a growth period of four to fourteen days at room temperature. Colonies were examined macroscopically and microscopically via the Tape Mount Method and the Slide Culture Method. In the rural environment, the most common culturable fungal species was identified as *Exophiala dermatidis* with 77 Colony Forming Units, followed by the yeast *Candida albicans* with 9 CFU. In the urban environment and warmer climates, specifically between 71°C and 82°C, the most isolated species was *Cladosporium spp.* with 63 Colony forming Units, followed by *Pencillium marneffeii* with 15 CFU. During the colder temperature conditions, between 13° C and 27°C, the most abundant fungal species by afar consisted of solely *Cladosporium spp.* This study provides insight into fungi and their indigenous environments and seasonal climates.

31-PAENIBACILLUS AND ITS POTENTIAL FOR ANTIBIOTIC PRODUCTION.

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The family *Paenibacillaceae* is composed of Gram-positive endospore-forming bacteria that are distinct from other groups of *Bacillus*. This group of organisms has been found in many environments, with some of its members being thermophilic and others able to tolerate cold temperatures. Some members of this group are producers of antibiotics, others produce compounds that are insecticidal and still others are used as probiotics. The genus *Paenibacillus* is relatively unexplored regarding its capability of producing secondary metabolites and as such is an area ripe for discovery. One group of bacteria for which our current arsenal of antibiotics is nearly gone is methicillin-resistant *Staphylococcus aureus* (MRSA). The current study addresses the ability of various isolates of *Paenibacillus* to produce biologically active compounds that can inhibit the growth of MRSA.

32-ISOLATION OF ANTIMYCOBACTERIAL COMPOUNDS FROM NATURAL SOURCES AS POTENTIAL ANTIBIOTICS FOR TREATMENT OF TUBERCULOSIS

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While eradicated in developed countries, tuberculosis remains a prevalent issue in a significant portion of the world. Tuberculosis infects roughly 1/3 of the global population (either latently or actively), and was responsible for 1.5 million deaths in 2014. The pathogen responsible for the disease, *Mycobacterium tuberculosis*, possesses a unique outer structure that makes it especially resistant to a large range of antibiotics. *M. tuberculosis* is also evolving resistance to the few strains of antibiotics that have been effective against it. This presents an urgent need for new antibiotics effective against this pathogen. This is the primary focus of our research. Instead of taking a strictly chemical method with the aim of synthesizing an antimycobacterial compound, we focused our sights on natural sources, in our case bacteria from soil. Up to now, we have characterized a soil isolate of unknown identity labeled “#22” which shows inhibitory action against *Mycobacterium smegmatis*, a pathogen surrogate of *M. tuberculosis*. Current research is focused on the chemical purification of the antibacterial compound of strain #22, and the examination of other soil isolates for the ability to inhibit *M. smegmatis*.

33-ANTI-MICROBIAL PROPERTIES OF DIFFERENT BEE PROPOLIS SAMPLES

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Propolis is a natural resinous substance collected by honeybees from buds and exudates of trees and is used by bees as a glue, general-purpose sealer and draught extruder for beehives. Known in folk medicine since ancient times, propolis has attracted much attention in recent years as a useful ingredient applied in medicine, domestic products and food products since it possesses various biological properties including antimicrobial, anti-oxidative and antiulcer properties. In this project, the antimicrobial activity of several propolis samples obtained from various parts of the world (Europe, Australia, USA and the Philippines). The propolis samples were extracted with ethanol and then assayed with seven Gram-positive and seven Gram-negative microorganisms using the disc diffusion assay. Results showed antimicrobial activity of several samples against some specific microorganisms with propolis from Russia and Washington showing the greatest activity against 7 microorganisms

34-SMALL COLONY VARIANT SWITCHING PHENOMENON IN *STAPHYLOCOCCI*.

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Staphylococcus aureus, a gram-positive bacterium that can be isolated from individuals suffering from respiratory complications like cystic fibrosis (CF), possesses certain traits that confer antibiotic resistance and thus difficulty in treatment. One of these characteristics is that *S. aureus* can exist in multiple phenotypic subpopulations induced by environmental conditions or genetic changes. One of these morphological subgroups is a slow-growing, non-virulent, non-pathogenic form aptly named “small-colony variants” for its conspicuously smaller size compared to a wild-type, “normal-colony variant.” An interesting finding is the same strain of *S. aureus* can revert between the two colony sizes; however, it is unclear what factors or cues induce the transition between normal and small colony variants. A long term, multiple generational qualitative analysis of the switching phenomenon has not been performed. By counting the number of small and normal colonies produced in each generation and noting the frequency of reversion, one could describe this observed switching phenomenon with appropriate statistical models that would be useful in predicting the future behavior of each strain. Such a model would have great clinical significance in the treatment of not just *S. aureus* infections, but other microbial pathogens with similar characteristics.

35-PRESENCE OF PVC GENE CLUSTER IN ENTEROBACTERIACEAE

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The pvc gene cluster, once identified in *Pseudomonas aeruginosa*, has been thought to exist in other bacteria such as Enterobacteriaceae. A group of 26 different enterics were acquired and grown in liquid culture. Out of the 26, 24 of the samples grew and their DNA was extracted. After running PCR under a variety of conditions with pvcA, pvcB, and pvcC primers our results yielded 2 samples, 341 (*Enterobacter aerogenes*) and 339 (*Escherichia freundii*), with possible pvcA gene presence. We propose that other enterics may also contain pvc genes and when discovered can be used to further understand their roles in inhibiting the growth of other bacteria.

36-ESTABLISHMENT AND CHARACTERIZATION OF MICROBIOME-DEPLETED PLANARIA

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Each human body is inhabited by a unique combination of microorganisms, collectively these microbiota are known as the human microbiome. It is estimated that there are substantially more microbial cells than human cells within the human body. The link between these symbiotic or commensal microbes and our health is a growing interest in research. To study this relationship in a tractable system, we are attempting to establish the planarian *Dugesia tigrina* as a model organism in the study of the animal gut microbiome and its effects on host health. We have had used various antibiotic treatments to greatly deplete the microbiota of the planaria and have assessed the overall effects of the drugs and the microbial depletion. Recently, we have tracked the rate of bacterial recolonization from a depleted state, again assessing the effects on the animals.

37-IDENTIFICATION OF *ENTEROBACTERIACEAE* USING A COLORIMETRIC CHEMICAL ENTEROPLURI SYSTEM

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The microbiome of the equine gut is a complex ecosystem of viruses, bacteria, protozoa, and fungi that function collectively in a mutualistic relationship with the host. To study the affects of the equine microbiome and how its biodiversity fluctuates in response to treatments such as antibiotics and probiotics it is important to know what species of bacteria are present. In this experiment bacteria were cultured and isolated from a fecal sample and tested using a colorimetric biochemical test system that identifies bacteria in the family Enterobacteriaceae and other oxidase negative and gram negative bacteria. *Providencia alcalifaciens*, *Providencia stuartii*, and *Escherichia coli* were identified in the horse stool.

38-GENOMIC ANALYSIS OF *CAS* GENES ISOLATED FROM *STAPHYLOCOCCI* IN WHITE TAIL DEER POPULATIONS

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Horizontal gene transfer is one of the most important evolutionary advantages in the archaeal and bacterial domains of life. DNA acquired in such a manner can provide specific selective advantages to these organisms, but can also be quite harmful. Bacteria, however, have developed mechanisms of defense against such deleterious transfer. Clustered regularly interspersed short palindromic repeat (CRISPR) loci and associated *cas* genes are among the most recently discovered of these mechanisms. These elements have mainly been observed in clinically isolated bacterial strains, but this study aims to characterize CRISPR/*cas* elements in a novel collection of *Staphylococci* isolated from local white tail deer populations. Through the use of PCR with custom primers, *cas* genes have been identified in some of these strains. As this collection of bacteria have not been in contact with homologous clinical strains, their resistance patterns, and thus their mechanisms of defense can provide insight to the evolution of these elements. It is also of note that CRISPR/*cas* loci can provide a mechanism to prevent the development of antibiotic resistance through the aforementioned transfer pathways, providing a possible pathway for bacterial sensitization, and prevention of the transmission of antibiotic resistance genes in bacterial populations.

39-DETERMINING THE MOLECULAR MECHANISMS RESPONSIBLE FOR THE EMERGENCE OF REDUCTIVE STRESS RESISTANCE OF PERSISTENT *MYCOBACTERIUM BOVIS*-BCG

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The World Health Organization (WHO) estimates that one-third of the world's population are thought to be infected with *Mycobacterium tuberculosis*, with one-half of those infected with drug resistant strains. Although the global incidence of tuberculosis has been slowly declining since 2003, approximately nine million individuals contracted the disease with mortality rates approaching 20% in 2013. There is a great need to develop more effective therapies and vaccines to treat and prevent tuberculosis, and one way to do this is to better characterize how mycobacteria respond to the environments they encounter within the host. We recently brought to light that 8 mM glutathione (GSH) is bactericidal to vegetative *Mycobacterium bovis*-BCG (BCG), and we postulated this to be the result of an increased biosynthesis of mycothiol (MSH) inducing a fatal reductive shift in the cytoplasm. However, non-replicating BCG (NRP BCG) is resistant to GSH-induced reductive stress. We extracted RNA from exposed and unexposed BCG and NRP BCG cultures, and we will analyze the transcriptome to pinpoint genes associated with the reductive stress killing of vegetative BCG and resistance to killing of NRP BCG. We anticipate that genes involved in fatty acid biosynthesis, the glyoxylate shunt, and gluconeogenesis will be upregulated in vegetative BCG exposed to GSH. These three pathways increase NAD⁺ concentrations, which has been associated with the alleviation of reductive stress. These data will provide fresh research avenues for antimicrobial chemotherapy and offer a more detailed picture of the interaction between persistent mycobacteria and molecules produced by the human immune response.

40-ANNOTATION AND CHARACTERIZATION OF NOVEL A CLUSTER PHAGES CERULEAN AND PENNY1

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Mycobacteriophages are viruses that infect mycobacteria, including the pathogenic bacteria *Mycobacterium tuberculosis* and *Mycobacterium leprae*. Cerulean and Penny1 are mycobacteriophages that infect *Mycobacterium smegmatis*, which falls under the same genus as *M. tuberculosis*. These phages were isolated from a soil sample at Providence College using a phage enrichment procedure that infects and kills its bacterial host, *M. smegmatis*, as indicated by the formation of plaques. Plate streaking allowed for the isolation of single phage colonies. DNA was extracted and the presence of genomic DNA was confirmed by each phage's absorption spectra. Based on the sequencing data, Cerulean and Penny belong to clusters A4 and A3, respectively. Annotation of the genome indicates that Cerulean contains 51,809 bp and 89 probable genes including gp71, a repressor, and gp34, an integrase, on its genome. Penny1's genome contains 50,884 bp and 89 probable genes including gp34, an integrase, and 3 tRNA sites on its genome. Interestingly, Cerulean and Penny1 both contain repressor binding sites specific to their clusters, which was confirmed using Multiple Em for Motif Elicitation (MEME). A comparison of Cerulean's genome to the GenBank database using BLASTp shows that Cerulean expresses an immunity repressor and an integrase identical to the mycobacteriophage Obama12, another A4 cluster phage. A comparison of Penny's genome to GenBank database using BLASTp shows that Penny expresses an integrase similar to the mycobacteriophage Tiffany, another A3 cluster phage. These data suggest that Cerulean is temperate and that Penny uniquely expresses an integrase without an identified repressor.

41-THE DYNAMICS OF SONIC HEDGEHOG FUNCTION IN FROG LIMB DEVELOPMENT

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Sonic hedgehog (Shh) is a diffusible morphogen that is expressed in the posterior of tetrapod limbs and patterns the anterior-posterior axis of the limb. In most tetrapods, absence of Shh or blocking of its function causes severe reduction of development across the anterior-posterior axis, but has very little effect on outgrowth along the proximal-distal axis. Our previous research in one species of frog, *Xenopus tropicalis*, showed a complete loss of outgrowth in many limbs in response to the blocking of Shh signaling with the chemical cyclopamine. This role of Shh in limb outgrowth has never been observed in any other tetrapod species, and phylogenetic comparisons of the species in which Shh function has been studied suggest that this is a novel role for Shh in frogs. But it remains unclear to what extent this applies very narrowly to *X. tropicalis*, if it applies to all frogs, or it applies to some clade of intermediate size. Here we use cyclopamine to investigate the effects of blocking Shh in another species of frog, *X. laevis*, in hopes of better understanding whether this role of maintaining limb bud outgrowth is unique to *X. tropicalis* or if it applies to other frogs in the family *Pipidae*. Additionally, we investigate the temporal dynamics of Shh function in *X. laevis* limb development by performing cyclopamine exposures at varying stages of limb development.

42-CLONING, EXPRESSION, AND PURIFICATION OF THE CELLULAR TORC PROTEIN

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Tax is a transcriptional activator expressed by the Human T Cell Leukemia Virus (HTLV) and is required to initiate viral gene expression. TORCs (TORC 1-3) are a family of cellular transcriptional co-activators that enhance HTLV gene expression and have been shown to bind Tax. TORC protein activity is regulated via phosphorylation at a serine residue. We have generated multiple TORC 1-3 mutants via site-directed mutagenesis including a serine to alanine constitutively active dephosphorylated mutant and a serine to aspartate constitutively inactive phosphorylation mimic mutant. The goal of this project is to examine wild-type and mutant TORC and Tax binding *in vitro* and determine which form of TORC, either the phosphorylated or dephosphorylated, binds Tax. In order to examine Tax-TORC binding we have cloned wild-type and mutant TORC3 genes from a mammalian expression vector to a bacterial expression vector, pGEX. The pGEX-TORC3 wild-type and mutant constructs have been transformed into the protein-expressing strain of *E. coli*, BL21, for expression and purification of GST-tagged TORC3. Future studies will assess TORC and Tax binding via GST pulldown.

43-PHYLOGENETIC AND MOLECULAR ANALYSIS OF DROSOPHILA SPECIES

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DNA and RNA were isolated from *Drosophila melanogaster* and *Drosophila hydei* for genetic and expressional studies. With *Drosophila melanogaster* as a positive control, we are using primers to conserved regions of ion channels to compare intron and exon boundaries in *Drosophila hydei*.

44-DEVELOPING A PROGRAMMED CELL DEATH MODEL FOR SOLID TUMOR GROWTH USING FLOCCULATING YEAST

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Cancer is most often associated with the abnormal growth of cells that give rise to solid tumors. We are developing a yeast model for solid tumors by taking advantage of variants of the budding yeast, *Saccharomyces cerevisiae*, which are able to flocculate into tumor-like structures called flocs. We are testing our hypothesis that antifungal drugs like caspofungin and amphotericin B will kill the outer layer of cells in the floc to undergo programmed cell death while protecting the inner layer of the flocculate. This would suggest that flocculation could have evolved as a protective mechanism against environmental triggers that induced programmed cell death. [In addition to funding from the RI-INBRE Program, our laboratory is supported by grant NIGMS R15 GM110578, awarded to N. Austriaco.]

45-DNA HYPERMETHYLATION OF PUTATIVE TUMOR/METASTASIS SUPPRESSORS IN PROSTATE CANCER

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There are aggressive and indolent forms of prostate cancer (CaP), which are currently indistinguishable at diagnosis. The aggressive, metastatic forms cause ~30,000 deaths each year. Gene specific DNA hypermethylation and transcriptional repression is often observed in CaP at genes which may have important tumor or metastasis suppressor activities. We utilized the TRansgenic Adenocarcinoma of Mouse Prostate (TRAMP) model in an effort to identify these genes for further study. We previously found that DNA methylation is disrupted in TRAMP and preventing this significantly inhibits tumor progression and metastatic development. We also performed genome-wide DNA methylation analysis to identify a list of genes that were hypermethylated in TRAMP, as compared to normal. We are now measuring DNA methylation and expression of these genes, in a large set of TRAMP tumors and metastases. Additionally, we are examining these genes in human CaP cell lines, PC3 and LNCaP to test whether the genes identified in TRAMP are also hypermethylated in the human disease. Several of these genes were indeed hypermethylated and suppressed in the majority of samples tested, as well as both cell lines. We then treated PC3 and LNCaP cells with a hypomethylating agent (DAC) to determine if it could reverse the observed hypermethylation and lead to expression of the putative tumor/metastasis suppressor genes. As expected, these genes were hypomethylated and re-expressed in the DAC treated PC3 and LNCaP cells, as compared to untreated cells. Our results may be useful in developing prognostic biomarkers and improved treatments for metastatic CaP in the future.

46-LOCALIZATION OF TORC MUTANTS IN HEK 293T CELLS

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Human T cell Leukemia Virus (HTLV) is a retrovirus that causes adult T cell leukemia and lymphoma. Tax is expressed by the virus and has been identified as a potent transcriptional activator that plays a major role in the transformation of infected T cells. Tax regulates gene expression by interaction with various cellular co-activators. Tax interacts directly with CREB and forms a complex that promotes viral transcription. CREB binding proteins, TORCs, have been shown to mediate the transcription of Tax and enhance Tax-mediated viral gene expression. There are three members of the TORC family, which are regulated by upstream phosphorylation signals. TORC proteins are activated via dephosphorylation and are inactivated when they are phosphorylated. Ultimately, the goal of this project is to determine if the HTLV Tax protein alters TORC phosphorylation and localization. We generated multiple TORC mutants including serine to alanine mutants which are predicted to be constitutively active dephosphorylated mutants and serine to aspartate mutants which are predicted to be constitutively inactive phosphorylated mutants. To confirm their activity (which is controlled via localization) we transfected wild-type and mutant TORC-expressing plasmids and observed their localization via immunofluorescence in HEK 293T cells. Preliminary results suggest that TORC1 is localized to the cytoplasm, TORC2 is localized to both the cytoplasm and nucleus, and TORC3 is localized to the nucleus regardless of the phosphorylation state of the protein. Further studies will be done to examine the localization of the wild-type and mutant TORC proteins in other cell lines.

47-CADMIUM EXPOSURE MAY NOT INDUCE OXIDATIVE DAMAGE IN HORSESHOE CRAB EMBRYOS

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Cadmium and other heavy metals are pollutants known to have toxic effects on marine arthropods. However, horseshoe crabs (*Limulus polyphemus*) have been known to be extremely resistant to such toxins, for unknown reasons. We carried out this experiment to determine if cadmium exposure of horseshoe crab embryos would lead to molecular damage from reactive oxygen species, or if they would be able to exhibit a defense against this toxin. We performed a 24-hour cadmium exposure on late stage 19 and early stage 20-1 embryos to determine the percentage of dead embryos at increasing concentrations. Through Probit analysis of the resulting dose response curve, the LC25 (5 mg/L) and LC37 (10 mg/L) doses of cadmium were calculated and used in subsequent experiments. To determine whether cadmium induced oxidative damage in the embryos, we performed the thiobarbituric acid reactive substances assay to measure the levels of lipid peroxidation in the form of malondialdehyde (MDA). We found no significant difference in the levels of MDA between cadmium treated and untreated embryos, suggesting that these embryos have defense mechanisms that protect against oxidative damage. There were also no significant differences in mobility between untreated embryos and embryos exposed to 10 mg/L of cadmium. We are currently assessing whether cadmium-treated embryos experienced oxidative DNA damage in the form of 8-oxoguanine and whether increased activity of superoxide dismutase, an antioxidant enzyme, may account for the observed lack of oxidative damage.

48-IDENTIFICATION OF GENETIC INTERACTIONS ASSOCIATED WITH PRP5 USING *S. CEREVISIAE* AS A MODEL

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Pre-mRNA splicing is an important process that is required for normal cellular functions. Mutations in genes associated with splicing can be detrimental to the cell, often causing disease or cell death. More than a quarter of the mutations that cause human disease disrupt mRNA splicing, leading to diseases such as cystic fibrosis. Therefore, it is crucial to understand the process of splicing in order to understand the diseases associated with it. Pre-mRNA splicing is a multistep process that requires ATP hydrolysis at each step. Several accessory proteins are required in order for successful splicing to occur, including essential DEAD-box proteins that facilitate ATP hydrolysis. Here we investigate the role of the DEAD-box protein Prp5 in splicing using the yeast *Saccharomyces cerevisiae*, as 85% of yeast splicing factors have a human ortholog. Furthermore, the absence of Prp5 ATPase activity, in yeast is lethal, highlighting its importance in splicing. In this study, potential genetic interactions between Prp5 and other genes involved in splicing were investigated. Determining these potential interactions is necessary to understand the process of splicing. To identify these interactions, a transposon mutagenesis screen was employed. We screened approximately 20,000 mutations, 61 of which showed genetic suppression of the temperature sensitive *prp5-1* mutation. Growth assays confirmed these mutations exhibited genetic suppression, suggesting important genetic interactions between these genes and Prp5. Further experiments will be carried out using Thermal Asymmetric Interlaced PCR (TAIL-PCR) to identify the genes responsible for suppression and identify the role of these genes in splicing.

49-DETECTION OF *MET* IN THE FLATWORM *GIRARIDA DOROTOCEPHALA* GENOME

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The mechanisms controlling morphallactic regeneration are among the most complex and well studied of all biological processes. Since the 18th century planaria have served as a model organism for the study of regeneration due to their immense developmental plasticity, simple body plan and relative abundance. In our investigation, fresh water brown planaria supplied by Carolina Biological Sciences (*G. dorotocephala*) were employed to determine whether a variant of human mesenchymal epithelial transition factor (MET), a key contributor to tissue recovery in vertebrates, can be found within the planarian genome. Our preliminary data suggests that a MET ortholog *is* expressed by this species, a finding that is partially corroborated by our *in silico* investigations. However, no amplicon of this gene was recovered when planarian DNA was subjected to PCR amplification using human MET oligoprimers. We conclude that while a MET variant is likely absent from the planarian genome, proteins that contribute to tissue repair in a similar fashion are undoubtedly present.

50-DOPAMINE MODULATION OF SYNAPSE-SPECIFIC SIGNALING IN THE ASH NEURON OF *C. ELEGANS*

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Dopamine acts through G protein-coupled receptors to control reward-based behavior and defects in dopamine signaling underlie schizophrenia and Parkinson's disease. Despite its clinical importance, we do not have a comprehensive understanding of the molecular or cellular mechanisms of dopamine signaling. For example, we do not know whether dopamine receptors are spread throughout the neuron so that dopamine can have global effects on neuron activity, whether they are found at all synapses in a neuron, or if there is strict control over receptor localization such that only a special subset of synapses recruit specific receptor types. Control over receptor location could allow synapse-specific modulatory control of circuit function and behavior. We plan to define the sites of dopamine receptor function throughout a single neuron in *C. elegans* called ASH using the genetically-encoded calcium sensor GCaMP and fluorescent reporter transgenes.

51-SYSTEMATIC MUTAGENESIS OF A MEIOTIC RECOMBINATION HOTSPOT

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Meiosis is a form of cell division found in all sexually reproducing organisms. During the process of recombination, genetic information is exchanged at high frequency through the breakage and rejoining of chromosomes. Recombination hotspots are sites where these recombination events occur preferentially. In the fission yeast *Schizosaccharomyces pombe*, one such hotspot is the *ade6-4095* motif, the sequence of which is 5'-GGTCTGGACC-3', which was found multiple times in a screen of larger 15-30 bp random sequences, so it is not clear if all 10 bp of the hotspot is required. In the present study, each of the ten bases of this sequence were systematically mutagenized in order to elucidate the necessary sequence to maintain hotspot activity. Our data suggest that most, though not all, nucleotides of the *ade6-4095* motif are nonessential for hotspot activity.

52-STUDYING PLANARIAN REGENERATION THROUGH IMMUNOFLUORESCENCE

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Regenerative abilities vary amongst species. Humans have limited regenerative capabilities, such as replacement of blood cells and endothelial cells. Salamanders have more impressive abilities, they can regenerate limbs. However, planarian flatworms have a remarkable capacity to regenerate any part of their body. The molecular mechanisms underlying planarian regeneration, however, are not fully understood. It is our contention that retinoic acid (RA) plays a role in mediating posterior regeneration in planaria, just as RA plays a critical role in posterior development and regenerative processes in vertebrates. We have found that application of RA to regenerating planaria delays regeneration of eye spots in the head, while using an inhibitor of RA synthesis inhibits posterior regeneration. Our initial analysis was limited to morphological markers visible with brightfield microscopy. To better understand alterations in regeneration we are using immunofluorescence to visualize specific cell populations. We are using the proliferation marker phospho-histone 3 to visualize dividing neoblasts. Neoblasts are the stem cell population and only mitotically active cells in the organism. Worms grown with an inhibitor of RA synthesis have delayed posterior regeneration. Therefore, we expect that we will see reduced neoblast proliferation in the posterior portion of the worm during regeneration. In the head region of the planarian is the central ganglia. We expect that regeneration of this anterior structure is inhibited by RA treatment. We are visualizing the nervous system using an antibody against synapsin.

53-INVESTIGATING CHANGES IN GENE EXPRESSION ASSOCIATED WITH THE ANTI-PROLIFERATIVE EFFECT OF TRANS-CINNAMALDEHYDE IN HELA CELLS

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Phytochemicals have historically been used for medicinal purposes in several Asian cultures. These products have the advantage of availability and apparently have fewer side effects. Despite their increase in popularity, only a few such compounds have been subjected to rigorous controlled studies and most of the data in support of their benefits remains anecdotal. Recently there has been a significant increase in the amount of research investigating the benefits of these phytochemicals for a myriad of conditions ranging from general wellness to cancer. We are interested in the anti-proliferative and anti-cancerous effects of bioactive components in cinnamon. We had previously demonstrated that trans-cinnamaldehyde (CIN), the active ingredient in cinnamon had a potent anti-proliferative effect on HeLa cells, a human cervical cancer cell line, but not L6, a rat muscle cell line. The proposed mechanism of the anti-proliferative effect was hypothesized to be via an increase in apoptosis or programmed cell death of the cancer cells. Results from our TUNEL assays, a test used to measure both apoptosis, supported our hypothesis of increased apoptosis in cancer cells upon treatment with the phytochemicals in a dose dependent manner. We are currently attempting to further dissect the molecular mechanism of this effect by monitoring changes in gene expression in cancer cells upon treatment with CIN. We are currently investigating changes in expression of *bax* and *bcl-2*, two genes associated with apoptosis with a house-keeping ribosomal gene as an internal control using quantitative PCR (qPCR).

54-CHARACTERIZATION OF YEAST BAX INHIBITOR, *BXII*, FUNCTION IN CELL DEATH, THE UNFOLDED PROTEIN RESPONSE, AND CALCIUM SIGNALING IN *SACCHAROMYCES CEREVISIAE*.

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Yeast Bax inhibitor-1 (*BXII/YBH3*) encodes a protein that belongs to the Bax Inhibitor (TMBIM) family of proteins that all contain a transmembrane BAX inhibitor motif. The crystal structure of a prokaryotic member of the family, BsYetJ, has revealed that the Bax inhibitor proteins are pH sensitive calcium leaks. In mammals, the Bax inhibitor family of proteins have cytoprotective properties that are most evident in paradigms of endoplasmic reticulum (ER) stress. Our studies have shown that yeast Bxi1p is localized to the endoplasmic reticulum and is involved in the unfolded protein response (UPR) that is triggered by endoplasmic reticulum (ER) stress. *BXII* is thought to act via a mechanism involving altered calcium dynamics. With DTT induction experiments using *Δbxi1* mutants and different UPR GFP reporters, we have confirmed our published data that suggests that *BXII* is involved in the UPR. Intriguingly, our preliminary data suggests that Bxi1p facilitates clustering of Ire1p during ER stress, a mechanism that is not engaged by calcium when it triggers the UPR. [Our laboratory is supported by grant NIGMS R15 GM110578, awarded to N. Austriaco.]

55-THE EFFECTS OF CARBARYL ON C6 ASTROCYTES

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Carbaryl is an insecticide and parasiticide that is responsible for the inhibition of the enzyme cholinesterase. Since carbaryl is applied to agricultural crops, it is vital to study how it affects the human brain. Astrocyte cells are an essential part of the central nervous system and are responsible for maintaining homeostasis by regulating glucose, synaptic transmission, and ion levels. Although studies have been conducted on neurons, neuroblastoma and nerve-tissue, little research has been done examining how carbaryl affects astrocytes. In this study, C6 astrocyte cells were treated with 0.075 mg/ml or 0.15 mg/ml of carbaryl for 24 hours. Cells were then stained with Hoechst and propidium iodide to identify cell nuclei and dead cells, respectively. Fluorescence microscopy and image analysis were used to measure both total cells and percentage of cell death. We hypothesized that carbaryl would have a negative effect on the astrocytes and cause cell death. Indeed, carbaryl caused significant cell death compared to control in a dose-dependent manner. This research will provide valuable information regarding how C6 astrocytes respond to carbaryl and will help us better understand how the central nervous system is affected by this insecticide. Future studies will examine the mechanism of this cell death in astrocytic cells.

56-EVALUATING THE POTENTIAL ROLE OF THE GENE M05D6.2 IN REPRODUCTION USING *CAENORHABDITIS ELEGANS* AND ITS CONNECTION TO THE TCP11 GENE IN HUMANS.

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Human t-complex protein 11 (TCP11) is a testis-specific gene product that is hypothesized to be necessary for proper sperm capacitation, acrosome reaction, and sperm morphology. M05D6.2 is the *Caenorhabditis elegans* ortholog for human TCP11. *C. elegans* have two sexes: hermaphrodite and male. Sperm from hermaphrodites and males must undergo proper sperm activation, which includes processes similar to sperm capacitation and acrosome reaction in mammals, to migrate to and fertilize the egg. We have used RNA interference (RNAi) to disrupt the gene function of M05D6.2 in *C. elegans*. Hermaphrodites subject to M05D6.2 RNAi-treatment show know reduction in fertility. However, when male *C. elegans* are subject to M05D6.2 RNAi-treatment our preliminary results indicate that they have a significant decrease in fertility. We are now generating animals lacking functional M05D6.2 and animals mimicking single nucleotide variants (SNVs) of TCP11. Together these studies will provide insight into the conserved biological role of TCP11 and provide a platform to investigate the consequences of SNVs on the cellular function of TCP11.

57-THE SEARCH FOR A VASCULAR ENDOTHELIAL GROWTH FACTOR RECEPTOR ORTHOLOG IN THE FLATWORM *GIRARIDA DOROTOCEPHALA* GENOME.

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Regeneration of lost or injured planarian tissue is controlled by a litany of molecular cues that initiate prompt cytoskeletal reorganization, re-epithelialization and recruitment of neoblasts to the wound site. While few multi-cellular eukaryotes share the restorative fidelity displayed by planaria, nearly all members of the animal kingdom rely upon epithelialization to reduce the likelihood of infection, minimize water loss/maintain tonicity and initiate recovery immediately following severe trauma. Unsurprisingly, many of the cellular hallmarks that facilitate reinstatement of epithelial continuity are conserved between species, despite massive variability within the repair scheme thereafter. A key contributor to this process in mammalian wound healing is the peptide ligand vascular endothelial growth factor (VEGF). While no homolog of the VEGF gene exists within the planarian genome, partial homology of its receptor, VEGFR has been identified through *in silico* investigations. Preliminary data from electrophoresed amplicons suggest that an ortholog of the ligand is present, though its function has not yet been characterized.

58-ANALYSIS OF 5-HYDROXYMETHYLCYTOSINE IN PROGRESSIVE STAGES OF A MOUSE MODEL OF PROSTATE CANCER

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DNA methylation is considered to be one of the major epigenetic modifications involved in regulating gene expression. In 2009, it was discovered that these methyl groups can be oxidized, resulting in hydroxymethylation. Furthermore, the primary methods used to examine DNA methylation cannot distinguish between these two modifications. We have shown that DNA methylation is disrupted in a mouse model of prostate cancer (TRAMP). For example, tumor specific increases in expression are associated with methylation of the transcribed region, or gene body. This was interesting considering that promoter DNA methylation is associated with repression of gene expression. After the discovery of hydroxymethylation, we hypothesized that what we originally thought was gene body methylation was actually hydroxymethylation. We have begun testing our hypothesis using several methods that can specifically measure DNA hydroxymethylation either globally or at individual genes. One such approach is hydroxymethylated DNA immunoprecipitation (hMeDIP). This method utilizes antibodies developed to bind only 5hmC, to enrich for DNA fragments that contain this modification to be used in quantitative polymerase chain reaction (qPCR) or Next Generation sequencing. Our data suggest that global levels of hydroxymethylation change throughout TRAMP tumor progression and that at least a portion of the DNA modifications in gene bodies is indeed hydroxymethylation. We also find that prostate tumors have altered genomic 5hmC patterns, as compared to normal prostate. This information may provide insight into the role of DNA hydroxymethylation in tumor specific gene regulation, which could lead to the identification of novel targets for the treatment of cancer.

59-BACTERIA BASED ASSAY FOR DETECTING HYPERORNITHINEMIA IN MOUSE BLOOD AND URINE

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Gyrate atrophy of the choroid and retina (GACR) is a hereditary form of progressive blindness caused by homozygosity for loss-of-function mutations in the ornithine aminotransferase gene (*Oat*). Impairment in the ornithine amino transferase (OAT) enzyme results in accumulations of circulating ornithine that lead to ophthalmic symptoms. Human with OAT deficiencies start suffering from visual impairment as young adults as do two OAT-deficient mouse models of GACR. Here we have developed an inexpensive and quantitative bacteria-based test using mutant *E. coli* that lack the ability to synthesize arginine. Bacterial growth is rescued in the presence of blood or urine samples from these mutant mice due to hyperornithinemia in these samples. Taking advantage of this we hope to develop a test that could be used to facilitate identification and treatment of OAT-deficient humans before the onset of visual impairment.

60-ENTRY AND LOCALIZATION OF ALLERGEN ALT A 1 IN HUMAN AIRWAY EPITHELIAL CELLS

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Alternaria alternata is a ubiquitous airborne fungus associated with an increased risk of allergy, asthma, and chronic obstructive pulmonary disorder (COPD). When inhaled, the fungus secretes the allergen Alt a 1 into the lung tissue. The interaction between the allergen and the epithelial cells lining the airway can cause an inflammatory response, increased mucous production, and irritation due to cell death. We investigated the timing and localization of the Alt a 1 allergen in airway epithelial cells using immunocytochemistry and fluorescent microscopy. In addition, we examined if entry increased the release of pro-inflammatory cytokines from the airway cells and/or if cell death was induced by allergen entry. Our results suggest that Alt a 1 quickly enters airway epithelial cells and is closely followed by cytokine production which persists over time, ultimately leading to cell death. The results of our project give insight into how quickly an allergen can enter airway cells and confirms the rapid innate immune response that occurs in response to this entry.

61-KNOCKOUT OF DNA METHYLTRANSFERASES ALTERS CALCIUM HOMEOSTASIS IN HCT116 COLON CANCER CELL LINE

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Calcium (Ca^{2+}) is a ubiquitous second messenger regulating a myriad of cellular processes including proliferation, metabolism, and cell death. Increased cytosolic Ca^{2+} activates apoptosis and is cytotoxic. Epigenetic modifications, such as DNA methylation, play a major role in transcriptional gene regulation. The link between epigenetics and Ca^{2+} signaling is not known. In order to study this relationship, we measured differences in Ca^{2+} handling between the colon cancer cell line (HCT116) and its genetic counterpart HCT116-DKO (double knockout of DNA methyltransferases 1 and 3b). We found that HCT116-DKO cells are resistant to thapsigargin, a sarcoplasmic endoplasmic reticulum Ca-ATPase pump inhibitor, induced cytotoxicity. This appears to be due to differential release of intracellular Ca^{2+} between the two cell lines. As this could be explained by altered levels of Ca^{2+} regulatory genes, we next examined the expression of several families of these genes in both cell lines, including ITPR, STIM, SERCA, ORAI, TRP, RYR. We found increased expression of a significant number of these genes in HCT116-DKO as compared to HCT cells. Current experiments focus on measuring DNA methylation levels in the promoters of these genes, as well as examining protein expression. Our results indicate that epigenetic mechanisms may be responsible for conferring the resistance of HCT116-DKO cells to thapsigargin mediated cytotoxicity.

62-VINCULIN FOCAL ADHESIONS RETARD CELLULAR MIGRATION WITH INCREASING EXTRACELLULAR MATRIX CONCENTRATIONS

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Cellular migration is very important process in biology, with major implications in cancer and embryonic development. The characteristics of cellular migration, such as direction and rate, are dictated by a multitude of factors, including chemoattractants and the chemical composition of the environment surrounding the cell, known as the extracellular matrix (ECM). Our current research has shown that adding functional blocking antibodies to an important cellular adhesion protein, E-cadherin, significantly increases cellular migration. However, a siRNA knockdown of E-cadherin showed virtually no change in cellular migration when compared to the control. To explain this conflicting data we hypothesize that another adhesion protein, vinculin, is responsible for the cellular adhesions made in the absence of E-cadherin. To prove this we have turned our focus to the extracellular matrix (ECM). The ECM is an array of various proteins and other macromolecules which the cell interacts with, and is also the primary focus of our research. Up to date, we have empirically shown that a higher overall concentration of macromolecules in the ECM impedes the rate of cellular migration. The next objective of our research is to show that this impediment of migration is mediated by a cellular adhesion protein known as vinculin.

63-GENETIC CHARACTERIZATION OF PROGRAMMED CELL DEATH IN ANEUPLOID YEAST CELLS

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Aneuploidy is the genetic state of a cell that has a chromosomal number that is not an exact multiple of the haploid complement. It is a leading cause of spontaneous abortions and of mental retardation in humans, and is a characteristic defect in cancer. Yeast cells that are aneuploid manifest a diversity of phenotypes including cell cycle defects, genomic instability, protein imbalance, chaperone stress and proteotoxicity. We are investigating the links between aneuploidy on the budding yeast, *Saccharomyces cerevisiae* and programmed cell death. We have shown that aneuploid yeast cells are more sensitive to ethanol-induced cell death. In addition, we also have data that suggests that caloric restriction protects aneuploid yeast from program cell death. [In addition to funding from the RI-INBRE Program, our laboratory is supported by grant NIGMS R15 GM110578, awarded to N. Austriaco.]

64-ASSESSING LIVER DAMAGE IN ZEBRAFISH EMBRYOS TREATED WITH ACETAMINOPHEN, ETHANOL AND A COMBINATIN OF THE TWO

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Zebrafish are commonly used as a model to study embryonic development. One of the advantages of using zebrafish as a model is their rapid development. Within three days of fertilization liver organogenesis is complete and the liver is functional. Therefore, we can assess toxin induced changes in liver development in a short amount of time. We are focusing on the effects of acetaminophen, a commonly used pharmaceutical drug, and ethanol, commonly consumed in beverages. Acetaminophen, used to treat pain and reduce fever, is toxic to the liver if an overdose is taken. Ethanol has both acute and chronic toxic effects on the liver. When administered separately to developing zebrafish embryos both induce liver cell death. We hypothesize that these effects will be induced at lower doses when acetaminophen and ethanol are administered together. To investigate this hypothesis we treat zebrafish embryos with acetaminophen, ethanol, or a combination of the two At 24 to 48 hours post fertilization. We are then assessing liver development at 3 to 5 days of development. We are then processing embryos for histological analysis by creating paraffin sections. To assess the mechanism of cell death we will then use immunofluorescence techniques to distinguish rates of apoptosis, necrosis, and autophagy.

65-SYNERGISTIC EFFECTS OF CURCUMIN AND DIRECT PHOTODYNAMIC THERAPY IN CERVICAL AND ORAL CANCERS

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Cancer is the one of the deadliest diseases in America. With Cervical Cancer effecting nearly 15,000 women each year, side effects like pain, weight and hair loss from radiation and chemotherapy are devastating. The novel possibility of Curcumin-mediated PDT as a less invasive, more efficient approach to cancer therapies is in initial investigative stages. Photodynamic therapy (PDT), when paired with Curcumin has shown increased apoptosis of Cervical Cancer (HeLa) *in vitro*, with potential for apoptosis of malignant cells without negative side effects. The precise concentrations and light durations to induce substantial apoptosis have been analyzed through flow cytometry and fluorescence microscopy. Paired treatment of 30uM Curcumin with 1-hour PDT has shown significant late apoptosis and end-stage apoptosis continuing 24 hours after treatment, with no viable cells present. This suggests paired treatment as an effective approach to HeLa cell apoptosis. Analysis of this treatment on Oral Cancer will also be presented.

66-MODULATION OF IMMUNE CELL FUNCTION BY DIET-INDUCED EPIGENETIC MODIFICATIONS

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Dietary components can play a critical role in regulating immune cell behavior during various diseases. We have recently shown that dietary components such as curcumin can modulate mast cell function during food allergy. Several studies also suggest that curcumin can induce epigenetic modifications in immune cells contributing to their function. We therefore hypothesized that mast cell and T cell responses are regulated via epigenetic modifications that induce changes in their proliferation and function. 5-Aza-2'-deoxycytidine (DAC) is a specific inhibitor of DNA methylation, and can thereby induce epigenetic changes in cellular DNA when exposed to it. Mast cells and T cells were treated with curcumin and DAC and their proliferation and survival were examined. Differences in the ability of curcumin and DAC to suppress cellular proliferation were evaluated. Similarly, the effects of these two agents in modulating the expression of the IgE receptor, as well as the production of cytokines was examined. Both curcumin and DAC altered the proliferation and cytokine production capacity of mast cells and T cells. Our data therefore suggest that induction of epigenetic changes in DNA by dietary agents can affect immune cell function and may have consequences in immune-mediated diseases.

67-THE EFFECTS OF DIETHYL PHTHALATE ON *DROSOPHILA MELANGASTER*, STUDIED THROUGH SCANNING ELECTRO MICROSCOPY AND DEVELOPMENTAL ASSAYS

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Phthalates are a class of chemicals widely used in the production of plastics and other common household products. Mounting scientific evidence suggests phthalates, such as diethyl phthalate, can act as endocrine disruptors, causing negative health effects like cancer and birth abnormalities. By using *Drosophila melanogaster* as a model organism, the developmental effects of phthalate exposure can be studied. Developmental assays can provide data correlating amount of exposure and effect on the life cycle of *D. melanogaster*. To further explore the effects of phthalates, a novel method was required to prepare *D. melanogaster* pupa and larva tissues for use in a scanning electron microscope. Use of a scanning electron microscope provides high detailed imaging of the *D. melanogaster* surface ultra structure. By comparing control and treatment tissues under the scope, potential differences induced by phthalate exposure can be determined.

68-DEVELOPMENTAL CARDIOTOXICITY OF GLYPHOSATE, THE MAIN INGREDIENT IN ROUND-UP® HERBICIDES

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Glyphosate (commercial formulation Round-up®) is a broad spectrum herbicide used aggressively in agricultural practices as well as home garden care. Although labeled “safe” by the chemical industry, doses tested by industry do not mimic chronic exposures to sublethal doses that humans in the environment are exposed to over long periods of time. Contamination into surface waters occurs after rainfall or flooding events, urban runoff and when wastewater treatment effluent enter water sources. Surface waters are not routinely tested for glyphosate contamination. Given the widespread uses of and exposure to glyphosate, studies on developmental toxicity are needed. Here we utilize the zebrafish vertebrate model system to study early effects of glyphosate exposure on the developing heart. An initial LC₅₀ experiment determined the mean lethal concentration at 50%, but we used a considerable lower dose. Results were reproducible using commercially purchased Round-up® or chemical grade glyphosate either by embryo soaking or injection. Treatment by embryo soaking with a 50µg/ml dilution of pure chemical grade glyphosate or the glyphosate equivalent in Round-up® starting at gastrulation results in structural abnormalities in the atrium and ventricle, irregular heart looping, *situs inversus* as well as decreased heart beats by 48 hours. We further investigate these structural abnormalities using a myosin light chain 2 green fluorescent protein transgenic and further investigate specific atrium and ventricle defects using immunohistological techniques. We conclude that glyphosate, at lower than environmentally approved doses, is developmentally toxic to the heart in zebrafish.

69-ARE FOOD ADDICTIONS, AND OVER EATING A RESULT OF BACTERIAL MANIPULATION? A COMPARISON STUDY IN DAPHNIA

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A public health issue, and a disease according to the American Medical Association, Obesity is a chronic illness that is associated with having excess body fat, and a Body Mass Index of 30 or more. A disease that has no direct or indirect cause, factors that contribute to obesity according to the Center for Disease Control and Prevention are behavior, environment, and genetics. Though these factors have been identified as the main cause to the complexity of the epidemic, there are other influencing factors, one which include bacterial manipulation from the gut flora.

A flora that outnumbers the human genome by 100 to 1, the human microbiome plays a role in health by boosting the immune system, aiding in digestion, producing vitamins, compounds, and lowering pH. A micro island, the question many scientists have begun to research is whether or not this microbiome is controlling, and/or manipulative?

So to add to the current research, and understanding of how “gut microbiota” influences eating patterns, a four month experimental study was designed at the University of Saint Joseph to study the effects of *Lactobacillus* concentrations in Daphnia, and how different bacterial concentrations affected feeding patterns. The hypothesis tested was that a higher concentration of gut bacteria in Daphnia would cause more food to be consumed in comparison to a lower concentration.

70-INDUCTION OF APOPTOSIS IN CAL-27 AND HeLA CANCER CELL LINES USING BERRY EXTRACTS

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Oral epithelial cancer is one of the most prominent types of cancer, being the sixth most common worldwide. Cervical epithelial cancer used to be the leading cause of death in women in the United States. However, advances in diagnosis and treatment of cervical cancer have improved survival outcomes to 70-73%, while oral cancer has not improved and remains at 50-55%. In the current research, HeLa and CAL-27 cell lines are compared for their induction of apoptosis following treatment with eleven different fruits, all combined in a compound known as Berry Extracts. The active element of these fruit extracts is reported to be Anthocyanins; it is the conjugated bond structure that is responsible for the bright colors of the fruits. Anthocyanins are flavonoids found in many fruits that have antioxidant and anti-carcinogenic properties. They have been shown to induce apoptosis in cancerous cells by triggering the intrinsic mitochondrial pathway and extrinsic FAS ligand pathway. Treatment of CAL-27 oral cancer and HeLa cervical cancer cells with varying concentrations of Berry Extracts demonstrated induction of apoptosis. Apoptosis was quantified by hemocytometer, fluorescence microscopy, flow cytometry, and DNA agarose gel electrophoresis. Results showed positive correlation between increasing concentration and incidence of apoptosis. HeLa cell and CAL-27 cell results showed comparable responses to treatment with Berry Extracts. These results suggest that Berry Extracts may induce cell death in CAL-27 cells in a similar fashion as in HeLa cells, potentially implying improved therapeutic effect in oral cancer.

71- $\alpha 6$ AND $\beta 4$ INTEGRIN SUBUNITS MEDIATE OUTGROWTH OF AXONS ON LAMININ

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Earlier data suggest that a laminin receptor in chick forebrain neurons is localized in the axons therefore mediating the axon-growth promoting properties of laminin. We tested the role of $\beta 4$ and $\alpha 6$ integrins in laminin-induced increases in axonal growth using function-blocking antibodies. Axons of the neurons grown on laminin treated with $\beta 4$ integrin function blocking antibodies or the $\alpha 6$ integrin function blocking antibodies, were significantly short compared to the untreated cultures. This data is consistent with the hypothesis that the $\alpha 6\beta 4$ heterodimer acts as the axonal laminin receptors in embryonic chick forebrain neurons. This is critical for the growth and development of axons. To directly test whether $\beta 4$ or $\alpha 6$ integrin was localized specifically to axons, we transfected cultured forebrain neurons from embryonic chicks with DNA constructs encoding both $\alpha 6$ and $\beta 4$ integrin genes. The preliminary results show that $\beta 4$ and $\alpha 6$ integrin are expressed in axons.

72-COMPARING PHOTOBHAVIORS OF GENETICALLY DIFFERENT POPULATIONS OF THE WATER FLEA *DAPHNIA MAGNA* ORDERED FROM DIFFERENT BIOLOGICAL SUPPLY COMPANIES

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This research compared the phototactic responses of *Daphnia magna* from two supply companies (Carolina Biological Supply Company [CB], Connecticut Valley Biological Supply Company [CV]) to better understand how these behaviors are genetically influenced. For each treatment, 10 organisms were exposed to the same light stimulus ($1.6 \mu\text{Em}^{-2}\text{s}^{-1}$ of 410-nm or 630-nm) and compared with dark controls for location in the test chamber after a 30 s light exposure. The photobehaviors of the CB and CV daphnids did not significantly differ from dark controls when tested using these two wavelengths. However, phototaxis in CB and CV showed a larger standard deviation than the controls, indicating increased variation in response to light. Although the CV and CB daphnids did not differ from the controls, the two populations showed a large but not statistically significant difference in phototaxis when compared with each other ($p = 0.055$). These results, when combined with previous research (Cheung, 2015), indicate that CV daphnids are more responsive to 410-nm light than 630-nm light. In contrast, CB daphnids do not show a phototactic response at either wavelength. These data suggest a difference in photobehavior that may be attributed to genetic variation. To determine if the two populations were derived from the same clonal ancestor, genome digests prepared with restriction endonucleases EcoRI, HindIII, and BglII were electrophoresed and analyzed. Digestion profiles revealed that DNA sequence variation exists between the two populations. While these assays are not definitive, the results provide evidence that the two *D. magna* populations are genetically distinct.

73-INVESTIGATION OF HEMATOLOGICAL RESPONSES TO DIACETYLMORPHINE AND METHADONE EXPOSURE USING AVIAN MODEL

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The prenatal effects of diacetylmorphine (active ingredient in heroin) and methadone are of particular importance due to prescription of methadone to pregnant heroin addicts to counteract the effects on fetal development. Heroin is classified as a teratogen; however, there is a shortage of data on heroin or methadone's effects on the fetal immune system. Immunological effects of methadone and heroin exposure were investigated using an avian model (*Gallus domesticus*). Pathogen free chick embryos were injected with heroin or methadone at doses based on levels commonly found in pregnant women. Following 20 days of incubation, blood samples from a heart puncture were collected from all embryos. White blood cell differential and partial blood count hematological tests were performed. For statistical analysis, SPSS ANOVA statistical package was used to calculate hematological differences between treatment groups. Significant differences in thrombocyte and white blood cell content were found in the treatment group exposed to the high heroin dosage (6.25mg/kg) as compared to the control group. Significant decreases in lymphocyte content were observed in all heroin exposed treatment groups as compared to the controls. In all methadone-exposed chicks, there were significantly more thrombocytes. The increase in thrombocytes could be attributed to an increase in blood clotting from gross brain bleeds, consistent with observations of exposed avian embryos. The increase in white blood cell content can be attributed to an increased fetal immune response. Detected immunological changes suggest possible harmful effects on developing organisms.

74-THE ROLE OF DREBRIN IN HEROIN RELAPSE IN RATS

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Repeated exposure to opiates causes a change in the levels of various proteins within the nucleus accumbens associated with altered neuronal plasticity. These changes are thought to be imperative in developing long-term adaptations that are essential for the transition towards the addicted state. Previous experiments have shown that repeated morphine exposure leads to a decrease in the expression of drebrin, an actin-associating protein. In the present study, it was hypothesized that overexpression of drebrin would cause a decrease in heroin relapse. Heroin was administered via a syringe hooked up to a self-administration box. The number of active responses was measured by examining the number of infusions received by the animals. The number of active responses was increased in the animals exposed to heroin when compared to the animals exposed to saline. Following exposure to heroin, rats with overexpression of drebrin demonstrated a decrease in heroin relapse when compared to control rats with no treatment. This observation led to the conclusion that drebrin may play a role in deactivating the pathway involved in stimulating the intensity of heroin relapse. Future research may lead to the possible characterization of drebrin as a functioning protein in the drug reward circuitry. Drebrin may be essential for decreasing heroin relapse in animals. This finding along with additional research may potentially lead to the development of therapeutic techniques for treating opiate drug addiction in humans.

75-RIBBED MUSSELS USE HSP70 AS PART OF MOLECULAR ADAPTATION TO SALT STRESS

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Osmoconforming marine invertebrates modulate concentrations of intracellular free amino acids to eliminate osmotic gradients imposed by tidal variations in environmental salinity. Before adaptation is completed, there is transient osmotic water flux. We propose that there is a mechanism to maintain protein conformation and function during the process of salinity adaptation. We hypothesize that an induced heat shock protein is produced in gills of the ribbed mussel *Geukensia demissa* as part of an adaptive response to increased salinity. Heat shock proteins (HSPs) are encoded by genes whose expression is typically modulated by thermal stress, but have also been shown to respond to other environmental stressors. Western blots show that *G. demissa* can produce both the stress-inducible Hsp70 protein and the constitutively expressed Hsc70 protein. Immunoblot data also show an increase in Hsp70 levels in salinity-shocked mussels suggesting that the chaperone is used as a protective measure during high-salinity adaptation. Quantitative real-time polymerase chain reaction (qPCR) is being used to determine if there are changes in the quantity of heat shock protein gene expression during high-salinity adaptation. Preliminary qPCR findings show that the creation of novel Hsp primers sequenced from obtained DNA sequences of *G. demissa* create reproducible standard curves, similar primer efficiencies and lack of primer-related artifacts. Initial RT-qPCR analysis indicates that in gills exposed to high-salinity for one hour, hsp70 expression normalized to a housekeeping gene has increased compared to that in gills maintained at a constant salinity. Supported by a CSU-AAUP grant to MAK.

76-DIGITAL MICROSCOPIC PHOTOGRAPHIC SERIES OF ADULT ZEBRAFISH CEREBELLUM, HORIZONTAL SERIES

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Digital photographic series from plastic embedded semithin sections of adult zebrafish brain, stained with toluidine blue, were used in this study. Serial sections of adult zebrafish brains were cut in all the three anatomical plans. This work utilized the horizontal series and focused on the cerebellar region. The poster demonstrates montaged images captured with 20x objective and/or 100x objective. They are presented in a consecutive order of the dorsal ventral orientation. Efforts to make these images in an interactive atlas are in progress.

The overall aim of this work was to contribute to the formation of a neuroanatomical atlas of a zebrafish brain. Zebrafish are now a model organism, so knowledge of the structure and function of the zebrafish brain is important and this project will address such need by providing a high-resolution guide to many of the cerebellum's important structures.

77-GENETIC ANALYSIS OF AN EMERALD ASH BORER (*AGRILUS PLANIPENNIS*) POPULATION IN WESTERN RUSSIA.

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Emerald ash borer (*Agrilus planipennis*; EAB) is an invasive beetle which has the potential to devastate ash tree populations (*Fraxinus* spp.). It was found outside of its native range of northeastern Asia and discovered in North America in 2002 and in Moscow Russia in 2003. The EAB range may be spreading from Moscow into European Russia with ash tree species perishing if EAB population densities are high similar to the devastation that has occurred in North America. Understanding the geographic origin of the Moscow population will provide additional information that can be used to guide control efforts to prevent further spread. This study provides genetic analysis of the Moscow Russian population, and compares the analysis with previous research performed on the North American and northeastern Asian populations. This information may be used to predict where the Moscow population originated.

78-DIFFERENCES IN VISUAL ACUITY BETWEEN DIFFERENT BREEDS OF GOLDFISH

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Selective breeding has led to the development of several different breeds of goldfish (*Carassius auratus*) that have different phenotypes. One particular phenotype that has been selected for is bulging telescopic eyes. It is believed that goldfish that have telescopic eyes have poor vision. The aim of this study was to determine if there is a difference in visual acuity between goldfish with telescopic eyes, such as the Black Moor goldfish, and goldfish with normal non-bulging eyes, such as the Calico Fantail goldfish. Visual acuity tests were conducted using a discrimination task that tested to see how well each breed of goldfish could see a black and white striped pattern printed at different magnifications from a distance of 20 cm. It is predicted that the Black Moor goldfish will have a lower visual acuity than Calico Fantail goldfish. Training each goldfish to associate the striped pattern with a food reward is currently underway; visual acuity testing will begin shortly. Data comparing the performance of the two breeds of fish will be used to see how our practice of selective breeding impacts the lives of animals we use as pets.

79-SEARCH FOR SAFE UNDERGROUND WATER THROUGH OBSERVATION OF TUBEWELL CONCRETE PLATFORM COLOR AND THE SEARCH FOR MICROBES IN SOUTHERN BANGLADESH

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The search for arsenic (As) safe drinking water for people in this densely populated South Asian country remains a challenge for policymakers and non-government organizations. The pace of installation of such options is not able to cope with the demand of safe water. The As and Fe rich groundwater develops a reddish-orange color with the silica of concrete while groundwater with low levels of As and Fe develops a diffuse ash color. We have investigated 200 tubewells with different degrees of platform color in Sharasti Upazila in the Chandpur district of Bangladesh. Using inductively coupled plasma optical emission spectroscopy (ICP-OES), we have determined 28 trace elements in tubewells in two unions and six villages. For drinking water, the people of Bangladesh used to rely on surface water, which was contaminated with bacteria causing diarrhea, cholera, typhoid, and other life-threatening diseases. The recent transition from surface water to groundwater in the late 1960s has significantly reduced deaths from waterborne pathogens; however new evidence in the 1990s suggests disease and death from arsenic and other toxic elements in groundwater are affecting large areas of Southern Bangladesh.

80-COMPARATIVE ANALYSES OF PHENOL CONTENT AND ANTIOXIDANT PROPERTIES OF PHILIPPINE TEA SAMPLES

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The phenol content and antioxidant properties of the water extracts of seven commercial fruit and medicinal plant based teas from the Philippines were evaluated and compared to one another. The total phenolic content, determined by the Folin-Ciocalteu method varied from 23.2 mg/g (bitter melon) to 91.49 mg/g (Pito-pito dried herbal tea) mg of gallic acid equivalent/g dry tea. The antioxidant properties were evaluated using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay system, which showed 80% to 100% inhibition or reduction of the DPPH. The 2,2-azinobis (3-ethyl-benzothiazoline-6-sulfonic acid (ABTS) assay was also performed and showed the same results as that of DPPH assay. A general trend in terms of antioxidant activities and total phenol content can be observed as pito-pito dried herbal tea showed 100% inhibition of both DPPH and ABTS.

81-AN ANALYSIS OF THE XANTHONE ALPHA-MANGOSTIN PRESENT IN DIFFERENT MANGOSTEEN PRODUCTS

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Xanthenes are tricyclic isoprenylated polyphenols found within the fruit mangosteen. Many studies conducted on the xanthone alpha-mangostin, found that the xanthone has anti-inflammatory, anti-carcinogenic, anti-oxidant, and anti-tumor properties. These properties expressed by the xanthenes have been highly admired by different Health & Wellness companies. Companies like Vemma, Terrasoul, and Soloaray have made products containing the fruit mangosteen, and are said to be one of the healthiest alternative to products in the Health & Wellness markets. Within this study different mangosteen products were examined to test, for the amounts of alpha-mangostin present. The samples that were tested consisted of liquid extracts and powders of the mangosteen fruit. Each sample was extracted into a solution of 80:20 acetone/water and ran through a high performance liquid chromatography (HPLC) instrument. The results given from the HPLC tests were interpreted and the data that was collected. The data retrieved of the samples were then plotted against the standard alpha-mangostin bought from Sigma-Aldrich. The data found that the liquid samples collected of mangosteen extract did not test properly. The concentration of alpha-mangostin could not be determined in any liquid samples and the test was discarded. The powder extracts used found significant amounts of alpha-mangostin within each test trial. The powder samples of the mangosteen fruit were also found to be statistically similar while the capsule containing the mangosteen extract was determined to be different.

82-MOLECULAR DYNAMICS SIMULATIONS TO INVESTIGATE INTERACTIONS BETWEEN FULLERENES AND AMYLOID PROTEINS

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Alzheimer's disease is a neurodegenerative illness that produces plaques in the brain. These neurotoxic plaques are produced by the Amyloid-Beta protein and its fibrils. A cure for Alzheimer's and associated dementia is the focus of many large scale investigations, both, in vivo, and in silico. Recently, fullerenes have been identified as potential inhibitors of the aggregation of amyloid proteins and fibrils that eventually lead to the disease. Fullerenes are hollow carbon spherical structures that are achiral, and have varying sizes. We have simulated the interaction of fullerenes of various sizes with the amyloid protein, and the beta fibrils. Our initial results show that small fullerenes can bind strongly to fibrils. The best binding pose from our docking simulation is then subjected to fully atomistic Molecular Dynamics simulation. We plan to analyze in detail the binding interactions, stability of the fullerene-fibril complex, and fullerene-amyloid complex. Our simulations will create a microscopic picture of these interactions, and shed light on the potential role of fullerenes as therapeutic targets for Alzheimer's Disease.

83-AN INVESTIGATION OF EMERGING ANTHROPOGENIC CONTAMINANTS IN HUDSON RIVER WATER USING *ORCONECTES IMMUNIS* AS A MODEL

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Illicit drugs and prescribed pharmaceuticals such as (S)-amphetamine are environmental contaminants that have the potential to damage aquatic ecosystems. Excess (S)-amphetamine capsules can be flushed down the toilet or excreted in urine and travel to wastewater treatment plants (WWTPs). In these facilities, the residual drugs are only partially removed and can still be detected in wastewater effluents. The purpose of this study was to investigate the potential bioaccumulation of (S)-amphetamine in the Hudson River by using crayfish (*Orconectes immunis*) as an indicator. Crayfish were exposed to (S)-amphetamine concentrations of 2.0 and 200.0 ng/L in aquatic tanks filled with raw river water over a 2 week period. In addition, controls were established using a raw river water flow-through system, a raw river water non-flowing system, and cages suspended directly in the river. At the termination of the experiment, crayfish were euthanized and chemically digested in high purity HNO₃. ICP-OES was used to detect differences in Ca²⁺ and Mg²⁺ content between treated and control crayfish. HPLC was used in quantitative presence/absence detection of (S)-amphetamine in treated crayfish. The results of HPLC did not confirm the presence of (S)-amphetamine in exposed crayfish. ICP-OES results indicated differences in Ca²⁺ content in comparison with controls, but not Mg²⁺. Although HPLC results did not detect the presence of (S)-amphetamine in exposed crayfish, differences in elemental composition raise concern about the potential impact of anthropogenic contamination on the health of aquatic species.

84-MONITORING THE INTERACTION OF NANOMATERIALS WITH CATALASE USING OPTICAL SPECTROSCOPY

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Nanomaterials are materials with morphological features on the nanoscale with special properties that stem from their small dimensions. The fascinating and useful properties of nanomaterials make them versatile materials in various fields of science, ranging from material science to medicine. Due to the potential application of nanomaterials, it is imperative to understand the interactions of nanomaterials with various biomolecules. In this study, the interactions of four nanomaterials—aluminum oxide, silicon oxide, tin oxide, and zinc oxide—with the enzyme, catalase, were investigated by various spectroscopic methods (absorbance, fluorescence and circular dichroism). Results showed aluminum oxide significantly reduced absorbance and emission of the catalase in comparison to the other nanoceramics. Silicon oxide and zinc oxide, however, had a significant initial change in emission and absorption, but did not have a substantial overall change like silicon oxide. The tin oxide decreased the absorbance and emission of the catalase slightly. The changes in the conformation of catalase upon mixing with the nanoceramics were also observed. Catalase has a high α -helix component (68.62%) and lower random and β -sheet component (26.65% and 4.73% respectively). For aluminum oxide, tin oxide, and zinc oxide, initially, the α -helix component decreased, but the higher concentration (4 mg) the α -helix component increases. At the highest concentration of nanoceramics (5 mg) the α -helix component drops again. When the silicon oxide is added to catalase, the α -helix component disappears and the random component as well as the β -sheet component increase.

85-THE STUDY OF ANTIBACTERIAL AND ANTIFUNGAL PROPERTIES AND ANTIFUNGAL PROPERTIES IN VARIOUS NATURAL AND CULTURAL FOODS

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This research focuses on investigating the medicinal properties of different foods. The foods investigated in this study were identified by either religious texts, folklore and old wives' tales, or cultural teachings that suggest these foods have some medicinal value. We are particularly interested in evaluating their antifungal and antibacterial properties. In order to identify the potentially active compounds, we have extracted the organic soluble compounds from each of the food samples. The isolated extracted samples were subsequently tested using a Kirby-Bauer Disk Diffusion Susceptibility assay.

86-ISCHEMIA IMPAIRS MITOCHONDRIAL VELOCITY IN WHITE MATTER OF THE BRAIN IN AN AGE-DEPENDENT MANNER

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Stroke frequently affects white matter of the brain leading to neurological deficits. Mitochondrial dynamics in axons that make up the white matter are critical for proper functioning of an organism, and these characteristics are known to be impaired during stroke. The risk for stroke increases with age, and mitochondria also show structural changes and functional deficiencies as they age. Therefore, it was hypothesized that age-dependent vulnerability of axon function to white matter following ischemic injury is a result of impaired mitochondrial velocity. A new technique was developed to image live mitochondria from mouse optic nerve (MON) axons, a pure white matter tract. MONs obtained from transgenic mice where mitochondria were tagged with cyan fluorescent protein (CFP) were studied. Using an inverted laser-scanning confocal microscope, MONs were employed from 1-month-old and 16-month-old Thy-1 Mito-CFP (+) mice to capture time-series images of CFP fluorescence from a single plane for 100 minutes. The time-series images consisted of baseline (20 min), followed by oxygen glucose deprivation (OGD) (60 min), and recovery (20 min) conditions. Mitochondrial motility drastically slowed down during OGD in both age groups. However, axonal mitochondria in older MONs showed a major deficit in maintaining their retrograde velocity in recovery compared to younger mitochondria. It is proposed that loss of mitochondrial mobility affects the ability of axon recovery; therefore, identifying possible solutions to maintain mitochondrial motility during ischemia could have major implications in designing potential therapies to improve a patient's recovery post stroke.

87-BINDING INTERACTION OF NANOCERAMICS (METAL OXIDES) WITH HUMAN SERUM ALBUMIN

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Nanomaterials are defined as materials with at least one external dimension in the size range from approximately 1-100 nanometers. The properties of nanomaterials make them versatile materials in various fields of science, ranging from material science, energy, to medicine. This study was conducted because the knowledge on the interactions of nanomaterials with different biomolecules is limited. The interaction of nanoceramics (aluminum oxide, silicon oxide, titanium oxide and zinc oxide) with human serum albumin (HSA)—the most abundant protein constituent of blood plasma— was investigated by various spectroscopic methods (absorbance, fluorescence and circular dichroism). Results showed aluminum oxide significantly changes in terms of reduced absorbance, emission, and CD profile in comparison to the other nanoceramics. Absorbance reduction in samples with silicon oxide was also observed. The nanoceramics also reduced the emission intensity in the samples of HSA. Interestingly, a peak was observed at around 420 nm for zinc oxide and 410 nm for aluminum oxide and silicon oxide as the amount of nanomaterials being added increased.

88-HANDS-ON EXPERIMENT TO ENHANCE STUDENT LEARNING ON NUCLEOPHILIC AROMATIC SUBSTITUTION REACTIONS

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Our laboratory has always been interested in developing serotonergic hybrids combining serotonin autoreceptors antagonism and serotonin transporters inhibition with the main goal to reduce the repetitive behaviors in children with autism. During our journey, we discovered an efficient and robust amination route utilizing nucleophilic aromatic substitution (NAS) reaction. This reaction uses isopropyl alcohol as the sole reagent/solvent. The high yields, lack of side reactions, wide range of amines used, and short reaction times (5-10 minutes average), make them highly attractive to be used as a teaching tool for the undergraduate chemistry laboratory. NAS is a process where a nucleophile attacks an electron deficient aromatic ring. This results in a carbanion intermediate stabilized by the electron withdrawing groups (EWG) attached to the ring. Loss of the leaving group (LG), typically a halogen, resulted in an overall substitution of the nucleophile for the halogen. Since stabilization of the anion is required for the reaction to proceed, EWG must be ortho and/or para to the site of nucleophilic attack. Methyl-4-fluoro-3-nitrobenzoate was used as starting material since it fulfills the criteria of having a halogen as LG and a nitro group as EWG in the ortho position. Out of the 15 amines that were conducted, only 5 amines as the nucleophiles were selected to be executed in the CHEM210 laboratory at the University of Saint Joseph. The reaction condition, yield, and full characterization of all products will be reported. The reflection of enhancing student learning on nucleophilic aromatic substitution reaction will also be reported.

89-CHEMOSELECTIVE OXIDATION OF HYDROBENZOIN DERIVATIVES

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The hydroxy carbonyl is a common structural moiety found in a number of natural products as well as in pharmaceuticals, whether it be in the alpha, beta or gamma orientation. Starting with (*R,R*)-(+)-hydrobenzoin and *meso*-hydrobenzoin and reacting them with S₂Cl₂ produced cyclic dialkoxy disulfides. Thermally conditions leads to fragment and oxidize one of the initial alcohols, thus producing an alpha hydroxy carbonyl. In an attempt to understand the electronic constraints of this novel methodology we initially are evaluating symmetric hydrobenzoin. Subsequent studies will be aimed at unsymmetric hydrobenzoin as well as non-benzylic based diols.

90-INVESTIGATION OF EPIBATIDINE ANALOGS TO INCREASE NICOTINIC SUBTYPE SELECTIVITY

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Analgesia drug addiction is a prominent medical condition that can be significantly improved with alterations of current medication. The addictive nature of current medication is due to the interaction with the opioid receptor causing a pleasurable sensation, encouraging the user to repeat the rewarding activity. Epibatidine is a potent nicotinic agonist naturally released from the skin of poison dart frogs. This compound has a narrow medicinal range where a small dose produces adequate analgesic effects while any higher dose can be fatal. Epibatidine has 200x the potency at analgesia in some models than morphine. The selectivity among nicotinic subtypes prevents epibatidine from being a viable analgesic due to the toxic side effects.

Currently there is a lack of epibatidine syntheses involving variability to the core structure. An option is to begin with pyridine and make an N-methyl pyridine salt. This salt can be reduced to a dihydro-pyridine and used in a Diels-Alder reaction to obtain analogs of epibatidine to adjust the subtype selectivity. Previous analogues such as these have shown similar affinity to epibatidine, but have not been tested for subtype selectivity nor have core modifications been made relative to the selectivity. This project is to build additions on the core structure which have not been researched. The N-methyl amine is being used as a base scaffold to enhance the stability of the dihydro-pyridine. The ultimate goal of this research is to synthesize a new and more effective compound to enhance current medicinal methods of non-addictive analgesics.

91-SYNTHESIS AND EVALUATION OF PHEVALIN AND DERIVATIVES AS BACTERIAL QUORUM SENSING INHIBITORS

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Infectious diseases are traditionally treated with compounds that either kill or inhibit bacterial growth, processes that have led to the growing concern of antibiotic resistance. Quorum sensing (QS) is the process by which bacteria communicate with one another through chemical signals known as auto-inducers, in order to coordinate their behavior. Auto-inducers are small molecules that are released by bacteria, which can bind to and stabilize the receptor proteins, causing the ligand-protein complex to initiate transcription of quorum sensing genes. QS plays a role in regulating virulence and pathogenicity in bacteria. Targeting the quorum sensing pathway creates an opportunity to control infectious bacteria without interfering with growth, making it less likely for bacteria to develop resistance. Our long term goal is the synthesis of small molecules that have the capability to inhibit QS. We have successfully synthesized in four steps the pyrazinone, phevalin, a known regulator of virulence factor expression in *Staphylococcus aureus*. Bioassays utilizing *Vibrio harveyi* demonstrated the ability of phevalin to inhibit bioluminescence, a QS-controlled phenotype. By varying the amino acid starting materials, we are developing a library of phevalin derivatives to further investigate the ability of these compounds to be potent quorum sensing inhibitors. To date, eight derivatives have been synthesized and the structure-activity relationships have been investigated. The most active derivatives were Leu-Phe and Tyr-Val with IC_{50} values of 39.11 and 47.95 $\mu\text{g/mL}$, respectively.

92-USE OF NATIVE PLANTS AND OILS TO SYNTHESIZE NOVEL ANTIMICROBIAL SURFACES

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In order to maintain a sterile environment and protect patients in a clinical setting from microorganisms can be a challenge. Previous research has been conducted where creating antimicrobial surfaces could minimize the growth of microorganisms e.g. bacteria, fungi, viruses. Challenges faced throughout the process of creating these surfaces include difficulty to industrialize, non-uniformity throughout the surface, and activity of the antimicrobial agent being lost by wiping off a given surface. Gelatin B are peptides and proteins produced by partial hydrolysis of collagen extracted from the skin, bones, and connective tissues of animals, its molecular weight affects its viscosity, gel strength and other properties, such as emulsion stabilization, by also destroying certain chemical cross linkages present in collagen, the part of the connective tissue that in the skin helps in firmness, suppleness and constant renewal of skin cells. Our work involves the utilization of Gelatin B to incorporate and fuse with plants essential oils in varying concentrations. Oils include: sage, thyme, neem seed, yarrow, propolis, black elderberry, ginger, turmeric, rosehip, tamanu, dragon blood, and key lime. These new surfaces are tested against gram positive and gram negative bacteria.

93-EXPLORING THE INTERACTIONS OF CYTOCHROME C WITH D_PG LIPIDS

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Fluorescence experiments monitoring the interactions between cytochrome c and labeled lipid vesicles containing 50 mole% 1,2-diacylphosphatidylglycerol lipids [10:0, 12:0, 14:0, 16:0, 18:1 (\square 9-cis)] with 1,2-dioleoyl-*sn*-glycero-3-phosphocholine (DOPC) in pH 7.4 buffered solutions are reported. Cytochrome c was observed to adsorb onto the negatively charged lipid vesicles in a similar manner for all vesicles. Subsequent cytochrome c desorption was observed upon the addition of up to a 10X excess of 1,2-dioleoyl-*sn*-glycero-3-phospho-(1'-*rac*-glycerol) (DOPG) vesicles to an extent related to the length of the acyl chains of the D_PG lipids and consistent with two binding modes of cytochrome to the lipid vesicles. AutoDock calculations of the binding energies between the corresponding set of simple fatty acids and cytochrome c and desorption experiments at different temperatures indicate the observed differences in extent of desorption are related to the packing strain experienced by the lipids in the bilayer.

94-MEDICATION DEVELOPMENT USING *LIATRIS SPICATA* [BLAZING STAR] PLANT

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Liatis spicata, a plant predominately found in the eastern part of the United States, has been shown to contain coumarins, which can prevent the innate clotting of blood when there is a wound. This is due to their natural coagulation properties. This plant has some additional uses in cancer treatments, gonorrhea, and snakebites. We wish to explore the active compound(s) of the plant and determine where on the plant the concentrations of these compound(s) are located in the highest yield. Initially, the different parts of the plant were cut and grouped together, then freeze-dried using a lyophilizer, and run on a soxhlet extractor using petroleum ether. The solid remains were run through the soxhlet extracting again using a 40% ethanol:60% water mixture. Both the organic extracts from the leaves, stem, stem tips, and flowers were run through the GC/MS and relative concentrations of organic compounds were determined.

95-CHEMISTRY IN THE AEROSOL INTERFACIAL REGION: A COMPUTATIONAL STUDY

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The chemical reactions caused by atmospheric aerosol particles are substantial elements that influence radiative forcing, chemical reaction cycles, and human health. Although the general properties of aerosol particles, along with the chemical reactions of their exterior are understood, the chemical reactions that occur in the interfacial region remain ambiguous. Due to the complexity of the interfacial region, self assembled reverse micelles (RM) are used as proxies to help develop a complete understanding of the photochemical properties of the region. We performed fully atomistic molecular dynamics simulations to explore the impact of trapped ionic species on the size and shape of reverse micelles. RMs were created using Packmol and the simulations were carried out using the open source, GROMACS engine. Simulations were run at constant temperature and pressure and under different ionic concentrations. We have analyzed RMs constructed from dioctyl sodium sulfosuccinate (AOT) surrounded by isooctane solvent. The size of RM is best defined by the ratio $w_0 = \text{H}_2\text{O}/\text{surfactant}$. We have simulated RMs with $w_0 = 5, 7.5, \text{ and } 10$. Each micelle size has a different amount of ions to ensure that each size has the same concentration. Preliminary simulations show that KCl holds the reverse micelle together more and makes it more spherical. Although, after running multiple simulations of different concentrations we discovered that there is a threshold concentration. When there are too many ions in the core they repel each other, which causes the reverse micelle to lose its spherical shape.

96-DETERMINATION OF ACID-BASE EQUILIBRIA OF MULTILAYERED PSEUDO-POLYELECTROLYTES

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The use of weak polyelectrolytes in multilayer polymer systems provides a means of altering the physicochemical properties of these thin films. Previously, we have examined the limits of the polyanions by incorporating the pseudo-polyelectrolytes (pPE's), poly(4-vinylphenol) (PVPh) and poly[5-(2-trifluoromethyl-1,1,1-trifluoro-2-hydroxypropyl)-2-norbornene] (PNBHFA). These pPE's, although being polyacids, should have pK_a values in the basic versus acidic pH range. In order to determine the $pK_{a(\text{app})}$ value of these polymers, once multilayered onto Snowtex silica particles with the weak polyelectrolyte, poly(allylamine hydrochloride) (PAH), we employed zeta potential. PVPh demonstrated $pK_{a(\text{app})}$ values ranging from 10.55 to 11.08 which varied based upon assembly pH conditions as well as layer number. PAH yielded $pK_{a(\text{app})}$ values ranging between 9.81-10.99 when multilayered with PVPh and 9.91-11.04 when partnered with PNBHFA. However, from our study it would appear that PNBHFA does not interact with PAH electrostatically, but rather via H-bonding, and therefore should actually not be classified as a pPE.

97-DETERMINATION OF pK_a VALUES OF POLYELECTROLYTES UTILIZING SPRAY DRYER AND PARTICLE SIZE ANALYZER

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The determination of the pK_a value of acids and bases (more accurately the conjugate acids of said bases) is often done through the well-known potentiometric titration method. Along with this method, there are thirteen more techniques that exist to determine the pK_a value of acids. These techniques are: UV/Vis spectrometry, conductometry, solubility, electrophoresis, partition coefficients, NMR, polarimetry, voltammetry, HPLC, fluorometry, calorimetry, computational, and *via* surface tension. We have discovered another possible method to determine the pK_a value through the use of the spray-dryer. This instrumentation allows for the careful synthesis of particles of a set size. Different pH value solutions of polymers (PAA, PAH, PMA, PEI) with identical ionic concentrations were individually run through the spray dryer at a set temperature and pressure. The particles obtained were then suspended in tetrahydrofuran or acetone and then measured by a particle size analyzer to determine their size. The goal of this was to see if particle sizes would be different, and if so would they correlate to the pK_a value of the polyacids. We can state that there is indeed a correlation between particle size and solution pH values. When poly(acrylic acid) was graphed this technique revealed a bell curve shape with a maxima at the polymer's pK_a value. The opposite occurred when poly(allylamine hydrochloride) with the bell curve having a minimum at the pK_a value. Poly(methyl methacrylate) and poly(ethylenimine) are still undergoing testing.

98-EFFECT OF pH ON THE SPECTROSCOPIC PROPERTIES OF SEVERAL HYDROXYCINNAMIC ACID DERIVATIVES

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Hydroxycinnamic acids are a class of aromatic acids and hydroxy derivatives of cinnamic acid. These compounds account for about one third of the phenolic compounds in our diet. Hydroxycinnamic acids are of great interest because they are potent antioxidants. This study observed the effect of pH on the spectroscopic properties (absorbance and fluorescence) of caffeic acid, coumaric acid, ferulic acid and sinapic acid. Computational calculations on absorbance were also carried out and compared with the experimental results. The absorbance and fluorescence spectra blue shifted from pH 3 to pH 7 and then red shifted from pH 7 onwards. Emission intensity was also observed to increase with increasing pH in ferulic acid and sinapic acid. However, caffeic acid, only increased in emission intensity up to pH 10. The emission intensity of coumaric acid decreased from pH 3 to pH 7 and increased and remained the same at higher pH. Theoretical calculations agree with experimental results in absorbance where there is a blue shift from pH 3 to pH 7 and then a red shift from pH 7 onwards.

99-AN OPEN SOURCE SANDBOX FOR ADAPTIVE IR EXPERIMENTATION

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The utility of the Internet has been defined by the field of information retrieval (IR). We have assembled individual open-source software components to construct a robust information retrieval architecture facilitating experimentation at two levels. First, by comparing the effects of a range of component control parameters, students can use this architecture to learn the foundation of a modern information retrieval system. Second, by providing a sandbox for incorporating various relevance feedback mechanisms, that allow for supervised and unsupervised query adaptation, student-researchers can perform novel experimentation. As a proof of concept, we evaluated the utility of a freely available document clustering component.

100-DOWNSTREAM ACOUSTIC PARTICLE FILTRATION FOR AN AEROSPACE APPLICATION

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The current issue in which this project aroused from is the inaccuracy and damage occurring in particular engines when solid particles enter into them, such as dust, sand, ice, etc. This is a major issue in many different types of devices, such as cars, jets, plant machines, and many more. This project will be sponsored by FloDesign, which is a company that works with aerospace technology.

The objective of this project is to create a product that prevents solid particles from entering an engine. Acoustic particle filtration with aerospace technology will be used to accomplish this task. There are two strategies to go about this project. The first method is the use of agglomeration of particles before it enters the engine so that the larger particles can be easily filtered. The second method is to use acoustics to either levitate or deflect the particles away from the engine inlet. For this project, a feasibility study of the second method of deflection will take place.

After multiple calculations using fluid mechanic properties and particle properties, it was determined that it would not be feasible to completely stop the particle while it is traveling at the high velocity of the air. Future work will look at using sound waves to deflect particles and guide them down a path away from the engine inlet. A feasibility study still needs to take place to determine if this goal is achievable at such high inlet velocities.

101-WASH-E (WATER SANITATION, HYGIENE AND ENERGY)

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The lab has worked on a number of systems that could be part of a comprehensive WASH-E solution for households in resource constrained communities. This project is aimed at filling in the needed pieces for such a solution and bringing the pieces together in a working design. These pieces are subsystems that include the following functions: rainwater harvesting, potable water treatment, domestic hot water heating, shower and clothes washing, a toilet and male urinal, a small scale garden with irrigation and soil control. Supplying water for families falls on the women and gets in the way of other activities. Target households often lack sanitation; nearly half of the world's population lacks access to a basic toilet. The potential to ease the supply quality and utilization of water is significant especially if the capital outlay is affordable. The method used to complete this system begins with modeling it with specific programs to see how much resources are needed to build it completely. After modeling, the group will set up a 3D model of it and use tests to make sure the system works correctly. Some of the equipment needed would include barrels, to harvest and filter water, gutters and filters which can be made with recyclables and buckets to move water. We have been able to finish modeling each subsystem, which are working as expected.

102-DEVELOPMENT AND IMPLEMENTATION OF RNA 16 PROTOCOL FOR ANALYSIS OF GSAP MICROFLUSH TOILET EFFLUENT OUTPUT

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The GSAP Microflush Toilet is a sustainable solution to the sanitation problem in the developing world that uses an innovative valve that flushes on 1 cup of water and a filter-digester system to process waste. The goal of this project is to analyze the outputs of the toilet digester to see what organisms are inputted and outputted from the Microflush system. Up to this point, filtrate effluent from off-grid toilet technologies has not been analyzed beyond marker bacteria, such as *E. coli*. Solid samples were taken at 0, 4, 10, 15, and 30 days of the digestion process and three filtrate samples were also collected: 1 from the raw outflow, 1 following Solar Disinfection (SOLDIS), and another after passing through a Slow Sand Filter (SSF). Each sample was processed using the PowerSoil DNA Extraction Kit and the DNA removed was quantified before RNA 16 was amplified with PCR and studied with gel electrophoresis. The samples were sent to the Rhode Island Genomics and Sequencing Center at URI for further sequencing using the Illumina MiSeq System. Samples so prepared are currently under analysis. DNA yields were 3.77 $\mu\text{g}/\text{mL}$ from the raw sample, 9.13 $\mu\text{g}/\text{mL}$ after 4 days, 148 $\mu\text{g}/\text{mL}$ after 10 days, 137 $\mu\text{g}/\text{mL}$ after 15 days, and 112 $\mu\text{g}/\text{mL}$ after 30 days. For the liquid samples, the raw effluent filtrate had 15.6 $\mu\text{g}/\text{mL}$ of DNA, the SOLDIS treated filtrate had 6.58 $\mu\text{g}/\text{mL}$, and the SSF processed filtrate had negligible DNA. Continued analysis will characterize the microbial community responsible for decomposing waste.

103-UPSTREAM ACOUSTIC PARTICLE FILTRATION FOR AN AEROSPACE APPLICATION

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The main problem being assessed in this senior design project is that when sand and dust particles get sucked into a gas turbine engine during flight, severe damage is caused. This damage is apparent on the turbine blades, the compressor, and the overall efficiency of the gas turbine. Maintenance costs as a result of this damage are usually very heavy. There are many filters and designs that exist to fix this problem, but most of these solutions are only efficient for larger sized particles. Particles that have sizes less than $10\mu\text{m}$ pass right through pre-existing filters and proceed to still cause damage.

It is believed that acoustics may provide a solution for filtering out particles that are less than $10\mu\text{m}$. Since this project is directly related to an aerospace application, the main objective of this project is to conduct a feasibility study for the agglomeration of particles that are traveling above 200 ft/s and are less than $10\mu\text{m}$. If the feasibility study proves that agglomeration is possible at these speeds and particle size, then it can be used in conjunction with pre-existing filters in order to achieve a much higher filter efficiency.

An experimental setup is currently in progress, and it is hopeful that testing will begin within the next week. The experiment will utilize acoustic standing wave theory, and fluids theory in order to produce an efficient testing apparatus. FloDesign Inc. is sponsoring this project and the work that is being done is in conjunction with their experience.

104-ENHANCEMENTS OF THE GSAP MICROFLUSH VALVE

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GSAP Microflush toilets work as affordable, off-grid, and sustainable toilet units in areas of third world countries that are lacking effective toilet facilities, and they are currently deployed in 17 countries. The toilet valve is an integral part of the toilet that both isolates waste from human space and directly releases the waste to the filter digester bed. Our enhancements efforts are aimed at reducing costs, making local fabrication easier, reducing the MTBF and improving the flexibility for use with both sit-down and squat fixtures and for enabling auto or manual flush modes. The first version of the valve had a MTBF of about 25,000 uses. Constructed with new materials, the improved valve successfully functioned for over 105,000 on a testing apparatus designed specifically for these valves. Improvements on the toilet valve now focus on improving the ergonomics of the toilet. Results will be presented for valves fitting both sit-down and squat fixtures that can function either automatically or manually using either internal counterweights, external counterweights, or a combination of both.

105-DESIGN AND FABRICATION OF A LOW-FLOW NEBULIZER DEVICE

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The Human Powered Nebulizer (HPN) Project team constructed a hand-crank, electricity-free air compressor to be used with a jet nebulizer device. Jet nebulizers are used with an air compressor to convert liquid medication to an inhalable aerosol, but currently available device designs, operating at about seven litres per minute of air, require too much human effort to make the HPN easy to use. Dr. Lars Olson of the HPN Project at Marquette University requested a new, low-flow nebulizer design to be created over the course of a year. Research has been completed to gain familiarity with the characteristics of modern nebulizer designs, and to characterize their flow paths to establish a platform for new nebulizer designs. Three existing jet nebulizer devices were purchased and solid models created of them using SolidWorks. COMSOL Multiphysics was used to analyze CFD simulations of these nebulizers, the results of which showed the extreme velocities and high reflux rates in the jet-nozzle-and-impactor-plate nebulizer devices. It was found that their low medication delivery efficiencies, high required air velocities and wide particle distribution make impactor-plate nebulizer devices impractical for use with the HPN. Current and future work focuses on utilization of a pneumatic rotary atomizer design to generate a monodisperse aerosol at a volume flow rate maximized at four litres per minute.

106-SLOW SAND FILTER WITH BIOCHAR FILTER

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The Slow Sand Filter is an easy method of water purification used to eliminate pathogens from contaminated fluids. It has been used with the Microflush toilet to build the first completely closed toilet in the world. We had constructed two models of slow sand filters and studied their efficacy in killing bacterium. A recent paper dealing with stormwater has identified that the use of (5%) biochar in a SSF can increase the bacteria kill rate by a factor of 100. In this research project we continued studying the model's efficacy but also design and construct multiple filters testing the efficiency of the addition of biochar to the filter. We tested the efficacy of biochar enhanced SSFs, against a control, for 3%, 5%, and 10% biochar homogenously mixed with sand in a reduced scale of 4 inch diameter system. We also tested the effects of the spacial distribution in a 5% Biochar SSF, comparing 3 stratified systems (top-middle-and bottom-layered) against the homogeneous system. We used biochar produced from coconut shells because it is easily accessible in Ghana. Biochar is used in filters to help with the removal of bacteria and fecal indicating bacterium. The significance of the next model is the use of low-cost, readily available, and sustainable materials.

107-IMPACT OF PHARMACEUTICALS ININ THE HUDSON RIVER ON THE HISTOPATHOLOGY AND BEHAVIOR OF THE CRAYFISH *ORCONECTES IMMUNIS*

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The global presence of pharmaceuticals in the natural environment is of increasing concern. The New York State Department of Environmental Conservation (NYSDEC) lacks monitoring, regulation regarding discharge, and standard levels for these chemicals. This study investigated the effects of fluoxetine, triclosan, and amphetamines, substances commonly used in Pharmaceuticals and Personal Care Products (PPCPs), on the pathology and behavior of the Hudson River crayfish *Orconectes immunis*. Experimental concentrations of the chemicals were calculated based on known ambient environmental levels. The following experimental concentrations were established and used in a controlled laboratory set-up: 2.0 and 200.0 ng/L of amphetamine, 0.05 and 5.0 µg/L of fluoxetine, and 2.3 and 230.0 µg/L of triclosan. In addition, three controls included flow-through tanks, filtered Hudson River water tanks, and cages submerged directly in the Hudson River at the Marist College Cornell Boathouse River Laboratory. On alternate days, behavioral observations and water chemistry measurements were conducted. After 14 days of exposure, the crayfish were harvested and histological slides of the brain, liver, exoskeleton, gills, and muscle were prepared and analyzed for pathological changes. Results demonstrated increased aggression in triclosan groups and less responsive behavior in fluoxetine groups. Histological analysis displayed alterations to tissue structure in higher concentrations, including hyper-vacuolization in hepatocyte structures, hypertrophy in gill structures, and eosinophilic inclusion bodies in brain structures. Further investigation of how PPCPs affect the Hudson River is necessary to understand the threat these chemicals pose to aquatic ecosystems and human populations that rely upon the river as a water resource.

108-USE OF MOLECULARLY IMRINTED POLYMER TO IMPROVE THE ANALYSIS OF NAPROXEN IN ENVIRONMENTAL WATER SAMPLES

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Pharmaceuticals are continually released into the environment. Because of their physical and chemical properties, they can accumulate in sediments, sludge, and soils, inducing adverse effects in terrestrial organisms. However, due to the very limited methods permitting the detection of these low-level concentration compounds in such complex matrices, their concentrations in environmental samples remain largely unknown. Among these pharmaceuticals are NSAIDs or nonsteroidal anti-inflammatory drugs, a class of drugs that provides antipyretic (fever reducing), analgesic (pain-killing) and anti-inflammatory effects. In this study, naproxen, an over the counter NSAIDs, has been used as the target analyte in the development of sampling pretreatment method using commercially available molecularly imprinted polymer (MIP). The naproxen in environmental water samples was extracted using MIP and then analyzed using high performance liquid chromatography (HPLC). Using the same source of samples, the use of MIP improved the analysis as higher amount of naproxen was found in comparison to the analysis made use of Oasis HLB, which is presently used in the analysis of naproxen. A shorter extraction time was also observed.

109-EVALUATION OF BACTERIAL REDOX STRESS AS A MARKER FOR THE CELLULAR CONSEQUENCES OF PCB CONTAMINATION IN THE HUDSON RIVER IN NEW YORK

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From the years 1947 to 1977, two General Electric plants dumped approximately 1.3 million gallons of PCBs into the Hudson River. Consequently, the river is one of the largest EPA superfund sites. Water samples from around the original dumping sites have been selected to determine the impact the contamination may have on the bacteria present at the different sites. Each site was selected based on its proximity to the original sites and its dredging status by the EPA. Dredging is the process by which large amounts of sediment are removed from the bottom of a body of water. Sites were chosen for almost every round of dredging, as well as sites that were not dredged. These sites include Hudson falls, Fort Edward, Troy Dam, Roaring Brook, Albany, Thomson, Snook Kill, Thompson Island Dam, Saratoga National Park, and Lock 3. Water samples have already been collected from Beacon and Williamsburg (both undredged sites). Using a Biolog III bacterial identification system, the bacterial diversity will be evaluated from the samples at each site. Selected bacteria will be used in an NAD/NADH-Glo™ Assay to determine the ratio of NAD to NADH present in the cytoplasm. NAD levels were selected as there have been studies linking PCB exposure to redox stress in fish. It is expected that the bacteria will accumulate more NAD, suggesting that the bacterial cytoplasm has experienced a reductive shift. The results from this study could identify some long-lasting consequences that PCB contamination has on redox stress in living organisms.

110-PROVIDENCE COLLEGE S-LAB: HEALTH PORTAL

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Through observation and research gathered in Ghana, Providence College and University of Ghana students have partnered with Providence College's S-lab in developing an off-line health portal that will provide medical information for citizens and community health volunteers. Medical instrumentation will complement the portal, and the entire system will be deployed on a tablet for use in the field. The system will be designed to support community health workers as they work with community members, identify their needs, offer certain interventions, and provide education in hygiene, as well as physical and mental health for the community. The portal will also include a system for documenting patient's information to create a medical history. This Health Portal and associated instrumentation intends to assist nurses and health care workers with their treatment of patients in rural areas where internet access and medical professionals are not widely available.

Currently, health care and related functions often rest with district volunteer nurses who possess minimal training beyond high school. The S-Lab's Health Portal would provide these nurses with instrumentation, a medical records application, and medical information that would otherwise be inaccessible while evaluating patients in rural settings. The development of the Health Portal would lead to an increase in preventative care, timely diagnoses, proper plans of treatment, and the overall knowledge of healthcare workers. Additionally, through a growing collection of educational resources, the Health Portal's accessibility for the average Ghanaian would give citizens otherwise unattainable knowledge and help them prevent the contraction and spread of certain illnesses.

111-EFFECT OF *RHODIOLA ROSEA* TREATMENT ON OVARIAN CANCER CELLS

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Numerous, previous studies have shown *Rhodiola crenulata* has anti-proliferative effects in invasive breast cancer cells. The purpose of this study was to investigate the effects of *Rhodiola rosea* on other gynecological cancer cell types specifically, ovarian cancer cells. Cells were exposed exposure on cell adhesion. The effect of Rhodiola treatment on cell proliferation rate was investigated by MTT assay. Adhesion assays were performed with blocking antibodies to determine the role of beta 1 integrin in regulating adhesion in treated SKOV-3 cells. SKOV-3 cells treated with Rhodiola exhibited increased cellular adhesion without increased cell proliferation. These results demonstrate *Rhodiola rosea* may have potential efficacy as supplement to traditional therapies in the treatment of ovarian cancer.

112-SOLID DISPERSIONS – A SMART FORMULATION STRATEGY FOR ENHANCING SOLUBILITY OF POORLY WATER SOLUBLE DRUGS.

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Poorly water – soluble drugs, such as atenolol, can be difficult to dissolve quickly in the gastrointestinal tract of the body. One way to improve the solubility of the drug is the addition of excipients, and create a solid dispersion. Solid dispersion enables the manipulation of the drug's water solubility which can lead to enhanced absorption in the body. A number of different formulations will be presented which determine the best combination of excipients and surfactants added to the drug. Solid dispersions of the drug were characterized using sophisticated techniques e.g. High Performance Liquid Chromatography (HPLC), Differential Scanning Calorimetry, and USP dissolution apparatus. Atenolol tablets were prepared from the solid dispersion formulations. Results indicated increased solubility and dissolution of atenolol using solid dispersions formulations which helps the audience understand the very difficult but critical issue in the dosage form development of poorly water soluble drugs.

113- FORMULATION, CHARACTERIZATION AND EX-VIVO BIOCOMPATIBILITY EVALUATION OF ANTIOXIDANT THYMOQUINONE AND CATALASE IN ALBUMIN-CHITOSAN MICROPARTICLES

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Purpose: To determine if Thymoquinone and Catalase in albumin-chitosan microparticles inhibit changes in the overall choroidal neovascularization of humanized retinal epithelial cells (ARPE-19). Thymoquinone and Catalase in albumin-chitosan microparticles were formulated for ocular administration to antagonize the effects of reactive oxygenated species (ROS) such as hydrogen peroxide (H₂O₂) in wet Age-related macular degeneration. The aim was to increase effective half-life of catalase and take advantage of the phagocytic uptake of the encapsulated both catalase and thymoquinone by the retina pigment epithelium. Both the Thymoquinone and Catalase microparticles were prepared by spray-drying. The microparticles were evaluated for particle size, and zeta-potential by zeta-sizer. Chemical stability, thermal stability were evaluated by Differential Scanning Calorimetry. Ex-vivo microparticle uptake and in-vitro toxicity studies were performed using retinal pigmented epithelial cells (ARPE-19). The microspheres had a mean particle size of 4.7 - 2 μm, optimal for phagocytic uptake, as demonstrated by Makino et al. **Methods:** By microencapsulating catalase and thymoquinone in an albumin-chitosan matrix, this project took advantage of the cell surface-mediated endocytotic uptake mechanism of retinal pigment epithelial cells to enhance intracellular uptake, while enhancing the stability of the encapsulated catalase and thymoquinone. **Results:** The microparticle uptake and toxicity studies into ARPE-19 demonstrated time and dose-dependent uptake of catalase microparticles and thymoquinone microparticles by retinal pigment epithelial cells and no toxicity to the ARPE-19 cells **Conclusion:** Microencapsulation of thymoquinone catalase and provided for an effective delivery system via endocytosis into the retinal pigmented epithelium overcoming some of the limitations to its ocular therapeutic use.

114-EFFECTS OF A HIGH FAT DIET ON METABOLISM AND WORKING MEMORY IN RATS

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Studies have shown a marked decline in cognitive functions, such as memory, as humans and animals age. Other factors, including obesity and dietary deficiencies, have also been demonstrated to play a role in memory impairment. The current study evaluated the effects that a control diet and a high fat diet had on metabolic parameters of female Long-Evans rats. In addition, working memory deficits were quantified using a T-maze. Statistical analyses were performed for both groups on mean: body weight, caloric intake, water intake, blood glucose levels, adiposity, and correct choices on the maze. There were marked increases in body weight, caloric intake, and adiposity in the high fat group. Furthermore, working memory was significantly impaired in the high fat group, which was characterized by a 60% decrease in retention. This study provides evidence that an increase in fat content in the daily diet not only affects body weight, but also has widespread effects on adiposity deposition, and a negative effect on cognition, specifically on the memory of the rat. Continued efforts to reduce fat content in the daily diet are warranted in order to maintain a sound working memory and balanced metabolism in humans.

115-BLOCKING CANNABINOID (CB₁) RECEPTORS IN THE BASOLATERAL AMYGDALA IMPAIRS THE LEARNING OF SAFETY SIGNALS

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Learning environmental cues that predict harmful and safe situations is an important evolutionary skill. Fear and safety associated stimuli are acquired through Pavlovian conditioning, where the fear cues become conditioned excitatory stimuli (CS+) and safety signals become conditioned inhibitory stimuli (CS-). The importance of the amygdala in the acquisition and expression of fear behavior is well established and there is evidence that the endocannabinoid system is required for the extinction of fear responses. This study examined the role of cannabinoid receptors (CB₁) located in the amygdala in safety signal learning. A Pavlovian inhibitory conditioning paradigm (AX+/BX-) was used to establish safety signals in rats. Prior to training, subjects received microinjections of SR141716A, a CB₁ receptor antagonist, into the amygdala. Results suggest that antagonizing CB₁ receptors in the amygdala attenuates safety signal learning in rats, demonstrating the importance of cannabinoid receptors in the amygdala in safety signal learning.

116-STRESS-INDUCED REINSTATEMENT OF MORPHINE-CPP IS ATTENUATED BY NOR-BNI IN FEMALE BUT NOT MALE RATS

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Over 71% of individuals relapse after extended treatment and abstinence of opiate addiction (Gossop et al, 1989). Redila and Chavkin (2008) showed that kappa opioid receptor (KOR) activation within the reward and stress pathways is required for stress-induced reinstatement of cocaine-conditioned place preference (CPP) in male rats. Others have suggested that the same pathways regulate reinstatement in opioid addiction and drug seeking behavior (Koob & LeMoal, 2001). This study examined whether Nor-BNI, a KOR antagonist, could prevent stress-induced reinstatement of morphine-CPP. Male and female rats underwent morphine-CPP training, extinction, and prior to an acute exposure to stress (a series of mild foot-shocks) a systemic injection of a vehicle or Nor-BNI. Results suggest that blocking KOR attenuated stress-induced reinstatement in females but not in males. Currently, the role of kappa opioid receptor, located in the BNST, is being examined for their role in reinstatement of morphine CPP.

117-OLFACTORY SENSORY NEURON REGENERATION IN AN ION CHANNEL KNOCKOUT MOUSE

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The olfactory epithelium is unique in that the sensory neurons regenerate throughout life. Methimazole is a hyperthyroid drug that with a single high dose causes the olfactory sensory neurons (OSNs) to slough off, resulting in massive regeneration. Although regeneration is affected by learning, odor exposure and aging, the role of activity dependent mechanisms in the regenerative process is unknown. The hyperpolarization-activated cyclic nucleotide-gated (HCN) channel contributes to the regulation of cell excitability. We tested the role of HCN channel activity in the regenerative process. We used mice deficient in one of the 4 HCN channel subunits, HCN1, to compare the regeneration of OSNs after methimazole injection to wildtype mice at various time points. We used hematoxylin and eosin stained olfactory epithelium sections to count the number of cells, an indicator of successful regeneration. Thus far our data suggest a less robust OSN regeneration in the HCN1 knockout mice. The most profound difference in regeneration between the HCN1 knockouts and wildtype was within the first two weeks post methimazole injection. At two weeks post injection, the knockout mice had less new cells than in the wildtype mice. At later time points the difference in the number of new cells between WT and HCN1^{-/-} mice is smaller, suggesting that HCN1^{-/-} mice eventually regenerate the epithelium similar to the WT mice. These data suggest that lack of HCN1 the subunit negatively impacts the regeneration of neurons in the olfactory epithelium and may have implications for adult neurogenesis elsewhere in the nervous system.

118-FITNESS CENTER MIRROR ANALYSIS

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Many individuals feel that the mirrors in their fitness centers are thinning and that this is done intentionally. This work investigates both claims: 1) are the mirrors “thinning,” and 2) is this done intentionally? Even flat mirrors have some curvature and can be curved cylindrically or spherically. The curvature affects the focal length, which in turn determines the magnification of the mirror. Spherical curvature will simply make the object look larger or smaller, while a cylindrically curved mirror will appear to alter volume. If the horizontal magnification is greater than the vertical magnification, the image will appear wider than the object that produced it. We developed a device and method to measure the average curvature of a mirror along the vertical and horizontal axes. The device employed a trio of calipers affixed to a straight edge. The measurements were taken at 5 Corners Fitness in Lynbrook, NY. Afterwards, for each mirror we found the ratio between the vertical and horizontal curvatures. Over 100 mirrors between 1 and 2 meters in height were analyzed. The data indicates a variety of curvatures: flat, spherical, and cylindrical of varying magnitudes. This distribution was distributed into five categories of magnification. Depending on the individual mirror, the image would be relatively thinner, relatively wider, or essentially unchanged from the object. This appears to be an artifact of installation and fabrication and not by intentional design.

119-NOVEL INTERFEROMETER TO MEASURE OPTICAL PATH LENGTH CHANGES IN THERMALLY LOADED MEDIA

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When a transparent material is thermally loaded, the change in optical path length (ΔOPL) is affected by both refractive index and length change. Conventional interferometry does not allow for the simultaneous measurement of both properties. This experiment consisted of building a system of two coupled interferometers to measure these variables simultaneously; a combination of a Michelson interferometer (MI) and a Mach-Zehnder (MZI) interferometer. The sample used for this experiment was air. In the test arm of the MZI a hollow copper pipe enclosed the air as it was heated from room temperature. As the copper pipe was heated, one end of the pipe was fixed so that it thermally expanded in only one direction. Simultaneously, the index of the air decreased as the temperature increased. Attached to the moveable end of the copper pipe is a mirror for the MI, forming the test leg of that device. As the sample was heated, the MI directly measures length change while the MZI measured total OPL change. From this data, the change in index can be determined. The data shows strong agreement with theoretical values, demonstrating the utility of this device for circumstances where length changes and index changes cannot be separately analyzed. All the length changes and ΔOPL percent differences are less than 1% from theoretical versus experimental data.

120-ANALYSIS OF THE DIGESTER SYSTEM AND PROCESSES OF A GSAP MICROFLUSH

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The project is aimed to study and improve the GSAP Microflush toilet. We focus on the toilet's filter digester, investigating the complex processes that take place within the digester. These processes include macro-organism enhanced aerobic digestion governed by a number of parameters including temperature, pH, oxygen, moisture and the C/N ratio of the deposited waste among other factors. The macro-organism we are focusing on is the e-fetida, a common earthworm. We are performing a long-term controlled study looking at the detailed efficacy of the process focusing on the aforementioned parameters. The measurement/control systems will operate from a LabVIEW program hosted on a PC. The programming and the user interfaces are graphical, enabled by LabVIEW 'S Dual Windows. Eventually we will construct 5 lab-bench scale filter digesters and monitor and control these parameters and continuous mass changes for each. In each digester 4 of the factors will be held constant while the 5th is varied so that we observe the overall effect. The long-term goal is to move from lab-scale digester and design a larger scale system that processes actual sledge and vegetable waste.

121-THAT'S CRAZY!: A CONTENT ANALYSIS OF MENTAL ILLNESS ON TELEVISION

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What do viewers learn about mental illnesses – including their characteristics, who suffers from them, and how they are treated – from watching television? Only a handful of studies have looked at this topic, and *Stout, Villegas* (2004) called for more research on the nature of such portrayals and their potential impact on the beliefs and attitudes of viewers. The current study uses a content analysis of 320 shows – including fiction (soap operas, dramas, crime/action, sitcoms, children's shows, and teen shows) and nonfiction (news, talk shows, and magazine shows) videotaped from 2012-2014 for the Center for Research on the Effects of Television (CRETV) archive. Coders analyzed each program for the presence of content related to mental illness or therapy, and the gender, age, and race/ethnicity of individuals identified as having a mental illness. Instances were also coded for the type of mental illness (e.g., addiction, suicide, depression, anxiety), whether any treatment occurred or was sought, whether the portrayal or reference to mental illness was in a positive, negative, or neutral context, and the reactions of others towards the mentally ill person. Results showed that the frequency of portrayals and references to mental illness varied by type of program, and consisted largely of jokes or off-hand references using euphemisms for mental and mental illness was rarely shown among children or teens, and while TV commercials for prescription medications for anxiety and depression are increasing, therapy and other forms of treatment are rarely shown.

122-VIOLENCE IS STILL COOL: A CONTENT ANALYSIS OF PHYSICAL VIOLENCE IN CHILDREN'S TV PROGRAMS (1994-2014)

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While there were many studies conducted during the 1980s and 1990s documenting the amount of physical violence on television and its impact on young viewers (Stipp & Milavsky, 1988; Bushman, 1995), less research has been conducted on the subject in the past decade. Most previous content analyses focused on the amount of violence (e.g., in children's shows vs. adult shows) and the way in which the violence was portrayed (e.g., glamorized, trivialized, sanitized). This study involves a descriptive content analysis of 120 television shows aimed at children, including humorous cartoons (like *Spongebob Squarepants*) and action shows (like *Power Rangers*); videotaped over a period of 20 years for the Center for Research on the Effects of Television (CRETV) archive. All programs were analyzed by 2 coders, working together, to describe: the nature of the violent act (instrumental vs. hostile), the demographics of the individuals involved (human vs. other, gender, age, race/ethnicity), the role of the characters involved (good guy vs. bad guy), and the consequence of the violence. While physical violence is rarely shown in prosocial or educational children's shows, the results showed that physical violence is still prevalent in humorous and action children's TV programs, is portrayed by good guys as often (or more) than by bad guys, and the consequences of the violent actions are still typically glamorized (success, congratulations), trivialized (laughter) or normalized (no reaction).

123-SEX IS NOT JUST IN THE CITY: HISTORICAL CHANGES IN SEXUAL CONTENT IN SITCOMS (1995-2015)

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While there have been many studies documenting the nature of *sexuality* (e.g., lewd and sexual behaviors) in the media (Ward, Reed, Trinh, & Foustand, 2014), some studies of its impact on young viewers (Fisher, Hill, Grube, Bersamin, Walker, & Gruber, 2009), there have been very few studies of the broader nature of *sexual content* (including jokes and sexual innuendos) in television programs and their potential impact on children, teens and emerging adults. The current study involves a descriptive content analysis of 150 half-hour situation comedies videotaped over a period of 20 years (in 1995, 2005, 2015) for the Center for Research on the Effects of Television (CRETV) archive. Sitcoms were chosen for analysis because of their broad appeal to children, teens and adults). Each program was analyzed to identify all portrayals of sex (e.g., implied and overt behaviors, innuendos, jokes, sexual references), references to or use of condoms or other birth control, the relationship between the individuals involved in the sexual behavior, and consequences of the sexual content (e.g., laughter, pregnancy, commitment to a relationship). Results showed a high frequency of sexual references and jokes (typically followed by laughter). When sexual activity was portrayed, it was typically by unmarried individuals with little planning and very rarely were there discussions of HIV prevention or birth control. The findings reflect a television world in which sexual content (like violent content) is typically shown as trivialized (humorous), glamorized (as fun), and trivialized (with no consequences).

124-THE CORRUPT SIDE OF CREATIVITY

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To be creative, it is often said, one must ‘think outside the box’ and use divergent thinking. Divergent thinking requires that people break some rules in order to make associations between previously unassociated cognitive elements. The creative process therefore involves rule breaking, as one must break rules to take advantage of existing opportunities or to create new ones. The purpose of this study is to explore whether individuals who are given the opportunity to cheat will then score higher on a test designed to measure creativity. Participants will be assigned to a likely-cheating condition or a control condition. In the likely-cheating condition, participants complete a computer-based arithmetic game. Participants are told the game has a programming glitch which causes the correct answers to appear unless they prevent them from being displayed by clicking in a certain place on the screen. Participants are told that although no one will be able to tell whether they clicked, they should try to solve the problems on their own honestly. In actuality, the number of clicks will be recorded as a measure of cheating. After the computer task, the Remote Associations Test will be administered as a measure of creativity, as well as the Big 5 personality inventory test. A comparison of creativity scores between the two conditions will be used to test the hypothesis that the act of cheating increases creativity.

125-RECOGNITION MEMORY DIFFERENCES ON RESPONSE BIAS ARE INFLUENCED BY AROUSAL AND CONTENT CONTROL

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This study is designed to explore the influence of arousal and content categorization on immediate long-term (retention interval of ten minutes) recognition memory differences between emotional and neutral pictures. Arousal (low, high) and content categorization (categorized, uncategorized) were systematically manipulated across the four experiments presented. We hypothesize a main effect of emotion with emotional pictures associated with a liberal response bias that does not co-occur with a memory accuracy enhancement, and a significant interaction between emotion and experiment. We hypothesize that low arousing emotional images will be associated with a more liberal emotional response bias than high arousing images, and that categorization will influence the emotional response bias in the low arousing experiments but not the high arousing experiments. Such results would complement prior findings supporting a mediating influence of semantic interrelatedness and/or categorical membership on bias differences between emotional and neutral words. Additionally, they would suggest that the influence of categorization is limited when it is in competition with more automatic, arousal-driven influences on memory.

126-LACK OF DELETERIOUS SIDE EFFECTS IN NALTREXONE-TREATED RATS

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In the United States, the increased prevalence of palliative care and pain management is a relatively new phenomenon. Consequently, opiate prescriptions have increased and new abuse pharmacotherapies, such as naltrexone treatment, have emerged. This experiment tested the effect of naltrexone, an opiate antagonist, on anxiety, body weight, food intake, and water intake, in female Long-Evans rats in order to specify potential side effects of the drug. Twelve rats were divided into two groups (n=6), control and naltrexone-treated. All animals received food and water ad libitum. Following a one week habituation period, a four week experimental period ensued in which six animals were administered naltrexone in condensed milk and six animals were given water in the condensed milk. The rats were tested for anxious behavior at the end of every week employing an elevated plus maze apparatus. Time spent in the open and closed arms was utilized for assessment of anxiety. Results indicated that there were no significant effects on anxiety, body weight, or food intake. A significant difference in water consumption was observed between the control and naltrexone-treated group suggesting that naltrexone induces polydipsia. Findings of this study may be of clinical significance in regard to the use of naltrexone for palliative care, pain management, and opiate abuse therapy in humans.

127-RACIAL PREFERENCE AND SELF-IDENTIFICATION IN LATINO CHILDREN

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A large body of research has investigated racial bias and self-identification of African American children, however the field is considerably underdeveloped as it pertains to children of Latino/Hispanic descent. As a contribution to the field, the current pilot study experimentally investigated the effect of language on racial preference, self-identification, and general racial identification in Latino children. Specifically, the researcher examined whether children would respond to the measures differently if interviewed in English or Spanish. Children were presented with nearly identical cartoons, differing only in skin tone, hair color, and eye color. Preliminary data suggest the children slightly prefer the lighter-skinned variation, particularly boys. Thus far, it appears language may impact self-identification, as two-thirds of children randomly assigned to the English-speaking condition identified with the light-skinned cartoon. Additional interviews will clarify preliminary results.

128-EMPLOYEES PERCEIVED VALUE OF WORK-LIFE PROGRAMS: THE ROLE OF GENDER

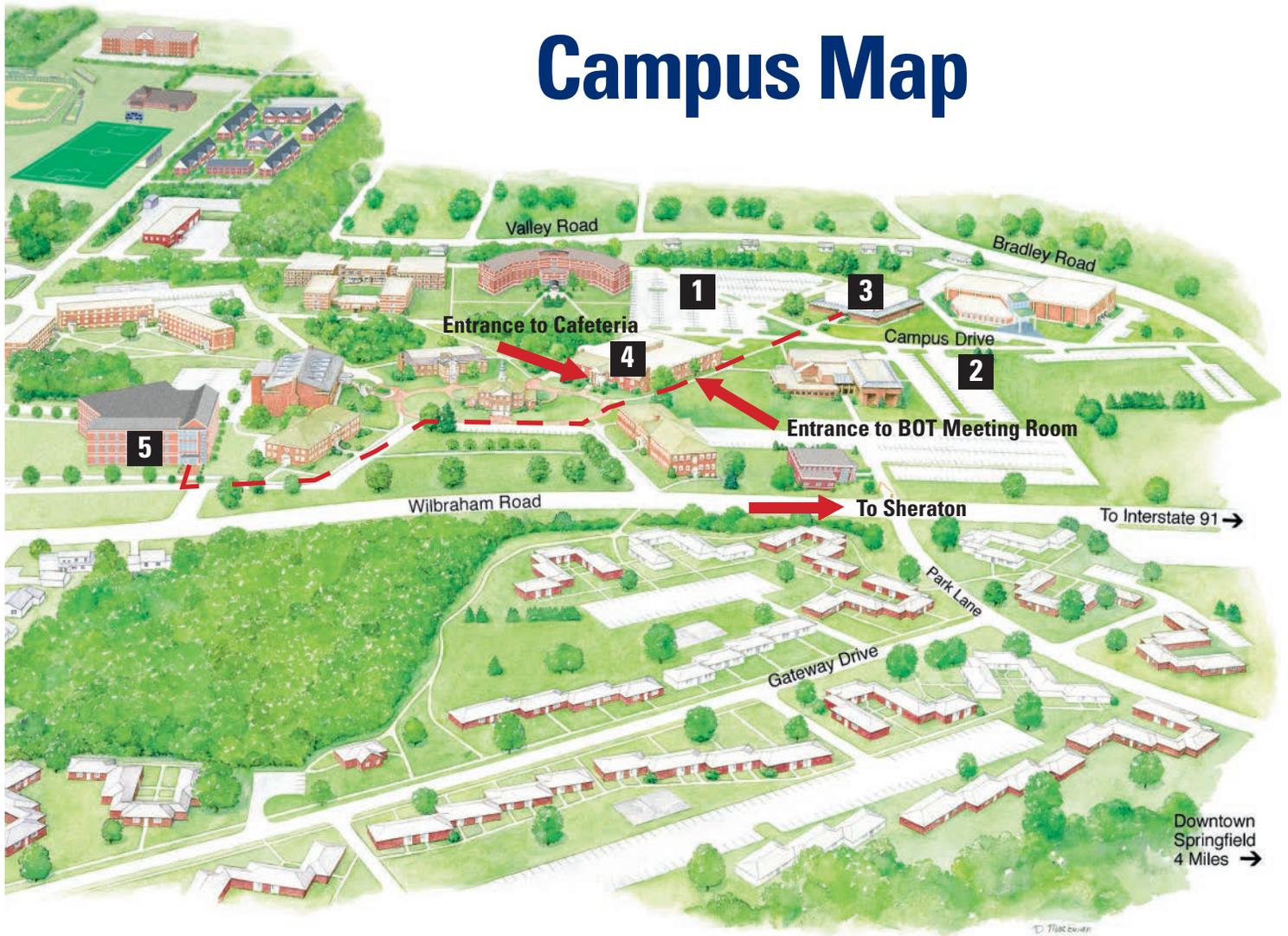
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As work-life balance has become an increasingly important issue in today's workplace, organizations have developed a variety of programs to assist employees in managing stress. This study looked at 14 work-life programs that companies typically offer, and analyzed data from 275 working adults from a variety of occupations. The goal of the present study was two-fold. First, we aimed to determine what value employees generally place on family-friendly organizational practices and policies. And second, we investigated the role gender plays in this valuation. Findings indicated that the programs and policies most helpful for employees are flexible schedules and leave options, the latter of which is particularly helpful to women.

Campus Map



1. Parking

2. Additional Parking

3. Rivers Memorial Hall

4. St. Germain Campus Center

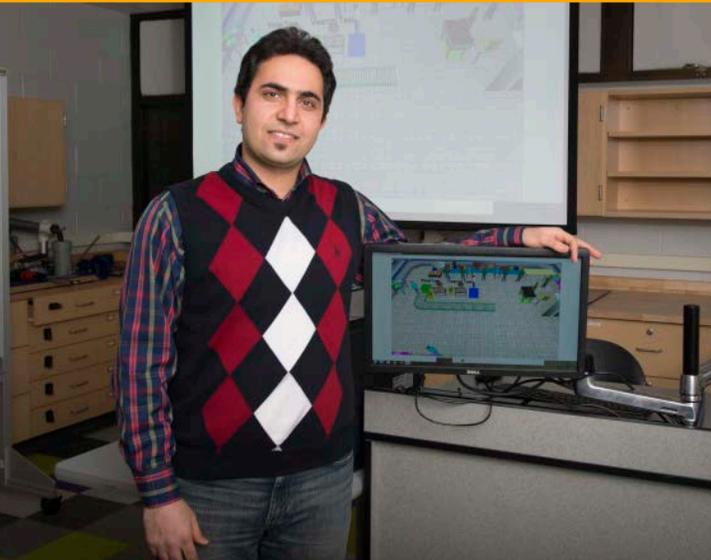
5. Center for the Sciences and Pharmacy



Breaking New Ground in Science and Technology Through Graduate and Advanced Study

College of Arts and Sciences

One of just 20 programs of its kind worldwide, the accredited PhD in Behavior Analysis program is ranked 3rd for Top Publishing in Behavior Analysis by the Association for Behavior Analysis International (ABAI). PhD candidates work with children and families in their research on the Autism Spectrum, ADHD, sleep interference, and other disorders. In a unique partnership with the renowned New England Center for Children, the PhD and Master of Applied Behavior Analysis the program is available to NECC faculty on the Center's own campus.



College of Engineering

Western New England University College of Engineering offers a variety of programs at the MS and PhD levels to domestic and international students. The PhD in Engineering Management lets students pursue research in such areas as Supply Chain Management to prepare for advanced opportunities in industry and academia. Students looking to advance into leadership roles in technology may choose the Master of Science in Engineering Management. Both the Master of Science in Electrical Engineering and the Master of Science in Mechanical Engineering offer opportunities for students to advance their technical knowledge of the field. Certificate programs provide opportunities for advanced study in Green and Yellow Belt Certification, as well as Risk Analysis and Supply Chain Engineering. Combined engineering master's degrees are offered in Business Administration (MBA) and Law (JD).



College of Pharmacy

The College of Pharmacy program prepares learners to enter the practice of pharmacy as general practitioners in a variety of practice settings and deliver optimal patient care to diverse populations. The primary intention of this educational experience is to transition dependent learners into independent professional practitioners dedicated to serving the community in which they live. The College of Pharmacy collaborates with the College of Arts and Sciences and the College of Engineering on a variety of research and scholarly initiatives as well as with the College of Business on two dual degree options; an MBA or MS in Organizational Leadership.

For more information, contact Matthew Fox, Director of Graduate Admissions, at 413-782-1517 or email study@wne.edu.

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